FiberHome

AN5116-06B/AN5516-06/AN5516-04
Optical Line Terminal Equipment
Hardware Description

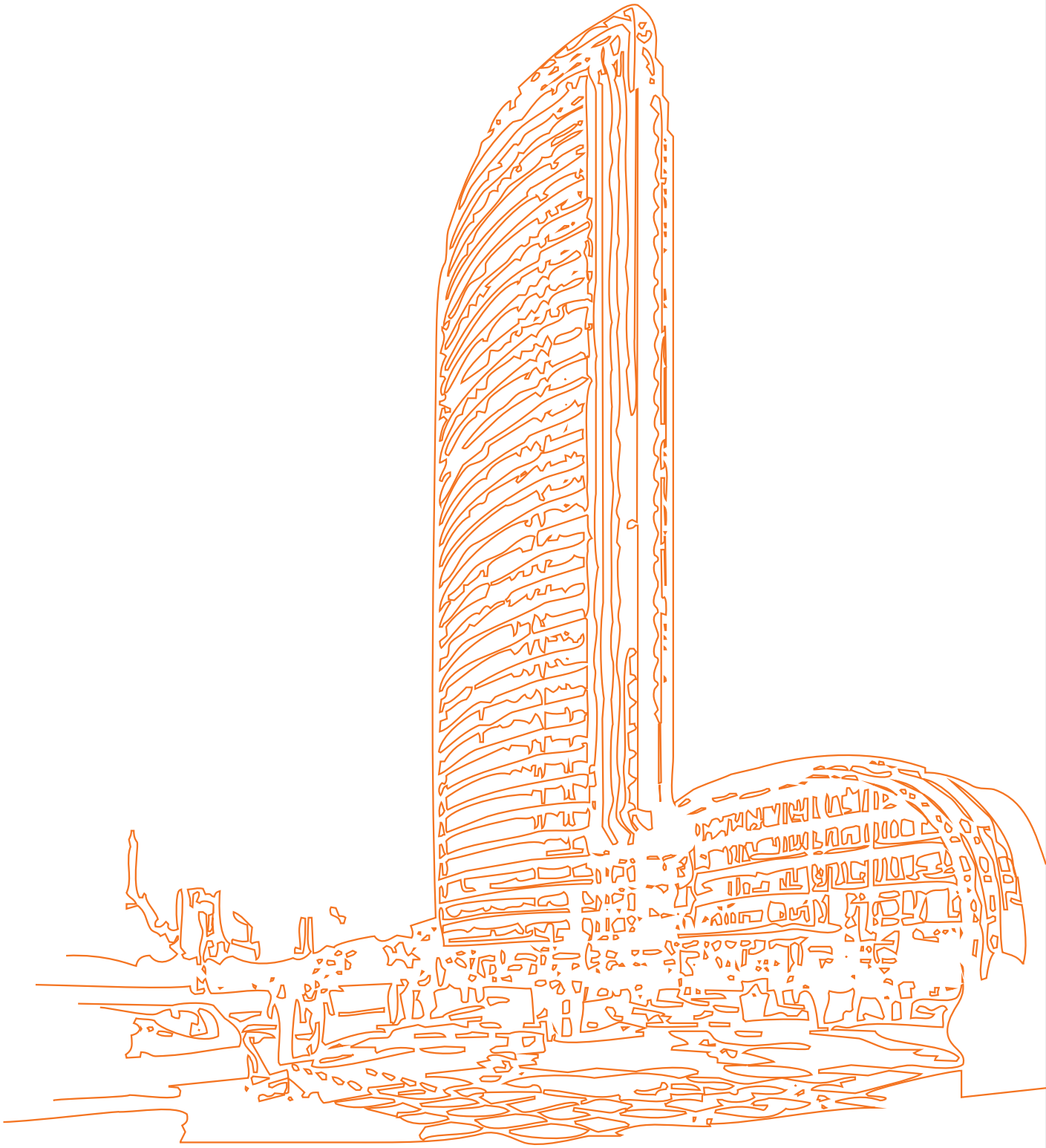
[Version: C]

MN000003085

FiberHome Telecommunication
Technologies Co., Ltd.

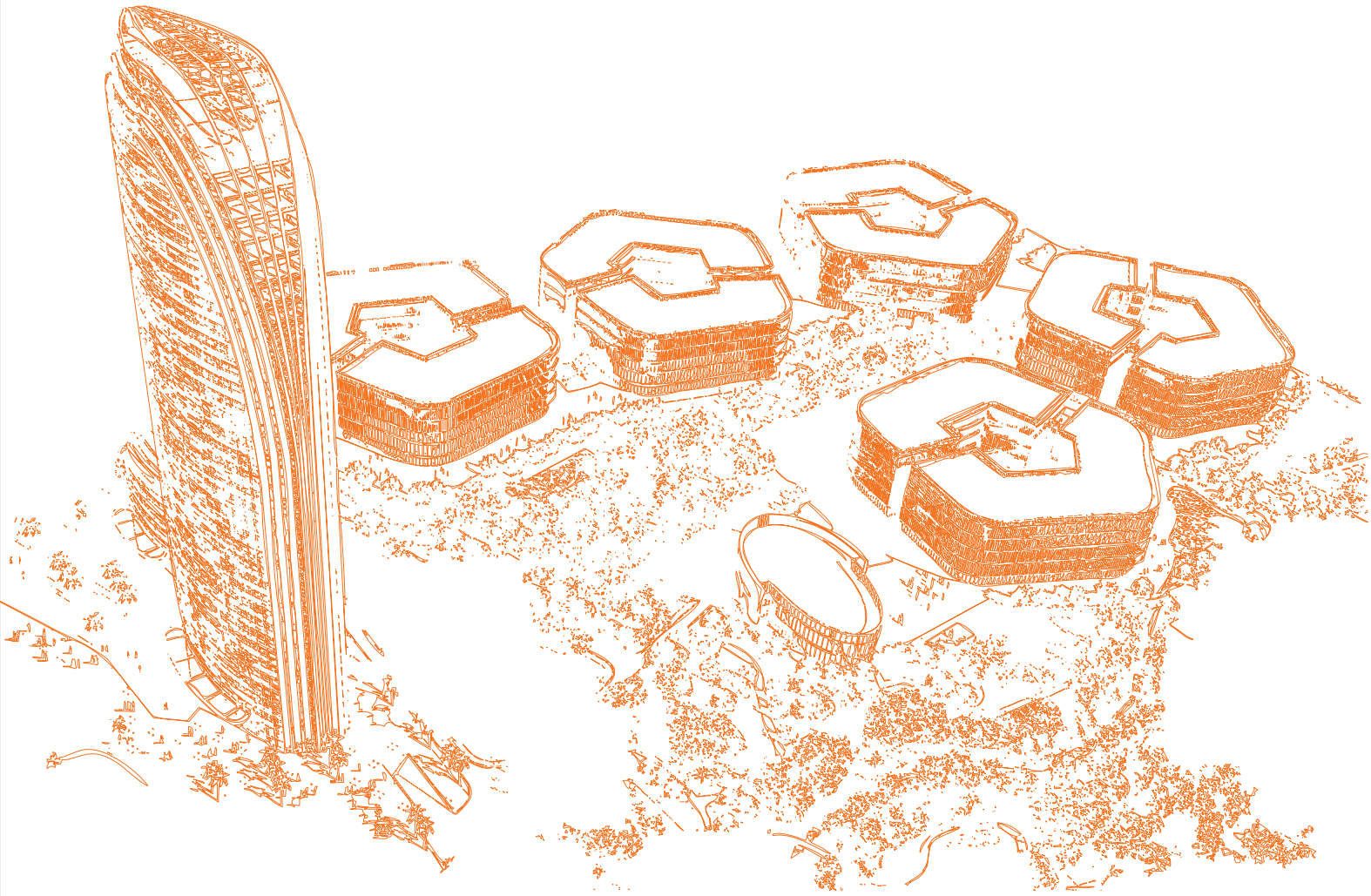
FiberHome

Customer Oriented
Honest and Devoted
Continuously Innovated
Incremental Development



FiberHome

People Centered
Advance with the Times
Benefiting Customers with Information



AN5116-06B/AN5516-06/ AN5516-04

Optical Line Terminal Equipment

Hardware Description

Version: C

Code: MN000003085

FiberHome Telecommunication Technologies Co., Ltd.

November 2017

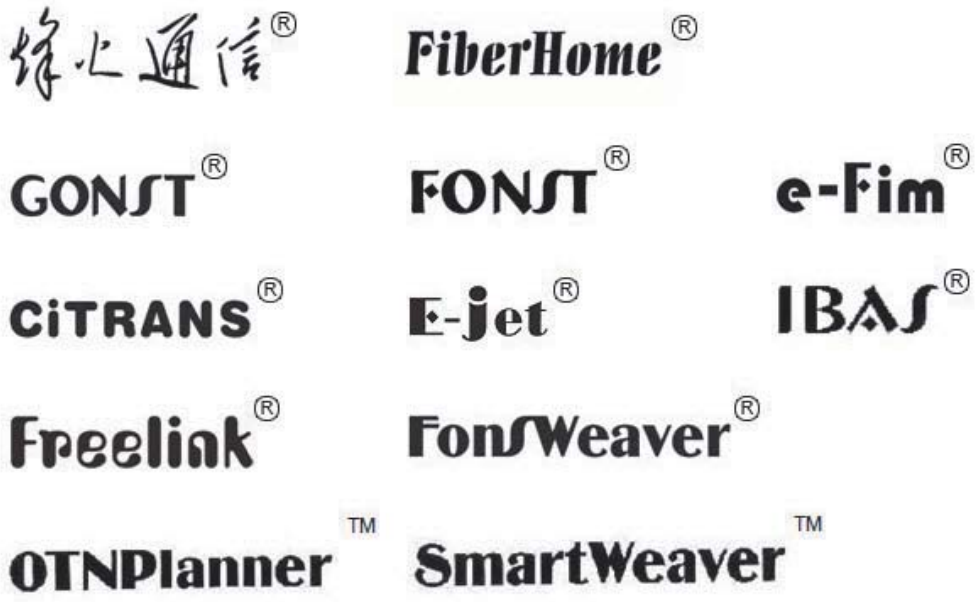
Thank you for choosing our products.

We appreciate your business. Your satisfaction is our goal. We will provide you with comprehensive technical support and after-sales service. Please contact your local sales representative, service representative or distributor for any help needed at the contact information shown below.

Fiberhome Telecommunication Technologies Co., Ltd.

Address: No. 67, Guanggu Chuangye Jie, Wuhan, Hubei, China
Zip code: 430073
Tel: +6 03 7960 0860/0884 (for Malaysia)
+91 98 9985 5448 (for South Asia)
+593 4 501 4529 (for South America)
Fax: +86 27 8717 8521
Website: http://www.fiberhomegroup.com

Legal Notice



are trademarks of FiberHome Telecommunication Technologies Co., Ltd. (Hereinafter referred to as FiberHome)

All brand names and product names used in this document are used for identification purposes only and are trademarks or registered trademarks of their respective holders.

Contents

1 Documentation Guide

Document Orientation

Hardware Description gives a detailed introduction to the hardware components of the OLT equipment AN5116-06B/AN5516-06/AN5516-04. This manual is designed for readers who want to have a detailed knowledge about the hardware of the equipment and who need the hardware information to guide their operation and maintenance of the equipment.

Intended Readers

- Marketing personnel
- Commissioning engineers
- Operation and maintenance engineers

Version Information

Version	Description
A	Initial version, corresponding to equipment version V4R2.
B	Updated version, corresponding to equipment versions V4R2.2 and V4R3.
C	Updated version, corresponding to equipment versions V4R2.4 and V4R2.5.

Content

Chapter	Content
Subrack	◆ Structure and dimensions ◆ Anti-dust screen ◆ Fan unit ◆ Ventilation principle ◆ Slot distribution ◆ Applicable cards
Card	◆ Card overview and positioning of cards in the system ◆ Interfaces and indicator LEDs on the card panel ◆ Applicable modules and performance parameters ◆ Working principle

Chapter	Content
Optical Module	Module types, parameters, and mappings between modules and cards
Wire and Cable	Functions, models, structures, connections and parameters of wires and cables
Cabinet	Types, appearance and dimensions of cabinets; equipment layout
PDP	Overview of PDPs and principles of selecting a matching PDP; PDP panels and terminals on the panels

Related Documentation

Manual	Applied to
Product Description	Network planning phase
Hardware Description	Network planning phase
Installation Guide	Network deployment phase
Quick Installation Guide	Network deployment phase / network maintenance phase
EPON Configuration Guide *GPON Configuration Guide* *MSAN Configuration Guide*	Network deployment phase / network maintenance phase
Alarm and Event Reference	Network maintenance phase

2 Subrack

The OLT series equipment offered by FiberHome mainly includes the AN5116-06B/ AN5516-06/AN5516-04.

- Subrack Models and Specifications
- Introduction to the AN5116-06B Subrack
- Introduction to the AN5516-06 Subrack
- Introduction to the AN5516-04 Subrack

2.1 Subrack Models and Specifications

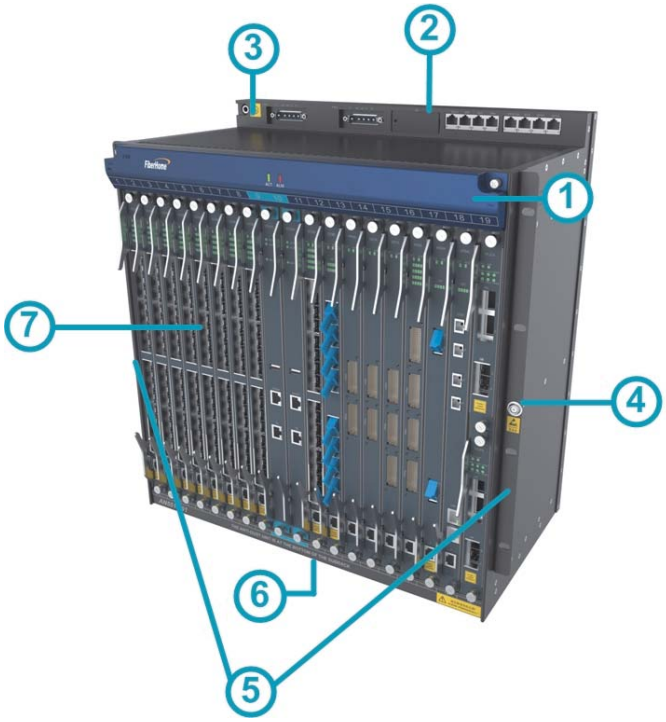
Item	AN5116-06B Subrack	AN5516-06 Subrack	AN5516-04 Subrack
Model	3061165	3061160	3061117
Weight of empty subrack (including the fan)	13.9 kg	10.8 kg	4.3 kg
Overall power consumption	1300 W	556 W	267 W
Operating temperature	Long term: 0℃ to 45℃ Short term: -5℃ to 55℃		
Storage temperature	-40℃ to 70℃		
Relative humidity for storage	10% to 100%		

2.2 Introduction to the AN5116-06B Subrack

This section introduces the structure, dimensions, slot distribution, anti-dust screen, fan unit and ventilation principle of the AN5116-06B subrack.

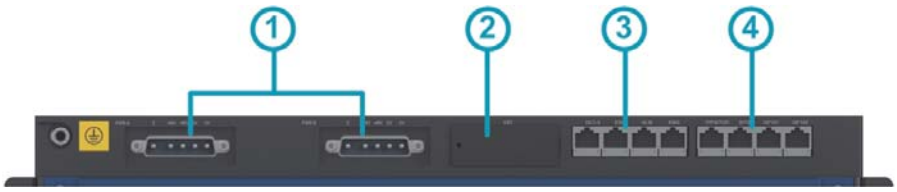
2.2.1 Structure and Dimensions

Subrack Structure



No.	Name	Function
①	Fan unit	Facilitates air cooling for the equipment.
②	Backplane	Connects with card modules, serves as the bus, and provides functional interfaces and power interfaces.
③	Subrack earth ground point	Connects with the subrack earth ground cable.
④	ESD protection earth ground fastener	Connects with the ESD protection unit.
⑤	Mounting ear	Secures the subrack in the cabinet.
⑥	Anti-dust screen	Prevents dust from entering the equipment.
⑦	Card area	Accommodates cards to implement various functions of the equipment.

Interfaces on the Backplane

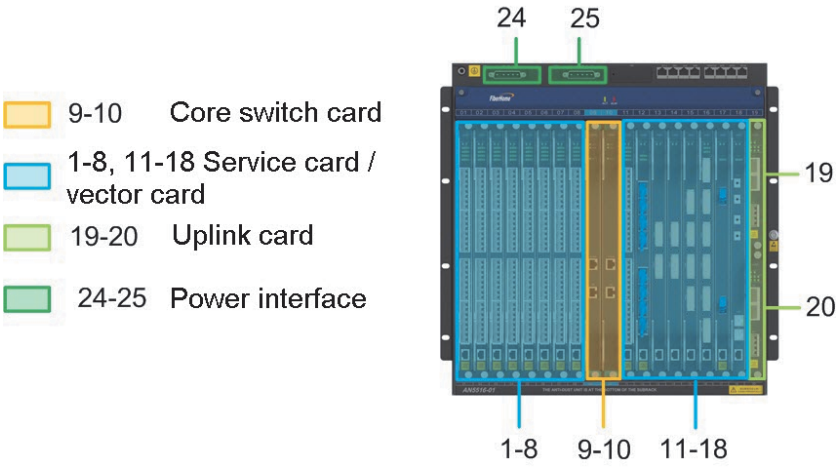


No. and Identifier		Description	Function
① PWR-A/PWR-B		Power interface	Connects with the PDP through the subrack power cable of the AN5116-06B to provide DC power supply for the subrack.
② EID		Electrical identifier	Provides information such as the MAC address, equipment model, subrack version number, and backplane card number for the network management system, so that the subrack is easy to identify.
③ Functional interfaces (from left to right)	DC1-3	Dry contact interface	Connects to external dry contact devices through the dry contact connection cables to monitor infrared detection, smoke, mains supply, humidity, temperature, fans, shaking, access control, etc.
	ESC	Environment monitoring interface	Connects to the external environment monitoring unit via the serial port to monitor the equipment environment.
	ALM	Alarm interface	Connects with the PDP through the subrack alarm cable to output the subrack alarm signals to the PDP.
	EMS	Out-of-band network management interface	Manages the equipment via the network management system.
④ Reserved interfaces		-	Functional interfaces reserved for future use.

Subrack Dimensions

Description	Dimensions (H × W × D)
Subrack without mounting ears	471.7 mm × 447.2 mm × 262.7 mm
Subrack with mounting ears for 19-inch cabinet	471.7 mm × 480.8 mm × 262.7 mm
Subrack with mounting ears for 21-inch cabinet	471.7 mm × 530 mm × 262.7 mm

2.2.2 Slot Distribution and Matching Cards



The AN5116-06B subrack provides 20 vertical slots in total. The slots can be classified as follows according to the types of cards that they house:

Classification	Slot	Card Type	Card Name
Slots for service cards	1 to 8, 11 to 18	EPON / 10G EPON Service Card	EC4B / EC8B / ECOB / XG8A
		GPON / XG-PON / GPON&XG-PON Combo Service Card	GC4B / GC8B / GCOB / XP4A / XP8A
		MSAN Service Card	PPDA / PPEA / APSA / VPSA / CATA / CVTA / SHUA / BROA / SETA / FTSA To enable the system level vectoring (SLV) function, please refer to the slot distribution rules as specified in Figure 2-1.
		Ethernet Service Card	GSOF
		TDM Service Card	CE1B / C155A
		OTDR Line Diagnosis and Measurement Card	ODMA / ODMB / ODMC
		Clock card (see TIMA)	TIMA
Slots for core switch cards	9 to 10	Core Switch Card	HSWA / HSWB / HSWD

Classification	Slot	Card Type	Card Name
Slots for uplink cards	19 to 20	Uplink Card	HU1A / HU1B / HU2A / HU2C / HU4A / GU6B / GU6F
Slots for vector cards	8 and 11	Vector Card	VCNA / FCEA To enable the system level vectoring (SLV) function, please refer to the slot distribution rules as specified in Figure 2-1.

Slot Distribution Rules for the Cards Supporting the SLV Function

If you want to use the vector card and the service card supporting the SLV function on the AN5116-06B, please abide by the following rules for slot distribution.

1. The vector card can only be applied to slot 8 or 11, adjacent to the slot for the core switch card. A subrack can accommodate two vector cards at most.
2. An FCEA card (35b SLV vector card) supports vector operations for four service cards, while a VCNA card (17a SLV vector card) supports vector operations for six service cards.
3. The service cards supporting the SLV function can only be applied to the four or six slots closest to the vector card(s) on the same side. For example, if a vector card is plugged in slot 8, the service cards supporting the SLV function can only be plugged in slots 4 to 7 (profile 35b) or slots 2 to 7 (profile 17a).

The figure below illustrates the rules mentioned above:

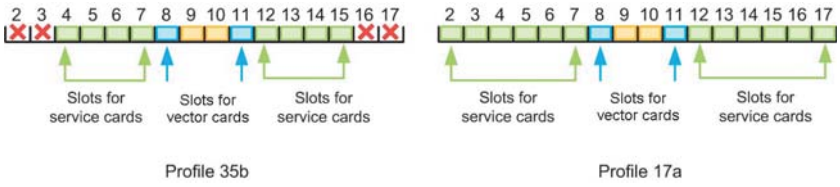


Figure 2-1 Slot Distribution Rules for the Cards Supporting the SLV Function

2.2.3 Anti-dust Screen

Model

The model number of the anti-dust screen for the AN5116-06B is 405000031.

Function

The self-latching anti-dust screen of the AN5116-06B is located at the bottom of the subrack. It is used together with the shield plate at the air inlet to prevent dust from entering the subrack.

Structure

Figure 2-2 shows the appearance and components of the anti-dust screen.

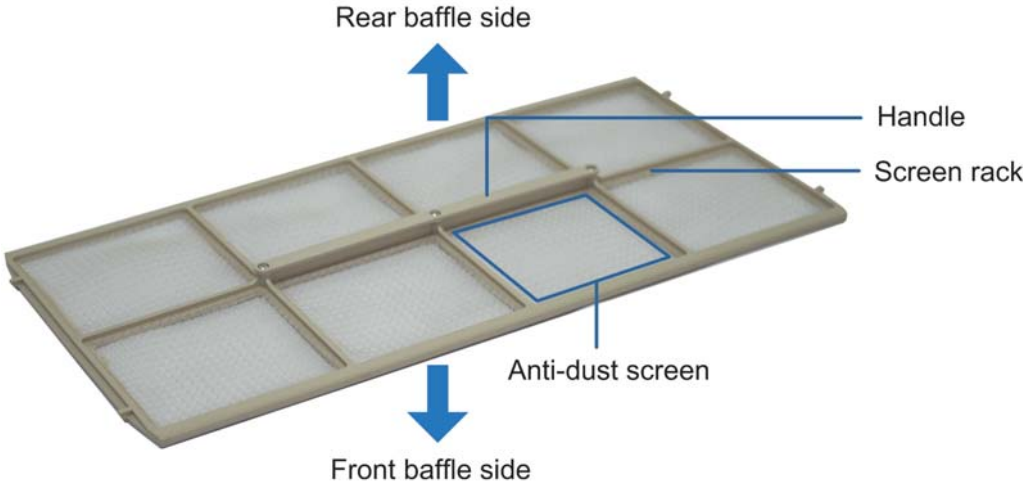


Figure 2-2 Anti-dust Screen (Upward View)

The anti-dust screen is used together with the shield plate. Figure 2-3 illustrates the components of the shield plate.

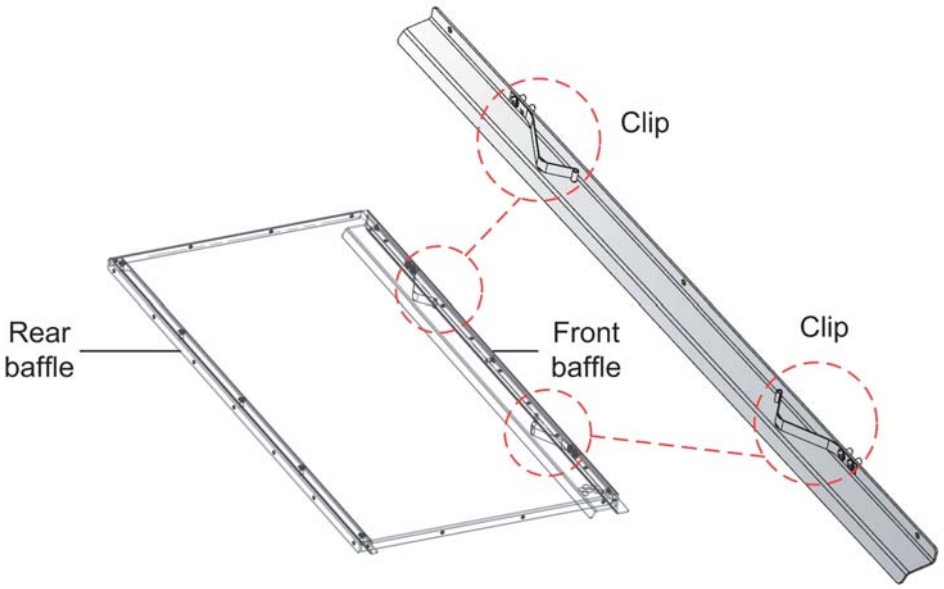


Figure 2-3 Shield Plate Components (Top View)

2.2.4 Fan Unit

Model

The model number of the fan unit for the AN5116-06B is 405000150.

Appearance

Working Principle

- Located on the top of the subrack, the fan unit exhausts hot air for heat dissipation. A flow of cooling air is forced into the subrack through the bottom of the subrack. After passing through each working card in the subrack, the air is exhausted from the top of the subrack.
- The fan unit is configured with a fan monitoring board, which can detect whether the fan is working normally. The monitoring board provides interfaces that communicate with the core switch card of the equipment, and sends the monitoring information to the core switch card regularly.
- The fan unit provides eight speed choices, and the fan speed can be regulated in two modes: the manual mode and the intelligent mode.
  - In the manual mode, the fan unit operates at the speed set in the network management system.
  - In the intelligent mode, the core switch card of the equipment automatically selects a speed for the fan unit according to the card temperature detected, and the fan unit will operate at the selected speed.

Indicator LEDs

Indicator LED Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The fan is powered on normally.
			OFF	The fan is not powered on normally.
ALM	Alarm indicator LED	Red	ON	The fan is faulty.
			OFF	The fan is working normally.

Technical Specifications

Item	Specification
Dimensions (H × W × D)	46.5mm × 437.0mm × 246.5mm
Weight	3.3kg

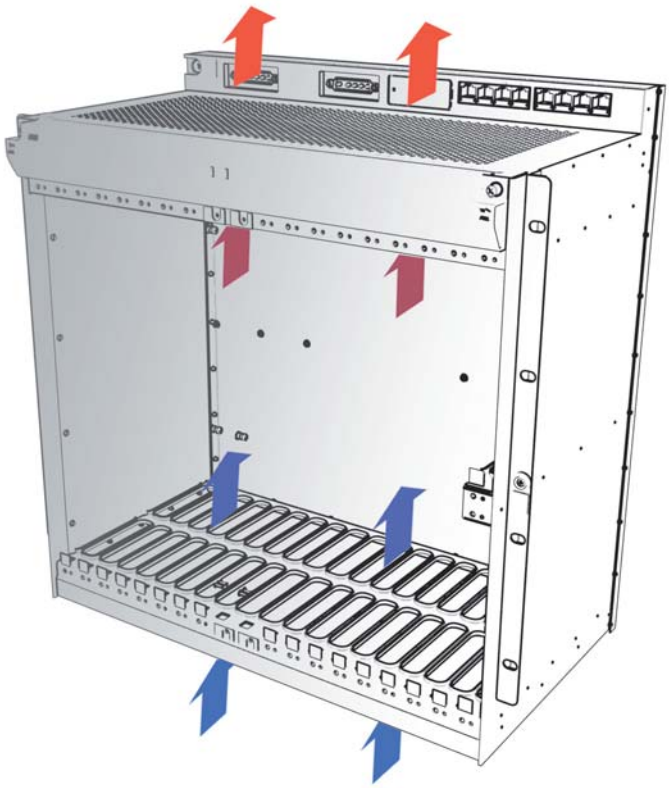
Item	Specification
Typical power consumption (the power consumption when the fan unit is operating at speed level 3)	≤ 60W
Maximum power consumption (the power consumption when the fan unit is operating at speed level 0)	≤ 160W

2.2.5 Ventilation Principle

Ventilation Process

A flow of cooling air is forced into the AN5116-06B subrack through the bottom of the subrack. Drawn by the fan unit located at the top of the subrack, the cool air goes upward and passes through the subrack, and is then exhausted from the top of the subrack.

Ventilation Principle

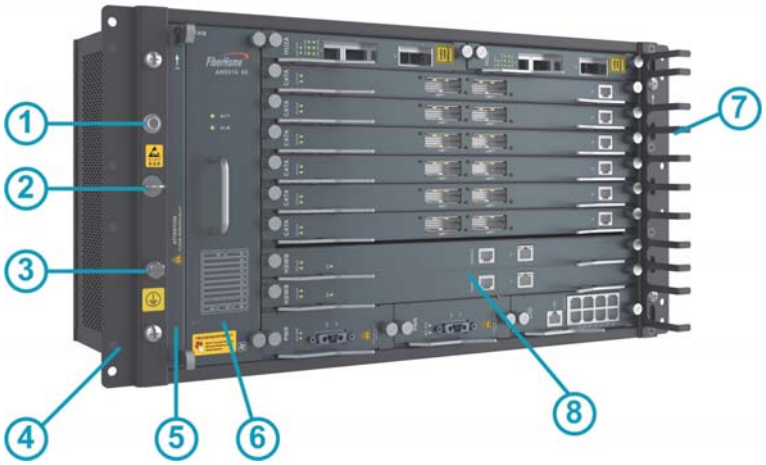


2.3 Introduction to the AN5516-06 Subrack

This section introduces the structure, dimensions, slot distribution, anti-dust screen, fan unit and ventilation principle of the AN5516-06 subrack.

2.3.1 Structure and Dimensions

Subrack Structure



S.N.	Name	Function
①	ESD protection earth ground fastener	Connects to the ESD protection unit.
②	Fiber puller hanger	Holds the fiber puller.
③	Subrack earth ground point	Connects with the subrack earth ground cable.
④	Mounting ear	Secures the subrack in the cabinet.
⑤	Anti-dust screen	Protects the cards in the subrack and prevents dust and foreign objects from entering the subrack.
⑥	Fan unit	Facilitates air cooling for the equipment.
⑦	Fiber passage unit	Facilitates routing and arranging of fibers and cables.
⑧	Card area	Accommodates cards to implement various functions of the equipment.

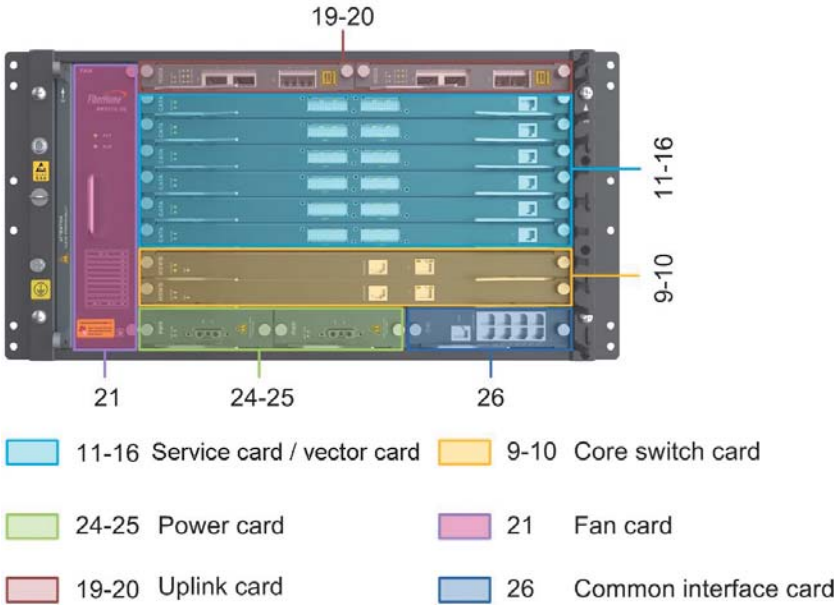
Dimensions of the Subrack

Description	Dimensions (H × W × D)
Subrack with mounting ears for 19-inch cabinet	265.9 mm × 480 mm × 242 mm
Subrack with mounting ears for 21-inch cabinet	265.9 mm × 530 mm × 242 mm

Note:

The height in the table excludes the fiber passage unit. The mounting ears of the AN5516-06 subrack for mounting in a 19-inch cabinet are connected with the left and right panels of the subrack respectively.

2.3.2 Slot Distribution and Matching Cards



The AN5516-06 subrack provides 14 slots in total. The slots can be classified as follows according to the types of cards that they house:

Classification	Slot	Card Type	Card Name
Slots for service cards	11 to 16	EPON / 10G EPON Service Card	EC4B / EC8B / ECOB / XG8A
		GPON / XG-PON / GPON&XG-PON Combo Service Card	GC4B / GC8B / GCOB / XP4A / XP8A
		MSAN Service Card	PPDA / PPEA / APSA / VPSA / CATA / CVTA / SHUA / BROA / SETA / FTSA To enable the system level vectoring (SLV) function, please refer to the slot distribution rules as specified in Figure 2-4.
		Ethernet Service Card	GSOF
		TDM Service Card	CE1B / C155A

Classification	Slot	Card Type	Card Name
		OTDR Line Diagnosis and Measurement Card	ODMA / ODMB / ODMC
		Clock card (see TIMA)	TIMA
Slots for core switch cards	9 to 10	Core Switch Card	HSWA / HSWB / HSWD
Slots for power cards	24 to 25	Power card (see PWR in Power Card)	PWR
Slot for the fan card	21	Fan Unit	FAN
Slots for uplink cards	19 to 20	Uplink Card	HU1A / HU1B / HU2A / HU2C / HU4A / GU6B / GU6F
Slot for common interface card	26	Common interface card (CIO)	CIO
Slots for vector cards	11	Vector Card	VCNA / FCEA To enable the system level vectoring (SLV) function, please refer to the slot distribution rules as specified in Figure 2-4.

Slot Distribution Rules for the Cards Supporting the SLV Function

If you want to use the vector card and the service card supporting the SLV function on the AN5516-06, please abide by the following rules for slot distribution.

1. The vector card can only be applied to slot 11, adjacent to the slot for the core switch card. A subrack can accommodate only one vector card.
2. An FCEA card (35b SLV card) supports vector operations for four service cards, while a VCNA card (17a SLV card) supports vector operations for five service cards.
3. The service cards supporting the SLV function can only be applied to the four or five slots closest to the vector card.

The figure below illustrates the rules mentioned above:

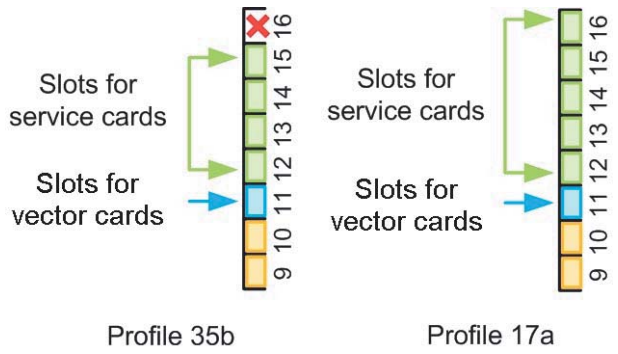


Figure 2-4 Slot Distribution Rules for the Cards Supporting the SLV Function

2.3.3 Anti-dust Screen

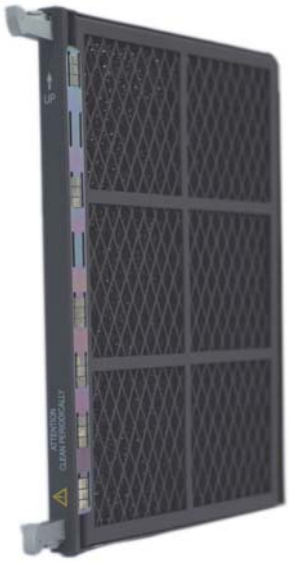
Model

The model number of the anti-dust screen for the AN5516-06 subrack is 405000029.

Function

The anti-dust screen is located on the left side of the fan unit in the AN5516-06 subrack. Secured by self latching, the anti-dust screen is easy to plug and unplug.

Appearance



2.3.4 Fan Unit

Model

The model number of the fan unit for the AN5516-06 is 405000248.

Appearance

Working principle

- Located on the left part of the subrack, the fan unit is used for air cooling by blowing air. The cool air enters the subrack from the left side of it, passes through each working card in the subrack, and is then exhausted from the right side of the subrack.
- The fan unit is configured with a fan monitoring board, which can detect whether the fan is working normally. The monitoring board provides interfaces that communicate with the core switch card of the equipment, and sends the monitoring information to the core switch card regularly.
- The fan unit provides seven speed choices, and the fan speed can be regulated in two modes: the manual mode and the intelligent mode.

- In the manual mode, the fan unit operates at the speed set in the network management system.
- In the intelligent mode, the core switch card of the equipment automatically selects a speed for the fan unit according to the card temperature detected, and the fan unit will operate at the selected speed.

Indicator LEDs

Indicator LED Identifier	Meaning	Status	Color	Description
RUN	Power working indicator LED	Green	ON	The fan is powered on normally.
			OFF	The fan is not powered on normally.
ALM	Alarm indicator LED	Red	ON	The fan is faulty.
			OFF	The fan is working normally.

