Huahuan

HT8000-I/HT8000-II/HT8000-VI

Multi-service OTN/WDM

Transport Platform

User's Manual

Beijing Huahuan Electronics Co.,Ltd.

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1 Overview

Thank you for choosing HT8000-I/HT8000-II/HT8000-VI Multi-service OTN/WDM Transport Platform from Beijing Huahuan Electronics Co., Ltd. For the best service from this product, please read this manual carefully.

1.1 Introduction

HT8000-I, HT8000-II and HT8000-VI are integrated OTN/WDM transport platform products intended for the metropolitan edge applications, including metropolitan convergence layer and access layer. They feature abundant service types, large system capacity, versatile protection functions, high integration, multiple topologies, DWDM, CWDM and DWDM/CWDM hybrid transmission.

HT8000-I is a 1U device with a maximum of 8*10G transmission capacity.

HT8000-II is a 2U device with a maximum of 16*10G transmission capacity.

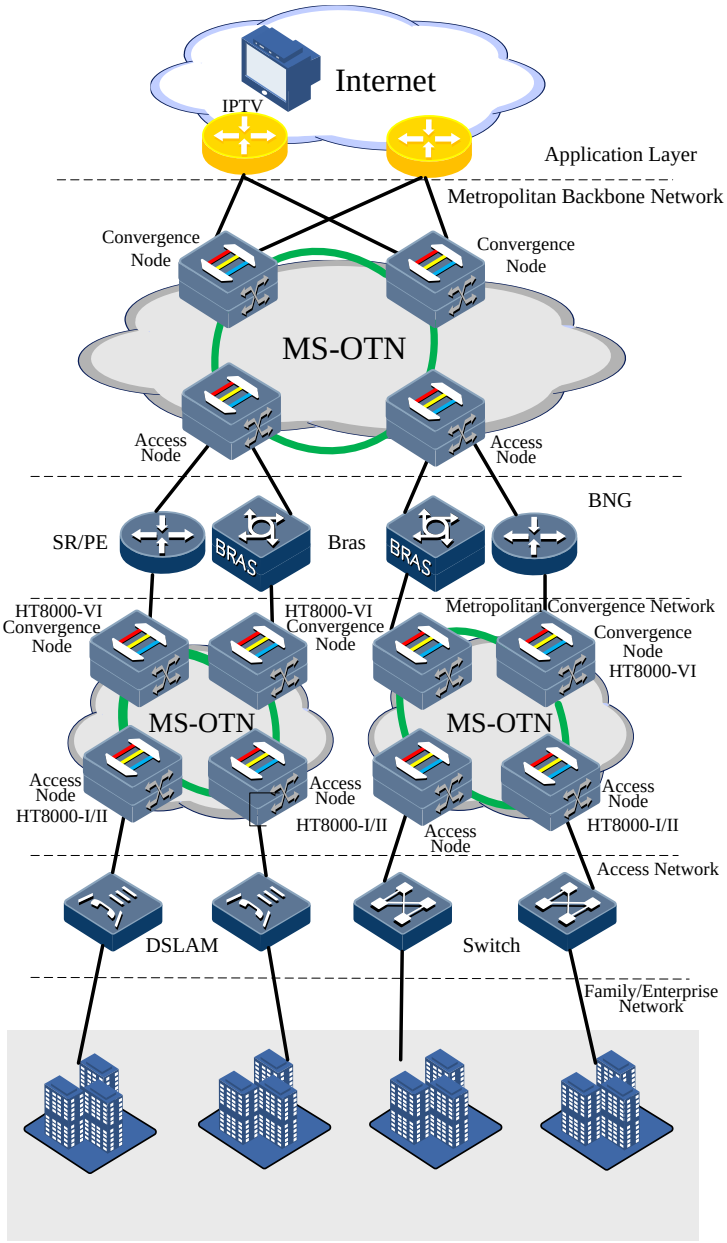
HT8000-VI is a 6U device with a maximum of 40*10G transmission capacity.

1.2 Typical Application

1.2.1 Metropolitan Broadband Bearing

HT8000-I/HT8000-II/HT8000-VI devices are applied in Metropolitan broadband network to provide a cost-efficient and high broadband solution for customers to resolve the tension of fiber recourse.

Figure 1-1 Metropolitan broadband bearing diagram

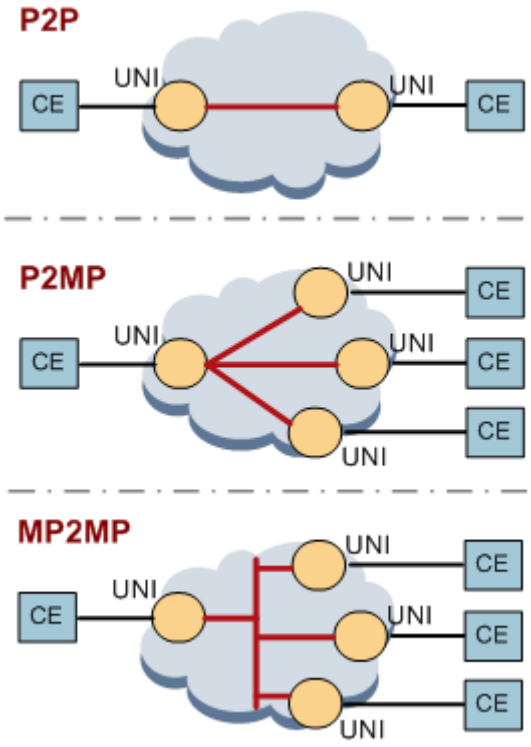


1.2.2 Leased Line Service

Leased line services are the mainstream in the network operation. HT8000-I/HT8000-II/HT8000-VI devices are capable of carrying leased line networks with flexible service access, high bandwidth, high reliability and easy operation with lowest Opex.

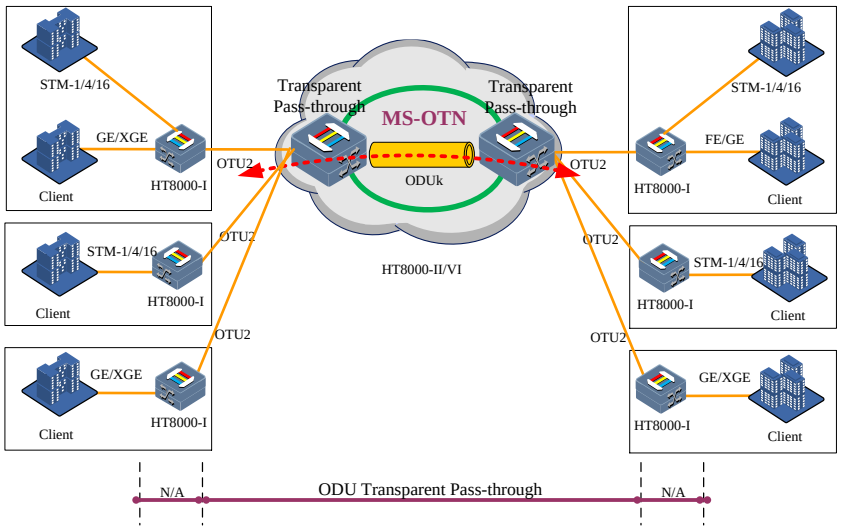
There are three types of leased lines: P2P (point-to-point), P2MP (point-to-multipoint) and MP2MP (multipoint-to-multipoint).

Figure 1-2 Leased line models



HT8000-I/HT8000-II/HT8000-VI can build flexible networks with different service cards to realize different services' access/multiplex and transparent pass-through.

Figure 1-3 Private line networking diagram



NOTE

1. HT8000-I is deployed as a CPE to aggregate GE, XGE and STM-N services into an OTU2 uplink signal, which can be connected to the DWDM module in the HT8000-II or HT8000-VI in a central office.
2. HT8000 (HT8000-02/03C/13) is deployed as a CPE to aggregate GE, XGE and STM-N services into an OTU2 uplink signal, which can be connected to the DWDM module in the HT8000-I, HT8000-II or HT8000-VI in a central office.
3. If HT8000-I or HT8000-II is only configured with the EDFA card, it can be used as an independent EDFA device.

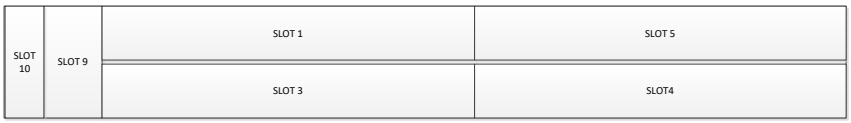
2 Hardware Architecture

2.1 Device Configuration

HT8000-I/HT8000-II/HT8000-VI devices use plug-in design. All cards in the chassis are installed horizontally at the front of the chassis and support hot swapping.

HT8000-I chassis provides four slots for cards. Slot layout is shown in Figure 2-1.

Figure 2-1 Slot layout of HT8000-I



HT8000-I can be configured with following cards, the slot assignment is shown in Table 2-1.

Table 2-1 Card configuration list of HT8000-I

Card Name	Slot	Remark
MC01	Slot 1	Management and clock card with 2 OSC channels

Card Name	Slot	Remark
FPS7-D48	Slot 10	48V DC power supply unit
FPS1-D48	Slot 4	48V DC power supply unit
FPS1-A220	Slot 4	220V AC power supply unit
FFT3	Slot 9	3 fans card for 1RU chassis
FS4	Slot 3/4/5	4 channels OSC card with external NM, BITs, and alarm port
O2A8-D	Slot 3/4/5	2xOTU2+8xAnyrate muxponder with ODU switch
O4M4	Slot 3/4/5	4xOTU2 multi-rate transponder
O2M2-P	Slot 3/4/5	2xOTU2 multi-rate transponder with 1+1 protection
C1G3-BSE-LC2737	Slot 3/4/5	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C1G3-BSE-LC3727	Slot 3/4/5	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
D1GH-S-LD2136	Slot 4	16 channels (D21-D36) DWDM MUX/DEMUX card with 1510nm OSC channel, occupying 2 slots
D1GD-S-LD2132	Slot 4	12 channels (D21-D32) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots

