



AN6001-G16

Optical Line Terminal Equipment

Product Overview

Version: C

Code: MN000003548

FiberHome Telecommunication Technologies Co., Ltd.

November 2020

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1 Documentation Guide

Document Orientation

Product Overview gives a general introduction to the positioning, features, functions, application, structure and hardware composition of the AN6001-G16 to help users get an overall knowledge about the product.

Intended Readers

- ◆ Marketing personnel
- ◆ Commissioning engineers
- ◆ Operation and maintenance engineers

Version Information

Version	Description
A	Initial version, corresponding to the equipment version V1R1.
B	Updated version, with the fan unit weight added.
C	Updated version, corresponding to the equipment version V1R2.

Content

Chapter	Summary
Product Introduction	<ul style="list-style-type: none">◆ Product positioning◆ Product appearance, structure, module distribution, interfaces, and indicator LEDs◆ Air cooling mode◆ Power supply mode
Product Highlights	Product highlights
Specifications	<ul style="list-style-type: none">◆ List of functions and features◆ Major technical specifications◆ Requirements for operating environment
Product Structure	<ul style="list-style-type: none">◆ Logical architecture◆ Software architecture
Modules	Types and specifications of optical modules
Cables	Functions, model numbers, structures, connections and parameters of wires and cables

Chapter	Summary
Indoor Cabinets	Models, appearance, dimensions, and overall layout of indoor cabinets
PDP	Model numbers, panels and terminals of the PDPs
Standards and Protocols	Standards and protocols that the equipment complies with

Related Documentation

Document	Applied to
<i>AN6001-G16 Optical Line Terminal Equipment Product Overview</i>	Network planning phase
<i>AN6001-G16 Optical Line Terminal Equipment Quick Installation Guide</i>	Network deployment phase / network maintenance phase
<i>AN6001-G16 Optical Line Terminal Equipment UNM2000 Configuration Guide</i>	Network deployment phase / network maintenance phase
<i>AN6001-G16 Optical Line Terminal Equipment CLI Reference</i>	Network deployment phase / network maintenance phase

2 Product Introduction

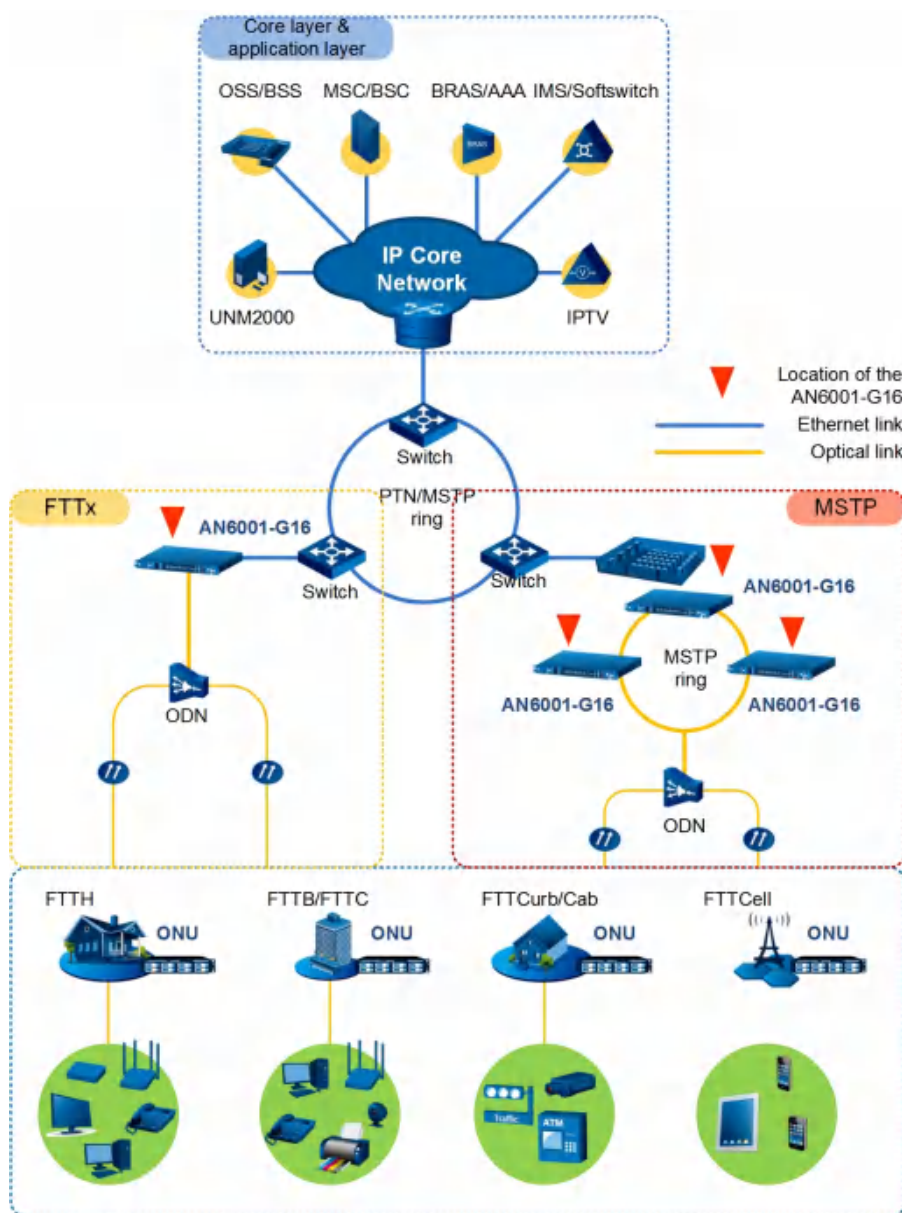
This chapter introduces the positioning, appearance, structure, modules, interfaces, indicator LEDs, air cooling mode, and power supply mode of the AN6001-G16.

- Product Positioning
- Product Appearance
- Subrack Structure
- Functional Modules and Virtual Cards
- Interfaces and Indicator LEDs
- Air Cooling Mode
- Power Supply Mode

2.1 Product Positioning

As a small-sized cassette-shaped optical line access equipment in a central office, the AN6001-G16 provides powerful GPON access, carrier-class reliability, sound security mechanism and selective QinQ functions. The UNM2000 is used as the network management system to enable centralized management, maintenance and monitoring of the equipment.

Residing on the edge of an access network, the AN6001-G16 connects to terminal equipment, located between subscriber terminals and devices at the distribution layer. It supports multiple access scenarios such as FTTH, FTTB, FTTC, FTTcurb/cab and FTTCcell, and can meet the demands for home access, enterprise access, and mobile backhaul.



- ◆ The AN6001-G16 can be deployed on the wall in the hallway of a building or in an outdoor cabinet to provide the Last Mile fiber access and cater to the broadband access demand in sparsely-populated areas.
- ◆ The AN6001-G16, used together with various ONUs, provides integrated user interfaces and abundant service functions to aggregate, merge, and forward user data to meet various service access demands of telecommunications, radio and television operators as well as the customer premises network.
- ◆ Through uplink ports, the AN6001-G16s can be cascaded to make up an MSTP ring, so as to provide redundancy protection and enhance network reliability.

2.2 Product Appearance

The AN6001-G16 is a 1U cassette-shaped optical line terminal device. It is designed with pluggable modularized power card, fan card, core switch service card, and optical modules for easy installation, deployment and maintenance.

Appearance

The AN6001-G16 supports three power supply schemes: DC-AC, dual-DC, and dual-AC. The figures below show the appearance of the equipment.



Figure 2-1 AC-DC Power Supply Scheme



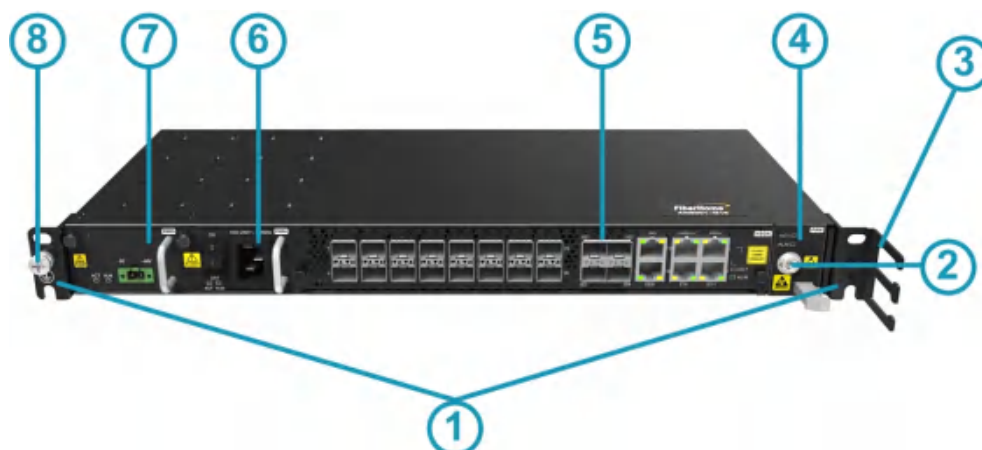
Figure 2-2 Dual-DC Power Supply Scheme



Figure 2-3 Dual-AC Power Supply Scheme

Structure

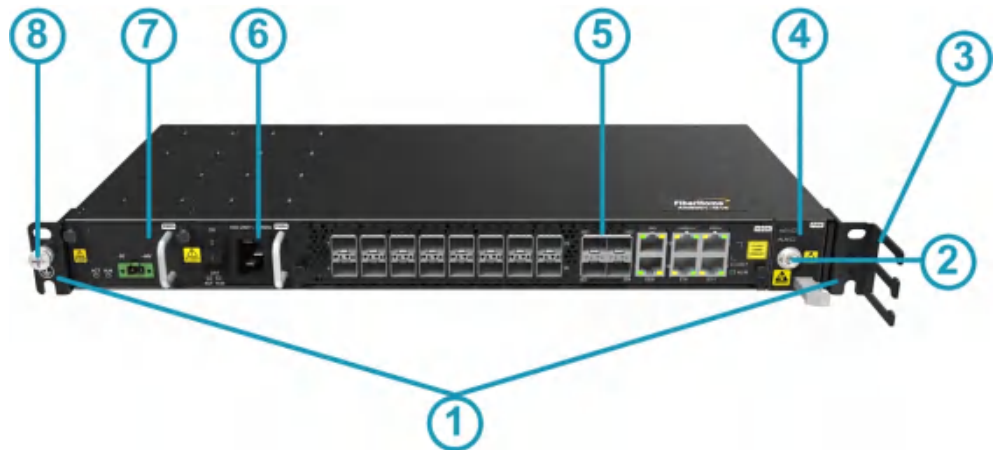
The figure below shows the components of the AN6001-G16 subrack using the AC-DC hybrid power supply scheme as an example.



No.	Name	Function
①	Mounting ears	Secure the subrack in a cabinet.
②	ESD protection earth ground fastener	Connects with an ESD protection unit.
③	Fiber passage unit	Facilitates routing and arranging of fibers and cables.
④	Fan card	Facilitates air cooling for the equipment.
⑤	Core switch service card	Receives GPON services; provides GE / 10GE uplink ports and interfaces for management, monitoring and debugging.
⑥	AC power card	Leads in 110 V / 220 V AC power supply. Here it can be replaced by a DC power card to provide 1 +1 DC power protection.
⑦	DC power card	Leads in -48 V DC power supply. Here it can be replaced by an AC power card to provide 1+1 AC power protection.
⑧	Subrack earth ground point	Connects with the subrack earth ground cable.

2.3 Subrack Structure

The figure below shows the components of the AN6001-G16 subrack using the AC-DC hybrid power supply scheme as an example.



No.	Name	Function
①	Mounting ears	Secure the subrack in a cabinet.
②	ESD protection earth ground fastener	Connects with an ESD protection unit.
③	Fiber passage unit	Facilitates routing and arranging of fibers and cables.
④	Fan card	Facilitates air cooling for the equipment.
⑤	Core switch service card	Receives GPON services; provides GE / 10GE uplink ports and interfaces for management, monitoring and debugging.
⑥	AC power card	Leads in 110 V / 220 V AC power supply. Here it can be replaced by a DC power card to provide 1 +1 DC power protection.
⑦	DC power card	Leads in -48 V DC power supply. Here it can be replaced by an AC power card to provide 1+1 AC power protection.
⑧	Subrack earth ground point	Connects with the subrack earth ground cable.

2.4 Functional Modules and Virtual Cards

Module Allocation

Three module allocation schemes are available to the AN6001-G16, corresponding to the power supply modes used.

