Arioonet320

Multi-service Optical Terminal

User Handbook

V1.02

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Revision History

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Contents

1 Introduction

1.1 Overview

PMUX-240 is designed as a modular system with two 155Mb/s optical interfaces to provide an ultra-compact, cost-effective and flexible multi-service platform. With optional cards such as E1 card and Ethernet card, it is easy to meet user's various requirements. It can realize the 4/8/16E1 and 100Mbps Ethernet transmission over optical line.

With low power consumption, high integration and well stability, PMUX-240 can be used to build point-to-point network; it is a cost-competitive solution for the application such as the telecommunication, the electric power and the finance fields.

1.2 Features

- Standard rack with 1U height and 19 Inch width
- Optical Interface
  - Two 155Mb/s optical interfaces, LC type SFP module, hot pluggable
  - Provides optical line 1+1 protection with switching time less than 50ms
  - Supports RPD (Remote Power down Detection) information sending function
  - Supports ALS (Automatic Leaser Shutdown) to protect operators from hurt
  - Local equipment supports optical line loop and device loop, remote equipment supports optical line loop
- E1 Interface
  - Provides 4/8/16 E1 interfaces
  - Optional 120Ω balanced E1 interface / 75Ω unbalanced E1 interface
  - E1 interface, Jitter tolerance and jitter generation fully comply with ITU-T G.703, G.823 recommendations.
  - Supports E1 device loop and E1 line loop for easy testing.
- Ethernet Interface
  - Provides 4 copper fast Ethernet interfaces
  - Four Ethernet ports share 100Mbps
  - Supports auto-negotiation, it can also be set to 10M full/half-duplex, 100M full/half-duplex mode by force
  - Accepts frames with length between 64 and 1518/1916 bytes (otherwise filtering).
  - VLAN function based on tags compliant to IEEE 802.1Q.
  - Up to 16 VLAN table
  - Supports MAC address dynamic learning
  - Auto MDI/MDX function.
  - Supports Link Fault Pass Through function
  - Throughout statistic of the Ethernet packets based on port

- Supports flow control and broadcast storm filtering control.
- Supports port rate control.

- Equipment timing mode
  - Tracing from local timing
  - Tracing from Optical line
  - Tracing from E1 line
- Supports embedded BERT for troubleshooting
- Management
  - Provides serial management interface(CONSOLE) and Ethernet management interface (EMU), both adopt RJ45 connector
  - Supports local management based on CLI command via CONSOLE interface or Telnet login
  - Supports local management based on WEB Browser login via local management interface (EMU)
  - Supports SmartView network management platform based on SNMP_V1 and SNMP_V2 protocol to perform excellent management
  - Supports firmware update online by remote control

2 System Architecture

2.1 Structure Diagram

PMUX-240 consists of chassis, system mainboard, E1 card and power module, as Figure.2-1 shows:

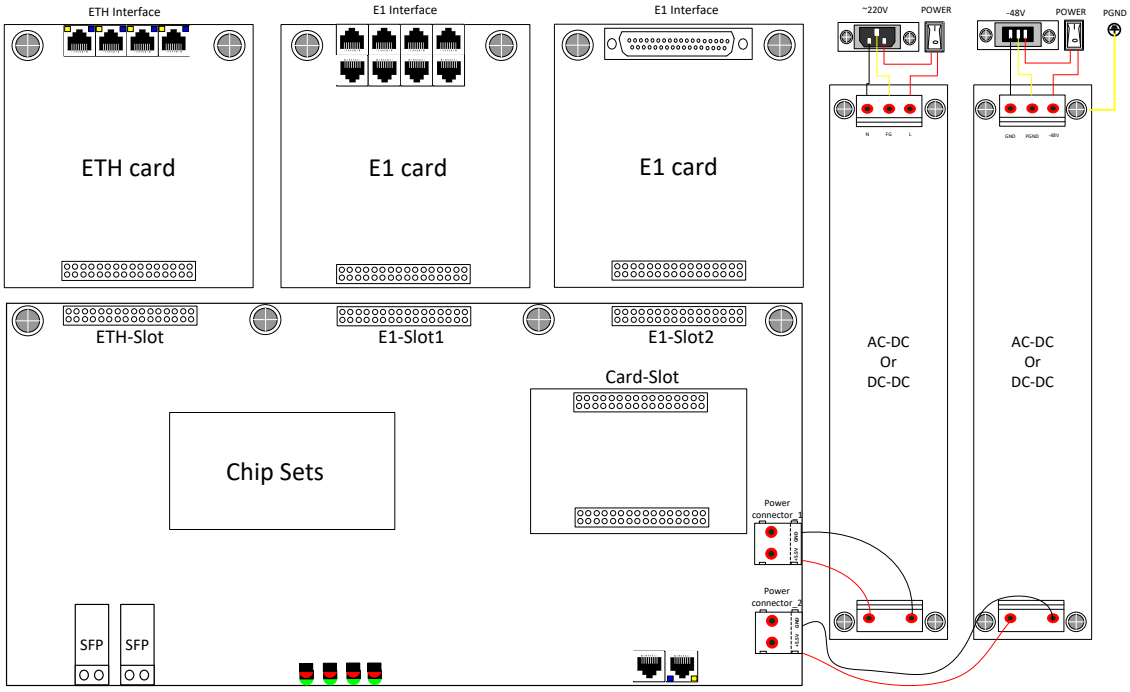


Figure.2-1 Structure diagram

2.2 Components of PMUX-240

Table 2-2 Components of PMUX-240

Type	Specification		Description	Remarks
chassis	PMUX-240 chassis		1U height, 482.6mm width and 195mm depth; The color of the chassis is black in default, it can be customized.	Required
mainboard	PMUX-240 mainboard		Multi-service platform mainboard with power supply of 5.5V	Optional
ARM card	CARM702J card		Realize card management and network-based management	Required
E1 card	CLIU8 card	DB37F-BNC-8E1 cable adapter	8-unbalanced E1 card, provide BNC interface by the cable adapter	Optional
	CLIU4 card	DB37F-BNC-4E1 cable adapter	4-unbalanced E1 card, provide BNC interface by the cable adapter	
	CLIUB8-	-	8-balanced E1 card, RJ48C	

	B card		interface	
	CLIUB4-B card	-	4-balanced E1 card, RJ48C interface	
Ethernet card	CET4		4 Electrical Ethernet interfaces	Optional
SFP module	155M SFP module*		155M SFP module	Optional
15W power module	□ -48V DC single power □ 220V AC single power □ -48V DC +220V AC double power □ -48V DC +-48V DC double power □ 220V AC +220V AC double power		RPW15DC-K5V5, -48V to +5.5V (DC/DC）; RPW25AC-K5V5, ~220V to +5.5V (AC/DC)；	One is required, the other is optional

Note 1: Items designated with '□' means optional.

