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1. 🕮 General

1.1 Overview

Thank you for selecting the Techroutes-TDMOIP series E1/T1 over Ethernet multiplexer product designed and made by **Techroutes Network Pvt.Ltd.,**. This converter T1 / E1 data encapsulated in the packet , support SAToP agreement and UDP/IP packet mode，that supports transportation of 4~16 E1 /T1 over FE port, that can be used to provide E1 communication channels over Ethernet or IP networks.

In addition, Techroutes-TDMOIP series also support the 2 local Ethernet data access, its internal buildup QoS which set the local Ethernet priority is lower than T1/E1 data, so as to ensure the T1/E1 signal priority transmission.

The Techroutes-TDMOIP series has many optional parameters, which can be modified by the user to suite different application requirements. Please read this manual carefully before installing the product. Techroutes-TDMOIP series model number is the table1.1-1

Table 1.1-1 Techroutes-TDMOIP series model number

Type	E1/T1connector qty	100Base-Tx electrical port	100Base-Fx optical qty	remark
16E1-4ETH	16	4	1	
8E1-4ETH	8	4	1	
4E1-4ETH	4	4	1	
16E1-4ETH-P	16	4	1	2 uplink port support(POE) function
8E1-4ETH-P	8	4	1	
4E1-4ETH-P	4	4	1	

Techroutes-TDMOIP series Features

- Provide 4/8/16 channel of E1/T1 over one Ethernet adaptive
- Provide 4 100Base-Tx electrical ports (2 for uplink, 2 for user data or monitoring) and 1 Ethernet optical port optical port can be used for uplink or user data
- Support SAToP protocol, Ethernet encapsulation support IP/UDP, support E1 Qos
- E1 clock supports 3 mode: local clock, adaptive and loopback
- 2 uplink Ethernet electrical port support 1 + 1 nondestructive protection; For

Techroutes-TDMOIP-4E1-4ETH-P /8E1-4ETH-P /16E1-4ETH-P , 2 uplink port support Ethernet feeder (POE) function, can provide the equipment with 55V DC, feeder power can arrive 50 W

- Ethernet built-in layer 2 switch, support VLAN(802.1Q based and QinQ based), port based、8021.1P based and TOS based) Support port speed limited, flow control, MAC address automatic learning and MAC address aging time set
- Support RJ-48C form of 120Ω _E1/100Ω _T1 interface, through the dip of bottom setting and special cable change into the 75Ω unbalanced interface, so as to realize the impedance matching
- High transmission efficiency, low transmission delay
- Frequency reduction stability, low jitter and drifting
- Resist to packet loss, no jump frequency, with frame synchronization protection
- Enough jitter buffer to resist packet delay variation (PDV)
- User-friendly Web server supported for easy setup and maintenance
- Support SNMP network management (V2 version)
- Support Local and remote Software and hardware online upgrade
- Support SNTP network time setting
- Support software test E1 error
- Techroutes-TDMOIP-4E1-4ETH-P /8E1-4ETH-P /16E1-4ETH-P support AC 100 ~ 260V and DC-48V double power supply, Techroutes-TDMOIP-4E1-4ETH /8E1-4ETH /16E1-4ETH support AC + DC) or double DC power supply, realize 1 + 1 backup

1.2 Applications

Techroutes-TDMOIP series could be worked with E1 over Ethernet interface multiplexer Techroutes-TDMOIP-63E1, make point-to-multipoint application, and point to point of connection, Typical application is shown in Fig 1.2-1~Fig 1.2-3.

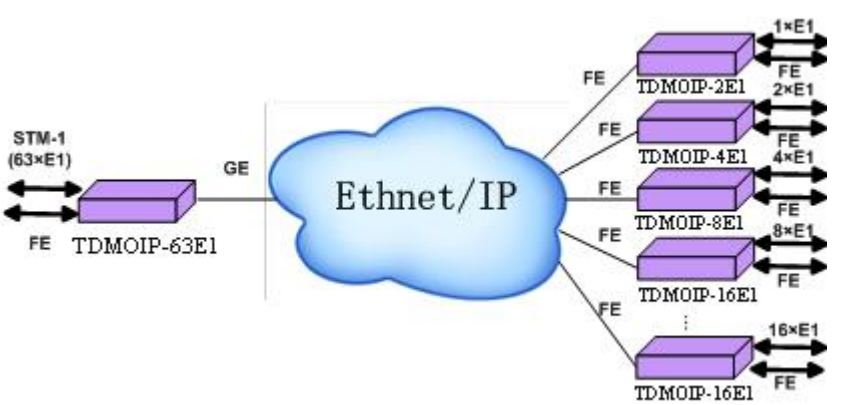


Figure 1.2-1 TECHROUTES-TDMOIP series Aggregate Application

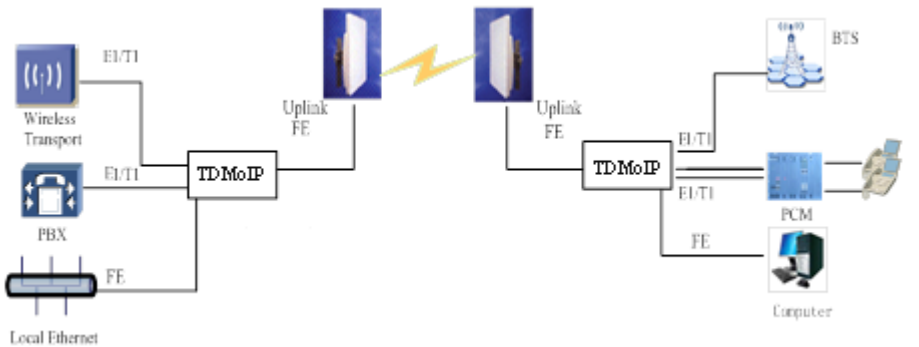


Figure1.2-2 Techroutes-TDMOIP series Typical application of wireless network

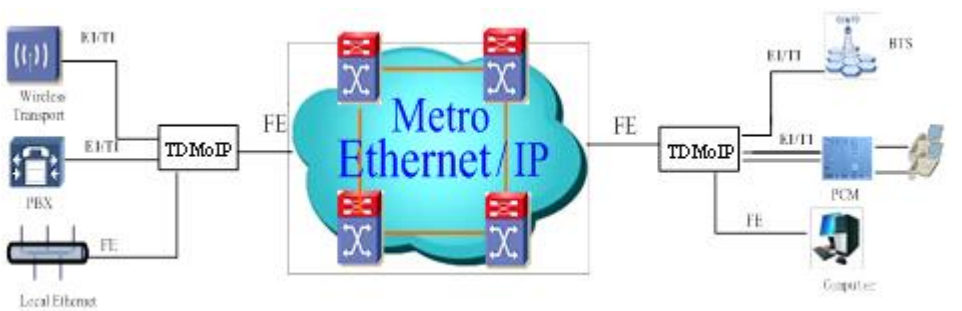


Fig. 1.2-3 Techroutes-TDMOIP series typical application of cable network

Techroutes-TDMOIP series could cooperate with wireless bridge of most manufactories in wireless network application use, At present, some the sold wireless bridge transmission bandwidth change with the Ethernet packets, some Bridges will introduce the packet delay jitter, when work with the different wireless bridge, need to adjust E1/T1 signal packet length and jitter, in order to get the best transmission effect.

Note : This equipment is used together with the wireless Bridges, usually connected with outdoor antenna system of wireless bridge through Ethernet cable, there is lightning risk at this time, must be in an upward in combination of Ethernet lightning protection protector, otherwise lightning will make seriously damage to the equipment, danger to the staff .

1.3 Timing modes

To emulate a transparent E1 channel over a packet network, the Techroutes-TDMOIP series not only conveys data stream content correctly from the source to the destination, but also recovers the E1/T1 timing from the source at the destination accurately. Packet networks do not provide such built-in timing transparency mechanism as TDM networks do. TECHROUTES-TDMOIP series uses its proprietary algorithm to reconstruct the E1 clock at the destination. The recovered clock is of very high quality, with low jitter and wander. Typical frequency offset is within ±5ppm, and jitter is below 0.1UI. It can be adopted in most applications. This timing mode of rebuilding the E1 clock at the destination is called Adaptive Timing.

Therefore, Techroutes-TDMOIP series equipment provides another mode , loop back timing mode. In this mode, Techroutes-TDMOIP series equipment with T1 / E1 input signal from the port of clock T1 / E1 reconstruction output data stream, by Techroutes-TDMOIP series equipment of internal memory will absorb completely network transmission of the formation of the drift. Once the input signal loss fault, will automatically switch to adaptive timing. Techroutes-TDMOIP series equipment with two kinds of timing mode is as the figure 1.3-1

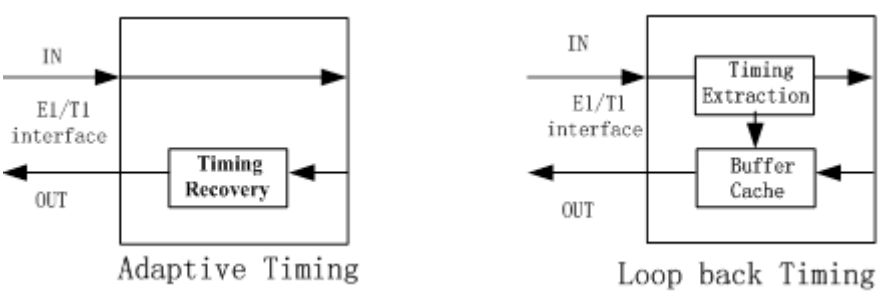


Fig.1.3-1 Timing modes

Correct timing mode setting is important for smooth operations. In most cases, setting both units to adaptive timing mode is sufficient. But sometimes, setting one unit to loop timing mode may work better. For example, setting the TECHROUTES-TDMOIP unit connected with the clock master (such as local exchange) to loop back mode, and the other unit connected with the clock slave (such as PBX or remote module) to adaptive mode, is probably better than setting both to adaptive modes.

One typical error in telecom applications is to connect two communication devices that are both clock slaves. Neither will TECHROUTES-TDMOIP support such operation no mater how the timing modes are set.

Note: The Lock Clock usually takes several minutes to stabilize. During

that period, clock drift may exceed the limit, errors and slips may occur.

Various timing schemes are listed in Table 1.4-1, for applications depicted in Fig.1.3-2.

Fig.1.3-2 Timing mode scheme reference diagram

Table 1.3-1 Timing mode schemes

A side Equipment clock mode	B side Equipment clock mode	A side TDMoIP Timing mode	B side TDMoIP Timing mode	Note
master	master	loop back	loop back	Equipment A & B clocks synchronous
		adaptive	adaptive	
master	master	adaptive	adaptive	Equipment A & B clocks plesiochronous
master	slave	loop back	adaptive	
		adaptive	adaptive	
slave	master	adaptive	loop back	
		adaptive	adaptive	
slave	slave			Not allowed

2. 🕮 *System Architecture*

2.1 Function Description

The core of TECHROUTES-TDMOIP is the TDM/Packet processing unit. It truncates E1/T1 data stream, and encapsulates the data into Ethernet packet with or without IP headers. The packets are passed to the Ethernet switch unit via MII interface, and are sent out through the uplink ports.

In the reverse direction, packets from the uplink ports are sent to the TDM/Packet processing unit for reassembling the original E1/T1 data stream, and outputting via E1/T1 interface. TDM/Packet processing unit need to process the reassembled data to recover the E1 clock which is the key element of the device. Very sophisticated algorithm is used to ensure that the reconstructed clock will meet the stringent requirement of TDM applications. The most important parameters are bit rate, jitter, wander, and signal delay.

The user can set various operational parameters through Network Management.