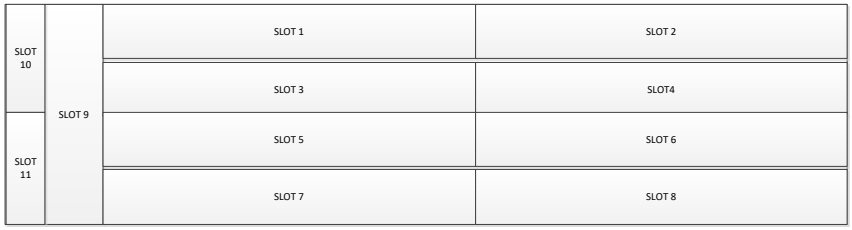
Card Name	Slot	Remark
D1GD-S-LD3344	Slot 4	12 channels (D33-D44) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
D1GD-S-LD4556	Slot 4	12 channels (D45-D56) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
C1G8-S-LC4761	Slot 3/4/5	8 channels (1471nm-1611nm) DWDM MUX/DEMUX card with 1510nm OSC channel
C1GX-LC4361	Slot 3/4/5	10 channels (1431nm-1611nm) CWDM MUX/DEMUX card
D1G8-SE-LD2128	Slot 3/4/5	8 channels (D21-D28) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD2936	Slot 3/4/5	8 channels (D29-D36) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD3744	Slot 3/4/5	8 channels (D37-D44) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD4552	Slot 3/4/5	8 channels (D45-D52) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD5360	Slot 3/4/5	8 channels (D53-D60) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port

Card Name	Slot	Remark
D1MF-S-LD2160	Slot 4	40 channels (D21-D60) DWDM MUX card with 1510nm OSC channel, occupying 2 slots
D1DF-S-LD2160	Slot 4	40 channels (D21-D60) DWDM DEMUX card with 1510nm OSC channel, occupying 2 slots
C1G2-BSE-LC5157	Slot 3/4/5	2 channels single-fiber 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C2G1-E-LC51	Slot 3/4/5	2 CH, 1510nm CWDM filter card with EXP port for OSC add/drop
A2GC-SM-P21.P17	Slot 3/4/5	Full C-band, integrated +21dBm BA and +17dBm PA, with OSC and Mon port
A2GC-SM-P17.P12	Slot 3/4/5	Full C-band, integrated +17dBm BA and +12dBm PA, with OSC and Mon port
A2GS-M-P17.P12	Slot 3/4/5	Single channel, integrated +17dBm BA and +12dBm PA, with Mon port
B1FN-40	Slot 4	40km DCF card, occupying 2 slots
B1FN-60	Slot 4	60km DCF card, occupying 2 slots
B1FN-80	Slot 4	80km DCF card, occupying 2 slots
P1P1	Slot 3/4/5	1+1 Optical line protection card
P1P1-M	Slot 1	1+1 Optical line protection card, supporting management function

Card Name	Slot	Remark
P1R1	Slot 3/4/5	1:1 Optical line protection card
P1R1-M	Slot 1	1:1 Optical line protection card, supporting management function
P1R1-P	Slot 3/4/5	1:1 Optical line protection card, supporting switching protocol control
P1R1-MP	Slot 1	1:1 Optical line protection card, supporting switching protocol control and management function
A1BS-MC-P17	Slot 1	Single channel, +17dBm Boost Amplifier, with MON port and management port
A1RC-M-G14	Slot 4	C-band, Raman Amplifier, G=14dB, with MON port
A1RC-MC-G14	Slot 1	C-band, Raman Amplifier, G=14dB, with MON port and management port, occupying 2 slots
A1BS-M-P17	Slot 3/4/5	Single channel, +17dBm Boost Amplifier, with Mon port
A1PS-M-P12	Slot 3/4/5	Single channel, +12dBm Preamplifier, with Mon port
A1PS-MC-P12	Slot 1	Single channel, +12dBm Preamplifier, with Mon port and management port
A2GS-NM-P21.P12	Slot 3/4/5	Single channel, Low noise application, integrated +21dBm BA and +12dBm PA, with Mon port

HT8000-II chassis provides eight slots for cards. Slot layout is shown in Figure 2-2.

Figure 2-2 Slot layout of HT8000- II



HT8000- II can be configured with following cards; the slot assignment is shown in Table 2-2.

Table 2-2 Card configuration list of HT8000- II

Card Name	Slot	Remark
MC01	Slot1/2	Management and clock card with 2 OSC channels
FPS7-D48	Slot 10/11	48V DC power supply unit
FFT6	Slot 9	6 fans card for 2U/6U chassis
FS4	Slot 3/4/5/6/7/8	4 channels OSC card with external NM, BITs, and alarm port
O2A8-D	Slot 3/4/5/6/7/8	2XOTU2+8xAnyrate muxponder with ODU switch
O4M4	Slot 3/4/5/6/7/8	4XOTU+2 multi-rate transponder

Card Name	Slot	Remark
O2M2-P	Slot 3/4/5/6/7/8	2 XOTU+2 multi-rate transponder with 1+1 protection
D1GH-S-LD2136	Slot 5/6/7/8	16 channels (D21-D36) DWDM MUX/DEMUX card with 1510nm OSC channel, occupying 2 slots
C1G8-S-LC4761	Slot 3/4/5/6/7/8	8 channels (1471nm-1611nm) DWDM MUX/DEMUX card with 1510nm OSC channel
C1GX-LC4361	Slot 3/4/5/6/7/8	10 channels (1431nm-1611nm) CWDM MUX/DEMUX card
D1G8-SE-LD2128	Slot 3/4/5/6/7/8	8 channels (D21-D28) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD2936	Slot 3/4/5/6/7/8	8 channels (D29-D36) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD3744	Slot 3/4/5/6/7/8	8 channels (D37-D44) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port

Card Name	Slot	Remark
D1G8-SE-LD4552	Slot 3/4/5/6/7/8	8 channels (D45-D52) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD5360	Slot 3/4/5/6/7/8	8 channels (D53-D60) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
C1G3-BSE-LC2737	Slot 3/4/5/6/7/8	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C1G3-BSE-LC3727	Slot 3/4/5/6/7/8	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
D1MF-S-LD2160	Slot 5/6/7/8	40 channels (D21-D60) DWDM MUX card with 1510nm OSC channel, occupying 2 slots
D1DF-S-LD2160	Slot 5/6/7/8	40 channels (D21-D60) DWDM DEMUX card with 1510nm OSC channel, occupying 2 slots
D1GD-S-LD2132	Slot 5/6/7/8	12 channels (D21-D32) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
D1GD-S-LD3344	Slot 5/6/7/8	12 channels (D33-D44) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots

Card Name	Slot	Remark
D1GD-S-LD4556	Slot 5/6/7/8	12 channels (D45-D56) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
C1G2-BSE-LC5157	Slot 3/4/5/6/7/8	2 channels single-fiber 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C2G1-E-LC51	Slot 3/4/5/6/7/8	2 CH, 1510nm CWDM filter card with EXP port for OSC add/drop
A2GC-SM-P21.P17	Slot 3/4/5/6/7/8	Full C-band, integrated +21dBm BA and +17dBm PA, with OSC and Mon port
A2GC-SM-P17.P12	Slot 3/4/5/6/7/8	Full C-band, integrated +17dBm BA and +12dBm PA, with OSC and Mon port
A2GS-M-P17.P12	Slot 3/4/5/6/7/8	Single channel, integrated +17dBm BA and +12dBm PA, with Mon port
B1FN-40	Slot 5/6/7/8	40km DCF card, occupying 2 slots
B1FN-60	Slot 5/6/7/8	60km DCF card, occupying 2 slots
B1FN-80	Slot 5/6/7/8	80km DCF card, occupying 2 slots
P1P1	Slot 3/4/5/6/7/8	1+1 Optical line protection card

Card Name	Slot	Remark
P1R1	Slot 3/4/5/6/7/8	1:1 Optical line protection card
P1R1-P	Slot 3/4/5/6/7/8	1:1 Optical line protection card, supporting switching protocol control
A1RC-M-G14	Slot 5/6/7/8	C-band, Raman Amplifier, G=14dB, with MON port, occupying 2 slots
A1RC-MC-G14	Slot 1	C-band, Raman Amplifier, G=14dB, with MON port and management port, occupying 2 slots
A1BS-M-P17	Slot 3/4/5/6/7/8	Single channel, +17dBm Boost Amplifier, with Mon port
A1PS-M-P12	Slot 3/4/5/6/7/8	Single channel, +12dBm Preamplifier, with Mon port
A1PS-MC-P12	Slot 1	Single channel, +12dBm Preamplifier, with Mon port and management port
A2GS-NM-P21.P12	Slot 3/4/5/6/7/8	Single channel, Low noise application, integrated +21dBm BA and +12dBm PA, with Mon port

HT8000-VI chassis provides twenty-four slots for cards. Slot layout is shown in Figure 2-3.

Figure 2-3 Slot layout of HT8000- VI

HT8000-VI can be configured with following cards; the slot assignment is shown in Table 2-3.

Table 2-3 Card configuration list of HT8000-VI

Card Name	Slot	Remark
MC01	Slot1/2	Management and clock card with 2 OSC channels
MC02	Slot 30/31	Expandable chassis cascade card, HT8000-VI includes 2 MC02 cards by default
FPS7-D48	Slot 28/29	48V DC power supply unit
FFT6	Slot 25/26/27	6 fans card for 1RU chassis

Card Name	Slot	Remark
FS4	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	4 channels OSC card with external NM, BITs, and alarm port
O2A8-D	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	2xOTU2+8xAnyrate muxponder with ODU switch
O4M4	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	4xOTU2 multi-rate transponder
O2M2-P	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	2xOTU2 multi-rate transponder with 1+1 protection
D1GH-S-LD2136	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	16 channels (D21-D36) DWDM MUX/DEMUX card with 1510nm OSC channel, occupying 2 slots
C1G8-S-LC4761	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (1471nm-1611nm) DWDM MUX/DEMUX card with OSC channel
C1GX-LC4361	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	10 channels (1431nm-1611nm) CWDM MUX/DEMUX card
C1G3-BSE-LC2737	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C1G3-BSE-LC3727	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	3-channel, single-fiber, 2-way CWDM MUX/DEMUX card with OSC channel and EXP port

Card Name	Slot	Remark
D1G8-SE-LD2128	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (D21-D28) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD2936	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (D29-D36) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD3744	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (D37-D44) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD4552	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (D45-D52) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1G8-SE-LD5360	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	8 channels (D53-D60) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port
D1MF-S-LD2160	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	40 channels (D21-D60) DWDM MUX card with 1510nm OSC channel, occupying 2 slots
D1DF-S-LD2160	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	40 channels (D21-D60) DWDM DEMUX card with 1510nm OSC channel, occupying 2 slots

Card Name	Slot	Remark
D1GD-S-LD2132	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	12 channels (D21-D32) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
D1GD-S-LD3344	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	12 channels (D33-D44) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
D1GD-S-LD4556	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	12 channels (D45-D56) DWDM MUX/DEMUX card with OSC channel, occupying 2 slots
C1G2-BSE-LC5157	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	2 channels single-fiber 2-way CWDM MUX/DEMUX card with OSC channel and EXP port
C2G1-E-LC51	Slot 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24	2 CH, 1510nm CWDM filter card with EXP port for OSC add/drop
B1FN-40	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	40km DCF card, occupying 2 slots
B1FN-60	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	60km DCF card, occupying 2 slots
B1FN-80	Slot 5/6/7/8/11/12/13/14/15/16/19/20/21/22/23/24	80km DCF card, occupying 2 slots

NOTE

The card occupying two slots is installed in the lower part of two slots it occupies.