Technical Specifications

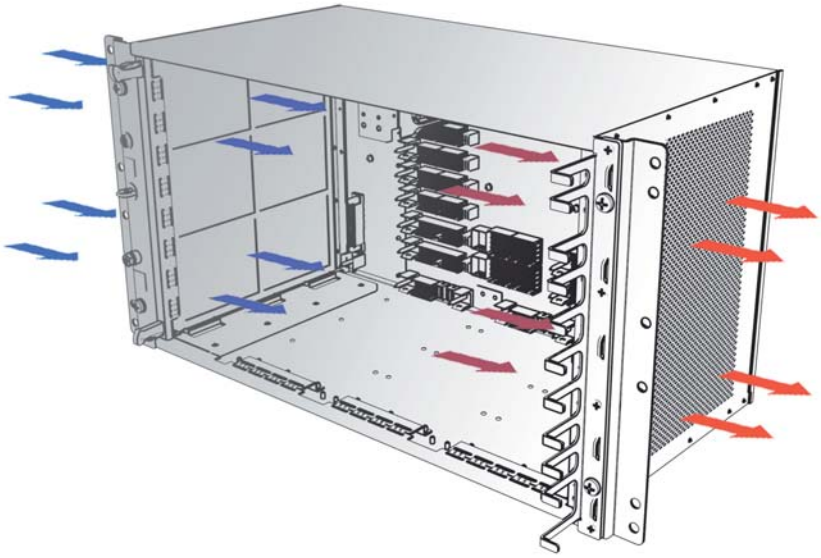
Item	Specification
Dimensions (W × H × D)	58.3 mm × 244.3 mm × 224.3mm
Weight	2.1kg
Typical power consumption (the power consumption when the fan unit is operating at speed level 3)	≤ 100W
Maximum power consumption (the power consumption when the fan unit is operating at speed level 0)	≤ 240W

2.3.5 Ventilation Principle

Ventilation Process

A flow of cooling air is forced into the AN5516-06 subrack through the left side of the subrack. Blown by the fan unit located at the left side of the subrack, the cool air goes rightward, passes through cards, and is then exhausted from the right side of the subrack.

Ventilation Principle



2.4 Introduction to the AN5516-04 Subrack

This section introduces the structure, dimensions, slot distribution, fan unit and ventilation principle of the AN5516-04 subrack.

2.4.1 Structure and Dimensions

Subrack Structure

No.	Name	Function
①	Mounting ear	Secures the subrack in the cabinet.
②	ESD protection earth ground fastener	Connects with the ESD protection unit.

No.	Name	Function
③	Subrack earth ground point	Connects with the subrack earth ground cable.
④	Fiber passage unit	Facilitates routing and arranging of fibers and cables.
⑤	Fan unit	Facilitates air cooling for the equipment.
⑥	Card area	Accommodates cards to implement various functions of the equipment.
⑦	Fiber puller hanger	Holds the fiber puller.

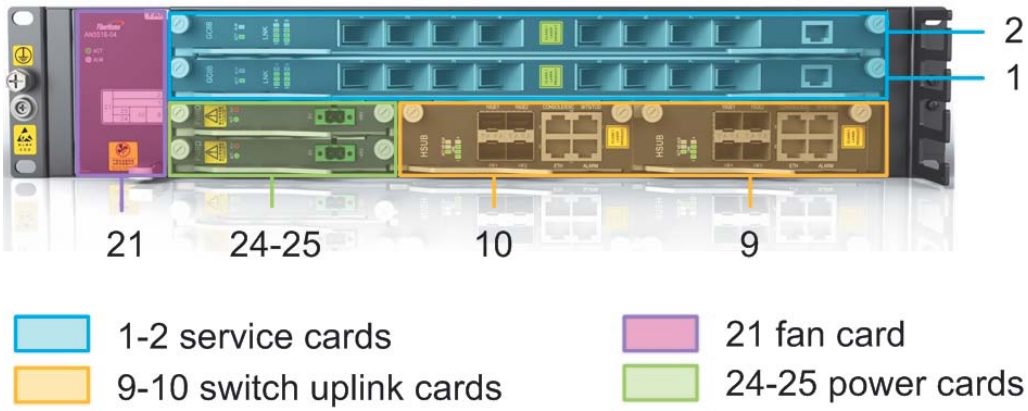
Subrack Dimensions

Description	Dimensions (H × W × D)
Subrack without mounting ears	88 mm × 443 mm × 239.5 mm
Subrack with mounting ears for 19-inch cabinet	88 mm × 480 mm × 241.5 mm
Subrack with mounting ears for 21-inch cabinet	88 mm × 530 mm × 241.5 mm

Note:

The size of the fiber passage unit is not considered for the depth (D) of the subrack listed here.

2.4.2 Slot Distribution and Matching Cards



The AN5516-04 subrack has one vertical slot and six horizontal slots. The slots can be classified as follows according to the types of cards that they house:

Classification	Slot	Card Type	Card Name
Slots for service cards	1 to 2	EPON / 10G EPON Service Card	EC4B / EC8B / ECOB / XG8A
		GPON / XG-PON / GPON&XG-PON Combo Service Card	GC4B / GC8B / GCOB / XP4A / XP8A
		MSAN Service Card	PPDA / PPEA / APSA / VPSA / FTSA / CATA / CVTA / SHUA
		Ethernet Service Card	GSOF
		TDM Service Card	CE1B / C155A
		OTDR Line Diagnosis and Measurement Card	ODMA / ODMB / ODMC
		Clock card (see TIMA)	TIMA
Slots for switch uplink cards	9 to 10	Switch Uplink Card	HSUB / HSUC
Slot for the fan card	21	Fan Unit	FAN
Slots for power cards	24 to 25	PWRA /PWRD	PWRA / PWRD

2.4.3 Fan Unit

Model

The code of the fan unit for the AN5516-04 is 405000171.

Appearance

Working principle

- Located on the left part of the subrack, the fan unit is used for air cooling by blowing air. The cool air enters the subrack from the left side of it, passes through each working card in the subrack, and is then exhausted from the right side of the subrack.
- The fan unit is configured with the fan monitoring board, which can detect the working status of fans. In addition, it provides interfaces for communicating with the switch uplink card of the equipment, so as to deliver the information detected to the switch uplink card regularly through the fan monitoring board.
- The fan unit provides eight speed choices, and the fan speed can be regulated in two modes: the manual mode and the intelligent mode.
  - In the manual mode, the fan unit operates at the speed set in the network management system.
  - In the intelligent mode, the switch uplink card of the equipment automatically selects a speed for the fan unit according to the detected card temperature.

Indicator LEDs

Indicator LED Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The fan is powered on normally.
			OFF	The fan is not powered on normally.
ALM	Alarm indicator LED	Red	ON	The fan is faulty.
			OFF	The fan is working normally.

Technical Specifications

Item	Specification
Dimensions (H × W × D)	85.4mm × 50.8mm × 249.9mm
Weight	0.7kg

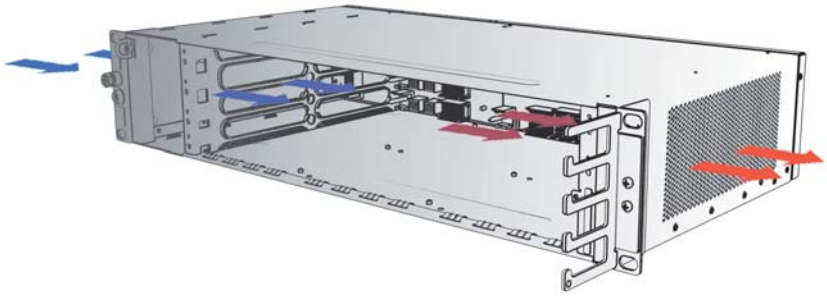
Item	Specification
Typical power consumption (the power consumption when the fan unit is operating at speed level 3)	≤ 12W
Maximum power consumption (the power consumption when the fan unit is operating at speed level 0)	≤ 32W

2.4.4 Ventilation Principle

Ventilation Process

A flow of cooling air is forced into the AN5516-04 subrack through the left side of the subrack. Blown by the fan unit located at the left side of the subrack, the cool air goes rightward and passes through the cards, and is then exhausted from the right side of the subrack.

Ventilation Principle



3 Card

- Card Structure and Dimensions
- Overview of Cards
- Core Switch Card
- Switch Uplink Card
- Uplink Card
- Power Card
- EPON / 10G EPON Service Card
- GPON / XG-PON / GPON&XG-PON Combo Service Card
- MSAN Service Card
- Vector Card
- Ethernet Service Card
- TDM Service Card
- OTDR Line Diagnosis and Measurement Card
- Other Cards

3.1 Card Structure and Dimensions

Card Structure

The following introduces the card structure, using the XP8A service card applicable to all the three OLT subrack models as an example.

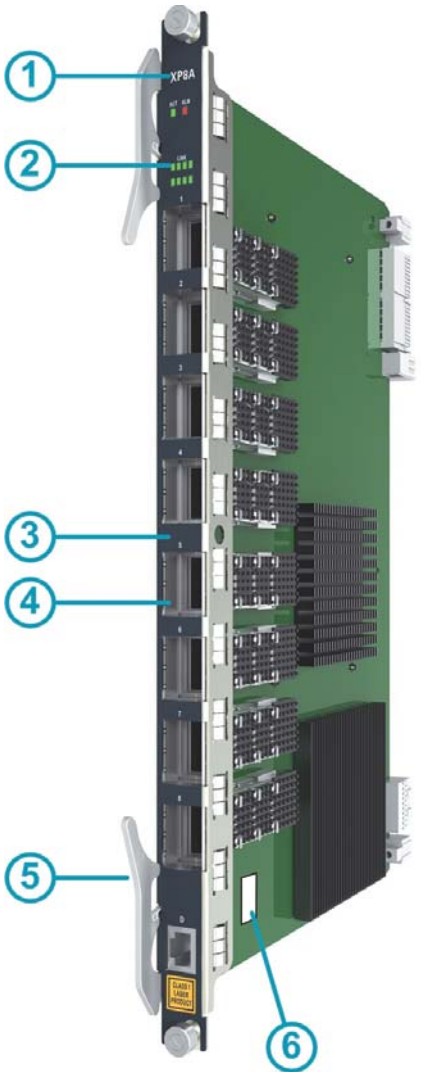


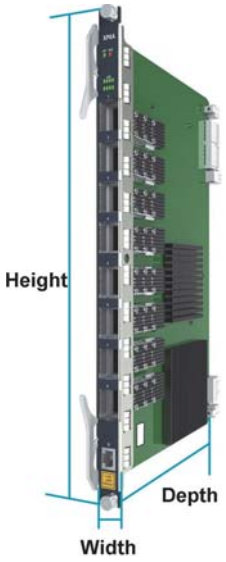
Figure 3-1 Card Structure

No.	Name	Function
①	Card name	Identifies the name of the card.
②	Indicator LED area	Contains various indicator LEDs, such as the interface status indicator LED and the card operating status indicator LED.

No.	Name	Function
③	Card panel	Provides card-related identifiers; protects and secures the card.
④	Interface	Provides interfaces for connection with different devices to implement the card functions.
⑤	Latch	Facilitates plugging or removing a card, protects the card against damage caused by improper operations.
⑥	Card number label	Located at the lower left part of the PCB to identify the number of the card.

Card Dimensions

The figure below shows how the card dimensions are measured.



The size of the reed is not counted for card width.

The card depth refers to the maximum distance between the panel and the connector.

Figure 3-2 Card Dimensions

The table below lists the card dimensions.

Card Type	Dimensions (H × W × D)
Core switch cards (HSWA, HSWB and HSWD)	366 mm × 24.7 mm × 224.5 mm
Uplink switch cards (HSUB and HSUC)	120.5 mm × 37.5 mm × 224.2 mm
Uplink cards (HU1A, HU1B, HU2A, HU2C, HU4A, GU6B and GU6F)	182 mm × 24.7 mm × 222.9 mm

Card Type	Dimensions (H × W × D)
Common cards (including service cards, vector cards, OTDR line diagnosis and measurement cards, and clock card)[Note 1]	366 mm × 22.2 mm × 224.2 mm
Power card (PWR)	113 mm × 34.7 mm × 224.35 mm
Power cards (PWRA and PWRD)	116 mm × 18.6 mm × 224.2 mm
Common interface card (CIO)	138 mm × 34.7 mm × 224.5 mm
Fan card (FAN) (AN5116-06B)	437 mm × 46.5 mm × 246 mm
Fan card (FAN) (AN5516-06)	244.3 mm × 58.3 mm × 224.3 mm
Fan card (FAN) (AN5516-04)	85.4 mm × 50.8 mm × 249.9 mm
Note 1: Different subracks may support different service cards. Please refer to Overview of Cards for details.	

3.2 Overview of Cards

The maximum frame length allowed for a card is 2 KBytes, and it will be 9 KBytes after the Jumbo Frame function is enabled.

Card Type	Card Name	Card Number	Matching Subracks			Power Consumption
			AN5116-06B	AN5516-06	AN5516-04	
Core switch card	HSWA	2115331	√	√	×	≤ 50 W
		2115334	√	√	×	
	HSWB	2201631	√	√	×	≤ 60 W
	HSWD	2201069	√	√	×	≤ 80 W
		2202258 (supporting the 1588 function)	√	√	×	≤ 85 W
Switch uplink card	HSUB	2201341	×	×	√	≤ 45 W
	HSUC	2201580	×	×	√	≤ 40 W
Uplink card	HU1A	2170846	√	√	×	≤ 15 W
	HU1B	2201320	√	√	×	≤ 15 W
	HU2A	2170854	√	√	×	≤ 20 W
	HU2C	2202303	√	√	×	≤ 18 W
	HU4A	2201073	√	√	×	≤ 20 W
	GU6B	2201319	√	√	×	≤ 15 W
	GU6F	2170855	√	√	×	≤ 10W

Card Type	Card Name	Card Number	Matching Subracks			Power Consumption
			AN5116-06B	AN5516-06	AN5516-04	
Power card	PWR	2201894	×	√	×	≤ 33 W
	PWRA	2201471	×	×	√	≤ 30 W
	PWRD	2201409	×	×	√	≤ 8 W
EPON service card	EC4B	2119318	√	√	√	≤ 35 W
	EC8B	2119354	√	√	√	≤ 45 W
		2200740	√	√	√	≤ 40 W
	ECOB	2201167	√	√	√	≤ 60 W
10G EPON service card	XG8A	2201075	√	√	√	≤ 75 W
GPON service card	GC4B	2119348	√	√	√	≤ 40 W
	GC8B	2200012	√	√	√	≤ 60 W
		2201330 (supporting the 1588 function)	√	√	√	
	GCOB	2201168	√	√	√	≤ 80 W
XG-PON service card	XP4A	2200952	√	√	√	≤ 100 W
	XP8A	2201737 (XFP)	√	√	√	≤ 75 W
		2202171 (SFP+)	√	√	√	≤ 81 W
		2202267 (SFP+)	√	√	√	≤ 76.5 W
GPON&XG-PON Combo service card	XP8C	2202188	√	√	√	≤ 100 W
POTS service card	PPDA	2201632	√	√	√	≤ 63 W
	PPEA	2202194	√	√	√	≤ 20 W
ADSL service card	APSA	2201844	√	√	√	≤ 75 W
VDSL service card	VPSA	2201905	√	√	√	≤ 81 W
	FTSA	2202571	√	√	√	≤ 76 W
AD Combo service card	CATA	2201654	√	√	√	≤ 130 W
VD Combo service card	CVTA	2201843	√	√	√	≤ 117 W
SHDSL service card	SHUA	2202133	√	√	√	≤ 30 W

Card Type	Card Name	Card Number	Matching Subracks			Power Consumption
			AN5116-06B	AN5516-06	AN5516-04	
ISDN service card	BROA	2202193	√	√	×	≤ 50 W
	SETA	2201898	√	√	×	≤ 48 W
Vector card	VCNA	2202477	√	√	×	≤ 115 W
	FCEA	2202494	√	√	×	≤ 115 W
Ethernet service card	GSOF	2201034	√	√	√	≤ 25 W
TDM service card	CE1B	2170845	√	√	√ √	≤ 25 W
	C155A	2170821	√	√	√	≤ 25 W
OTDR line diagnosis and measurement card	ODMA	2201374	√	√	√	≤ 25 W
	ODMB	2201373	√	√	√	≤ 25 W
	ODMC	2201334	√	√	√	≤ 25 W
Clock card	TIMA	2201332	√	√	√	≤ 15 W
Other cards	CIO	2201888	×	√	×	≤ 2 W
Note 1: √ indicates "supported"; × indicates "not supported".						

3.3 Core Switch Card

The core switch cards aggregate, switch and control traffic flow, process Layer-2 protocols, and manage the faults, performance and configuration of the equipment. They are used on the AN5116-06B and the AN5516-06.

3.3.1 Function Overview of the Core Switch Card

The core switch cards implement the following functions:

Classification	Function
Interface function	Provides the local commissioning serial port to meet the demand of CLI local management.
	Provides the out-of-band management network port.
Multicast functions	Supports the multicast function; four multicast modes are available: Proxy, Snooping, Proxy-Snooping, and MLD multicast.
	Supports multicast protocols such as PIM-SM / DM and IGMP V2 / V3.

Classification	Function
Voice functions	Supports NGN voice service and voice protocols SIP and H.248.
VLAN functions	Supports port-based and IEEE 802.1q-based VLAN.
	Supports selective QinQ VLAN and VLAN translation.
Layer 2 switching function	Supports Layer 2 switching.
Layer 3 functions	Supports ARP and ARP Proxy.
	Supports the DHCP Server / Relay / Snooping function.
	Supports the IPv6 protocol.
	Supports uplink based on the routing protocols such as OSPF.
QoS functions	Supports flow control.
	Supports priority queues and processes user services on the basis of priority.
Maintenance and management functions	Supports the mirroring function of the uplink interface.
	Supports remote upgrade of card software.
	Supports multiple management VLANs and multiple management IP addresses.
	Supports reporting the environment monitoring information and the alarm information for the equipment and the connected ONUs.
Reliability functions	Supports PON port protection.
	Supports uplink port trunking and port dual-uplink protection.
	Supports RSTP to avoid generation of loops in the network.
	Supports MSTP to avoid proliferation and infinite loop of packets in the loop network and allow load balance in the VLAN.
Safety functions	Supports classification and filtering of data packets at Layers 2 to 7.
	Supports ACL functions and provides a strict security protection mechanism.
	Supports suppression of broadcast packets, multicast packets and unknown packets to prevent broadcast storms in the network.
	Prevents DoS attacks.

The functions supported by the core switch cards vary as follows:

- The HSWB card can process MSAN service data. To enable MSAN access, users must select this card as the core switch card for the OLT equipment.
- The HSWD card provides a USB interface for connection with the storage device to import / export the system upgrade and configuration files.

- The HSWD (2202258) card supports the 1588 / synchronous Ethernet clock function.

The core switch cards provide interfaces as follows:

Card Name	Local Commissioning Serial Port	Out-of-band Management Network Port	USB Interface
HSWA	1	1	-
HSWB	1	1	-
HSWD	1	1	1

3.3.2 HSWA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-1 Interfaces

Identifier	Meaning	Description
CONSOLE	Local commissioning serial port	Connects to a CLI network management computer.
FE	Out-of-band management network port	Connects to an out-of-band network management computer.

Table 3-2 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT[Note 1]	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is standby and is receiving a configuration command from the active card.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Table 3-2 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
MS	Active / standby status indicator LED	Green	ON	The card is active.
			OFF	The card is standby.
Note 1: When the ACT indicator LED of a standby card is blinking or extinguished, do not unplug the active card or execute the active-to-standby switching command , which may cause loss of card configuration data.				

Technical Specifications

Item	Specification
Network standards	IEEE 802.1ag, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE Std 802.1s-2002, RFC 2236, RFC 3376, RFC 826, RFC 2328, RFC 2131, ITU-T Y.1731, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s
Switching mode	Store-and-forward
Capacity of the core switch card	488 Gbit/s
Supported MAC address quantity	32 k
Switching time	≤ 50 ms

Interface Specifications

Item		Specification
CONSOLE interface	Interface type	RJ-45
	Interface standard	Asynchronous EIA / TIA-232
	Baud rate	9600 Bd

Function

See Function Overview of the Core Switch Card.

Working Principle

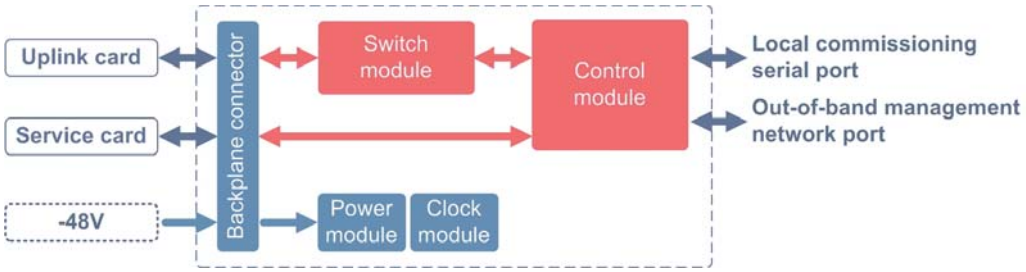


Figure 3-3 Working Principle of the HSWA Card

- The control module is used for configuring the entire system, collecting and reporting statuses, processing protocols, and providing the local commissioning serial port and the out-of-band management network interface.
- The switch module is used to switch service data.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.3.3 HSWB

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-3 Interfaces

Identifier	Meaning	Description
CONSOLE	Local commissioning serial port	Connects to a CLI network management computer.
FE	Out-of-band management network port	Connects to an out-of-band network management computer.

Table 3-4 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT[Note 1]	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is standby and is receiving a configuration command from the active card.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.
MS	Active / standby status indicator LED	Green	ON	The card is active.
			OFF	The card is standby.
Note 1: When the ACT indicator LED of a standby card is blinking or extinguished, do not unplug the active card or execute the active-to-standby switching command , which may cause loss of card configuration data.				

Technical Specifications

Item	Specification
Network standards	IEEE 802.1ag, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE Std 802.1s-2002, RFC 2236, RFC 3376, RFC 826, RFC 2328, RFC 2131, ITU-T Y.1731, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s
Switching mode	Store-and-forward
Capacity of the core switch card	488 Gbit/s
Supported MAC address quantity	32 k
Switching time	≤ 50 ms

Interface Specifications

Item		Specification
CONSOLE interface	Interface type	RJ-45
	Interface standard	Asynchronous EIA / TIA-232
	Baud rate	9600 Bd

Function

See Function Overview of the Core Switch Card.

Working Principle

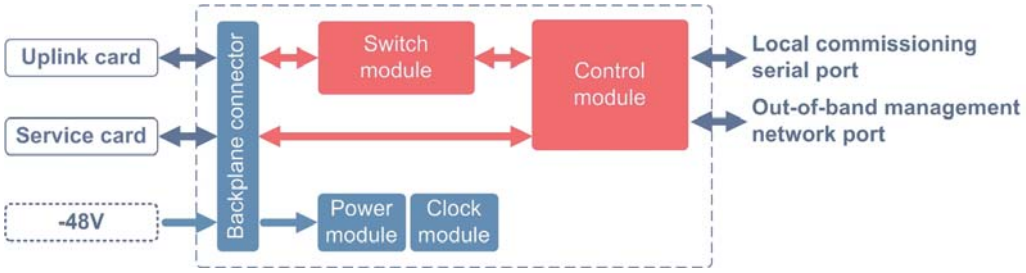


Figure 3-4 Working Principle of the HSWB Card

- The control module is used for configuring the entire system, collecting and reporting statuses, processing protocols, and providing the local commissioning serial port and the out-of-band management network interface.
- The switch module is used to switch service data.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.3.4 HSWD

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-5 Interfaces

Identifier	Meaning	Description
USB	USB interface	Connects with the USB storage device.
CONSOLE	Local commissioning serial port	Connects to a CLI network management computer.
FE	Out-of-band management network port	Connects to an out-of-band network management computer.

Table 3-6 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT[Note 1]	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is standby and is receiving a configuration command from the active card.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card is being reset or has alarms.
			OFF	The card is working normally.
MS	Port status indicator LED	Green	ON	The card is active.
			OFF	The card is standby.
Note 1: When the ACT indicator LED of a standby card is blinking or extinguished, do not unplug the active card or execute the active-to-standby switching command , which may cause loss of card configuration data.				

Technical Specifications

Item	Specification
Network standards	IEEE 802.1ag, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE Std 802.1s-2002, RFC 2236, RFC 3376, RFC 826, RFC 2328, RFC 2131, ITU-T Y.1731, etc.
Operating modes	1 Gbit/s, 10 Gbit/s, 20 Gbit/s and 40 Gbit/s
Switching mode	Store-and-forward
Capacity of the core switch card	1.92 Tbit/s
Supported MAC address quantity	2201069: 288k 2202258 (supporting the 1588 function): 128k
Switching time	≤ 50 ms

Interface Specifications

Item		Specification
CONSOLE interface	Interface type	RJ-45
	Interface standard	Asynchronous EIA / TIA-232
	Baud rate	9600 Bd

Function

See Function Overview of the Core Switch Card.

Working Principle

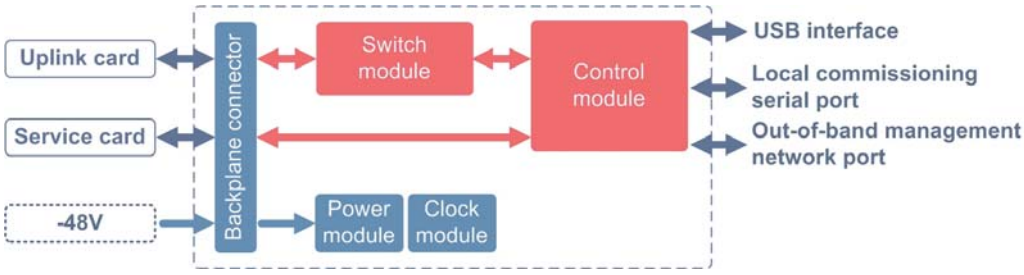


Figure 3-5 Working Principle of the HSWD Card (2201069)

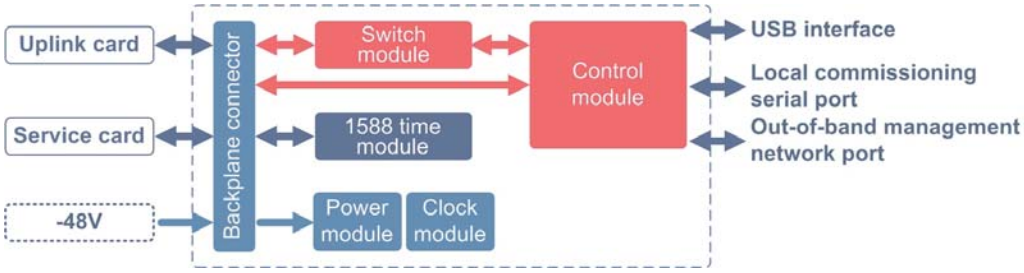


Figure 3-6 Working Principle of the HSWD Card Supporting the 1588 Function (2202258)

- The control module is used for configuring the entire system, collecting and reporting statuses, processing protocols, and providing the USB interface, local commissioning serial port and out-of-band network management interface.
- The switch module is used to switch service data.
- The 1588 clock module is used to implement the 1588 / synchronous Ethernet clock function.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.4 Switch Uplink Card

The switch uplink cards aggregate, switch, control and uplink traffic flow, process Layer-2 protocols, and manage the faults, performance and configuration of the equipment. They are used on the AN5516-04.

3.4.1 Function Overview of the Switch Uplink Card

The switch uplink card implements the following functions:

Classification	Function
Interface function	Provides the uplink ports.
	Provides the local commissioning / monitoring serial port to meet the CLI local management requirement and monitor the equipment environment.
	Provides the out-of-band management network port.
	Provides the BITS / TOD interface to support clock synchronization.
	Provides the alarm interface to output the equipment alarms to the PDP, the top of the cabinet, or the head of row cabinet.
Multicast functions	Supports the multicast function. Four multicast modes are available: proxy, snooping, proxy-snooping, and controlled multicast.
	Supports multicast protocols such as PIM-SM / DM and IGMP V2 / V3.
Voice functions	Supports NGN voice service and voice protocols SIP and H.248.
VLAN functions	Supports port-based and IEEE 802.1q-based VLAN.
	Supports selective QinQ VLAN and VLAN translation.
Layer 2 switching function	Supports Layer 2 switching.
Layer 3 functions	Supports ARP and ARP Proxy.
	Supports the DHCP Server / Relay / Snooping / Option 82 function.
	Supports the IPv6 protocol.
	Supports uplink based on the routing protocols such as OSPF.
QoS functions	Supports flow control.
	Supports priority queues and processes user services on the basis of priority.
Maintenance and management functions	Supports the mirroring function of the uplink interface.
	Supports remote upgrade of card software.

Classification	Function
	Supports multiple management VLANs and multiple management IP addresses.
	Supports reporting the environment monitoring information and the alarm information for the equipment and the connected ONUs.
Reliability functions	Supports PON port protection.
	Supports uplink port trunking and port dual-uplink protection.
	Supports RSTP to avoid generation of loops in the network.
	Supports MSTP to avoid proliferation and infinite loop of packets in the loop network and allow load balance in the VLAN.
Safety functions	Supports classification and filtering of data packets at Layers 2 to 7.
	Supports ACL functions and provides a strict security protection mechanism.
	Supports suppression of broadcast packets, multicast packets and unknown packets to prevent broadcast storms in the network.
	Prevents DoS attacks.

The switch uplink cards provide the ports as follows:

Card	GE Uplink Optical / Electrical Port[Note 1]	10GE Uplink Optical Port	Local Commissioning / Monitoring Serial Port	Out-of-band Management Network Port	BITS / TOD Port	Alarm Port
HSUB	2	2	1	1	1	1
HSUC	4	-	1	1	1	1
Note 1: Serves as either GE optical port or electrical port by using GE optical module or electrical module as desired.						

3.4.2 HSUB

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-7 Interfaces

Identifier	Meaning	Description
10GE1 (1), 10GE2 (2)	10GE uplink optical interface	Connect to the IP network.
GE1 (3), GE2 (4)	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.
CONSOLE / ESC	Local commissioning / monitoring serial port	Connects to the CLI network management computer / environment monitoring equipment.
BITS / TOD	Clock interface	Connects to the external clock device.
ETH	Out-of-band management network port	Connects to an out-of-band network management computer.
ALARM	Alarm interface	Outputs the equipment alarms to the PDP, the top of the cabinet, or the head of row cabinet.

Table 3-8 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
MS	Active / standby status indicator LED	Green	ON	The card is active.
			OFF	The card is on standby or faulty.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Table 3-8 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
LNK 1 to 4	Uplink port connection status indicator LED	Green	ON	The port is connected.
			Blinking	The port is receiving / transmitting data normally.
			OFF	The port is not connected.

Technical Specifications

Item	Specification
Network standards	IEEE 802.1ag, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE Std 802.1s-2002, RFC 2236, RFC 3376, RFC 826, RFC 2328, RFC 2131, ITU-T Y.1731, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s
Switching mode	Store-and-forward
Capacity of the switch uplink card	488 Gbit/s
Supported MAC address quantity	32 k

Interface Specifications

Item		Specification
CONSOLE / ESC interface	Interface type	RJ-45
	Interface standard	Asynchronous EIA-232/TIA-232
	Baud rate	9600 Bd

Item		Specification
Matching module[Note 1]	GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
		1.25G-100m-TDM-SFP (1000BASE-T)
	GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
		1.25G-15km-TDM-SFP (1000BASE-LX)
		1.25G-40km-TDM-SFP (1000BASE-EX)
		1.25G-80km-TDM-SFP (1000BASE-ZX1)
	10GE optical module	10G-10km-TDM-SFP+ (I-64.1)
		10G-40km-TDM-SFP+ (10GBASE-ER/EW)
		10G-80km-TDM-SFP+ (L-64.2)
Note 1: See GE / 10GE Module for the specifications of the modules.		

Function

See Function Overview of the Switch Uplink Card.

Working Principle

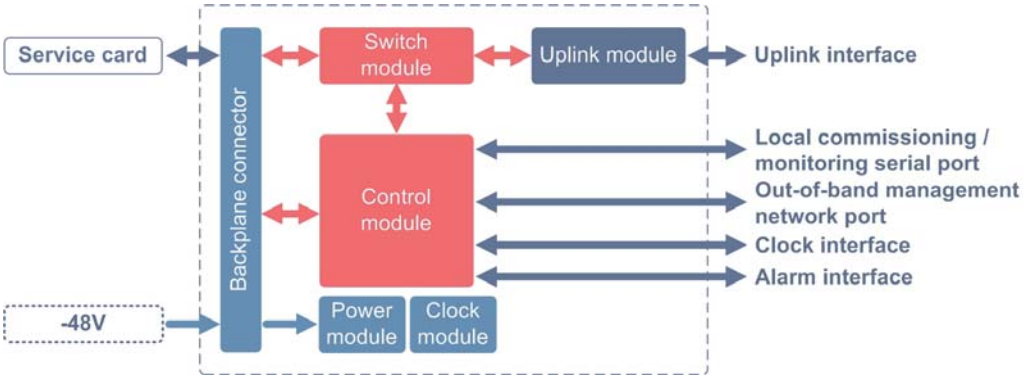


Figure 3-7 Working Principle of the HSUB Card

- The uplink module provides four uplink interfaces to connect the service flows of the entire system to the IP network.
- The switch module is used to switch service data.
- The control module is used for configuring the entire system, collecting and reporting statuses, processing protocols, and providing the local commissioning / monitoring serial port, out-of-band network management interface, clock interface and alarm interface.

- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.4.3 HSUC

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-9 Interfaces

Identifier	Meaning	Description
GE1 to GE4	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.
CONSOLE / ESC	Local commissioning / monitoring serial port	Connects to the CLI network management computer / environment monitoring equipment.
BITS / TOD	Clock interface	Connects to the external clock device.
ETH	Out-of-band management network port	Connects to an out-of-band network management computer.
ALARM	Alarm interface	Outputs the equipment alarms to the PDP, the top of the cabinet, or the head of row cabinet.

Table 3-10 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.

Table 3-10 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
MS	Active / standby status indicator LED	Green	ON	The card is active.
			OFF	The card is on standby or faulty.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.
LNK 1 to 4	Uplink port connection status indicator LED	Green	ON	The port is connected.
			Blinking	The port is receiving / transmitting data normally.
			OFF	The port is not connected.

Technical Specifications

Item	Specification
Network standards	IEEE 802.1ag, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE Std 802.1s-2002, RFC 2236, RFC 3376, RFC 826, RFC 2328, RFC 2131, ITU-T Y.1731, etc.
Operating modes	10 / 100 / 1000 Mbit/s
Switching mode	Store-and-forward
Capacity of the switch uplink card	488 Gbit/s
Supported MAC address quantity	32 k

Interface Specifications

Item		Specification
CONSOLE / ESC interface	Interface type	RJ-45
	Interface standard	Asynchronous EIA-232/TIA-232
	Baud rate	9600 Bd
Matching module[Note 1]	GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
		1.25G-100m-TDM-SFP (1000BASE-T)
	GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
		1.25G-15km-TDM-SFP (1000BASE-LX)

Item		Specification
		1.25G-40km-TDM-SFP (1000BASE-EX)
		1.25G-80km-TDM-SFP (1000BASE-ZX1)
Note 1: See GE / 10GE Module for the specifications of the modules.		

Function

See Function Overview of the Switch Uplink Card.

Working Principle

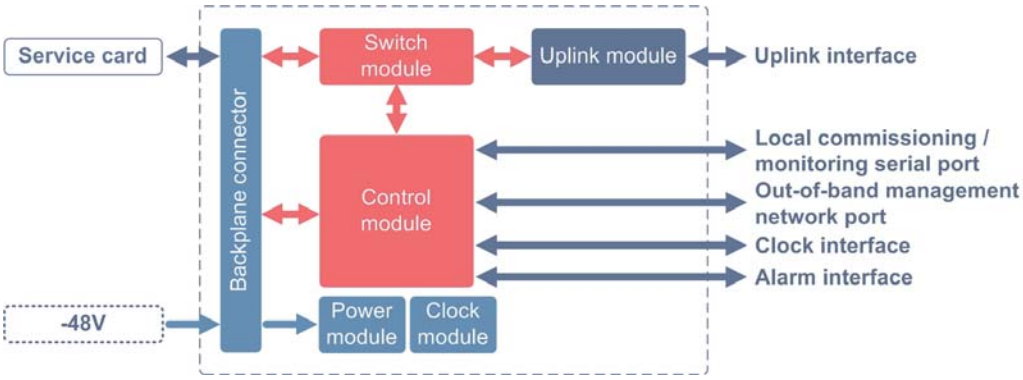


Figure 3-8 Working Principle of the HSUC Card

- The uplink module provides four uplink interfaces to connect the service flows of the entire system to the IP network.
- The switch module is used to switch service data.
- The control module is used for configuring the entire system, collecting and reporting statuses, processing protocols, and providing the local commissioning / monitoring serial port, out-of-band network management interface, clock interface and alarm interface.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5 Uplink Card

The uplink cards are used for uplinking, and are applicable to the AN 5116-06B and the AN5516-06.

3.5.1 Function Overview of the Uplink Card

The uplink card supports the following functions:

- Provides the uplink ports.
- Each uplink port can be used as the network management port to connect with a network management computer.
- Each uplink interface can be used as a cascade interface allowing multiple equipment sets to be cascaded to the IP network via a single IP port.
- The HU1B and GU6B cards support the synchronous Ethernet function.

The uplink cards provide the ports as follows:

Card	GE Uplink Optical / Electrical Port[Note 1]	10GE Uplink Optical Port
HU1A	4	1
HU1B	4	1
HU2A	2	2
HU2C	4	2
HU4A	-	4
GU6B	6	-
GU6F	6	-
Note 1: Serves as either GE optical port or electrical port by using GE optical module or electrical module as desired.		

3.5.2 HU1A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-11 Interfaces

Identifier	Meaning	Description
XFP1	10GE uplink optical interface	Connects to the IP network.
SFP2 to 5	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.