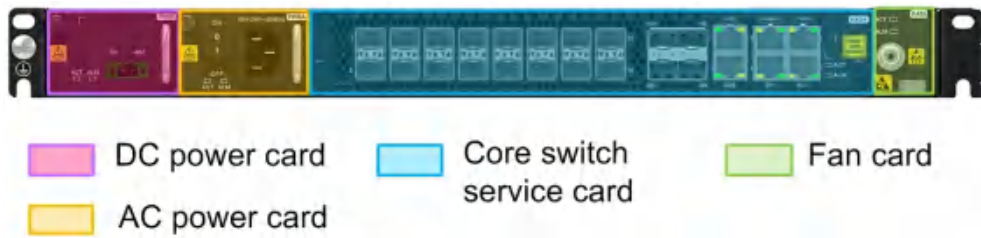


Figure 2-4 AC-DC Power Supply Scheme

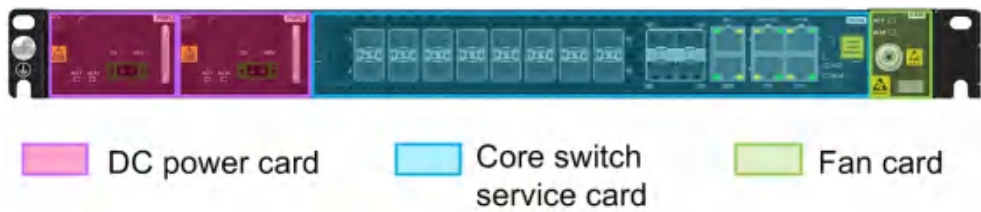


Figure 2-5 Dual-DC Power Supply Scheme

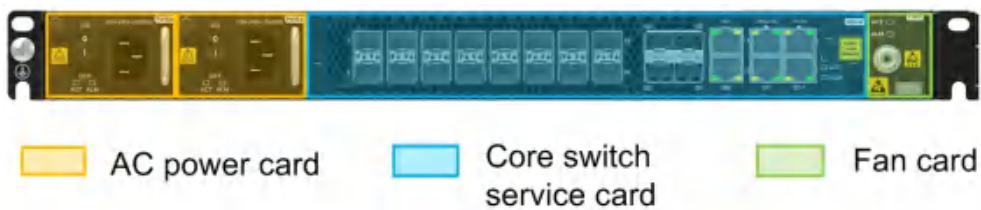
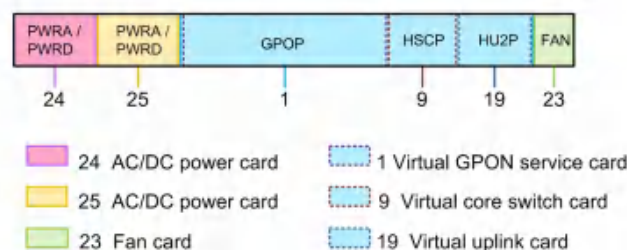


Figure 2-6 Dual-AC Power Supply Scheme

Virtual Card

The AN6001-G16 uses virtual cards to implement upper-layer management. The core switch service card (HSOA) integrates three virtual cards: GOP, HSCP and HU2P. The virtual cards are integrated with the subrack and cannot be plugged / unplugged or replaced.

The figure below illustrates the allocation of virtual slots in the AN6001-G16 subrack.






2.5 Interfaces and Indicator LEDs

Interfaces

Identifier	Meaning	Description
CONSOLE/ESC	RS232 local debugging serial port / RS485 environment monitoring port	Connects to an environment monitoring device and reports the environment status to the network management system.
1PPS/TOD	Clock interface	Introduces high-precision clock and time information for time synchronization.
ETH	Out-of-band network management interface	Connects to an out-of-band network management computer.
DC1-7	Dry contact interface	Connects to dry contact signals.
1 to 16	GPON ports	Connect to ONUs via an ODN.
10GE1/10GE2	10GE optical ports (SFP+)	Connect to an IP network.
GE3/GE4	GE optical ports (SFP)	
GE5/GE6	GE electrical ports	

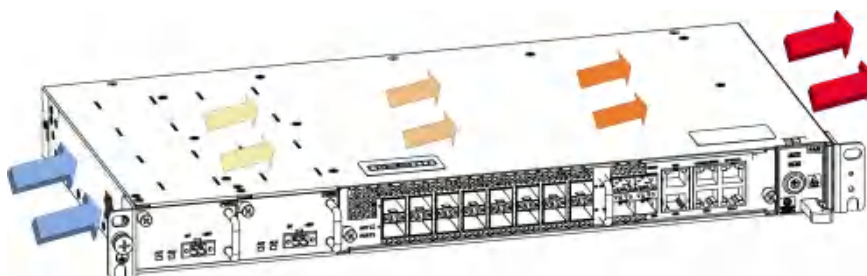
Indicator LEDs

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.	
			OFF	The card is not powered on or is not working normally.	
ALM	Alarm indicator LED	Red	ON	The card has alarms.	
			OFF	The card has no alarms.	
	GPON port	LINK: link status indicator ^{Note 2}	Green	ON	The port is connected to an ONU at the far end, and the ONU has been authorized.
			Green	OFF	The port is not connected to an ONU at the far end, or the far-end ONU is not authorized.
	Uplink optical port	LINK: link status indicator ^{Note 3}	Green	ON	The port is connected to an upper-layer device.
			Green	Blinking	The port is transmitting data to or receiving data from an upper-layer device.

Identifier	Meaning		Color	Status	Description
				OFF	The port is not connected to an upper-layer device.
	Uplink electrical port	LINK: link status indicator	Green	ON	The port is connected to an upper-layer device without data transmission between them.
				OFF	The port is not connected to an upper-layer device.
		ACT: data status indicator	Yellow	Blinking	The port has data flow.
				OFF	The port has no data flow.
<p>Note 1: The ACT indicators of the power card and fan card do not have the Blinking Slowly status.</p> <p>Note 2: The left and right LINK indicators correspond to the upper and lower GPON ports respectively.</p> <p>Note 3: The left and right LINK indicators correspond to the upper and lower uplink optical ports respectively.</p>					

2.6 Air Cooling Mode

The AN6001-G16 uses forced air cooling. The fan card is located at the right side of the subrack (front view). The cool air is drawn from the left side to the right side of the subrack to take away heat, as illustrated in the figure below.



2.7 Power Supply Mode

The AN6001-G16 provides three power supply schemes: dual-DC, dual-AC and DC-AC hybrid schemes. All these schemes support 1+1 redundancy backup.



AC Power Supply

The AN6001-G16 supports 110 V / 220 V active-standby AC power supply featuring lightning protection, filtering, lightning protection failure alarming, and input voltage detection.

DC Power Supply

The AN6001-G16 supports -48 V active-standby DC power supply featuring voltage monitoring, failure alarming and protection switching.

The table below describes the model numbers, appearance and input / output specifications of the PDPs for the DC power supply scheme of the AN6001-G16.

Item	PDP260B	PDP296B
Model	3000063-1FA 3000063-2FA 3000063-1FB 3000063-2FB	3000068-1FA 3000068-2FA
Appearance		
Range of input voltage	-38 V to -60 V	-38 V to -60 V
Number of inputs	Two (one active and one standby)	Two (one active and one standby)
Input current	A maximum of 96 A for a single input	A maximum of 96 A for a single input
Output voltage range	-38 V to -60 V	-38 V to -60 V
Number of outputs	Six	Six
Output current	A maximum of 32 A for a single output	A maximum of 32 A for a single output

Note:

- ◆ The AN6001-G16 uses the PDP260B (3000063-1FA/2FA) by default.
- ◆ When lightning protection is required, the PDP296B (3000068) is used.
- ◆ When DC circuit breakers are needed, the PDP260B (3000063-1FB/2FB) is used.

3 Product Highlights

High-density Modularized Integration

- ◆ 1U high, designed with modularized core switch service cards, fan card, and power cards for easy installation and replacement.
- ◆ Supports 16 GPON ports, two 10GE uplink ports (SFP+), two GE uplink optical ports (SFP) and two GE uplink electrical ports to allow access of 1024 ONUs.

Flexible Deployment

Supports mounting in 19-inch / 21-inch cabinets or outdoor cabinets and mounting on the wall. Suitable for long-haul broadband access applications in villages, towns and factories. Provides users with access to multiple services such as broadband, voice and IPTV services; caters to various access demands of telecommunications, radio and television operators as well as the customer premises network; and saves the backbone optical fiber resources.

Carrier-class Reliability

- ◆ Supports 1+1 redundancy protection for PON ports, uplink ports and power interfaces. All the slots meet the requirement of fault tolerance.
- ◆ Supports Type B PON protection, rogue ONU detection, optical link check, and TWAMP check.
- ◆ Supports service switching with the WTR time less than 50 ms.
- ◆ Supports high-precision time synchronization (compliant with IEEE 1588V2, ITU-T G.8275.1 and ITU-T G.8275.2), and serves as a bearer network for wireless backhaul. It can meet the rigorous requirements of mobile wireless system for clock synchronization in the backhaul network.

Abundant Ethernet Functions

- ◆ Provides versatile VLAN processing functions, including selective QinQ, VLAN translation and VLAN aggregation.

- ◆ Provides overall QoS functions, including dynamic bandwidth allocation, priority control, multiple traffic classification mechanisms, and queue scheduling to meet the QoS demand of different services such as VoIP, IPTV and Internet access.
- ◆ Provides sound ACL functions, including L2, L3 and user-defined ACLs.
- ◆ Supports IGMP Snooping and Proxy, IGMPv3 and MLDv2 source address filtering, and rate control for multicast packets.
- ◆ Supports STP/MSTP, link aggregation, DHCP and port isolation.
- ◆ Supports both IPv4 and IPv6 to enable smooth migration to the next-generation IP network.

Quick Forwarding

- ◆ Supports Layer 3 functions, including OSPF, DHCP Relay and ARP Proxy.
- ◆ Supports basic MPLS functions, including static LSP, MPLS LDP and MPLS RSVP, to cater for new applications of networks.
- ◆ Supports VPN, allowing a service provider to cater for the IP VPN demands of multiple clients. The configurations are simplified for easy expansion.

Remote Management and Easy Maintenance

- ◆ Provides visualized management based on GUI EMS, which covers configuration, alarm and performance monitoring, data statistics, user management and so on.
- ◆ Supports management based on command lines with downward compatibility.
- ◆ Supports remote software upgrade, which simplifies operation and saves man power.

4 Specifications

This chapter introduces major technical specifications of the AN6001-G16 and requirements for the running environment.

- List of Functions and Features
- Major Technical Specifications
- Detailed Technical Specifications

4.1 List of Functions and Features

Classification		Function
ONU authentication and authorization management		Multiple ONU authentication modes, including authentication based on physical identifier, logical identifier (without password), physical identifier / logical identifier (without password), or password, and hybrid authentication based on physical identifier + physical password
Access feature		GPON access
Service functions	Multicast	IGMP V1 / V2 / V3
		IGMP Proxy / Snooping
		MLD V1 / V2
		MLD Proxy / Snooping
		Multicast VLAN
		Copy and broadcast of multicast packets
		Multicast information statistics
		Management of multicast subscribers
		Management of multicast programs
	Voice	VoIP voice service
		H.248 and SIP
		PPPoE configuration
		DHCP configuration
		Query of NGN statistics information
		Query of NGN resource status
Voice intercommunication inside the PON		
Time and clock synchronization		System internal clock
		BITS clock
		1PPS/TOD time
		High-precision time synchronization compliant with IEEE 1588V2, ITU-T G.8275.1 and ITU-T G.8275.2
		Adaptive clock recovery (based on ITU-T G.8265.1)
		Synchronous Ethernet clock
Layer 2 functions	VLAN	802.1Q VLAN
		VLAN aggregation
		QinQ VLAN
		Selective QinQ (Stacking VLAN)
		VLAN translation

Classification		Function
	Layer 2 forwarding strategy	VLAN + MAC forwarding
		SVLAN + CVLAN forwarding
	Layer 2 switching	Independent learning of MAC addresses
		Shared learning of MAC addresses
Clearing a Layer 2 forwarding table globally		
	Configuring the MAC address aging time for the OLT and ONU	
Layer 3 functions	Layer 3 interface	Creation and use of Super VLANs
	ARP Proxy	ARP Proxy
	DHCP	DHCP Relay, DHCP Snooping, and DHCP Server
		DHCPv6 Relay and DHCPv6 PD
		DHCPv6 Option18 / Option37
		DHCP Option82 and PPPoE+
		Isolation of illegal DHCP servers
	Routing	Static routing
		OSPFv2 and OSPFv3
		RIP and RIPng
		IS-IS for IPv4 and IS-IS for IPv6
		BGP for IPv4 and BGP for IPv6
		Route management
Route filtering		
MPLS	Static LSP	
	MPLS LDP	
	MPLS RSVP	
	Label management	
	MPLS Ping / Traceroute diagnosis	
	MPLS QoS	
	MPLSoAI	
VPN	VRF	
	VPWS	
	VPLS	
	BGP/MPLS IPv4 VPN	
QoS	Traffic classification	
	Priority processing	
	Traffic policing based on trTCM	
	WRED	

Classification		Function
		Traffic shaping
		HQoS
		PQ, WRR, and PQ + WRR queue scheduling algorithms
		IPv4 / IPv6 QoS
Maintenance and management	Maintenance	Ingress and egress mirroring and flow mirroring
		Flexible port mirroring (port mirroring based on PON ports and ONUs, and remote mirroring)
		Save and query of performance statistics and historical data
		In-service software upgrade
		Automatic rollback during software upgrade
		Synchronized equipment configurations and EMS configurations
		License
		TWAMP
	Network management	SNMP
		SSH
		LLDP
		Telnet
		In-band management
		Out-of-band management
		Classification of operation authority
		Remote operation and user management
		Log management
		Version and data management
		Exception handling for the equipment
		Reliability
ERPS		
MSTP (IEEE 802.1s), RSTP (IEEE 802.1w) and STP (IEEE 802.1D)		
Static or LACP dynamic port aggregation compliant with IEEE 802.3ad		
Trunk: port load shared between Trunk groups based on MPLS labels		
Service overload control		
1+1 protection for PON ports		
1+1 protection for uplink ports		
1+1 protection for DC or AC power interfaces		
Isolation of GPON ports		
Isolation of uplink ports		
Cascading over Ethernet networks		