2.2 Card Introduction

This section describes the function and use of various cards on HT8000-I/HT8000-II/HT8000-VI. There are interfaces and indicators on the cards, indicating their running status, alarm status, and other status, which facilitates the on-site installation and commissioning.

2.2.1 48V DC Power-supply Card/700W (FPS7-D48)

FPS7-D48 card is connected to the -48V power supply and provides protection against input under-voltage, input overvoltage, output overvoltage, output overcurrent, output short-circuit, and over temperature.

HT8000-II/HT8000-VI can use two power supply cards to provide 1+1 power protection.

There is a PWR LED and two power interfaces on the front panel of FPS7-D48. The front panel diagram is shown in Figure 2-4, the PWR LED is described in Table 2-4, and the description of power interface is shown in Table 2-5.

Figure 2-4 The front panel diagram of FPS7-D48

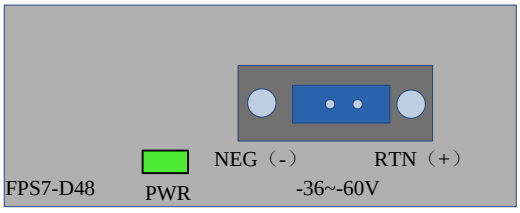


Table 2-4 LED functional descriptions of FPS7-D48

LED	Status	Descriptions
PWR	On (green)	Normal power supply/voltage input
	Off	Abnormal power supply access

Table 2-5 Description of power interface

Panel interface	Descriptions
NEG(-)	Connect to the negative terminal of the power supply
RTN(+)	Connect to the positive terminal of the power supply

2.2.2 48V DC Power-supply Card/100W (FPS1-D48)

FPS1-D48 card is connected to the -48V power supply and provides protection against input under-voltage, input overvoltage, output overvoltage, output overcurrent, output short-circuit, and over temperature. It is only used in HT8000-I device.

There is a PWR LED and two power interfaces on the front panel of FPS1-D48. The front panel diagram is shown in Figure 2-5, the PWR LED is described in Table 2-6, and the description of power interface is shown in Table 2-7.

Figure 2-5 The front panel diagram of FPS1-D48

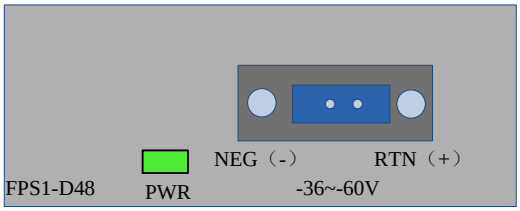


Table 2-6 LED functional descriptions of FPS1-D48

LED	Status	Descriptions
PWR	On (green)	Normal power supply/voltage input
	Off	Abnormal power supply access

Table 2-7 Description of power interface

Panel interface	Descriptions
NEG(-)	Connect to the negative terminal of the power supply
RTN(+)	Connect to the positive terminal of the power supply

2.2.3 220V AC Power-supply Card (FPS1-A220)

FPS1-A220 card is connected to the 220V power supply and provides protection against input under-voltage, input overvoltage, output overvoltage, output overcurrent, and over temperature. It supports hot swap and redundancy protection.

There is a PWR LED and a power interface on the front panel of FPS1-A220. The front panel diagram is shown in Figure 2-6, the PWR LED is described in Table 2-8.

Figure 2-6 The front panel diagram of FPS1-A220

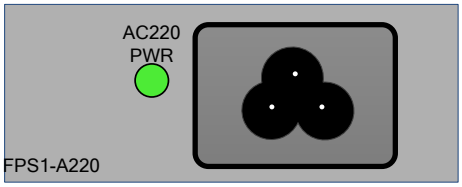


Table 2-8 LED functional descriptions of FPS1-A220

LED	Status	Descriptions
PWR	On (green)	Normal power supply/voltage input
	Off	Abnormal power supply access

2.2.4 4-channel OSC Card (FS4)

FS4 card is used to process 4 optical supervisory channels (OSC1-OSC4) at each site.

FS4 card provides clock source for the system.

FS4 card has 2 LEDs, 4 OSC ports, 1 BITS port, 1 1PPS TOD port, and 1 alarm output port. The front panel diagram is shown in Figure 2-7, the LEDs are described in Table 2-9.

Figure 2-7 The front panel diagram of FS4

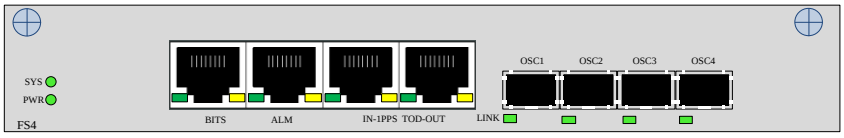


Table 2-9 LED functional descriptions of FS4

LED	Color	Descriptions
PWR	Green	Power supply indication: On: normal Off: abnormal
SYS	Green	Device running indication: Blink: normal Off: abnormal
LINK	Green	Ethernet optical port signal status indication: On: optical signal received Off: loss of optical signal

2.2.5 Management Clock Card (MC01)

MC01 card provides the interface between the system and the network management system. It coordinates with the network management system to control each card of the equipment and realizes the communication between the equipment.

MC01 card is used to process 2 optical supervisory channels at each site. The OSC interface uses LC dual-fiber SFP module or single-fiber SFP module.

MC01 supports interconnection communication between network elements through DCC channels.

MC01 provides clock source for the system.

HT8000-II/HT8000-VI supports MC01 card backup protection.

MC01 provides 1 NM interface, 2 EXT interfaces, 1 CONSOLE interface, 1 BITS external clock input/output interface, 1PPS TOD interface, 2 OSC interfaces, 4 LEDs, 1 reset button and a set of 2-position dip switch. The

front panel diagram is shown in Figure 2-8, the LEDs are described in Table 2-10, and the Dip switch functions are shown in Table 2-11.

Figure 2-8 The front panel diagram of MC01

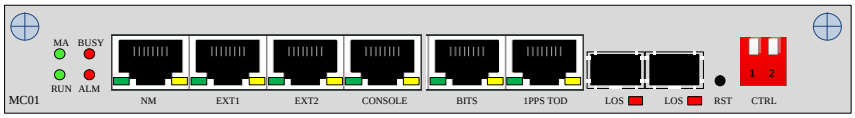


Table 2-10 LED functional descriptions of MC01

LED	Color	Descriptions
RUN	Green	Device running indication: Blink: normal Off: abnormal
MA	Green	Active/standby status indication: On: active status Off: standby status
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm
BUSY	Red	System board data synchronization indication: On: synchronization acquisition Off: no data synchronized
Green light at NM/EXT ports	Green	Ethernet optical port Link/Active indication: On: link up Blink: date transmitted in Ethernet optical port Off: link down

LED	Color	Descriptions
Yellow light at NM/EXT ports	Yellow	Ethernet port Speed indication: On: link to 100M Off: link to 10M or link down Blink: date transmitted in Ethernet port
LOS	Red	Ethernet optical port signal status indication: On: loss of optical signal Off: optical signal received

Table 2-11 Dip switch functions

Dip No.	Function
1	ON (down): Default IP configuration
2	ON (down): Reserved

Management Ports

MC01 provides 1 NM port, 2 EXT ports and 1 CONSOLE port as its network management ports, marks and definitions are shown in Table 2-12. Network management ports use standard RJ-45 socket whose connector diagram is shown in Figure 2-9, NM/EXT ports are FE electrical ports; see its socket definition in Table 2-13. CONSOLE port pin definition is shown in Table 2-14.

Table 2-12 Marks and definitions of management ports

Mark	Definition
NM/EXT	Out-of-band management port

Mark	Definition
CONSOLE	RS232 management port, using hyper terminal to manage device

Figure 2-9 Pin definition of RJ45 connector

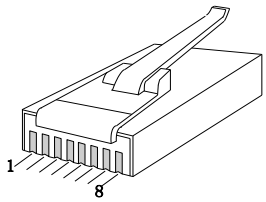


Table 2-13 RJ-45 Ethernet socket definition

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

Table 2-14 RJ45 socket definition of CONSOLE management port

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

BITS Port

MC01 card provides 1-channel of external clock input/output port, supporting 2MHz, 2Mbit/s clock mode. It is marked with “BITS”, using RJ45 socket. RJ-45 connector diagram and pin definition are shown in Figure 2-9 and Table 2-15.

Table 2-15 Definition of external clock input\output ports

Pin	Definition	Description
1	IN+	IN is Rx OUT is Tx
2	IN-	
3	CGND	
4	OUT+	
5	OUT-	
6	CGND	
7	-	
8	-	

1PPS+TOD Port

MX02 card provides 1 1PPS TOD port with configurable input and output. It is marked with "1PPS TOD", using RJ45 socket. RJ-45 connector diagram and pin definition are shown in Figure 2-9 and Table 2-16.

Table 2-16 1PPS+ToD port pin definition

Pin	Definition	Description
1	-	-
2	-	-
3	RS-422_1_N	1PPS -
4	GND	GND
5	GND	GND
6	RS-422_1_P	1PPS+
7	RS-422_2_N	TOD time information
8	RS-422_2_P	TOD time information

Reset Button

There is a reset button marked with “RST” on the front panel of MC01 card, which is used to reset the card manually, as shown in Figure 2-10.

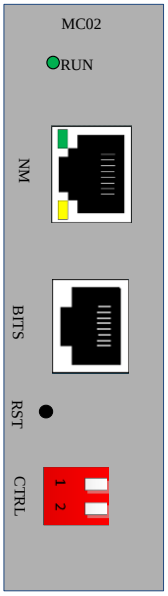
Figure 2-10 Reset button

2.2.6 Expandable Chassis Cascade Card (MC02)

MC02 is used for HT8000-VI device. It supports multilevel chassis cascading, realizes the communication between the cascaded devices, so as to increase access traffic of the device.

MC02 provides a green LED (RUN) to indicate its operational status, blinking means running normally, off means running abnormally or unpowered. The front panel diagram of MC02 is shown in Figure 2-11.

Figure 2-11 The front panel diagram of MC02



NOTE

The NM port and BITS port are designed for internal use.

Reset Button

There is a reset button marked with “RST” on the front panel of MC02 card, which is used to reset the card manually, as shown in Figure 2-12.

Figure 2-12 Reset button

2.2.7 8 Anyrate+2 OTU Muxponder Card (O2A8-D)

O2A8-D card multiplexes 8 channels of any service signals at any rate into OTU2 optical signals. ODU cross-connect is internally supported.