*Note 2: PMUX-240 supports all types of 155M SFP optical module; users can purchase the SFP optical module by themselves. It is suggested to use the SFP module with DDM function; otherwise, some information may not be uploaded and shown correctly.

2.3 Card slot of PMUX-240

Table 2-3 card slot of PMUX-240

Name	Description
ETH-Slot	Ethernet card slot
E1-Slot1	E1 card slot
E1-Slot2	E1 card slot
Card-slot	CARM702 card slot
Power connector _1/2	Power module socket, if the selected power module is DC-DC module, the corresponding panel is -48VDC panel, if the selected power module is AC-DC module, the corresponding panel is 220VAC panel.

Note1: For the Ethernet and E1 card, Hot plug is not supported!

Note2: Before hot plugging the SFP optical module, both the operator and the device must be connected to the same earth in a reliable way! Otherwise, the device may be damaged!

2.4 Introduction to E1/Etherent Card

PMUX-240 can provide four kinds of E1 card to provide E1 interface: CLIU4, CLIU8, CLIUB4-B and CLIUB8-B E1 card, and provides CET4 card, to provide Ethernet interfaces.
Note: The E1/Ethernet card do not support hot-pluggable, before installing E1/Ethernet cards, make sure the equipment is power off and open the chassis.

2.4.1 CLIU4/8 E1 Card

CLIU4/8 is the unbalanced E1 card providing 4/8 E1 unbalanced interfaces with a bit rate of 2.048 Mb/s, which is compliant to ITU-T G.703 standard. It adopts DB37 connector as its physical interface, provides BNC interfaces by DB37F-BNC-4/8E1 cable adapter. Refer to Appendix 2 for E1 adapter.

2.4.2 CLIUB4/8-B Card

CLIUB4/8-B is the balanced E1 card providing 4/8 E1 balanced interfaces with a bit rate of 2.048 Mb/s, which is compliant to ITU-T G.703 standard. It adopts RJ45 connector as its physical interface. Refer to Appendix 2 for more.

2.4.3 CET4 card

CET4 is an Ethernet card used for local LAN access and can provide 4 shared electrical Ethernet interfaces compliant to IEEE 802.3u 100 BASE-TX standards. These 4 Ethernet interfaces share a wan channel, the bandwidth of which can be up to 100Mb/s.
The 4 fast Ethernet interfaces operate in full or half duplex with flow control, besides, CET4 supports VLAN function.

3 Typical Application

PMUX-240 can be used to build point-to-point network, the four Ethernet ports share 100Mb/s, as the following figure shows:

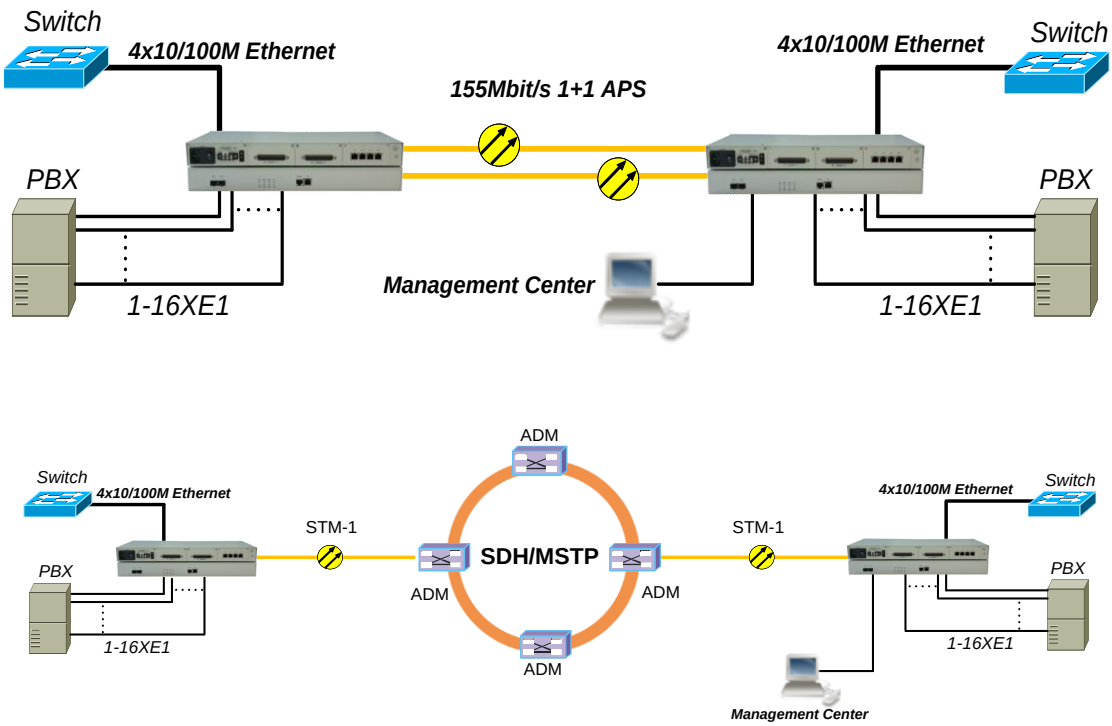


Fig. 3-1 Point to point network

4 Panel Description

4.1 Front Panel

The front panel is arranged with optical interfaces, work status indicators, alarm indicators and management interfaces, as Fig.4-1 shows:

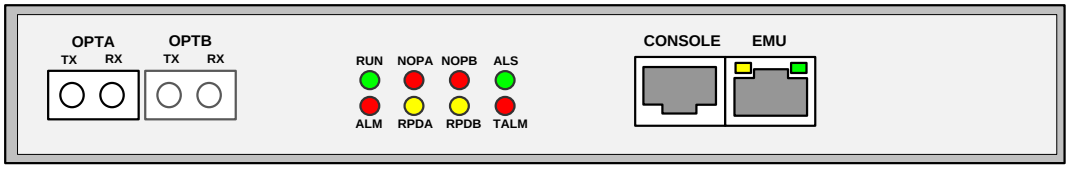


Fig. 4-1 Front Panel

Table 4-1-1 Indicators on front panel

Name	Description
RUN	Running indicator, green. BLINK: Device works normally (the blink cycle is 0.3s) Quickly blink: Device initializing (the quickly blink cycle is 0.1s) Slowly blink: Data transferring from ARM to FLASH (the slowly blink cycle is 1s) ON or OFF: Abnormal working status
ALM	Alarm indicator, red ON: Alarm present OFF: No alarm
NOPA/B	Optical signal loss alarm indicator ,red ON: Optical signal loss is detected at port A/B OFF: SFP works normally or no SFP module present in the socket, or optical interface is disabled by management software or NOP alarm is shielded by software. Note: When the fiber is broken, if ALS is enabled, the interface will start sending a laser pulse in a certain interval periodically. When the fiber is healed, the emitter will send laser after a while as ALS is enabled. Thus, if the fiber has already recovered, this indicator will still be ON for a short time, and then be OFF.(if ALS worked in short interval mode, the time delay is about 12.5s; while if ALS worked in long interval mode, this time delay is about 100s)
RPDA/B	Remote device power-down indicator, yellow ON: Remote power down Note1: RPDA/B must be used combined with NOP LED to indicate the