Classification	Function
	Bidirectional forwarding detection (BFD)
	Downlink GEM frame encryption
Security	Up to 120 ACL rules per uplink port
	Authentication of ONU terminals and reports of illegal ONU registration events
	Limit on maximum number of MAC addresses learned to prevent attacks by users' MAC addresses
	MAC address filtering
	Packet filtering and port binding based on the source MAC address, destination MAC address, Ethernet type, VLAN, CoS, source IP address, destination IP address, IP port and protocol type
	Protection against DoS attacks

4.2 Major Technical Specifications

Item	Description	
Dimensions (H × W × D) of a subrack without mounting ears	44.4 mm × 443 mm × 220 mm (1U)	
Dimensions (H × W × D) of a subrack with mounting ears for 19-inch cabinets	44.4 mm × 480 mm × 225 mm	
Dimensions (H × W × D) of a subrack with mounting ears for 21-inch cabinets	44.4 mm × 530 mm × 233 mm	
Card dimensions (H × W × D)	Core switch service card (HSOA)	40.8 mm × 277 mm × 207.5 mm
	AC power card (PWRA)	39.6 mm × 64 mm × 205.5 mm
	DC power card (PWRD)	39.6 mm × 64 mm × 205.5 mm
	Fan unit (FAN)	44.2 mm × 30.8 mm × 209.5 mm
Overall weight	2.4 kg	
Fan unit weight	0.3 kg	
Power	DC voltage range: -38.4 V _{DC} to -57.6 V _{DC}	
	AC voltage range: 90 V _{AC} to 290 V _{AC}	

Item	Description
Overall power consumption	<ul style="list-style-type: none"> ◆ Maximum power consumption: 90 W ◆ Static power consumption: 57 W <p>The overall power consumption is measured under the following conditions:</p> <ul style="list-style-type: none"> ◆ Maximum power consumption: all the ports are 100% loaded. ◆ Static power consumption: all the ports are unloaded, and the optical ports are not plugged with optical modules.
Operating temperature	<ul style="list-style-type: none"> ◆ Long-term operating temperature: 0°C to 45°C ◆ Short-term operating temperature: -10°C to 55°C <p>Note: The operating temperature is measured at an altitude of no more than 1800 m. The ambient temperature of the equipment will decrease by 1°C for each altitude rise of 220 m.</p>
Operating humidity	<ul style="list-style-type: none"> ◆ Long-term operating humidity: 5% to 85% (no condensation) ◆ Short-term operating humidity: 5% to 90% (no condensation)
System switching capability	44 Gbit/s
Slot bandwidth	20 Gbit/s
Maximum number of uplink ports in the system	2 × 10GE uplink ports + 2 × GE uplink optical ports + 2 × GE uplink electrical ports
Maximum number of GPON ports in the system	16
Maximum number of ONUs connected to the system	1024
Throughput	88 Gbit/s
Port rate	<ul style="list-style-type: none"> ◆ Uplink: 1.244 Gbit/s ◆ Downlink: 2.488 Gbit/s
Maximum number of T-CONTs per PON port	1024
Maximum transmission distance (PON port)	60 km
Maximum differential fiber distance (maximum difference in ONU-to-PON port distance between two ONUs under the same PON port)	80 km
System reliability specifications	<ul style="list-style-type: none"> ◆ Basic reliability: 30 000 hours ◆ Task reliability: 50 000 hours <p>Note: The mean time to repair (MTTR) for the entire system is 0.5 hour.</p>

4.3 Detailed Technical Specifications

4.3.1 Requirements for Operating Environment

Item	Requirement
Bearing capacity of the floor in the equipment room	> 600 kg/m ²
Grounding resistance	< 10Ω
Atmospheric pressure	70 kPa to 106 kPa
Altitude	-60 m to 4000 m
Temperature change rate	≤ 0.5°C/min
Ambient air quality	No corrosive and solvent gas, and no dust; no strong electromagnetic fields nearby.
Solar radiation	≤ 700 W/m ²
Thermal radiation	≤ 600 W/m ²
Concentration of mechanical active substances	Suspended dust: ≤ 0.4 mg/m ³
	Deposited dust: ≤ 15 mg/(m ³ ·h)
	Gravel: ≤ 300 mg/m ³
Concentration of chemical substances	SO ₂ ≤ 0.30 mg/m ³
	H ₂ S ≤ 0.10 mg/m ³
	NO _x ≤ 0.50 mg/m ³
	NH ₃ ≤ 1.00 mg/m ³
	Cl ₂ ≤ 0.10 mg/m ³
	HCl ≤ 0.10 mg/m ³
	HF ≤ 0.01 mg/m ³
O ₃ ≤ 0.05mg/m ³	
Noise standard	≤ 63 dBA (measured at a temperature of 23±2°C)

4.3.2 Card Dimensions

The AN6001-G16 contains the HSOA, PWRA/PWRD and FAN cards. The table below lists the dimensions of the cards.

Card Type	Dimensions (H × W × D)
Core switch service card (HSOA)	40.8 mm × 277 mm × 207.5 mm
AC power card (PWRA)	39.6 mm × 64 mm × 205.5 mm

Card Type	Dimensions (H × W × D)
DC power card (PWRD)	39.6 mm × 64 mm × 205.5 mm
Fan card (FAN)	44.2 mm × 30.8 mm × 209.5 mm

4.3.3 GPON Performance

Item	Description
GPON performance	Provides 16 GPON ports.
	Supports access of 1024 ONUs.
	Uplink rate: 1.24416 Gbps; downlink rate: 2.48832 Gbps
	Supports Type B protection switching.
	Supports downlink GEM frame encryption.
	Maximum transmission distance: 60 km
	Maximum differential fiber distance: 40 km
	TCONT:1000
	Throughput: 88 Gbps

4.3.4 Reliability

Equipment Model	Basic Reliability	Task Reliability
AN6001-G16	30 000 h	50 000 h
Note 1: The mean time to repair (MTTR) for the entire system is 0.5 hour.		

5 Product Structure

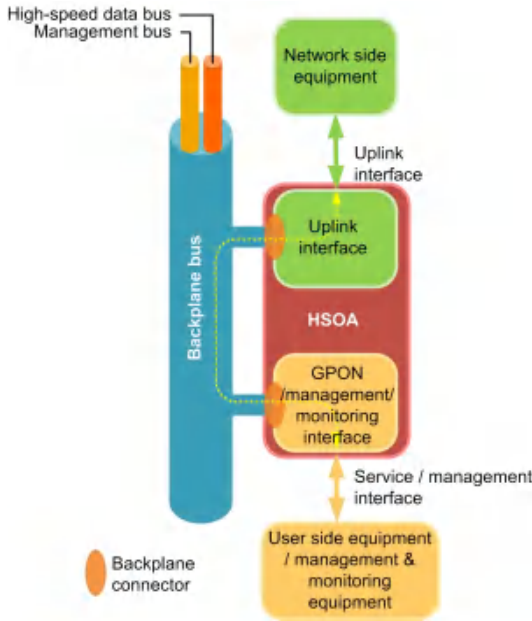
This chapter introduces the logical architecture and software architecture of the AN6001-G16.

Logical Architecture

Software Architecture

5.1 Logical Architecture

The figure below shows the logical architecture of the AN6001-G16.



The AN6001-G16 implements the switching based on IP packet core. The core switch service card communicates via the backplane buses (combination of the data bus and management bus) interconnected at high speed to exchange service data or management information.

The table below describes the interfaces of the AN6001-G16.

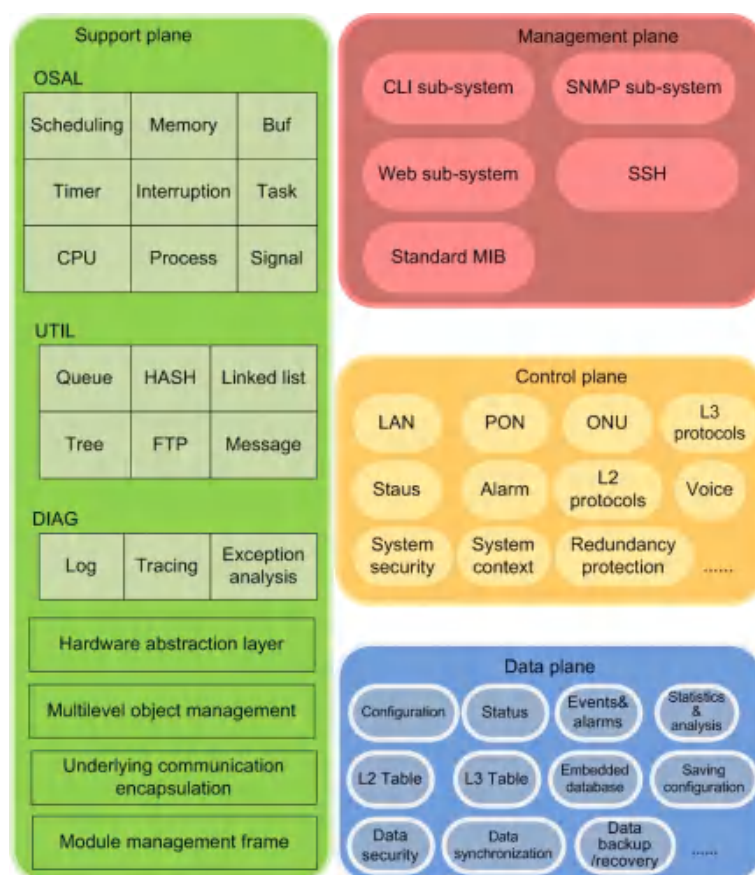
Classification	Interface	Description
Uplink interface	10GE1/10GE2	10GE uplink port, using SFP+ encapsulation
	GE3/GE4	GE uplink optical port, using SFP encapsulation
	GE5/GE6	GE uplink electrical port
Management and monitoring interface	CONSOLE/ESC	RS232 local debugging serial port and RS485 environment monitoring port
	1PPS/TOD	Clock interface
	ETH	Out-of-band network management interface
	DC1-7	Seven dry contact ports
GPON port	1 to 16	16 GPON ports
Power interface	PWRA	AC power input interface; 110 V / 220 V; supporting 1+1 protection switching

Classification	Interface	Description
	PWRD	DC power input interface; -48 V; supporting 1+1 protection switching

5.2 Software Architecture

Software Architecture of the Core Switch Module

The figure below illustrates the core switch software architecture of the AN6001-G16.

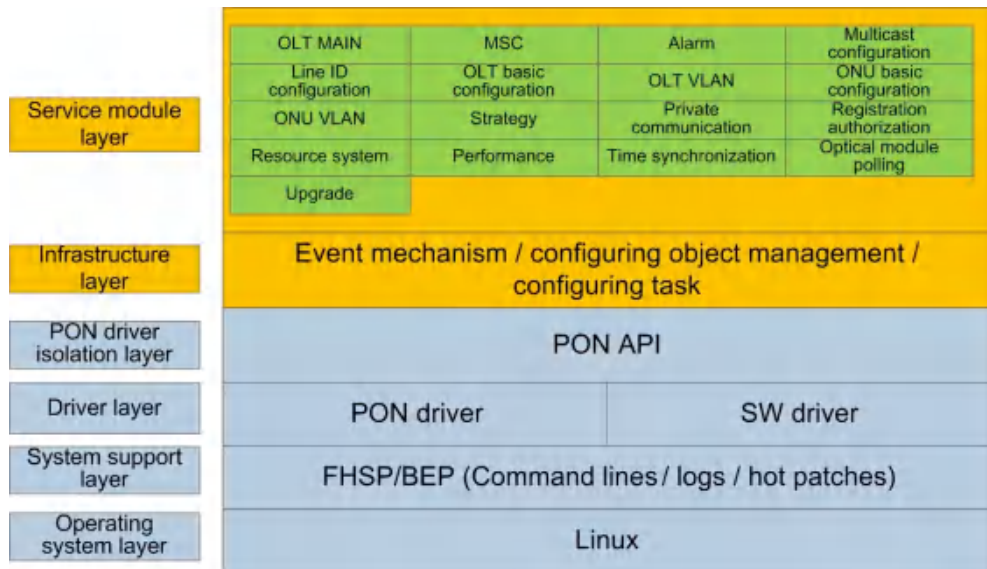


- ◆ Support plane: Serves the entire system, available for all the layers and modules in the system; provides universal operating system and supports hardware transplantation; provides complete software tool set, session management, and IPC encapsulation.

- ◆ Management plane: Manages equipment based on Telnet, WEB, SSH, SNMP, RMON and so on; intervenes in the operation of the control plane when necessary.
- ◆ Control plane: Controls the operation of all network protocols; supports flexible configuration of functional modules to cater to various application scenarios.
- ◆ Data plane: Manages the configuration data, status data, alarm time data and operation data of functional modules and protocol modules in the system collectively.

Software Architecture of the Service Module

The figure below illustrates the service software architecture of the AN6001-G16.



- ◆ Operating system layer: Works based on the Linux operating system.
- ◆ System support layer: Provides system support and fault diagnosis functions such as the operating system abstract layer (OSAL), command lines, logs and hot patches.
- ◆ Driver layer: Provides the PON MAC and SW chip driver.
- ◆ PON driver isolation layer: Defines the universal PON_API interface and shields the difference in underlying hardware schemes so that the upper-layer software can make use of the OLT underlying hardware functions.
- ◆ Infrastructure layer: Provides the infrastructure module to set up the service card architecture.

- ◆ Service logic layer: Defines the service model and the service modules based on it.

6 Modules

This chapter introduces types and specifications of the optical modules for the AN6001-G16.

Mappings Between Modules and Interfaces

The pluggable optical modules applied to the AN6001-G16 have two encapsulation formats: SFP and SFP+.