O2A8-D supports RMON function, alarm and performance monitoring functions.

O2A8-D is coded by NRZ. It supports the ESC function to integrate the monitoring information into the service channel for transmission.

O2A8-D has 2 NNI interfaces and 8 UNI interfaces. NNI optical interfaces support the LC dual-fiber SFP+ optical module or single-fiber SFP+ optical module; UNI optical interfaces support the LC dual-fiber SFP/SFP+ optical module or single-fiber SFP/SFP+ optical module. The front panel diagram is shown in Figure 2-13, the LED is described in Table 2-17.

Figure 2-13 The front panel diagram of O2A8-D

Table 2-17 LED functional descriptions of O2A8-D

LED	Color	Descriptions
LOS	Red	Ethernet optical port signal status indication: On: loss of optical signal Off: optical signal received

2.2.8 4-channel Transponder Card (O4M4)

O4M4 is used to map 4 channels of multi-service 10G signals (e.g.10GE/STM-64) to OTU2 signals, achieving transparent pass-through of this traffic.

O4M4 supports RMON function, alarm and performance monitoring functions.

O4M4 is coded by NRZ. It supports the ESC function to integrate the monitoring information into the service channel for transmission.

O4M4 card has 4 NNI interfaces and 4 UNI interfaces. NNI/UNI optical interfaces support the LC dual-fiber SFP+ optical module or single-fiber SFP+ optical module. The front panel diagram is shown in Figure 2-14, the LED is described in Table 2-18.

Figure 2-14 The front panel diagram of O4M4

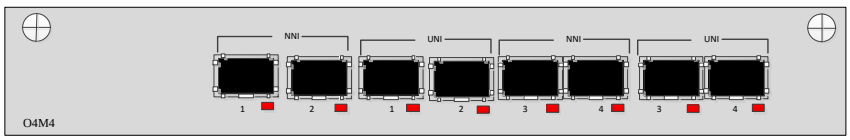


Table 2-18 LED functional descriptions of O4M4

LED	Color	Descriptions
Optical ports at NNI/UNI side	Red	Optical port signal status indication: On: loss of optical signal Off: optical signal received

2.2.9 2-channel Transponder Card (O2M2-P)

O2M2-P is used to map 2 channels of multi-service 10G signals (e.g.10GE/STM-64) to OTU2 signals, achieving transparent pass-through of this traffic. Its NNI side supports 2 groups of 1+1 protections.

O2M2-P supports RMON function, alarm and performance monitoring functions.

O2M2-P is coded by NRZ. It supports the ESC function to integrate the monitoring information into the service channel for transmission.

O2M2-P has 4 NNI interfaces and 2 UNI interfaces. NNI/UNI optical interfaces support the LC dual-fiber SFP+ optical module or single-fiber SFP+ optical module. The front panel diagram is shown in Figure 2-15, the LED is described in Table 2-19.

Figure 2-15 The front panel diagram of O2M2-P

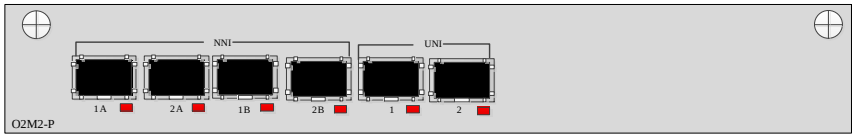


Table 2-19 LED functional descriptions of O2M2-P

LED	Color	Descriptions
Optical ports at NNI/UNI side	Red	Optical port signal status indication: On: loss of optical signal Off: optical signal received

2.2.10 16-channel DWDM MUX/DEMUX Card (D1GH-S-LD2136)

D1GH-S-LD2136 is a 16-channel (D21-D36) DWDM MUX/DEMUX card with 1510nm OSC channel.

D1GH-S-LD2136 supports DWDM technical specifications.

The front panel diagram of D1GH-S-LD2136 is shown in Figure 2-16, the LED is described in Table 2-20.

Figure 2-16 The front panel diagram of D1GH-S-LD2136

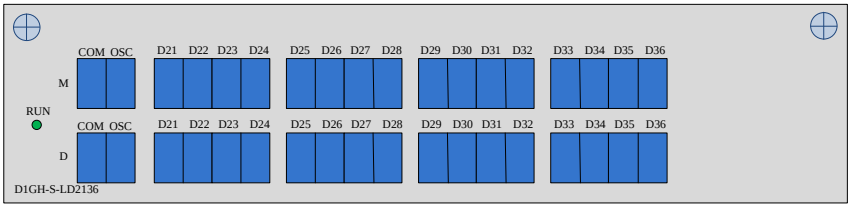


Table 2-20 LED functional descriptions of D1GH-S-LD2136

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

D1GH-S-LD2136 provides 36 optical interfaces, among which, D21-D36 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals; OSC interfaces are used to input/output supervisory signals, and COM interfaces are used to output/input multiplexed signals.

2.2.11 8-channel DWDM MUX/DEMUX Card (D1G8-SE-LD2128/D1G8-SE-LD2936/D1G8-SE-LD3744 /D1G8-SE-LD4552/D1G8-SE-LD5360)

D1G8-SE-LD2128 is an 8-channel (D21-D28) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port.

D1G8-SE-LD2936 is an 8-channel (D29-D36) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port.

D1G8-SE-LD3744 is an 8-channel (D37-D44) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port.

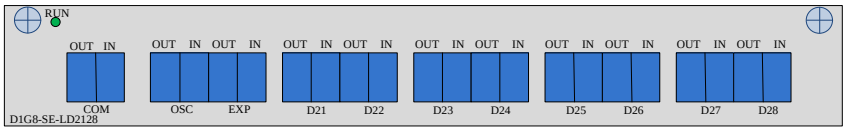
D1G8-SE-LD4552 is an 8-channel (D45-D52) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port.

D1G8-SE-LD5360 is an 8-channel (D53-D60) DWDM MUX/DEMUX card with 1510nm OSC channel and EXP port.

D1G8-SE-LD2128/D1G8-SE-LD2936/D1G8-SE-LD3744/D1G8-SE-LD4552/D1G8-SE-LD5360 supports DWDM technical specifications.

The front panel diagrams are shown in Figure 2-17, the LED is described in Table 2-21.

Figure 2-17 The front panel diagram of D1G8-SE-LD2128/ D1G8-SE-LD2936/D1G8-SE-LD3744/D1G8-SE-LD4552/D1G8-SE-LD5360



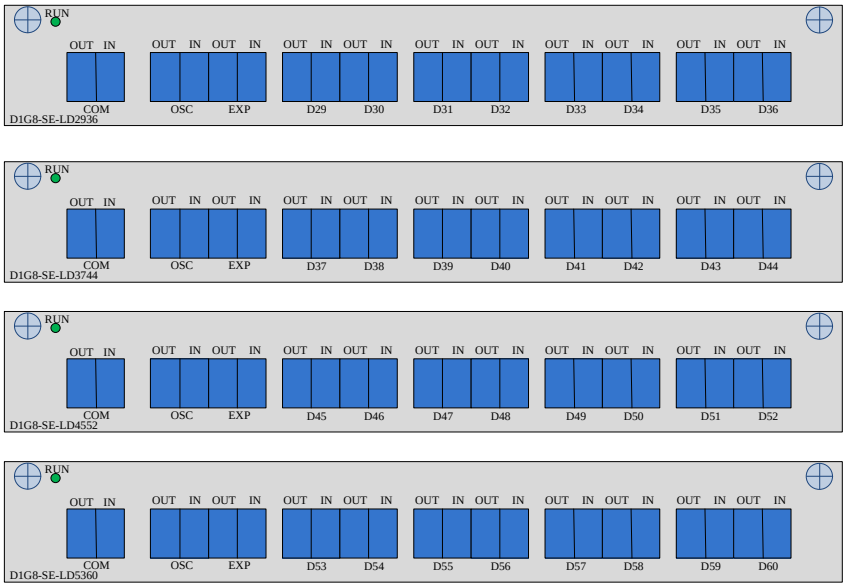


Table 2-21 LED functional descriptions of D1G8-SE-LD2128/ D1G8-SE-LD2936/D1G8-SE-LD3744/D1G8-SE-LD4552/D1G8-SE-LD5360

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

D1G8-SE-LD2128/D1G8-SE-LD2936/D1G8-SE-LD3744/D1G8-SE-LD4552/D1G8-SE-LD5360 provides 22 optical interfaces, among which, D21-D28/D29-D36/D37-D44/D45-D52/D53-D60 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals; OSC interfaces are used to input/output supervisory signals, EXP interfaces are the cascaded input/output interfaces and COM interfaces are used to output/input multiplexed signals.

2.2.12 12-channel DWDM MUX/DEMUX Card (D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556)

D1GD-S-LD2132 is a 12-channel (D21-D32) DWDM MUX/DEMUX card with OSC channel.

D1GD-S-LD3344 is a 12-channel (D33-D44) DWDM MUX/DEMUX card with OSC channel.

D1GD-S-LD4556 is a 12-channel (D45-D56) DWDM MUX/DEMUX card with OSC channel.

D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556 supports DWDM technical specifications.

The front panel diagrams are shown in Figure 2-18, the LED is described in Table 2-22.

Figure 2-18 The front panel diagrams of D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556

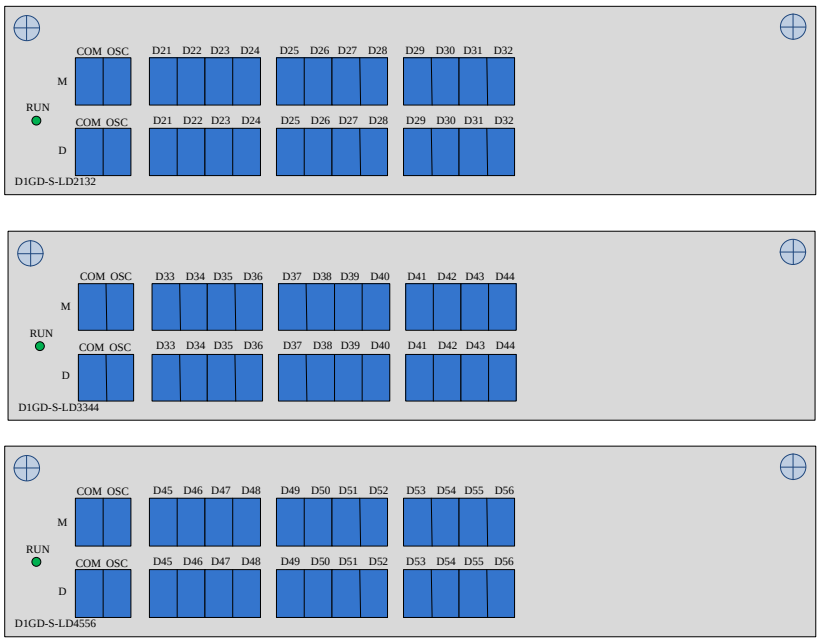


Table 2-22 LED functional descriptions of D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556 provides 28 optical interfaces, among which, D21-D32/D33-D44/D45-D56 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals; OSC interfaces are used to input/output supervisory signals and COM interfaces are used to output/input multiplexed signals.