2.2 Structure

TECHROUTES-TDMOIP adopt standard 1U box, which is composed by system board and power module. TECHROUTES-TDMOIP system structure is shown in Fig 2.2-1-2.2-2

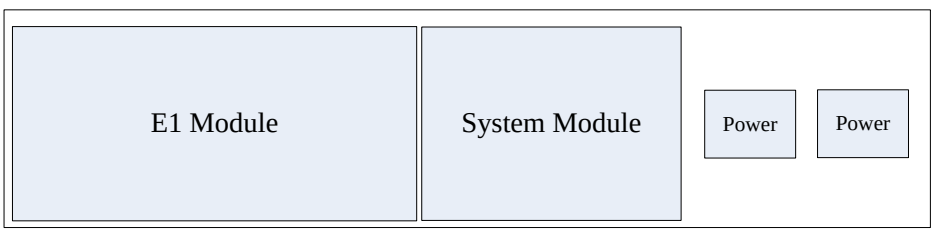


Fig 2.2-1 TECHROUTES-TDMOIP system structure

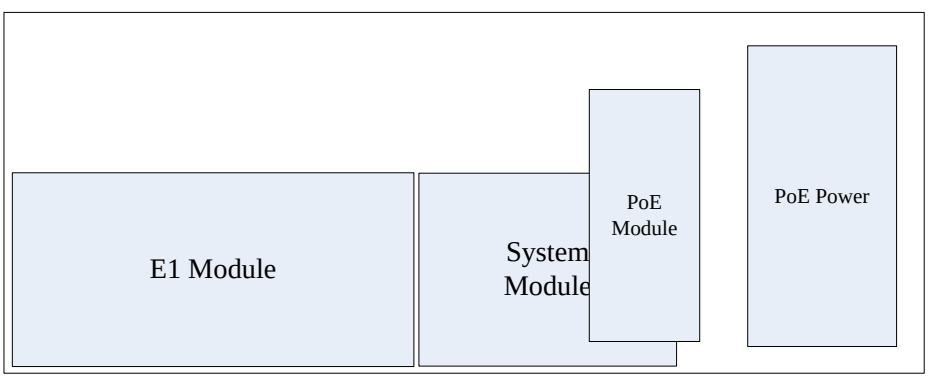


Fig 2.2-1 TECHROUTES-TDMOIP system structure

2.3 Front panel

2.3.1 Diagram

TECHROUTES-TDMOIP, all service interface ,power port ,indicators and dips are in the front of panel , no indicators or dips in the rear panel , TECHROUTES-TDMOIP series front panel is shown in Fig 2.3-1~Fig 2.3-9.

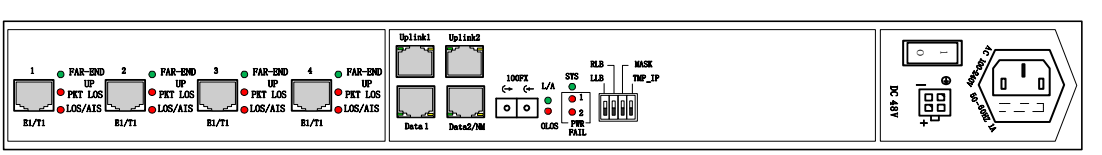


Fig. 2.3-1 Front panel of TECHROUTES-TDMOIP-4E1-4ETH

(DC-48V/100~240V AC)

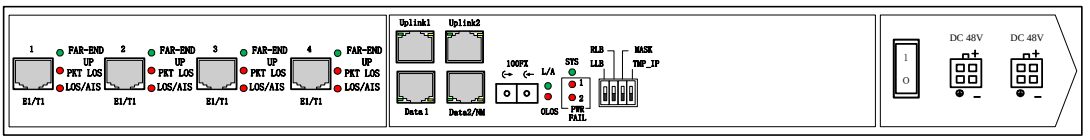


Fig. 2.3-2 Front panel of TECHROUTES-TDMOIP-4E1-4ETH (Dual DC-48V)

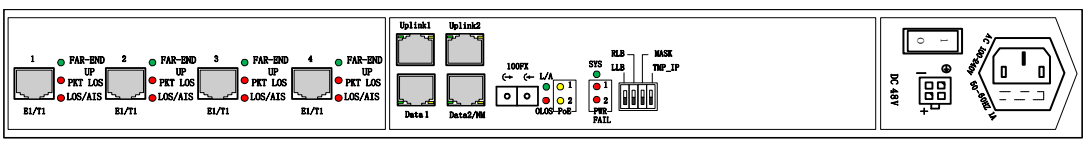


Fig. 2.3-3 Front panel of TECHROUTES-TDMOIP-4E1-4ETH-P (-48V DC/100~240V AC)

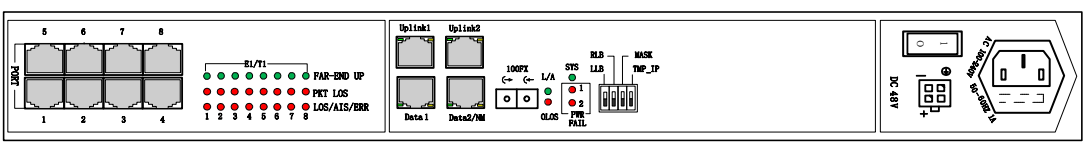


Fig. 2.3-4 Front panel of TECHROUTES-TDMOIP-8E1-4ETH (-48V DC/100~240V AC)

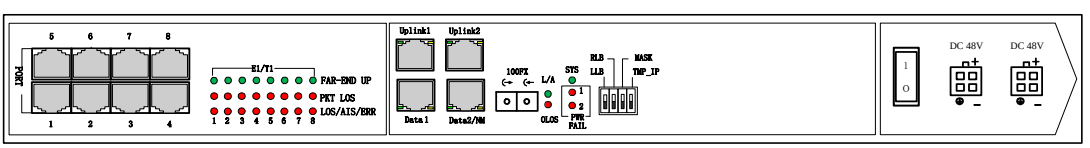


Fig. 2.3-5 Front panel of TECHROUTES-TDMOIP-8E1-4ETH (Dual -48V DC)

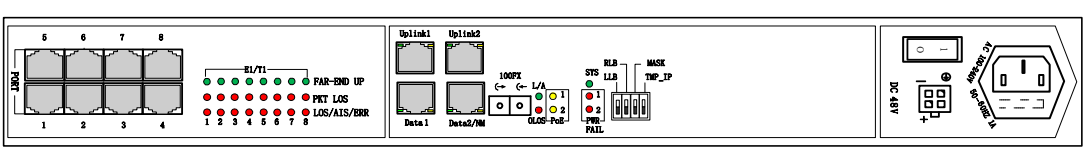


Fig. 2.3-6 Front panel of TECHROUTES-TDMOIP-8E1-4ETH-P (-48V DC/100~240V AC)

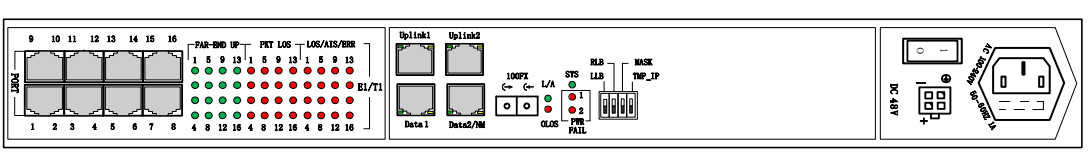


Fig. 2.3-7 Front panel of TECHROUTES-TDMOIP-16E1-4ETH (-48V DC/100~240V AC)

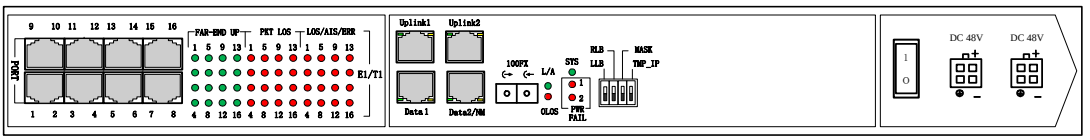


Fig. 2.3-8 Front panel of TECHROUTES-TDMOIP-16E1-4ETH (Dual -48V DC)

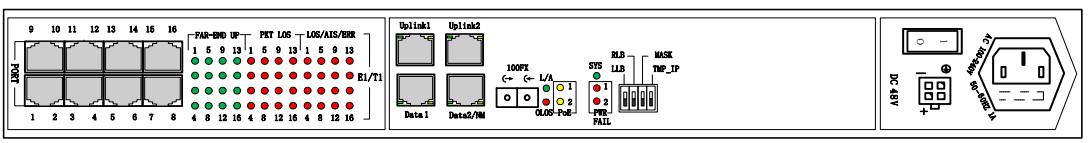


Fig. 2.3-9 Front panel of TECHROUTES-TDMOIP-16E1-4ETH-P(-48V DC/100~240V AC))

2.3.2 LED's

The definition is shown in Table 2.3-1:

Table 2.3-1 the indicators definition of TECHROUTES-TDMOIP series

Identification	Color	Qty	Definition	Remark
SYS	Green	1	System working state instructions Blink: Normal On: System is on configuration or work abnormally Off: System does not work or abnormally work	
PWR FAIL	Red	2	The power failure alarm instructions On: Power Off / Failure Off: Normal	Indicators 1，2 is corresponding to the left and right power supply
L/A	Green	1	0ptical Ethernet interface state instructions On: Connected with remote Ethernet optical interface Off: Not connected with Ethernet optical interface	Optical Ethernet interface indicators
OLOS	Red	1	Optical Ethernet interface receiving	

			instructions On: No receiving Off: Receiving normally	
（Ethernet electrical port LINK）	Green	4	Ethernet electrical interface instructions On: Link normally Blink: Data transmitting/receiving Off: Link abnormally	One link indicator on the left of each Ethernet electrical interface
（Ethernet electrical port FDX）	Yellow	4	Ethernet electrical interface rate instructions: On ： rate is HULL Off ： rate is HALF	One FDX indicator on the right of Ethernet electrical interface
POE	Yellow	2	Uplinked POE instructions： On ： power supply Off ： no power supply	Only TECHROUTES-TDMOIP-4/8/16E1-4ETH-P，indicators 1，2 is separately corresponding to the unlinked port 1，2
FAR-END UP 1~16	Green	16	E1 / T1 addressing the remote equipment link state instructions On: Addressing the remote MAC address Off: unaddressing the remote MAC address	
PKT LOS 1~16	Red	16	E1 / T1 service lost package instructions in Ethernet link On: Cannot receive the E1/T1 remote package Blink: Remote E1/T1 lost package or disorderly sequence Off: Remote E1/T1 no lost package and disorderly sequence	
LOS/AIS 1~16	Red	16	E1 / T1 port alarm status instructions On: LOS alarm Regular slow blink: AIS alarm Irregular fast blink:	

			receive HDB3 code ,wrong E1/T1 signal Off: no alarm	

2.3.3 Dip Switches Definition

There are four Dip Switches on the front panel, the definition show in Table 2.3-2.

