FE1 over Gigabit Ethernet Multiplexer

MODEL: BD-FE1-IP-G BD-2FE1-IP-G BD-4FE1-IP-G

User Manual

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Preface

Version Description

Manual version: V1.0

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Brief Introduction

This User Manual describes the installation and operation of E1 communications conversion 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.

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Chapter 1 Introduction

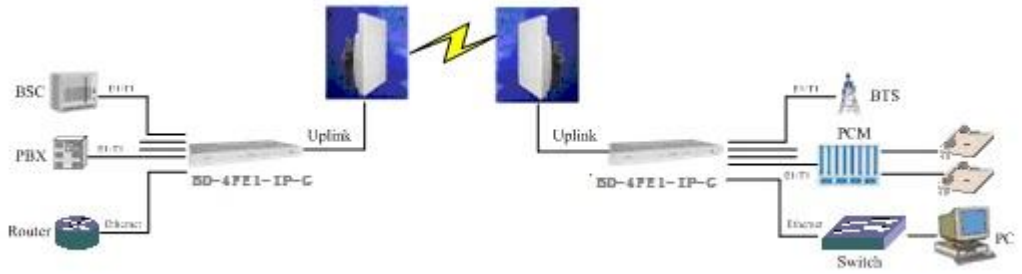
1.1 overview

The FE1 over GE Multiplexer Series Gateway ensure the circuit emulation traffic priority. Restructuring any slot group of each E1 interface with built-in time slot allocation circuit-TSA, providing Channel associated signal processing capability. Having the performance of high transmission efficiency, low transmission delay, high precision clock recovery.

Support 1-4 E1 interface and IP internet transmission of 4 1000M Ethernet interface .

1.2 Applications

FE1 over GE series devices can establish 1-4 E1 transparent channels over Ethernet or IP network for the provision of voice, images and other real-time business, Typical applications as shown in figure.



In the Figure above, FE1 over GE provide 1~4 channels of E1 over Ethernet to connect the base station controller, the PSTN access network equipment and other E1 terminal equipment. The two routers at two sides can share local Ethernet data by any Ethernet port of FE1 over GE. The internal QoS mechanisms of FE1 over GE can ensure the priority of E1 signal.

1.3 Features

- Up to 4 independent E1 interface, E1 interface impedance support 75Ω and 120 Ω
- Support L2TPv3/IPv4, UDP/IPv4, Metro Ethernet (MEF-8) and MPLS (MFA-8) and other agreements
- E1 interface complies with G.703, G.704 standard
- Support two 1000 Mbps Ethernet optical interface
- Configure via CLI/Web/SNMP(v1/v2c/v3)
- Support Tag VLAN (802.1q)
- Support software and firmware upgrade
- Support Ring Protection(recovery time<20ms) and 1+1 Protection
- Support NTP, SNMP, RSTP protocol
- Support TACACS+
- Support Qos setting
- Support for log management and configuration file import and export
- Support Web, Console, Telent, SNMP network management, remote monitoring and software upgrades, easy to operate and maintain

1.4 Technical Specifications

E1 Interface

- Number of E1 Ports: 4
- Interface Standard: G.703 G.704
- Line Impedance and Connector

  Impedance:120 Ω, balanced

  75Ω, unbalanced

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Connector Type: RJ-45

- Data Rate: 2.048 Mb/s±50ppm
- Line Code: HDB3
- Framing: unframed, framed, with or without CRC-4
- Jitter and Wander Performance:

  ITU-T G.823 (for internal, loopback and external clock modes)
- Number of differential Clock Input Interface: 1
- Point-to-point one-way additional processing delay (Minimum delay setting): ≤1.2ms
- Output frequency stability (adaptive timing, Stable): ≤ 50ppb
- Output Jitter (adaptive timing): ≤ 0.03UI

Ethernet Interface

- Number of Ports: 2-port UTP and 2-port SFP
- Interface Type: 10/100/1000M GE RJ45 ports and 1000M SFP optical ports
- Data Rate: 32Kbps~1000Mbps(Minimum setting unit is 32Kbps)
- Protection: 1+1 Protection, Ring Protection (recovery time < 20 msec)
- Max Frame Size: 9Kb
- Protocol: IPV4，IPV6 (Planning)，MPLS，MEF，UDP
- Standard

  IEEE 802.3 (10BASE-T)

  IEEE 802.3u (100BASE-T)

  IEEE 802.3z (1000BASE-X)

  IEEE 802.3ab (1000BASE-T)