2.2.13 40-channel DWDM MUX Card (D1MF-S-LD2160)

D1MF-S-LD2160 is a 40-channel (D21-D60) DWDM MUX card with 1510nm OSC channel.

D1MF-S-LD2160 supports DWDM technical specifications.

The front panel diagram of D1MF-S-LD2160 is shown in Figure 2-19, the LED is described in Table 2-23.

Figure 2-19 The front panel diagram of D1MF-S-LD2160

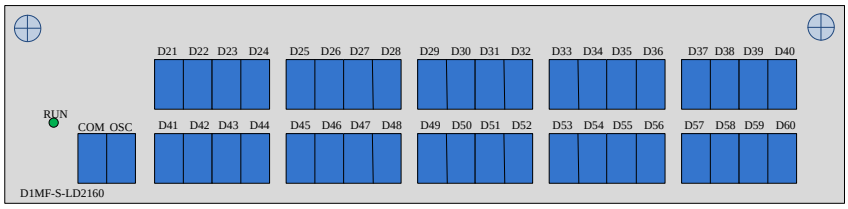


Table 2-23 LED functional descriptions of D1MF-S-LD2160

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

D1MF-S-LD2160 provides 42 optical interfaces, among which, D21-D60 interfaces are used to input the signals to be multiplexed; OSC interfaces are used to input supervisory signals, and COM interfaces are used to output multiplexed signals.

2.2.14 40-channel DWDM DEMUX Card (D1DF-S-LD2160)

D1DF-S-LD2160 is a 40-channel (D21-D60) DWDM DEMUX card with 1510nm OSC channel.

D1DF-S-LD2160 supports DWDM technical specifications.

The front panel diagram of D1DF-S-LD2160 is shown in Figure 2-20, the LED is described in Table 2-24.

Figure 2-20 The front panel diagram of D1DF-S-LD2160

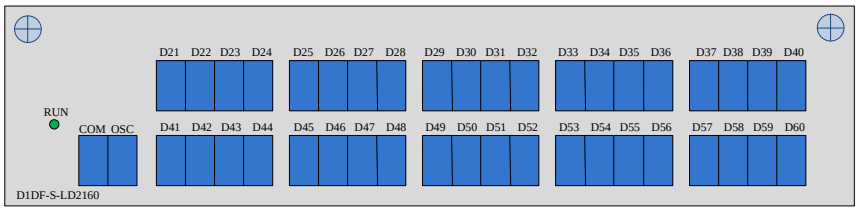


Table 2-24 LED functional descriptions of D1DF-S-LD2160

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

D1DF-S-LD2160 provides 42 optical interfaces, among which, D21-D60 interfaces are used to output the de-multiplexed signals; OSC interfaces are used to output supervisory signals, and COM interfaces are used to input multiplexed signals.

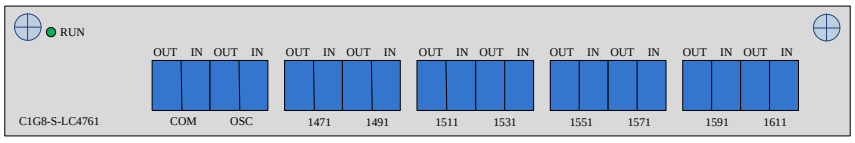
2.2.15 8-channel CWDM MUX/DEMUX Card (C1G8-S-LC4761)

C1G8-S-LC4761 is an 8-channel (1471nm-1611nm) CWDM MUX/DEMUX card with OSC channel.

C1G8-S-LC4761 supports CWDM technical specifications.

The front panel diagram of C1G8-S-LC4761 is shown in Figure 2-21, the LED is described in Table 2-25.

Figure 2-21 The front panel diagram of C1G8-S-LC4761



NOTE

The number under each optical port is the wavelength accessible to the optical port.

Table 2-25 LED functional descriptions of C1G8-S-LC4761

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

C1G8-S-LC4761 provides 20 optical interfaces, among which, 1471-1611 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals; OSC interfaces are used to input/output supervisory signals, and COM interfaces are used to output/input multiplexed signals.

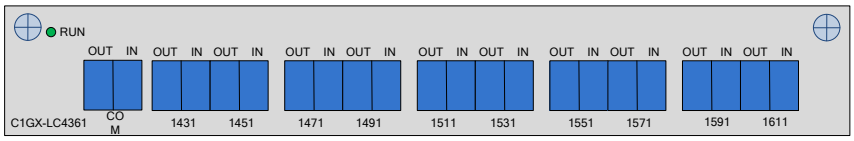
2.2.16 10-channel CWDM MUX/DEMUX Card (C1GX-LC4361)

C1GX-LC4361 is a 10-channel CWDM MUX/DEMUX card.

C1GX-LC4361 supports CWDM technical specifications.

The front panel diagram of C1GX-LC4361 is shown in Figure 2-22, the LED is described in Table 2-26.

Figure 2-22 The front panel diagram of C1GX-LC4361



NOTE

The number under each optical port is the wavelength accessible to the optical port.

Table 2-26 LED functional descriptions of C1GX-LC4361

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

C1GX-LC4361 provides 22 optical interfaces, among which, 1431-1611 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals; and COM interfaces are used to output/input multiplexed signals.

2.2.17 2-channel, Single-fiber, 2-way MUX/DEMUX Card（C1G2-BSE-LC5157）

C1G2-BSE-LC5157 supports single-fiber two-way transmission function, that is, two wavelength optical signals and one wavelength optical monitoring signal are de-multiplexed from the MUX wave signal; and another one wavelength optical monitoring signal and two wavelength optical signals are multiplexed into the MUX wave signal.

C1G2-BSE-LC5157 supports CWDM technical specifications.

C1G2-BSE-LC5157 provides an EXP port which can cascade other MUX/DEMUX cards to accomplish the multiplexing of remaining channels in the MUX signal.

The front panel diagram of C1G2-BSE-LC5157 is shown in Table 2-22, the LED is described in Table 2-27.

Figure 2-23 The front panel diagram of C1G2-BSE-LC5157

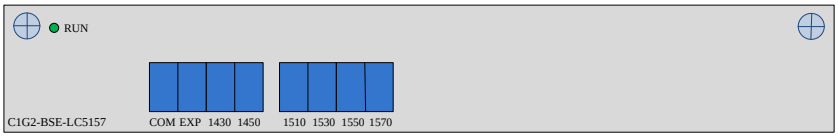


Table 2-27 LED functional descriptions of C1G2-BSE-LC5157

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

C1G2-BSE-LC5157 provides 8 optical interfaces, among which COM is a single-fiber 2-way interface for receiving and sending multiplexed signals; EXP interface is an expansion port; 1510, 1530, 1550 and 1570 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals, and 1430 and 1450 interfaces are used to input or output monitoring signals.

NOTE

It is recommended that the 1430, 1510 and 1550 optical ports are in one group, and the 1450, 1530 and 1570 optical ports are in another group, among those two groups, one group is used to receive optical signals, and the other is used to send optical signals.

2.2.18 2-way, Single CH CWDM Card (C2G1-E-LC51)

C2G1-E-LC51 is a 2-way 1510nm CWDM filtering card with EXP port for OSC add/drop.

C2G1-E-LC51 supports CWDM technical specifications.

The front panel diagram of C2G1-E-LC51 is shown in Figure 2-24, the LED is described in Table 2-28.

Figure 2-24 The front panel diagram of C2G1-E-LC51

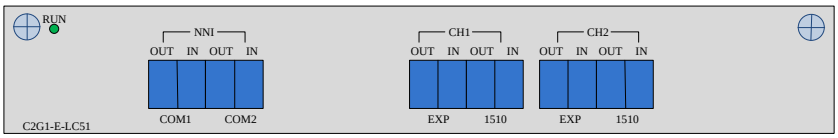


Table 2-28 LED functional descriptions of C2G1-E-LC51

LED	Color	Descriptions
RUN	Green	System running indication: On: running normally Off: running abnormally

C2G1-E-LC51 provides 12 optical interfaces, among which, EXP interfaces are used to receive/transmit signals in the master optical channels; 1510 interfaces are used to input/output supervisory signals, and COM interfaces are used to input/output line signals.

2.2.19 3-channel, Single-fiber, 2-way CWDM MUX/DEMUX Card (C1G3-BSE-LC2737/ C1G3-BSE-LC3727)

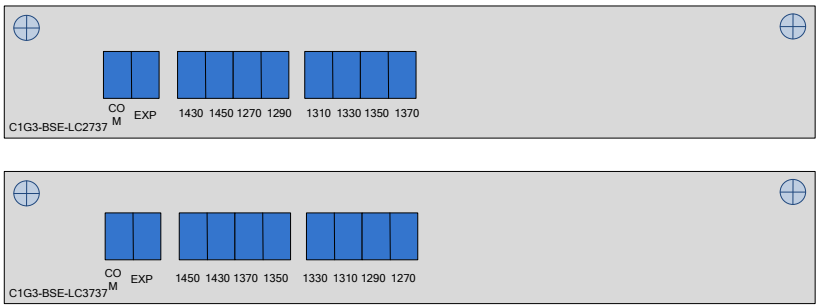
C1G3-BSE-LC2737 and C1G3-BSE-LC3727 are 3-channel, single-fiber, 2-way CWDM MUX/DEMUX cards with OSC channels.

C1G3-BSE-LC2737 and C1G3-BSE-LC3727 support CWDM technical specifications.

C1G3-BSE-LC2737 and C1G3-BSE-LC3727 respectively provide an EXP port which can cascade other MUX/DEMUX cards to accomplish the multiplexing/de-multiplexing of remaining channels in the MUX signal.

The front panel diagrams of C1G3-BSE-LC2737/ C1G3-BSE-LC3727 are shown in Figure 2-25.

Figure 2-25 The front panel diagrams of C1G3-BSE-LC2737/ C1G3-BSE-LC3727



C1G3-BSE-LC2737/C1G3-BSE-LC3727 provides 10 optical interfaces, among which COM is a single-fiber 2-way interface for receiving and sending multiplexed signals. EXP interface is an expansion port. 1270, 1290, 1310, 1330, 1350 and 1370 interfaces are used to input the signals to be multiplexed or output the de-multiplexed signals, and 1430 and 1450 interfaces are used to input or output monitoring signals.