There are two types of module interfaces: LC and SC, as shown in the figure below.



The table below describes the mappings between the modules and the equipment interfaces.

Interface	Module Type	Application Code	Module Code
1 to 16	GPON optical module	CLASS C+	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)
		CLASS C++	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
10GE1/10GE2	10GE optical module	10GBASE-LR	10G-10km-TDM-SFP+ (10GBASE-LR)
		10GBASE-ER	10G-40km-TDM-SFP+ (10GBASE-ER)
		L-64.2	10G-80km-TDM-SFP+ (L-64.2)
GE3/GE4	GE optical module	1000BASE-LX	1.25G-10km-TDM-SFP (1000BASE-LX)
		1000BASE-EX	1.25G-40km-TDM-SFP (1000BASE-EX)
		1000BASE-ZX1	1.25G-80km-TDM-SFP (1000BASE-ZX1)

Module Specifications

The following introduces the types and specifications of optical modules.

Table 6-1 GPON Optical Modules

Item	Specification	
Module code	2.5/1.25G-20km-GPON OLT-SFP (CLASS C+)	2.5/1.25G-20km-GPON OLT-SFP (CLASS C++)
Optical module type	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, 1290 nm to 1330 nm, 1280 nm to 1360 nm
Encapsulation mode	SFP	SFP
Rate	Tx: 2.488 Gbit/s Rx: 1.244 Gbit/s	Tx: 2.488 Gbit/s Rx: 1.244 Gbit/s
Output optical power	4 dBm to 7 dBm (room temperature)	5.5 dBm to 10 dBm (room temperature)
Optical fiber connector type	SC/PC or SC/UPC	SC/PC or SC/UPC
Transmission distance	20 km	20 km
Receiving sensitivity	-32 dBm	-32 dBm
Overload optical power	-12 dBm	-12 dBm
Extinction ratio	> 8.2 dB	> 8.2 dB

Table 6-2 10GE Optical Modules

Item	Specification		
Module code	10G-10km-TDM-SFP+ (10GBASE-LR/LW)	10G-40km-TDM-SFP+ (10GBASE-ER/EW)	10G-80km-TDM-SFP+ (L- 64.2)
Optical module type	10GBASE-LR/LW	10GBASE-ER/EW	L-64.2
Wavelength range	1260 nm to 1355 nm	1530 nm to 1565 nm	1530 nm to 1565 nm
Encapsulation mode	SFP+	SFP+	SFP+
Rate	1.229 Gbit/s to 10.313 Gbit/s ^{Note 1}	9.953 Gbit/s to 10.313 Gbit/s ^{Note 1}	9.953 Gbit/s to 11.3 Gbit/s
Output optical power	-8.2 dBm to 0.5 dBm	-4.7 dBm to 4 dBm	0 dBm to 4 dBm
Optical fiber connector type	LC	LC	LC
Transmission distance	10 km	40 km	80 km
Receiving sensitivity	-14.4 dBm	-15.8 dBm	-24 dBm
Overload optical power	0.5 dBm	-1 dBm	-7 dBm
Extinction ratio	3.5 dB to 6.5 dB	> 3 dB	> 9 dB
Note 1: Without the CDR function.			

Table 6-3 GE Optical Modules

Item	Specification		
Module code	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-LX	1000BASE-EX	1000BASE-ZX1
Wavelength range	1275 nm to 1350 nm	1275 nm to 1350 nm	1500 nm to 1580 nm
Encapsulation mode	SFP	SFP	SFP
Rate	1.25 Gbit/s	1.25 Gbit/s	1.25 Gbit/s
Output optical power	-8 dBm to -3 dBm	-5 dBm to 0 dBm	-2 dBm to 3 dBm
Optical fiber connector type	LC	LC	LC
Transmission distance	15 km	40 km	80 km
Receiving sensitivity	-23 dBm	-23 dBm	-25 dBm
Overload optical power	-3 dBm	-3 dBm	-3 dBm
Extinction ratio	9.0 dB to 15 dB	9.0 dB to 15 dB	9.0 dB to 15 dB

7 Cables

This chapter introduces the applications, model numbers, structures and technical specifications of the wires and cables for the AN6001-G16.

- Cable Overview
- Power Cable
- Protection Earth Ground Cable
- Fiber Jumper
- Network Cable
- Clock and Time Cable
- Environment Monitoring Unit Connection Cable
- Serial Port Line
- Dry Contact Cable

7.1 Cable Overview

Cable	Model	Applied to
Cabinet Power Cable	-48 V power cable: 3696234 (16 mm ²) / 3696231 (25 mm ²)	PDP260B (3000063)
	0V power cable: 3696235 (16 mm ²) / 3696232 (25 mm ²)	
	-48 V power cable: 408000076 (16 mm ²) / 408000021 (25 mm ²)	PDP296B (3000068)
	0 V power cable: 408000075 (16 mm ²) / 408000020 (25 mm ²)	
Subrack DC Power Cable	408000062	The PWRD card of the equipment
Subrack AC Power Cable	<ul style="list-style-type: none"> ◆ WX00219 (national standard) ◆ WX00000543 (American standard) ◆ WX00000515 (British standard) ◆ WX00000514 (European standard) 	The PWRA card of the equipment
Cabinet Protection Earth Ground Cable	408000041 (16 mm ²), 408000019 (25 mm ²)	Connecting the earth ground point on the top of the cabinet and the ground busbar in the equipment room
Subrack Protection Earth Ground Cable	3696084	The subrack
PDP Protection Earth Ground Cable	3696239	PDP260B (3000063)
	408000018	PDP296B (3000068)
Fiber Jumper	LC/PC-type optical fiber jumper: OFC-LC/PC-LC/PC-S-20	The 10GE1 / 10GE2 port or GE3 / GE4 port of the HSOA card
	SC/PC-type optical fiber jumper: OFC-SC/PC-SC/PC-S-20	Ports 1 to 16 of the HSOA card
Network Cable	3695095	The GE5 / GE6 port or ETH interface of the HSOA card
Clock and Time Cable	409000163	The 1PPS/TOD interface of the HSOA card
Environment Monitoring Unit Connection Cable	409000159	The CONSOLE/ESC interface of the HSOA card
Serial Port Line	3695341	The CONSOLE/ESC interface of the HSOA card
Dry Contact Cable	3695452	The DC1-7 interface of the HSOA card

7.2 Power Cable

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

7.2.1 Cabinet Power Cable

Function

The cabinet power cables, including the -48 V power cable and the 0 V power cable, are used to induct the power source for the equipment room to the PDP inside the cabinet.


Model

The AN6001-G16 can use the PDP260B (3000063) or PDP296B (3000068). The cabinet power cables vary with the PDP used. Table 7-1 describes the mappings between the cabinet power cables and the PDPs. Please refer to this table and select appropriate cabinet power cables for the PDP.

Table 7-1 Model Numbers of Cabinet Power Cables

PDP Model	Cable Type	Cable Model	Cable Color
PDP260B (3000063)	-48 V power cable	3696234 (16 mm ²) 3696231 (25 mm ²)	Blue
	0 V power cable	3696235 (16 mm ²) 3696232 (25 mm ²)	Black
PDP296B (3000068)	-48 V power cable	408000076 (16 mm ²) 408000021 (25 mm ²)	Blue
	0 V power cable	408000075 (16 mm ²) 408000020 (25 mm ²)	Black

Structure

Cable Model	Description	Illustration
3696231, 3696232, 3696234 and 3696235	M10 uninsulated ring terminal + bare wire	
408000020, 408000021, 408000075 and 408000076	M6 uninsulated ring terminal + bare wire	

Connection

PDP Model	Cable Type	Internal Connector	External Connector
PDP260B (3000063)	-48 V power cable (blue)	-48V1 connector (active) -48V2 connector (standby)	External -48 V connector
	0 V power cable (black)	GND1 connector (active) GND2 connector (standby)	External 0 V connector
PDP296B (3000068)	-48 V power cable (blue)	-48V_A connector (active) -48V_B connector (standby)	External -48 V connector
	0 V power cable (black)	0V_A connector (active) 0V_B connector (standby)	External 0 V connector

Technical Specifications

Item	Specification
Cable type	Double-sheathed, heat-resistant (withstanding a temperature up to 105°C), and single-core soft cable
Maximum rated current	<ul style="list-style-type: none"> ◆ 16 mm² power cable: 80 A ◆ 25 mm² power cable: 100 A

7.2.2 Subrack DC Power Cable

Function

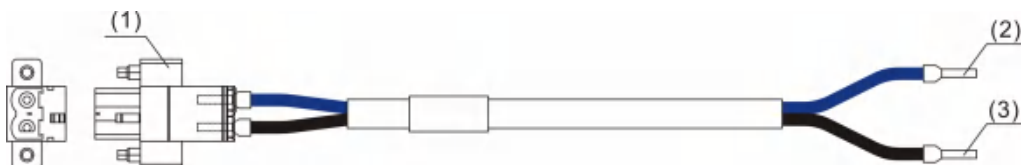
The subrack DC power cable connects the PDP and the equipment's DC power card (PWRD) to induct a set of redundant branch power rails from the PDP to the subrack.

Model

The model number of the subrack DC power cable for the AN6001-G16 is 408000062.

Structure

The subrack DC power cable has a two-conductor power plug on one end and two cord end terminals on the other end, as illustrated in the figure below.



(1) Two-conductor power plug (2) -48 V cord end terminal (3) 0 V cord end terminal

Connection

No.	Cable Connector	Connected to	
		PDP260B (3000063)	PDP296B (3000068)
(1)	Two-conductor power plug	The power input interface of the DC power card (PWRD)	
(2)	Cord end terminal (-48 V, blue)	The -48V connector on the PDP	The -48V_A_1 to -48V_A_3 / -48V_B_1 to -48V_B_3 connectors on the PDP
(3)	Cord end terminal (0 V, black)	The 0V connector on the PDP	The 0V_A_1 to 0V_A_3 / 0V_B_1 to 0V_B_3 connectors on the PDP

Technical Specifications

Item	Specification
Cable type	Two-core sheathed cable
Color	Blue (-48 V), black (0 V)
Maximum current	16 A
Cross-sectional area of the conductor	2 × 2.5 mm ²

7.2.3 Subrack AC Power Cable

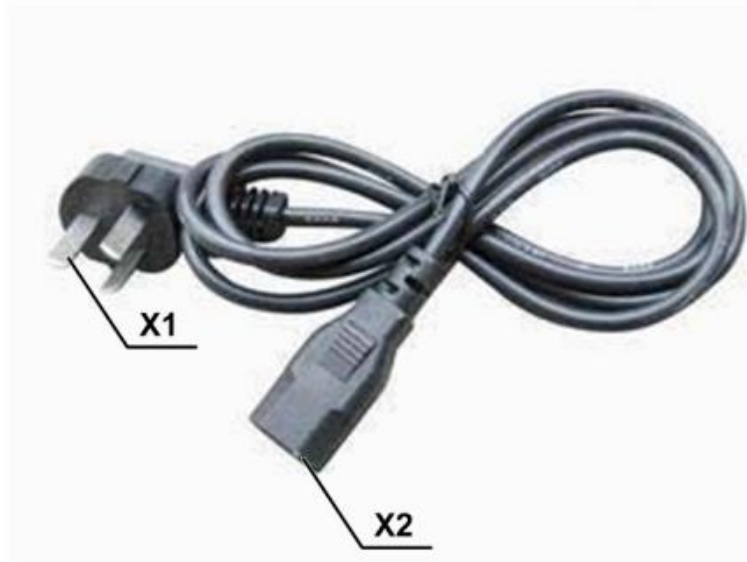
The subrack AC power cable connects an external AC power supply to the AC power card (PWRA) of the equipment to induct the external AC power to the subrack.

Material Number

- ◆ WX00219 (national standard)
- ◆ WX00000543 (American standard)
- ◆ WX00000515 (British standard)
- ◆ WX00000514 (European standard)

Structure

Here WX00219 (national standard) is used as an example. The figure below shows the appearance and structure of the subrack AC power cable.



Note:

The figure is for reference only. The AC power cables used in other countries / regions may look different.

Connection

Cable	Cable Connector	Connected to
Subrack AC power cable	Three-conductor male plug	External power supply unit
	Three-conductor female plug	Power input interface of the AC power card (PWRA)

Technical Specifications

Item	Specification
Cable model	Subrack AC power cable with three-conductor plugs
Connector X1	Three-conductor male plug
Connector X2	Three-conductor female plug
Cross-sectional area of the conductor	<ul style="list-style-type: none"> ◆ WX00219 (national standard): $3 \times 0.75 \text{ mm}^2$ ◆ WX00000543 (American standard): $3 \times 0.75 \text{ mm}^2$ ◆ WX00000515 (British standard): $3 \times 1 \text{ mm}^2$ ◆ WX00000514 (European standard): $3 \times 0.75 \text{ mm}^2$

7.3 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.

7.3.1 Cabinet Protection Earth Ground Cable

Function

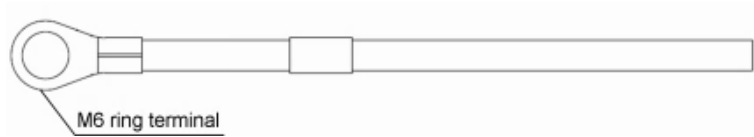
The cabinet protection earth ground cable is used to connect the earth ground point on the top of the cabinet and the ground busbar in the equipment room.

Model

The AN6001-G16 can use the cabinet protection earth ground cables with the model numbers 408000041 (16 mm^2) and 408000019 (25 mm^2).