	remote power down or fiber break. Refer to 5.2 'RPD' for more. Note2: if RPD alarm is shielded by management software, or no SPF module present in the socket, the corresponding RPD alarm of the corresponding optical interface will be off.
TALM	TLOS of E1 port indicator, red. ON: TLOS alarm is detected on at least one E1 port OFF: TLOS alarm is detected on none of E1 ports or E1 card is not present on the socket.
ALS	ALS indicator, green ON: ALS function of the two optical interfaces are configured as enabled simultaneously by management software; OFF: ALS function of the two optical interfaces are configured as disabled simultaneously by management software; Note: The ALS function of optical A and B must be configured as enable or disable simultaneously; only when the corresponding optical interface detects a Loss of signal and the ALS is enabled by the management software, that particular optical interface will enter into the ALS state.

Table 4-1-2 EMU interface indicators

LINK/ACTIVE	Ethernet link indicator, green ON: Normal link but no data transmit or receive; Blink: Normal link and there are data transmitting and receiving; OFF: No link or the interface is damaged
SPEED	Ethernet speed indicator, yellow ON: operating with 100M; OFF: operating with 10M

Table 4-1-3 Interfaces on front panel

Name	Functional Description	Remark
OPTA/B	155M optical port A and B, perform 155M signal transmitting and receiving; It is SFP optical interface, supports HOT-pluggable.	Before using fiber to connect the two devices, the parameters of optical interface (Mean launched power– maximum and Minimum overload) should be considered carefully, otherwise, the optical module may be damaged.
CONSOLE	Serial network management interface	Refer to appendix 1 for the cable

	(RJ-45 interface), for CLI management	definition
EMU	Ethernet network management interface (RJ-45 interface), for local and remote management	crossover and straight through cable auto-adaptive

4.2 Rear Panel

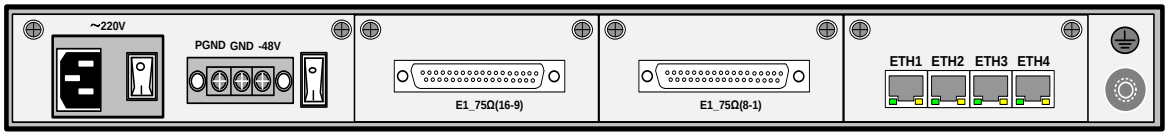


Fig. 4-2-1 Rear panel

Table 4-2 Rear panel description

Name	Functional description	
-48VIN	-48V AC power interface, the accepted voltage ranges from -36 to -72V.	
PGND	Protective ground	
GND	-48V power ground	
~220VIN	~220V AC power interface, the permitted voltage range is: 85~264V	
Power	Power switch. 'I': Power on; 'O': Power off	
E1 Interface	As Figure 4-2-1 shows, if CLIU8/4 E1 card is installed, there are 8/4 E1 unbalance interfaces(DB37) available, the DB37F-BNC-8E1/4E1 cable adapter is needed, refer to appendix 2; if CLIUB8/4-B E1 card is installed, there are 8/4 E1 balanced interfaces(RJ48C) available. If no card is installed, there are no E1 interfaces.	
Ethernet interface	4 Ethernet interfaces, auto-detect the cross-over and straight-through cable. If CET4 card is installed, there are 4 shared copper Ethernet interfaces,	
	ETH1-ETH4	Shared electrical Ethernet Interfaces (RJ45 connector, and are numbered as Ethernet port 1 to 4) supports cross and straight cable; The RJ45 connector includes green LINK/ACT and yellow SPD indicators; Green LINK/ACT indicator will shine when Ethernet interface has been connected; while blinking if the Ethernet interface is transmitting or receiving data; Yellow SPD indicator: Lighting for 100M, Non-Lighting for 10M.
⏚	Protective ground (PGND) screw, connect with the chassis. The PGND screw should be connected to the equipment room ground by the external PGND cord.	

5 Functional Description

5.1 Automatic Laser Shutdown

In order to minimize or eliminate risk of exposure to laser radiation from fiber breaks, all optical interfaces in the PMUX-240 support the Automatic Laser Shutdown (ALS) function.

When an optical interface detects a Loss of Signal (LOS) for 800ms, it will enter into an ALS state. The interface will then start sending a laser pulse in a certain interval periodically (10/100s cease and 2s transmit) in order to restore as the fiber is healed.

In default, ALS is disabled.

PMUX-240 also supports manually send a laser pulse when ALS is enabled, using manual function to send restart pulse to restore the laser within 2s when fiber is healed; if fiber is still broken, the laser only lasts for 2s, after that, it will automatically send pulse in a certain interval again.

Note:

(1) Enable or disable ALS just means that the ALS function is effective configured by management software, only when the corresponding optical interface detects a Loss of signal and the ALS is enabled by the management software, that particular optical interface will enter into the ALS state.

(2) ALS should be disabled when measuring Average Optical Transmit Power and Receiving Sensitivity.

5.2 Remote Power down Detection(RPD)

During the project launching and daily maintenance, there will be defects such as the broken of optical fiber line or power-off of the remote equipment. RPD is used to identify these two defects to make maintenance facility. With the management software or the RPD alarm LED on the front of the device, the operator can view whether the RPD alarm presents.

Table 5-2 lists the corresponding alarm LED status in case of fiber broken or device power down.

Table 5-2 RPD and NOP case

LED / Case	RPDA(B)	NOPA(B)
The remote device connected with port A(B) power- off and optical fiber is normal	ON	OFF
Fiber A(B) is broken	OFF	ON
Both the remote device connected with port A(B) and optical fiber are normal	OFF	OFF

5.3 Ethernet function

PMUX-240 provides four fast Ethernet interfaces (LAN interface), compatible with IEEE802.3 series standard. Each interface supports auto-negotiation, which can work in 100M full/half-duplex, 10M full/half-duplex mode; it can also be set to 100M full/half-duplex, 10M full/half-duplex mode by force(note: the FX port cannot be set to 10M mode by force). The default is auto-negotiation. Each LAN interface supports flow-control separately.