Table 2.3-2 TECHROUTES-TDMOIP

Dip Switches Definition of front panel

Dip	label	Definition
DIP-1	LLB	E1/T1 port Tx to Rx loop back ON: set local E1/T1 port Tx to Rx loop back OFF: cancel local E1/T1 port Tx to Rx loop back
DIP-2	RLB	E1/T1 port Rx to Tx loop back ON: set local E1/T1 port Rx to Tx loop back OFF: cancel local E1/T1 port Rx to Tx loop back
DIP-3	MASK	Alarm mask set ON: set local alarm mask Off; cancel local alarm mask
DIP-4	TMP_IP	IP set ON: restore default IP address 192.192.192.192 OFF: use the user's Setting IP address
Note :1) Dial TMP_IP dip ， 5 minutes later, no matter whether the user dial up ,will return to the original user Settings IP 2) Dial down all the dips , power failure will recover the default setting of the factory, but keep the current IP address, MAC address		

There is one group of 8 DIP 1， on the bottom of TECHROUTES-TDMOIP-4E1, two groups of 8 dips， DIP1~DIP2 on the bottom of TECHROUTES-TDMOIP-8E1,4 groups of 8 dips， DIP1~DIP4 on the bottom of TECHROUTES-TDMOIP-16E1,used to control the T1/E1 interface impedance and 75Ω unbalanced interface shell grounding , every 8 dips control 4 channel T1/E1 interface, which DIP1definiation is as the table 2.3-3 shows, DIP2-DIP4 definition is on the analogy of .this

Table 2.3-3 TECHROUTES-TDMOIP

Dip Switches Definition of bottom panel

Dip	Definition
One	ON: the first channel of E1/T1 Interface impedance is 75Ω OFF: the first channel of E1/T1 Interface impedance is 120Ω-E1/100Ω-T1

Two	ON: the first channel of E1/T1 Interface shell grounding OFF: the first channel of E1/T1 Interface shell suspended
Three	ON: the second channel of E1/T1 Interface impedance is 75Ω OFF: the second channel of E1/T1 Interface impedance is 120Ω-E1/100Ω-T1
Four	ON: the second channel of E1/T1 interface shell grounding OFF: the second channel of E1/T1 interface shell suspended
Five	On：the third channel of E1/T1 Interface impedance is 75Ω Off：the third channel of E1/T1 Interface impedance is 120Ω-E1/100Ω-T1
Six	ON: the third channel of E1/T1 interface shell grounding OFF: the third channel of E1/T1 interface shell suspended
Seven	On：the fourth channel of E1/T1 Interface impedance is 75 Ω Off：the fourth channel of E1/T1 Interface impedance is 120Ω-E1/100Ω-T1
eight	ON: the fourth channel of E1/T1 interface shell grounding OFF: the fourth channel of E1/T1 interface shell suspended

2.3.4 E1/T1 Port

TECHROUTES-TDMOIP-4E1-4ETH equipment with 4 channel of 120Ω-E1/100Ω-T1 balance interface, TECHROUTES-TDMOIP-8E1-4ETH equipment with 8 channel of 120Ω-E1/100Ω-T1 balance interface, TECHROUTES-TDMOIP-16E1-4ETH equipment with 16 channel of 120Ω-E1/100Ω-T1 balance interface, all adopt RJ-48C form. RJ-48C joints and wire sequence and signals defined as follows.

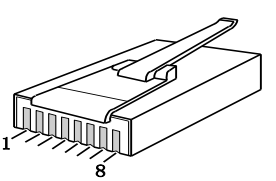


Fig 2.3-5 RJ-48C socket pin sequence

Table 2.3-4 TECHROUTES-TDMOIP-4E1 and 8E1 RJ-48C socket signal definition

Pin	1	2	3	4	5	6	7	8
Signal	-	+	GND	+	-	GND		
	E1-IN			E1-OUT				

Table 2.3-5 TECHROUTES-TDMOIP-16E1-4ETH RJ-48C socket signal definition

PIN	E1connecting	Twisted pair	Using 5 cable making pairs color of the recommended
1	E1_IN（1）-	pair	Blue

2	E1_IN（1）+		Blue white
3	E1_OUT（1）+	pair	Orange
4	E1_OUT（1）-		Orange white
5	E1_IN（2）-	pair	Green
6	E1_IN（2）+		Green white
7	E1_OUT（2）+	pair	Brown
8	E1_OUT（2）-		Brown and white

On the bottom of TECHROUTES-TDMOIP series equipment have 1 ~ 4 group of 8 DIP, used to control the impedance of the T1/E1 interface and 75Ω unbalance interface shell grounded. When the interface choose 75Ω impedance, Techroutes-TDMOIP-4/8E1-4ETH/P equipment can use BH4.815.122 cable which convert 120Ω-cable E1/100Ω-T1 balance interface (RJ-48C) to 75Ω unbalanced interface (BNC). The "+" connect core, " — "connect skin. Techroutes-TDMOIP-16E1-4ETH/P equipment use the BH4.815.123 cable which convert 120Ω-cable E1/100Ω-T1 balance interface (RJ-48C) to 75 Ω unbalanced interface (BNC). The "+" connect core "-" connect skin.

TECHROUTES-TDMOIP series equipment T1/E1 interface through network provide Rx→Tx, Tx→ Rx loop back operation, convenient opening, maintain test. Loop back definition details are in 3.1.2 description. Section

Node :

1. T1/E1 interface card don't support a hot swap. if need to change , please shut off the power
2. T1/E1 interface using RJ-48C socket, TECHROUTES-TDMOIP-16E1-4ETH equipment one socket corresponding two channel T1/E1, belonging to private definition, don't make the interface with the TECHROUTES-TDMOIP-4E1 and 8E1 equipment standard RJ-48C socket confusion, or it will damage the interface.
3. T1/E1 interface choice set by the network management software.

2.3.5 Ethernet port

There are four 100Base-Tx Ethernet electrical ports (two ports are uplink ports used to connect with transmission network and the other two are local data ports used to connect with local Ethernet), and one 100Base-Fx optical port used as either uplink port or local data port. Ethernet electrical port supports three modes: auto-negotiation, 10M full duplex/half-duplex and 100M full-duplex/half-duplex. Ethernet optical port supports auto-negotiation or 100M full-duplex mode.

Ethernet built-in layer-2 switches function. Supporting Ethernet packet size

up to 2000 bytes, Support port speed limited, IEEE802.3 x flow control, the MAC address automatic learning and MAC address aging time function set e tc.VLAN setting based on 802.1Q or QinQ, QoS setting based on port, 8021. 1P and TOS.

Ethernet electrical port adopts RJ45 socket. RJ45 Ethernet socket is defined in Table 2.3-5. Ethernet optical port can use double-fiber SFP optical module and the port labeled（→ is for optical signal output, （← for input. Also Ethernet optical port can use single-fiber optical module which has only one optical interface The wavelength of the single fiber module is the optical wavelength, or for 1310 nm, or for 1550 nm.

Depending on different transmission distance, Different SFP optical module could be selected.

Table 2.3-5 RJ45 socket definition

Pin	1	2	3	4	5	6	7	8
Definition	TxD+	TxD-	RxD+			RxD-		

TECHROUTES-TDMOIP(P) series equipment two unlinked electrical Ethernet port control (POE) function by Webserver network management, open after POE by Ethernet data pin provide 55V DC (support output short circuit pr otection function) to net Bridges , feeding power can be up to 50W, at the same time, not influence the data transmission. Its RJ45 Ethernet socket ap plication feet when idle power supply, pin 4, and 5 connection is for the po sitive, pin 7, 8 connection for is negative, such as table 2.3-6 description.

Table 2.3-6 support POE function RJ45 Ethernet socket definition

Pin	1	2	3	4	5	6	7	8
Definition	TxD+	TxD-	RxD+	55V+	55V+	RxD-	55V-	55V-

Note:

1. **TECHROUTES-TDMOIP(P) series equipment can make Ethernet supply power function that the uplinked port in the transmission of data and will provide 55V DC continuously, need to pay attention to safety, Ethernet cable don't be naked.**
2. **TECHROUTES-TDMOIP(P) series equipment can make Ethernet supply power function that the uplinked port must not connect with monitoring computer, in order to avoid damage. Therefore recommended**

Data2 / NM monitoring port

3. **TECHROUTES-TDMOIP(P) series equipment can make Ethernet supply power function that cannot set Ethernet loop back (including software loop back and adopted Ethernet cable of hardware loop back)**

IN auto-negotiation mode, TECHROUTES-TDMOIP Ethernet electrical port supports HP auto-MDIX function and it can check the transmission and receiving sequence and make configuration. So both MDI and MDI-X interfaces are supported and both cross line and direct line can be selected.

2.3.6 Power Switch and Power Socket

Two power options are available, ~220V AC or -48V DC. It should be specified at the time of purchase.

3. Installation

3.1 Mechanical

TECHROUTES-TDMOIP can be placed at the table top or mounted on a 19" rack， The mechanical dimensions of TECHROUTES-TDMOIP are given in Fig.3.1-1.

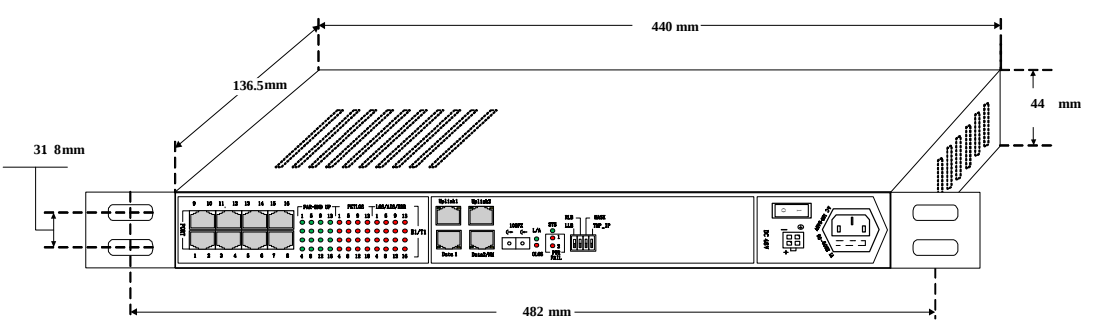


Fig.3.1-1 TECHROUTES-TDMOIP Mechanical dimensions

3.2 Electrical

3.2.1 Power connection

For the -48V type, connect -48 supply to the power connector -48V port, and ground to the other port. For ~220V equipment, connect the device to the ~220V

outlet with standard power cord supplied with the equipment.

***WARNING*: The system must be securely connected to a good protective ground for safety.**

3.2.2 E1/T1 connections

TECHROUTES-TDMOIP-4E1-4ETH supports 4 channels E1-120Ω/T1-100Ω balanced interface and TECHROUTES-TDMOIP-8E1-8ETH can support 8 channels E1-120Ω/T1-100Ω balanced interfaces. TECHROUTES-TDMOIP-16E1-4ETH can support 16 channels E1-120Ω/T1-100Ω balanced interfaces. The RJ-48C sockets are default for all the ports. Besides, it can also support 75Ω non-balanced interface by the Dip switches on the rear panel and external impedance converting cable.

Note: TECHROUTES-TDMOIP-16E1-4ETH one socket corresponding two E1/T1, belong to the proprietary protocol, should not make mix up with the RJ-48C socket of TECHROUTES-TDMOIP-4E1 and 8E1 , It may damage the interface.

E1/T1 interface provide Rx→Tx、Tx→ Rx through NMS, and the loopback of E1 channels can be set up independently. Rx→Tx、Tx→ Rx loop back definition is shown in Fig 3.1.-1:

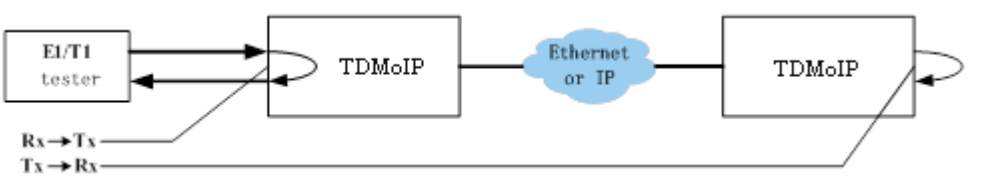


Fig 3.1-1 E1/T1 loop back

Rx→Tx can test E1/T1 connection cable, and Tx→ Rx is used to test the whole circuit including TECHROUTES-TDMOIP in the two ends and the link between them.