NOTE

It is recommended that the 1450, 1370, 1330 and 1290 optical ports are in one group, and the 1430, 1350, 1310 and 1270 optical ports are in another group, among those two groups, one group is used to receive optical signals, and the other is used to send optical signals.

2.2.20 C-band, Pre+Boost EDFA (A2GC-SM-P21.P17/ A2GC-SM-P17.P12)

A2GC-SM-P21.P17 can realize amplification function of full C-band optical signal with integrated +21dBm BA and +17dBm PA. A2GC-SM-P17.P12 can realize amplification function of full C-band optical signal with integrated +17dBm BA and +12dBm PA. A2GC-SM-P21.P17/A2GC-SM-P17.P12 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

On the front panel of A2GC-SM-P21.P17/A2GC-SM-P17.P12, 2 OSC interfaces are used to supervise channel signal transmission; 2 MON interfaces are used to online monitor optical signals; 2 OUT interfaces are used to output the amplified signals; 2 IN interfaces are used to input signals to be amplified. The front panel diagrams are shown in Figure 2-26, 2 LEDs are described in Table 2-29.

Figure 2-26 The front panel diagrams of A2GC-SM-P21.P17/A2GC-SM-P17.P12

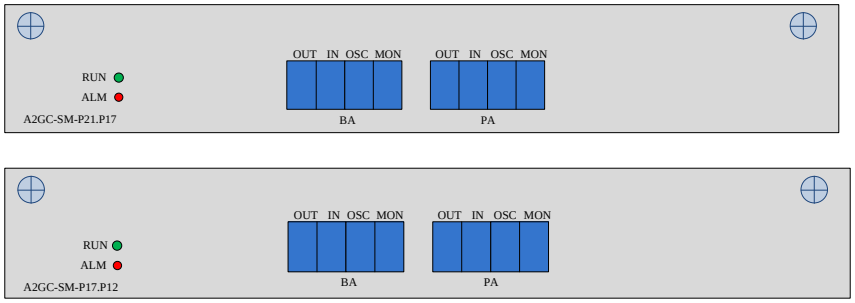


Table 2-29 LED functional descriptions of A2GC-SM-P21.P17/A2GC-SM-P17.P12

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

2.2.21 C-band Raman Optical Amplifier Card (A1RC-M-G14)

A1RC-M-G14 is a C-band Raman optical amplifier card, realizing amplification function of full C-band optical signal, with a maximum of 14dB gain. It is managed and used alone.

A1RC-M-G14 provides an MON port for on-line monitor optical signals.

On the front panel of A1RC-M-G14, 1 MON interface is used to monitor signal output; 1 PMON interface is used to monitor Pump amplifying power, 1 OUT interface is used to output the amplified signals; 1 IN interface is used to input signals to be amplified. The front panel diagram is shown in Figure 2-27, 2 LEDs are described in Table 2-30.

Figure 2-27 The front panel diagram of A1RC-M-G14

Table 2-30 LED functional descriptions of A1RC-M-G14

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

2.2.22 C-band Raman Optical Amplifier Card (A1RC-MC-G14)

A1RC-MC-G14 is a C-band Raman optical amplifier card, realizing amplification function of full C-band optical signal, with a maximum of 14dB gain. It is managed and used alone.

A1RC-MC-G14 provides an MON port for on-line monitor optical signals.

A1RC-MC-G14 provides the interface between the system and the network management system. It coordinates with the network management system to control each card of the equipment and realizes the communication between the equipment.

On the front panel of A1RC-MC-G14, 1 MON interface is used to monitor signal output; 1 PMON interface is used to monitor Pump amplifying power, 1 OUT interface is used to output the amplified signals; 1 IN interface is used to input signals to be amplified. The front panel diagram is shown in Figure 2-28, 2 LEDs are described in Table 2-31.

Figure 2-28 The front panel diagram of A1RC-MC-G14

Table 2-31 LED functional descriptions of A1RC-MC-G14

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally

LED	Color	Descriptions
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

2.2.23 Single CH, Pre+Boost EDFA (A2GS-M-P17.P12)

A2GC-SM-P21.P17 can realize amplification function of single channel optical signal with integrated +17dBm BA and +12dBm PA.

A2GC-SM-P21.P17/A2GC-SM-P17.P12 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

On the front panel of A2GS-M-P17.P12, 2 MON interfaces are used to online monitor optical signals; 2 OUT interfaces are used to output the amplified signals; 2 IN interfaces are used to input signals to be amplified. The front panel diagram is shown in Figure 2-29, 2 LEDs are described in Table 2-32.

Figure 2-29 The front panel diagram of A2GS-M-P17.P12

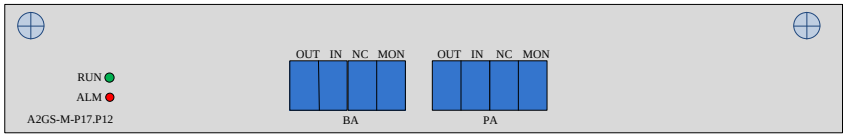


Table 2-32 LED functional descriptions of A2GS-M-P17.P12

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally

LED	Color	Descriptions
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

NOTE

NC interfaces are reserved.

2.2.24 Single CH, Boost Amplifier Card (A1BS-MC-P17)

A1BS-MC-P17 can realize amplification function of single channel optical signal with +17dBm boost amplifier.

A1BS-MC-P17 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

A1BS-MC-P17 provides an MON port for on-line monitor optical signals.

A1BS-MC-P17 provides the interface between the system and the network management system, works with the network management system to manage each card of the device, and realizes the communication between the devices.

On the front panel of A1BS-MC-P17, 1 MON interface is used to online monitor optical signals; 1 OUT interface is used to output the amplified signals; 1 IN interface is used to input signals to be amplified, 1 NM interface and 1 CONSOLE interface are used as monitoring interfaces, 1 OSC interface is used to supervise channel signal transmission. The front panel diagram is shown in Figure 2-30, 3 LEDs are described in Table 2-33.

Figure 2-30 The front panel diagram of A1BS-MC-P17

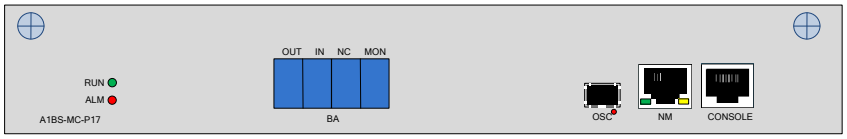


Table 2-33 LED functional descriptions of A1BS-MC-P17

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm
LED at OSC port	Red	Optical port signal status indication: On: loss of optical signal Off: optical signal received

NOTE

NC interface is reserved.

2.2.25 Single CH, Boost Amplifier Card (A1BS-M-P17)

A1BS-M-P17 can realize amplification function of single channel optical signal with +17dBm boost amplifier.

A1BS-M-P17 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

A1BS-M-P17 provides an MON port for on-line monitor optical signals.

On the front panel of A1BS-M-P17, 1 MON interface is used to online monitor optical signals; 1 OUT interface is used to output the amplified signals; and 1 IN interface is used to input signals to be amplified. The front panel diagram is shown in Figure 2-31, 2 LEDs are described in Table 2-34.

Figure 2-31 The front panel diagram of A1BS-M-P17

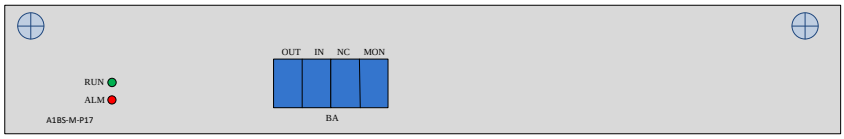


Table 2-34 LED functional descriptions of A1BS-M-P17

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

NOTE

NC interface is reserved.

2.2.26 Single CH, Preamplifier Card (A1PS-MC-P12)

A1PS-MC-P12 can realize amplification function of single channel optical signal with +12dBm preamplifier.

A1PS-MC-P12 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

A1PS-MC-P12 provides an MON port for on-line monitor optical signals.

A1PS-MC-P12 provides the interface between the system and the network management system, works with the network management system to manage each card of the device, and realizes the communication between the devices.

On the front panel of A1PS-MC-P12, 1 MON interface is used to online monitor optical signals; 1 OUT interface is used to output the amplified signals; 1 IN interface is used to input signals to be amplified, 1 NM interface and 1 CONSOLE interface are used as monitoring interfaces, 1 OSC interface is used to supervise channel signal transmission. The front panel diagram is shown in Figure 2-32, 3 LEDs are described in Table 2-35.

Figure 2-32 The front panel diagram of A1PS-MC-P12

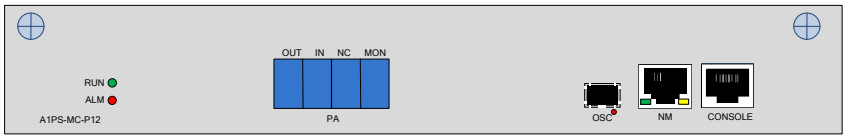


Table 2-35 LED functional descriptions of A1PS-MC-P12

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

LED	Color	Descriptions
LED at OSC port	Red	Optical port signal status indication: On: loss of optical signal Off: optical signal received

NOTE

NC interface is reserved.

2.2.27 Single CH, Preamplifier Card (A1PS-M-P12)

A1PS-M-P12 can realize amplification function of single channel optical signal with +12dBm preamplifier.

A1PS-M-P12 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

A1PS-M-P12 provides an MON port for on-line monitor optical signals.

On the front panel of A1PS-M-P12, 1 MON interface is used to online monitor optical signals; 1 OUT interface is used to output the amplified signals; and 1 IN interface is used to input signals to be amplified. The front panel diagram is shown in Figure 2-33, 2 LEDs are described in Table 2-36.

Figure 2-33 The front panel diagram of A1PS-M-P12

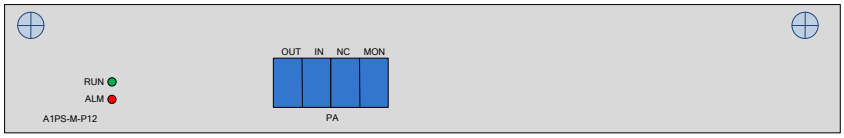


Table 2-36 LED functional descriptions of A1PS-M-P12

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

NOTE

NC interface is reserved.

2.2.28 Single CH, Low Noise, Pre+Boost EDFA (A2GS-NM-P21.P12)

A2GS-NM-P21.P12 can realize amplification function of single channel optical signal with integrated +21dBm BA and +12dBm PA, low noise.

A2GS-NM-P21.P12 supports automatic gain control function, which has no effect on online service when increasing or decreasing the channel.