  IEEE 802.1ad (Q in Q)

  IEEE 802.3ad (Link Aggregation) (Planning)

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IEEE 802.3x (Flow Control)

IEEE 802.1p (COS priority)

IEEE 802.1Q (Virtual LAN)

- Magnetic Isolation Protection: 1.5 KV built-in

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- Compliance

  IETF: RFC4623 (PWE3), RFC4553 (SAToP), RFC5086 (CESoPSN),

  ITU-T: Y.1413 and Y1453

  MFA: IA 8.0.0

  MEF: 8
- Number of PW Connections: 128
- Timing

  Internal (from internal oscillator) (optional)

  External (E1 via dedicated port) (optional)

  Loopback (derived from the E1/T1 receive line)

  Adaptive (regenerated from Ethernet link)
- Adaptive Clock accuracy: ±10 ppb
- Jitter Buffer Size: 1 to 256 msec

Internal Bridge

- Number of VLANs: 1-4094 with 16 VLAN support
- Compliance: 802.1Q
- LAN Table: Up to 2K MAC addresses
- L2CP handling: transparent and Termination
- QoS Priority Queues: 4
- Port-Based VLAN: Untagged, tagged, unmodified

Management

- Console Port:

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Interface standard: RS-232

Connector: RJ-45

Baud rate: 115.2kbps

- SNMP: SNMP (v1/v2), SNMPv3 (Planning)
- Support: telnet, web, SYSLOG, Activity logging (user activities), TACACS+, SNTP
- Out-of-Band Ethernet Management: Any one of the User Ethernet port should be configured as an out of band management port.

Power Requirements

- AC/DC dual power supply Adaptive input
- AC: 100V~240V/50Hz
- DC: -36V ~ -72V
- Power Consumption: ≤6W

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Chapter 2 Operation

This chapter:

- Explains how to power FE1 over GE up and down.
- Describes the device's panel
- Provides a detailed description of the front panel controls and indicators and their functions.

2.1 Turning on the Unit

➢ To turn on the unit:

- Connect the power cord to the mains.

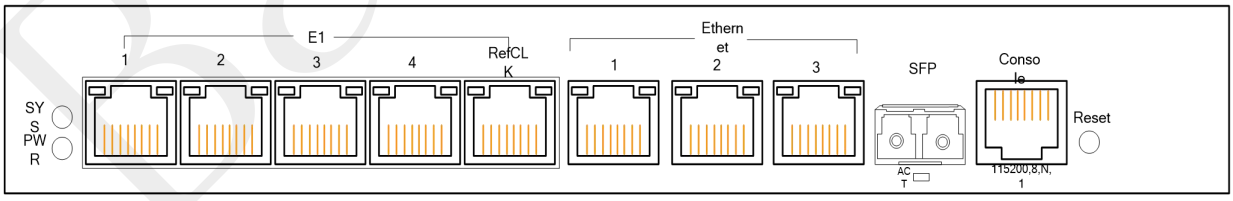
The PWR indicator turns on and remains on as long as FE1 over GE receives power.

Once installed, FE1 over GE requires no operator attention, except for occasionally monitoring the front panel indicators. Intervention is only required when the unit must be configured to its operational requirements, or when diagnostic tests are performed.

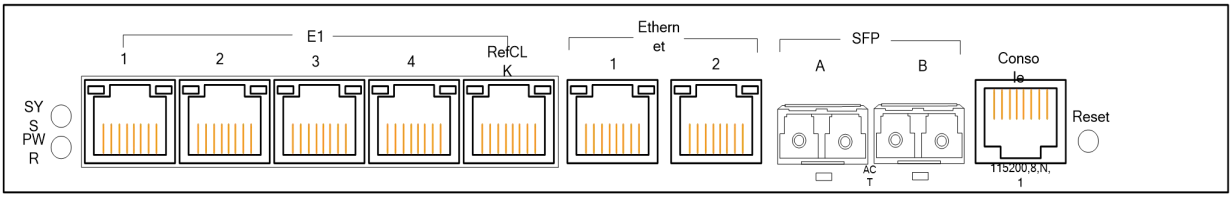
2.2 Device's Panel

Figure 3-1 lists the front panel of different specifications

Figure 2-1 4FE1 over GE Device Front Panel Picture



BD-4FE1-IP-G with 3GE+1FX



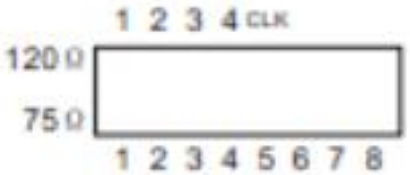
BD-4FE1-IP-G with 2GE+2FX

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Figure 2-2 FE1 over GE Device Rear Panel Diagram



Figure 2-3 dip the bottom



2.3 Indicators

The unit's LEDs are located on the front panel. Table 2-1 lists the functions of the LED indicators.