PMUX-240 provides one WAN interfaces (inside and invisible) compatible with IEEE802.3/802.3u standard, which is fixed to 100M full-duplex mode, the bandwidth is 100M.

PMUX-240 supports up to 1518/1916 bytes per Ethernet frame, it can be configured by management software to meet the user's needs. In default, the maximum packet length is 1916 bytes.

In order to meet the user's various requirements, PMUX-240 supports standard aging: The MAC address learning is enabled and the aging time is 300s;

5.3.1 Port Rate Control

PMUX-240 supports port rate control function, user can control the port rate (bandwidth) of the ingress or egress traffic on each port, to protect regular traffic from an overabundance of the broadcast or multicast traffic.

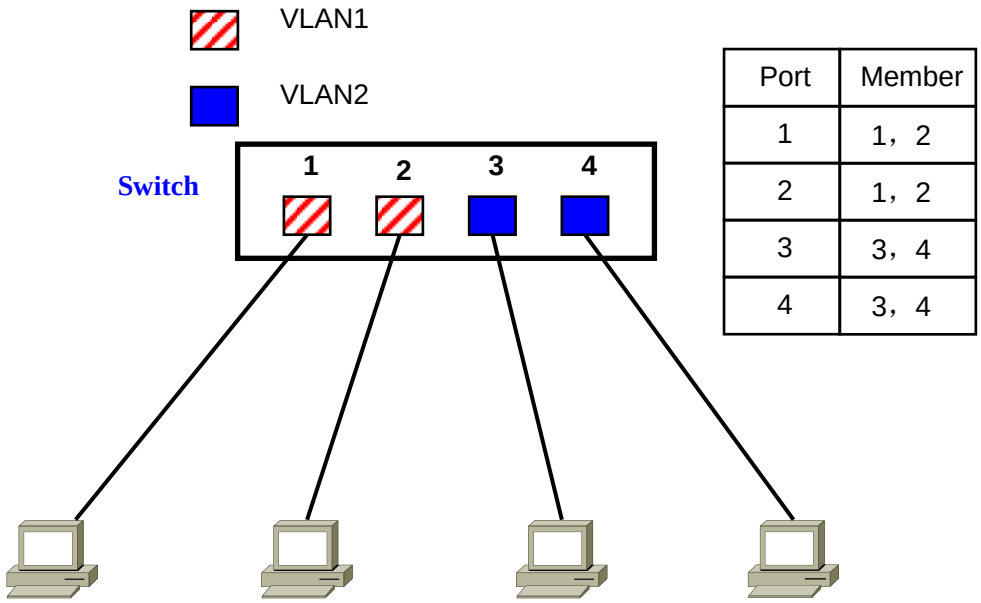
The port bandwidth can be set as 2M, 3M, 4M…100M.

5.4 VLAN Function

5.4.1 Port-based VLAN

Port-based VLAN is used to assign each port of one switch to a separate VLAN, or multiple ports to the same VLAN. Port-based VLAN can't across different switches.

Port-based VLAN doesn’t require its bridge to recognize the VLAN-tagged frames or to look up the VLAN table; Packets received from a port will only go forward to its associated ports - port members, so you must define the port member for each port, that is, to define the final destination ports allowed for each port, as Fig. 5-4-1-1 shows:



Port	Member
1	1，2
2	1，2
3	3，4
4	3，4

Fig. 5-7-1-1 Port-based VLAN

Fig. 5-4-1-1 is the diagram for a switch with 4 ports, while PMUX-240 provides 5 ports at most (4 LAN ports and 1 WAN port).

5.4.1.1 Configuration Instance

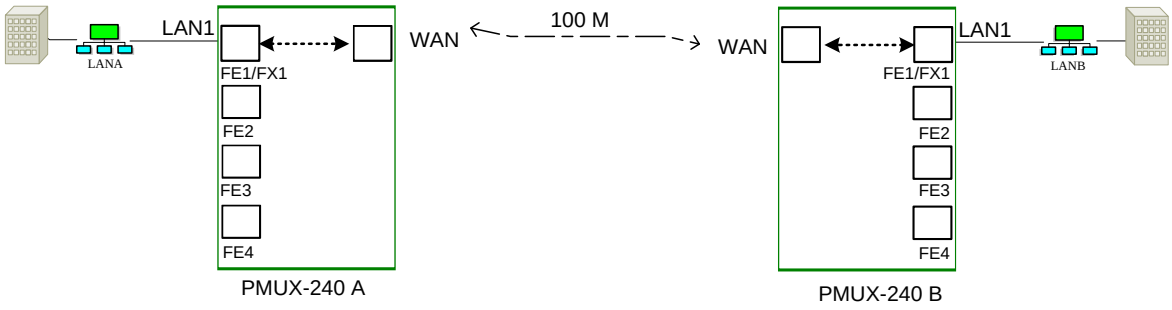


Fig. 5-4-1-1 Application for port-based VLAN

As Fig. 5-4-1-1 shows, by creating port-based VLAN to the two equipments (PMUX-240 A and PMUX-240 B）separately, the following communication can be implemented:

LAN A<---------->LAN B

Configuration steps:

Step 1: Disable the 802.1Q tag-based VLAN of both the two equipments;

Step 2: Configure the port table of PMUX-240 A, as table 5-4-1-2-1 shows:

Table 5-4-1-2-1

port	Port Member

LAN1	LAN1, WAN
WAN	LAN1, WAN

Step 3: Configure port table for PMUX-240 B, as table 5-4-1-2-1 shows, therefore, the port-based VLAN has been created for the two equipments;

----------Config finish----------

5.4.2 802.1 Q Tag-based VLAN

The 802.1Q Tag-based VLAN requires its bridge to recognize frames with a VLAN tag; lookup the VLAN table to find out the record whose VLAN ID is identical with the packet tag; forward packet according to both the record of VLAN table and the port members.