Structure

As shown in the figure below, the yellow- / green cable has an M6 uninsulated ring terminal on one end for connection with the cabinet. You need to make a grounding terminal on the other end of the cable for connection with the busbar.



Connection

Cable Connector	Description
M6 uninsulated ring terminal	Connected to the earth ground point on the top of the cabinet.
Bare wire terminal	Prepared according to the earth ground point on the busbar.

Technical Specifications

Item	Specification
Cable type	Single core soft cable
Color	Yellow- / green
Maximum rated current	<ul style="list-style-type: none"> ◆ 16 mm² protection earth ground cable: 80 A ◆ 25 mm² protection earth ground cable: 100 A

7.3.2 Subrack Protection Earth Ground Cable

Function

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

Model

The model number of the subrack protection earth ground cable used by the AN6001-G16 is 3696084.

Structure

The figure below shows the subrack protection earth ground cable. Both ends of the cable are M6 pre-insulation terminals, and between them is a yellow- / green 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°C) single-core soft cable
Color	Yellow- / green
Maximum current	32 A
Cross-sectional area of the conductor	4 mm ²

7.3.3 PDP Protection Earth Ground Cable

Function

The PDP protection earth ground cable is used to connect the protection ground of the PDP and the earth ground point on the top of the cabinet. Before delivery, this cable has been connected to the PE terminal of the PDP.



Model

The AN6001-G16 can be equipped with PDP260B (3000063) or PDP296B (3000068). The protection earth ground cables used on the two PDPs are different. See Table 7-2 for the mappings between the PDPs and their protection earth ground cables.

Table 7-2 Protection Earth Ground Cables for the PDPs

PDP Model	Cable Model
PDP260B (3000063)	3696239
PDP296B (3000068)	408000018

Structure

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

Connection

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

Note:

The PDP protection earth ground cable has been connected to the inner PE connector of the PDP before delivery; therefore, you only need to connect the cable to the earth ground point on the top of cabinet on site.

Technical Specifications

Cable Model	Cable Type	Color	Maximum Current	Cross-sectional Area of Conductor
3696239	Single core soft cable	Yellow- / green	63 A	10 mm ²
408000018			40 A	6 mm ²

7.4 Fiber Jumper



Function

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

Model

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

Structure

Classification	Connector
LC/PC optical fiber connector	
SC/PC optical fiber connector	

Connection

Cable	Connector	Card Interface Connected	Connection on the ODF Side
Fiber jumper	SC/PC connector	Ports 1 to 16 of the HSOA card	Connected to remote ONUs to provide GPON downlink channels.
	LC/PC connector	10GE1 and 10GE2 ports of the HSOA card	Connected to the IP network to provide GE and 10 GE optical channels.
GE3 and GE4 ports of the HSOA card			

Reference for Choosing Fiber Jumpers

Parameter	Basis for Choice
Length	On-site investigation
Single-mode / multi-mode	Type of the optical module
Type of the optical fiber connector	<ul style="list-style-type: none"> ◆ Optical module type ◆ Cabinet depth^{Note 1}
<p>Note 1: Optical fiber connectors that are 55 mm long or 39 mm long are most commonly used. The former are called long connectors, and the latter short connectors. When the equipment is mounted in a 300 mm-deep cabinet, it is advisable to use 39 mm long optical fiber connectors (short connectors).</p>	

7.5 Network Cable

Function

The network cable is used to connect the local equipment to the uplink equipment, out-of-band network management system or time synchronization device.

Model

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

Structure

Both ends of the network cable are equipped with the RJ-45 connectors (also known as crystal heads), as shown in the figure below.



Table 7-3 lists the pin definitions for the straight-through network cable.

Table 7-3 Pin Definitions for 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
6	Green	6
7	White- / brown	7
8	Brown	8

Table 7-4 lists the pin definitions for the cross-over network cable.

Table 7-4 Pin Definitions for the Cross-over 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

Connection

Cable	Card Interface Connected	Connection at the Opposite End
Network cable	The GE5 / GE6 port, ETH interface or 1PPS/TOD interface of the HSOA card	Connected to the uplink equipment, out-of-band network management system or time synchronization 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

7.6 Clock and Time Cable

The clock and time cable connects the clock interface of the AN6000-2 subrack to the interface of an external clock source to introduce clock synchronization signals to the subrack or connect the equipment to an external time source to transfer time signals.

Material Number

409000163

Structure

Figure 7-1 shows the appearance and structure of the clock and time cable.



Figure 7-1 Clock and Time Cable

Table 7-5 Pinout and Wiring of the Clock and Time Cable

Connector X1	Time cable		75Ω clock cable		
Pin Number	Wire Color	Connector X2	Cable	Connector X3 / X4	Definition
1	-	-	Coaxial core	X3 core	TX
2	-	-	Coaxial shield	X3 shield	
3	Green	3	-	-	-
4	-	-	Coaxial core	X4 core	RX
5	-	-	Coaxial shield	X4 shield	
6	White- / green	6	-	-	-
7	Brown	7	-	-	-
8	White- / brown	8	-	-	-

Technical Specifications

Table 7-6 describes technical specifications of the clock and time cable.

Table 7-6 Technical Specifications of the Clock and Time Cable

Item	Specification
Time cable	Cat 5e network cable 4 × 2 × 24 AWG
75Ω clock cable	Coaxial cable SYFZ-75-2-1
Connector X1 / X2	RJ-45 connector
Connector X3 / X4	BNC coaxial connector

7.7 Environment Monitoring Unit Connection Cable

Function

The environment monitoring unit connection cable is used to connect the CONSOLE/ESC interface of the equipment to the external environment monitoring device.

Model

The model number of the environment monitoring unit connection cable is 409000159.

Structure



The table below defines the pins of the environment monitoring unit connection cable.

Pin of the Local End	Wire Color	Pin of the Opposite End
1	White- / orange	7
2	Orange	8
7	White- / brown	5
8	Brown	6

7.8 Serial Port Line

Function

The serial port line is used for debugging or local maintenance. It connects the local debugging serial port of the HSOA card and the serial port of the network management computer.

Model

The model number of the serial port line is 3695341.

Structure

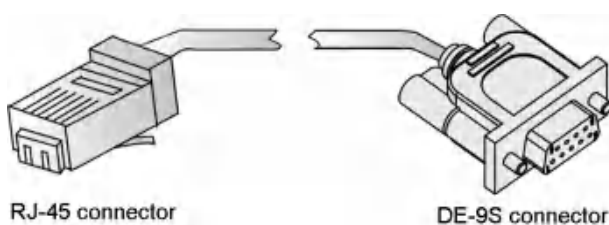


Table 7-7 lists the terminal definitions for the serial port line.

Table 7-7 Terminal Definitions for the Serial Port Line

Connected Signal	RJ-45 Connector Pin	DE-9S Connector Pin
Signal transmitted by the equipment	3	2
GND	4/5	5
Signal received by the equipment	6	3

Connection

Cable	Cable Connector	Connection Description
Serial port line	RJ-45 connector	Connected to the CONSOLE/ESC interface of the HSOA card.
	DE-9S connector	Connected 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	93.8Ω/km
Characteristic impedance	100±15Ω
Number of conductors	4

7.9 Dry Contact Cable

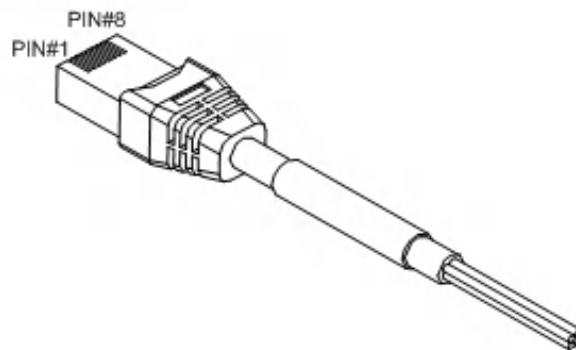
Function

The dry contact cable is used to connect the dry contact interface on a card to an external dry contact device to enable monitoring of infrared detection, 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	Connection Description
Dry contact cable	RJ-45 connector	Connected to the DC1-7 interface of the HSOA 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	AWG24

8 Indoor Cabinets

This chapter introduces the cabinets used by the AN6001-G16.

- Cabinet Overview
- Detailed Dimensions of Cabinets

8.1 Cabinet Overview

Table 8-1 shows the model numbers and appearances of the cabinets for the AN6001-G16, and Table 8-2 describes the dimensions and weight of the cabinets.

Table 8-1 Models and Appearances of the Cabinets

Cabinet Model	4102596 to 4102599	404000068 to 404000071 ^{Note 1}	404000596 to 404000599
Description	19-inch 600 mm-deep cabinet with dust screen	21-inch 300 mm-deep cabinet with dust screen	21-inch 340 mm-deep cabinet with dust screen

Table 8-1 Models and Appearances of the Cabinets (Continued)


Appearance			
Remarks	<p>Note 1:</p> <ul style="list-style-type: none"> ◆ Among SC/PC optical fiber connectors, the 55 mm long and 39 mm long ones are most commonly used. The 55 mm ones are called long connectors, and the 39 mm ones are called short connectors. When the equipment is mounted in a 300 mm-deep cabinet, it is advisable to use the 39 mm optical fiber connectors (short connectors). ◆ Among LC/PC optical fiber connectors, the 48 mm long and 31 mm long ones are most commonly used. The 48 mm ones are called long connectors, and the 31 mm ones are called short connectors. When the equipment is mounted in a 300 mm-deep cabinet, it is advisable to use the 31 mm optical fiber connectors (short connectors). 		

Table 8-2 Dimensions and Weight of the Cabinets

Cabinet Type	Cabinet Model	Dimensions (H × W × D) (mm)	Weight (kg)
19-inch 600 mm-deep cabinet with dust screen	4102596	1600 × 600 × 600	94
	4102597	2000 × 600 × 600	109

Table 8-2 Dimensions and Weight of the Cabinets (Continued)

Cabinet Type	Cabinet Model	Dimensions (H × W × D) (mm)	Weight (kg)
	4102598	2200 × 600 × 600	117
	4102599	2600 × 600 × 600	134
21-inch 300 mm-deep cabinet with dust screen	404000068	1600 × 600 × 300	58
	404000069	2000 × 600 × 300	69
	404000070 ^{Note 1}	2200 × 600 × 300	74
	404000071	2600 × 600 × 300	85
21-inch 340 mm-deep cabinet with dust screen	404000599	1600 × 600 × 340	46.8
	404000598	2000 × 600 × 340	58
	404000597	2200 × 600 × 340	63.6
	404000596	2600 × 600 × 340	74.8

**Caution:**

To ensure good ventilation of a cabinet, clean the dust screens on the cabinet bottom and cabinet door regularly. It is advised to clean them with water or a vacuum cleaner once every six months. Dust screens in service for over three years have degraded performance in flame retardation; please replace them in a timely manner.

8.2 Detailed Dimensions of Cabinets

This section introduces detailed dimensions of 19-inch and 21-inch cabinets.