Table 2-1. LEDs and Controls

Name	Colors	Functions	Status	Description
SYS	YELLOW	System Operating Indication	Blinking	System is Working
			Off	System is Abnormal
PWR	GREEN	Power Indication	On	Unit is Powered
			Off	Unit is Off
E1 Indicator	RED	E1 LOS Indication	On	E1 No Signal, LOS Alarm
			Blinking	E1 LOF Alarm
			Off	E1 Normal
Ethernet Port LEDs	YELLOW	Ethernet Data Transceiver Indication	On	No Data Transceiving
			Blinking	Data Transceiving
			Off	Not Connected
	GREEN	Ethernet Speed Indication	On	1000Mbps Connect
			Off	10/100Mbps Connect

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ACT	RED	Optical port LEDs (No this function)	On	Connected
			Off	Not connected
			Blinking	Data Transceiving

E1 Interface

Support 4 E1 interface and a differential clock input, All are used with the red LED RJ45.

wired according to the following table

Table 2-2 E1 Connector Pinouts

Pin	1	2	3	4	5	6	7	8
Function	Tx+	Tx-	NC	Rx+	Rx-	NC	NC	NC

Table 2-3 Differential Clock Input Pinouts

Pin	1	2	3	4	5	6	7	8
Function	NC	NC	NC	CLK IN+	CLK IN+	NC	NC	NC

Ethernet Interface

Supports 2-port UTP + 2-port SFP.

Data rate: 1000Mbps.

Console Interface

The Console interface is an 8-pin RJ-45 connector, Support 115200bps baud rates, wired according to Table 2-4.

Table 2-4 Console Pinouts

Pin	1	2	3	4	5	6	7	8
Function	NC	NC	TXD	GND	GND	RXD	NC	NC

Dip the bottom

E1 and differential clock inputs Unbalanced (75Ω) and balance (120Ω) DIP, the default unbalanced impedance (120Ω).The DIP function definition as follow:

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DIP No.	1	2	3	4	5	6	7	8
Description	1-4 channel impedance setting				E1 reference CLK	Reserved		
75Ω	Setting 75Ω:E1 impedance 75Ω					DIP No.6/7/8 default:120Ω position		
120Ω	Setting 120Ω:E1 impedance 120Ω							

Reset

Restore to factory default setting by pressing 5 second

Power

The device supports two voltage, AC220V or DC-48V input. Allows power fluctuations in the range of 10%. Please note that there are positive and negative polarity DC input. DC-48V: POWER connect to the cathode, RETURN then negative.

2.4 Turning Off the Unit

- To turn off the unit:
  - Remove the power cord from the power source.

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Chapter 3 NMS Configuration

Operating condition:

PC operating systems: WINDOWS98/XP/Win 7

Network connection: 10/100/1000Base-TX Ethernet interface, the AUTO MDI / MDI-X. Internet Explorer 5.0 or later

Parameter settings:

IP address settings: PC IP address and subnet mask must be in the same segment with the device IP address and subnet mask, and must not be the same IP address.

The default value of FE1 over GE: IP address: 192.168.0.168 Subnet Mask: 255.255.255.0.

3.1 User Login

This product provides Web browser-based configuration interface, this configuration program is suitable for any MS Windows or UNIX platforms, browser, for example.

Enter "192.168.0.168" in the address bar, press Enter, you will see the login screen that below shows. Input user name and password in the login dialog box (the default factory settings are "admin"), select the language (in Chinese and English, and here only on the Chinese), click the submit button.