3.2.3 Ethernet cable/optic fiber connections

TECHROUTES-TDMOIP provides four 100Base-Tx Ethernet electrical interfaces (two ports are uplink port and the other two are local data ports,Data2 is as the monitoring port), and one 100Base-Fx optical interface used as either uplink port or local Ethernet port

Ethernet Optical adopts SFP integrated optical modules, and the port labeled （→ is for optical signal output, （← for input. Also Ethernet optical port can use single-fiber optical module which has only one optical interface. The wavelength of single-fiber optical module means its luminescence wavelength, 1310nm or 1550nm. It should note that equipments with the same luminescence wavelength cannot

connect with each other. So it should select the equipments with the match luminescence wavelength when using the single-fiber module.

Note:

1. **At auto-negotiation mode, Ethernet electrical port supports HP auto-MDIX function and it can check the transmission and receiving sequence and make configuration. So both MDI and MDI-X interfaces are supported and both cross line and direct line can be selected.**

4. Troubleshooting

After power up of equipment TECHROUTES-TDMOIP, the system should start after 90seconds to work properly. The system completion startup SYS light change from long bright to flashing light. You can observe each interface light to judge each port working statue.

4.1 Common fault diagnosis and ruled out

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

4.1.1 PWR FAIL LED ON

The PWR FAIL light indicates that the corresponding power supply board is not complete plugged in or not connected with, please check the following subject: the power supply to meet the requirements or not, he power plug is connected, the switch is open.

4.1.2 SYS LED does not blink

After star up 90 seconds or during working statue, the SYS light flashing that is mean system have not start up completion or program problem, you can turn off the power and reboot, if still does not start up properly you need to find supplier for technical support.

4.1.3 Ethernet Electrical port LINK LED OFF

Ethernet electrical port LINK light off indicates that corresponding Ethernet port does not connect properly. You can check the cable connection, cable line ordering, under mandatory mode does it using the straight-through cable (crossover cable),the electrical interface connection does match the client configuration whether, and connection with network device is working properly or not.

4.1.4 Ethernet optical port L/A LED OFF or OLOS LED ON

Ethernet optical ports L/A light off indicate that the corresponding Ethernet does not establish connect properly. The OLOS light on indicates no received light.

Can check the corresponding fiber is connected or not, the using single-fiber module and the equipment connected to the same emission wavelength (should using wavelength as pair optical modules), and device working properly or not.

4.1.5 E1/T1 Alarm LED ON

There are two groups of LEDs, PKT LOS and LOS for E1 alarms LEDs.

When E1 LOS LED is on, loss of E1 signal fault is detected by Techroutes-TDMOIP. Possible causes include:

- The downstream equipment such as telephone exchange or PCM terminal is powered off.
- The E1 cable connection looses or broken.

E1 LOS LED blinks when respective input E1 signal is AIS, i.e. the content of E1 data is all 1. Such alarm indicates fault conditions on the part of the downstream equipment.

E1 LOS site is controlled by Dip Switch RA state. When RA Dip Switch ON, the red LEDs indicate remote E1 LOS state. When RA Dip Switch OFF, the red LEDs indicate local E1 LOS state.

4.1.6 TWO ENDS DEVICES CANNOT CONNECT

Both sides of devices in the same Ethernet broadcast domain, checking both side of device IP address should on dual relationship. Check MAC address is unique (include other device on the same network); Using Ping command to check network, checking bandwidth is sufficient or not.

If two sides of devices are not in same Ethernet segment, checking device IP default gateway setting, IP address, IP address mask, and check conflicts of MAC address or IP address; check bandwidth is sufficient. IP address and gateway address can be set by NMS, MAC address set by manufacture.

Check both ends of the device VLAN setting should be in accordance with eachother.

4.1.7 Both Sides devices of E1/T1 have slip

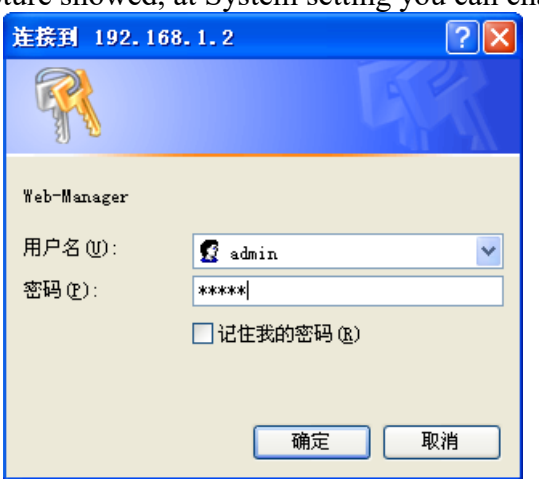
Check both sides devices TECHROUTES-TDMOIP E1/T1 clock setting, at least one of device should be Master-Clock.

Check TECHROUTES-TDMOIP time mode setting. If both sides of the E1/T1 equipment are not in the state of the synchronization, TECHROUTES-TDMOIP timing model must be adaptive timing, not loop timing.

At beginning of startup, slip is normal.

5. Web Manager

TECHROUTES-TDMOIP support Web Server to monitoring devices. Login Web Server need Username and Password, the default Username and password are “admin”, as below picture showed, at System setting you can change it.



All Web Server include 7 parts: System Info, Alarm Status, Alarm Management, ETH Management, E1 Management, SNMP Management, and System.

Following will introduce the Web Server Management of TECHROUTES-TDMOIP

5.1 System Info

After login Web Server, will show Welcome page. In this page include Hardware version number, Software version number, Web manager version number, IP address, Subnet Mask, Gateway IP address, MAC address. IP address and Subnet address and Gateway address can be set by customer, other only for checking. As shown in Fig 5.1-1. The default setting IP address is 192.168.1.2.

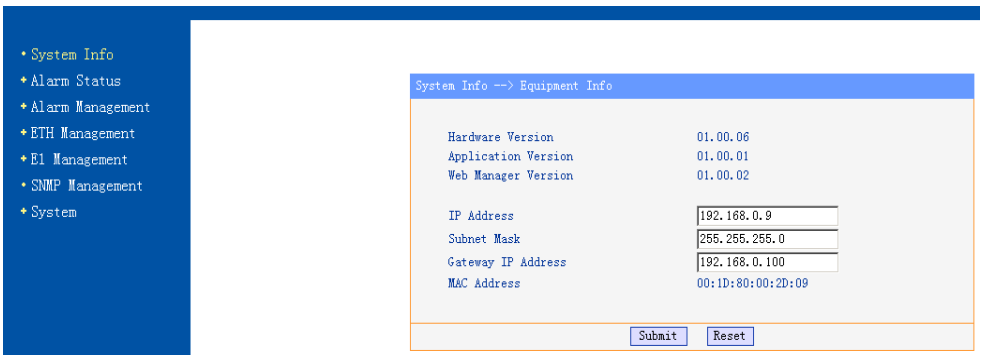


Fig 5.1-1 System Info

5.2 Alarm Status

Alarm status include E1 channel, Ethernet port, power supply and alarm log.

5.2.1 E1 Channel Status

Click left side of Alarm Status—Channel will show E1 Channel Service name, Loop status, E1 port LOS, AIS alarm and calculation of LOS, Remote Connection Status. E1 loop for testing connection, definition of LOOP please check 3.1.2. E1 Loop setting after submitting will changed, but not saved, after device startup E1 not in Loop stats. Please check Fig 5.2-1.

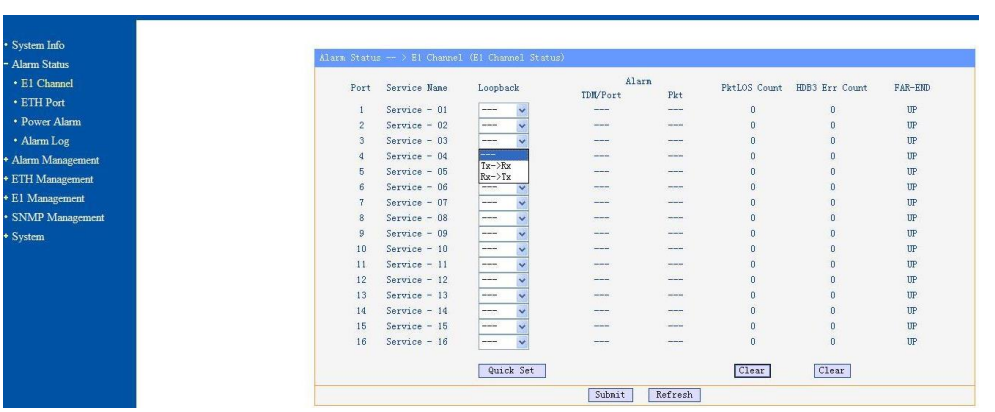


图 5.2-1 E1 Alarm Status

5.2.2 Ethernet Port Status

Click Left side Alarm Status – ETH Port will show 4 Ethernet electrical ports and 1 optical port LINK UP/DOWN stats, as shown in Fig5.2-2.

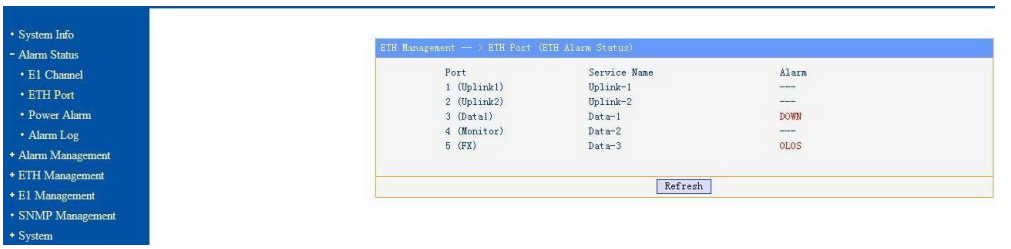


Fig 5.5-2 ETH port Alarm Status

5.2.3 Power Status

Click left side Alarm Status – Power Status will show Power Alarm Status, include 2 power off alarm Status information, as shown in Fig 5.2-3.

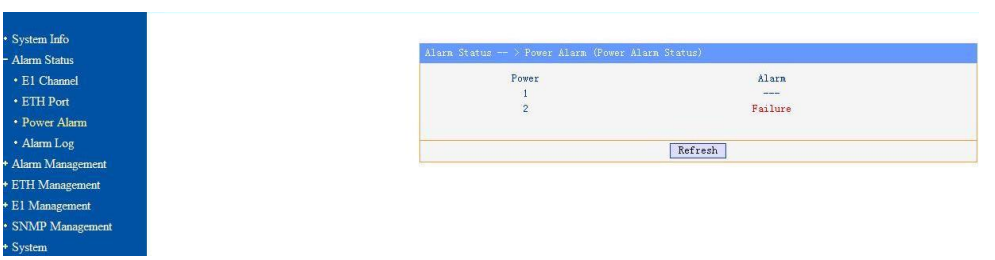


Fig 5.2-3 Power Status

5.2.4 Alarm Log

Click Left side Alarm Status – Alarm Log, include Alarm Type, Alarm Item, Port number, time. As shown in Fig 5.2-4.

Fig 5.2-4 Alarm Log

5.3 Alarm Management

This section includes E1 channels, Ethernet port and power alarm shielding.

5.3.1 Alarm Shielding Management

If set alarm mask, then this alarm will be shielded at alarm log, alarm indicator on panel and will not display no matter what situation is unless the mask is canceled.