Table 3-12 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
LNK1 to LNK5	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.
WAN1	WAN / LAN mode indicator LED	Green	ON	The upper-layer device's port connected to this card is in the WAN mode.
			OFF	The upper-layer device's port connected to this card is in the LAN mode.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, IEEE 802.3ae, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
	1.25G-100m-TDM-SFP (1000BASE-T)
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
10GE optical module	10G-10km-TDM-XFP (I-64.1)
	10G-40km-TDM-XFP (S-64.2b)
	10G-80km-TDM-XFP (L-64.2)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

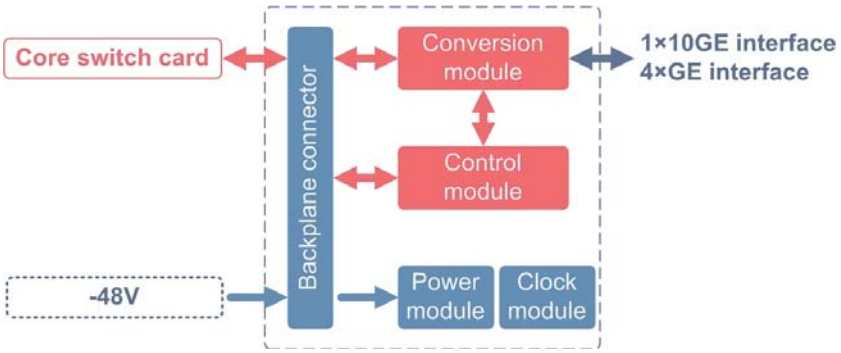


Figure 3-9 Working Principle of the HU1A Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.3 HU1B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-13 Interfaces

Identifier	Meaning	Description
SFP+1	10GE uplink optical interface	Connects to the IP network.
SFP2 to 5	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical module and GE electrical module. The electrical module is auto-negotiated to rates 10 / 100 / 1000M.

Table 3-14 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
LINK1 to 5	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, IEEE 802.3ae, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
10GE optical module	10G-10km-TDM-SFP+ (I-64.1)
	10G-40km-TDM-SFP+ (10GBASE-ER/EW)
	10G-80km-TDM-SFP+ (L-64.2)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

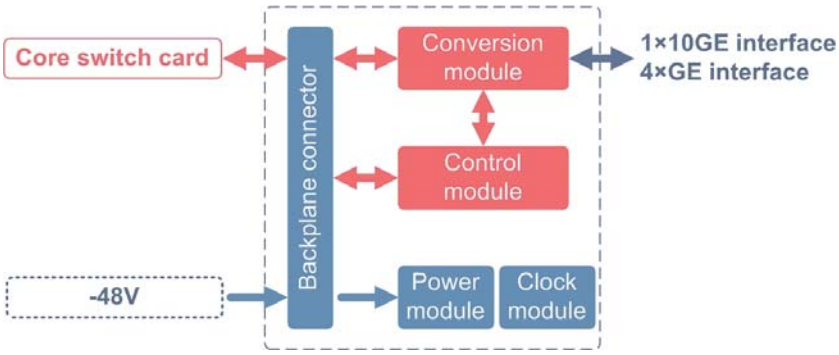


Figure 3-10 Working Principle of the HU1B Card

- The conversion module provides uplink interfaces and transmits data transparently.

- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.4 HU2A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-15 Interfaces

Identifier	Meaning	Description
XG1 to 2	10GE uplink optical interface	Connect to the IP network.
GE3 to 4	GE uplink optical / electrical interface	Connect to the IP network. Supports both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.

Table 3-16 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.

Table 3-16 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
LNK1 to LNK4	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.
WAN1 to WAN2	WAN / LAN mode indicator LED	Green	ON	The upper-layer device's port connected to this card is in the WAN mode.
			OFF	The upper-layer device's port connected to this card is in the LAN mode.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, IEEE 802.3ae, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
	1.25G-100m-TDM-SFP (1000BASE-T)
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
10GE optical module	10G-10km-TDM-XFP (I-64.1)
	10G-40km-TDM-XFP (S-64.2b)
	10G-80km-TDM-XFP (L-64.2)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

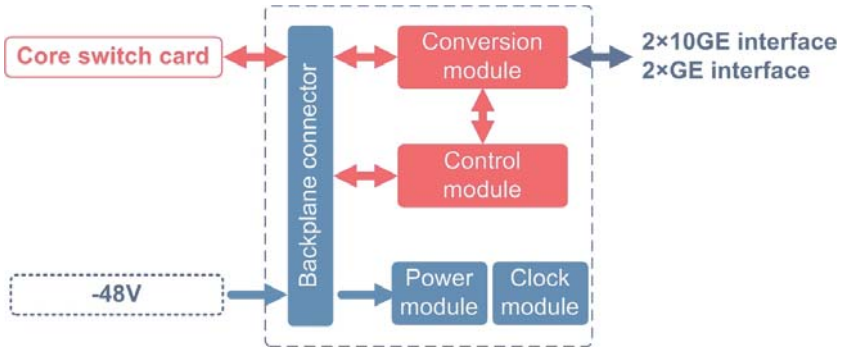


Figure 3-11 Working Principle of the HU2A Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.5 HU2C

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-17 Interfaces

Identifier	Meaning	Description
XG1 to 2	10GE uplink optical interface	Connect to the IP network.
GE3 to 6	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.

Table 3-18 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.
LNK1 to LNK6	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			OFF	The port is not connected with the upper-layer device.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, IEEE 802.3ae, etc.
Operating modes	10 / 100 / 1000 Mbit/s, 10 Gbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
	1.25G-100m-TDM-SFP (1000BASE-T)
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)

Item	Specification
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
10GE optical module	10G-0.3km-TDM-SFP+ (10GBASE-SR/SW)
	10G-10km-TDM-SFP+ (10GBASE-LR/LW)
	10G-40km-TDM-SFP+ (10GBASE-ER/EW)
	10G-80km-TDM-SFP+ (L-64.2)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

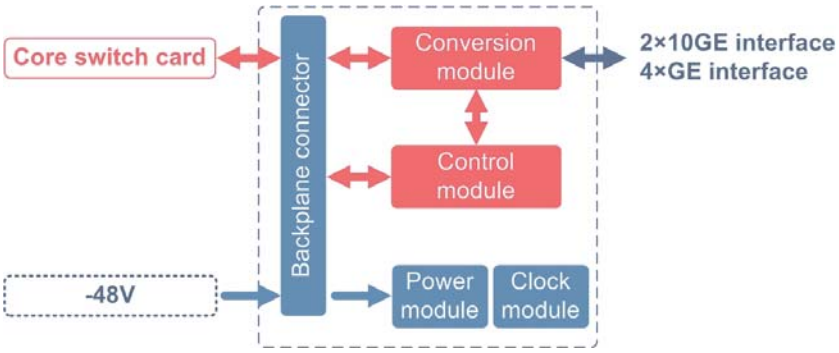


Figure 3-12 Working Principle of the HU2C Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.6 HU4A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-19 Interfaces

Identifier	Meaning	Description
XG1 to 4	10GE uplink optical interface	Connect to the IP network. Support auto negotiation to GE/10GE.

Table 3-20 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
LINK1 to 4	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3ae, etc.
Operating modes	1000 Mbit/s, 10 Gbit/s

Matching Module

Item	Specification
10GE optical module	10G-0.3km-TDM-SFP+ (10GBASE-SR/SW)
	10G-10km-TDM-SFP+ (10GBASE-LR/LW)
	10G-40km-TDM-SFP+ (10GBASE-ER/EW)
Note 1: GE / 10GE Module shows the module specifications.	

Function

See Function Overview of the Uplink Card.

Working Principle

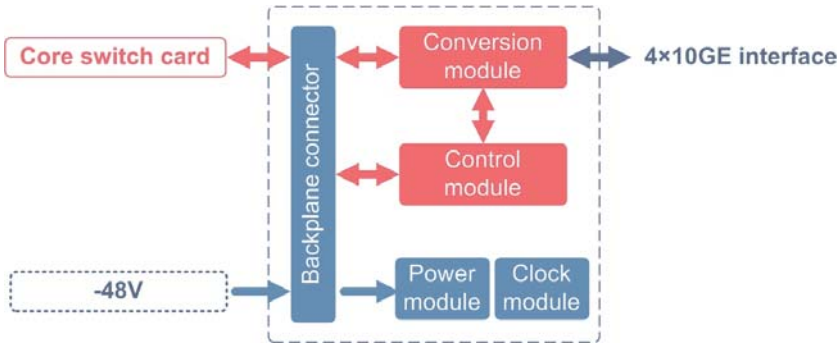


Figure 3-13 Working Principle of the HU4A Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.7 GU6B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-21 Interfaces

Identifier	Meaning	Description
GE1 to 6	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical module and GE electrical module. The electrical module is auto-negotiated to rates 10 / 100 / 1000M.

Table 3-22 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
LINK1 to 6	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, etc.
Operating modes	10 / 100 / 1000 Mbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
GE optical module	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)

Item	Specification
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

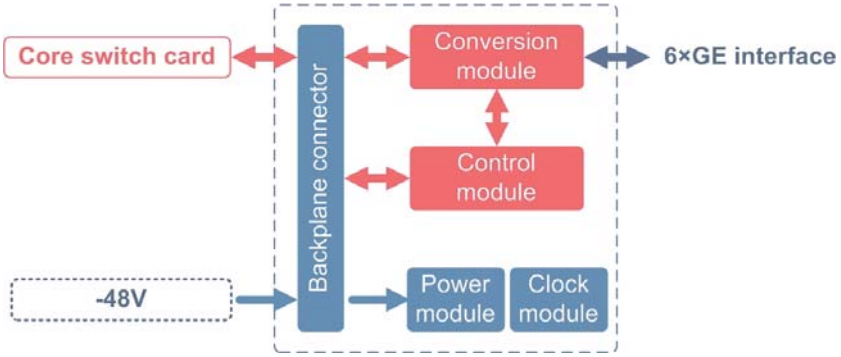


Figure 3-14 Working Principle of the GU6B Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.5.8 GU6F

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-23 Interfaces

Identifier	Meaning	Description
GE1 to 6	GE uplink optical / electrical interface	Connect to the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.

Table 3-24 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
LNK1 to LNK6	Port status indicator LED	Green	ON	The port is connected with the upper-layer device.
			Blinking quickly	The port is transmitting data to or receiving data from the upper-layer device.
			OFF	The port is not connected with the upper-layer device.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3z, etc.
Operating modes	10 / 100 / 1000 Mbit/s

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
	1.25G-100m-TDM-SFP (1000BASE-T)

Item	Specification
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
Note 1: See GE / 10GE Module for the specifications of the modules.	

Function

See Function Overview of the Uplink Card.

Working Principle

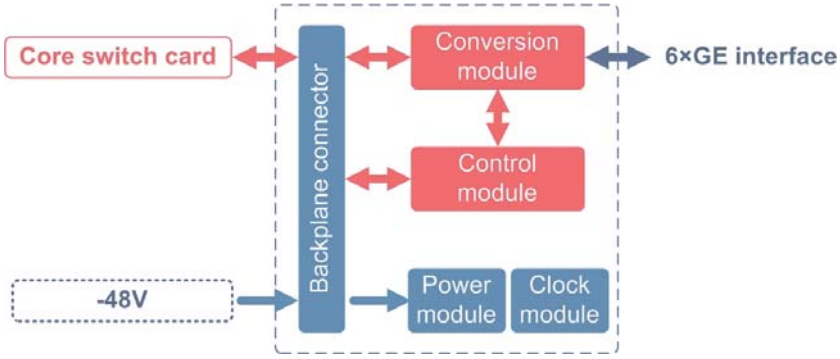


Figure 3-15 Working Principle of the GU6F Card

- The conversion module provides uplink interfaces and transmits data transparently.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.6 Power Card

The power cards induct the AC / DC power supply for the equipment. They are applicable to the AN5516-06 and the AN5516-04.

3.6.1 PWR

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-25 Interfaces

Identifier	Meaning	Description
0V, -48V	DC power interface	Inputs the -48V DC power supply. 0V corresponds to the high potential of the DC power supply while -48V the low potential of the DC power supply.

Table 3-26 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			OFF	The card is not working normally.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card works normally without alarms.

Function

The PWR card provides -48 V DC power supply for the equipment, and performs the lightning protection and filtering functions.

Working Principle

The PWR card inducts the -48 V DC power from the PDP and supplies power to the equipment.

3.6.2 PWRA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-27 Interfaces

Identifier	Meaning	Description
AC IN	AC power supply interface	Connects with the mains supply to supply power to the equipment.

Table 3-28 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			OFF	The card is not working.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally or not powered on.
POWER	Power indicator LED	Green	ON	The equipment is powered on.
			OFF	The equipment is not powered on.

Technical Specifications

Item	Specification
Working voltage	90 VAC to 286 VAC

Function

The PWRA card provides the mains supply (AC power supply) for the equipment, and performs the lightning protection and filtering functions.

Working Principle

The PWRA card converts the external 220 V AC power into the -48 V DC power for the equipment.

3.6.3 PWRD

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-29 Interfaces

Identifier	Meaning	Description
0V, -48V	DC power interface	Inputs the -48V DC power supply. 0V corresponds to the high potential of the DC power supply while -48V the low potential of the DC power supply.

Table 3-30 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			OFF	The card is not working normally.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card works normally without alarms.

Function

The PWRD card provides -48V DC power input for the equipment, and performs the lightning protection and filtering functions. When two PWRD cards are configured for the equipment, the redundancy protection for the power cards can be implemented.

Working Principle

The PWRD card inducts the -48 V DC power from the PDP and supplies power to the equipment.

3.7 EPON / 10G EPON Service Card

The EPON / 10G EPON service cards provide service interfaces to access EPON / 10G EPON services by working together with ONUs.

3.7.1 Function Overview of the EPON / 10G EPON Service Card

The EPON / 10G EPON service cards implement the functions as follows:

Classification	Function
Interface function	Provides EPON / 10G EPON service interfaces.
Access features	Supports Triple Play, including data, voice and IPTV.
Multicast functions	Supports the IGMP proxy / snooping multicast and the controlled multicast.
QoS functions	Supports real-time DBA.
	Provides the selective QoS and SLA functions.
Maintenance and management functions	Supports local and remote loopback tests.
	Supports remote upgrade of the card software.
	Supports automatic discovery and detection of ONUs.
	Supports pre-authorization and pre-configuration of ONUs.
	Supports ONU configuration in a batch manner.
	Supports automatic upgrade of the ONU software to facilitate maintenance and management.
Reliability functions	Provides the FEC function.
	Provides OAM functions.

The functions supported by the EPON / 10G EPON service cards vary as follows:

- The 10G EPON cards support 10G/10G symmetric access and 10G/1G asymmetric access.
- The 10G EPON cards support PR30 / PRX30 link budget.

- The 10G EPON cards support hybrid access of 10G and 1G EPON ONUs.

The EPON / 10G EPON service cards provide the interfaces as follows:

Card Name	EPON Port	10G EPON Port
EC4B	4	-
EC8B	8	-
ECOB	16	-
XG8A	-	8

3.7.2 EC4B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-31 Interfaces

Identifier	Meaning	Description
1 to 4	EPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-32 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.

Table 3-32 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 4	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.
MS1 to 4	Active / standby status indicator LED	Green	ON	The PON port is active.
			OFF	The PON port is standby.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004, IETF RFC2236, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	16 k
Maximum split ratio	1:64
Maximum LLID	256
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
EPON optical module	1.25G-20km-EPON OLT-SFP (PX20+)
Note 1: EPON Optical Module shows the module specifications.	

Function

See Function Overview of the EPON / 10G EPON Service Card.

Working Principle

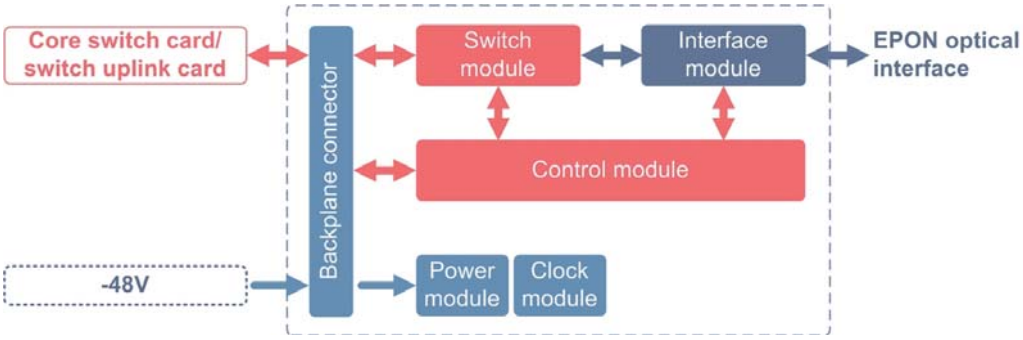


Figure 3-16 Working Principle of the EC4B Card

- The interface module provides EPON interfaces, and enables the conversion between EPON packets and Ethernet packets.
- The switch module aggregates signals on four lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.7.3 EC8B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-33 Interfaces

Identifier	Meaning	Description
1 to 8	EPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-34 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 8	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004, IETF RFC2236, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:64
Maximum LLID	256
Bandwidth allocation granularity	64 kbit/s

Item	Specification
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
EPON optical module	1.25G-20km-EPON OLT-SFP (PX20+)
Note 1: EPON Optical Module shows the module specifications.	

Function

See Function Overview of the EPON / 10G EPON Service Card.

Working Principle

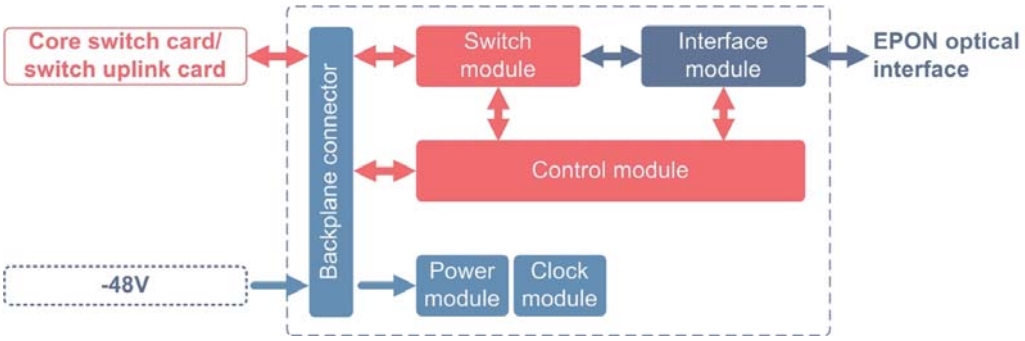


Figure 3-17 Working Principle of the EC8B Card

- The interface module provides EPON interfaces, and enables the conversion between EPON packets and Ethernet packets.
- The switch module aggregates signals on eight lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.7.4 ECOB

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-35 Interfaces

Identifier	Meaning	Description
1 to 16	EPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-36 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 16	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004, IETF RFC2236, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:64
Maximum LLID	256
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
EPON optical module	1.25G-20km-EPON OLT-SFP (PX20+)
Note 1: EPON Optical Module shows the module specifications.	

Function

See Function Overview of the EPON / 10G EPON Service Card.

Working Principle

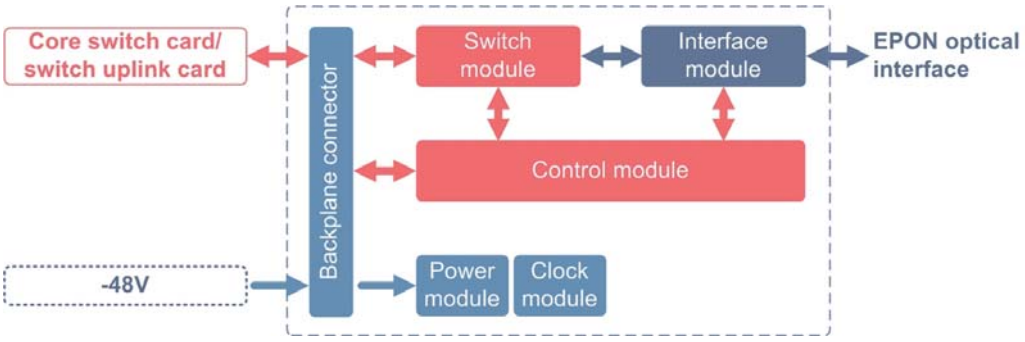


Figure 3-18 Working Principle of the ECOB Card

- The interface module provides EPON interfaces, and enables the conversion between EPON packets and Ethernet packets.

- The switch module aggregates signals on16 lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.7.5 XG8A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-37 Interfaces

Identifier	Meaning	Description
1 to 8	10G EPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-38 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.

Table 3-38 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
			OFF	The card is working normally.
LINK1 to 8	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE802.3x, IEEE 802.3ah, IEEE 802.3av, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004, IETF RFC2236, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:128
Maximum LLID	1024
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
10G EPON optical module	10/1.25G-20km-10G EPON OLT asymmetric - XFP (10G/1G BASE-PRX30)
	10/1.25G-20km-10G EPON OLT symmetric-XFP (10G BASE-PR30)
Note 1: 10G EPON Optical Module shows the module specifications.	

Function

See Function Overview of the EPON / 10G EPON Service Card.

Working Principle

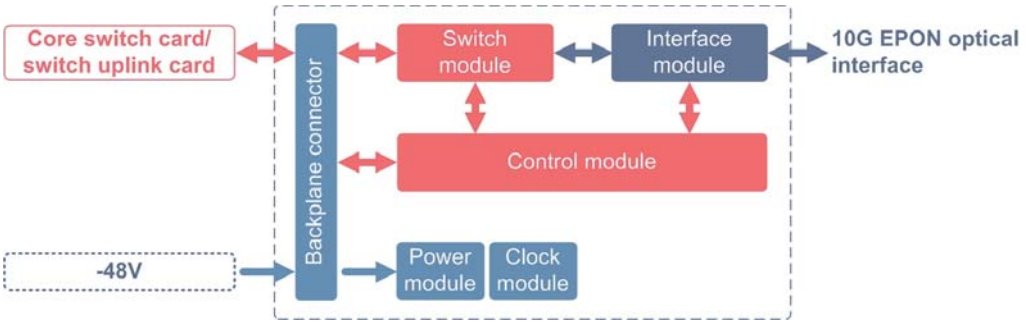


Figure 3-19 Working Principle of the XG8A Card

- The interface module provides 10G EPON interfaces, and enables the conversion between EPON packets and Ethernet packets.
- The switch module aggregates signals on eight lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8 GPON / XG-PON / GPON&XG-PON Combo Service Card

The GPON / XG-PON / GPON&XG-PON Combo service cards provide service interfaces to access GPON / XG-PON services by working together with ONUs.

3.8.1 Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card

The GPON / XG-PON / GPON&XG-PON Combo service cards implement the functions as follows:

Classification	Function
Interface function	Provides GPON / XG-PON / GPON&XG-PON Combo service interfaces.
Access features	Supports Triple Play, including data, voice and IPTV.

Classification	Function
Multicast functions	Supports the IGMP proxy / snooping multicast and the controlled multicast.
QoS functions	Supports real-time DBA.
	Provides the selective QoS and SLA functions.
Maintenance and management functions	Supports local and remote loopback tests.
	Supports remote upgrade of the card software.
	Supports automatic discovery and detection of ONUs.
	Supports pre-authorization and pre-configuration of ONUs.
	Supports ONU configuration in a batch manner.
	Supports automatic upgrade of the ONU software to facilitate maintenance and management.
Reliability functions	Provides the FEC function.
	Provides OAM functions.

The functions supported by the GPON / XG-PON service cards vary as follows:

- The XG-PON cards support 10G / 2.5G asymmetric access.
- The XG-PON cards support the N1 and N2a / N2b link budget.

The GPON&XG-PON Combo service cards support the functions as follows:

- Smooth upgrade of services from the GC8B card to the XP8C card
- Hybrid access of XG-PON (10G/2.5G) and GPON (2.5G/1.25G) services via a single PON port
- D1 and D2 link budget

The GPON / XG-PON / GPON&XG-PON Combo service cards provide the ports as follows:

Card	GPON Port	XG-PON Port	GPON&XG-PON Combo Port
GC4B	4	-	-
GC8B	8	-	-
GCOB	16	-	-
XP4A	-	4	-
XP8A	-	8	-
XP8C	-	-	8

3.8.2 GC4B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-39 Interfaces

Identifier	Meaning	Description
1 to 4	GPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-40 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 4	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Table 3-40 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
MS1 to 4	Active / standby status indicator LED	Green	ON	The PON port is active.
			OFF	The PON port is standby.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IETF RFC 2236, ITU-T G.984.1, ITU-T G.984.2, ITU-T G.984.3, ITU-T G.984.4, TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:128
Maximum Alloc ID	1024 / PON
Maximum Port ID	4096 / PON
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
GPON optical module	2.5/1.25G-20km-GPON OLT-SFP (CLASS B+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
Note 1: GPON Optical Module shows the module specifications.	

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

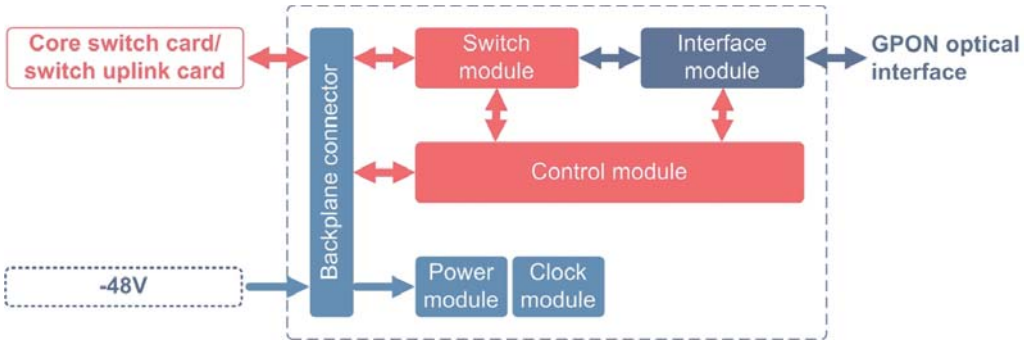


Figure 3-20 Working Principle of the GC4B Card

- The interface module provides GPON interfaces, and enables the conversion between GPON packets and Ethernet packets.
- The switch module aggregates signals on four lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8.3 GC8B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-41 Interfaces

Identifier	Meaning	Description
1 to 8	GPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-42 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 8	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IETF RFC 2236, ITU-T G.984.1, ITU-T G.984.2, ITU-T G.984.3, ITU-T G.984.4, TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:128
Maximum Alloc ID	1024 / PON
Maximum Port ID	4096 / PON
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
GPON optical module	2.5/1.25G-20km-GPON OLT-SFP (CLASS B+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
Note 1: GPON Optical Module shows the module specifications.	

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

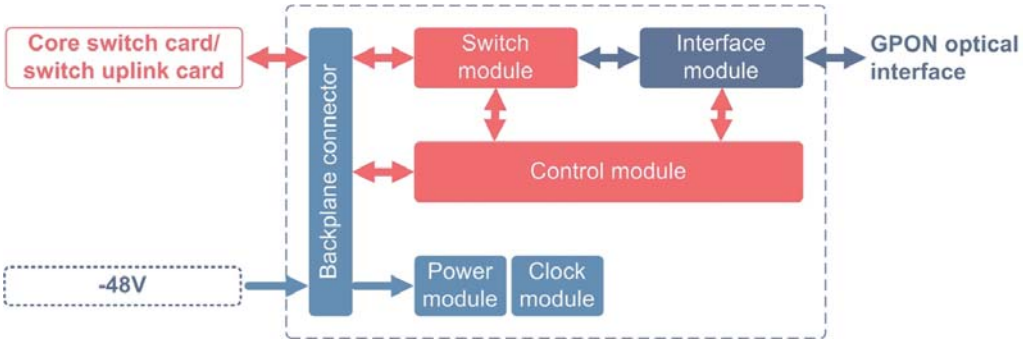


Figure 3-21 Working Principle of the GC8B Card

- The interface module provides GPON interfaces, and enables the conversion between GPON packets and Ethernet packets.
- The switch module aggregates signals on eight lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8.4 GCOB

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-43 Interfaces

Identifier	Meaning	Description
1 to 16	GPON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-44 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 16	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3x, IEEE 802.3ah, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IETF RFC 2236, ITU-T G.984.1, ITU-T G.984.2, ITU-T G.984.3, ITU-T G.984.4, TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	32 k
Maximum split ratio	1:128
Maximum Alloc ID	1024 / PON
Maximum Port ID	4096 / PON
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
GPON optical module	2.5/1.25G-20km-GPON OLT-SFP (CLASS B+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)
	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
Note 1: GPON Optical Module shows the module specifications.	

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

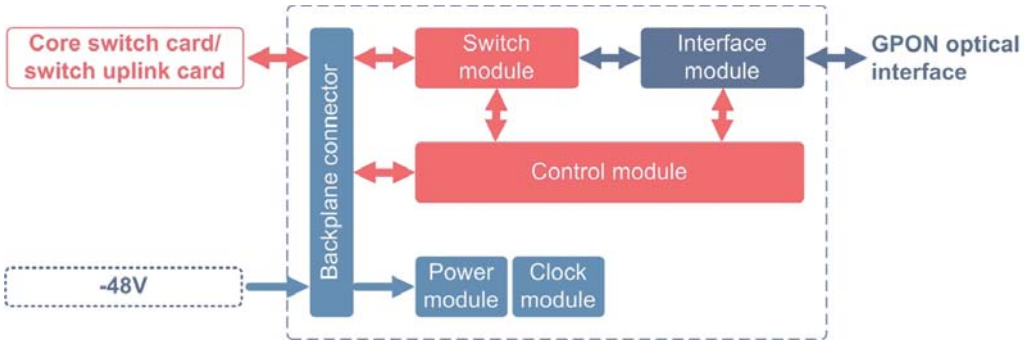


Figure 3-22 Working Principle of the GCOB Card

- The interface module provides GPON interfaces, and enables the conversion between GPON packets and Ethernet packets.
- The switch module aggregates signals on16 lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8.5 XP4A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-45 Interfaces

Identifier	Meaning	Description
1 to 4	XG-PON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-46 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 4	Port status indicator LED	Green	ON	An ONU is activated at the port.
			OFF	No ONU is activated at this port.
MS1 to 4	Port status indicator LED	Red	ON	An ONU is authorized under the port.
			OFF	No ONU is authorized under the port.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, ITU-T G.703, ITU-T G.987, ITU-T G.987.1, ITU-T G.987.2, ITU-T G.987.3, ITU-T G.988, IETF RFC 2236, TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	256 k
Maximum split ratio	1:128
Maximum quantity of T-CONTs	1024
Bandwidth allocation granularity	256 kbit/s
Optical fiber connector	SC/PC

Matching Module

Item	Specification
XG-PON optical module	10/2.5G-20km-XG-PON OLT-XFP (N1 ODN CLASS)
	10/2.5G-20km-XG-PON OLT-XFP (N2a ODN CLASS)
Note 1: XG-PON Optical Module shows the module specifications.	

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

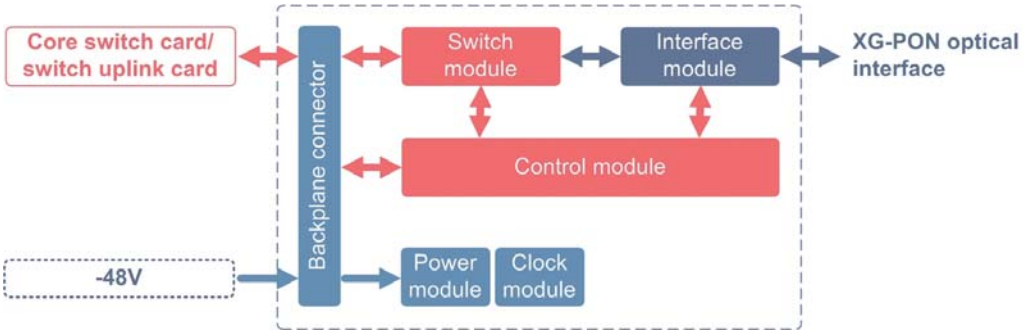


Figure 3-23 Working Principle of the XP4A Card

- The interface module provides XG-PON interfaces, and enables the conversion between the XG-PON packets and Ethernet packets.
- The switch module aggregates signals on four lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8.6 XP8A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Figure 3-24 XP8A-2201737 (XFP)

Figure 3-25 XP8A–2202171 (SFP+) and 2202267 (SFP+)

Table 3-47 Interfaces

Identifier	Meaning	Description
1 to 8	XG-PON interface	Connected to a remote ONU via an ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-48 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 to 8	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, ITU-T G.703, ITU-T G.987, ITU-T G.987.1, ITU-T G.987.2, ITU-T G.987.3, ITU-T G.988, IETF RFC 2236, TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	2201737 (XFP): 250k 2202171 (SFP+): 256k 2202267 (SFP+): 250k
Maximum split ratio	1:256
Maximum quantity of T-CONTs	2048
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC

Matching Module

Item	Card Number	Specification
XG-PON optical module	2201737 (XFP)	10/2.5G-20km-XG-PON OLT-XFP (N1 ODN CLASS)
		10/2.5G-20km-XG-PON OLT-XFP (N2a ODN CLASS)
	2202171 (SFP+), 2202267 (SFP+)	10/2.5G-20km-XG-PON OLT-SFP+ (N1 ODN CLASS)
Note 1: XG-PON Optical Module shows the module specifications.		

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

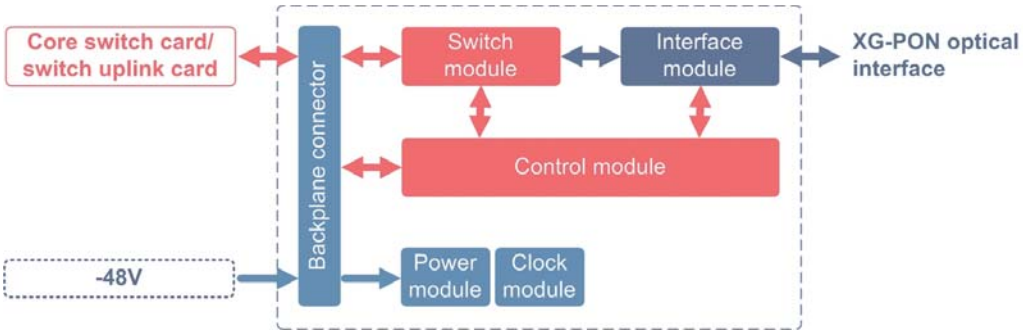


Figure 3-26 Working Principle of the XP8A Card

- The interface module provides XG-PON interfaces, and enables the conversion between the XG-PON packets and Ethernet packets.
- The switch module aggregates signals on eight lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.8.7 XP8C

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-49 Interface Description

Identifier	Meaning	Description
1 to 8	GPON&XG-PON Combo interface	Connect to remote ONUs via the ODN.
D	Debugging interface	RJ-45 debugging serial port

Table 3-50 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms for fiber disconnection, light leakage, and absence of optical module at the PON port, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LINK1 ~ 8	Port status indicator LED	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3ah、IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, ITU-T G.703, ITU-T G.984.1, ITU-T G.984.2, ITU-T G.984.3, ITU-T G.984.4, ITU-T G.987、ITU-T G.987.1, ITU-T G.987.2, ITU-T G.987.3, ITU-T G.988, IETF RFC 2236, and TR-156, etc.
Switching mode	Store-and-forward
Supported MAC address quantity	250 k
Maximum split ratio	1:256
Maximum quantity of T-CONTs	2048
Bandwidth allocation granularity	64 kbit/s
Optical fiber connector	SC/PC
Network cable	G.652 single-mode fiber

Matching Module

Item	Specification
GPON&XG-PON Combo optical module	10/2.5G:2.5/1.25G-20km-XG-PON:GPON OLT-XFP (D1 ODN CLASS)
	10/2.5G:2.5/1.25G-20km-XG-PON:GPON OLT-XFP (D2 ODN CLASS)

Function

See Function Overview of the GPON / XG-PON / GPON&XG-PON Combo Service Card.

Working Principle

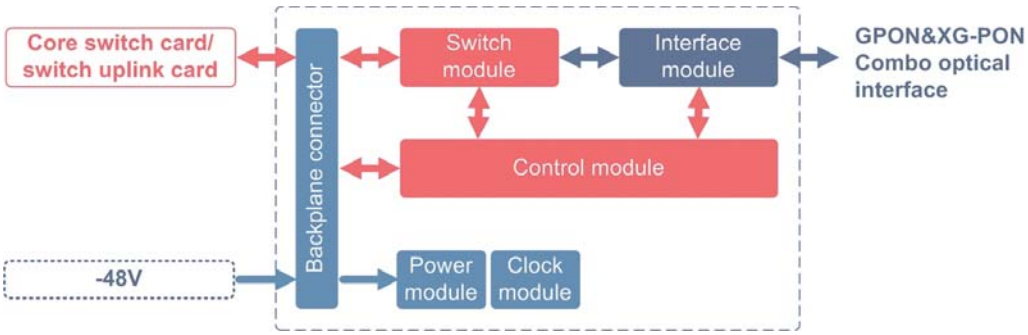


Figure 3-27 Working Principle of the XP8C Card

- The interface module provides the GPON&XG-PON Combo interface, and enables conversion between the GPON/XG-PON packets and Ethernet packets.
- The switch module aggregates signals on eight lines from the ports.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9 MSAN Service Card

The MSAN service cards are used in integrated service access, including POTS access, xDSL access, voice and data hybrid access, and ISDN access. When applied to the AN5116-06B / AN5516-06, the MSAN service cards should be used together with the HSWB card.

See the table below for the access functions provided by the MSAN service cards.

Card Type	Card Name	Access Function
POTS interface card	PPDA	Provides access to 64 POTS voice signals.
	PPEA	Provides access to 64 POTS FXO voice signals.
ADSL interface card	APSA	Provides access to 64 ADSL signals.
VDSL interface card	FTSA	Provides access to 48 VDSL signals.
	VPSA	Provides access to 64 VDSL signals.
AD Combo card	CATA	Provides hybrid access to 48 voice and ADSL data signals.
VD Combo card	CVTA	Provides hybrid access to 48 voice and VDSL data signals.
SHDSL interface card	SHUA	Provides access to 32 SHDSL signals.
ISDN interface card	BROA	Provides access to 16 channels of ISDN BRI services.
	SETA	Provides access to 16 channels of ISDN PRI services.

3.9.1 PPDA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

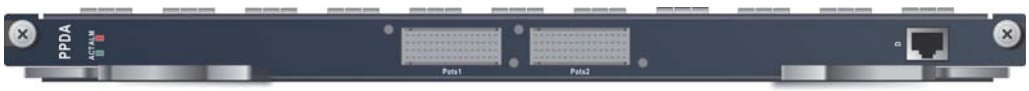


Table 3-51 Interfaces

Identifier	Meaning	Description
Pots1 to Pots2	Voice interface	Connected with the MDF via the 64-conductor audio interface connection cable to access subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-52 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Audio interface transmission standard	RFC 2236, RFC 3376, TR101, etc.