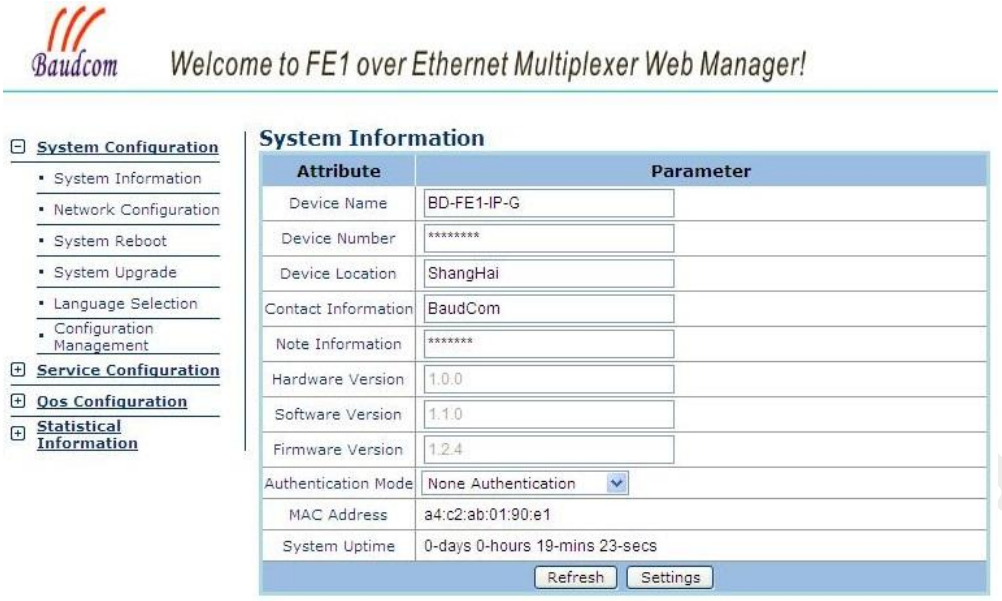
3.2 System Settings

3.2.1 System Information

This page setting device name, device ID, device address, contact information and certification mode selection;

Display hardware version, software version, firmware version, MAC address of the network management device, and other information equipment uptime.

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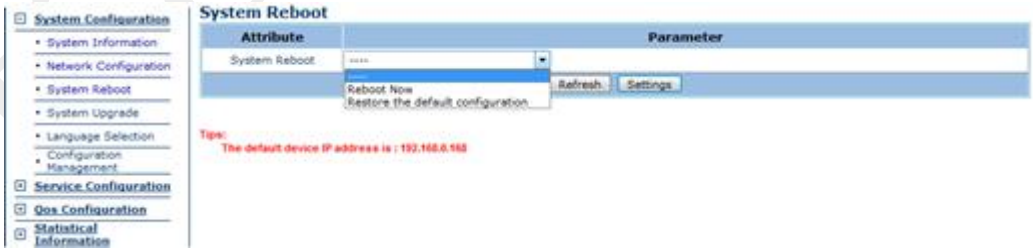
3.2.2 Network Configuration

This page can set the device network IP address, subnet mask, and default gateway, display network MAC.



3.2.3 System Reboot

This page can restart the device or restore the factory default configuration



3.2.4 System Upgrade

Software or firmware upgrade file, reboot the device after the upgrade is complete



Step1: Upload the upgrade file;

Step 2: Follow the prompts to choose to upgrade software or configuration files;

Software upgrade is completed automatically reboot.

The firmware upgrade is completed, please reboot manually.

3.2.5 Language Selection

Equipment web pages default English version of this page can be switched in the Chinese and English version.



3.3 Service Configuration

3.3.1 Simulation Gateway Configuration

Support four network protocol: IPv4/L2TPv3, IPv4/UDP, MEF, MPLS, supports point to point communication, the purpose of MAC, IP settings for the end purpose of the same type of equipment source MAC, source IP, subnet mask and gateway based on where the network to set up.

Note:

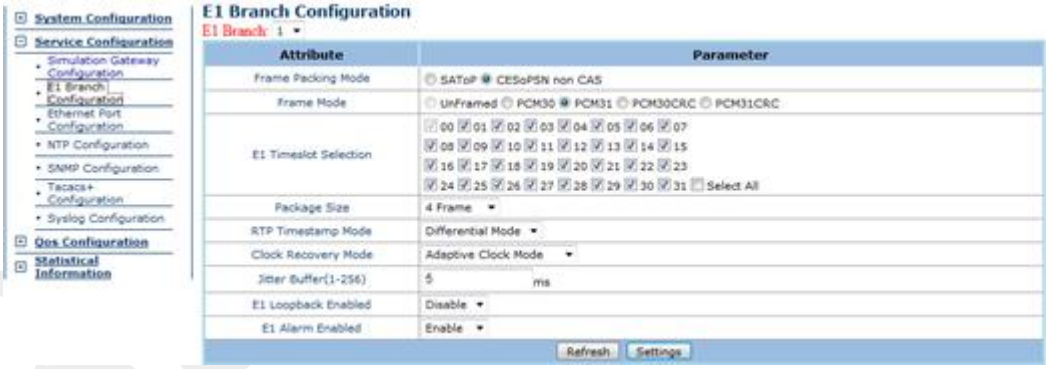
The device has two MAC and IP, one is used for network management, another for business transfer, gateway simulation parameters source MAC, source IP for business transfers