E1 channel supports not only shielding any alarm of any channel, but also batch shielding. But Ethernet port alarm and power alarm shielding can only be set one by one. As shown in Fig 5.3-1 , Fig 5.3-2 and Fig5.3-3

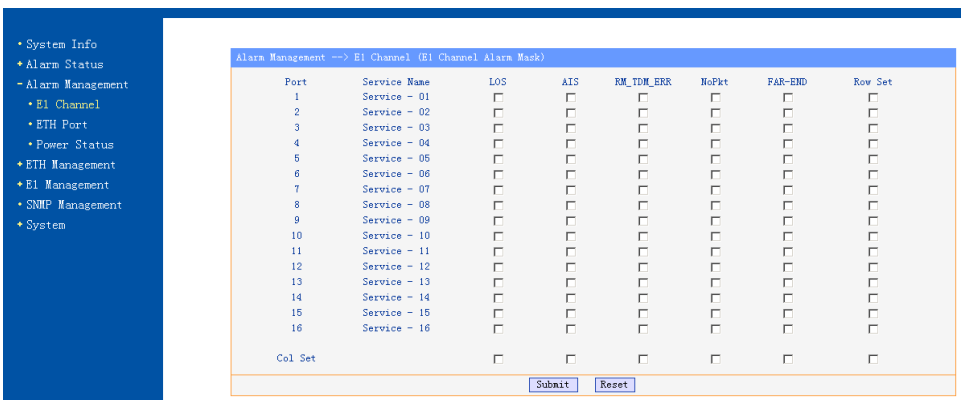


Fig.5.3-1 E1 alarm management

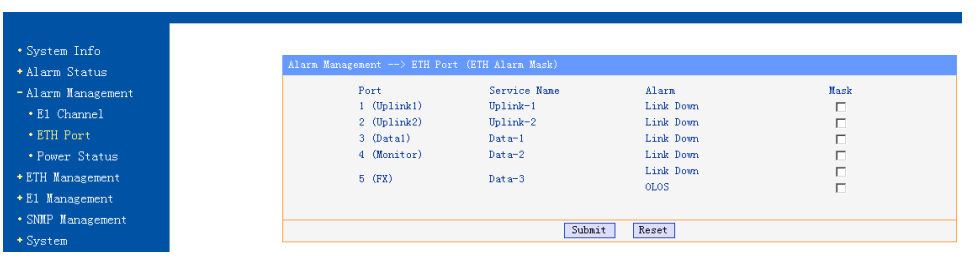


Fig.5.3-2 Ethernet alarm management

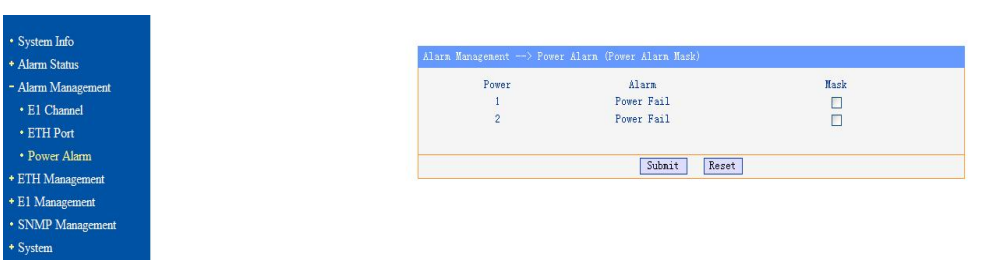


Fig.5.3-3 power alarm management

5.4 Ethernet Management

This section includes Ethernet port management, Ethernet senior management (MAC address aging time, QoS management and port Throughput limiting) and VLAN management.

5.4.1 Ethernet Management

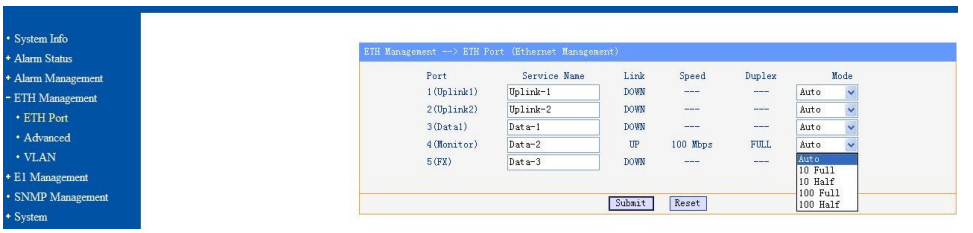


Fig.5.4-1 Ethernet Management

Table 5.4-1 Ethernet management parameters

Parameters		Options	Explanation
Ethernet Management	Port		5 Ethernet ports number
	Service No.		Ethernet service No.: support at most 15 capital/small letters, digit and part special character input. Chinese character support 7 numbers(not support some special characters, as “ / ”、 “ \ ” input).
	Link		Link: indicate current Ethernet link(Up/Down)
	Speed		Speed: indicate current Ethernet port speed(10/100Mbps)
	Duplex		Duplex: indicate current Ethernet work mode (HALF/FULL)
	Mode	Auto ,100 M full, 100M half, 10M full, 10M half	5 Ethernet ports work mode configuration: Auto-adaptive (default) 100M full 100M half 10M full 10M half Electrical interface work modes have Auto, 100M full, 100M half, 10M full and 10M half. Optical interface work modes have Auto and 100M full

Note: The sentence with underline is default settings.

5.4.2 Ethernet Senior Management

Ethernet senior management supports MAC address aging time, Ethernet port QoS management and throughput limiting. MAC address aging time range is 0~524287s (default: 300s).as the fig 5.4-2

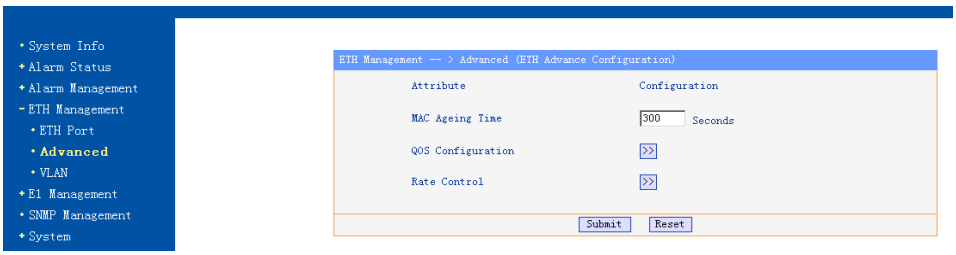


Fig 5.4-2 Ethernet management

For Ethernet interface 1~5, we can enable QoS (based on port, IEEE 802.1p and TOS)

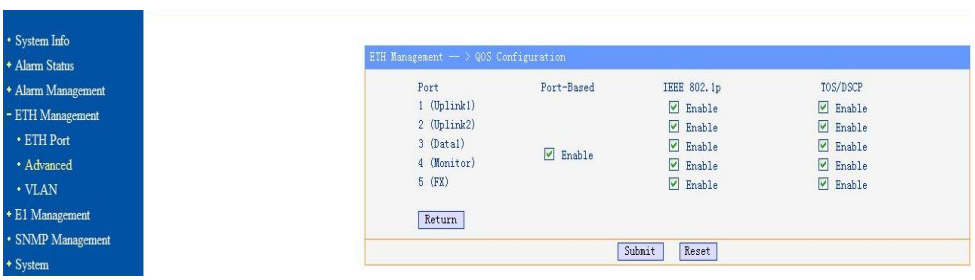


Fig 5.4-3 Ethernet QoS configuration

Port throughput limiting of Ethernet senor management includes enable Ethernet port throughput limiting and speed configuration (supporting entry speed limiting)and storm Refrain . As shown in Fig 5.4-4. Speed class of Ethernet interface is shown in Table 5.4-2. When we configure the maximum port speed, if the value is not equal to any speed class, it will select the lower speed class proximal to this value. For example, value is set to 70, after clicking Submit, the value will change to 64, means the maximum speed is 64KB.

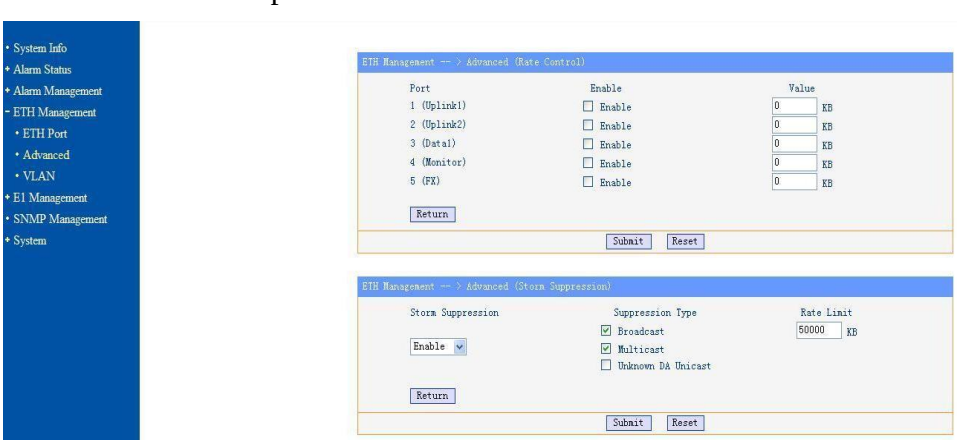


Fig 5.4-4 Ethernet port speed limiting configuration and storm Refrain .

Table 5.4-2 Speed class of Ethernet interface

Speed limiting range	speed class interval	minimum speed	maximum speed
Lower than 2M	64KB	64KB	1.792MB
Higher than 2M，lower than 100M	1MB	2MB	100MB

5.4.3 VLAN Management

Two uplink Ethernet electrical interfaces support 1+1 Nondestructive protection. After enabling 1+1 protect, equipment configure Q in Q VLAN automatically and user only need to configure VID of uplink Ethernet electrical interface and monitoring port. As shown in Fig 5.4-5 and Fig 5.4.6.

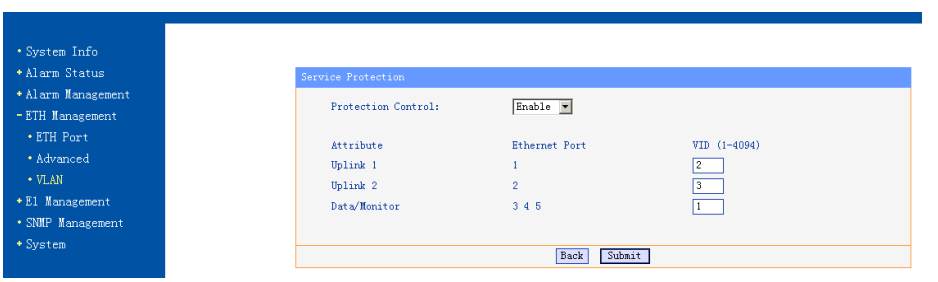


Fig 5.4-5 uplink 1+1 Nondestructive configuration

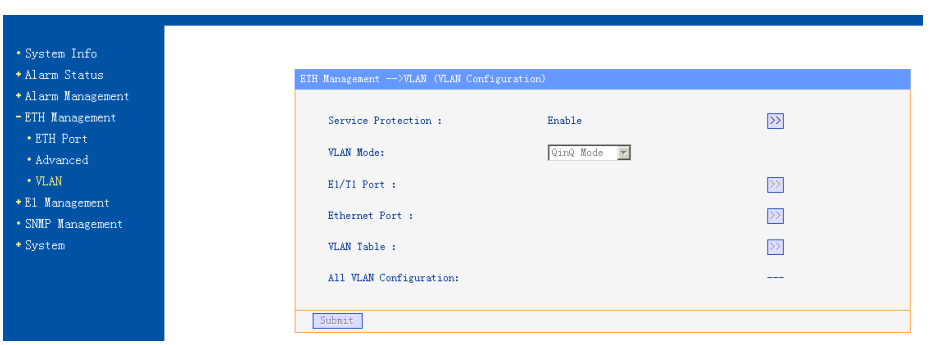


Fig 5.4-6 configure Q in Q VLAN automatically

Forbid uplink 1+1 nondestructive protection function, TECHROUTES-TDMOIP Ethernet supports 802.1 Q VLAN and Q in Q VLAN. 802.1Q VLAN is that adding the VLAN tag in front of Ethernet frame type. Q in Q VLAN is that nesting the VLAN (S-Tag) of operators in 802.1Q outer layer to enable the VLAN stacking. VLAN management parameters are shown in Table 5.4-3.