Detailed Dimensions of a 19-inch Cabinet

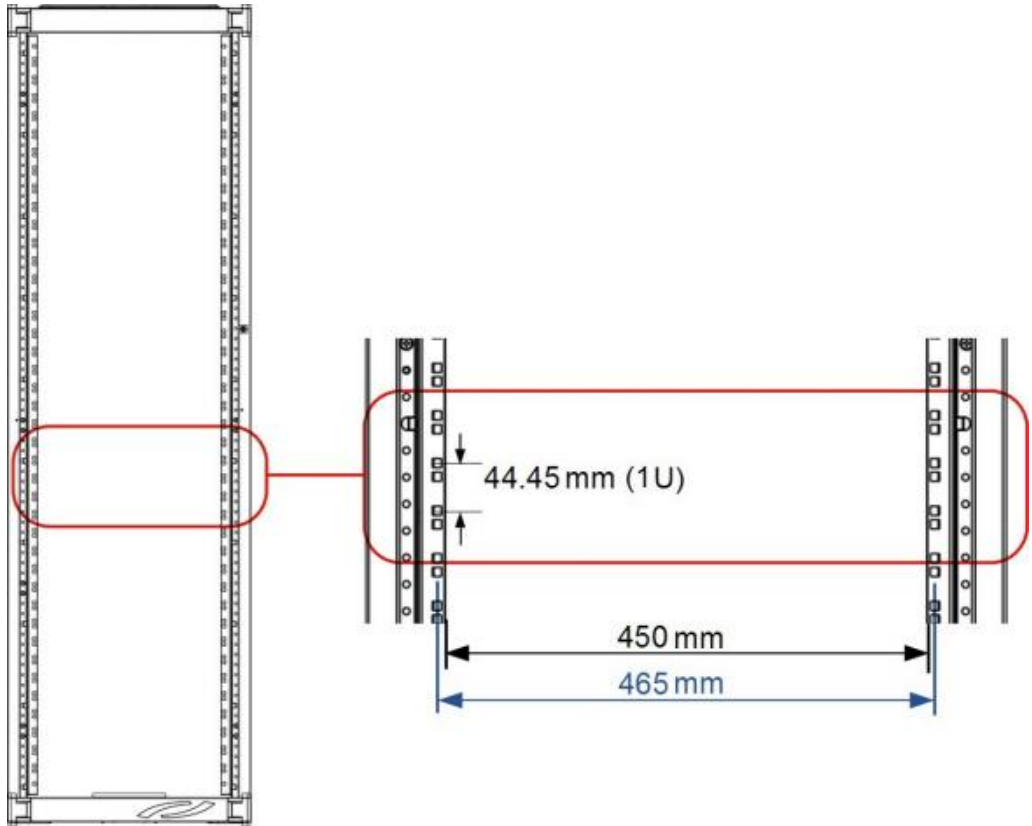


Table 8-3 Detailed Dimensions of a 19-inch Cabinet

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

Detailed Dimensions of a 21-inch Cabinet

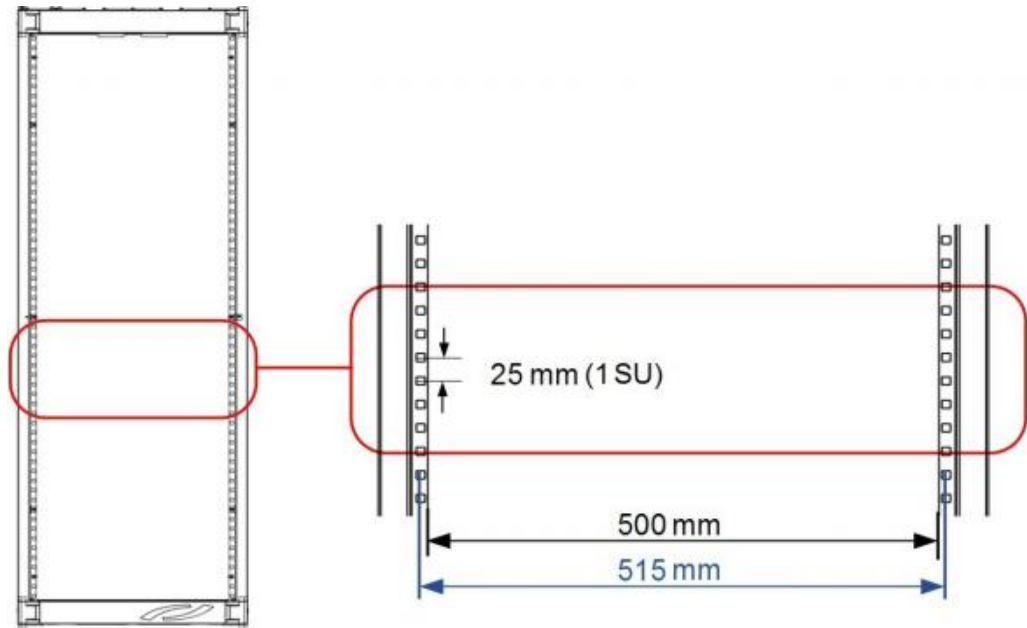


Table 8-4 Detailed Dimensions of a 21-inch Cabinet

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

8.2.1 Detailed Dimensions of a 19-inch Cabinet

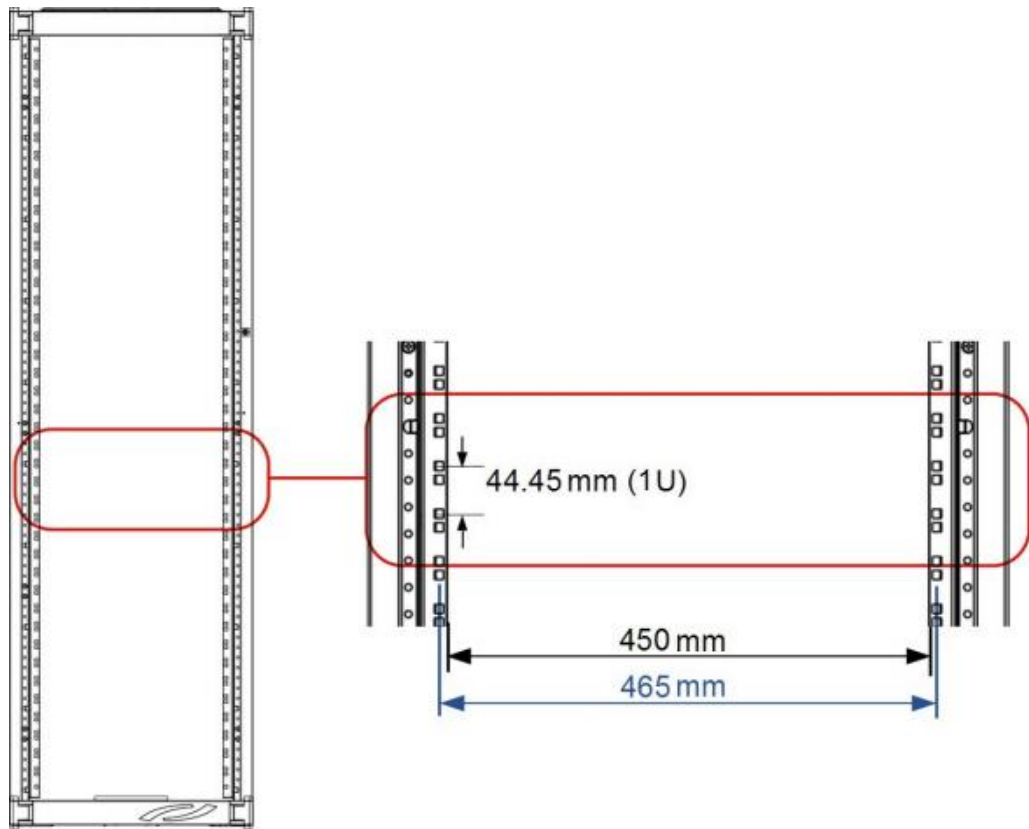


Table 8-5 Detailed Dimensions of a 19-inch Cabinet

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

8.2.2 Detailed Dimensions of a 21-inch Cabinet

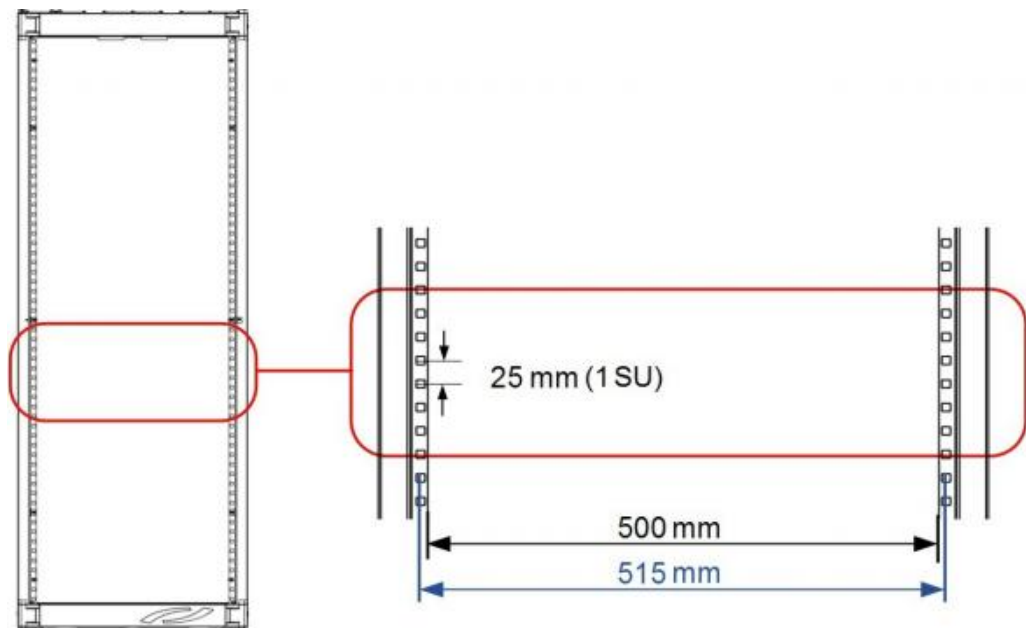


Table 8-6 Detailed Dimensions of a 21-inch Cabinet

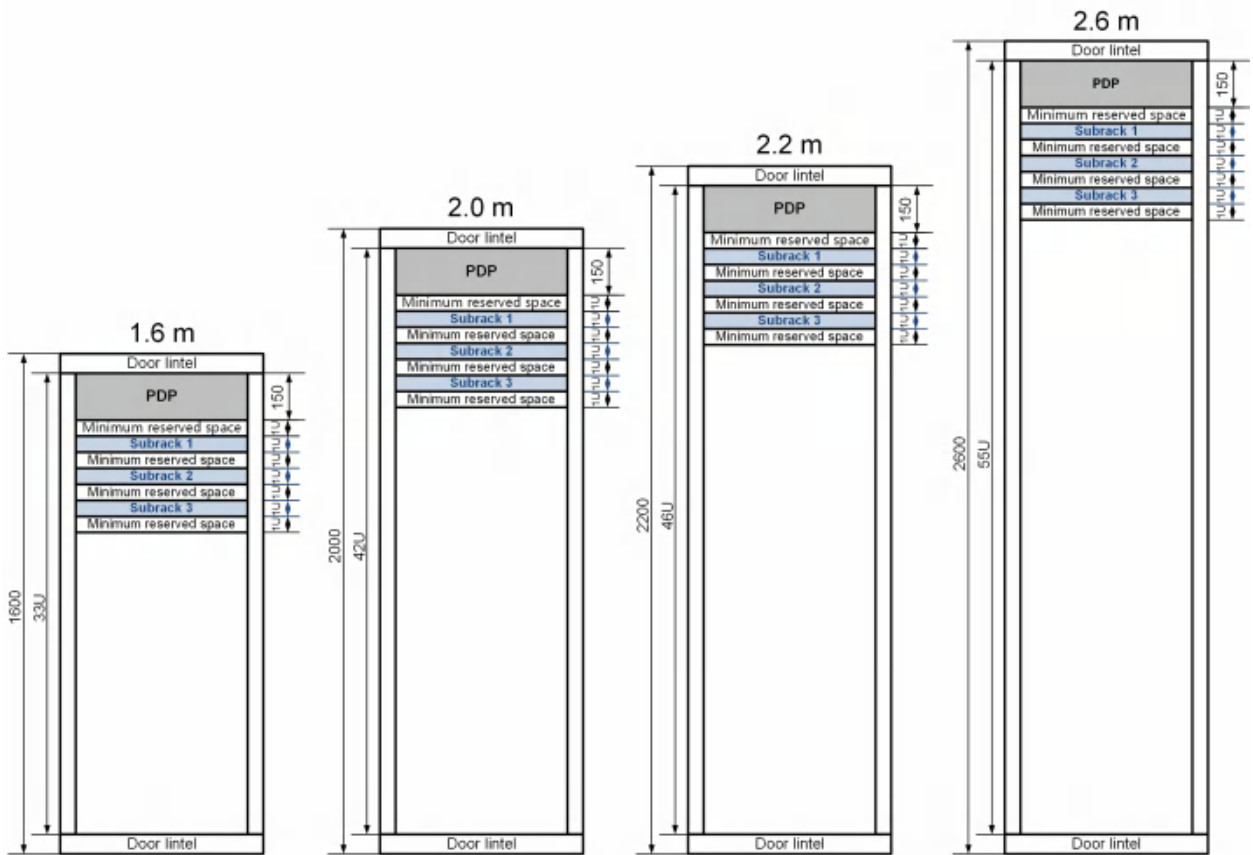
Item	Specification
Distance between holes on the mounting flange	1 SU = 25 mm
Angle opening width	500 mm
Fixing centres	515 mm

8.2.3 Equipment Layout

Guide

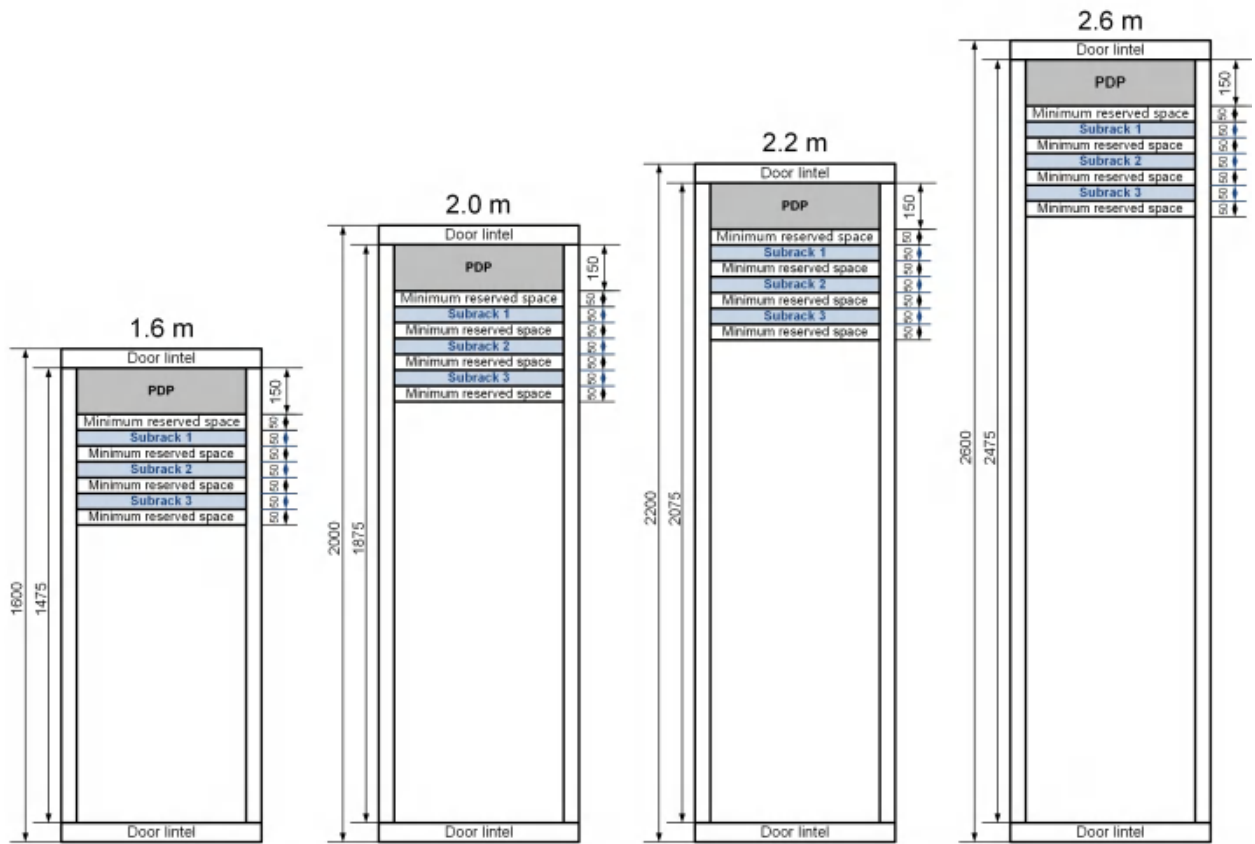
When several AN6001-G16 subracks are to be installed in a cabinet, generally they are arranged from the top down.