Tips:the local device's destination IP/MAC should set to the remote device's source IP/MAC

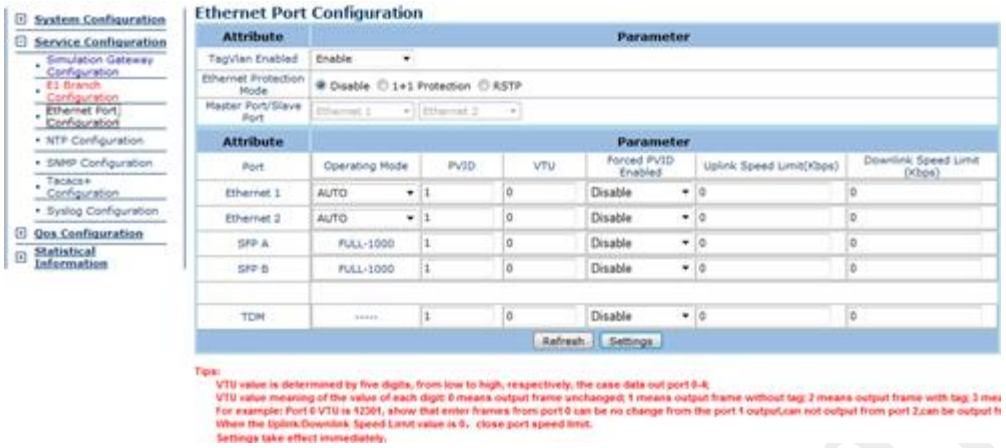
3.3.2 E1 Branch Configuration

Set E1 frame mode, E1 timeslot, frame size, RTP timestamp mode, the clock recovery mode, E1 line loopback function enabled and disabled, E1 alarm settings such as enable and disable.



3.3.3 Ethernet Port Configuration

Set Vlan enable and disable, 1+1 protection mode, RSTP enabled and disabled, and the port speed configuration Vlan table settings



Tips: under the 1+1 protection mode,master port should be connected to the other device's master port.

3.3.4 NTP Configuration

Network Time Protocol (NTP) to enable and disable, when NTP almighty you need to set the server IP and port number.



3.3.5 SNMP Configuration

Configure SNMP protocol parameters:

When the trap mode select V1 or V2 Mode, you need to set Set_key and Get_key;

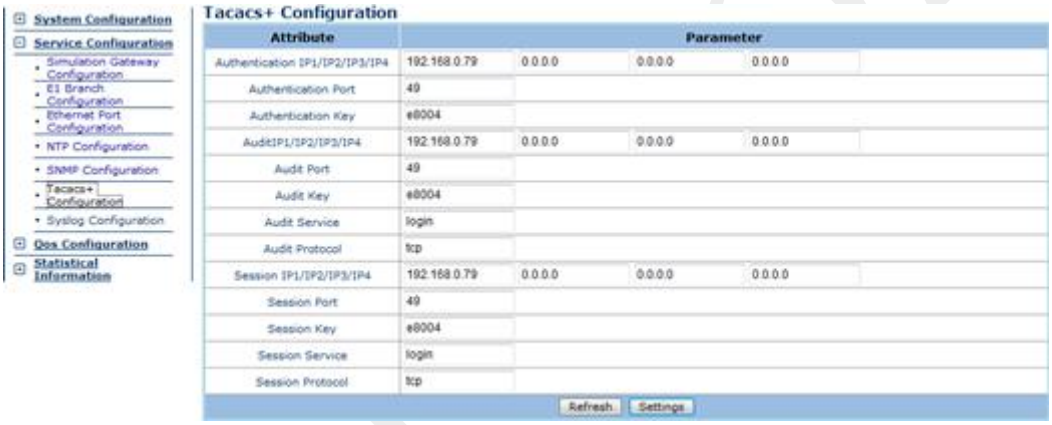
When the trap mode selection V3 Mode, you need to set Auto_proto and Poli_proto;

When the trap mode select All Mode, you need to set all parameters.