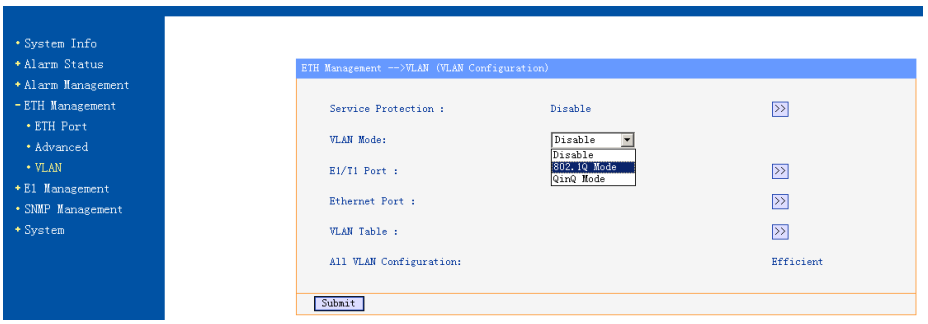


Fig 5.4-7 VLAN management 1—VALN configuration

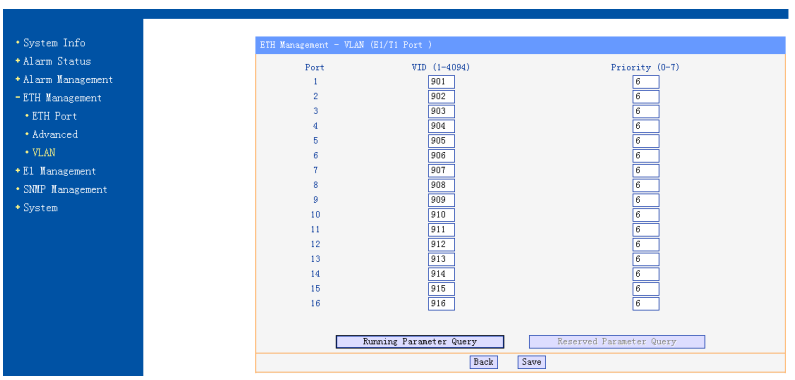


Fig 5.4-8 VLAN management 2—E1 port configuration

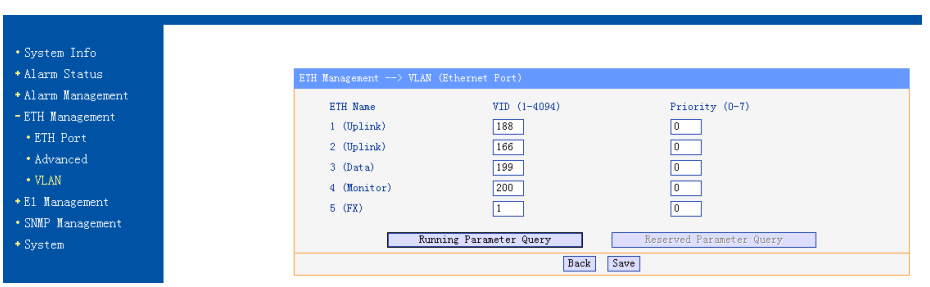


Fig 5.4-9 VLAN management 3—Ethernet port VLAN configuration

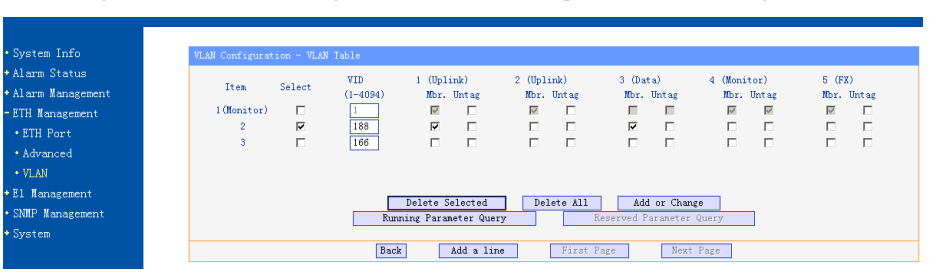


Fig 5.4-10 VLAN management 4—VLAN Table

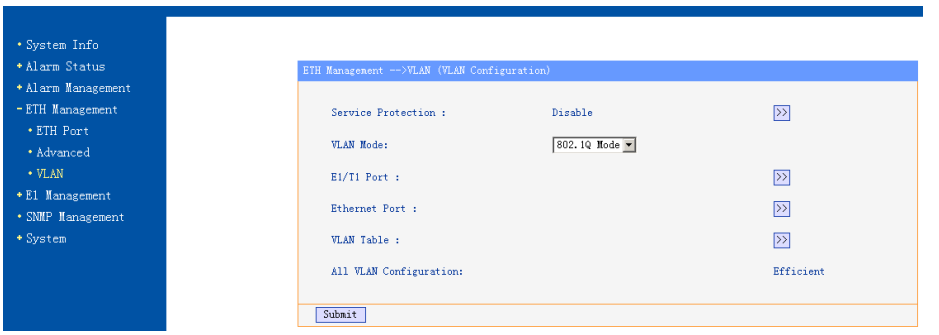


Fig 5.4-11 VLAN management 5—VLAN configuration confirmation

Table 5.4-3 VLAN management parameters

Parameters	Options	Explanation
VLAN Mode	Disable	No VLAN tag
	802.1Q	Add the VLAN tag before Ethernet frame type.
	Q in Q	Add operators VLAN (S-Tag) in 802.1Q. Realizing VLAN stack.
Service Protection	Protection Control	Disable: not supply slave transmission channel. Enable: Both master and slave transmission channels transport service and no data loss during protection switching.
	Attribute	Attribute of 1~5 Ethernet port, including uplink port and data/monitoring port.
	Ethernet Port	Ethernet port number 1~5.
	VID	VLAN ID, support 4094 VLAN, ID, range (1-4094)
E1 Channel VLAN Configuration	Port	E1port number 1～2
	VID	VLAN ID, support 4094 VLAN, ID, range (1-4094)
	Priority	Define customer priority, including 8 PRI degrees (0-7). PRI is higher when this number is bigger.
Ethernet Port VLAN Configuration	Eth Name	Ethernet port number 1~5.
	VID	VLAN ID, support 4094 VLAN, ID, range (1-4094)
	Priority	Define customer priority, including 8 PRI degrees (0-7). PRI is higher when this number is bigger.
VLAN Table	VLAN table configurations, inquiry, add and delete.	

Parameters	Options	Explanation
	Select	When adding VLAN group or VLAN members, property configuration changed, it should be tick off.
	VID	VLAN group ID, support 1-4094
	Mbr.	VLAN group member, it will be VLAN member when tick off
	Untag	tagged/untagged, ticking off means (untag)

Note: According to the PVID value of Data2/NM port, it will automatically generate a default monitoring VLAN entry and it cannot be changed. If it needs to modify the monitoring VID value, it needs to modify the PVID of monitoring port.

5.5 E1 Management

E1 management includes E1 service management, E1 senior management, Bit error test. Every section has many parameters setting. As shown in Table 5.5-1:

5.5.1 E1 Service Management

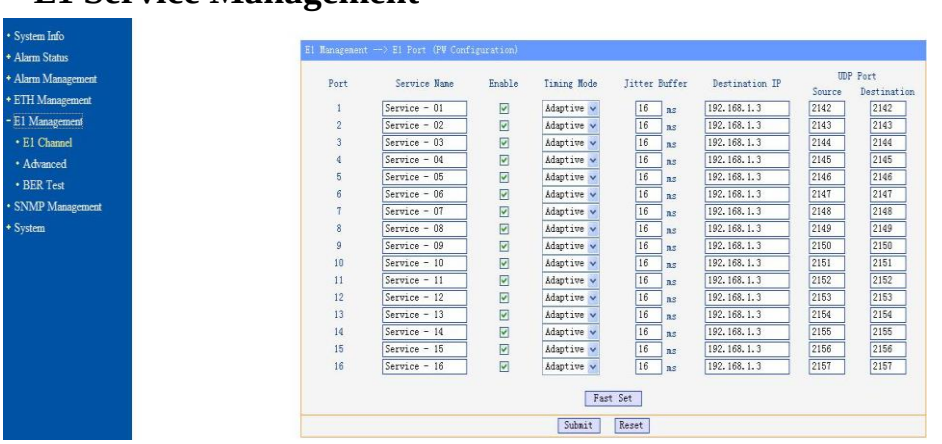


Fig 5.5-1 E1 channel Management

5.5.2 E1 Senior Management

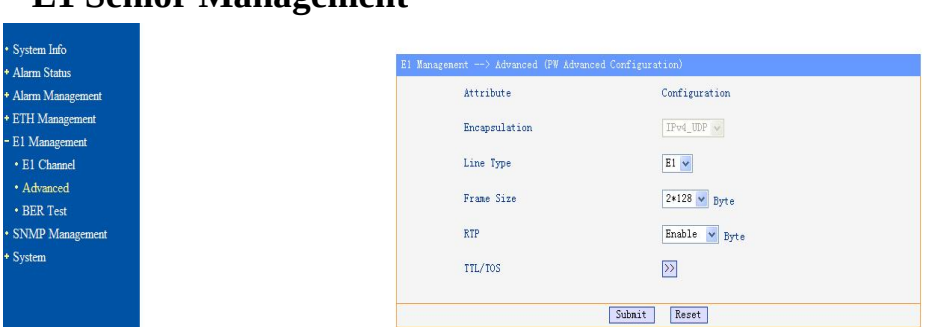


Fig 5.5-2 E1 channel senior Management

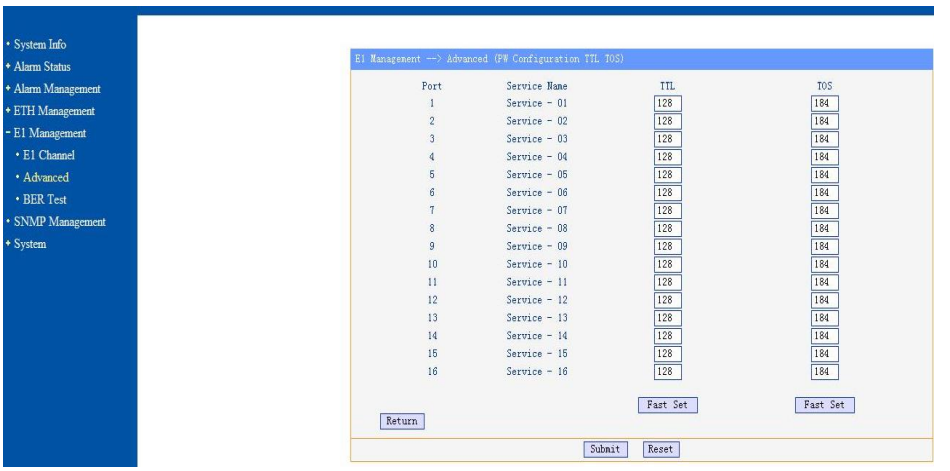


Fig 5.5-3 TTL/TOS configuration of E1 channel Management

Table 5.5-1 E1 Management parameters

Parameters		Selections	Explanations
E1 Channel	Service Name		E1 service name ： support at most 15 capital/small letters, digit and part special character input. Chinese character support 7 numbers(not support some special characters, as “ / ”、 “ \ ” input).
	Enable		Enable this E1 channel. Default: disable
	Timing Mode	Adaptive	Adaptive mode:E1 timing from remote E1 stream
		Loopback	Loop back mode:E1 timing comes from local E1 stream
		Local	Local mode: E1 timing comes from local equipment crystal oscillator
	Jitter Buffer	4~256ms	Jitter absorption buffer: worked with the link with bigger jitter, used to buffer the receiving packets. Coming packets buffer to eliminate jitter. Range：4~256ms Default: 16ms
	Destination IP		Remote end IP address；4 E1 line IP addresses can be set separately Default 192.168.1.3
	UDP Port	Source	UDP Source Port: Effective range:1024~65535
		Destination	UDP Destination Port: Effective range:1024~65535
Advanced	Encapsulation	IPv4_UDP	IP Encapsulation