19-inch Cabinet



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

21-inch Cabinet



Note 1: Unit: mm

9 PDP

This chapter introduces the appearances, specifications, panel connectors, cables, and cable connections of the PDPs used by the AN6001-G16.

- PDP Overview
- Panels and Terminals of PDPs

9.1 PDP Overview

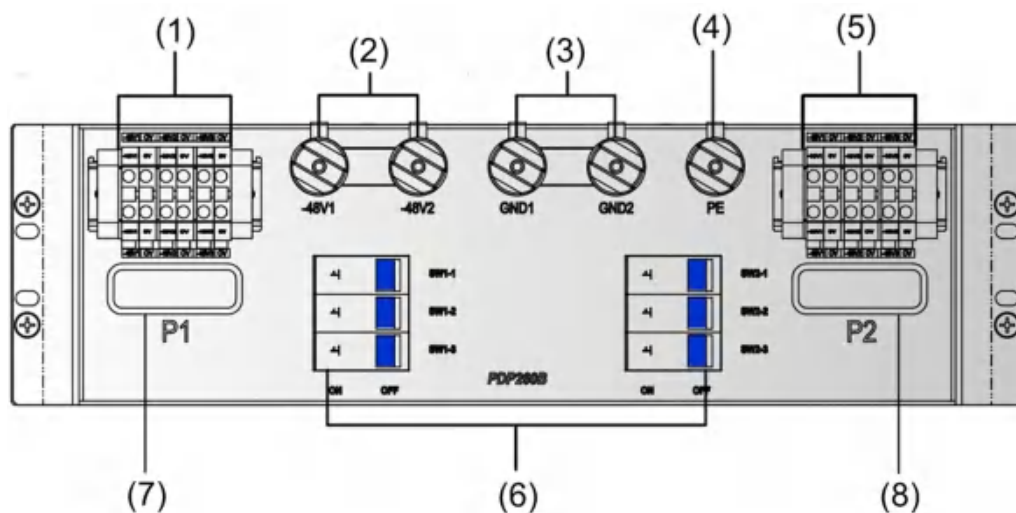
PDP Model		Sub racks Supported
		AN6001-G16
PDP260B	3000063-1FA	√
	3000063-2FA	√
	3000063-1FB	√
	3000063-2FB	√
PDP296B	3000068-1FA	√
	3000068-2FA	√

Note 1: √ indicates "supported"; × indicates "not supported".

9.2 Panels and Terminals of PDPs

The following introduces the terminal board and power connectors of the PDP260B (3000063).

Terminal Board



(1) Branch power rail output connector 1

(2) External power -48 V input connector

(3) External power 0 V input connector

(4) Protection earth ground cable connector

(5) Branch power rail output connector 2

(6) Automatic circuit breaker connector 2

(7) Branch power rail 0 V output connector 1

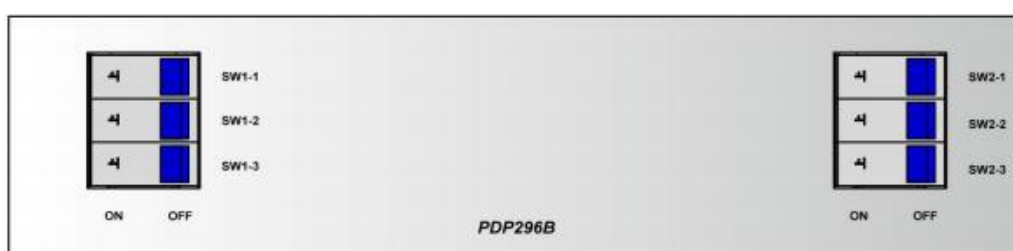
(8) Branch power rail 0 V output connector 2

Power Connectors

Connector Type	No.	Connector	Description
External power input (2 × 1 channels)	(2)	-48V1, -48V2	-48 V external power input connectors. The two connectors back up each other.
	(3)	GND1, GND2	0 V external power input connectors. The two connectors back up each other.
	(4)	PE	Connected to the earth ground point on the top of the cabinet.
Branch power rail output (2 × 3 channels)	(1)	-48V1 to -48V3 (on P1)	Power automatic circuit breakers. The outer connectors act as the -48 V branch power output connectors, corresponding to P1.
	(5)	-48V1 to -48V3 (on P2)	Power automatic circuit breakers. The outer connectors act as the -48 V branch power output connectors, corresponding to P2.
	(7)	0V (on P1)	0 V branch power output connector, corresponding to P1.
	(8)	0V (on P2)	0 V branch power output connector, corresponding to P2.

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

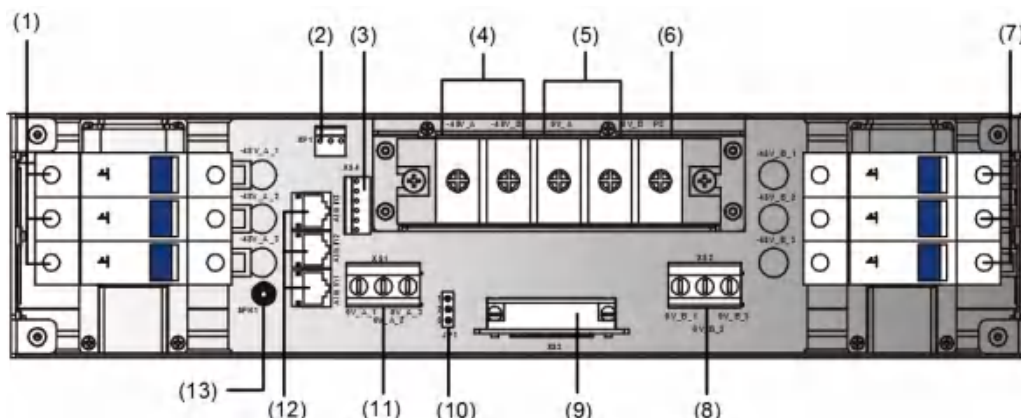
Front Panel



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	Connected to the earth ground point on the top of the cabinet.
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.
	(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.

Connector Type	No.	Connector	Description
	(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, which can output the alarm information to the head of row cabinet.
Alarm output connector for indicator LEDs	(3)	XS4	XP7 is a six-conductor D-type socket, which can output the alarm indicator triggering signal to the cabinet-top indicator LEDs.

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 indicated by (9) in the figure.

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

Appendix A Standards and Protocols

A.1 Environment Standards

Standard Number	Title
ETSI EN 300 019-1-1	Environmental Engineering (EE) Environmental conditions and environmental tests for telecommunications equipment Part 1-1: Classification of environmental conditions: Storage Class 1.1: Weather-protected, partly temperature-controlled storage locations Class 1.2: Weather-protected, not temperature-controlled storage locations
ETSI EN 300 019-1-2	Environmental Engineering (EE) Environmental conditions and environmental tests for telecommunications equipment Part 1-2: Classification of environmental conditions: Transportation Class 2.1: Very careful transportation Class 2.2: Careful transportation
ETSI EN 300 019-1-3	Environmental Engineering (EE) Environmental conditions and environmental tests for telecommunications equipment Part 1-3: Classification of environmental conditions: Stationary use at weather-protected locations Class 3.1: Temperature-controlled locations Class 3.2: Partly temperature-controlled location
ETSI ETS 300 019-1-3 A1	Amendment 1 to Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations
ETSI ETS 300 019-2-0	Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-0: Specification of environmental tests
ETSI ETS 300 019-2-1	Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-1: Specification of environmental tests: Storage

Standard Number	Title
ETSI ETS 300 019-2-2	Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-2: Specification of environmental tests: Transportation
ETSI ETS 300 019-2-3	Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-3: Specification of environmental tests; Stationary use at weatherprotected locations
ETSI ETS 300 019-2-3 A1	Amendment 1 to - Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-3: Specification of environmental tests; Stationary use at weatherprotected locations
ETSI EN 300 019-2-4	Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-4: Specification of environmental tests; Stationary use at non-weatherprotected locations
ETSI EN 300 753	Environmental Engineering (EE) Environmental conditions and environmental tests for telecommunications equipment October 1997: Acoustic noise emitted by telecommunications equipment
IEC 60068-2	Basic Environmental Testing Procedures
IEC 60721-2-6	Environmental conditions appearing in nature - Earthquake vibration
IEC 60721-3-1	Amendment 1 - Modular order for the development of mechanical structures for electronic equipment practices - Part 1: Generic standard
IEC 60721-3-3	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather-protected locations
ETSI EN 300 753	Equipment Engineering (EE) Acoustic noise emitted by telecommunications equipment
NEBS GR-63-CORE	Network Equipment-Building System (NEBS) Requirements: Physical Protection
ROHS	Restriction of the use of certain hazardous substance in electrical and electronic equipment.
IEC 60950-22-2005	Information technology equipment - Safety - Part 22: Equipment to be installed outdoors
IEC 61587-1-2007	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis

Standard Number	Title
IEC 61587-2-2000	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 2: Seismic tests for cabinets and racks
IEC 61587-3-2006	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks
UL 94-1996	UL Standard for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances Fifth Edition

A.2 EMC Standards

Standard Number	Title
CISPR 22	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
CISPR 24	Information technology equipment - Immunity characteristics - Limits and methods of measurement
EN 300 386	Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; Electromagnetic Compatibility (EMC) requirements
EN 55022	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
EN 55024	Information technology equipment - Immunity characteristics - Limits and methods of measurement
EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
ETSI EN 300132-2	Power supply interface at the input telecommunications equipment; Part 2: Operated by direct current (DC)

Standard Number	Title
ETSI EN 300386 V 1.4.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; Electromagnetic Compatibility (EMC) requirements
IEC 61000-3-2	Electromagnetic compatibility - Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
IEC 61000-3-3	Electromagnetic compatibility - Limits - Limitation of voltage changes, voltage fluctuation and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
IEC 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
IEC 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
IEC 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
IEC 61000-4-8	Electromagnetic compatibility - Testing and measurement techniques - Power frequency magnetic field immunity test
IEC 61000-4-11	Electromagnetic compatibility - Testing and measurement techniques - Voltage dips, short interruption and voltage variations immunity tests
ITU-T K.20	Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents
ITU-T K.43	Immunity requirements for telecommunication equipment
ITU-T K.48	EMC requirements for telecommunication equipment - Product family Recommendation
EN 300 386	Electromagnetic compatibility requirement for telecommunication network equipment
CISPR 22 (EN55022)	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
CISPR 24 (EN55024)	Information technology equipment - Immunity characteristics - Limits and methods of measurement

A.3 Safety Standards

Standard Number	Title
EN 60825-1	Safety of laser products - Part 1: Equipment classification and requirements
EN 60825-2	Safety of laser products - Part 2: Safety of optical fibre communication
EN 60950-1	Information technology equipment - Safety - Part 1: General Requirements
IEC 60950-1	Safety of Information Technology Equipment. Including Electrical Business Equipment
IEC 60825-1	Safety of laser products - Part 1: Equipment classification and requirements
IEC 60825-2	Safety of laser products - Part 2: Safety of optical fibre communication
IEC 60950-2001	Safety of Information technology equipment including Electrical Business Equipment
UL 60950-1:2003	Information Technology Equipment - Safety - Part 1: General Requirements
CAN/CSA-C22.2 No 60950-1	Safety of Information Technology Equipment Including Electrical Business Equipment
UL 60950-1	Safety of Information Technology Equipment Including Electrical Business Equipment
IEC Publication 479-1	Guide on the effects of current passing through the human body
IS 8437 {1993}	Guide on the effects of current passing through the human body
IS 13252 {1993}	Safety of information technology equipment including electrical business equipment

A.4 GPON Access Standards

Standard Number	Title
ITU-T G.984.1	Gigabit-capable passive optical networks (GPON): General characteristics
ITU-T G.984.2	Gigabit-capable Passive Optical Networks (GPON): Physical Media Dependent (PMD) layer specification
ITU-T G.984.3	Gigabit-capable Passive Optical Networks (G-PON): Transmission convergence layer specification
ITU-T G.Imp984.3	Implementers' Guide for ITU-T Rec. G.984.3 (02/2004)

Standard Number	Title
ITU-T G.984.4	Gigabit-capable passive optical networks (G-PON): ONT management and control interface specification
ITU-T G.Imp.984.4	Implementor's Guide for ITU-T Rec. G.984.4
ITU-T G.984.5	Enhancement band for gigabit capable optical access networks
ITU-T G.984.6	Gigabit-capable passive optical networks (GPON): Reach extension
ITU-T G.988	ONU management and control interface (OMCI) specification