On the front panel of A2GS-NM-P21.P12, 2 MON interfaces are used to online monitor optical signals; 2 OUT interfaces are used to output the amplified signals; 2 IN interfaces are used to input signals to be amplified. The front panel diagram is shown in Figure 2-34, 2 LEDs are described in Table 2-37.

Figure 2-34 The front panel diagram of A2GS-NM-P21.P12

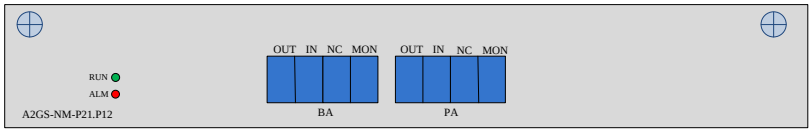


Table 2-37 LED functional descriptions of A2GS-NM-P21.P12

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs Off: no alarm

NOTE

NC interface is reserved.

2.2.29 40/60/80km DCF Card (B1FN-40/B1FN-60/B1FN-80)

After an optical signal is transmitted over certain distance, the optical signal pulse is widened because of the positive dispersion accumulated in the system. This widened shape seriously affects the system transmission performance. B1FN-40/B1FN-60/B1FN-80 uses the negative dispersion of the DCF to compensate the positive dispersion of the transmitting fiber, so that to compress the signal to realize the long-distance communication.

B1FN-40 provides 40km compensation distance; B1FN-60 provides 60km compensation distance; B1FN-80 provides 80km compensation distance.

B1FN-40/B1FN-60/B1FN-80 has 1 LED, 1 OUT interface and 1 IN interface. The front panel diagrams are shown in Figure 2-35, the LED is described in Table 2-38.

Figure 2-35 The front panel diagrams of B1FN-40/B1FN-60/B1FN-80

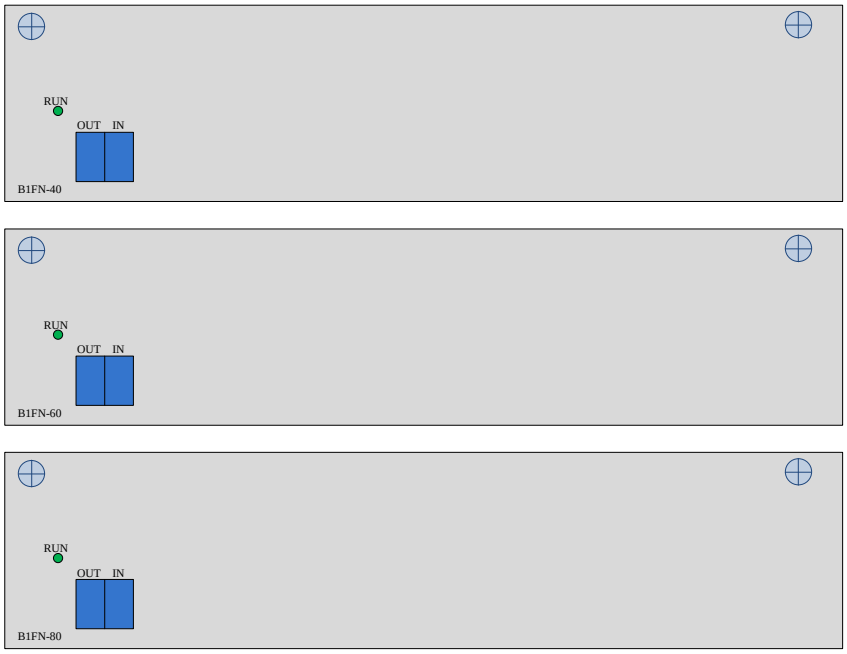


Table 2-38 LED functional descriptions of B1FN-40/B1FN-60/B1FN-80

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally

2.2.30 Single CH 1+1 OLP Card (P1P1)

P1P1 is a 1+1 optical line protection card with dual-fed selective receiving function. It supports automatic/forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

On the front panel of P1P1 card, there are five LEDs. UNI side provides an RO interface and a TI interface. NNI side MASTE channel provides a TO1

interface and an RI1 interface; SLAVE channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-36, LEDs are described in Table 2-39.

Figure 2-36 The front panel diagram of P1P1

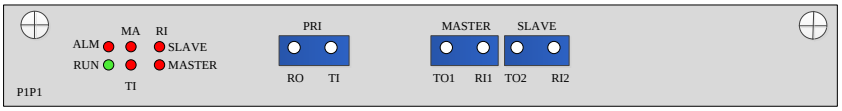


Table 2-39 LED functional descriptions of P1P1

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm
MA	Red	NNI side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
TI	Red	UNI side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

LED	Color	Descriptions
RI MASTER	Red	NNI side optical signal receiving indication: On: the optical power received by MASTER channel is lower than threshold Off: the optical power received by MASTER channel is higher than threshold
RI SLAVE	Red	NNI side optical signal receiving indication: On: the optical power received by SLAVE channel is lower than threshold Off: the optical power received by SLAVE channel is higher than threshold

NOTE

TO1 interface is used to transmit optical signals to MASTE channel;

RI1 interface is used to receive optical signals from MASTE channel;

TO2 interface is used to transmit optical signals to SLAVE channel;

RI2 interface is used to receive optical signals from SLAVE channel;

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to NNI-side TO1 and TO2 interfaces.

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side RI1 and RI2 interfaces to the UNI-side RX interface.

2.2.31 Single CH 1+1 OLP Card (P1P1-M)

P1P1-M is a 1+1 optical line protection card. It supports automatic /forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

P1P1-M card provides the interface between the system and the network management system; works with the network management system to manage each card of the equipment and realizes the intercommunication between the equipment.

On the front panel of P1P1-M card, there is an NM interface, a CONSOLE interface and 5 LEDs. UNI side provides an RO interface and a TI interface. NNI side MASTE channel provides a TO1 interface and an RI1 interface; SLAVE channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-37, LEDs are described in Table 2-40.

Figure 2-37 The front panel diagram of P1P1-M

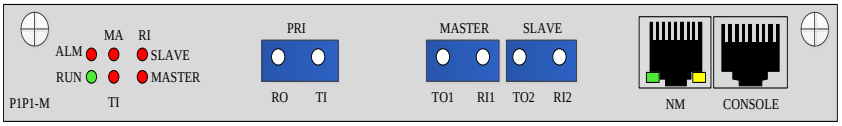


Table 2-40 LED functional descriptions of P1P1-M

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally

LED	Color	Descriptions
Green light at NM port	Green	Ethernet port Link/Active indication: On: link up Blink: date transmitted in Ethernet port Off: link down
Yellow light at NM port	Yellow	Ethernet port Speed indication: On: link to 100M Off: link to 10M or link down Blink: date transmitted in Ethernet port
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm
MA	Red	NNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
TI	Red	UNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

LED	Color	Descriptions
RI MASTER	Red	NNI-side optical signal receiving indication: On: the optical power received by MASTER channel is lower than threshold Off: the optical power received by MASTER channel is higher than threshold
RI SLAVE	Red	NNI-side optical signal receiving indication: On: the optical power received by SLAVE channel is lower than threshold Off: the optical power received by SLAVE channel is higher than threshold

NOTE

TO1 interface is used to transmit optical signals to MASTE channel;

RI1 interface is used to receive optical signals from MASTE channel;

TO2 interface is used to transmit optical signals to SLAVE channel;

RI2 interface is used to receive optical signals from SLAVE channel;

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to NNI-side TO1 and TO2 interfaces.

RO interface (connecting to RX interface of UNI-side device) outputs optical signal received by NNI-side RI1 and RI2 interfaces to the UNI-side RX interface.

Management Ports

P1P1-M provides 1 NM port and 1 CONSOLE port as its network management ports, marks and definitions are shown in Table 2-12.

Network management ports use standard RJ-45 socket whose connector diagram is shown in Figure 2-9, NM port is the FE electrical port; see its socket definition in Table 2-13. CONSOLE port pin definition is shown in Table 2-14.

2.2.32 Single CH 1:1 OLP Card (P1R1)

P1R1 is a 1:1 optical line protection card. It supports automatic /forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

P1R1 card is used to process 1-channel optical monitoring channel and monitor the received optical signals. The OSC interface uses LC dual-fiber SFP module or single-fiber SFP module.

On the front panel of P1R1 card, there is an OSC optical interface and six LEDs. The PRI channel and SEC channel on the UNI side respectively provide an RO interface and a TI interface; NNI side MASTE channel provides a TO1 interface and an RI1 interface; SLAVE channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-38, LEDs are described in Table 2-41.

Figure 2-38 The front panel diagram of P1R1

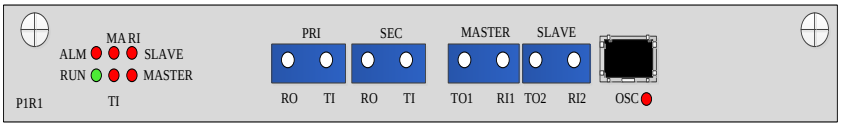


Table 2-41 LED functional descriptions of P1R1

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally

LED	Color	Descriptions
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm
MA	Red	NNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
TI	Red	UNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
RI MASTER	Red	Optical signal receiving indication: On: the optical power received by MASTER channel is lower than threshold Off: the optical power received by MASTER channel is higher than threshold
RI SLAVE	Red	Optical signal receiving indication: On: the optical power received by SLAVE channel is lower than threshold Off: the optical power received by SLAVE channel is higher than threshold

LED	Color	Descriptions
OSC	Red	Optical port signal state indication: On: optical signal loss Off: optical signal is received

NOTE

TO1 interface is used to transmit optical signals to MASTE channel;

RI1 interface is used to receive optical signals from MASTE channel;

TO2 interface is used to transmit optical signals to SLAVE channel;

RI2 interface is used to receive optical signals from SLAVE channel;

When the MASTER channel is fault-free:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI1 interface of NNI-side MASTER channel to the RX interface of UNI-side PRI channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO1 interface of NNI-side MASTER channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI2 interface of NNI-side SLAVE channel to the RX interface of UNI-side low-priority device.

TI interface (connecting to TX interface of UNI-side device) inputs TX signal of UNI-side low-priority device and transmits it to TO2 interface of NNI-side SLAVE channel.

When the MASTER channel fails, for example, the fiber is broken:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI2 interface of NNI-side SLAVE channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO2 interface of NNI-side SLAVE channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side low-priority device) service is interrupted.

TI interface (connecting to TX interface of UNI-side low-priority device) service is interrupted.

2.2.33 Single CH 1:1 OLP Card (P1R1-M)

P1R1-M is a 1:1 optical line protection card. It supports automatic /forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

P1R1-M card provides the interface between the system and the network management system; works with the network management system to manage each card of the equipment and realizes the intercommunication between the equipment.