Interface Specifications

Table 3-53 Specifications of the POTS Interface

Item	Specification
Loop resistance	≤ 2100 Ω
Loop current	18 mA to 49 mA; the default value is 19 mA.
Ringing voltage	35 Vrms to 85 Vrms
Two-wire return loss	≥ 20 dB
Impedance characteristic	600 Ω or CPLX
Protection capability	Complies with the ITU-T K.20 and ITU-T K.40 standards.

Table 3-53 Specifications of the POTS Interface (Continued)

Item	Specification
Idle channel noise	< -65 dB
Frequency feature	300 Hz to 3400 Hz

Function

- Provides access to 64 POTS analog voice signals.
- Supports telephone ringing and ringing-off.
- Supports onhook / offhook detection.
- Supports the 16 kHz / 12 kHz pulse accounting functions.
- Supports the polarity reversal function.
- Supports lowering and normal reactive voltage value.
- Supports the circuit test, loop-line test, and ringing current test.
- Supports adjustment of gain.
- Supports remote upgrade.
- Supports card reset and port reset.
- Supports active-standby switching of core switch cards.

Working Principle

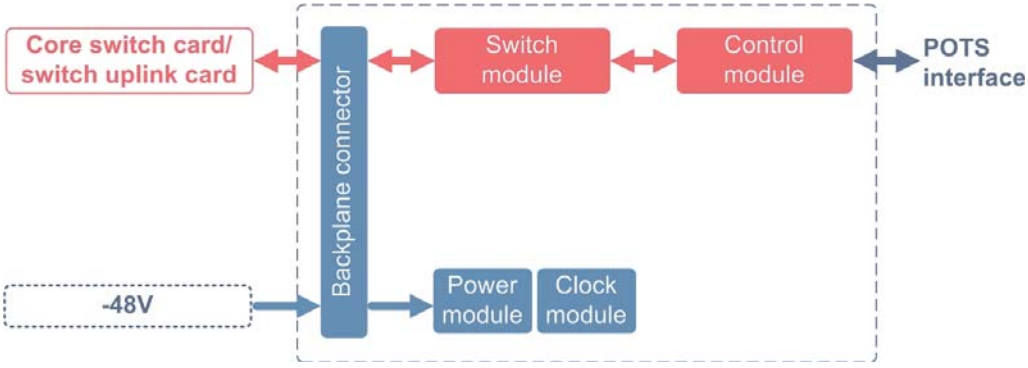


Figure 3-28 Working Principle of the PPDA Card

- The control module loads the card software, controls the card operation, and manages the card.
- The switch module aggregates the signals from the POTS interfaces.

- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.2 PPEA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-54 Interfaces

Identifier	Meaning	Description
Pots1 to Pots2	Voice FXO interface	Connect to the S socket of the PBX via the 64-conductor audio interface connection cable.
D	Debugging interface	RJ-45 debugging serial port

Table 3-55 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Audio interface transmission standard	YD/T 1054-2000

Interface Specifications

Table 3-56 Specifications of the POTS Interface

Item	Specification
Two-wire return loss	≥ 20 dB
Impedance characteristic	600 Ω or CPLX
Protection capability	Complies with the ITU-T K.20 and ITU-T K.40 standards.
Idle channel noise	< -65 dB
Frequency feature	300 Hz to 3400 Hz

Function

- Provides FXO interfaces to access 64 POTS analog voice signals.
- Supports detection of the ringing current.
- Supports detection of the polarity.
- Supports control of off-hook / onhook.
- Supports adjustment of gain.
- Supports remote upgrade.
- Supports card reset and port reset.
- Supports active-standby switching of core switch cards.

Working Principle

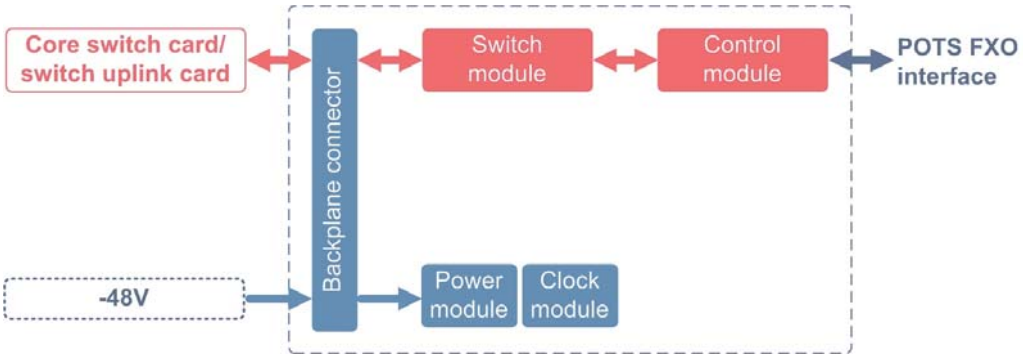


Figure 3-29 Working Principle of the PPEA Card

- The control module loads the card software, controls the card operation, and manages the card.
- The switch module aggregates the voice signals from the POTS FXO interfaces.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.3 APSA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

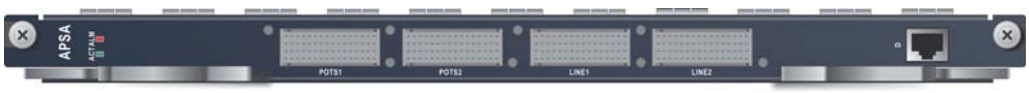


Table 3-57 Interfaces

Identifier	Meaning	Description
POTS1 to POTS2	Voice interface	Connected with the splitter in the card. POTS1 is for the first 32 channels of services, and POTS2 the next 32 channels. Connected to the voice processing device via the 64-conductor audio interface connection cable to access subscribers' telephones .
LINE1 to LINE2	Voice and ADSL data hybrid interface	Connected with the splitter in the card. LINE1 is for the first 32 channels of services, and LINE2 the next 32 channels. Connected to the MDF via the 64-conductor audio interface connection cable to access the modem and subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-58 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being powered on and started.
			Blinking quickly	The card is communicating with the core switch card and receiving the configuration data.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236, ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5, ITU-T G.998.1, IETF RFC 3435, ITU-T G.711, ITU-T G.711.1, RFC 2236, Annex K ATM Transmission, Annex K Packet Transmission, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM

Interface Specifications

Table 3-59 Specifications of the ADSL Interface

Item	ADSL Interface	ADSL2 Interface	ADSL2+ Interface
Interface type	HDXS 64-conductor interface	HDXS 64-conductor interface	HDXS 64-conductor interface
Interface rate	Uplink: 1 Mbit/s Downlink: 8 Mbit/s	Uplink: 1 Mbit/s Downlink: 12 Mbit/s	Uplink: 1 Mbit/s Downlink: 26 Mbit/s
Transmission media	Twisted-pair cable	Twisted-pair cable	Twisted-pair cable
Transmission distance	3 km to 5 km	5 km	5 km

Function

- Provides 64 ADSL ports; encodes / decodes / aggregates ADSL signals on 64 lines.
- Supports the ADSL / ADSL2 / ADSL2+ standard access mode.
- Supports ADSL service by using an ADSL modem at the subscriber side.
- Forwards Ethernet frames in multiple formats, including unicast, multicast, and broadcast packets.
- Supports the interconversion between the ATM cell and the Ethernet frame.

Working Principle

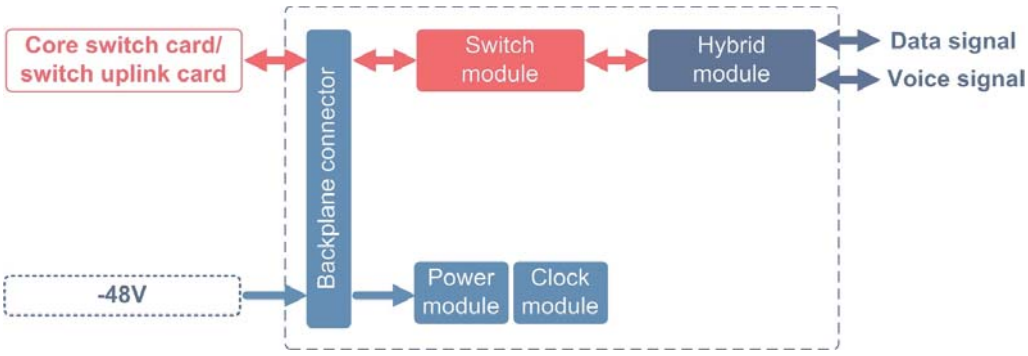


Figure 3-30 Working Principle of the APSA Card

- The hybrid module aggregates the service flows, sets up the channel for data exchange with the switch module, and enables combination / separation of the data and voice signals inside the card.
- The switch module aggregates ADSL signals on 64 lines from the ports.

- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.4 VPSA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-60 Interfaces

Identifier	Meaning	Description
POTS1 to POTS2	Voice interface	Connected with the splitter in the card. POTS1 is for the first 32 channels of services, and POTS2 the next 32 channels. Connected to the voice processing device via the 64-conductor audio interface connection cable to access subscribers' telephones .
LINE1 to LINE2	Voice and data hybrid interface	Connected with the splitter in the card. LINE1 is for the first 32 channels of services, and LINE2 the next 32 channels. Connected to the MDF via the 64-conductor audio interface connection cable to access the modem and subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-61 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being powered on and started.
			Blinking quickly	The card is communicating with the core switch card and receiving the configuration data.
			OFF	The card is not powered on.

Table 3-61 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236, ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5, ITU-T G. 993.2, ITU-T G.993.5, ITU-T G.998.1, IETF RFC 3435, ITU-T G. 711, ITU-T G.711. 1, RFC 2236, Annex K ATM Transmission, Annex K Packet Transmission, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM / PTM

Interface Specifications

Table 3-62 Specifications of the VDSL Interface

Item	VDSL2 Interface
Interface type	HDXS 64-conductor interface
Interface rate	Uplink: 50 Mbit/s Downlink: 100 Mbit/s
Transmission media	Twisted-pair cable
Transmission distance	3 km

Function

- Provides 64 VDSL ports; encodes / decodes / aggregates VDSL signals on 64 lines.
- Supports the VDSL2 standard access mode.
- Supports VDSL service by using a VDSL modem at the subscriber side.
- Forwards Ethernet frames in multiple formats, including unicast, multicast, and broadcast packets.
- Supports direct conversion between the ATM / PTM and Ethernet frames.
- Supports SLV based on profile 17a when used together with a vector card.

Working Principle

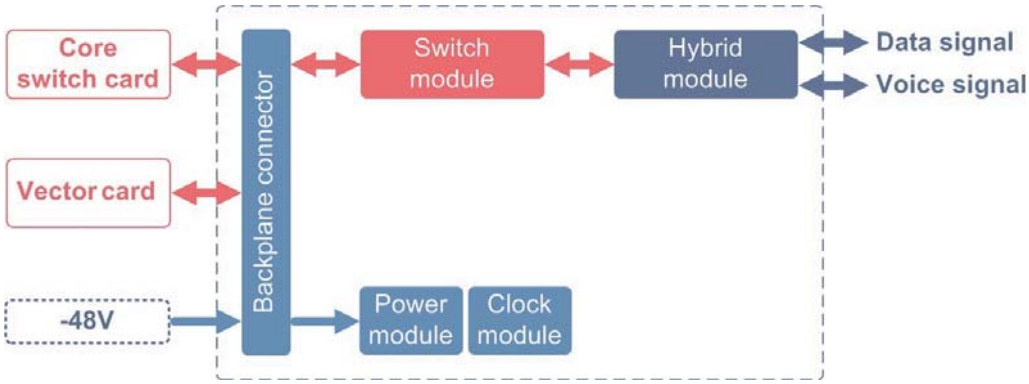


Figure 3-31 Working Principle of the VPSA Card

- The hybrid module aggregates the service flows, sets up the channel for data exchange with the switch module, and enables combination / separation of the data and voice signals inside the card.
- The switch module aggregates VDSL signals from 64 lines.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.5 FTSA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-63 Interfaces

Identifier	Meaning	Description
POTS1 to POTS2	Voice interface	Connected with the splitter in the card. POTS1 is for the first 24 channels of services, and POTS2 the next 24 channels. Connected to the voice processing device via the 64-conductor audio interface connection cable to access subscribers' telephones .
LINE1 to LINE2	Voice and data hybrid interface	Connected with the splitter in the card. LINE1 is for the first 24 channels of services, and LINE2 the next 24 channels. Connected to the MDF via the 64-conductor audio interface connection cable to access the modem and subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-64 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being powered on and started.
			Blinking quickly	The card is communicating with the core switch card and receiving the configuration data.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236, ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5, ITU-T G.993.2, ITU-T G.993.5, ITU-T G.998.1, IETF RFC 3435, ITU-T G.711, ITU-T G.711.1, RFC 2236, Annex K ATM Transmission, Annex K Packet Transmission, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM / PTM

Interface Specifications

Table 3-65 Specifications of the VDSL Interface

Item	VDSL2 Interface
Interface type	HDXS 64-conductor interface
Interface rate	Uplink: 50 Mbit/s Downlink: 300 Mbit/s
Transmission media	Twisted-pair cable
Transmission distance	3 km

Function

- Provides 48 VDSL ports to encode / decode / aggregate VDSL signals on 48 lines.
- Supports the VDSL2 standard access mode.
- Supports VDSL service by using a VDSL modem at the subscriber side.
- Forwards Ethernet frames in multiple formats, including unicast, multicast, and broadcast packets.
- Supports direct conversion between the ATM / PTM and Ethernet frames.
- Supports SLV based on profile 35b when used together with the vector card.

Working Principle

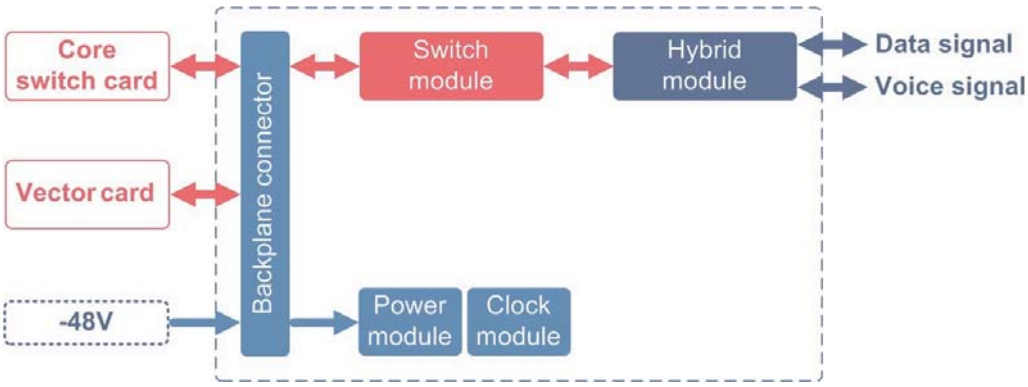


Figure 3-32 Working Principle of the FTSA Card

- The hybrid module aggregates the service flows, sets up the channel for data exchange with the switch module, and enables combination / separation of the data and voice signals inside the card.

- The switch module aggregates VDSL signals from 48 lines.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.6 CATA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-66 Interfaces

Identifier	Meaning	Description
LINE1 to LINE2	Voice and ADSL data hybrid interface	Connected to the MDF via the 64-conductor audio interface connection cable to access the modem and subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-67 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236, ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5, ITU-T G.998.1, IETF RFC 3435, ITU-T G.711, ITU-T G.711.1, RFC 2236, Annex K ATM Transmission, Annex K Packet Transmission, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM

Interface Specifications

Table 3-68 Specifications of the POTS Interface

Item	Specification
Loop resistance	≤ 2100 Ω
Loop current	18 mA to 49 mA; the default value is 19 mA.
Ringing voltage	35 Vrms to 85 Vrms
Two-wire return loss	≥ 20 dB
Impedance characteristic	600 Ω or CPLX
Protection capability	Complies with the ITU-T K.20 and ITU-T K.40 standards.
Idle channel noise	< -65 dB
Frequency feature	300 Hz to 3400 Hz

Table 3-69 Specifications of the ADSL Interface

Item	ADSL Interface	ADSL2 Interface	ADSL2+ Interface
Interface type	HDXS 64-conductor interface	HDXS 64-conductor interface	HDXS 64-conductor interface
Interface rate	Uplink: 1 Mbit/s Downlink: 8 Mbit/s	Uplink: 1 Mbit/s Downlink: 12 Mbit/s	Uplink: 1 Mbit/s Downlink: 26 Mbit/s
Transmission media	Twisted-pair cable	Twisted-pair cable	Twisted-pair cable
Transmission distance	3 km to 5 km	5 km	5 km

Function

- Provides hybrid access to voice and ADSL data signals on 48 lines.
- Supports the ADSL / ADSL2 / ADSL2+ standard access mode.
- Supports ADSL service by using an ADSL modem at the subscriber side.

- Forwards Ethernet frames in multiple formats, including unicast, multicast, and broadcast packets.
- Supports the conversion between ATM cells and Ethernet frames.
- Supports telephone ringing and ringing-off.
- Supports onhook / offhook detection.
- Supports the polarity reversal function.
- Supports lowering and normal reactive voltage value.
- Supports the circuit test, loop-line test, and ringing current test.
- Supports adjustment of gain.
- Supports remote upgrade.

Working Principle

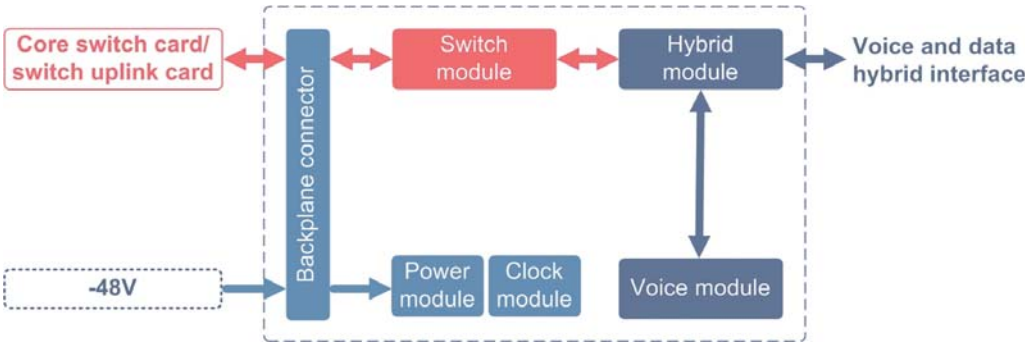


Figure 3-33 Working Principle of the CATA Card

- The hybrid module aggregates the service flows, sets up the channel for data exchange with the switch module, and enables combination / separation of the data and voice signals inside the card.
- The switch module aggregates voice and data combined signals on 48 lines.
- The voice module enables access of voice and fax services.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.7 CVTA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-70 Interfaces

Identifier	Meaning	Description
LINE1 to LINE2	Voice and data hybrid interface	Connected to the MDF via the 64-conductor audio interface connection cable to access the modem and subscribers' telephones.
D	Debugging interface	RJ-45 debugging serial port

Table 3-71 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236, ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5, ITU-T G. 993.2, ITU-T G.993.5, ITU-T G.998.1, IETF RFC 3435, ITU-T G. 711, ITU-T G.711. 1, RFC 2236, Annex K ATM Transmission, Annex K Packet Transmission, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM / PTM

Interface Specifications

Table 3-72 Specifications of the POTS Interface

Item	Specification
Loop resistance	≤ 2100 Ω
Loop current	18 mA to 49 mA; the default value is 19 mA.
Ringing voltage	35 Vrms to 85 Vrms
Two-wire return loss	≥ 20 dB
Impedance characteristic	600 Ω or CPLX
Protection capability	Complies with the ITU-T K.20 and ITU-T K.40 standards.
Idle channel noise	< -65 dB
Frequency feature	300 Hz to 3400 Hz

Table 3-73 Specifications of the VDSL Interface

Item	VDSL2 Interface
Interface type	HDXS 64-conductor interface
Interface rate	Uplink: 50 Mbit/s Downlink: 100 Mbit/s
Transmission media	Twisted-pair cable
Transmission distance	3 km

Function

- Provides hybrid access to voice and VDSL data signals on 48 lines.
- Supports the VDSL2 standard access mode.
- Supports VDSL service by using a VDSL modem at the subscriber side.

- Forwards Ethernet frames in multiple formats, including unicast, multicast, and broadcast packets.
- Supports direct conversion between the ATM / PTM and Ethernet frames.
- Supports telephone ringing and ringing-off.
- Supports onhook / offhook detection.
- Supports the polarity reversal function.
- Supports lowering and normal reactive voltage value.
- Supports the circuit test, loop-line test, and ringing current test.
- Supports adjustment of gain.
- Supports remote upgrade.
- Supports SLV based on profile 17a when used together with a vector card.

Working Principle

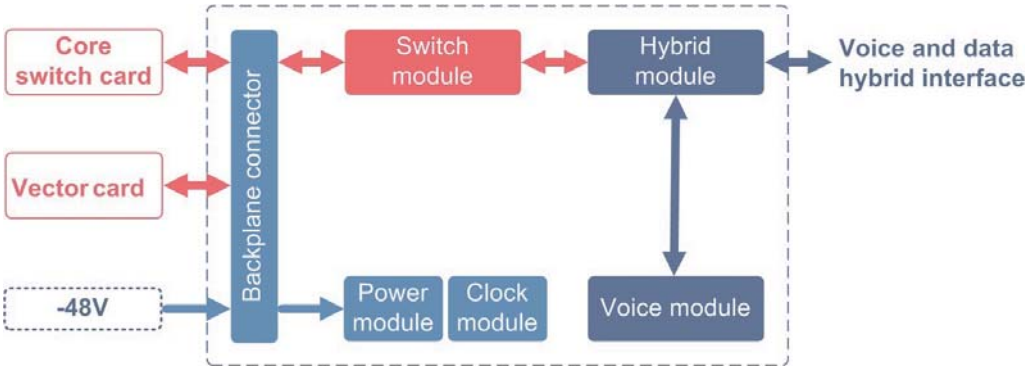


Figure 3-34 Working Principle of the CVTA Card

- The hybrid module aggregates the service flows, sets up the channel for data exchange with the switch module, and enables combination / separation of the data and voice signals inside the card.
- The switch module aggregates voice and data combined signals on 48 lines.
- The voice module provides access to voice and fax services.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.8 SHUA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-74 Interfaces

Identifier	Meaning	Description
xDSL	SHDSL ATM / EFM service interface	Connects to the MDF via the 64-conductor audio interface connection cable and accesses the modem.
D	Debugging interface	RJ-45 debugging serial port

Table 3-75 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being powered on and started.
			Blinking quickly	The card is communicating with the core switch card and receiving the configuration data.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004 (IEEE EFM), ITU-T G.991.2, ITU-T G.994.1, ITUT G.998.1, ITU-T G.998.2, ITU-T K.20, ITU-T K.21, ITU-T K.45, TR-060, ITU-T G.703, ITU-T G.704, ITU-T G.706, ITU-T G.711, ITU-T G.713, RFC 2236, RFC 3376, TR101, etc.
Working mode	ATM / EFM

Interface Specifications

Table 3-76 Specifications of the G.SHDSL Interface

Item	Specification
Interface rate	Single: 5.7 Mbit/s Pair: 11.4 Mbit/s
Transmission distance and typical rate (the uplink and downlink rates are symmetric)	◆ 1.2 km: 5120 kbit/s ◆ 1.8 km: 5120 kbit/s ◆ 2.4 km: 4672 kbit/s ◆ 3.0 km: 2304 kbit/s ◆ 3.6 km: 1024 kbit/s ◆ 4.8 km: 1024 kbit/s
Transmission medium	Twisted-pair cable
Modulation type	TC-PAM
Transmission power	13.5 dBm

Function

- Provides 32 G.SHDSL ports based on the ATM / EFM mode, and allows encoding / decoding / aggregation of 32 SHDSL line signals at the same time.
- Supports symmetric bidirectional communication.
- Applies the one-to-one fully transparent transmission mode to the UNI side and SNI side interfaces.

Working Principle

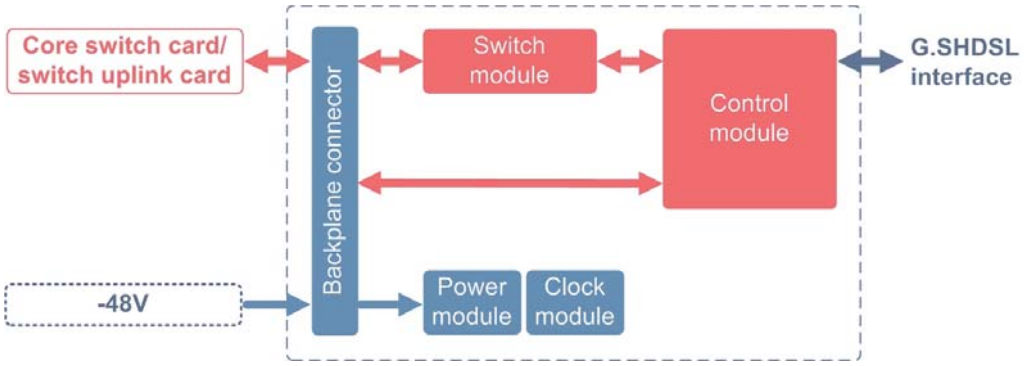


Figure 3-35 Working Principle of the SHUA Card

- The control module loads the card software, controls the card operation, and manages the card.
- The switch module aggregates G.SHDSL signals on 32 lines from the port.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.9.9 BROA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-77 Interfaces

Identifier	Meaning	Description
LINE	ISDN BRI service interface	Connects to the MDF via the 64-conductor audio interface connection cable, accesses the NT1+ equipment on the user side, and then accesses the user telephone.
D	Debugging interface	RJ-45 debugging serial port

Table 3-78 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	ITU-T G.961, ITU-T Q.921, ITU-T Q.931, RFC 2236, RFC 3376, TR101, etc.

Interface Specifications

Table 3-79 Specifications of the LINE Interface

Item	Specification
Transmission mode	2-wire full-duplex digital transmission
Line code	2B1Q
Line impedance	135 Ω
Line rate	144 kbit/s
Transmission distance	0.4 mm cable: 3.5 km 0.5 mm cable: 5 km

Function

- Provides the 16-line ISDN 2B+D access U interface to support the end-to-end digital connection and enable the voice service.
- Supports remote power feeding for 16 NT1+s.
- Supports the 2B1Q encoding and decoding.

- Supports the 2-wire full-duplex digital transmission mode for each line.
- Supports transparent transmission of signal tones, such as the dial tone, ring back tone, and busy tone.
- Supports the protection against lightning stroke up to 4 kV.

Working Principle

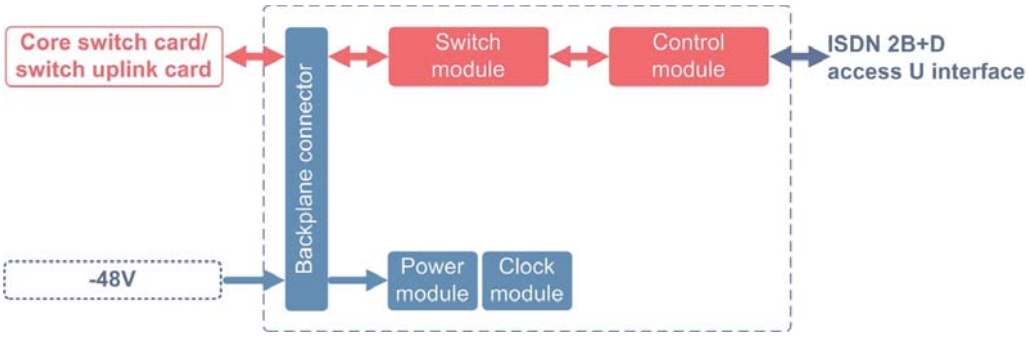


Figure 3-36 Working Principle of the BROA Card

- The control module performs the line encoding / decoding and TDM bus aggregation functions, and provides lightning protection at the interface.
- The switch module loads the card software, controls the card operation, manages the card, and extracts the D channel signaling from the 2B+D information in the card.
- The power module provides the power supply for each functional module in the card.
- The clock module provides the clock for each functional module in the card.

3.9.10 SETA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

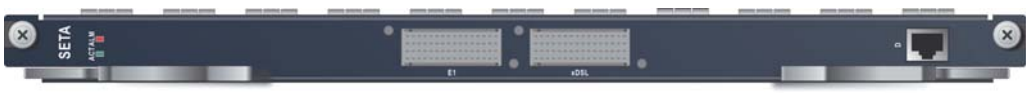


Table 3-80 Interfaces

Identifier	Meaning	Description
E1	E1 service interface	Accesses 16 channels of services. Connects to the MDF via the 64-conductor E1 interface connection cable.
xDSL	SHDSL TDM service interface	Accesses 16 channels of services. Connects to the MDF via the 64-conductor audio interface connection cable and accesses the modem.
D	Debugging interface	RJ-45 debugging serial port

Table 3-81 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being powered on and started.
			Blinking quickly	The card is communicating with the core switch card and receiving the configuration data.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, IEEE 802.3ah-2004 (IEEE EFM), ITU-T G.991.2, ITU-T G.994.1, ITU-T G.998.1, ITU-T G.998.2, ITU-T K.20, ITU-T K.21, ITU-T K.45, TR-060, ITU-T G.703, ITU-T G.704, ITU-T G.706, ITU-T G.711, ITU-T G.713, ITU-T G.742, ITU-T G.823, RFC 2236, RFC 3376, TR101, etc.
Working mode	TDM

Interface Specifications

Table 3-82 Specifications of the G.SHDSL Interface

Item	Specification
Interface rate	2048 kbit/s
Transmission distance (depending on the line quality)	Reaches the maximum rate within a distance of 3 km.
Transmission medium	Twisted-pair cable
Modulation type	TC-PAM
Transmission power	13.5 dBm

Table 3-83 Specifications of the E1 Interface

Item	Specification
Encoding type	HDB3
Interface type	75-Ohm unbalanced interface, 120-Ohm balanced interface
Transmission delay	< 1.5 ms (uplink or downlink)
Bit error ratio	The 24-hour BER is 0.
Interface rate	2048 kbit/s
Allowable frequency offset	2048 kHz ± 50 ppm

Function

- Provides 16 G.SHDSL ports and 16 E1 ports; encodes / decodes / aggregates SHDSL signals on 16 lines in the TDM mode and E1 signals on 16 lines.
- Supports SHDSL-E1 pass-through: providing users with 16 channels of E1 services and 16 channels of G.SHDSL services.
- Supports CES of E1 interface: providing emulation services for E1 access users based on the Ethernet emulation function.
- Supports CES of SHDSL interface: providing emulation services for SHDSL access users based on the Ethernet emulation function.
- Supports terminating the ISDN voice signaling: terminates the ISDN voice service signaling and switches to the NGN mode for uplinking to enable conversion of voice service.

Working Principle

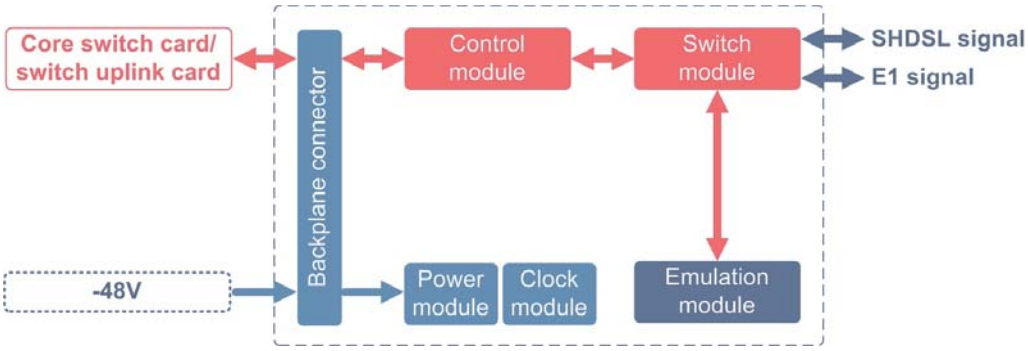


Figure 3-37 Working Principle of the SETA Card

- The switch module aggregates16 SHDSL signals and 16 E1 signals.
- The control module controls the entire card.
- The emulation module provides 16 channels of TDM services based on Ethernet emulation.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.10 Vector Card

The vector cards are used to implement the vectoring function.

The table below shows the vector processing capability of each vector card.

Card Name	Quantity of Lines for Vector Operation
VCNA	384 lines for vector operation based on profile 17a
FCEA	192 lines for vector operation based on profile 35b

3.10.1 VCNA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-84 Interfaces

Identifier	Meaning	Description
D	Debugging interface	RJ-45 debugging serial port

Table 3-85 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3ba, IEEE 802.3ap, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236

Function

- Supports VDSL 17a vector processing for 384 lines.
- Supports system level vectoring (SLV) based on profile 17a .
- Supports remote upgrade.

Working Principle

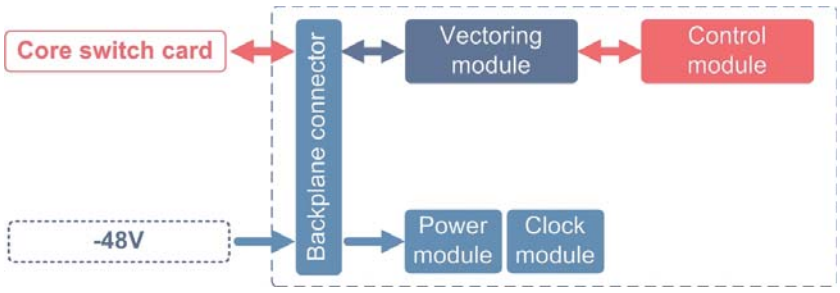


Figure 3-38 Working Principle of the VCNA Card

- The control module loads the card software, controls the card operation, and manages the card.
- The vector operation module implements vector operations on 384 lines.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.10.2 FCEA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-86 Interfaces

Identifier	Meaning	Description
D	Debugging interface	RJ-45 debugging serial port

Table 3-87 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3ba, IEEE 802.3ap, IEEE 802.3u, IEEE 802.3x, IEEE 802.3z, IEEE 802.1D, IEEE 802.1p, IEEE 802.1Q, RFC 2236

Function

- Supports VDSL 35b vector processing for 192 lines.
- Supports SLV based on profile 35b.
- Supports remote upgrade.

Working Principle

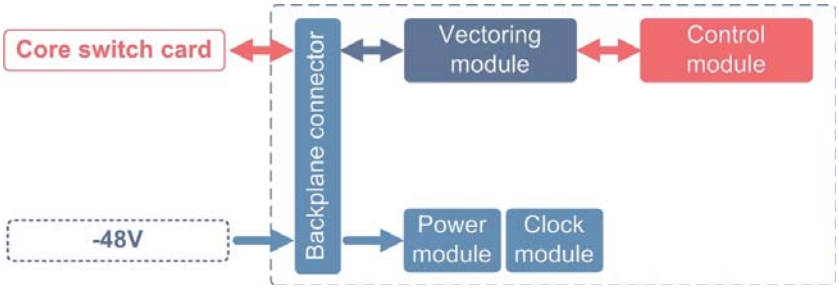


Figure 3-39 Working Principle of the FCEA Card

- The control module loads the card software, controls the card operation, and manages the card.
- The vector operation module implements vector operations on 192 lines.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.11 Ethernet Service Card

The Ethernet service card provides access to or uplinks the Ethernet service.

3.11.1 GSOF

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-88 Interfaces

Identifier	Meaning	Description
1 to 16	GE optical / electrical interface	Connect to remote ONUs or the IP network. Support both GE optical modules and GE electrical modules. The electrical modules include the 10 / 100 / 1000M self-adaptive electrical module and the 1000M electrical module.
D	Debugging interface	RJ-45 debugging serial port

Table 3-89 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has an urgent alarm.
			OFF	The card is working normally.
LNK1 to LNK16	Port status indicator LED	Green	ON	The connection between this port and the opposite end equipment has been set up.
			Blinking quickly	Data are being received or transmitted between this port and the opposite end equipment.
			OFF	The connection between this port and the opposite end equipment is not set up.

Technical Specifications

Item	Specification
Network standards	IEEE802.1D, IEEE 802.3, IEEE 802.3u, IEEE 802.3z, RFC 2236, IEEE 802.1AX-2008, IEEE Std 802.1s-2002, RFC 3376, etc.

Matching Module

Item	Specification
GE electrical module	1.25G-100m-TDM-SFP (10/100/1000BASE-T)
	1.25G-100m-TDM-SFP (1000BASE-T)
GE optical module	1.25G-0.55km-TDM-SFP (1000BASE-SX)
	1.25G-15km-TDM-SFP (1000BASE-LX)
	1.25G-40km-TDM-SFP (1000BASE-EX)
	1.25G-80km-TDM-SFP (1000BASE-ZX1)
See GE / 10GE Module for the specifications of the modules.	

Function

- Provides 16 GE optical / electrical interfaces.
- Supports network topology architectures such as chain, tree and star networks.
- Supports uplink and downlink network.
- Supports optical power detection and line diagnosis.

Working Principle

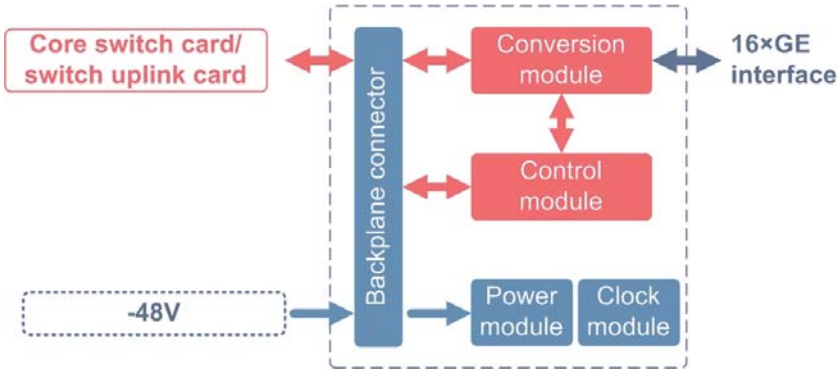


Figure 3-40 Working Principle of the GSOF Card

- The conversion module enables transparent transmission of data.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.12 TDM Service Card

The TDM service cards provide the clock synchronization function and uplink the TDM services.

3.12.1 CE1B

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-90 Interfaces

Identifier	Meaning	Description
E1 to E32	E1 interface	Connect with the transmission network via the E1 cable.
CLK IN	Clock input interface	Introduces the external clock.
CLK OUT	Clock output interface	Connects to the clock input port of the cascade equipment to synchronize the clock.