3.3.6 Tacacs+ Configuration

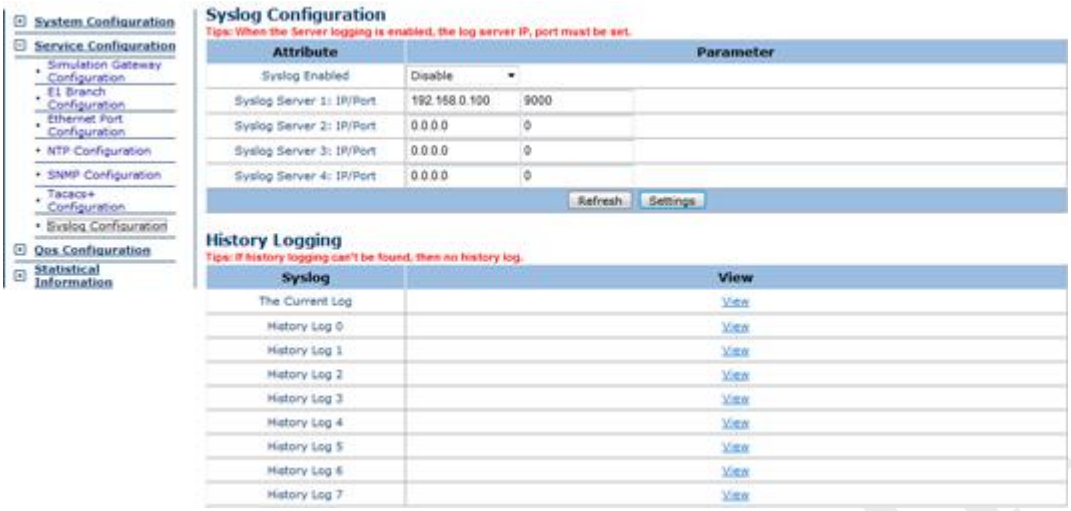
Tacacs + authentication protocol parameter settings, you need to set the authentication IP, audit IP, the session IP and other related parameters.



3.3.7 Syslog Configuration

Logging turned on and off, open the Local Logging, click View The Current Log in system logging.

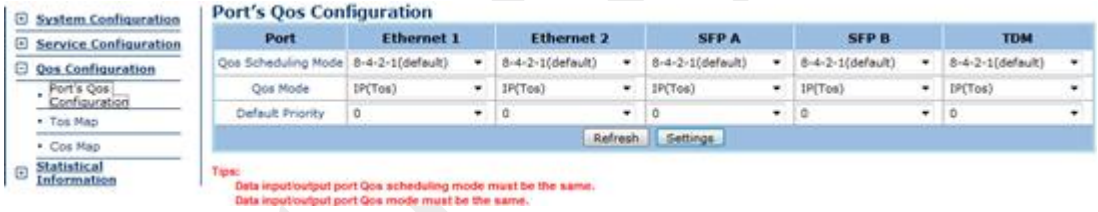
Open the Server Logging, you need to set the log server IP and port number.



3.4 QoS Configuration

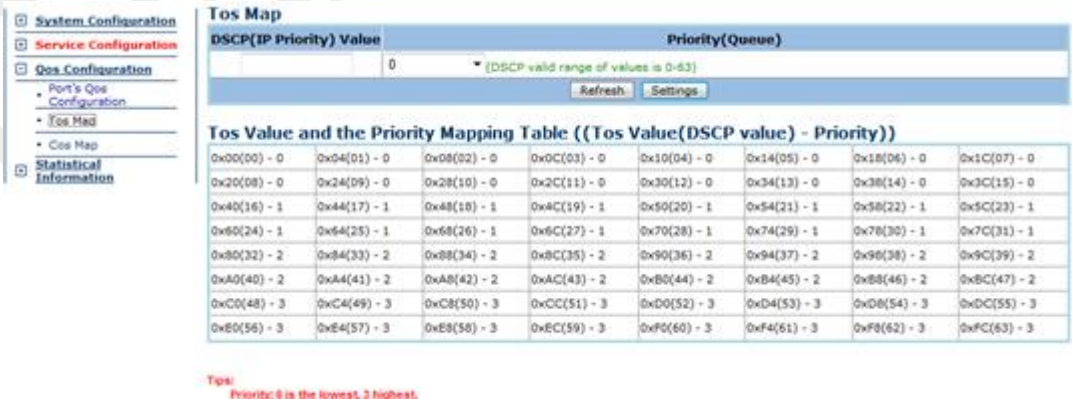
3.4.1 Port's QoS Configuration

Select the port Qos debug mode, Qos mode, the default priority setting, the system default port priority



3.4.2 Tos Map

Set Tos value and the priority mapping table.