The 802.1Q Tag-based VLAN is used to achieve VLAN across switches, that is, it allows the ports of different switches be assigned to the same VLAN, as Fig.5-4-2-1shows;

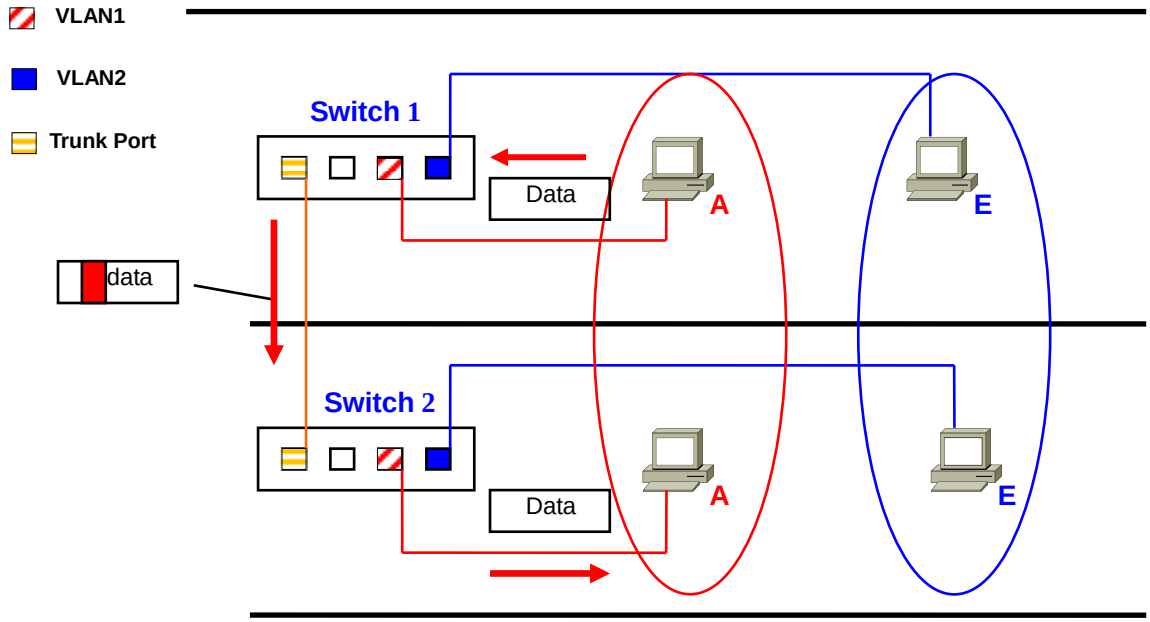


Fig. 5-4-2-1 802.1Q Tag-based VLAN

5.4.2.1 802.1Q Tag-based VLAN Term

Tag: 802.1Q VLAN Tag header, which is a field within a frame that identifies the VLAN.

Tagged frame: A data frame that contains 802.1Q VLAN tag header.

Untagged frame: A data frame that does not contain 802.1Q VLAN tag header.

VLAN ID: VLAN IDentification, a unique number (between 1 and 4094) that identifies a particular VLAN. The default VLAN ID is '1. (VLAN ID=0 is NULLVLAN, 4095 is reserved.)

PVID: Port VLAN ID, a unique number (between 1 and 4094), the default PVID for all the ports is '1'. PVID is an identification used to classify incoming untagged frames when they are received, for example, if PVID of port 1 of switch is '2', it means that any untagged incoming traffic received on port 1 of switch will be considered as traffic of VLAN 2 in the switch.
Access, Trunk, Hybrid: The port mode for VLAN, refer to Table 5-4-2-1 for more.

Table 5-4-2-1 VLAN port mode

Mode	Description	Remark
Access	All the packets received on the ingress of the 'Access port' can only belong to one VLAN; On the ingress of the port, when the tagged packet received on the port, if the VLAN ID is consistent to the port PVID, the packet will be forward; otherwise, the packet will be discarded; when the untagged packet received on the port, the packet will be added on PVID tag, then go forward to the specific VLAN according to the PVID; On the egress of the port, the tag will be removed before forwarding to the end station.	When an Ethernet port is connected with terminal device such as a PC, this port mode is recommended.
Trunk	It is also called Tag-aware port mode; Packets with different Tag received on the ingress of the 'Trunk port' could belong to different VLANs. On the ingress of the port, the received packet that is already VLAN-tagged can be correctly forwarded; the untagged packet received will be added on PVID tag and forwarded to the specific VLAN according to the PVID; On the egress of the port, the tagged packet will be transmitted directly.	when an Ethernet port is connected with device that can distinguish and deal with VLAN tag such as SWITCH with VLAN function, this mode is recommended
Hybrid	Packets with different Tag received on the ingress of the 'Hybrid port' could belong to different VLANs; On the ingress of the port, the process of forwarding in Hybrid mode is the same as that in Trunk mode.	Hybrid Port connects LAN that combines tagged or untagged devices or switches, this port mode can be adopted in more complex environment

	On the egress of the port, if it is the untagged packet before entering into the device, the output will be untagged packet on the egress of the port; if it is the tagged packet before entering into the device, the output will be the tagged packet on the egress of the port.	

5.4.2.2 Configuration Instance

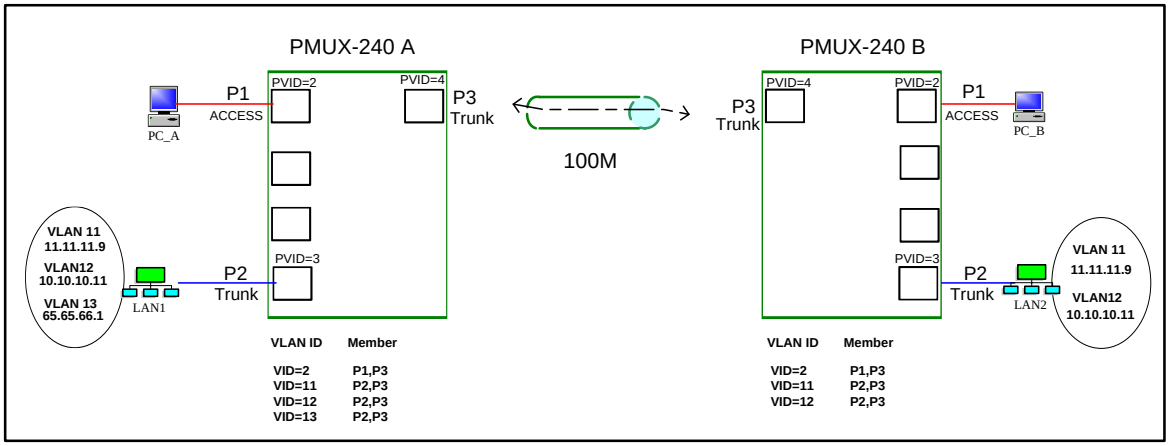


Fig. 5-4-2-2-1 Typical Application for 802.1Q Tag-based VLAN

As Fig. 5-4-2-2-1 shows, the port P1 of the two equipments connects to a PC separately, and port P2 connects to a LAN separately. The following communication can be implemented.

PC_A<---------->PC_B

LAN1(VLAN11,VLAN12)<---------->LAN2(VLAN11,VLAN12)

Note:

1） Port P1 in Fig. 5-4-2-2-1 is LAN1 port, P2 is LAN4 port, and P3 is WAN1 port;

2） Port P2 of PMUX-240（A） belongs to three different VLANs: VLAN11, VLAN12 and VLAN13; port P2 of PMUX-240（B）belongs to VLAN11 and VLAN12. The isolation of the three VLANs is implemented by other routers.