Table 3-91 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, PWE3, ITU-T G.825
Operating modes	75 Ohm unbalanced
Delay	The loopback delay is less than 3 ms.
Bit error ratio	The 24-hour BER is 0.

Interface Specifications

Item	Specification	
Encoding type	HDB3	
Nominal frequency	2048 kHz ± 50 ppm	
Pairs in each direction	The outer conductors of the coaxial pairs at the input and output ports are connected to the ground.	
Test load impedance	75 Ω, resistive	120 Ω, resistive
Nominal peak voltage of a **mark** (pulse)	2.37 V	3 V
Nominal peak voltage of a **mark** (no pulse)	0 ± 0.237 V	0 ± 0.3 V
Nominal pulse width	244 ns	
Ratio of the amplitudes of positive and negative pulses at the centre of the pulse interval	0.95 to 1.05	
Ratio of the widths of positive and negative pulses at the nominal half amplitude	0.95 to 1.05	

Function

- Provides 32 E1 uplink ports.
- Supports the E1 circuit emulation.
- Obtains four kinds of clocks according to network conditions:
  - Clock of the E1 line;
  - Clock of the external clock source;
  - Internal free running clock;
  - Clock of the time card.

Working Principle

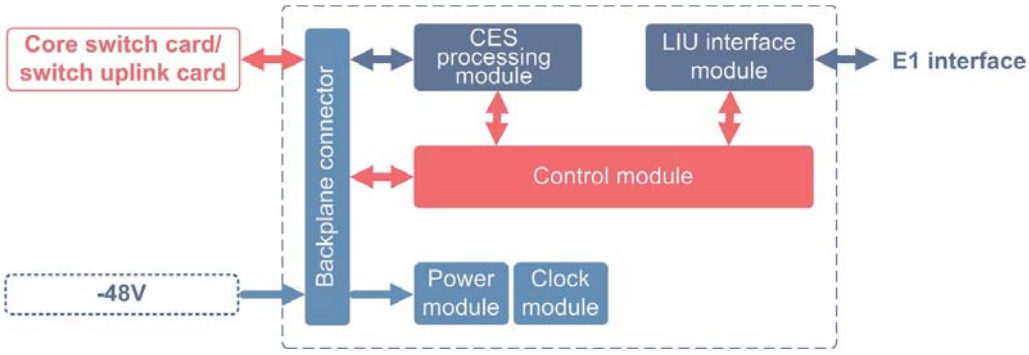


Figure 3-41 Working Principle of the CE1B Card

- The LIU interface module provides the E1 interface for users.
- The CES processing module performs the conversion between the Ethernet packets and the TDM signals.
- The control module supervises the whole card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.12.2 C155A

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-92 Interfaces

Identifier	Meaning	Description
CLK IN 1	Clock input interface	Inputs the first external clock.
CLK IN 2	Clock input interface	Inputs the second external clock.

Table 3-92 Interfaces (Continued)

Identifier	Meaning	Description
CLK OUT	Clock output interface	Outputs the external clock.
STM-1 1 to 2	STM-1 uplink optical interface	Two STM-1 optical interfaces are provided for connection with the transmission network. If the two interfaces are used at the same time, optical interface 1 will be the active one by default.

Table 3-93 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card has alarms or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
LNK 1 to 2	Port status indicator LED	Green	ON	The optical interface is connected with the equipment at the opposite end, and is receiving data normally.
			OFF	The optical interface is not connected with the equipment at the opposite end.
MS 1 to 2	Active / standby status indicator LED	Green	ON	The optical interface is active.
			OFF	The optical interface is standby.

Technical Specifications

Item	Specification
Network standards	IEEE 802.3, PWE3, ITU-T G.825
Operating modes	STM-1
Delay	The loopback delay is less than 3 ms.
Bit error ratio	The 24-hour BER is 0.

Matching Module

Item	Specification
TDM optical module	155M-15km-TDM-SFP (S1.1)
Note 1: See TDM Optical Module for the specifications of the modules.	

Function

- Provides two STM-1 optical interfaces to implement 1+1 protection.
- Supports the E1 circuit emulation.
- Obtains four kinds of clocks according to network conditions:
  - Clock of the E1 line;
  - Clock of the external clock source;
  - Internal free running clock;
  - Clock of the time card.

Working Principle

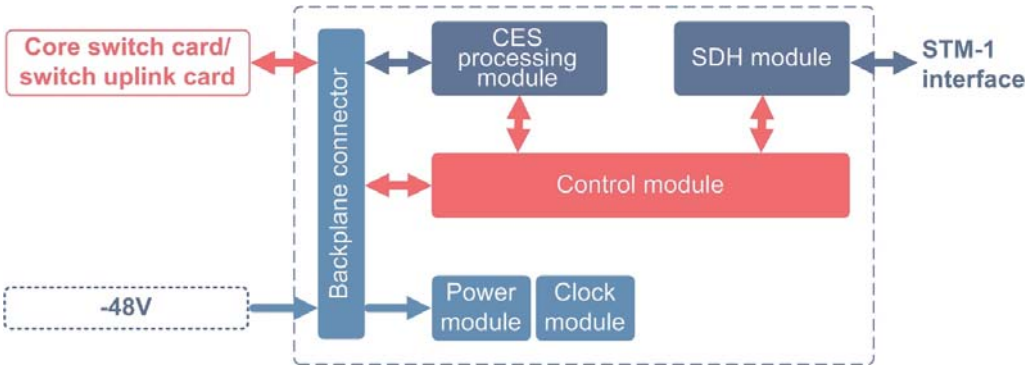


Figure 3-42 Working Principle of the C155A Card

- The SDH module performs the conversion between the E1 signals and the STM-1 signals.
- The CES processing module performs the conversion between the Ethernet packets and the TDM signals.
- The control module supervises the whole card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.13 OTDR Line Diagnosis and Measurement Card

The OTDR line diagnosis and measurement card is used to detect and isolate faults on the optical fiber link, so as to help maintenance engineers isolate the faulty point quickly.

3.13.1 Function Overview of the OTDR Line Diagnosis and Measurement Card

The functions of the OTDR line diagnosis and measurement card are as follows:

- Provides the OTDR optical ports.
- Supports two optical link monitoring measures for the access network: OTDR test and optical module detection.
- Isolates faults to point for the fiber between the card and the splitter and for the branch fibers with the optical split ratio no larger than 1:8; isolates faults to segment for the branch fibers with the optical split ratio larger than 1:8.
- Supports two operating modes: manual test and periodical monitoring.
- Detects the optical link aging tendency and isolates the link faults.
- When connected with the 64-channel extended equipment, each OTDR port can monitor the optical links of 64 PON ports.

The OTDR line diagnosis and measurement cards provide the ports as follows.

Card	OTDR Optical Port
ODMA	1
ODMB	2
ODMC	4

3.13.2 ODMA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-94 Interfaces

Identifier	Meaning	Description
OTDR 1	Optical power detection interface	Connects with the device to be tested on the remote end, corresponding to the remote device one to one.
COM	COM serial port	Controls the remote end equipment.
ETH	Commissioning network port	Reserved functional interface
D	Debugging serial port	RJ-45 debugging serial port

Table 3-95 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
TEST	Port status indicator LED	Green	ON	The mappings between this port and the PON port of the service card have been configured.
			Blinking quickly	The optical link of the designated PON port is being tested.
			OFF	The mappings between this port and the PON port of the service card are not configured.

Technical Specifications

Item	Specification
Network standards	ITU-T Rec L.40, ITU-T Rec L.53, EN 300 386, IEEE 802.3, IEEE 802.3ah, etc.

Interface Specifications

Item		Specification
Optical power detection interface	Interface type	SC/APC
	Dynamic range (SNR=1)	36 dB
	Wavelength range	1640 nm to 1660 nm
	Loss resolution	0.01 dB

Function

See Function Overview of the OTDR Line Diagnosis and Measurement Card.

Working Principle

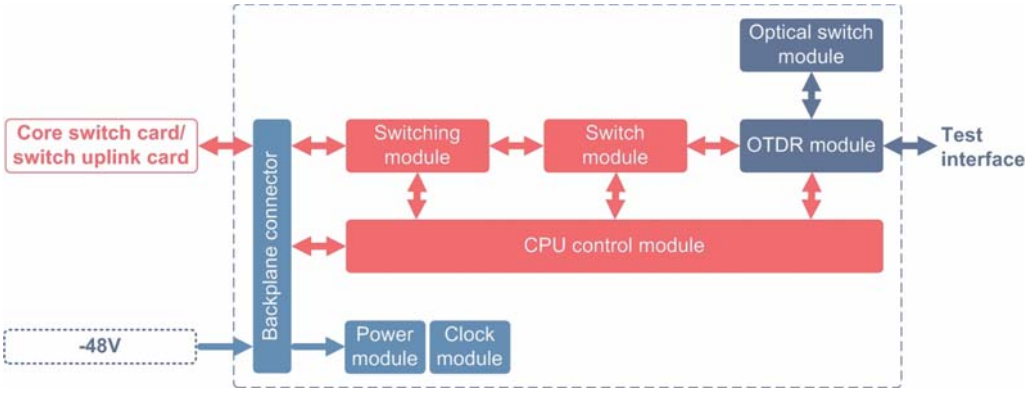


Figure 3-43 Working Principle of the ODMA Card

- The optical switch module is used to extend the test ports.
- The OTDR module transmits the test optical signals and analyzes the reflected signals to ascertain the fault conditions of the optical fiber link.
- The switch module aggregates the signals from the ports.
- The switching module performs the active-standby switching of the 10G signals and the 100 M out-of-band management ports on the backplane.
- The CPU control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.13.3 ODMB

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-96 Interfaces

Identifier	Meaning	Description
OTDR 1 to 2	Optical power detection interface	Connect with the devices to be tested on the remote end, corresponding to the remote device one to one.
COM	COM serial port	Controls the remote end equipment.
ETH	Commissioning network port	Reserved functional interface
D	Debugging serial port	RJ-45 debugging serial port

Table 3-97 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.
TEST	Port status indicator LED	Green	ON	The mappings between this port and the PON port of the service card have been configured.
			Blinking quickly	The optical link of the designated PON port is being tested.
			OFF	The mappings between this port and the PON port of the service card are not configured.

Technical Specifications

Item	Specification
Network standards	ITU-T Rec L.40, ITU-T Rec L.53, EN 300 386, IEEE 802.3, IEEE 802.3ah, etc.

Interface Specifications

Item		Specification
Optical power detection interface	Interface type	SC/APC
	Dynamic range (SNR=1)	36 dB
	Wavelength range	1640 nm to 1660 nm
	Loss resolution	0.01 dB

Function

See Function Overview of the OTDR Line Diagnosis and Measurement Card.

Working Principle

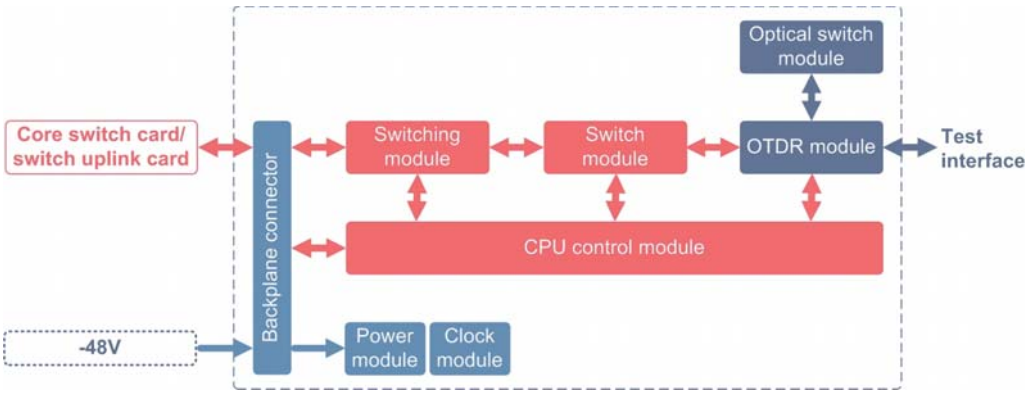


Figure 3-44 Working Principle of the ODMB Card

- The optical switch module is used to extend the test ports.
- The OTDR module transmits the test optical signals and analyzes the reflected signals to ascertain the fault conditions of the optical fiber link.
- The switch module aggregates the signals from the ports.
- The switching module performs the active-standby switching of the 10G signals and the 100 M out-of-band management ports on the backplane.

- The CPU control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.13.4 ODMC

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-98 Interfaces

Identifier	Meaning	Description
OTDR 1 to 4	Optical power detection interface	Connect with the devices to be tested on the remote end, corresponding to the remote device one to one.
COM	COM serial port	Controls the remote end equipment.
ETH	Commissioning network port	Reserved functional interface
D	Debugging serial port	RJ-45 debugging serial port

Table 3-99 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			Blinking quickly	The card is receiving a configuration command.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The communication between the active and standby cards fails.
			OFF	The card is working normally.

Table 3-99 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
TEST	Port status indicator LED	Green	ON	The mappings between this port and the PON port of the service card have been configured.
			Blinking quickly	The optical link of the designated PON port is being tested.
			OFF	The mappings between this port and the PON port of the service card are not configured.

Technical Specifications

Item	Specification
Network standards	ITU-T Rec L.40, ITU-T Rec L.53, EN 300 386, IEEE 802.3, IEEE 802.3ah, etc.

Interface Specifications

Item		Specification
Optical power detection interface	Interface type	SC/APC
	Dynamic range (SNR=1)	36 dB
	Wavelength range	1640 nm to 1660 nm
	Loss resolution	0.01 dB

Function

See Function Overview of the OTDR Line Diagnosis and Measurement Card.

Working Principle

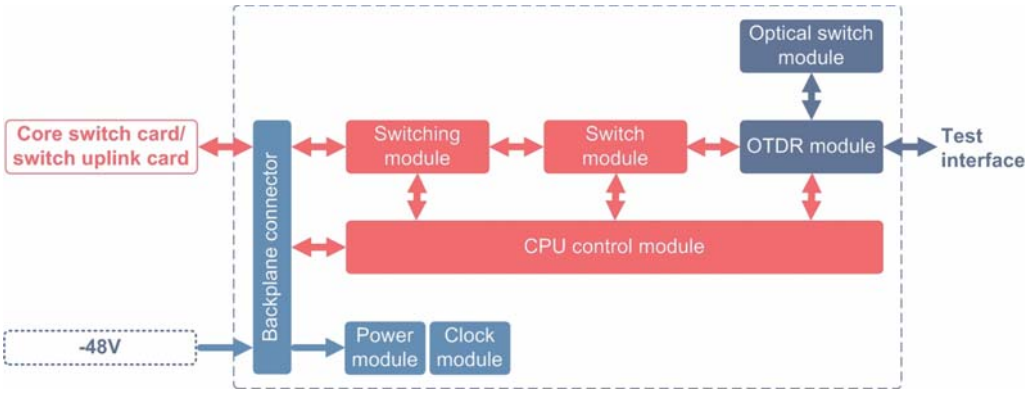


Figure 3-45 Working Principle of the ODMC Card

- The optical switch module is used to extend the test ports.
- The OTDR module transmits the test optical signals and analyzes the reflected signals to ascertain the fault conditions of the optical fiber link.
- The switch module aggregates the signals from the ports.
- The switching module performs the active-standby switching of the 10G signals and the 100 M out-of-band management ports on the backplane.
- The CPU control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.14 Other Cards

This section introduces the basic information, panels, technical parameters, interface specifications, functions and working principles of the clock card and the common interface card.

3.14.1 TIMA

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-100 Interfaces

Identifier	Meaning	Description
1PPS+TOD_IN	1PPS+TOD input interface	Inducts the high-precision clock and time information from GPS.
1PPS+TOD_OUT	1PPS+TOD output interface	Connects to the time input port of the cascade equipment for time synchronization.
CLK_IN 1 to 2	BITS clock input interface	Inducts clock information from the E1 link.
CLK_OUT	BITS clock output interface	Connects to the clock input port of the cascade equipment to synchronize the clock.
SFP	1588 Ethernet optical interface	Inducts the high-precision clock and time information from 1588 Ethernet.
1000MASK_TX	1588 Ethernet electrical interface	Inducts the high-precision clock and time information from 1588 Ethernet.
D	Debugging interface	RJ-45 debugging serial port

Table 3-101 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized or the software is being started. The communication link between the active and standby cards is not set up.
			Blinking quickly	The card is receiving a configuration command or the communication link between the active and standby cards is being set up.
			OFF	The card is not powered on or the software is not started.
ALM	Alarm indicator LED	Red	ON	The card has the alarms for unlocking of the system phase locked loop and so on, or the communication between the active and standby cards is interrupted.
			OFF	The card is working normally.
CLK 1 to 2	BITS clock status indicator LED	Green	ON	The port is receiving the BITS clock signal normally.

Table 3-101 Indicator LEDs (Continued)

Identifier	Meaning	Color	Status	Description
			OFF	The port is not receiving the BITS clock signal normally.
MS 1 to 2	Working indicator LED for the current BITS clock	Green	ON	The current BITS is the working clock.
			OFF	The current BITS is the standby clock.
LNK/ACT	1588 Ethernet connection status indicator LED	Green	ON	The port is connected with the opposite end equipment normally.
			Blinking	The port is transmitting / receiving data.
			OFF	The port is not in use.

Technical Specifications

Item	Specification
Network standards	IEEE1588, ITU-T G.812, ITU-T G.823, ITU-T G.8261, etc.
PTP accuracy / system 1PPS overall delay	< 1 us

Interface Specifications

Item		Specification
1000BASE-TX interface	Interface type	RJ-45
	Interface standard	IEEE 802.3-2005
	Interface rate	1000 Mbit/s
Coaxial interface	Interface type	RG-59
	Interface standard	ITU-T G.703
	Interface rate	2 Mbit/s
Matching module[Note 1]	TDM optical module	155M-2km-TDM-SFP (100BASE-SX)
		155M-15km-TDM-SFP (S1.1)
		155M-40km-TDM-SFP (L1.1)
		155M-80km-TDM-SFP (L1.2)
Note 1: See TDM Optical Module for the specifications of the modules.		

Function

The TIMA card can extract the clock or time information in multiple ways.

- Extracts high-precision clock and time information from the GPS or the IEEE 1588 Ethernet interface to provide high-precision E1, 1PPS and TOD signals for the system.
- Extracts the clock information from the BITS. In this mode, the time information cannot be extracted.

Working Principle

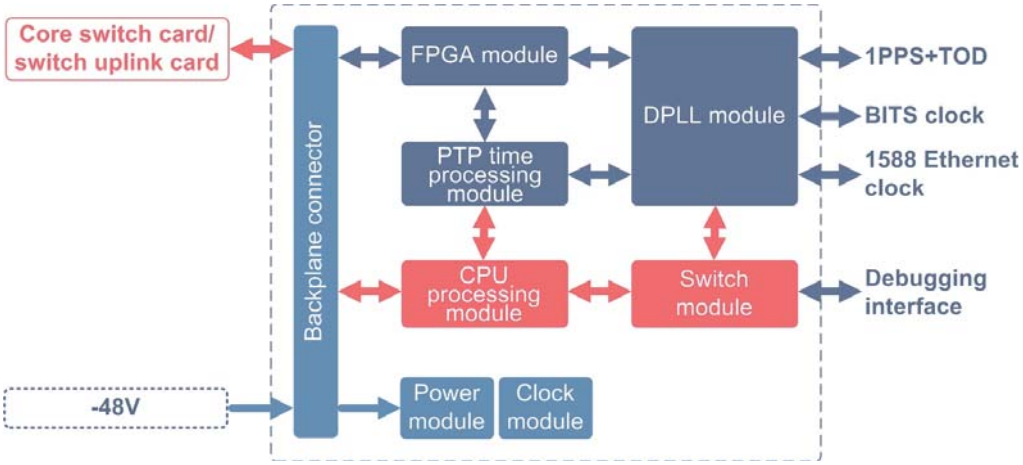


Figure 3-46 Working Principle of the TIMA Card

- The DPLL (Digital Phase Locked Loop) module extracts the clock information from the 1PPS signal, BITS and 1588 Ethernet.
- The FPGA module is used in clock source selection, control of data transmitting and receiving on the backplane, and 1PPS+TOD adjustment, etc.
- The PTP time processing module is used to process the 1588 time message and restore the 1PPS clock.
- The CPU processing module is used to process the TOD information and control the optical module.
- The switch module is used to switch various clock signals.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

3.14.2 CIO

Basic Information

Overview of Cards shows the number, matching subracks and power consumption of the card.

Panel Description

Table 3-102 Interfaces

Identifier	Meaning	Description
EMS	Out-of-band management network port	Connects with an out-of-band network management computer.
ALM	Alarm interface	Outputs the equipment alarms to the PDP, the top of the cabinet, or the head of row cabinet.
ESC	Environment monitoring interface	Connects to the environment monitoring equipment and reports the environment status to the network management system.
DC1 to DC14	Dry contact interface	Access dry contact signals.
1PPS/TOD	Reserved functional interface	
BITS		
GPIO1		
GPIO2		

Table 3-103 Indicator LEDs

Identifier	Meaning	Color	Status	Description
ACT	Working indicator LED	Green	ON	The card is working normally.
			Blinking slowly	The card is being initialized.
			OFF	The card is not powered on.
ALM	Alarm indicator LED	Red	ON	The card is being reset or has alarms.
			OFF	The card is working normally.

Function

- Provides the EMS interface for the out-of-band network management of the system.
- Provides the alarm monitoring interface (ALM).
- Provides the RS485 environment monitoring interface.
- Provides dry contact interfaces for 14 lines.

Working Principle

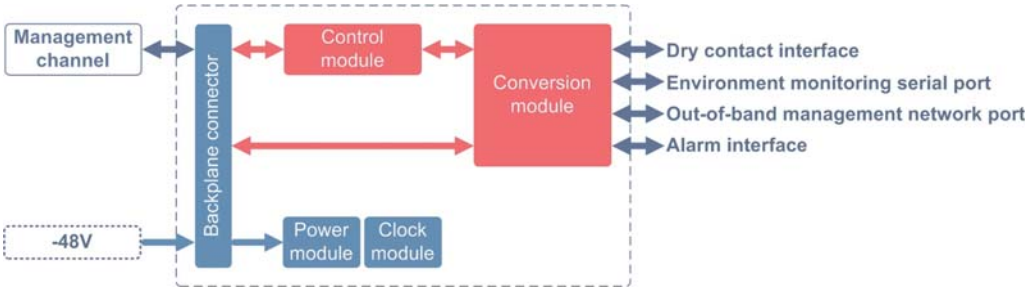


Figure 3-47 Working Principle of the CIO Card

- The conversion module transmits data transparently, and provides dry contact interface, environment monitoring serial port, out-of-band management network interface and alarm interface.
- The control module loads the card software, controls the card operation, and manages the card.
- The power module supplies power to each functional module of the card.
- The clock module provides clock signals for each functional module of the card.

4 Optical Module

This section introduces the specifications of the optical modules supported by the OLT. The optical modules provide the optical / electrical conversion interfaces for cards.

- Mappings Between Modules and Cards
- EPON Optical Module
- 10G EPON Optical Module
- GPON Optical Module
- XG-PON Optical Module
- GPON&XG-PON Combo Optical Module
- GE / 10GE Module
- TDM Optical Module

4.1 Mappings Between Modules and Cards

The AN5116-06B/AN5516-06/AN5516-04 supports encapsulation formats including SFP, SFP+ and XFP for pluggable modules.

The module interface types include LC, SC and RJ-45 (for the electrical module). Figure 4-1 shows the modules with different interface types.

Figure 4-1 Module Appearance

Module Type	Application Code	Module Code	Applicable Cards
EPON optical module	PX20+	1.25G-20km-EPON OLT-SFP (PX20+)	EC4B , EC8B, ECOB
10G EPON optical module	10G/1G BASE-PRX30	10/1.25G-20km-10G EPON OLT asymmetric-XFP (10G/1G BASE-PRX30)	XG8A
	10G BASE-PR30	10/1.25G-20km-10G EPON OLT symmetric-XFP (10G BASE-PR30)	XG8A
GPON optical module	CLASS B+	2.5/1.25G-20km-GPON OLT-SFP (CLASS B+)	GC4B , GC8B, GCOB
	CLASS C+	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)	GC4B , GC8B, GCOB
	CLASS C++	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)	GC4B , GC8B, GCOB
XG-PON optical module	N1 ODN CLASS	10/2.5G-20km-XG-PON OLT-SFP+ (N1 ODN CLASS)	XP8A (2202171, 2202267)
		10/2.5G-20km-XG-PON OLT-XFP (N1 ODN CLASS)	XP4A , XP8A (2201737)
	N2a ODN CLASS	10/2.5G-20km-XG-PON OLT-XFP (N2a ODN CLASS)	XP4A , XP8A (2201737)

Module Type	Application Code	Module Code	Applicable Cards
GPON&XG-PON Combo optical module	D1 ODN CLASS	10/2.5G:2.5/1.25G-20km-XG-PON: GPON OLT-XFP (D1 ODN CLASS)	XP8C (2202188)
	D2 ODN CLASS	10/2.5G:2.5/1.25G-20km-XG-PON: GPON OLT-XFP (D2 ODN CLASS)	XP8C (2202188)
GE electrical module	10/100/1000BAS-E-T	1.25G-100m-TDM-SFP (10/100/1000BASE-T)	HSUB , HSUC HU1A , HU1B, HU2A, HU2C, GU6B, GU6F GSOF
	1000BASE-T	1.25G-100m-TDM-SFP (1000BASE-T)	HSUB , HSUC HU1A , HU2A, HU2C, GU6F GSOF
GE optical module	1000BASE-SX	1.25G-0.55km-TDM-SFP (1000BASE-SX)	HSUB , HSUC HU1A , HU1B, HU2A, HU2C, GU6F GSOF
	1000BASE-LX	1.25G-15km-TDM-SFP (1000BASE-LX)	HSUB , HSUC HU1A , HU1B, HU2A, HU2C, GU6B, GU6F GSOF
	1000BASE-EX	1.25G-40km-TDM-SFP (1000BASE-EX)	HSUB , HSUC HU1A , HU1B, HU2A, HU2C, GU6B, GU6F GSOF
	1000BASE-ZX1	1.25G-80km-TDM-SFP (1000BASE-ZX1)	HSUB , HSUC HU1A , HU1B, HU2A, HU2C, GU6B, GU6F GSOF
10GE optical module	10GBASE-SR/SW	10G-0.3km-TDM-SFP+ (10GBASE-SR/SW)	HU2C , HU4A
	10GBASE-LR/LW	10G-10km-TDM-SFP+ (10GBASE-LR/LW)	HU2C , HU4A
	I-64.1	10G-10km-TDM-SFP+ (I-64.1)	HSUB HU1B
		10G-10km-TDM-XFP (I-64.1)	HU1A , HU2A
	10GBASE-ER/EW	10G-40km-TDM-SFP+ (10GBASE-ER/EW)	HSUB HU1B , HU2C, HU4A
	S-64.2b	10G-40km-TDM-XFP (S-64.2b)	HU1A , HU2A
	L-64.2	10G-80km-TDM-SFP+ (L-64.2)	HSUB HU1B , HU2C
		10G-80km-TDM-XFP (L-64.2)	HU1A , HU2A

Module Type	Application Code	Module Code	Applicable Cards
TDM optical module	100BASE-SX	155M-2km-TDM-SFP (100BASE-SX)	TIMA
	S1.1	155M-15km-TDM-SFP (S1.1)	TIMA , C155A
	L1.1	155M-40km-TDM-SFP (L1.1)	TIMA
	L1.2	155M-80km-TDM-SFP (L1.2)	TIMA

4.2 EPON Optical Module

Item	Specification
Module code	1.25G-20km-EPON OLT-SFP (PX20+)
Optical module type	PX20+
Wavelength range	Tx: 1480 nm to 1500 nm Rx: 1260 nm to 1360 nm
Encapsulation mode	SFP
Rate	Tx: 1.25 Gbit/s Rx: 1.25 Gbit/s
Output optical power	3.5 dBm to 7 dBm (room temperature)
Optical fiber connector type	SC/PC
Transmission distance	20 km
Receiving sensitivity	-30 dBm
Overload optical power	-6 dBm
Extinction ratio	> 9 dB

4.3 10G EPON Optical Module

Item	Specification	
Module code	10/1.25G-20km-10G EPON OLT asymmetric-XFP (10G/1G BASE-PRX30)	10/1.25G-20km-10G EPON OLT symmetric-XFP (10G BASE-PR30)
Optical module type	10/1G BASE-PRX30	10G BASE-PR30
Wavelength range	Tx: 1490 nm (1480 nm to 1500 nm), 1577 nm (1575 nm to 1580 nm) Rx: 1260 nm to 1360 nm	Tx: 1490 nm (1480 nm to 1500 nm), 1577 nm (1575 nm to 1580 nm) Rx: 1270 nm (1260 nm to 1280 nm), 1310 nm (1280 nm to 1360 nm)
Encapsulation mode	XFP	XFP
Rate	Tx: 10.3125 Gbit/s, 1.25 Gbit/s Rx: 1.25 Gbit/s	Tx: 10.3125 Gbit/s, 1.25 Gbit/s Rx: 10.3125 Gbit/s, 1.25 Gbit/s

Item	Specification	
Output optical power	1490 nm: 2 dBm to 7 dBm 1577 nm: 2 dBm to 5 dBm	1490 nm: 2 dBm to 7 dBm 1577 nm: 2 dBm to 5 dBm
Optical fiber connector type	SC/PC	SC/PC
Transmission distance	20 km	20 km
Receiving sensitivity	-29.78 dBm	1270 nm: -28 dBm; 1310 nm: -29.78 dBm
Overload optical power	-9.38 dBm	1270 nm: -6 dBm; 1310 nm: -9.38 dBm
Extinction ratio	1490 nm: > 9 dB, 1577 nm: > 6 dB	1490 nm: > 9 dB, 1577 nm: > 6 dB

4.4 GPON Optical Module

Item	Specification		
Module code	2.5/1.25G-20km-GPON OLT-SFP (CLASS B+)	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
Optical module type	CLASS B+	CLASS C+	CLASS C++
Wavelength range	Tx: 1480 nm to 1500 nm Rx: 1260 nm to 1360 nm	Tx: 1480 nm to 1500 nm Rx: 1260 nm to 1360 nm	Tx: 1480 nm to 1500 nm Rx: 1260 nm to 1360 nm, 1290 nm to 1330 nm, 1280 nm to 1360 nm
Encapsulation mode	SFP	SFP	SFP
Rate	Tx: 2.488 Gbit/s Rx: 1.244 Gbit/s	Tx: 2.488 Gbit/s Rx: 1.244 Gbit/s	Tx: 2.488 Gbit/s Rx: 1.244 Gbit/s
Output optical power	2.5 dBm to 5 dBm (room temperature)	4 dBm to 7 dBm (room temperature)	5.5 dBm to 10 dBm (room temperature)
Optical fiber connector type	SC/PC	SC/PC	SC/PC
Transmission distance	20 km	20 km	20 km
Receiving sensitivity	-29 dBm (room temperature)	-31 dBm (room temperature)	-31 dBm (room temperature)
Overload optical power	-8 dBm	-12 dBm	-12 dBm
Extinction ratio	> 8.2 dB	> 8.2 dB	> 8.2 dB

4.5 XG-PON Optical Module

Item	Specification		
Module code	10/2.5G-20km-XG-PON OLT-XFP (N1 ODN CLASS)	10/2.5G-20km-XG-PON OLT-SFP+ (N1 ODN CLASS)	10/2.5G-20km-XG-PON OLT-XFP (N2a ODN CLASS)
Optical module type	N1 ODN CLASS	N1 ODN CLASS	N2a ODN CLASS
Wavelength range	Tx: 1575 nm to 1580 nm Rx: 1260 nm to 1280 nm	Tx: 1575 nm to 1580 nm Rx: 1260 nm to 1280 nm	Tx: 1575 nm to 1580 nm Rx: 1260 nm to 1280 nm
Encapsulation mode	XFP	SFP+	XFP
Rate	Tx: 9.95328 Gbit/s Rx: 2.48832 Gbit/s	Tx: 9.95328 Gbit/s Rx: 2.48832 Gbit/s	Tx: 9.95328 Gbit/s Rx: 2.48832 Gbit/s
Output optical power	2 dBm to 6 dBm (full temperature range)	2 dBm to 6 dBm (full temperature range)	4 dBm to 8 dBm (full temperature range)
Optical fiber connector type	SC/PC	SC/PC	SC/PC
Transmission distance	> 20 km	> 20 km	> 20 km
Receiving sensitivity	-27.5 dBm	-27.5 dBm	-29.5 dBm
Overload optical power	-7 dBm	-7 dBm	-9 dBm
Extinction ratio	> 8.2 dB	> 8.2 dB	> 8.2 dB

4.6 GPON&XG-PON Combo Optical Module

Item	Specification	
Module code	10/2.5G:2.5/1.25G-20km-XG-PON:GPON OLT-XFP (D1 ODN CLASS)	10/2.5G:2.5/1.25G-20km-XG-PON:GPON OLT-XFP (D2 ODN CLASS)
Optical module type	D1 ODN CLASS	D2 ODN CLASS
Wavelength range	GPON ◆ Tx: 1490 nm (1480 nm to 1500 nm) ◆ Rx: 1310 nm (1290 nm to 1330 nm) XG-PON ◆ Tx: 1577 nm (1575 nm to 1580 nm) ◆ Rx: 1270 nm (1260 nm to 1280 nm)	GPON ◆ Tx: 1490 nm (1480 nm to 1500 nm) ◆ Rx: 1310 nm (1290 nm to 1330 nm) XG-PON ◆ Tx: 1577 nm (1575 nm to 1580 nm) ◆ Rx: 1270 nm (1260 nm to 1280 nm)
Encapsulation mode	XFP	XFP

Item	Specification	
Rate	GPON ◆ Tx: 2.488 Gbit/s ◆ Rx: 1.244 Gbit/s XG-PON ◆ Tx: 9.95328 Gbit/s ◆ Rx: 2.48832 Gbit/s	GPON ◆ Tx: 2.488 Gbit/s ◆ Rx: 1.244 Gbit/s XG-PON ◆ Tx: 9.95328 Gbit/s ◆ Rx: 2.48832 Gbit/s
Output optical power	GPON ◆ 1490 nm: 1.5 dBm to 5 dBm XG-PON ◆ 1577 nm: 1 dBm to 6 dBm	GPON ◆ 1490 nm: 3 dBm to 7 dBm XG-PON ◆ 1577 nm: 5 dBm to 8 dBm
Optical fiber connector type	SC/PC	SC/PC
Transmission distance	20 km	20km
Receiving sensitivity	GPON ◆ 1310 nm: -28 dBm XG-PON ◆ 1270 nm: -26.5 dBm	GPON ◆ 1310 nm: -32 dBm XG-PON ◆ 1270 nm: -30.5 dBm
Overload optical power	GPON ◆ 1310 nm: -8 dBm XG-PON ◆ 1270 nm: -7 dBm	GPON ◆ 1310 nm: -12 dBm XG-PON ◆ 1270 nm: -9 dBm
Extinction ratio	> 8.2 dB	> 8.2 dB

4.7 GE / 10GE Module

GE Electrical Module

Item	Specification	
Module code	1.25G-100m-TDM-SFP (10/100/1000BASE-T)	1.25G-100m-TDM-SFP (1000BASE-T)
Module type	10/100/1000BASE-T	1000BASE-T
Encapsulation mode	SFP	SFP
Rate	1.25 Gbit/s	1.25 Gbit/s
Connector type	RJ-45	RJ-45
Transmission distance	100m	100m

GE Optical Module

Item	Specification			
Module code	1.25G-0.55km-TDM-SFP (1000BASE-SX)	1.25G-15km-TDM-SFP (1000BASE-LX)	1.25G-40km-TDM-SFP (1000BASE-EX)	1.25G-80km-TDM-SFP (1000BASE-ZX1)
Optical module type	1000BASE-SX	1000BASE-LX	1000BASE-EX	1000BASE-ZX1
Wavelength range	770 nm to 860 nm	1275 nm to 1350 nm	1275 nm to 1350 nm	1500 nm to 1580 nm
Encapsulation mode	SFP	SFP	SFP	SFP
Rate	1.25 Gbit/s	1.25 Gbit/s	1.25 Gbit/s	1.25 Gbit/s
Output optical power	-9.5 dBm to -4 dBm	-8 dBm to -3 dBm	-5 dBm to 0 dBm	-2 dBm to 3 dBm
Optical fiber connector type	LC	LC	LC	LC
Transmission distance	0.55 km[Note 1]	15 km	40 km	80 km
Receiving sensitivity	-17 dBm	-20 dBm	-23 dBm	-25 dBm
Overload optical power	0 dBm	-3 dBm	-3 dBm	-3 dBm
Extinction ratio	> 9 dB	9.0 dB to 15 dB	9.0 dB to 15 dB	9.0 dB to 15 dB
Note 1: @50/125um fiber				

10GE Optical Module

Item	Specification					
Module code	10G-0.3km-TDM-SFP+ (10GBASE-SR/SW)	10G-10km-TDM-SFP+ (10GBASE-LR/LW)	10G-10km-TDM-SFP+ (I-64.1) / 10G-10km-TDM-XFP (I-64.1)	10G-40km-TDM-SFP+ (10GBASE-ER/EW)	10G-40km-TDM-XFP (S-64.2b)	10G-80km-TDM-SFP+ (L-64.2) / 10G-80km-TDM-XFP (L-64.2)
Optical module type	10GBASE-SR/SW	10GBASE-LR/LW	10GBASE-LR/LW I-64.1 P1I1-2D1	10GBASE-ER/EW	10GBASE-ER/EW S-64.2b P1S1-2D2b	10GBASE-ZR/ZW L-64.2 P1L1-2D2
Wavelength range	840 nm to 860 nm	1260 nm to 1355 nm	1290 nm to 1330 nm	1530 nm to 1565 nm	1530 nm to 1565 nm	1530 nm to 1565 nm
Encapsulation mode	SFP+	SFP+	SFP+/XFP	SFP+	XFP	SFP+/XFP
Rate	9.953 Gbit/s to 11.09 Gbit/s[Note 1]	1.2288 Gbit/s to 10.3125 Gbit/s[Note 1]	9.953 Gbit/s to 11.3 Gbit/s	9.953 Gbit/s to 10.3125 Gbit/s[Note 1]	9.953 Gbit/s to 11.3 Gbit/s	9.953 Gbit/s to 11.3 Gbit/s
Output optical power	-7.3 dBm to -1 dBm	-8.2 dBm to 0.5 dBm	-6 dBm to -1 dBm	-4.7 dBm to 4 dBm	-1 dBm to 2 dBm	0 dBm to 4 dBm
Optical fiber connector type	LC	LC	LC	LC	LC	LC
Transmission distance / dispersion tolerance	0.3 km	10 km 33 ps/nm	10 km	40 km	40 km 800 ps/nm	80 km 1600 ps/nm
Receiving sensitivity	-11.1 dBm OMA	-14.4 dBm	-14 dBm	-15.8 dBm	-17 dBm	-24 dBm
Overload optical power	-13 dBm	0.5 dBm	-1 dBm	-1 dBm	-1 dBm	-7 dBm
Extinction ratio	3 dB to 6 dB	3.5 dB to 6.5 dB	> 6 dB	> 3 dB	> 8.2 dB	> 9 dB
Note 1: Without the CDR function.						