3.4.3 Cos Map

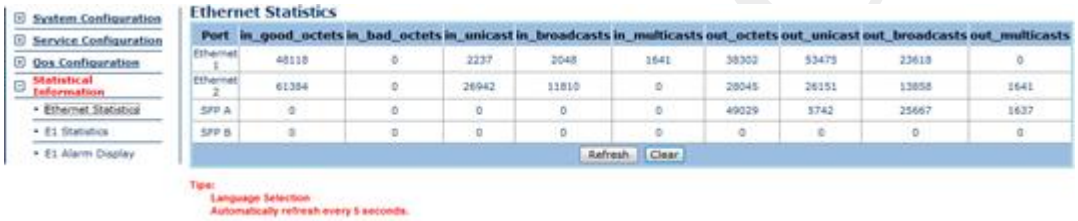
Set Cos value and the priority mapping table.



3.5 Statistical Information

3.5.1 Ethernet Statistics

Display Ethernet port statistics information.



3.5.2 E1 Statistics

E1 port statistics information display.



3.5.3 E1 Alarm Display

E1 port alarm information display



Chapter 4 Technical Specifications

4.1 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	-40℃ ～ +80℃
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.

4.2 Power Supply Section

Input Voltage： AC:220V or DC:-48V

4.4 E1 Interface

Number of E1 Ports: 4

Data Rate: 2.048 Mb/s±50ppm

Line Code: HDB3

Interface Impedance： RJ45, 75Ωunbalanced/120Ω balanced

Connector Type: RJ45

Interface Standard: ITU-T G.703 G.704 G.706

Wander Performance: ITU-T G.823

Framing: unframed, framed, with or without CRC-4

Number of differential Clock Input Interface: 1

Point-to-point one-way additional processing delay (Minimum delay setting): ≤1.2ms

Output frequency stability (adaptive timing, Stable): ≤ 50ppb

Output Jitter (adaptive timing): ≤ 0.03UI

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4.5 Ethernet Electrical Interface

Speed rate: 10M/100M Auto-negotiation、10M half-Duplex、10M Full Duplex、100M Half-Duplex, 100M Full Duplex Optional.

Interface Standard: IEEE 802.3, 802.3u, 802.3z, 802.3ab, 802.3x, 802.3ad, 802.1q VLAN, 802.1ad Q in Q, 802.1p

Connector Type: RJ45 with LEDs

4.6 Ethernet Optical Interface

Type: 1000Base-FX

Compliance: IEEE 802.3, 802.1P，802.1Q

Connector Type: LC （SFP）

Wavelength: 1310/1550nm

Transmission distance: 10km，20km，40km optional

4.7 Physical Characteristics

Housing : Metal

Weight: 1.0 kg (2.2 lb)

Dimensions: 265×44.5×160mm (10.4×1.75×6.3 in.)

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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.

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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.

11. Don't use the laser beam straight to the eyes, to prevent damage to the retina.

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.

Please disconnect the power supply before you plug in/out power cable. And operate the device under the environment which is suggested by the user manual.

5.4 Test

Test the following steps before operating: Connect correctly to the power supply and the PWR and LOS LED light on, SYS and WRK LED light flashing and other LED indicators are all off.

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5.5 Set Up and Connection

According to the network environment requires the connection, turn on the power, the device enters the normal working condition.

If the device is not working properly, see Troubleshooting, such as the problem still persists, please follow the Company or with the Company's distributors, agents contact.

Appendix A

We can preliminarily judge whether each interface is working properly by observing the light of each interface after device startup is completed.

Common Faults and Troubleshooting

This paragraph describes common mistakes and faults that may occur during installation and maintenance. Please seek support from company for other problems.

A.1 E1 Alarms

The E1 warning LED is set by Dip to confirm the local E1 alarms or remote E1 alarms, When E1 LOS LED is on, loss of E1 signal fault is detected. Troubleshooting is through the following steps:

First： check the E1 terminal equipment, such as the PCM device, whether it is shutdown.

Second： check if the E1 connection is reliable, whether the E1 cable is broken or loses, which will lead to the loss of input signal.

A.1 Cannot set up E1channel

Cannot set up E1channel may be caused by a variety of reasons, and the main causes as the following:

(1) If both ends of the gateway are powered on.

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(2) If both ends of the device's network cable are connected properly, observe that whether the link LED is on, the cable is good contact.