Configuration steps:

For equipment A:

Step 1: Enable the 802.1Q tag-based VLAN;;

Step 2: Add the VLAN records in the following table to VLAN table:

VLAN ID	VLAN members
2	P1, P3

11	P2, P3
12	P2, P3
13	P2, P3

Step 3: Configure the port mode for each Ethernet port:

Port	Mode
P1	Access
P2	Trunk
P3	Trunk

Step 4: Configure the port PVID for each Ethernet port

port	VLAN_ID（PVID）	priority
P1	2	0 (default)
P2	3	0 (default)
P3	4	0 (default)

Step 5: Configure the port table for each port

port	Port members
P1	P1, P3
P2	P2, P3
P3	P1, P2, P3

For equipment B:

Step 1: Enable the 802.1Q tag-based VLAN;;

Step 2: Add the VLAN records in the following table to VLAN table:

VLAN ID	VLAN members
2	P1, P3
11	P2, P3
12	P2, P3

Step 3: Configure the port mode for each Ethernet port:

Port	Mode

P1	Access
P2	Trunk
P3	Trunk

Step 4: Configure the port PVID for each Ethernet port

port	VLAN_ID（PVID）	priority
P1	2	0 (default)
P2	3	0 (default)
P3	4	0 (default)

Step 5: Configure the port table for each port

port	Port members
P1	P1, P3
P2	P2, P3
P3	P1, P2, P3

Therefore, the Tag-based VLAN has been created for the two equipments;

----------Config finish----------

5.5 Loop back

PMUX-240 supports various loop back modes configured by management software or CLI command for fault localization and failure detection, includes optical loop, E1 loop.

Note: The default configuration is no loop. The loopback configuration will be lost after restarting device (or the device is power off).

5.5.1 Optical loop

①A/B optical loop back to line side

②A/B optical loop back to device side

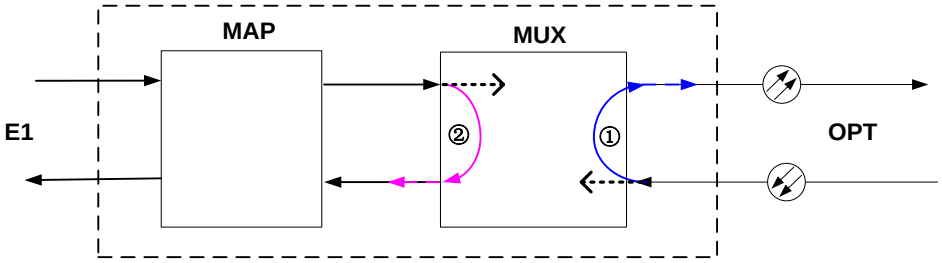


Figure 5-5-1 Optical loop

5.5.2 E1 loop

E1 loop includes E1 loop to line side and E1 loop to device side. The loopback command can be implemented for each E1 channel or a batch of E1 channels. The default configuration is no loop. Note: The loopback configuration will be lost after restarting device (or the device is power off).

③: E1 loop back to line side. AIS can be inserted to device side.

④: E1 loopback to device side. AIS can be inserted to line side.

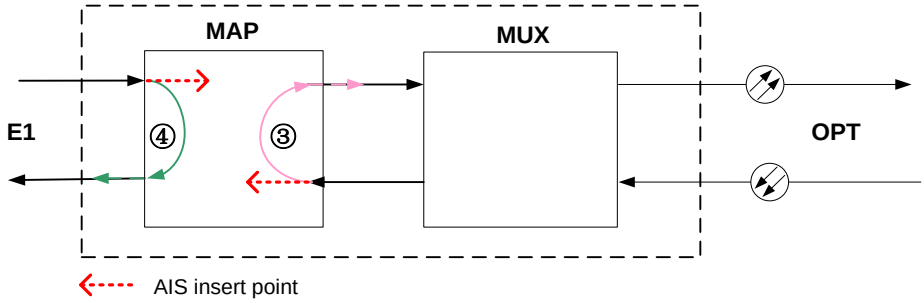


Figure 5-5-2 E1 loop

5.6 Embedded BERT

PMUX-240 provides an embedded BERT (Bit Error Ratio Tester) for maintenance actions such as fault localization and failure detection. It makes a great facility for operator in environment without any external BERT.

5.6.1 Feature

- Built-in a 2.048Mb/s, 2E15-1 length, PRBS generator and detector
- PRBS can be add(drop) to(from) line side E1 paths as well as E1 physical ports
- Provides error counters at each receiving side

5.6.2 Application

The BERT generate $2^{15}-1$ pseudo random sequence which is inserted into the transmitting channel (choose one channel from E1_1 to E1_16), and the sequence is received from the receiving channel (choose the same channel number as the transmitting channel number) and be checked for bit error static by BERT. Note that normal data transfer on the tested channel will be interrupted.

It also supports single bit error inserting to test the E1 channel when BERT is enabled.

PMUX-240 provides two positions for transmitting and two positions for receiving, as figure 5-6-2 shows:

Position (1): Transmitting toward optical line (OPT);

Position (2): Receiving from optical line (OPT);

Position (3): Transmitting toward E1 interface (E1);

Position (4): Receiving from E1 interface (E1);

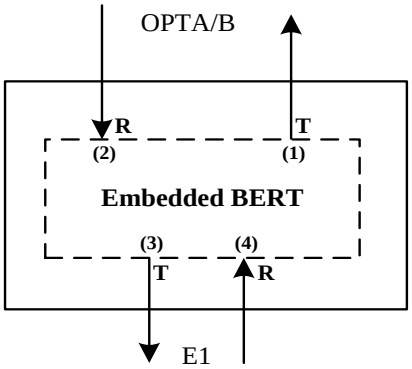


Fig. 5-6-2 four positions

Application1: Transmitting at position (1) and Receiving at position (2)

choose one channel from E1_1 to E1_16 as the tested channel, open to transmit at position (1) of device 1, thus, the BERT start to insert $2^{15}-1$ pseudo random sequence into the transmitting channel; on device 2, configure that E1 as loopback to line side or use cable to loop the E1 port, open to receive at position(2) of device 1, check for bit error static by BERT, as Fig.5-6-2-1 shows;