Parameters		Selections	Explanations
	Frame Size	1×128 byte	Every Ethernet packet encapsulation length can select 1×128 byte /2×128byte/4×128 byte. The longer the packet is, the more E1 data encapsulated in the packet, the lower expense ratio is, the higher bandwidth efficiency is and the bigger time delay is. Vise versa. Default: 2
		2×128 byte	
		4×128 byte	
	RTP	Enable	Real-time Transport Protocol, used to define E1 time Stamp. Default: Enable
		Disable	
	TTL/TOS		TTL: Time To Live, Default: 128 TOS: Type Of Service, Default: 184

Supplementary item:

1. Whether E1 bandwidth is adaptive depends on whether enable this E1. **Suggestion:** If this E1 is not used, it is better to let this E1 channel disabled.
2. Each end of Ethernet devices has a unique and fixed with 12 a hexadecimal MAC address, such as 80-80-80-80-80-80, can make the communication with other equipment. TECHROUTES-TDMOIP-63E1 equipment Ethernet MAC address has formed, not need to set. TECHROUTES-TDMOIP series equipment support ARP protocol addressing, the opposite equipment or default gateway equipment's MAC address can automatically get through Negotiation, no need to set the opposite end MAC address, but need set up IP address

Note：In Ethernet broadcast domain, all the equipment's MAC addres s must be the only, otherwise it will cause address conflict.

3. In order to improve the transmission service quality of E1 data ， according to provide transmission Ethernet whether support IEEE 802.1 Q, 802.1 AD and 802.1 p standard, TECHROUTES-TDMOIP series equipment can set the standard is packed to join contain priority VLAN label (V-Tag) or QinQ label (S-Tag). According to 802.1 Q/QinQ / 802.1 p standard packing, the encapsulation spending slightly bigger, but can be transmitted by higher priority. But not support 802.1p standard network, there is no practical significance, but increases unnecessary transmission bandwidth costs , therefore, will make VLAN set to Disable

5.5.3 Error test

Click BER Test will display error Test , including error Test enable, the selection of Test channels ,the selection of test start and end, port state r frame synchronization out-of-frame), (Bit), error-rate and Test duration , as shown in

figure 5.5-4 . If need to test error for channel , the first elected "enable" and "start", and second click "submit" button for beginning to test. The end could choose the channel "stop", and click "submit" button, this time display test results. During test click on the "Refresh" button, can inquiry test error.

By the current time

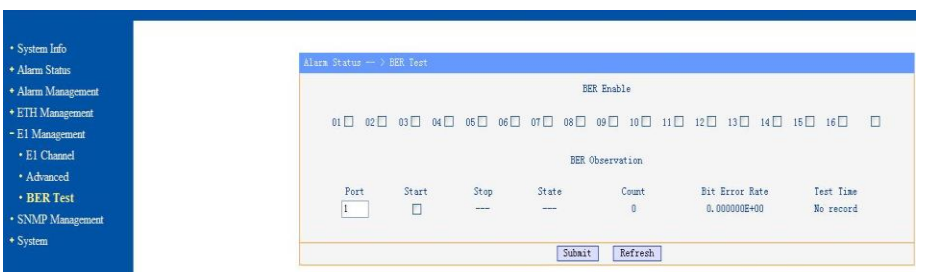


Fig 5.5-4 Error test

5.6 SNMP Management

SMMP management is the figure 5.6-1,SNMP parameters is in the table 5.6-1

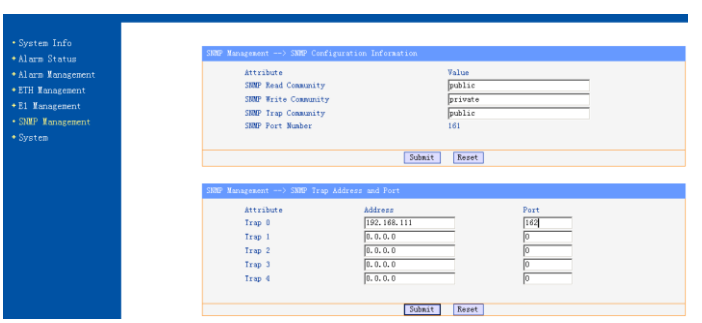


Fig 5.6-1 SNMP management

Table 5.6-1 SNMP management parameters

Parameters		Option	Explanations
SNMP Configuration Information	SNMP Read Community		Read commands of device nodes (Read-only) Default: public
	SNMP Write Community		Configure commands of device nodes Default: private
	SNMP Trap Community		Receive commands of Trap Default: public

Parameters		Option	Explanations
	SNMP Port Number		The communication ports connecting the devices with SNMP, SNMP protocol, Default: port: 161
SNMP Trap Address and Port	SNMP Trap Address		Address used to receive Trap information: The most addresses and ports can be set is up to 5. That means the device can sent Trap information to 5 network management equipments. SNMP Trap Address needs to be configured at the first time(initial value: 0), but it can be saved and recovered.
	SNMP Trap Port		Ports used to receive Trap information: it needs to be configured at the first time (initial value: 0), but it can be saved and recovered.

5.7 System Configuration

This section includes time configuration, change the password, Default parameter recovery, upgrade online and reboot system.

5.7.1 System time management

System time can be modified in three ways: manually enter the time, Get Local PC Time or SNTP network time. As shown in Fig 5.7-1.

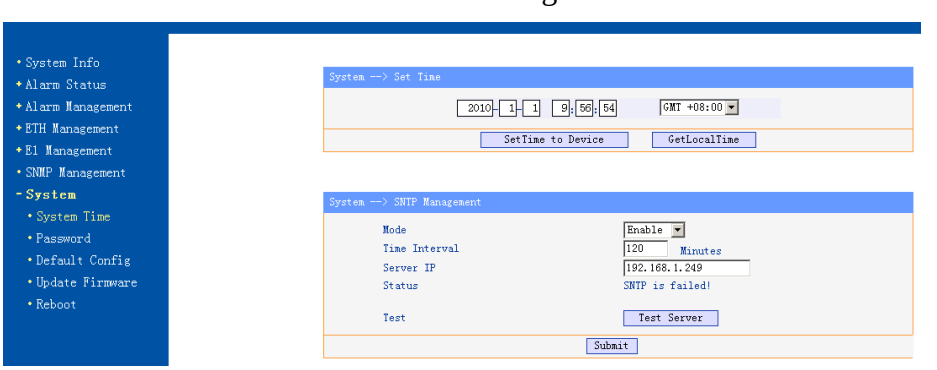


Fig 5.7-1 system time management

SNTP management includes SNTP server option (stop/start/test), time setting interval (10~60000 minutes), SNTP server IP address and SNTP server status

display (disable/enable, connect successfully/fail).

Note: It needs to get the current time again once the power is off.

5.7.2 password management

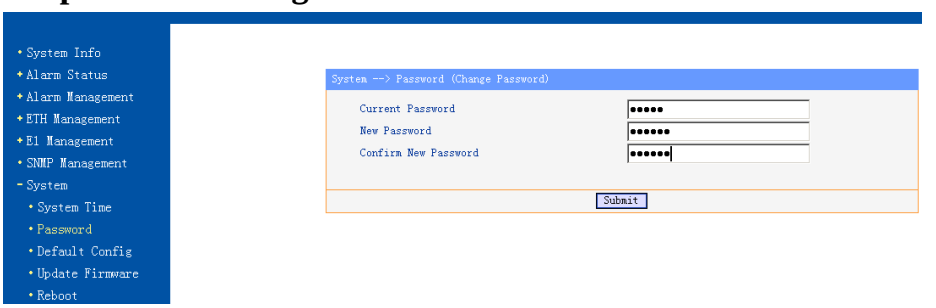


Fig 5.7-2 password management

The change will be valid after confirm the submitting.

5.7.3 Default parameter recovery

Default parameter recovery can make all the parameters recover to factory default except the IP address of equipments and the devices will reboot automatically. If not selected to remain current IP, IP address will also recover to factory default (192.168.1.2). At the same time, due to the change of IP, it will show Access failed. Then we need to restart Web Server.

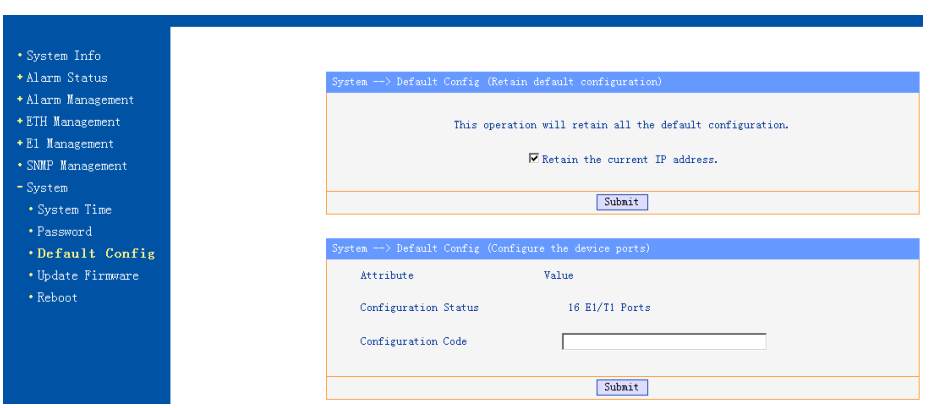


Fig 5.7-3 default parameters recovery

TECHROUTES-TDMOIP supports changing E1/T1 port number. For example, change TECHROUTES-TDMOIP E1/T1 port number to 1. It is shown as follows:

Step 1. Generate the configuration code by verification code. Input the MAC address of TECHROUTES-TDMOIP and set E1 number as 1 and then click Generate.

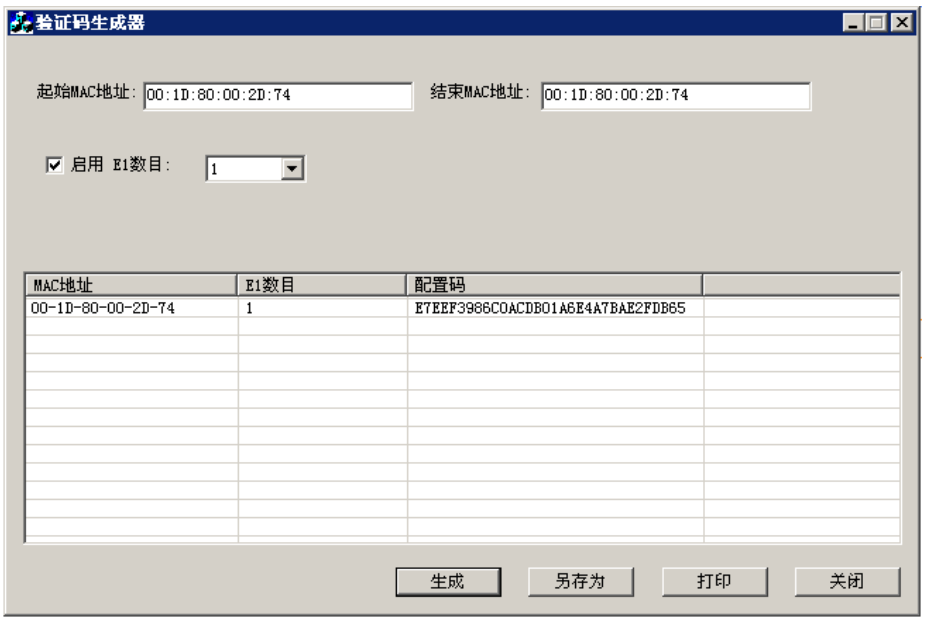


Fig 5.7-4 generate configuration code

Step 2. Input the configuration code and click Submit.