(3) Check both ends of the network cable is normal.

(4) Check the network that both ends of the device transport through is normal.

By the ping command to ping NMS IP address of remote device(Need to confirm both ends of the NMS card IP address setting are right) or by using NMS send and receive data packets to check if the MAC address of peer equipment is obtain.

(5) IP and MAC address settings of the device are normal (all 0s or all 1s is prohibited), check if the IP address in the network segment is repeated, the MAC address is unique.

(6) Check whether the agreement of both sides is set to the same, as the following:

UDP/IPv4 corresponding UDP/IPv4

L2TPv3/IPv4 corresponding L2TPv3/IPv4

MEF corresponding MEF

MPLS corresponding MPLS

(7) Whether both sides select the RTP header (both sides choose the RTP header, or both sides do not choose the RTP Header).

(8) UDP mode, whether UDP port numbers that corresponding to the E1 port are the same; L2TPv3 mode, whether the session ID that corresponding to the E1 port are the same, the cookie can choose of both sides are consistent; the MEF mode, whether the ECID that corresponds to the E1 port is consistent; the MPLS mode, whether the inner label is consistent.

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(9) Whether both sides of the circuit simulation protocol settings is consistent.

SAToP corresponding SAToP

TDM Pseudowire Access Gateway (not with CAS) corresponding TDM Pseudowire Access Gateway (not with CAS)

TDM Pseudowire Access Gateway (with CAS) corresponding TDM Pseudowire Access Gateway (with CAS)

(10) Check that the transmission network has enough bandwidth. It can be judged by the growing number of NMS data buffer empty.

(11) Check that whether the jitter from network is too large, to judge by the number of NMS data buffer empty and full. If the network jitter is too large, we can determine it is true or not by setting the jitter buffer size.

(12) Check for E1 alarms, whether the local E1 cable dropped or poor contact or line broken. If there is a local LOS alarm, please check whether the end of E1 cable is dropped or poor contact or line broken.

(13) Both ends of the gateway are set to the differential clock mode, but common clock source does not exist.

A.1 Downstream reporting slips

Check the timing mode settings of FE1 over GE. Whether both sides of the E1 in the asynchronous state. If there is no public reference clock source, FE1 over GE device timing mode must be set to adaptive timing mode, both ends cannot work in loopback timing mode.

At the transition time after power on or reapplying the E1 signal, slips and errors are acceptable. Such transition may take several minutes.

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If it slips for a long time, further analysis is required to find out the reasons. And it may be caused by one or several reasons:

(1) The transmission network does not have enough bandwidth. It can be judged by the growing number of data buffer empty.

(2) Network in half duplex mode, but the network needs to be in full-duplex status.

(3) Network itself result in error.

(4) E1 interface cable problems or poor contact.

(5) E1 itself has line error.

(6) Both sides of E1 equipment in asynchronous state, but both ends of the device work in loopback clock recovery mode.

(7) Different sources clock of both ends of the device, but both ends of the device set to be at system clock operating mode.

(8) One end of the device choose adaptive mode and the other end choose differential mode.

(9) Both ends of the device set differential mode while their public reference clock from different sources.

(10) make sure that both ends of the device have good ground.

Appendix B

Warranty Card

The Company guarantees:

1. Warranty
    1) In free warranty period (12 months from the date of purchase), upon Company recognized normal use circumstances, the Company will responsible for replace or repair any component that was damaged under free of charge.

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2) In charged warranty (out of 12 months free warranty and beyond or less than 36 months), under recognized normal use circumstances, the Company will charge for the replacement component, but shall keep the maintenance services free.

2. The Warranty does not cover the follows, and the maintenance ices will be charged:
   3) Over 36 months from the date of purchase.
   4) User fails to provide certificate of purchase date and the product's serial number indicates the date of manufacture is more than 39 months.
   5) Including but not limited to damages caused by severe impact, extrusion, drops, liquid immersion and other abnormal conditions.
   6) The frangibility label is damaged.
   7) Unauthorized disassembling product behavior.
   8) Force majeure results in product damage, such as earthquakes, floods, lightning, etc.
3. After product been repaired, the new replacement parts will enjoy 12 months free warranty start from the date of replacement.
4. If there is any failure of the product, user may choose to send the product back to the Company or mail the product to service agencies of the Company throughout the country.
5. For any damage caused due to improper operations, the company does not assume any responsibility. If indeed the product itself causes damages, the company only assume responsibilities within the product price range and does not including but not limited to all direct or indirect losses caused by data loss

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