A.5 Standards and Protocols for Services

Protocols for NGN Voice Service

Standard Number	Title
ITU-T G.711	Pulse code modulation (PCM) of voice frequencies
ITU-T G.711.1	Wideband embedded extension for G.711 pulse code modulation
ITU-T G.723.1	Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s
ITU-T G.729	Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)
ITU-T G.729.1	G.729 based Embedded Variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729
ITU-T G.Imp 729	Implementers' Guide for G.729 Annexes B, F, G, I and C+ (Coding of speech at 8 kbit/s using CS-ACELP)
RFC 3261	SIP: Session Initiation Protocol
RFC 2327	SDP: Session Description Protocol
RFC 3262	Reliability of Provisional Responses in the Session Initiation Protocol (SIP)
RFC 4028	Session Timers in the Session Initiation Protocol (SIP)
RFC 3525	Gateway Control Protocol Version 1
RFC 3015	Megaco Protocol Version 1.0
ITU-T H.248.1	Gateway control protocol: Version 3
RFC 3389	Real-time Transport Protocol (RTP) Payload for Comfort Noise (CN)
ITU-T T.30	Procedures for document facsimile transmission in the general switched telephone network
ITU-T T.38	Procedures for real-time Group 3 facsimile communication over IP networks
RFC 3550	A Transport Protocol for Real-Time Applications

Standard Number	Title
RFC 3611	RTP Control Protocol Extended Reports (RTCP XR)
ITU-T Q.23	Technical features of push-button telephone sets
ITU-T Q.24	Multifrequency push-button signal reception
ITU-T E.180	Technical characteristics of tones for the telephone service
RFC 2833	RIP Payload for DTMF Digits, Telephony Tones and Telephony Signals
RFC 2198	RTP Payload for Redundant Audio Data
ITU-T G.168	Digital network echo cancellers

Protocols for Multicast Service

Number	Title
IETF RFC 1112	Host Extensions for IP Multicasting
IETF RFC 2236	Internet Group Management Protocol, Version 2
IETF RFC 3376	Internet Group Management Protocol, Version 3
IETF RFC 2710	Multicast Listener Discovery (MLD) for IPv6
IETF RFC 3810	Multicast Listener Discovery Version 2 (MLDv2) for IPv6

Time Standards

Standard Number	Title
IEEE 1588-2008	IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
IETF RFC 1305	Network Time Protocol (Version 3) Specification, Implementation and Analysis
IETF RFC 2030	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
G.984.3-Amendment 2	Time-of-day distribution and maintenance updates and clarifications
ITU-T G.8275.1	Precision time protocol telecom profile for phase/time synchronization with full timing support from the network
ITU-T G.8275.2	Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network
ITU-T G.8265.1	Precision time protocol telecom profile for frequency synchronization

Ethernet Protocols

Standard Number	Title
IEEE 802-2001	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture
IEEE 802.1ad	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks - Amendment 4: Provider Bridges
IEEE 802.1ag-2007	IEEE Standard for Local and Metropolitan Area Networks Virtual Bridged Local Area Networks Amendment 5: Connectivity Fault Management
IEEE 802.1w-2001	Local and metropolitan area networks - Common specifications - Part 3: Media access control (MAC) bridges; Amendment 2: Rapid reconfiguration
IEEE 802.1x-2004	IEEE Standard for Local and Metropolitan Area Networks Port-Based Network Access Control
IEEE 802.1D-2004	IEEE Standard for Local and metropolitan area networks: Media Access Control (MAC) Bridges
IEEE 802.1Q-2005	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks - Amendment 4: Provider Bridges
IEEE 802.3ah	IEEE Standard for Information technology- Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment: Media Access Control Parameters, Physical Layers, and Management Parameters for Subscriber Access Networks
IEEE 802.1s-2002	IEEE Standards for Local and metropolitan area networks - Virtual Bridged Local Area Networks - Amendment 3: Multiple Spanning Trees
ITU-T Y.1291	An architectural framework for support of Quality of Service in packet networks
ITU-T Y.1730	Requirements for OAM functions in Ethernet-based networks and Ethernet services
TR-101	Migration to Ethernet-Based DSL Aggregation
ITU-T Y.1731	OAM functions and mechanisms for Ethernet-based networks
IEEE 802.1ag	Connectivity Fault Management, IEEE Standard for Local and Metropolitan Area Networks Virtual Bridged Local Area Networks Amendment 5

A.6 Standards for Network Protections

Reference Standard for Ethernet Link Aggregation

Standard Number	Title
IEEE 802.1AX-2008	IEEE Standard for Local and metropolitan area networks - Link Aggregation

Reference Standard for MSTP

Standard Number	Title
IEEE Std 802.1d	1998 Edition, Spanning Tree Protocol
IEEE Std 802.1w-2001	Rapid Spanning Tree Protocol
IEEE Std 802.1s-2002	Multiple Spanning Tree Protocol

Reference Standard for ERPS

Standard Number	Title
ITU-T G.8032 V1	Ethernet Ring Protection Switching
ITU-T G.8032 V2	Ethernet Ring Protection Switching

A.7 Standards for Layer 3 Functions

Reference Standard for ARP

Standard Number	Title
IETF RFC 826	An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware

Reference Standard for ARP Proxy

Standard Number	Title
IETF RFC 1027	Using ARP to Implement Transparent Subnet Gateways

Reference Standard for DHCP Relay

Standard Number	Title
RFC 2131	Dynamic Host Configuration Protocol

Reference Standards for DHCPv6 Relay

Standard Number	Title
RFC 3315	DHCPv6 Snooping
RFC 3736	Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 6221	DHCPv6 LDRA

Reference Standard for DHCP Proxy

Standard Number	Title
dsl2006[1].127.00	Proposals of DHCP relay improvements

Routing Protocols

Standard Number	Title
IETF RFC 1723	RIP Version 2 Carrying Additional Information
IETF RFC 2453	RIP Version 2
RFC 1583	OSPF Version 2
RFC 1765	OSPF Database Overflow
RFC 2328	OSPF Version 2
RFC 2370	The OSPF Opaque LSA Option
RFC 3137	OSPF Stub Router Advertisement
RFC 3623	Graceful OSPF Restart
RFC 3630	Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 3682	The Generalized TTL Security Mechanism (GTSM)
RFC 3906	Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels
RFC 4576	Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4577	PDF OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4750	OSPF Version 2 Management Information Base

Reference Standards for L3VPN

Standard Number	Title
RFC 2764	A Framework for IP Based Virtual Private Networks
RFC 2917	A Core MPLS IP VPN Architecture
RFC 3392	Capabilities Advertisement with BGP-4

Standard Number	Title
RFC 4026	Provider Provisioned Virtual Private Network (VPN) Terminology
RFC 4271	BGP-4
RFC 4364	BGP / MPLS IP Virtual Private Networks (VPNs)
RFC 4382	MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base
RFC 4447	Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)
RFC 4577	OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4659	BGP-MPLS VPN Extension for IPv6 VPN
RFC 4760	Multiprotocol Extensions for BGP-4
RFC 4762	Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling
RFC 5668	4-Octet AS Specific BGP Extended Community
draft-ietf-l2vpn-oam-req-frmk-01	VPLS OAM Requirements and Framework
draft-ietf-l2vpn-signaling-08	Provisioning, Autodiscovery, and Signaling in L2VPNs
draft-ietf-pwe3-redundancy-04	Pseudowire Redundancy

A.8 IPv6 Standards

Standard Number	Title
IETF RFC 2373	IP Version 6 Addressing Architecture
IETF RFC 2460	Internet Protocol, Version 6 (IPv6) Specification
IETF RFC 2464	Transmission of IPv6 Packets over Ethernet Networks
IETF RFC 2472	IP Version 6 over PPP
IETF RFC 2710	Multicast Listener Discovery (MLD) for IPv6
IETF RFC 3315	Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
IETF RFC 3633	IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6
IETF RFC 3736	Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
IETF RFC 3810	Multicast Listener Discovery Version 2 (MLDv2) for IPv6
IETF RFC 4604	Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
IETF RFC 2080	RIPng for IPv6
IETF RFC 2461	Neighbor Discovery for IP Version 6 (IPv6)

Standard Number	Title
IETF RFC 2462	IPv6 Stateless Address Autoconfiguration
IETF RFC 2463	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
IETF RFC 2474	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
IETF RFC 2545	Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
IETF RFC 2675	IPv6 Jumbograms
IETF RFC 2740	OSPF for IPv6
IETF RFC 2858	Multiprotocol Extensions for BGP-4
IETF RFC 3646	DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
IETF RFC 3697	IPv6 Flow Label Specification

A.9 Other Standards

Standard Number	Title
IETF RFC 2284	PPP Extensible Authentication Protocol (EAP)
SFF-8472	Specification for Diagnostic Monitoring Interface for Optical Transceivers (Rev 10.3 Dec.1, 2007)
ITU-T Rec L.40	Optical fibre outside plant maintenance support, monitoring and testing system
ITU-T Rec L.53	Optical fibre maintenance criteria for access networks
IETF RFC 2362	Protocol Independent Multicast-Sparse Mode
ITU-T Y.1731	Operations, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks
RFC 3032	MPLS Label Stack Encoding
RFC 3035	MPLS using LDP and ATM VC Switching
RFC 3063	MPLS Loop Prevention Mechanism
RFC 3107	Carrying Label Information in BGP-4
RFC 3270	Multi-Protocol Label Switching (MPLS) Support of Differentiated Services
RFC 3346	Applicability Statement for Traffic Engineering with MPLS
RFC 3443	Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
RFC 3564	Requirements for Support of Differentiated Services-aware MPLA Traffic Engineering

Standard Number	Title
RFC 4379	Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures
RFC 4448	Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4553	Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
RFC 4618	Encapsulation Methods for Transport of PPP/High-Level Data Link Control (HDLC) over MPLS Networks
RFC 4905	Encapsulation Methods for Transport of Layer 2 Frames over MPLS Networks
RFC 4906	Transport of Layer 2 Frames Over MPLS
RFC 4915	Multi-Topology (MT) Routing in OSPF
RFC 5462	Multiprotocol Label Switching (MPLS) Label Stack Entry: "EXP" Field Renamed to "Traffic Class" Field
RFC 5994	Application of Ethernet Pseudowires to MPLS Transport Networks
ITU-T G.8112	Interfaces for the transport MPLS (MPLS-TP) hierarchy
ITU-T G.8110	MPLS layer network architecture
ITU-T G.8110.1	Application of MPLS in the transport network
ITU-T G.8121	Characteristics of transport MPLS equipment functional blocks
IP/MPLS Forum 19.0.0	MPLS Inter-Carrier Interconnect (MPLS-ICI) Technical Specification
IP/MPLS Forum 20.0.0	MPLS in Mobile Backhaul Networks Framework and Requirements Technical Specification
BBF WT-221	Technical Specification for MPLS in Mobile Backhaul Networks

Appendix B Abbreviations

AAA	Authentication, Authorization and Accounting
ACL	Access Control List
ARP	Address Resolution Protocol
BFD	Bidirectional Forwarding Detection
BLV	Basics Level Vectoring
BRAS	Broadband Remote Access Server
BSS	Base Station Subsystem
BSC	Base Station Controller
CoS	Class of Service
DHCP	Dynamic Host Configuration Protocol
DoS	Denial of Service
FMC	Fixed Mobile Convergence
FTTB	Fiber To The Building
FTTC	Fiber To The Curb
FTTH	Fiber To The Home
FTTO	Fiber To The Office
FTP	File Transfer Protocol
GEM	GPON Encapsulation Mode
GPON	Gigabit-capable Passive Optical Network
HQoS	Hierarchical Quality of Service
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPTV	Internet Protocol Television
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
LACP	Link Aggregation Control Protocol
MAC	Medium Access Control
MDU	Multi-Dwelling Unit
MGC	Media Gateway Controller
MGCP	Media Gateway Control Protocol
MIB	Management Information Base
MLD	Multicast Listener Discover

MOS	Mean Opinion Score
MSAN	MultiService Access Node
MSC	Media Server Controller
MSTP	Multiple Spanning Tree Protocol
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NGN	Next Generation Network
OAM	Operation, Administration And Maintenance
ODN	Optical Distribution Network
ONUs	Optical Network Unit
OSAL	Operating System Abstraction Layer
OSPF	Open Shortest Path First
OSS	Operations Support System
OLTs	Optical Line Termination
PDP	Power Distribution Panel
PON	Passive Optical Network
POTS	Plain Old Telephone Service
ppm	parts per million
PPPoE	Point to Point Protocol over Ethernet
PSTN	Public Switched Telephone Network
PTN	Public Telecommunications Network
QinQ	802.1Q-in-802.1Q
QoS	Quality of Service
RADIUS	Remote Authentication Dial In User Service
RMON	Remote Network Monitoring
RSTP	Rapid Spanning Tree Protocol
RTP	Real-time Transport Protocol
SBU	Single Business Unit
SFP	Small Form-factor Pluggable transceiver
SFU	Single Family Unit
SHDSL	Symmetric High bit rate Digital Subscriber Line
SIP	Session Initiation Protocol
SLV	System Level Vectoring
SNI	Service Node Interface
SNMP	Simple Network Management Protocol
SSH	Secure Shell

STB	Set Top Box
STP	Straight-Through Processing
TCP	Transmission Control Protocol
TWAMP	Two-Way Active Measurement Protocol
VLAN	Virtual Local Area Network
VoIP	Voice over Internet Protocol

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