4.8 TDM Optical Module

Item	Specification			
Module code	155M-2km-TDM-SFP (100BASE-SX)	155M-15km-TDM-SFP (S1.1)	155M-40km-TDM-SFP (L1.1)	155M-80km-TDM-SFP (L1.2)
Optical module type	100BASE-SX	100BASE-LX S1.1	100BASE-EX L1.1	100BASE-ZX L1.2
Wavelength range	830 nm to 860 nm	1265 nm to 1360 nm	1265 nm to 1360 nm	1480 nm to 1580 nm
Encapsulation mode	SFP	SFP	SFP	SFP
Rate	155 Mbit/s	155 Mbit/s	155 Mbit/s	155 Mbit/s
Output optical power	-9.5 dBm to -3 dBm	-15 dBm to -8 dBm	-5 dBm to 0 dBm	-5 dBm to 0 dBm
Optical fiber connector type	LC	LC	LC	LC
Transmission distance	2 km	15 km	40 km	80 km
Receiving sensitivity	-24 dBm	-28 dBm	-34 dBm	-34 dBm
Overload optical power	-3 dBm	-8 dBm	-10 dBm	-10 dBm
Extinction ratio	> 8.2 dB	8.2 dB to 15 dB	10 dB to 15 dB	10 dB to 15 dB

5 Wire and Cable

The following introduces the wires and cables applied to the AN5116-06B/AN5516-04/AN5516-06.

- Cable Overview
- Power Cable
- Protection Earth Ground Cable
- Alarm Cable
- Fiber Jumper
- 64-conductor Audio Interface Connection Cable
- 64-conductor E1 Interface Connection Cable (75 Ω)
- 64-conductor E1 Interface Connection Cable (120 Ω)
- Network Cable
- E1 Coaxial Cable
- Coaxial Clock Cable
- Serial Port Line
- Dry Contact Cable

5.1 Cable Overview

Cable	Model	Applied to
Cabinet Power Cable	-48V power cable: 3696231 (25mm^2)	PDP260B (3000063)
	0V power cable: 3696232 (25mm^2)	
	Protection earth ground cable: 408000019 (25mm^2)	
	-48V power cable: 3696097 (16mm^2) / 408000003 (25mm^2)	PDP850A (3000064)
	0V power cable: 408000033 (16mm^2) / 408000006 (25mm^2)	
	Protection earth ground cable: 408000041 (16mm^2) / 408000019 (25mm^2)	
	-48V power cable: 408000021 (25mm^2)	PDP296B (3000068)
	0V power cable: 408000020 (25mm^2)	
	Protection earth ground cable: 408000019 (25mm^2)	
Subrack Power Cable (AN5116-06B)	408000009	AN5116-06B subrack (with the model number 3061165)
Subrack Power Cable (AN5516-06)	408000226	The PWR card of the AN5516-06 subrack (with the model number 3061160)
Subrack DC Power Cable (AN5516-04)	408000062	The PWRD card of the AN5516-04 subrack (with the model number 3061117)
Subrack AC Power Cable (AN5516-04)	◆ WX00000543 (American standard) ◆ WX00000515 (British standard) ◆ WX00000514 (European standard)	The PWRA card of the AN5516-04 subrack (with the model number 3061117)
PDP Protection Earth Ground Cable	3696239	PDP260B (3000063)
	408000007	PDP850A (3000064)
	408000018	PDP296B (3000068)
Subrack Protection Earth Ground Cable	3696084	AN5116-06B / AN5516-04 / AN5516-06 subrack
Alarm Cable for the Head of Row Cabinet	3696135	PDP850A (3000064) and PDP296B (3000068)
Subrack Alarm Cable	3695095	PDP850A (3000064) and PDP296B (3000068)
Fiber Jumper	LC/PC-type optical fiber jumper: OFC-LC/PC-LC/PC-S-20	HU1A / HU1B / HU2A / HU2C / HU4A / GU6F / GU6B / GSOF / C155A / TIMA card

Cable	Model	Applied to
	SC/PC-type optical fiber jumper: OFC-SC/PC-SC/PC-S-20	EC4B / EC8B / ECOB / XG8A / GC4B / GC8B / GCOB / XP4A / XP8A / XP8C card
	SC/APC-type optical fiber jumper: OFC-SC/APC-SC/PC-20	ODMA / ODMB / ODMC card
64-conductor Audio Interface Connection Cable	409000113	CATA / CVTA / PPDA / PPEA / APSA / FTSA / VPSA / SHUA / SETA / BROA card
64-conductor E1 Interface Connection Cable (75 Ω)	409000031	SETA card
64-conductor E1 Interface Connection Cable (120 Ω)	409000040	SETA card
Network Cable	3695095	HU1A / HU1B / HU2A / HU2C / GU6B / GU6F / GSOF / TIMA / HSWA / HSWB / HSWD / HSUB / HSUC / ODMA / ODMB / ODMC card
E1 Coaxial Cable	3695442	CE1B card
Coaxial Clock Cable	3695187	C155A / TIMA / CE1B card
Serial Port Line	3695341	HSWA / HSWB / HSWD / HSUB / HSUC card
Dry Contact Cable	3695452	The DC1-3 interface on the AN5116-06B subrack backplane; the CIO card of the AN5516-06

5.2 Power Cable

The power cables supply electric energy to loads so that the loads can work normally.

5.2.1 Cabinet Power Cable

Function

The cabinet power cables, including the -48V power cable, 0V power cable and protection earth ground cable, are used to induct the power supply from the equipment room to the PDP in the cabinet.

Model

The PDPs applicable to the AN5116-06B / AN5516-06 / AN5516-04 include PDP260B (3000063), PDP850A (3000064) and PDP296B (3000068). These PDPs use different cabinet power cables. Please select the power cables matching with the PDP model. See Table 5-1 for the mappings between the cabinet power cable model and the PDP model.

Table 5-1 Model of Cabinet Power Cable

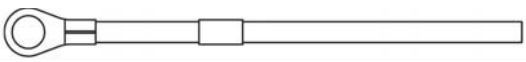
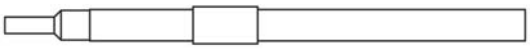
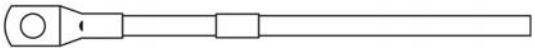
Model of PDP	Cable	Cable Model	Color
PDP260B (3000063)	-48 V power cable	3696231 (25mm^2)	Blue
	0V power cable	3696232 (25mm^2)	Black
	Protection earth ground cable	408000019 (25mm^2)	yellow- / green
PDP850A (3000064)	-48 V power cable	3696097 (16mm^2) 408000003 (25mm^2)	Blue
	0V power cable	408000033 (16mm^2) 408000006 (25mm^2)	Black
	Protection earth ground cable	408000041 (16mm^2) 408000019 (25mm^2)	yellow- / green
PDP296B (3000068)	-48 V power cable	408000021 (25mm^2)	Blue
	0V power cable	408000020 (25mm^2)	Black
	Protection earth ground cable	408000019 (25mm^2)	yellow- / green

Note:

Follow the principles below to select cabinet power cables if the PDP850A (3000064) is used.

- If the PDP is not equipped with a busbar, either 16mm^2 or 25mm^2 power cables can be used.
- If the PDP is equipped with a busbar, only the 25mm^2 power cables can be used.

Structure

Cable Model	Description	Structure Illustration
3696231/3696232/408000019 408000006/408000041 408000021/408000020	Uninsulated ring terminal + bare wire	
3696097/408000003	Cord end terminal + bare wire	
408000033	copper cord end terminal + bare wire	

Connection

One end of the cabinet power cable is connected with the PDP or with the earth ground point on the top of the cabinet, and the other end is connected with the head of row cabinet in the equipment room. See Table 5-2 for details.

Table 5-2 Connection of the Cabinet Power Cable

PDP Used	Cable	Internal Connector		External Connector
PDP260B (3000063)	-48 V power cable (blue)	-48V1 terminal (active) -48V2 terminal (standby)		-48 V DC external power supply
	0V power cable (black)	GND1 terminal (active) GND2 terminal (standby)		External power earth ground
	Protection earth ground cable (yellow- / green)	Earth ground point on the cabinet top		Earth ground point on the head of row cabinet in the equipment room
PDP850A (3000064)	-48 V power cable (blue)	Select one active and one standby terminals if the PDP is equipped with a busbar.	Select an active terminal from -48V_1 to -48V_ 4 in Area A. Select a standby terminal from -48V_1 to -48V_ 4 in Area B	-48 V DC external power supply
		Select the active and standby terminals as needed if the PDP is not equipped with a busbar.	-48V_1 to -48V_ 4 terminals in Area A (active) -48V_1 to -48V_ 4 terminals in Area B (standby)	
	0V power cable (black)	GND terminal on the busbar		External power ground

Table 5-2 Connection of the Cabinet Power Cable (Continued)

PDP Used	Cable	Internal Connector	External Connector
	Protection earth ground cable (yellow- / green)	Earth ground point on the cabinet top	Earth ground point on the head of row cabinet in the equipment room
PDP296B (3000068)	-48 V power cable (blue)	-48V_A terminal (active) -48V_B terminal (standby)	-48 V DC external power supply
	0V power cable (black)	0V_A (active) 0V_B (standby)	External power ground
	Protection earth ground cable (yellow- / green)	Earth ground point on the cabinet top	Earth ground point on the head of row cabinet in the equipment room

Technical Specifications

Parameter	Parameter
Maximum rated current	◆ 16mm^2 power cable: 80 A ◆ 25mm^2 power cable: 100A

5.2.2 Subrack Power Cable (AN5116-06B)

Function

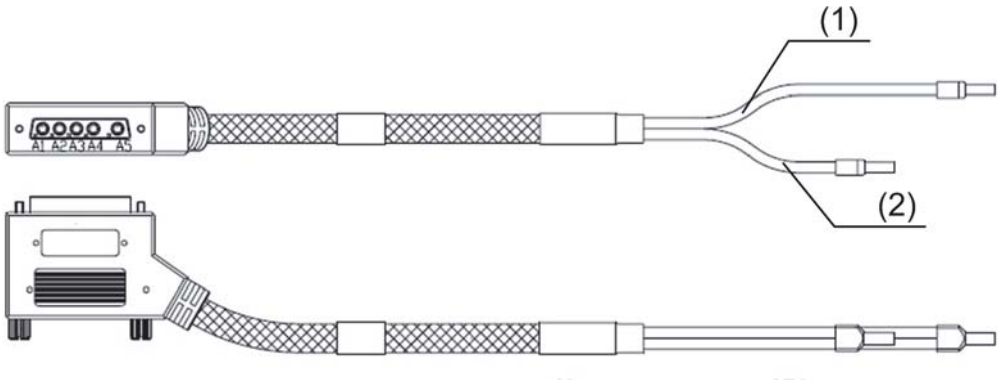
The AN5116-06B subrack power cable connects the PDP and the subrack to output a set of redundant branch power rails (two branch power rails in total) from the PDP to the subrack. The subrack power cable has already been connected in the cabinet before delivery.

Model

The model number of the power cable for the AN5116-06B subrack (3061165) is 408000009.

Structure

The AN5116-06B subrack power cable has a D-type five-conductor plug on one end for connection with the subrack and two cord end terminals on the other end for connection with the PDP, as shown in Figure 5-1.



(1) 0 V power cable (black) (2) -48 V power cable (blue)

Figure 5-1 Subrack Power Cable (AN5116-06B)

Connection

Cable Connector	Connection Description		
	PDP260B (3000063)	**PDP850A (3000064)**	**PDP296B (3000068)**
Cord end terminal (-48V, blue)	Connected to the -48V connector on the PDP.	Connected to the -48V_1 to -48V_4 connectors in Area A or -48V_1 to -48V_4 connectors in Area B on the PDP.	Connected to the -48V_A_1 to -48V_A_3 / -48V_B_1 to -48V_B_3 connectors on the PDP.
Cord end terminal (0V, black)	Connected to the 0V connector on the PDP.	Connected to the 0V_1 to 0V_4 connectors in Area A or 0V_1 to 0V_4 connectors in Area B on the PDP.	Connected to the 0V_A_1 to 0V_A_3 / 0V_B_1 to 0V_B_3 connectors on the PDP.
D-type five-conductor plug	Connected to the PWR-A and PWR-B power interfaces on the backplane of the AN5116-06B subrack.		

Technical Specifications

Item	Specification
Cable color	Blue (-48V), black (0V)
Cross-sectional area of the power cable terminal	2 × 4mm^2
Maximum rated current	◆ 4 mm^{2}power cable: 32 A ◆ Component: 60 A

5.2.3 Subrack Power Cable (AN5516-06)

Function

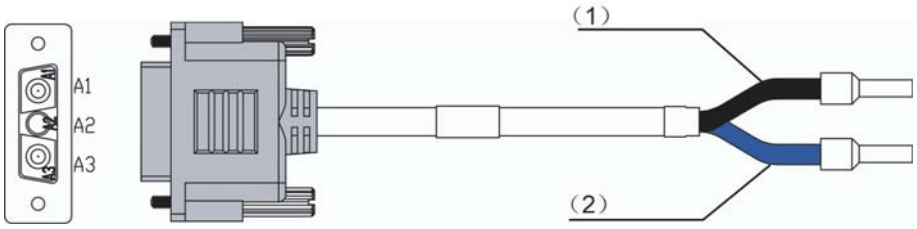
The AN5516-06 subrack power cable connects the PDP and the power card in the subrack to output a set of redundant branch power rails (two branch power rails in total) from the PDP to the subrack. The subrack power cable has already been connected in the cabinet before delivery.

Model

The model number of the power cable for the AN5516-06 subrack (3061160) is 408000226.

Structure

The AN5516-06 subrack power cable has a D-type two-conductor plug on one end for connection with the subrack and two cord end terminals on the other end for connection with the PDP, as shown in Figure 5-2.



(1) 0 V power cable (black) (2) -48 V power cable (blue)

Figure 5-2 Subrack Power Cable (AN5516-06)

Connection

Cable Connector	Connection Description	
	PDP260B (3000063)	PDP296B (3000068)
Cord end terminal (-48V, blue)	Connected to the -48V connector on the PDP.	Connected to the -48V_A_1 to -48V_A_3 / -48V_B_1 to -48V_B_3 connectors on the PDP.
Cord end terminal (0V, black)	Connected to the 0V connector on the PDP.	Connected to the 0V_A_1 to 0V_A_3 / 0V_B_1 to 0V_B_3 connectors on the PDP.
D-type two-conductor power plug	Connected to the power interface of the power card in the AN5516-06 subrack.	

Technical Specifications

Item	Specification
Cable color	Blue (-48V), black (0V)
Rated current	40 A

5.2.4 Subrack DC Power Cable (AN5516-04)

Function

The subrack DC power cable connects the PDP and the PWRD card of the AN5516-04 to output a set of redundant branch power rails (two branch power rails in total) from the PDP to the subrack.

Model

The model number of the DC power cable for the AN5516-04 subrack (3061117) is 408000062.

Structure

As shown in Figure 5-3, the subrack DC power cable (408000062) has two cord end terminals on one end and a two-conductor power plug on the other end.

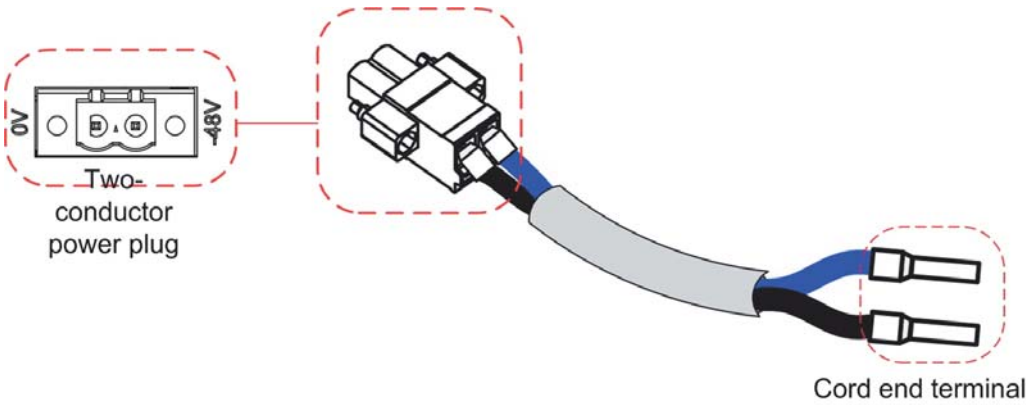


Figure 5-3 Subrack DC Power Cable (408000062)

Connection

Cable Connector	Connection Description	
	PDP260B (3000063)	**PDP296B (3000068)**
Cord end terminal (-48V, blue)	Connected to the -48V connector on the PDP.	Connected to the -48V_A_1 to -48V_A_3 / -48V_B_1 to -48V_B_3 connectors on the PDP.
Cord end terminal (0V, black)	Connected to the 0V connector on the PDP.	Connected to the 0V_A_1 to 0V_A_3 / 0V_B_1 to 0V_B_3 connectors on the PDP.
Two-conductor power plug	Connected to the power input interface of the DC power card (PWRD) in the AN5516-04 subrack.	

Technical Specifications

Item	Specification
Cable type	Double-sheathed double-conductor soft cable
Color	The external sheath is gray-white, and the core wires are blue and black.
Maximum current	16A
Cross-sectional area of the conductor	2 × 1.5 mm^2

5.2.5 Subrack AC Power Cable (AN5516-04)

Function

The subrack AC power cable connects the external AC power supply and the PWRA card of the AN5516-04, so as to induct the external AC power into the subrack.

Model

The AC power cables for the AN5516-04 subrack (3061117) are available in three models for different regions, and they will be delivered according to the country of destination.

- WX00000543 (American standard)
- WX00000515 (British standard)
- WX00000514 (European standard)

Structure

As shown in Figure 5-4, the subrack AC power cable has a three-conductor power plug on one end and a three-conductor power jack on the other end.

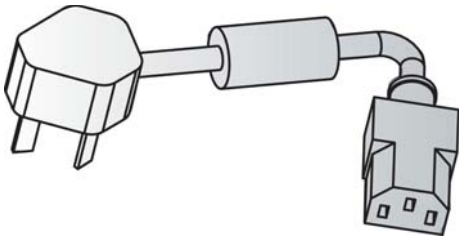


Figure 5-4 Subrack AC Power Cable (AN5516-04)

Connection

Cable	Cable Connector	Connection Description
Subrack AC power cable	Tree-conductor plug	Connected to external power supply unit.
	Tree-conductor jack	Connected to the power input interface of the AC power card (PWRA) in the AN5516-04 subrack.

5.3 Protection Earth Ground Cable

The protection earth ground cables (including the cabinet protection earth ground cable and the subrack protection earth ground cable) protect the equipment from lightning and interference.

5.3.1 PDP Protection Earth Ground Cable

Function

The PDP protection earth ground cable is used to connect the PDP protection earth ground and the cabinet earth ground point. The PDP protection earth ground cable has been connected to the PE terminal of the PDP before delivery.

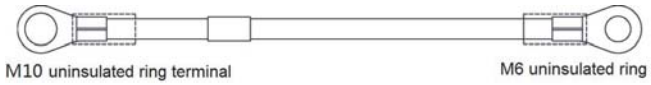
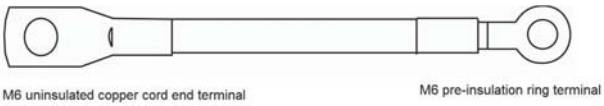
Model

The PDPs applicable to the AN5116-06B/AN5516-06/AN5516-04 include PDP260B (3000063), PDP850A (3000064) and PDP296B (3000068). These PDPs use different protection earth ground cables. See Table 5-3 for the mappings between the PDPs and protection earth ground cables.

Table 5-3 Mappings between PDPs and Protection Earth Ground Cables

PDP Used	Cable Model
PDP260B (3000063)	3696239
PDP850A (3000064)	408000007
PDP296B (3000068)	408000018

Structure

Cable Model	Description	Appearance
3696239	The terminal at the PDP side is an M10 uninsulated ring terminal and that at the cabinet side is an M6 uninsulated ring terminal, with a yellow- / green cable between them.	
408000007	The terminal at the PDP side is a cord end terminal and that at the cabinet side is an M6 uninsulated ring terminal, with a yellow- / green cable between them.	
408000018	The terminal at the PDP side is an M6 uninsulated copper cord end terminal and that at the cabinet side is an M6 pre-insulation ring terminal, with a yellow- / green cable between them.	

Connection

PDP Used	Cable Model	Cable Connector	Description
PDP260B (3000063)	3696239	M10 uninsulated ring terminal	Connects to the PE terminal of the PDP.
		M6 uninsulated ring terminal	Connects to the earth ground point on the cabinet top.
PDP850A (3000064)	408000007	Cord end terminal	Connects to the PE terminal of the PDP.
		M6 uninsulated ring terminal	Connects to the earth ground point on the cabinet top.
PDP296B (3000068)	408000018	M6 uninsulated copper cord end terminal	Connects to the PE terminal of the PDP.
		M6 pre-insulation ring terminal	Connects to the earth ground point on the cabinet top.

Note:

The terminal of the PDP protection earth ground cable at the PDP side has been connected to the inner PE connector of the PDP before delivery. Users need only connect the other end of the cable to the earth ground point on the cabinet top.

Technical Specifications

Cable Model	Cable Type	Color	Maximum Current	Cross-sectional Area of the Conductor
3696239	Single-core soft cable	Yellow- / green	40 A	10.5mm^2
408000007				10mm^2
408000018				2x6mm^2

5.3.2 Subrack Protection Earth Ground Cable

Function

The subrack protection earth ground cable is used to connect the subrack with the protection earth ground terminal of the cabinet to provide ground protection for the subrack.

Model

The model number of the AN5116-06B/AN5516-06/AN5516-04 subrack protection earth ground cable is 3696084.

Structure

The subrack protection earth ground cable is shown in Figure 5-5. Both ends of the cable are M6 pre-insulation terminals, and between them is a yellow- / green cable.

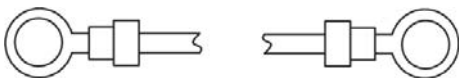


Figure 5-5 Subrack Protection Earth Ground Cable

Connection

Cable Connector	Connection Description
M6 pre-insulation ring terminal	Connects to the cabinet earth ground point.
M6 pre-insulation ring terminal	Connects to the subrack earth ground point.

Technical Specifications

Item	Specification
Cable type	Single-sheathed heat-resistant (withstanding a temperature up to 90℃) single-core soft cable
Color	Yellow- / green
Maximum current	32 A
Cross-sectional area of the conductor	4mm^2

5.4 Alarm Cable

The alarm cables include the subrack alarm cable and the alarm cable for the head of row cabinet.

Note:

The PDPs applicable to the AN5116-06B / AN5516-04 / AN5516-06 include PDP260B (3000063), PDP850A (3000064) and PDP296B (3000068). The PDP260B (3000063) is not equipped with the alarm cable.

5.4.1 Alarm Cable for the Head of Row Cabinet

Function

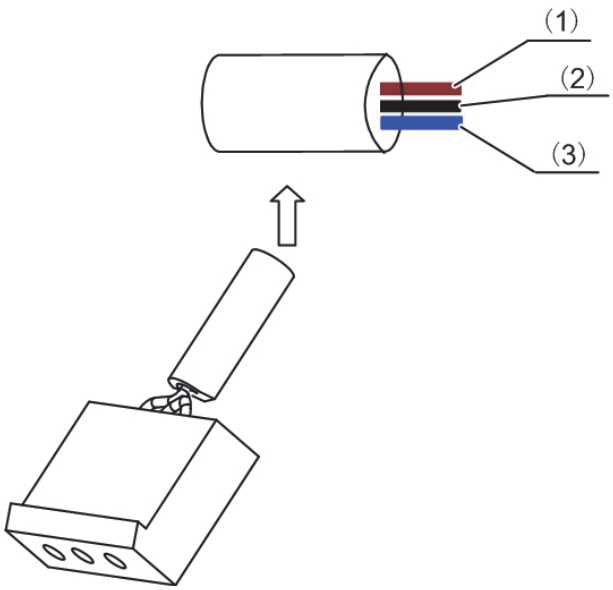
The alarm cable for the head of row cabinet is used to connect the PDP with the head of row cabinet to output the equipment alarm signals to the head of row cabinet.

Model

The model number of the alarm cable for the head of row cabinet matching with the PDP850A (3000064) and PDP296B (3000068) is 3696135.

Structure

As shown in Figure 5-6, one end of the alarm cable for the head of row cabinet is a three-conductor D-type connector, and the other end is the three-conductor cable led out from the connector. The brown, black and blue wires output CALL (order wire call) , NUA (non-urgent alarm) and UA (urgent alarm) signals respectively.



(1) Brown, CALL (2) Black, NUA (3) Blue, UA

Figure 5-6 Alarm Cable for the Head of Row Cabinet

Note:

Installers need to make plugs matching with the head of row cabinet in the equipment room by themselves.

Connection

Cable	Connector	Connection Description
Alarm cable for the head of row cabinet	Three-conductor D-type connector	Connects to the XP6 terminal on the PDP850A (3000064). Connects to the XP1 terminal on the PDP296B (3000068).
	Three-conductor cable	Connects to the head of row cabinet.

5.4.2 Subrack Alarm Cable

Function

The subrack alarm cable connects the subrack with the PDP, and outputs the subrack alarms to the PDP.

Model

The model number of the subrack alarm cable used for the PDP850A (3000064) and PDP296B (3000068) is 3695095.

Structure

The subrack alarm cable is a straight-through network cable with RJ-45 connectors (also known as crystal heads) on both ends, as shown in Figure 5-7.

Figure 5-7 Subrack Alarm Cable

Connection

Cable Connector	Connection Description		
	AN5116-06B Subrack	AN5516-06 Subrack	AN5516-04 Subrack
RJ-45 connector at the subrack side	Connects to the alarm interface (ALM) on the backplane of the subrack.	Connects to the alarm interface (ALM) on the CIO card.	Connects to the alarm interface (ALARM) of the HSUB / HSUC card.
RJ-45 connector at the PDP side	◆ PDP850A (3000064): Connects to one of the connectors XS1 to XS4 on the PDP. ◆ PDP296B (3000068): Connects to one of the connectors AlmIn1 to AlmIn3 on the PDP.		

Technical Specifications

Item	Specification
Cable type	CAT-5 twisted pair
Connector type	RJ-45
Number of conductors	8
Conductor diameter	AWG24
Breakdown voltage	2000 V

5.5 Fiber Jumper

Function

Serving as the transmission carrier for optical signals, fiber jumper is applied to short-distance transmission of optical signals. It connects the optical interface of a card to the ODF.

Model

Classification	Model
LC/PC-type optical fiber jumper	OFC-LC/PC-LC/PC-S-20
SC/PC-type optical fiber	OFC-SC/PC-SC/PC-S-20
SC/APC-type optical fiber	OFC-SC/APC-SC/PC-20

Structure

Classification	Connector
LC/PC-type fiber connector	
SC/PC-type optical fiber connector	
SC/APC-type fiber connector	

Connection

Table 5-4 Connection of the Optical Fiber Jumper

Cable	Connector	Card Connected	Port Connected	Connection on the ODF Side
Fiber jumper	SC/PC connector	EC4B	1 to 4	Provides the EPON downlink channel for connection with the remote ONU.
		EC8B	1 to 8	
		ECOB	1 to 16	
		XG8A	1 to 8	Provides the 10G EPON downlink channel for connection with the remote ONU.
		GC4B	1 to 4	Provides the GPON downlink channel for connection with the remote ONU.
		GC8B	1 to 8	
		GCOB	1 to 16	
		XP4A	1 to 4	Provides the XG-PON downlink channel for connection with the remote ONU.
		XP8A	1 to 8	Provides the XG-PON downlink channel for connection with the remote ONU.
		XP8C	1 to 8	Provides the GPON&XG-PON Combo downlink channel for connection with the remote ONU.
	LC/PC connector	HSUB	10GE1 (1), 10GE2 (2)	Provides GE and 10 GE optical channels for connection with the IP network.
			GE1 (3), GE2 (4)	

Table 5-4 Connection of the Optical Fiber Jumper (Continued)

Cable	Connector	Card Connected	Port Connected	Connection on the ODF Side
		HSUC	GE1 to GE4	
		HU1A	XFP	
		HU1B	SFP+	
		HU2A	GE/XG	
		HU2C	GE/XG	
		HU4A	XG	
		GU6F	GE	
		GU6B	GE	
		GSOF	1 to 16	Provides the GE optical channel for connection with the remote end Ethernet equipment.
		C155A	STM-1 1 to 2	Provides the STM-1 optical channel for connection with the transmission network.
		TIMA	SFP	Provides the high-precision 1588 Ethernet clock and time information for connection with the IP network.
	SC/APC connector	ODMA	OTDR1	Provides the OTDR test channel for connection with the remote device.
		ODMB	OTDR1 to 2	
		ODMC	OTDR1 to 4	

Basis for Choice of Optical Fiber

Parameter	Basis for Choice
Length	On-site investigation
Single-mode / multi-mode	Type of the optical module
Fiber connector type	Type of the optical module

5.6 64-conductor Audio Interface Connection Cable

Function

The 64-conductor cable connects the MSAN service card in the subrack with the downstream equipment to transfer MSAN service signals.

Model

The model number of the 64-conductor audio interface connection cable is 409000113.

Structure

One end of the 64-conductor audio interface connection cable is the HDSX 64-conductor plug, and the other end comprises 32 twisted pairs, as shown in Figure 5-8.

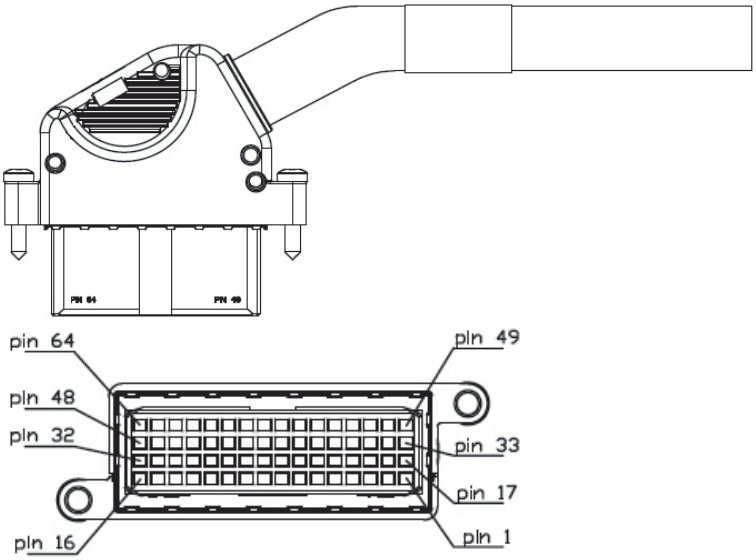


Figure 5-8 Structure of the 64-conductor Audio Interface Connection Cable

The color-coding scheme of the 64-conductor audio interface connection cable is shown in Table 5-5.

Table 5-5 Pinout and Wiring of the 64-conductor Audio Interface Connection Cable

Pin	Wire Color		Pin	Wire Color	
1	White	One twisted pair	33	Black	One twisted pair
3	Blue		35	Blue	
2	White	One twisted pair	34	Black	One twisted pair
4	Orange		36	Orange	
5	White	One twisted pair	37	Black	One twisted pair
7	Green		39	Green	
6	White	One twisted pair	38	Black	One twisted pair
8	Brown		40	Brown	
9	White	One twisted pair	41	Black	One twisted pair

Table 5-5 Pinout and Wiring of the 64-conductor Audio Interface Connection Cable (Continued)

Pin	Wire Color		Pin	Wire Color	
11	Blue (white)		43	Blue (white)	
10	White	One twisted pair	42	Black	One twisted pair
12	Orange (white)		44	Orange (white)	
13	White	One twisted pair	45	Black	One twisted pair
15	Green (white)		47	Green (white)	
14	White	One twisted pair	46	Black	One twisted pair
16	Brown (white)		48	Brown (white)	
17	Red	One twisted pair	49	Yellow	One twisted pair
19	Blue		51	Blue	
18	Red	One twisted pair	50	Yellow	One twisted pair
20	Orange		52	Orange	
21	Red	One twisted pair	53	Yellow	One twisted pair
23	Green		55	Green	
22	Red	One twisted pair	54	Yellow	One twisted pair
24	Brown		56	Brown	
25	Red	One twisted pair	57	Yellow	One twisted pair
27	Blue (white)		59	Blue (white)	
26	Red	One twisted pair	58	Yellow	One twisted pair
28	Orange (white)		60	Orange (white)	
29	Red	One twisted pair	61	Yellow	One twisted pair
31	Green (white)		63	Green (white)	
30	Red	One twisted pair	62	Yellow	One twisted pair
32	Brown (white)		64	Brown (white)	

Note 1: Blue (white) refers to a blue wire with a white full vertical stripe, and the width of the white stripe is approximately 1/3 of the circumference of the wire. Orange (white), green (white) and brown (white) indicate likewise.

Connection

Card Connected	Service Type	Cable Connector	32 Twisted Pairs
CATA / CVTA	Hybrid voice and data service	HDSX 64-conductor plug: Connects to the LINE interface of the card.	The 32 twisted pairs are connected to the MDF, where they are connected with the splitters: After being separated by the splitters, the data and voice signals are transmitted to the modems and the subscriber's telephones respectively.
PPDA	Voice service	HDSX 64-conductor plug: Connects to the POTS interface of the card.	The 32 twisted pairs are connected to the MDF, where they are connected with the subscribers' telephones.
PPEA	Voice service	HDSX 64-conductor plug: Connects to the POTS interface of the card.	The 32 twisted pairs are connected to the MDF, where they are connected with the S socket of the PBX.
APSA / VPSA / FTSA	Data service	HDSX 64-conductor plug: Connects to the LINE interface of the card.	The 32 twisted pairs are connected to the MDF, where they are connected with the splitters: After being separated by the splitters, the data and voice signals are transmitted to the modems and the subscriber's telephones respectively.
	Voice service	HDSX 64-conductor plug: Connects to the POTS interface of the card.	The 32 twisted pairs are connected to the MDF, and then connected to an external voice service processing device or a voice service card (e.g. the PPDA card) in the subrack via the MDF. Finally the voice signals are connected to the subscribers’ telephones.
SHUA / SETA	Data service	HDSX 64-conductor plug: Connects to the xDSL interface of the card.	The 32 twisted pairs are connected to the MDF to access data service.
BROA	Voice service	HDSX 64-conductor plug: Connects to the LINE interface of the card.	The 32 twisted pairs are connected to the MDF, where they are connected with the U interface of the NT1 +equipment on the subscriber side to access subscribers' telephones.

Figure 5-9 illustrates the connection of the 64-conductor audio interface cable, taking the CATA, PPDA, PPEA, APSA, SHUA and BROA cards as examples.

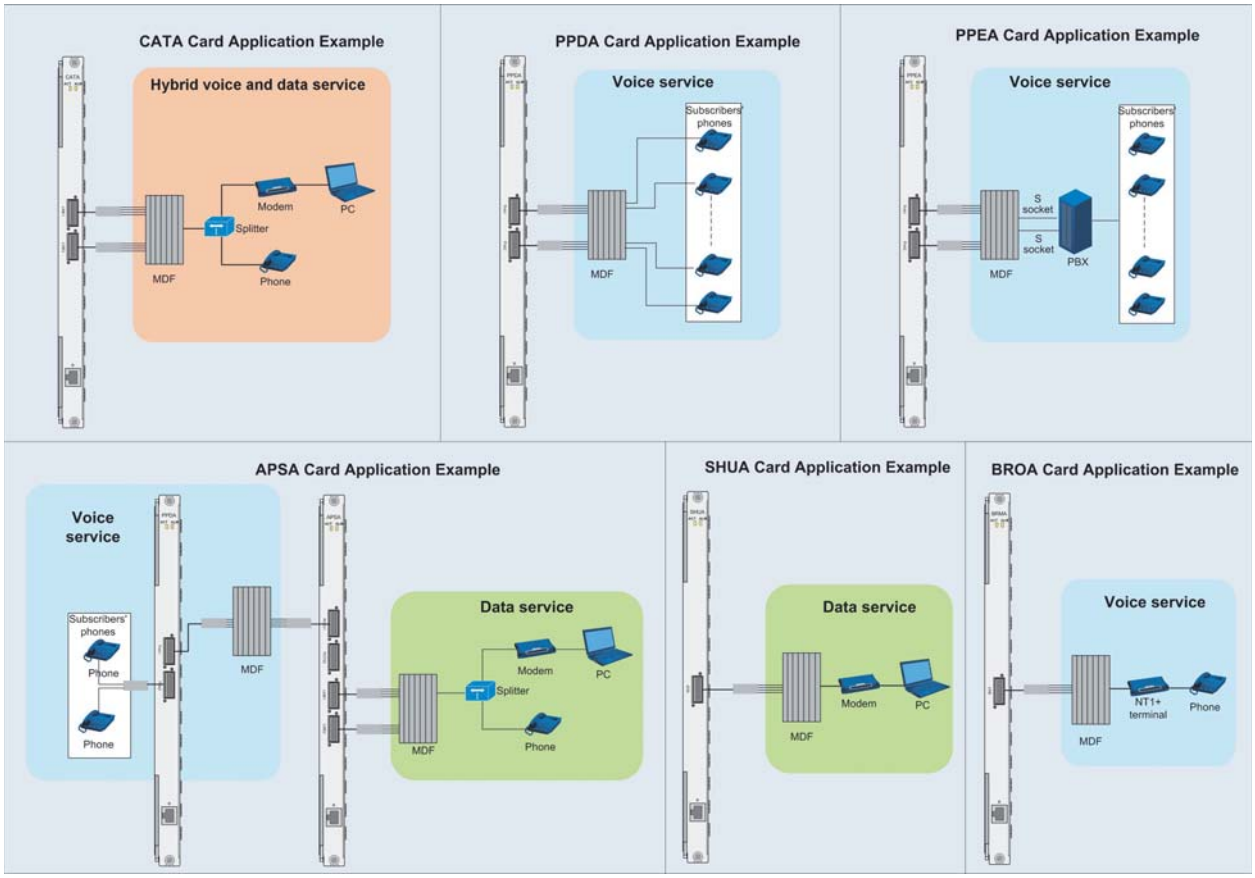


Figure 5-9 Example of Connecting the 64-conductor Audio Interface Cable

Technical Specifications

Item	Specification
Connector type	64-conductor connector with an interval of 2 mm
Maximum DC resistance of conductor	145 Ω/km

5.7 64-conductor E1 Interface Connection Cable (75 Ω)

Function

The 64-conductor E1 interface connection cable is used to transfer the E1 interface signal of the MSAN service card (SETA), connecting the service card inside the subrack and the downlink ODF.