Fig 5.7-5 change E1/T1 port number

Step 3 .Check the E1/T1 number in Configuration Status to confirm whether the change is successful.

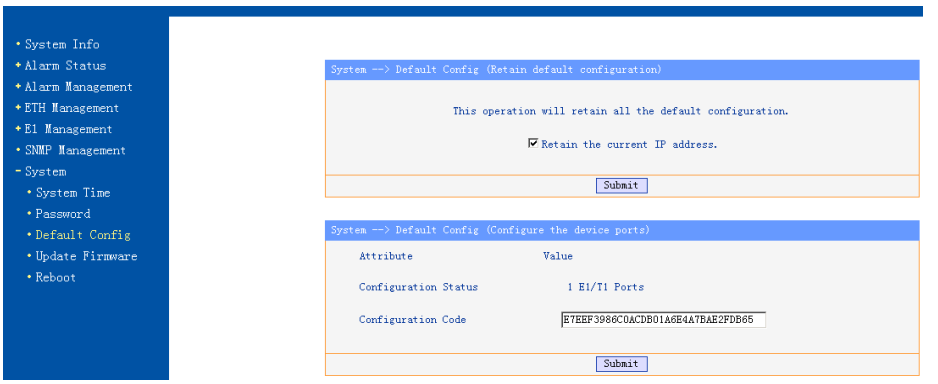


Fig 5.7-6 change is successful

5.7.4 Upgrade online

Both TECHROUTES-TDMOIP hardware and software program can be upgraded by ftp. Following will introduce Web Server upgrade online operation.

Step 1: Use any FTP tool or input ftp://root:root@192.168.1.2/home/ftp directly in My Computer address bar to access the ftp server. And then copy the upgrade program to the server, as figure 5.7-7.

Note: Hardware program file name is H_Patch.r, and software program file name is S_patch.r. The file name cannot be changed.

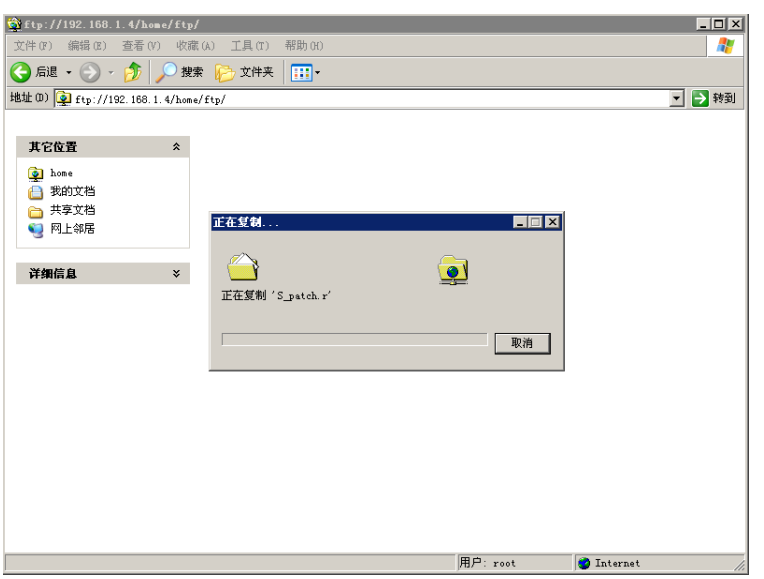


Fig 5.7-7 upgrade online 1—upload upgrade program

Step 2: Select program type (it is available to select software and hardware at the same time) and click Upgrade to start.

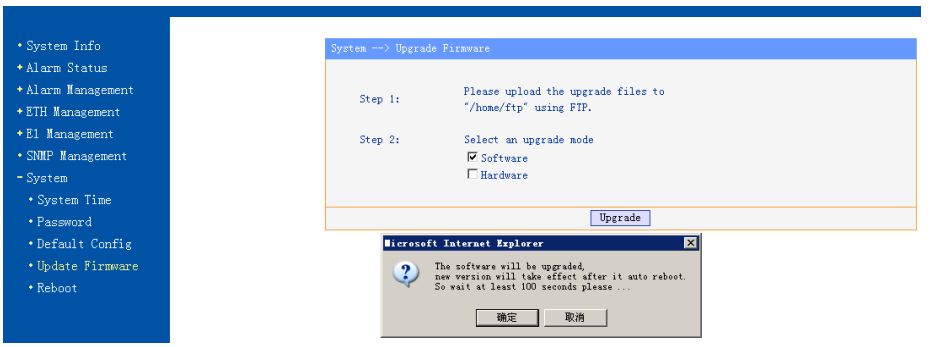


Fig 5.7-8 upgrade online 2—upgrade program

It may take several minutes to complete the upgrade. During the upgrade, we can refresh to check upgrade progress.

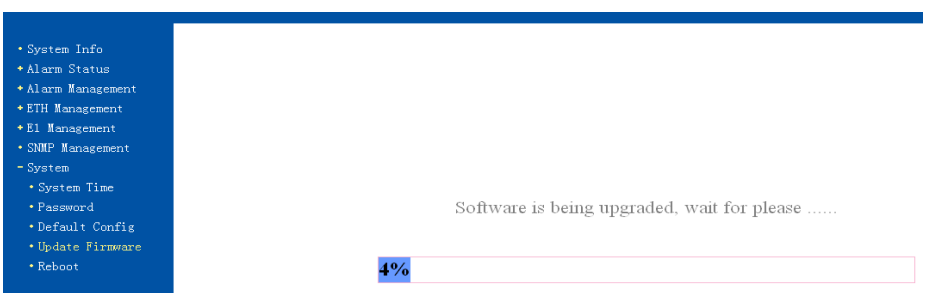


Fig 5.7-9 upgrade online 3—during the upgrade

When the upgrade is done, click Confirm to reboot the equipment. Login Web management again to check the version number and confirm the upgrade is successful.

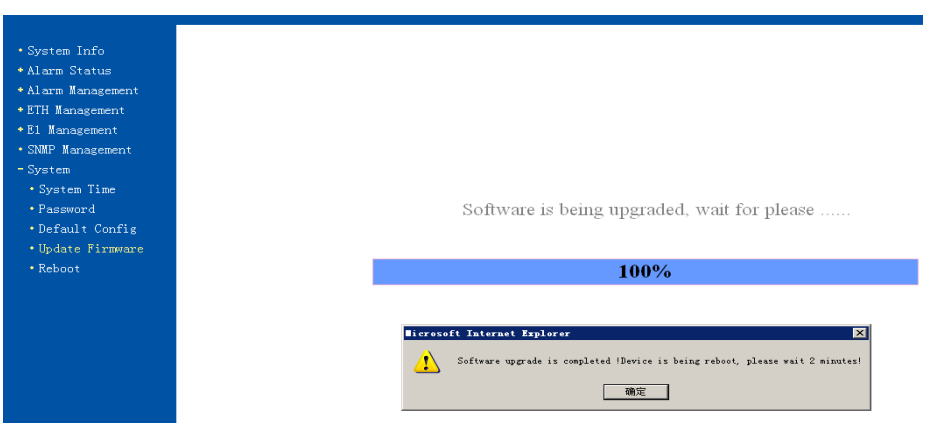


Fig 5.7-10 upgrade online 4—operate successfully

Note: If the power is off during upgrade, it may make equipment not start and need to program procedures with download line.

5.7.5 Reboot system

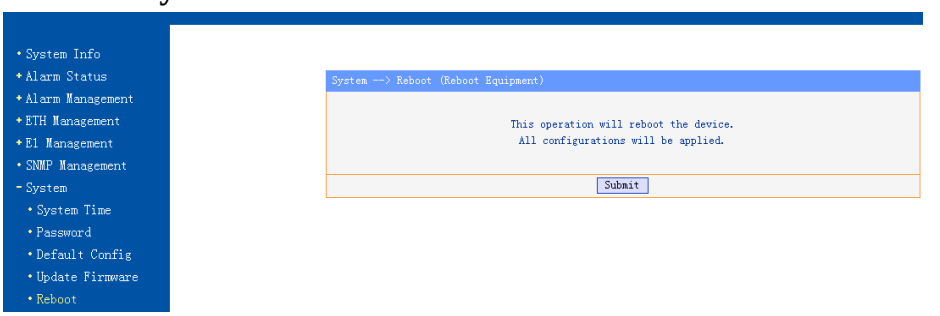


Fig5..7-11 Reboot equipment

6. 🕮 *Specification*

6.1 Capacity

TECHROUTES-TDMOIP-4E1-4ETH 4 E1/T1 ports, 4 100Base-Tx Ethernet electrical ports，1 100Base-Fx Ethernet optical port；

TECHROUTES-TDMOIP-8E1-4ETH 8 E1/T1 ports , 4 100Base-Tx Ethernet electrical ports，1 100Base-Fx Ethernet optical port

TECHROUTES-TDMOIP-16E1-4ETH 16 E1/T1 ports, 4 100Base-Tx Ethernet electrical ports，1 100Base-Fx Ethernet optical port

6.2 E1/T1 Interface Features

Comply with ITU-T G.703 recommendation

End-to-end delay (minimum delay setting): ≤ 10ms

Output frequency offset (adaptive timing, stabilized): ≤□5 ppm

Output jitter (adaptive timing): ≤ 0.1UI

Interface Impedance default：E1-120Ω/T1-100Ω; Supporting 75Ω

Connector: RJ-48C

Ports: TECHROUTES-TDMOIP-4E1-4ETH : 4 E1/T1 ports

TECHROUTES-TDMOIP-8E1-4ETH : 8 E1/T1 ports

TECHROUTES-TDMOIP-16E1-4ETH : 16 E1/T1 ports

6.3 Ethernet Port

Comply with IEEE 802.3、802.1Q、802.1ad、802.1P and relative other protocol.

Operating Mode：electrical port support auto-negotiation forced 10M/100M, Half/Full Duplex ， optical support forced 100M full duplex

MTU: 2000 byte

Connector： 100M Electrical port: RJ45

100M Optical Port: LC

Interface no.: 100M Electrical Port： 4

100M Optical Port: 1

6.4 POE function

TECHROUTES-TDMOIP-4/8/16E1-4ETH-P uplinked could support POE function

voltage: 55V

power: 50W

6.5 Power

AC: 100V~260V/50Hz ~60Hz (fuse: 1A)

DC: -36V ~ -72V

Power Consumption: **TECHROUTES-TDMOIP-16E1-4ETH： ≤7W**

TECHROUTES-TDMOIP-4/8E1-4ETH： ≤6.5W

6.6 Operating condition

Temperature: (0～45) ℃

Humidity: ≤90％RH (non-condensing)

6.7 Dimensions

Width × Height × Depth (mm): **440× 44× 136.5**

6.8 Weight

Net weight ≤3.5kg

Appendix

Specialized terminologies and acronyms:

Acronym	Explanations
TDM	Time Division Multiplex
SAToP	Structure-Agnostic TDM over Packet
DSCP	Differentiated Services Code point
UDP	User Datagram Protocol
QoS	Quality of Service
TOS	terms of service
TTL	Time To Live
VLAN	Virtual Local Area Network
RTP	Real-time Transport Protocol
SNTP	Simple Network Time Protocol
POE	Power Over Ethernet