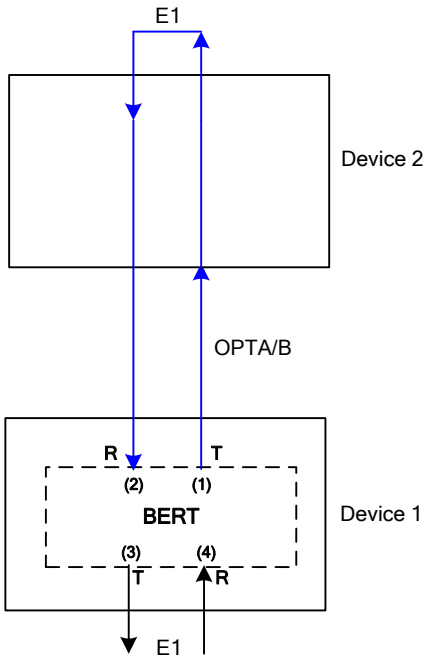


Fig. 5-6-2-1 Appication1

Application 2: Transmitting at position (3) and Receiving at position (4)

This application is use to test the E1 cable. Choose one channel from E1_1 to E1_16 as the

tested channel, open to transmit at position (3), use E1 cable to loop the E1 port, open to receive at position(4) of device1, check for bit error static by BERT, as Fig.5-6-2-2 shows:
Note: In application 3, if configure E1 loop by management software, LOS alarm will occur on the embedded BERT, this alarm can disappear after using E1 cable to loop the E1 port.

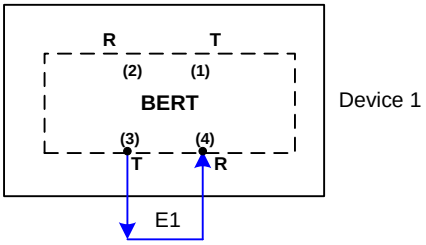


Fig. 5-6-2-2 Application 2

Note: the BERT configuration will be lost after restarting the device(or the device is power off)

5.7 Timing Architecture

PMUX-240 provides two timing modes: mode 0(A, B, Local) and mode 1(E1, A, B, LOCAL), the default is mode 0.
In point-to-point application, if both local and remote equipment are configured as the same timing mode, by auto-negotiation, one equipment will be the master timing and the other will be the slave. The timing mode and the actual timing status can be viewed by management software.
When both local and remote equipment are configured as mode 0, by auto-negotiation, one equipment will trace from an internal oscillator, the other will trace from optical line A / B as the timing source. If the optical line A/B is looped or failed (NOP, LOF), the timing status of both the two equipment will be "free-run".
When both local and remote equipment are configured as mode 1, by auto-negotiation, one equipment will trace any received 1-16 E1 line as timing source, the other will trace from optical line A / B as the timing source. If the optical line A/B is looped or failed (NOP, LOF), the timing status of the equipment which trace the optical line will be "free-run".
When one equipment is configured as mode 1, and the other equipment is configured as mode 0, by auto-negotiation, the equipment which is configured as mode 1 will trace any received 1-16 E1 line as timing source, the equipment which is configured as mode 0 will trace from optical line A / B as the timing source. If the optical line A/B is looped or failed (NOP, LOF), the timing status of the equipment which trace the optical line will be "free-run".

5.7.1 Application for timing configuration

Both local and remote equipment are configured as mode 0, by auto-negotiation, equipment

(A) will trace from an internal oscillator (free-run), equipment (B) will trace from optical line A as the timing source. If the optical line A is looped or failed (NOP, LOF), it will trace from the optical line B as the timing source. When optical line A is restored, it will trace from optical line A again; if both optical line A and B failed (NOP or LOF), the timing status of both the two equipment will be "free-run".

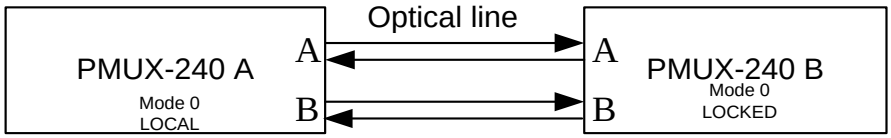


Figure 5-7-1-1 Application I for timing configuration

Equipment (A) timing mode: mode 1; equipment (B) timing mode: mode 0.

By auto-negotiation, equipment (A) will trace any received 1-16 E1 line as timing source, equipment (B) will trace from optical line A as the timing source. If the optical line A is looped or failed (NOP, LOF), it will trace from the optical line B as the timing source. When optical line A is restored, it will trace from optical line A again; if both optical line A and B failed (NOP or LOF), the timing status of both the two equipment will be "free-run".

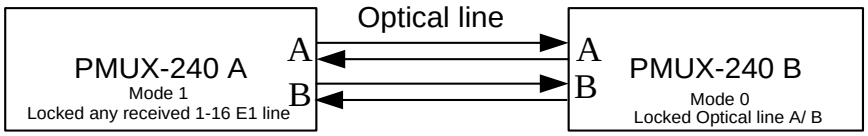


Figure.5-7-1-2 Application II for timing configuration

5.8 Alarm and Performance

PMUX-240 provides many alarm monitoring. Refer to Table 5-8-1 for details:

Table 5-8-1 Alarm list

Alarm Name	Alarm Description
Alarm for Optical Port（A/B）	
RPD	Remote power down
NOP	Loss of Optical Signal on the receive line
LOF	Loss Of Frame
IE-3	Bit error Excessive
IE-6	Degraded signal defects
AIS	Alarm Indication Signal
*TF	Transmit Fault
*TD	Transmit Degraded Signal (bias-current excessive)
*RPL	RX Power Low
*RPH	RX Power High

*LPL	TX Power Low
*LTH	Laser Temperature High
E1 interface alarm (E1_1~16)	
TLOS	E1 Loss of signal
TU-AIS	TU Alarm indication
Ethernet alarm	
LINKDOWN	Ethernet physical interface LINK_DOWN
TU-AIS	Alarm Indicator Signal of Tributary Unit
GFP-LOF	GFP loss of frame
VCAT-ERR	Virtual concatenation tributary alarm

Note:

The alarm with * means: if the SFP optical module does not support DDM function, these alarms will not be viewed.

PMUX-240 also provides E1 performance statistic, optical line bit error statistic and Ethernet performance statistic, as table 5-8-2 shows:

Table 5-8-2 Local/ remote E1 performance statistic

Item	Performance
CV	E1 port code violation count statistic

Table 5-8-3 Optical line bit error statistic

Item	Performance
B1	Optical line bit error statistic

Table 5-8-4 Ethernet performance

Performance Item		Definition
LAN port and WAN port	RX Byte Count	Ethernet byte counter for the receiving client data frames
	RX Packet Count	Ethernet packet counter for the receiving client data frames
	TX Byte Count	Ethernet byte counter for the transmitting client data frames
	TX Packet Count	Ethernet packet counter for the transmitting client data frames

	Drop packet Count	Packets discarded （including oversize packets, undersize packet , CRC error packet and so on）

5.9 Device management

PMUX-240 supports local management via CLI command based on serial RS232 port (CONSOLE). By CLI, the configuration can be executed (such as changing MAC address, IP address and so on).