Model

The model number of the 64-conductor E1 interface connection cable (75 Ω) is 409000031.

Structure

The structure of the 64-conductor E1 interface connection cable (75 Ω) is shown in Figure 5-10.

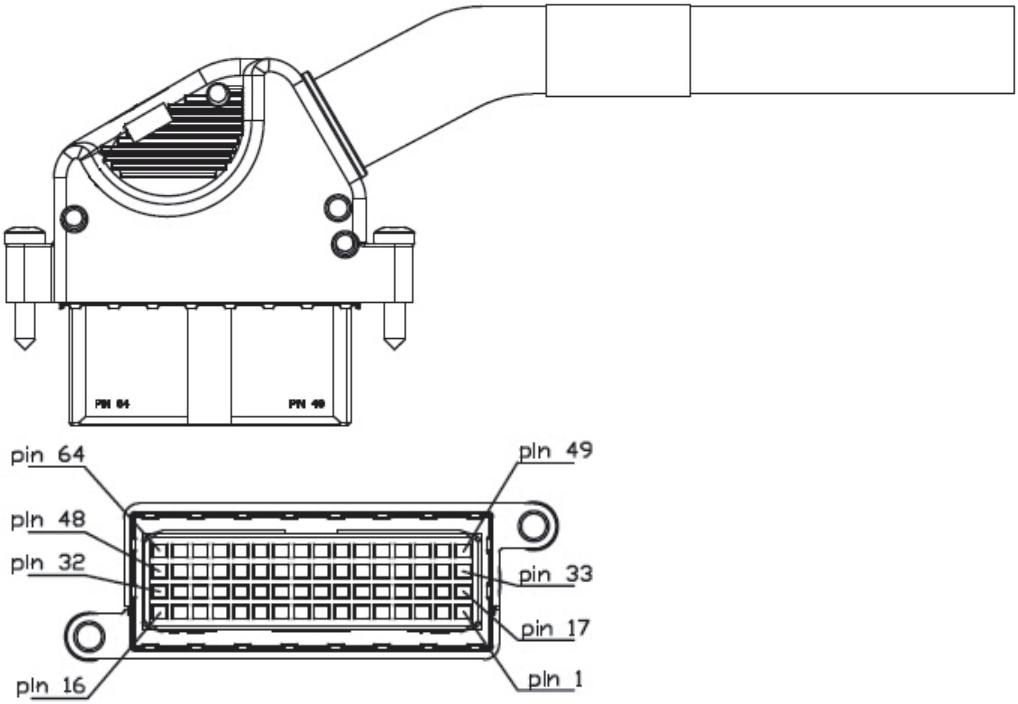


Figure 5-10 Structure of the 64-conductor E1 Interface Connection Cable (75Ω)

The color-coding scheme of the 64-conductor E1 interface connection cable (75 Ω) is shown in Table 5-6.

Table 5-6 Color-coding Scheme of the 64-conductor E1 Interface Connection Cable (75 Ω)

Pin	Cable and SN	E1 Signal Definition	Pin	Cable and SN	E1 Signal Definition
1	Wire No.1	R0	33	Wire No.17	R8
2	Shielded wire No.1		34	Shielded wire No.17	
17	Shielded wire No.2	T0	49	Shielded wire No.18	T8
18	Wire No.2		50	Wire No.18	
3	Wire No.3	R1	35	Wire No.19	R9
4	Shielded wire No.3		36	Shielded wire No.19	

Table 5-6 Color-coding Scheme of the 64-conductor E1 Interface Connection Cable (75 Ω) (Continued)

Pin	Cable and SN	E1 Signal Definition	Pin	Cable and SN	E1 Signal Definition
19	Shielded wire No.4	T1	51	Shielded wire No.20	T9
20	Wire No.4		52	Wire No.20	
5	Wire No.5	R2	37	Wire No.21	R10
6	Shielded wire No.5		38	Shielded wire No.21	
21	Shielded wire No.6	T2	53	Shielded wire No.22	T10
22	Wire No.6		54	Wire No.22	
7	Wire No.7	R3	39	Wire No.23	R11
8	Shielded wire No.7		40	Shielded wire No.23	
23	Shielded wire No.8	T3	55	Shielded wire No.24	T11
24	Wire No.8		56	Wire No.24	
9	Wire No.9	R4	41	Wire No.25	R12
10	Shielded wire No.9		42	Shielded wire No.25	
25	Shielded wire No. 10	T4	57	Shielded wire No.26	T12
26	Wire No.10		58	Wire No.26	
11	Wire No.11	R5	43	Wire No.27	R13
12	Shielded wire No. 11		44	Shielded wire No.27	
27	Shielded wire No. 12	T5	59	Shielded wire No.28	T13
28	Wire No.12		60	Wire No.28	
13	Wire No.13	R6	45	Wire No.29	R14
14	Shielded wire No. 13		46	Shielded wire No.29	
29	Shielded wire No. 14	T6	61	Shielded wire No.30	T14
30	Wire No.14		62	Wire No.30	
15	Wire No.15	R7	47	Wire No.31	R15
16	Shielded wire No. 15		48	Shielded wire No.31	
31	Wire No.16	T7	63	Shielded wire No.32	T15
32	Shielded wire No. 16		64	Wire No.32	

Connection

Cable	Cable Connector	Connection Description
64-conductor E1 interface connection cable (75 Ω)	HDXS 64-conductor plug	Connected with the E1 interface of the SETA card.
	32 coaxial cables	Connected with the MDF.

Technical Specifications

Item	Specification
Maximum DC resistance of conductor	355 Ω/km
Cable outside diameter	12±0.5 mm

5.8 64-conductor E1 Interface Connection Cable (120 Ω)

Function

The 64-conductor E1 interface connection cable is used to transfer the E1 interface signal of the MSAN service card (SETA), connecting the service card inside the subrack and the downlink ODF.

Model

The model number of the 64-conductor E1 interface connection cable (120 Ω) is 409000040.

Structure

The 64-conductor E1 interface connection cable (120 Ω) has an HDSX 64-conductor plug on one end and 32 twisted pairs on the other end, as shown in Figure 5-11.

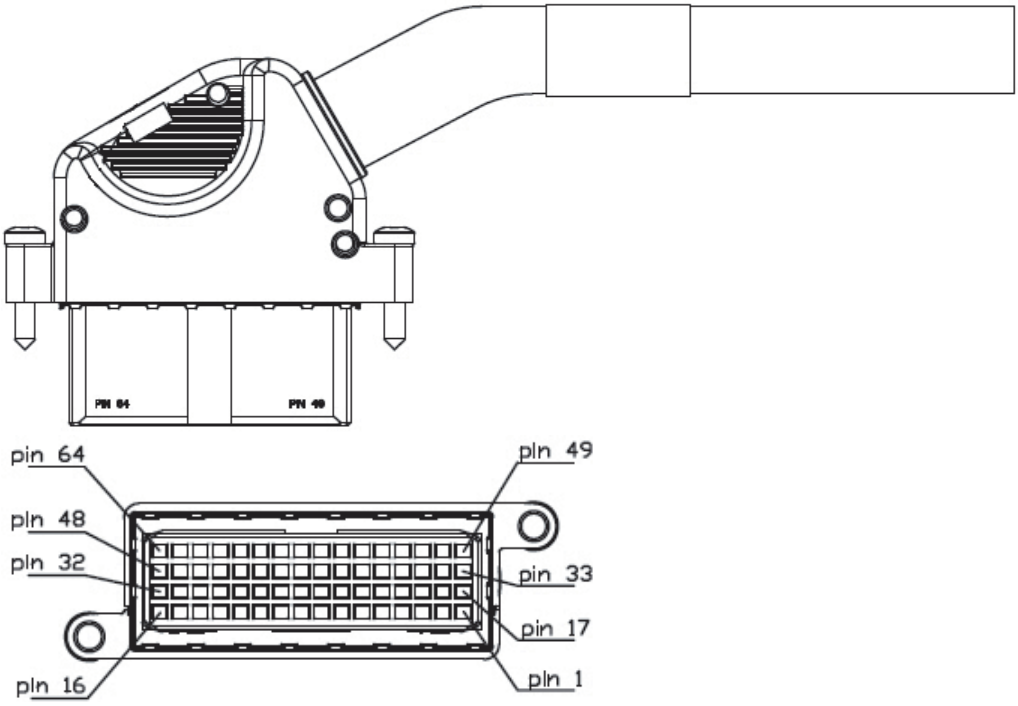


Figure 5-11 Structure of the 64-conductor E1 Interface Connection Cable (120Ω)

The color-coding scheme of the 64-conductor E1 interface connection cable (120 Ω) is shown in Table 5-7.

Table 5-7 Color-coding Scheme of the 64-conductor E1 Interface Connection Cable (120 Ω)

Pin	Pairs and Color Band		E1 Signal Definition	Pin	Pairs and Color Band		E1 Signal Definition
1	White	Blue	R0	33	Red	Orange	R8
2	Blue			34	Brown		
17	White		T0	49	Red		T8
18	Orange			50	Grey		
3	White		R1	35	Black		R9
4	Green			36	Blue		
19	White		T1	51	Black		T9
20	Brown			52	Orange		
5	White		R2	37	Black		R10
6	Grey			38	Green		
21	Red		T2	53	Black		T10
22	Blue			54	Brown		
7	Red		R3	39	Black		R11

Table 5-7 Color-coding Scheme of the 64-conductor E1 Interface Connection Cable (120 Ω) (Continued)

Pin	Pairs and Color Band		E1 Signal Definition	Pin	Pairs and Color Band		E1 Signal Definition
8	Orange			40	Grey		
23	Red		T3	55	Yellow		T11
24	Green			56	Blue		
9	Red	Blue	R4	41	White	Orange	R12
10	Brown			42	Blue		
25	Red		T4	57	White		T12
26	Grey			58	Orange		
11	Black		R5	43	White		R13
12	Blue			44	Green		
27	Black		T5	59	White		T13
28	Orange			60	Brown		
13	Black		R6	45	White		R14
14	Green			46	Grey		
29	Black		T6	61	Red		T14
30	Brown			62	Blue		
15	Black		R7	47	Red		R15
16	Grey			48	Orange		
31	Yellow		T7	63	Red		T15
32	Blue			64	Green		

Connection

Cable	Connector	Connection Description
64-conductor E1 interface connection cable (120 Ω)	HDXS 64-conductor plug	Connected to the E1 interface of the SETA card.
	32 twisted pairs	Connected to the MDF.

Technical Specifications

Item	Specification
Maximum DC resistance of conductor	150 Ω/km
Cable outside diameter	12±0.5 mm

5.9 Network Cable

Function

The network cable is used for uplinking service at the electrical interface, monitoring the equipment via the network management system, or monitoring the remote end equipment. It connects to the uplink equipment, the network management computer, the remote end equipment, and the environment monitoring equipment, etc.

Model

The model number of the network cable (including straight-through network cable and cross-connect network cable) is 3695095.

Structure

Both ends of the network cable are installed with the RJ-45 connectors (also known as crystal heads), as shown in Figure 5-12.

Figure 5-12 Network Cable

See Table 5-8 for the pin definition of the straight-through network cable.

Table 5-8 Pin Definition of the Straight-through Network Cable

Pin of the Local End	Wire Color	Pin of the Opposite End
1	White- / orange	1
2	Orange	2
3	White- / green	3
4	Blue	4
5	White- / blue	5

Table 5-8 Pin Definition of the Straight-through Network Cable (Continued)

Pin of the Local End	Wire Color	Pin of the Opposite End
6	Green	6
7	White- / brown	7
8	Brown	8

See Table 5-9 for the pin definition of the cross-connect network cable.

Table 5-9 Pin Definition of the Cross-connect Network Cable

Pin of the Local End	Wire Color	Pin of the Opposite End
1	White- / orange	3
2	Orange	6
3	White- / green	1
4	Blue	4
5	White- / blue	5
6	Green	2
7	White- / brown	7
8	Brown	8

The pin definition for the connectors on both ends of the COM port network cable is shown in Table 5-10.

Table 5-10 Pin Definition of the COM Port Network Cable

Pin of the Local End	Wire Color	Pin of the Opposite End
1	White- / orange	1
2	Orange	2
3	White- / green	3
4	-	-
5	-	-
6	Green	6
7	-	-
8	-	-

When the network cable is used to connect the TIMA card and the external clock device, its pinouts are defined as in Table 5-11.

Table 5-11 Pinouts of the Network Cable (Time Synchronization Cable)

PIN	Signal Definition	Meaning
1	NC	Not connected (high impedance) by default
2	NC	Not connected (high impedance) by default
3	422_1_N	1PPS
4	GND	RS422 level GND
5	GND	RS422 level GND
6	422_1_P	1PPS
7	422_2_N	TOD time information
8	422_2_P	TOD time information

Connection

Cable	Cable Connector	Card Connected	Port Connected	Connection at the Remote End
Network cable	RJ-45 connector at the subrack side	HU1A / HU1B	SFP	Connects to the IP network to enable electrical interface uplink; connects to the UNM2000 computer to enable supervision via the network management system.
		HU2A / HU2C / GU6B / GU6F	GE	
		GSOF	1 to 16	Connect to remote ONUs to access the subscribers' Ethernet services.
		TIMA	1000MASK_TX	Connects with the opposite end equipment to extract the 1588 Ethernet clock and time information.
		HSWA / HSWB / HSWD	FE	Connects with the out-of-band UNM2000 computer to enable supervision via the network management system.
		HSUB / HSUC	ETH	Connects with the out-of-band UNM2000 computer to enable supervision via the network management system.
		CIO	EMS	Connects to the network management equipment.
			ESC	Connects to the environment monitoring equipment.
		ODMA / ODMB / ODMC	COM	Connects to the remote end device.

Technical Specifications

Item	Specification
Cable type	CAT-5 twisted pair
Connector type	RJ-45
Number of conductors	8
Conductor diameter	AWG24
Breakdown voltage	2000 V

5.10 E1 Coaxial Cable

Function

An E1 coaxial cable can carry eight E1 signals. It connects the E1 interface of the CE1B card to the DDF, and finally to the transmission network.

Model

The AN5116-06B/AN5516-06/AN5516-04 uses the 75 Ω E1 coaxial cable with the model number 3695442.

Structure

See Figure 5-13 for the appearance of the 75 Ω E1 cable.

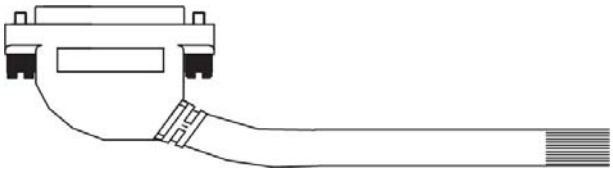


Figure 5-13 Coaxial 75Ω E1 Cable

The end of the E1 cable connected with the CE1B card is a DB-44P type plug, and the end connected with the DDF is the bare wire. Figure 5-14 shows the DB-44P type plug, and Table 5-12 defines the pins.

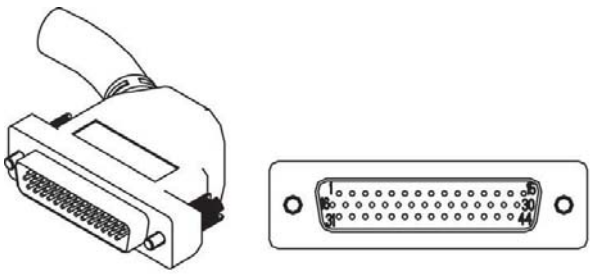


Figure 5-14 The DB-44P Plug

Table 5-12 Pins of E1 Interfaces

E1 Interface Number	Pin	Coaxial Cable Number	E1 Interface	E1 Interface Number	Pin	Coaxial Cable Number	E1 Interface
1-8	15, 30	1	The 1st E1 Rx	9-16	15, 30	1	The 9th E1 Rx
	14, 29	2	The 1st E1 Tx		14, 29	2	The 9th E1 Tx
	13, 28	3	The 2nd E1 Rx		13, 28	3	The 10th E1 Rx
	12, 27	4	The 2nd E1 Tx		12, 27	4	The 10th E1 Tx
	11, 26	5	The 3rd E1 Rx		11, 26	5	The 11th E1 Rx
	10, 25	6	The 3rd E1 Tx		10, 25	6	The 11th E1 Tx
	9, 24	7	The 4th E1 Rx		9, 24	7	The 12th E1 Rx
	8, 23	8	The 4th E1 Tx		8, 23	8	The 12th E1 Tx
	7, 22	9	The 5th E1 Rx		7, 22	9	The 13th E1 Rx
	6, 21	10	The 5th E1 Tx		6, 21	10	The 13th E1 Tx
	5, 20	11	The 6th E1 Rx		5, 20	11	The 14th E1 Rx
	4, 19	12	The 6th E1 Tx		4, 19	12	The 14th E1 Tx
	3, 18	13	The 7th E1 Rx		3, 18	13	The 15th E1 Rx
	2, 17	14	The 7th E1 Tx		2, 17	14	The 15th E1 Tx
	1, 16	15	The 8th E1 Rx		1, 16	15	The 16th E1 Rx
	31, 32	16	The 8th E1 Tx		31, 32	16	The 16th E1 Tx
17-24	15, 30	1	The 17th E1 Rx	25-32	15, 30	1	The 25th E1 Rx
	14, 29	2	The 17th E1 Tx		14, 29	2	The 25th E1 Tx
	13, 28	3	The 18th E1 Rx		13, 28	3	The 26th E1 Rx
	12, 27	4	The 18th E1 Tx		12, 27	4	The 26th E1 Tx
	11, 26	5	The 19th E1 Rx		11, 26	5	The 27th E1 Rx
	10, 25	6	The 19th E1 Tx		10, 25	6	The 27th E1 Tx
	9, 24	7	The 20th E1 Rx		9, 24	7	The 28th E1 Rx

Table 5-12 Pins of E1 Interfaces (Continued)

E1 Interface Number	Pin	Coaxial Cable Number	E1 Interface	E1 Interface Number	Pin	Coaxial Cable Number	E1 Interface
	8, 23	8	The 20th E1 Tx		8, 23	8	The 28th E1 Tx
	7, 22	9	The 21st E1 Rx		7, 22	9	The 29th E1 Rx
	6, 21	10	The 21st E1 Tx		6, 21	10	The 29th E1 Tx
	5, 20	11	The 22nd E1 Rx		5, 20	11	The 30th E1 Rx
	4, 19	12	The 22nd E1 Tx		4, 19	12	The 30th E1 Tx
	3, 18	13	The 23rd E1 Rx		3, 18	13	The 31st E1 Rx
	2, 17	14	The 23rd E1 Tx		2, 17	14	The 31st E1 Tx
	1, 16	15	The 24th E1 Rx		1, 16	15	The 32nd E1 Rx
	31, 32	16	The 24th E1 Tx		31, 32	16	The 32nd E1 Tx

Connection

Cable	Cable Connector	Connection Description
E1 coaxial cable	DB-44P type plug	Connects with the E1 to E32 ports of the CE1B card.
	Bare wire	Connects with the DDF.

Technical Specifications

Item	Parameter
Cable type	SYFZ-75-2-1×16
Connector type	D-Sub, Type B, 44P male plug
Characteristic impedance	(75 ± 3) Ω
Cable diameter	11.2 mm
Number of cores	16
Diameter of inner conductor	2.15 mm
DC resistance of inner conductor	≤ 350 Ω/km
Frequency attenuation	1MHz: ≤ 2.9 dB/100 m 2MHz: ≤ 3.7 dB/100 m 10MHz: ≤ 9.5 dB/100 m
Capacitance	1 kHz: ≤ 64 pF/m

5.11 Coaxial Clock Cable

Function

The coaxial clock cable is used to transmit the clock signals and connect the BITS clock interface of the local equipment with the clock equipment at a lower / higher layer.

Model

The model number of the coaxial clock cable is 3695187.

Structure

As shown in Figure 5-15, the coaxial clock cable has the SAA series L-type coaxial plug on one end and the bare wire on the other end.

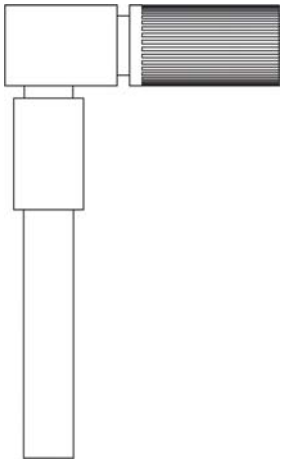


Figure 5-15 Coaxial Clock Cable

Connection

Cable	Cable Connector	Connection Description
Coaxial clock cable	SAA series L-type coaxial plug	Connects with the CLK IN 1 / CLK IN 2 / CLK OUT interface of the C155A / TIMA card.
		CLK IN / CLK OUT interface of the CE1B card
	Bare wire end	Connects to the external clock device.

Technical Specifications

Table 5-13 Technical Specifications of the Clock Coaxial Cable

Item	Specification
Cable type	SYV-75-2-2
Connector type	SAA-type coaxial connector
Characteristic impedance	75 Ω
Number of conductors	1

5.12 Serial Port Line

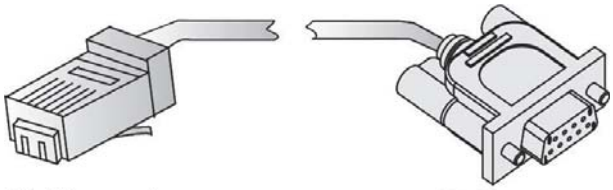
Function

The serial port line is used for commissioning or local maintenance. It connects the local commissioning serial port of the core switch card or switch uplink card of the equipment and the serial port of the network management computer.

Model

The model number of the serial port line is 3695341.

Structure



The pin definitions for the serial port line is shown in Table 5-14.

Table 5-14 Pinout of the Serial Port Line

Connected Signal	RJ-45 Connector Pin	DE-9S Connector Pin
Tx of the equipment	3	2
GND	4/5	5
Rx of the equipment	6	3

Connection

Cable	Cable Connector	Connection Description
Serial port line	RJ-45 connector	Connects to the CONSOLE interface of the core switch card of the AN5116-06B / AN5516-06.
		Connects to the CONSOLE / ESC interface of the switch uplink card of the AN5516-04
	DE-9S connector	Connects to the serial port of the network management computer.

Technical Specifications

Item	Specification
Cable outside diameter	5.2±0.3 mm
Maximum DC resistance of conductor	93.8 Ω/km
Characteristic impedance	100±15 Ω
Number of conductors	4

5.13 Dry Contact Cable

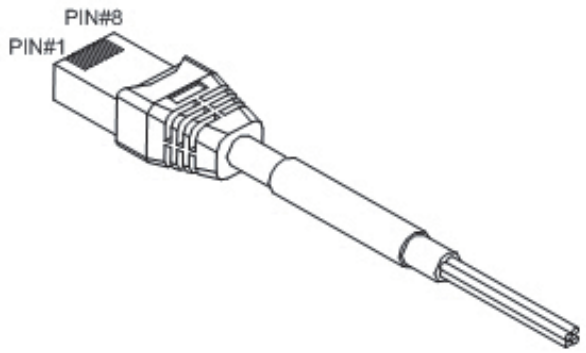
Function

The dry contact cable is used to connect the dry contact interface on the subrack or card to external dry contact device to enable infrared detection and monitoring of smoke, mains supply, humidity, temperature, fans, shake, door access control, etc.

Model

The model number of the dry contact cable is 3695452.

Structure



Connection

Cable	Cable Connector	AN5116-06B	AN5516-06
Dry contact cable	RJ-45 connector	Connected to the DC1 to DC3 interfaces on the backplane of the subrack.	Connected to the DC1 to DC14 interfaces of the CIO card.
	Bare wire end	Connected to the dry contact device.	

Technical Specifications

Item	Specification
Cable type	CAT-5 twisted pair
Connector type	RJ-45
Number of conductors	8
Conductor diameter	AWG 24

6 Cabinet

The following introduces the cabinets used by the AN5116-06B/AN5516-06/ AN5516-04.

- Overview of Cabinet
- Detailed Dimensions of the Cabinets
- Equipment Layout

6.1 Overview of Cabinet

Table 6-1 Overview of Cabinet Models

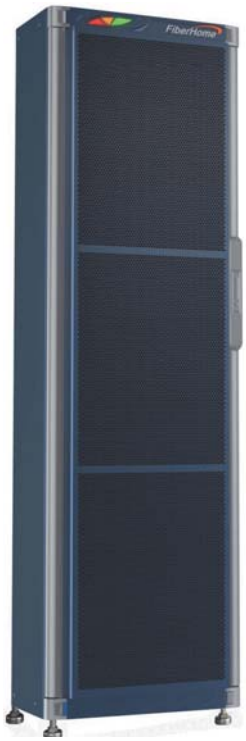
Cabinet Model	4102596 to 4102599	4102589 to 4102592	404000068 to 404000071	404000337 to 404000340
Description	19-inch 600 mm-deep cabinet with anti-dust screen	21-inch 300 mm-deep cabinet without anti-dust screen	21-inch 300 mm-deep cabinet with anti-dust screen	21-inch 340 mm-deep cabinet without anti-dust screen
Appearance				

Table 6-2 Dimensions and Weight of the Cabinets

Cabinet Type	Cabinet Model	Dimensions (H × W × D) (mm)	Weight (kg)
19-inch 600 mm-deep cabinet with anti-dust screen	4102596	1600 × 600 × 600	94
	4102597	2000 × 600 × 600	109
	4102598	2200 × 600 × 600	117
	4102599	2600 × 600 × 600	134
21-inch 300 mm-deep cabinet without anti-dust screen	4102589	1600 × 600 × 300	56
	4102590	2000 × 600 × 300	61
	4102591	2200 × 600 × 300	66
	4102592	2600 × 600 × 300	76

Table 6-2 Dimensions and Weight of the Cabinets (Continued)

Cabinet Type	Cabinet Model	Dimensions (H × W × D) (mm)	Weight (kg)
21-inch 300 mm-deep cabinet with anti-dust screen	404000068	1600 × 600 × 300	58
	404000069	2000 × 600 × 300	69
	404000070	2200 × 600 × 300	74
	404000071	2600 × 600 × 300	85
21-inch 340 mm-deep cabinet without anti-dust screen	404000337	1600 × 600 × 340	57.5
	404000338	2000 × 600 × 340	62.5
	404000339	2200 × 600 × 340	67.5
	404000340	2600 × 600 × 340	77.5

6.2 Detailed Dimensions of the Cabinets

The following introduces the detailed dimensions of the 19-inch and 21-inch cabinets.

6.2.1 Detailed Parameters of the 19-inch Cabinet

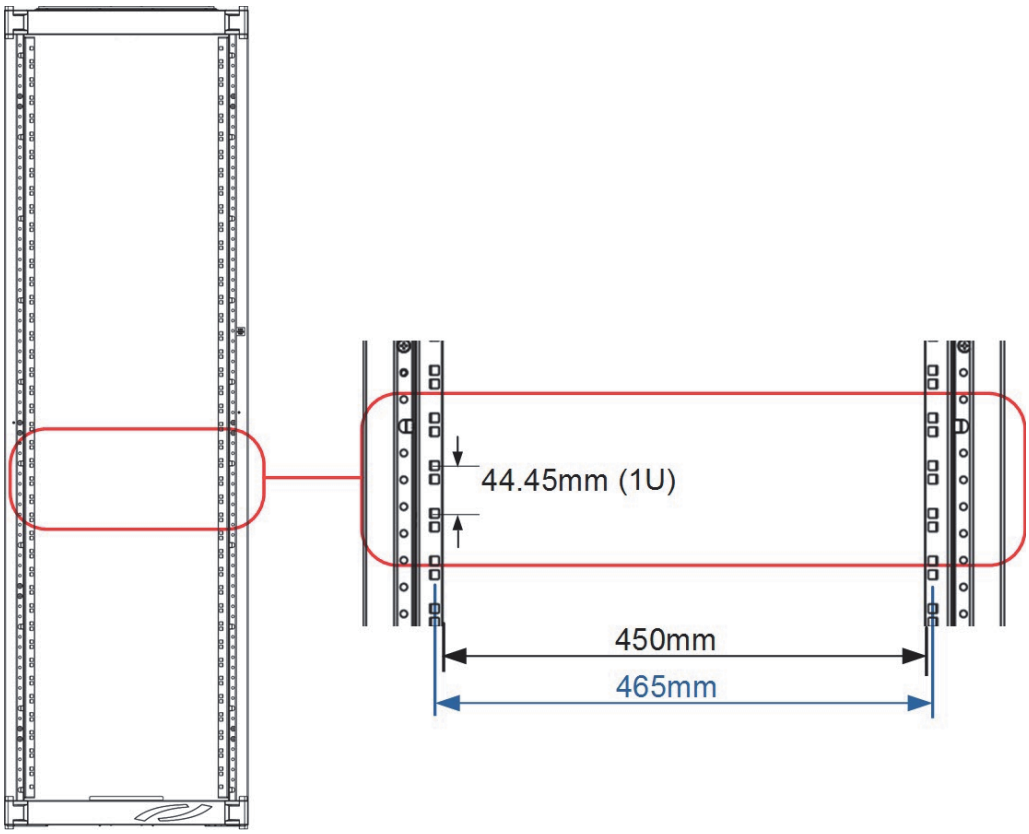


Figure 6-1 Detailed Dimensions of the 19-inch Cabinet

Table 6-3 Detailed Parameters of the 19-inch Cabinet

Item	Specification
Distance between holes on the mounting flange	1 U = 44.45 mm
Angle opening width	450 mm
Fixing centres	465 mm

6.2.2 Detailed Dimensions of the 21-inch Cabinet

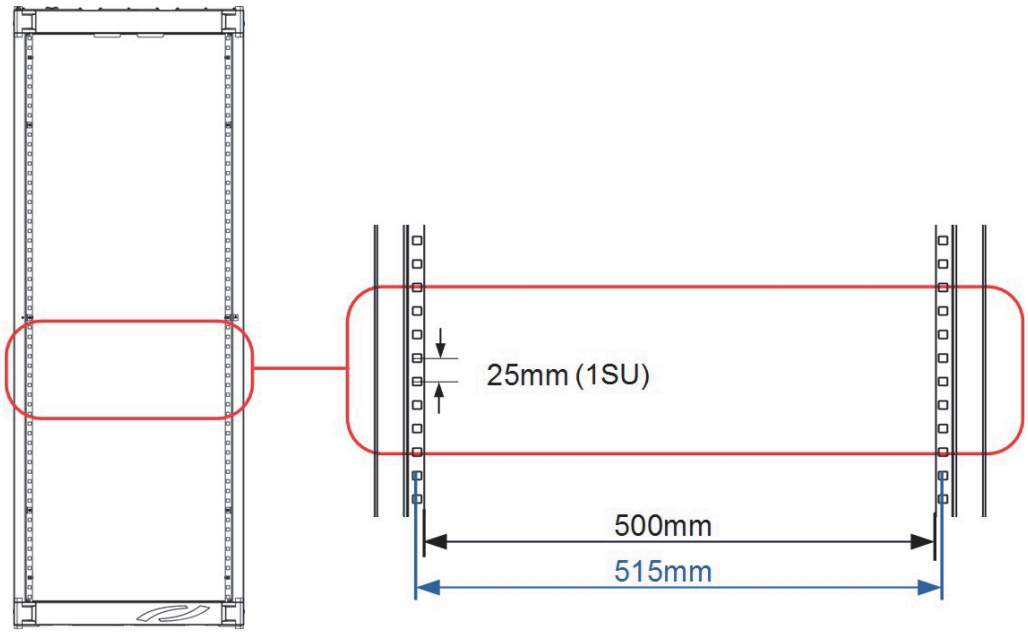


Figure 6-2 Detailed Dimensions of the 21-inch Cabinet

Table 6-4 Detailed Dimensions of the 21-inch Cabinet

Item	Specification
Distance between holes on the mounting flange	1 SU = 25 mm
Angle opening width	500 mm
Fixing centres	515 mm

6.3 Equipment Layout

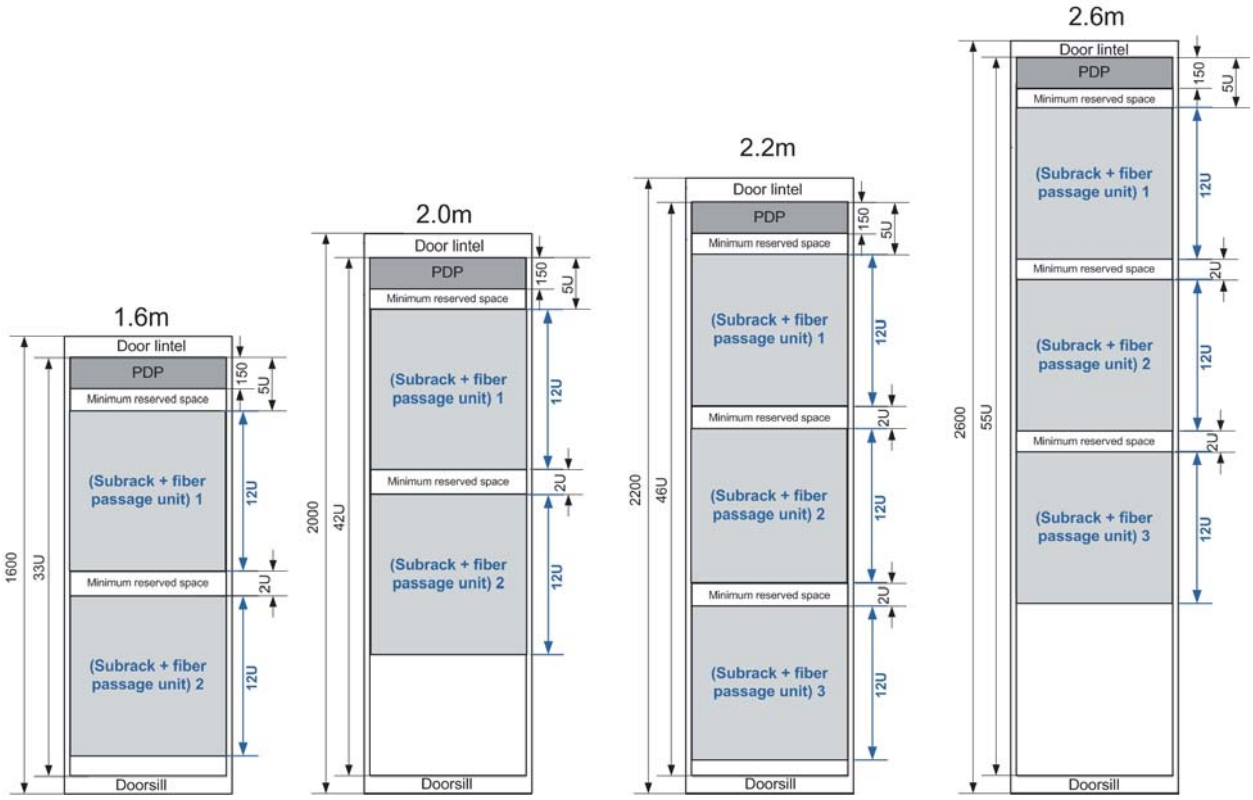
The following introduces typical layout of the AN5116-06B/AN5516-06/AN5516-04 in 19-inch cabinets and 21-inch cabinets respectively.

6.3.1 Layout of the AN5116-06B Subrack

Guide

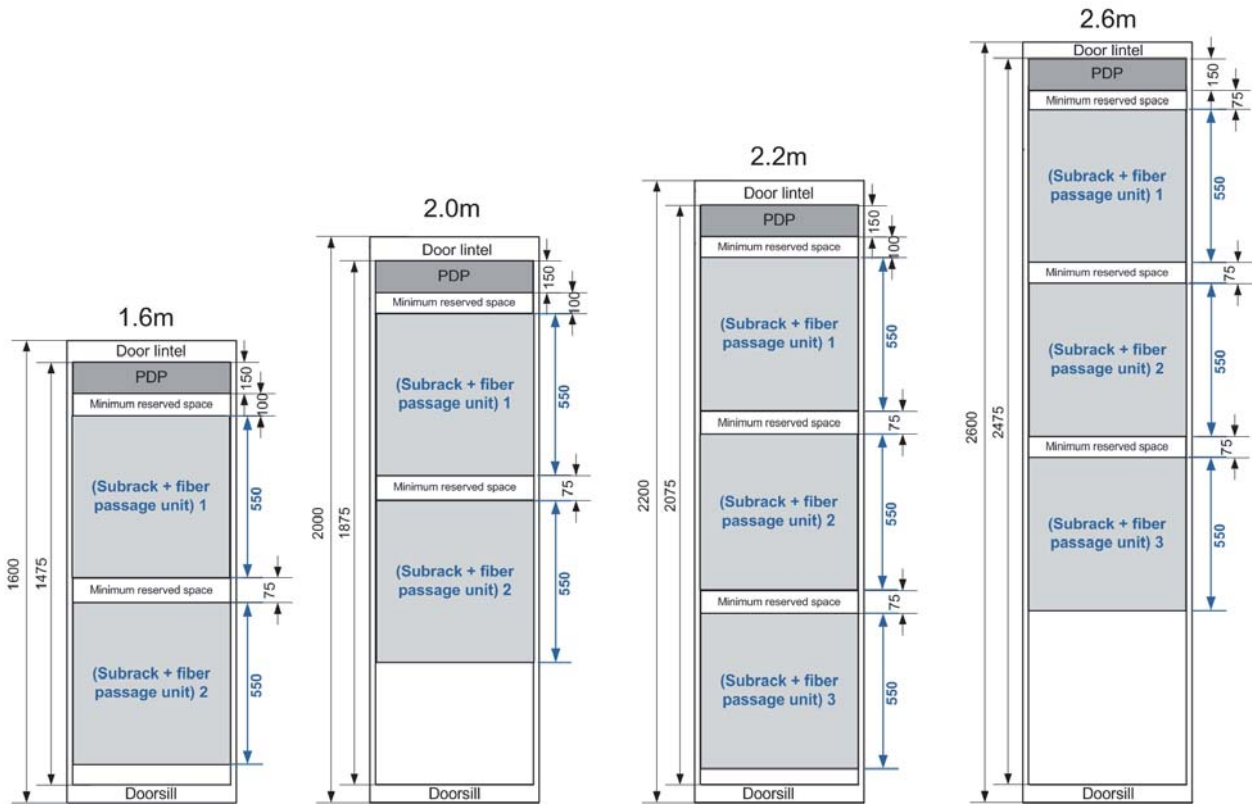
To install multiple AN5116-06B subracks in the cabinet, arrange the subracks from the top down when the top access wiring mode is used. If the floor access wiring mode is used, arrange the subracks from the bottom up. Generally, the subracks are installed from the top down in the cabinet.

19-inch Cabinet



Note 1: Unit: U; 1U=44.45mm

21-inch Cabinet



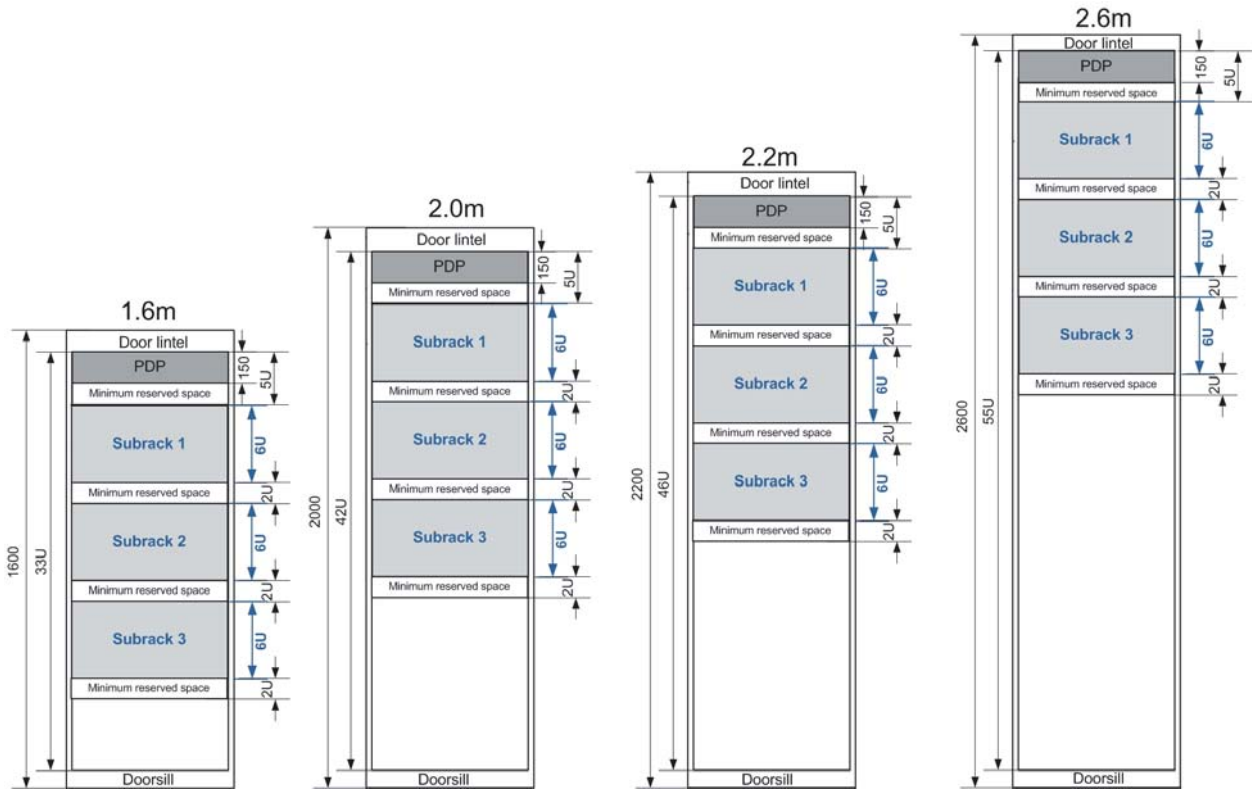
Note 1: Unit: mm

6.3.2 Layout of the AN5516-06 Subrack

Guide

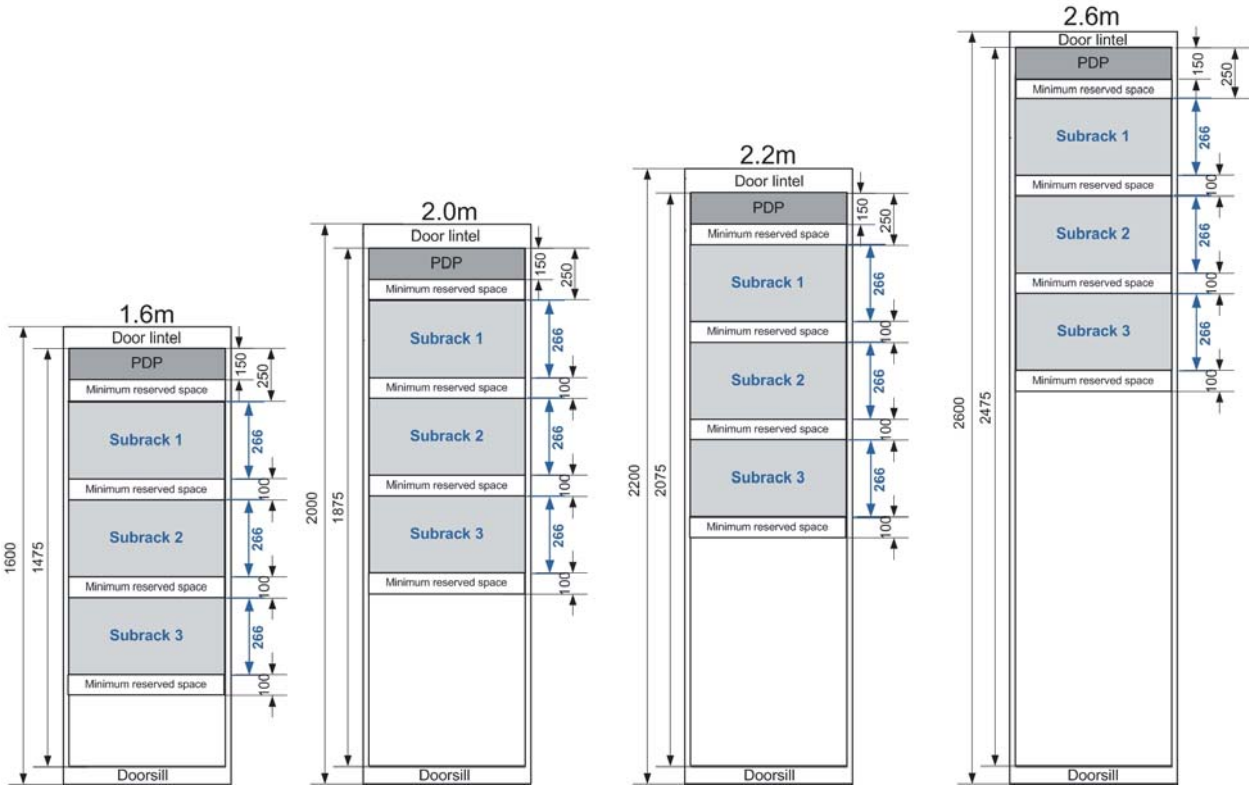
If multiple AN5516-06 subracks are to be installed in a cabinet, arrange them from the top down.

19-inch Cabinet



Note 1: Unit: U; 1U = 44.45 mm

21-inch Cabinet



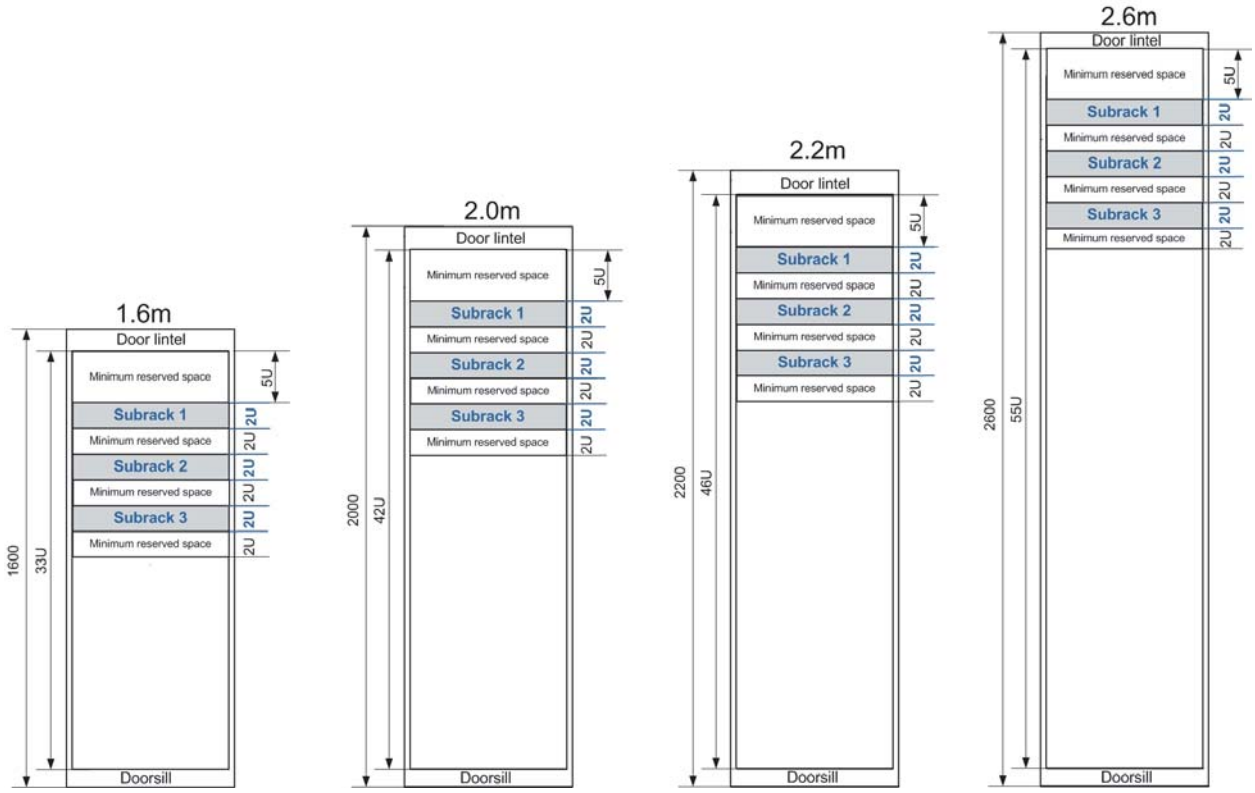
Note 1: Unit: mm

6.3.3 Layout of the AN5516-04 Subrack

Guide

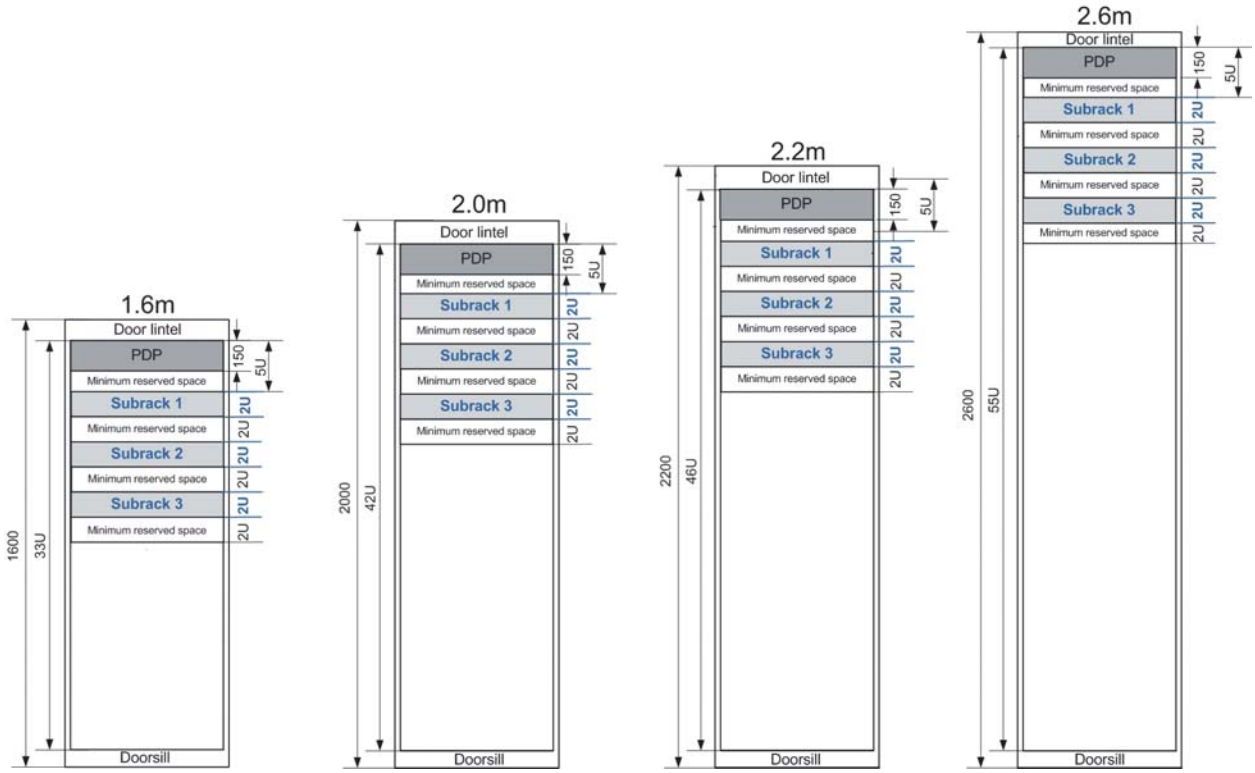
- When multiple AN5516-04 subracks are to be installed in a cabinet, arrange the subracks from the top down.
- The AN5516-04 subrack supports both DC and AC power supplies. Determine the equipment layout according to the power supply mode.

19-inch Cabinet (AC Power Supply)



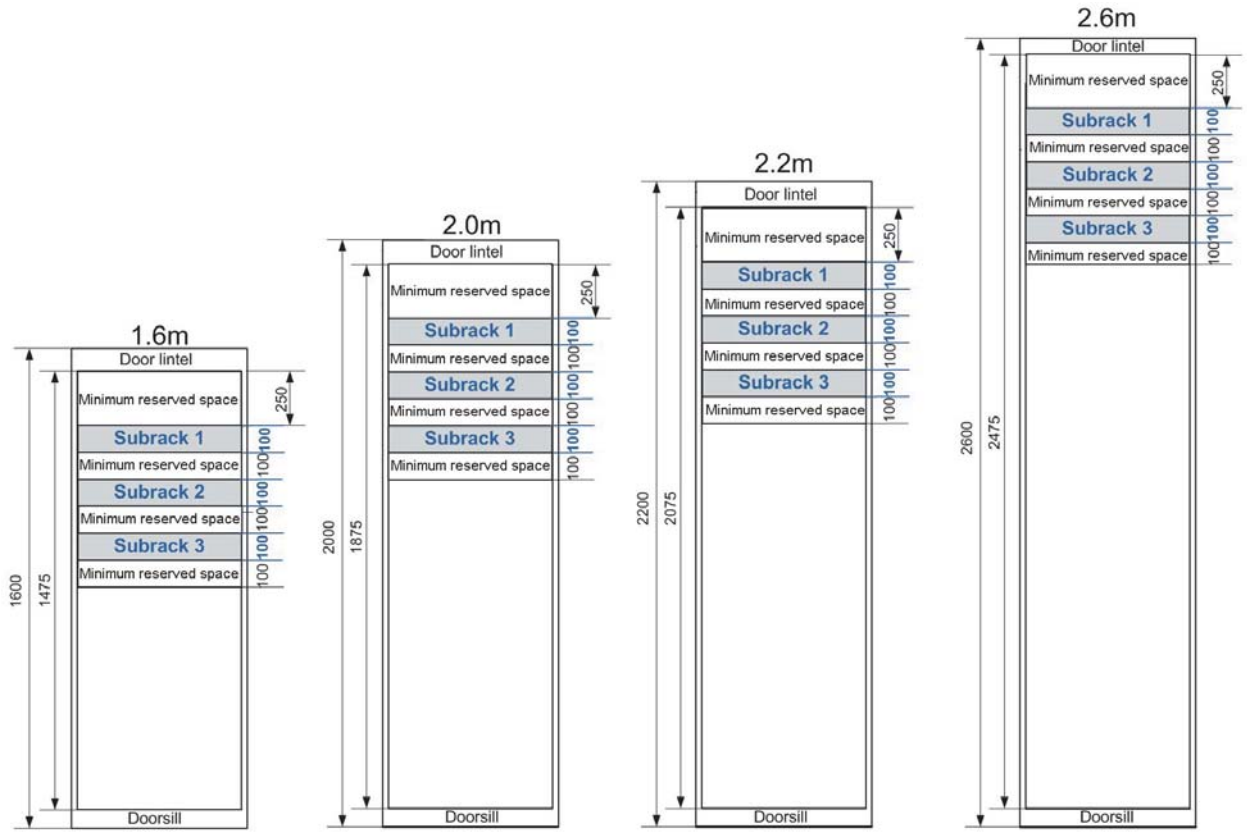
Note 1: Unit: U; 1U = 44.45 mm

19-inch Cabinet (DC Power Supply)



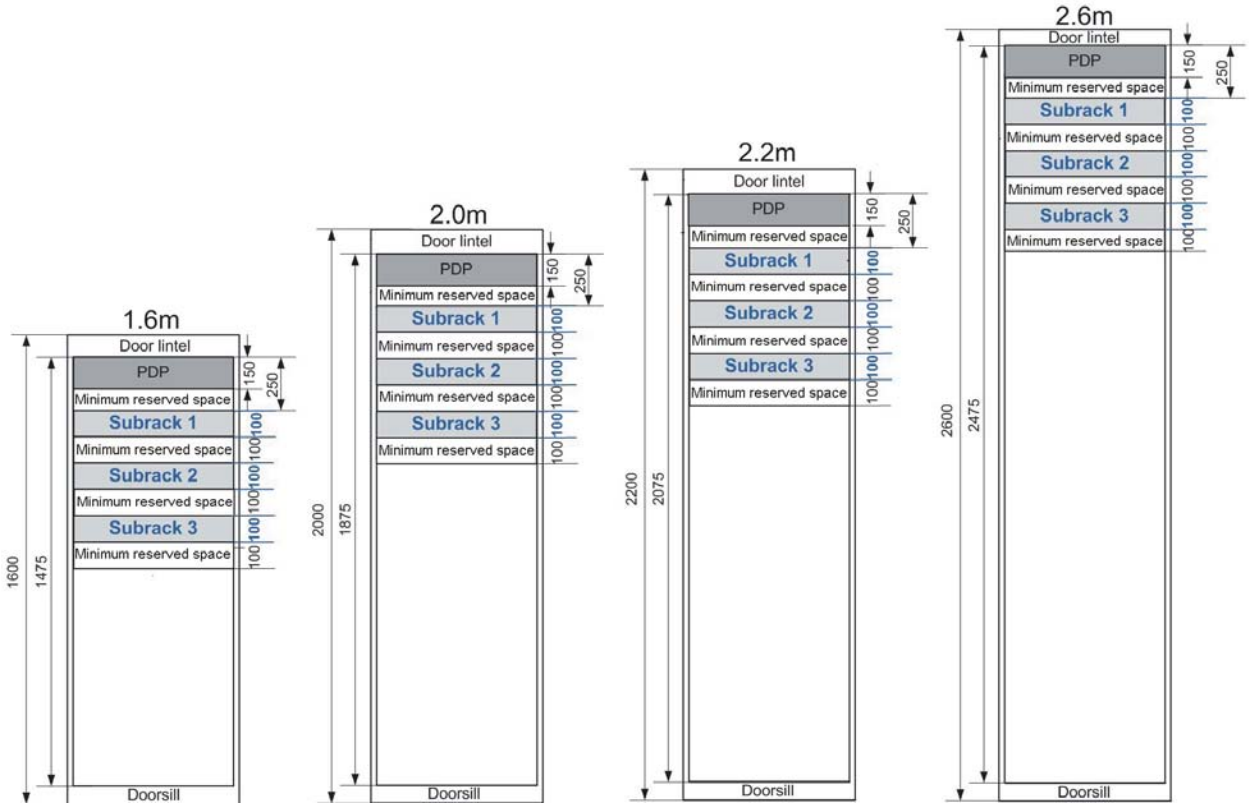
Note 1: Unit: U; 1U = 44.45 mm

21-inch Cabinet (AC Power Supply)



Note 1: Unit: mm

21-inch Cabinet (DC Power Supply)



Note 1: Unit: mm

7 PDP

- Overview of PDPs
- PDP Selection Principle
- Panel and Terminal

7.1 Overview of PDPs

The AN5116-06B/AN5516-06/AN5516-04 matches with multiple PDPs. Users can choose one of them according to their demand of power supply. The PDP296B is preferred, and the PDP850A is alternative. Table 7-1 shows the models, appearance, and input / output specifications of the PDPs.

Table 7-1 Appearance and Input / Output Specifications of PDPs

Item	PDP296B	PDP850A
Model number	3000068-1FA 3000068-2FA	3000064-1FH 3000064-2FH
Appearance		
Matching Subracks	AN5116-06B AN5516-06 AN5516-04	AN5116-06B
Range of input voltage	-38 V to -60 V	-38 V to -60 V
Input channels	Two channels of power (one active and one standby)	Eight channels of power (four active and four standby)
Input current	The maximum current of a single channel is 96 A.	The maximum current of a single channel is 63A.
Range of output voltage	-38 V to -60 V	-38 V to -60 V
Output channels	Six channels of output power	Eight channels of output power
Output current	The maximum current of a single channel is 32 A.	The maximum current of a single channel is 63 A.

7.2 PDP Selection Principle

The following introduces how to plan and calculate the PDP power distribution demand so that users can connect the PDP power lines flexibly.

1. Count the expected total power consumption of all the devices to be powered according to the device type and the subrack type / quantity.
2. Calculate the current required for a single subrack according to the formula I = P/U. For example:

P: Power Value (Maximum Power)[Note 1]	U: Equipment Room Voltage (Average Value)[Note 2]	I: Required current (minimum value)
≈ 1300 w (GPON access scenario)	-40 V	≈ 32 A
≈ 1560 w (XG-PON access scenario)	-40 V	≈ 40 A
≈ 2300 w (voice and data hybrid access scenario with all the ports fully configured with services)	-40 V	≈ 63 A
Note 1: The power value here is the maximum power consumption of the subrack fully configured with services in high temperature. It is used only as an example of calculation. The typical reference value of the subrack power consumption is lower than this value. Please calculate the actual power consumption of the subrack according to the power consumption of cards given in Overview of Cards. Note 2: It is the average estimated value considering the uncontrollable factors of the power supply in the equipment room. The value can be raised if the power supply in the equipment room is favorable.		

3. Confirm the number of subracks in the cabinet to determine the quantity of power supply branches and the current of each branch. To ensure stable operation of equipment and future expansion, please plan a current higher than the calculated value for the power supply line.
4. Choose a proper PDP according to the desired number of power branches and the current value; determine the wiring scheme and the power cable types to be used.
5. Connect the power cables according to the wiring scheme.

7.3 Panel and Terminal

This section introduces the panels and terminals of the three PDPs as follows:

- PDP260B (3000063)
- PDP850A (3000064)
- PDP296B (3000068)

7.3.1 PDP850A (3000064)

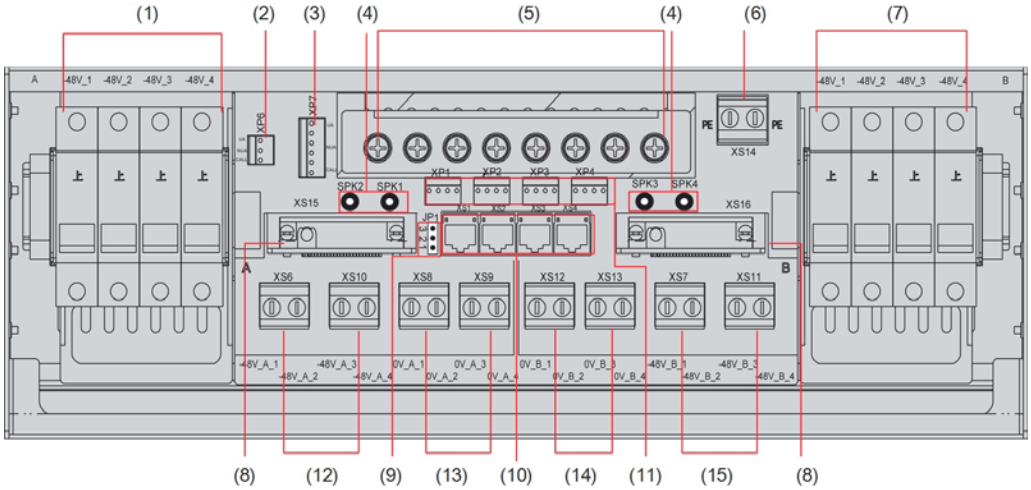
The following introduces the front panel, power / alarm terminals, jumper pins and lightning protection module of the PDP850A (3000064).

Front Panel

On the front panel of the PDP850A (3000064), there are eight automatic air circuit breakers which control the power supply outputs. Among them,

- SW1-1 to SW1-4 switch on / off branch power rails -48V_A_1 to -48V_A_4 respectively.
- SW2-1 to SW2-4 switch on / off branch power rails -48V_B_1 to -48V_B_4 respectively.

Terminal Board



(1) External power -48V input connector A

(2) Alarm terminal for the head of row cabinet

(3) Cabinet top indicator LED alarm terminal

(4) Audible alarm buzzer

(5) Busbar

(6) Protection earth ground cable connector

(7) External power -48V input connector B

(8) Lightning protection module

(9) Jumper pin

(10) Subrack alarm aggregation terminal

(11) Alarm cascade terminal

(12) Branch power rail -48V output connector A

(13) Branch power rail 0V output connector A

(14) Branch power rail 0V output connector B

(15) Branch power rail -48V output connector B

Power Connectors

Connector Type	S.N.	Connector	Description
External power input (2×4 channels)	(1)	-48V_1 to -48V_4 in Area A	Inducts 2×4 channels of -48V power from the external. The connectors in Area A and Area B can back up each other[Note].
	(7)	-48V_1 to -48V_4 in Area B	
	(5)	Eight connectors on the busbar	Inducts external 0V signals.
	(6)	Right connector of XS14	Connects to the PE protection earth ground of the external power.

Connector Type	S.N.	Connector	Description
Branch power output (2×4 channels)	(12)	XS6, XS10	Outputs 2×4 channels of **-48V** power. Branch A and Branch B can back up each other.
	(15)	XS7, XS11	
	(13)	XS8, XS9	Outputs 2×4 channels of **0V** power. Branch A and Branch B can back up each other.
	(14)	XS12, XS13	
Note 1: Users only need to induct 2×1 channels of power from the external when the PDP is equipped with a busbar. If the PDP is not equipped with a busbar, users need to induct 2×4 channels of power from the external. When the busbar is used, the air circuit breakers can control each channel of power independently.			

Alarm Connectors

Connector Type	S.N.	Connector	Description
Subrack alarm convergence connector	(10)	XS1 to XS4	RJ-45 sockets receiving the alarm information from the equipment inside the cabinet.
Alarm cascade terminal	(11)	XP1 to XP4	XP1 to XP4 correspond to XS1 to XS4 one by one. When two PDPs are installed in the cabinet, the alarm cables of the front and rear subracks are connected to the XS terminals of the front and rear PDPs respectively. The front XP terminals and rear XP terminals are cascaded correspondingly.
Alarm connector for the head of row cabinet	(2)	XP6	XP6 is a three-conductor D-type socket, and it can output the alarm information to the head of row cabinet.
Alarm connector for indicator LEDs on the top of cabinet	(3)	XP7	XP7 is a six-conductor D-type socket, and it can output the triggering signal to the cabinet-top indicator LED.

Jumper Pin

JP1 is the jumper pin for selecting the operating status indicator LED of the PDP. It is located as indicated by (9) in the figure. Selection is made as follows:

- Short pin1 and pin2 of JP1, and the green indicator LED on the top of the cabinet will indicate the normal working status of the PDP.
- Short pin2 and pin3 of JP1, and the green indicator LED on the top of the cabinet will be controlled by the order wire call (CALL) signal, instead of indicating the working status of the PDP.

Note:

Pin2 and pin3 of JP1 have been shorted by default before delivery of the PDP.

Lightning Protection Module

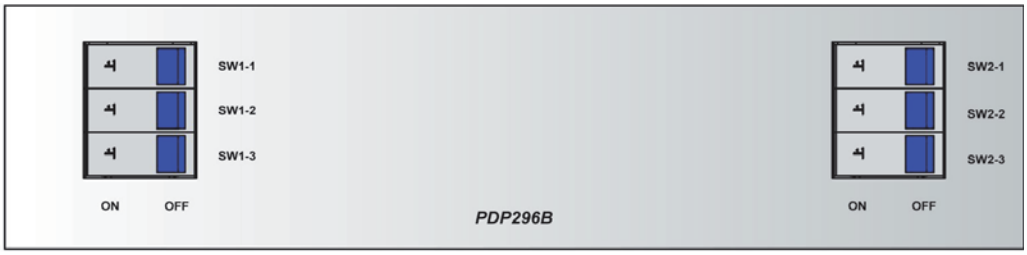
The lightning protection module is inserted into the bases of XS15 and XS16, as indicated by (8) in the figure.

The lightning protection module can withstand the surge of 4 kV (1.2/50 us - 8/20 us combination wave) in the common mode and the surge of 2 kV (1.2/50 us - 8/20 us combination wave) in the differential mode, so as to guarantee the normal operation of the equipment.

7.3.2 PDP296B (3000068)

The following introduces the front panel, power / alarm connectors, jumper pin and lightning protection module of the PDP296B (3000068).

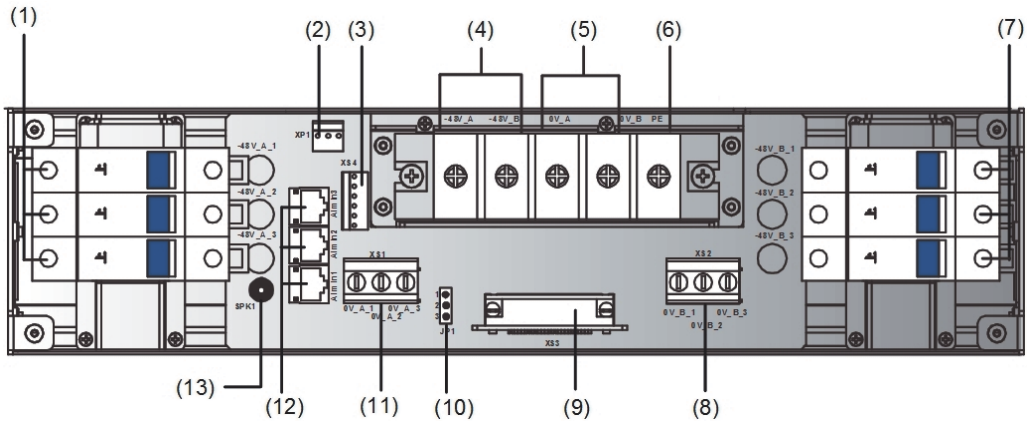
Front Panel



The PDP296B (3000068) has six air automatic circuit breakers on its front panel to control the power supply outputs. Among which:

- The ACBs SW1-1 to SW1-3 control the branch power rails -48V_A_1 to -48V_A_3 respectively .
- The ACBs SW2-1 to SW2-3 control the branch power rails -48V_B_1 to -48V_B_3 respectively .

Terminal Board



(1) Branch power rail -48V output connector A

(2) Alarm connector for the head of row cabinet

(3) Cabinet top indicator LED alarm connector

(4) External power -48V input connector

(5) External power 0V input connector

(6) Protection earth ground cable connector

(7) Branch power rail -48V output connector B

(8) Branch power rail 0V output connector B

(9) Lightning protection module

(10) Jumper pin for selecting the working status indicator LED of the PDP

(11) Branch power rail 0V output connector A

(12) Subrack alarm convergence connector

(13) Buzzer

Power Connectors

Connector Type	No.	Connector	Description
External power input (2×1 channels)	(4)	-48V_A, -48V_B	-48 V external power input connectors. The -48V_A and -48V_B connectors back up each other.
	(5)	0V_A, 0V_B	0 V external power input connectors. The 0V_A and 0V_B connectors back up each other.
	(6)	PE	Connects to the PE protection earth ground of the external power.
Branch power rail output (2 × 3 channels)	(1)	-48V_A_1 to -48V_A_3	Automatic circuit breakers (ACBs). The outer connectors are -48 V branch power rail output connectors corresponding to -48V_A.

Connector Type	No.	Connector	Description
	(7)	-48V_B_1 to -48V_B_3	Automatic circuit breakers (ACBs). The outer connectors are -48 V branch power rail output connectors corresponding to -48V_B.
	(11)	0V_A_1 to 0V_A_3 (XS1)	0 V branch power rail output connectors, corresponding to 0V_A.
	(8)	0V_B_1 to 0V_B_3 (XS2)	0 V branch power rail output connectors, corresponding to 0V_B.

Alarm Connector

Connector Type	No.	Connector	Description
Subrack alarm convergence connector	(12)	AlmIn1 to AlmIn3	RJ-45 sockets receiving the alarm information from the equipment inside the cabinet
Alarm output connector for the head of row cabinet	(2)	XP1	XP6 is a three-conductor D-type socket, and it can output the alarm information to the head of row cabinet.
Alarm output connector	(3)	XS4	XP7 is a six-conductor D-type socket, and it can output the triggering signal to the cabinet-top indicator LED.

Jumper Pin

JP1 is the jumper pin for selecting the operating status indicator LED of the PDP. It is located as indicated by (10) in the figure, and can be set in either of the following two ways:

- Short pin1 and pin2 of JP1, and the green indicator LED on the top of the cabinet will indicate the working status of the PDP.
- Short pin2 and pin3 of JP1, and the green indicator LED on the top of the cabinet will be controlled by the CALL (order wire call) signal.

Note:

Pin2 and pin3 of JP1 have been shorted by default before delivery of the PDP.

Lightning Protection Module

The lightning protection module is plugged into the base of XS3, as shown in (9) in the figure.

The lightning protection module, using the standard DB-25 plug, can withstand the surge of 2kV (1.2/50 us - 8/20 us combination wave) in the common mode and the surge of 1kV (1.2/50 us - 8/20 us combination wave) in the differential mode, so as to guarantee the normal operation of the equipment.

Product Documentation Customer Satisfaction Survey

Thank you for reading and using the product documentation provided by FiberHome. Please take a moment to complete this survey. Your answers will help us to improve the documentation and better suit your needs. Your responses will be confidential and given serious consideration. The personal information requested is used for no other purposes than to respond to your feedback.

Name	
Phone Number	
Email Address	
Company	

To help us better understand your needs, please focus your answers on a single documentation or a complete documentation set.

Documentation Name	
Code and Version	

Usage of the product documentation:

1. How often do you use the documentation?

☐ Frequently ☐ Rarely ☐ Never ☐ Other (please specify) _____

2. When do you use the documentation?

☐ in starting up a project ☐ in installing the product ☐ in daily maintenance ☐ in trouble shooting ☐ Other (please specify) _____

3. What is the percentage of the operations on the product for which you can get instruction from the documentation?

☐ 100% ☐ 80% ☐ 50% ☐ 0% ☐ Other (please specify) _____

4. Are you satisfied with the promptness with which we update the documentation?

☐ Satisfied ☐ Unsatisfied (your advice) _____

5. Which documentation form do you prefer?

☐ Print edition ☐ Electronic edition ☐ Other (please specify) _____

Quality of the product documentation:

1. Is the information organized and presented clearly?

☐ Very ☐ Somewhat ☐ Not at all (your advice) _____

2. How do you like the language style of the documentation?

☐ Good ☐ Normal ☐ Poor (please specify) _____

3. Are any contents in the documentation inconsistent with the product?

_____

4. Is the information complete in the documentation?

☐ Yes

☐ No (Please specify) _____

5. Are the product working principles and the relevant technologies covered in the documentation sufficient for you to get known and use the product?

☐ Yes

☐ No (Please specify) _____

6. Can you successfully implement a task following the operation steps given in the documentation?

☐ Yes (Please give an example) _____

☐ No (Please specify the reason) _____

7. Which parts of the documentation are you satisfied with?

_____

8. Which parts of the documentation are you unsatisfied with?Why?

_____

9. What is your opinion on the Figures in the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

☐ Practical ☐ Unpractical (your advice) _____

10. What is your opinion on the layout of the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

11. Thinking of the documentations you have ever read offered by other companies, how would you compare our documentation to them?

Product documentations from other companies:_____

Satisfied (please specify) _____

Unsatisfied (please specify) _____

12. Additional comments about our documentation or suggestions on how we can improve:

_____

_____

Thank you for your assistance. Please fax or send the completed survey to us at the contact information included in the documentation. If you have any questions or concerns about this survey please email at edit@fiberhome.com

FiberHome Telecommunication Technologies Co., Ltd.

Address: No. 67, Guanggu Changye Jie,
Wuhan, Hubei, China
Zipcode: 430073
Tel: +6 03 7960 0860/0884 (for Malaysia)
+91 98 9985 5448 (for South Asia)
+593 4 501 4529 (for South America)
Fax: +86 27 8717 8521
Website: http://www.fiberhomegroup.com