PMUX-240 also supports network management platform based on SNMP (V1 and V2C) to complete configuration management and kinds of alarm monitoring.

Besides, PMUX-240 also supports Log on to the WEB Browser via local management interface (EMU) to do local management

Table 5-15-1 Default Management Configuration

No.	Item	Factory Settings	CLI management	SmartView/WEB
1	MAC address	fixed and unique	Read/write	Read only
2	IP Address	192.168.0.155	Read/write	Read/write
3	Subnet mask	255.255.255.0	Read/write	Read/write
4	gateway	192.168.0.1	Read/write	Read/write
5	TRAP IP	127.0.0.1	Read/write	Read/write

6 Device installation and notice

I Open the package, check out the package contents such as equipment and parts according to the packing list; for any damage, contact with the supplier instantly;

II Connect to the interfaces

- ✓ connect the various interfaces with suitable cables respectively ;
- ✓ Connect the optical lines with optical fiber cable
- ✓ Connect the control terminal to the front panel CONSOL connector or a SNMP management station to the front EMU port.

III connect to the power

- ✓ Always set the power switch at OFF position first and then connect the power.
- ✓ Connect the power cable. For AC power supply, the accessory power cable can be used; for DC power supply, please take caution of the connector's polarity, reverse connection is forbidden.
- ✓ Connect the PGND connector on the rear panel to the earth of the telecommunication house in a reliable way.

Notice:

a. Before hot plugging the SFP optical module, both the operator and the device must be connected to the same earth in a reliable way! Otherwise, the device may be damaged!

b. Make sure optical A of one NE must be connected with optical B of its neighboring NE.

c. Before using fiber to connect the two devices, the parameters of optical interface (Mean launched power– maximum and Minimum overload) should be considered carefully.

7 Technical Specifications

Table 7-1 E1 interface

Subject	Description
Bit rate	2.048Mb/s±50ppm
Coding	HDB3
Impedance	75Ω unbalanced or 120Ω balanced
Standard	ITU-T G.703、G.704、G.823

Table 7-2 Electrical Ethernet Interface

Subject	Description
Connector	RJ-45
Working mode	Auto - negotiation is the default setting
Complies with IEEE 802.3 and 10/100 Base-Tx Ethernet Protocol	

Table 7-3 Ethernet parameters

Subject	Description
MAC address table capacity	1K
MAC aging time	five minutes
Minimum frame-length	64 bytes
Maximum frame-length	1518/1916 bytes
Working mode	Support auto-negotiation compliant to IEEE802.3u. Enabled as default
VLAN function	Disabled as default
Flow control	Enabled as default

Table 7-4 Ethernet management interface (EMU)

Subject	Description
Bit rate	100Mb/s
Connector	RJ45

Table 7-5 RS232 network management interface (CONSOLE)

Subject	Description
Baud rate	19200
bits	8
Stop bit	1

parity check	None
Electricity level	EIA-RS232 standard
Connector	RJ45

Table 7-6 Power supply

Subject	Description
Input DC voltage	-36～-72V DC
Input AC voltage	85～264V AC
Power consumption	Less than 15W

Table 7-7 Dimension and weight

Subject	Description
Dimension	434mm×44mm×195mm（width×height×depth）
Weight	1.8kg

Table 7-8 Environment requirements

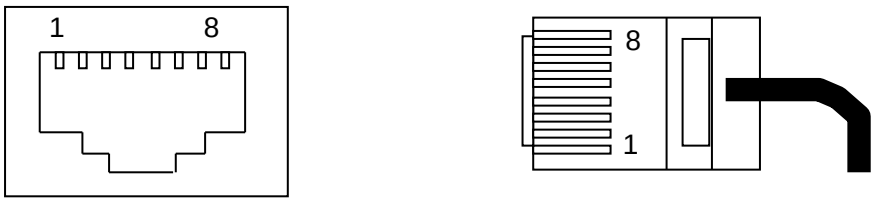
Subject	Description
Working temperature	-5℃～50℃
Storage temperature	-40℃～70℃
Relative Humidity	≤95％，no condensation

Appendix 1 RS232 network management interface（CONSOLE）

Table A-1 Console (RJ45) cable definition

Pin	Definition	Remarks
PIN1	-	-
PIN2	-	-
PIN3	-	-
PIN4	-	-
PIN5		
PIN6	GND	Ground
PIN7	RSNM-IN	Serial data input（RS232 level）
PIN8	RSNM-OUT	Serial data output（RS232 level）

The CONSOLE cable adopts RJ45 connector at one end to connect the front panel of equipment, and DB9 connector at the other end to connect PC, the diagram is as Fig. A-1-1 and Fig. A-1-2 shows:



7: Receive data　　8：Transmit data　　6：Ground

Fig. A-1-1 RJ45 connector

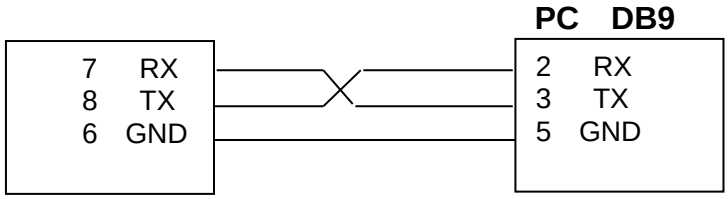


Fig. A-1-2　Connection

Appendix 2 E1 interface

The unbalanced E1 interface adopts DB37 connector as physical interface, which has the corresponded adapters: DB37F-BNC-4E1 cable adapter for 4E1 75Ω, as Fig. A-2-1 shows; DB37F-BNC-8E1 cable adapter for 8E1 75Ω, as Fig. A-2-2 shows;

Fig. A-2-1 DB37F-BNC-4E1 cable adapter

Fig. A-2-2 DB37F-BNC-8E1 cable adapter

The balanced E1 interface adopts RJ45 interface, as Table A-2 shows:

Table A-2 120Ω E1 interface (RJ45 connector) definition

Pin	Definition	Remarks
PIN1	RXD+	P-input of 120 Ω E1 interface
PIN2	RXD-	N-input of 120 Ω E1 interface
PIN3	-	Null
PIN4	TXD+	P-output of 120 Ω E1 interface
PIN5	TXD-	N-output of 120 Ω E1 interface
PIN6	-	Null
PIN7	-	Null
PIN8	-	Null

Figure Index

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