P1R1-M card is used to process 1-channel optical monitoring channel and monitor the received optical signals. The OSC interface uses LC dual-fiber SFP module or single-fiber SFP module.

On the front panel of P1R1-M card, there is an NM interface, a CONSOLE interface, an OSC optical interface and six LEDs. The PRI channel and SEC channel on the UNI side respectively provide an RO interface and a TI interface; NNI side MASTE channel provides a TO1 interface and an RI1 interface; SLAVE channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-40, LEDs are described in Table 2-43.

Figure 2-39 The front panel diagram of P1R1-M

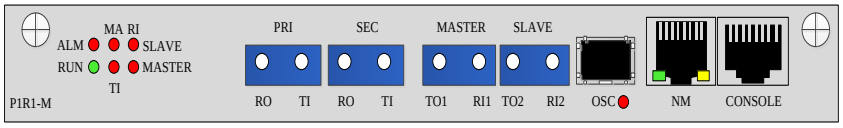


Table 2-42 LED functional descriptions of P1R1-M

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
Green light at NM port	Green	Ethernet port Link/Active indication: On: link up Blink: date transmitted in Ethernet port Off: link down
Yellow light at NM port	Yellow	Ethernet port Speed indication: On: link to 100M Off: link to 10M or link down Blink: date transmitted in Ethernet port
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm
OSC	Red	Optical port signal state indication: On: optical signal loss Off: optical signal is received
MA	Red	NNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

LED	Color	Descriptions
TI	Red	UNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
RI MASTER	Red	Optical signal receiving indication: On: the optical power received by MASTER channel is lower than threshold Off: the optical power received by MASTER channel is higher than threshold
RI SLAVE	Red	Optical signal receiving indication: On: the optical power received by SLAVE channel is lower than threshold Off: the optical power received by SLAVE channel is higher than threshold

NOTE

TO1 interface is used to transmit optical signals to MASTE channel;

RI1 interface is used to receive optical signals from MASTE channel;

TO2 interface is used to transmit optical signals to SLAVE channel;

RI2 interface is used to receive optical signals from SLAVE channel;

When the MASTER channel is fault-free:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI1 interface of NNI-side MASTER channel to the RX interface of UNI-side PRI channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO1 interface of NNI-side MASTER channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI2 interface of NNI-side SLAVE channel to the RX interface of UNI-side low-priority device.

TI interface (connecting to TX interface of UNI-side device) inputs TX signal of UNI-side low-priority device and transmits it to TO2 interface of NNI-side SLAVE channel.

When the MASTER channel fails, for example, the fiber is broken:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by RI2 interface of NNI-side SLAVE channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO2 interface of NNI-side SLAVE channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side low-priority device) service is interrupted.

TI interface (connecting to TX interface of UNI-side low-priority device) service is interrupted.

Management Ports

P1R1-M provides 1 NM port and 1 CONSOLE port as its network management ports, marks and definitions are shown in Table 2-12. Network management ports use standard RJ-45 socket whose connector diagram is shown in Figure 2-9, NM port is the FE electrical port; see its socket definition in Table 2-13. CONSOLE port pin definition is shown in Table 2-14.

2.2.34 Single CH 1:1 OLP Card (P1R1-P)

P1R1-P is a 1:1 optical line protection card. It supports automatic /forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

P1R1-P supports non-return mode and return mode. The NNI-side working line, protection line and return time can be set.

P1R1-P card is used to process 2 optical monitoring channels and monitor the received optical signals. The OSC interface uses LC dual-fiber SFP module or single-fiber SFP module.

On the front panel of P1R1-P card, there are two OSC optical interfaces and six LEDs. The PRI channel and SEC channel on the UNI side respectively provide an RO interface and a TI interface; NNI side CHL1 channel provides a TO1 interface and an RI1 interface; CHL2 channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-40, LEDs are described in Table 2-43.

Figure 2-40 The front panel diagram of P1R1-P

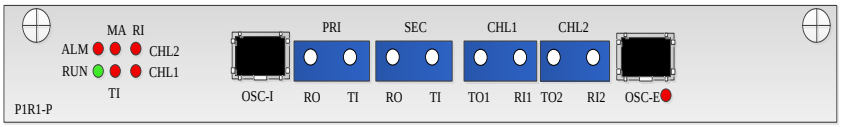


Table 2-43 LED functional descriptions of P1R1-P

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm

LED	Color	Descriptions
OSC-I	Red	Optical port signal state indication: On: optical signal lost in the in-band monitoring channel Off: optical signal is received in the in-band monitoring channel
OSC-E	Red	Optical port signal state indication: On: optical signal lost in the out-of-band monitoring channel Off: optical signal is received in the out-of-band monitoring channel
MA	Red	NNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
TI	Red	UNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
CHL1	Red	NNI-side CHL1 channel optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

LED	Color	Descriptions
CHL2	Red	NNI-side CHL2 channel optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

NOTE

CHL1/CHL2 can be set as the working channel optionally. The following part uses CHL1 as the working channel, CHL2 as the protection channel. The actual setting shall prevail when using:

TO1 interface is used to transmit optical signals to CHL1 channel;

RI1 interface is used to receive optical signals from CHL1 channel;

TO2 interface is used to transmit optical signals to CHL2 channel;

RI2 interface is used to receive optical signals from CHL2 channel;

When the working channel CHL1 is fault-free:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side working channel RI1 to the RX interface of UNI-side PRI channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to NNI-side working channel TO1 interface.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side protection channel RI2 to the UNI-side low-priority device RX interface.

TI interface (connecting to TX interface of UNI-side device) inputs TX signal of UNI-side low-priority device and transmits it to TO2 interface of NNI-side protection channel.

When the working channel fails, like the fiber is broken:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side protection channel RI2 to the UNI-side PRI channel RX interface.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO2 interface of NNI-side protection channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side low-priority device) service is interrupted.

TI interface (connecting to TX interface of UNI-side low-priority device) service is interrupted.

When the working channel is in non-return mode, after the working channel is restored, the protection channel will not be switched to the working channel. When the working channel is in return mode, the protection channel is switched to the working channel according to the return time after the working channel is restored.

2.2.35 Single CH 1:1 OLP Card (P1R1-MP)

P1R1-MP is a 1:1 optical line protection card. It supports automatic /forced/manual switching modes in case of service interruption caused by fiber line deterioration or interruption.

P1R1-MP supports non-return mode and return mode. The NNI-side working line, protection line and return time can be set.

P1R1-MP card provides the interface between the system and the network management system; works with the network management system to manage each card of the equipment and realizes the intercommunication between the equipment.

P1R1-MP card is used to process 1-channel optical monitoring channel and monitor the received optical signals. The OSC interface uses LC dual-fiber SFP module or single-fiber SFP module.

On the front panel of P1R1-MP card, there is an NM interface, a CONSOLE interface, two OSC optical interfaces and six LEDs. The PRI channel and SEC channel on the UNI side respectively provide an RO

interface and a TI interface; NNI side CHL1 channel provides a TO1 interface and an RI1 interface; CHL2 channel provides a TO2 interface and an RI2 interface. The front panel diagram is shown in Figure 2-40, LEDs are described in Table 2-43.

Figure 2-41 The front panel diagram of P1R1-MP

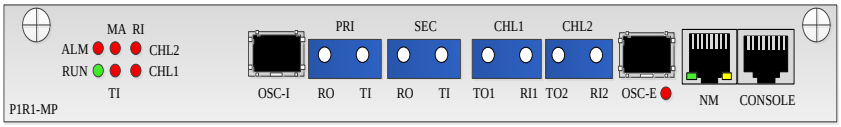


Table 2-44 LED functional descriptions of P1R1-MP

LED	Color	Descriptions
RUN	Green	System running indication: Blink: running normally Off: running abnormally
Green light at NM port	Green	Ethernet port Link/Active indication: On: link up Blink: date transmitted in Ethernet port Off: link down
Yellow light at NM port	Yellow	Ethernet port Speed indication: On: link to 100M Off: link to 10M or link down Blink: date transmitted in Ethernet port
ALM	Red	Alarm status indication: On: alarm occurs to the card Off: no alarm

LED	Color	Descriptions
OSC-I	Red	Optical port signal state indication: On: optical signal lost in the in-band monitoring channel Off: optical signal is received in the in-band monitoring channel
OSC-E	Red	Optical port signal state indication: On: optical signal lost in the out-of-band monitoring channel Off: optical signal is received in the out-of-band monitoring channel
MA	Red	NNI-side work channel optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
TI	Red	UNI-side optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold
CHL1	Red	NNI-side CHL1 channel optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

LED	Color	Descriptions
CHL2	Red	NNI-side CHL2 channel optical signal receiving indication: On: the received optical power is lower than threshold Off: the received optical power is higher than threshold

NOTE

CHL1/CHL2 can be set as the working channel optionally. The following part uses CHL1 as the working channel and CHL2 as the protection channel. The actual setting shall prevail when using:

TO1 interface is used to transmit optical signals to CHL1 channel;

RI1 interface is used to receive optical signals from CHL1 channel;

TO2 interface is used to transmit optical signals to CHL2 channel;

RI2 interface is used to receive optical signals from CHL2 channel;

When the working channel CHL1 is fault-free:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side working channel RI1 to the RX interface of UNI-side PRI channel.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to NNI-side working channel TO1 interface.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side protection channel RI2 to the UNI-side low-priority device RX interface.

TI interface (connecting to TX interface of UNI-side device) inputs TX signal of UNI-side low-priority device and transmits it to TO2 interface of NNI-side protection channel.

When the working channel fails, like the fiber is broken:

1. PRI: The optical path with high-priority

RO interface (connecting to RX interface of UNI-side device) outputs optical signal which received by NNI-side protection channel RI2 to the UNI-side PRI channel RX interface.

TI interface (connecting to TX interface of UNI-side device) inputs UNI-side TX signal and transmits it to TO2 interface of NNI-side protection channel.

2. SEC: the optical path with low-priority

RO interface (connecting to RX interface of UNI-side low-priority device) service is interrupted.

TI interface (connecting to TX interface of UNI-side low-priority device) service is interrupted.

When the working channel is in non-return mode, after the working channel is restored, the protection channel will not be switched to the working channel. When the working channel is in return mode, the protection channel is switched to the working channel according to the return time after the working channel is restored.

Management Ports

P1R1-MP provides 1 NM port and 1 CONSOLE port as its network management ports, marks and definitions are shown in Table 2-12. Network management ports use standard RJ-45 socket whose connector diagram is shown in Figure 2-9, NM port is the FE electrical port; see its socket definition in Table 2-13. CONSOLE port pin definition is shown in Table 2-14.

2.2.36 3-fan Card (FFT30)/6-fan Card (FFT6)

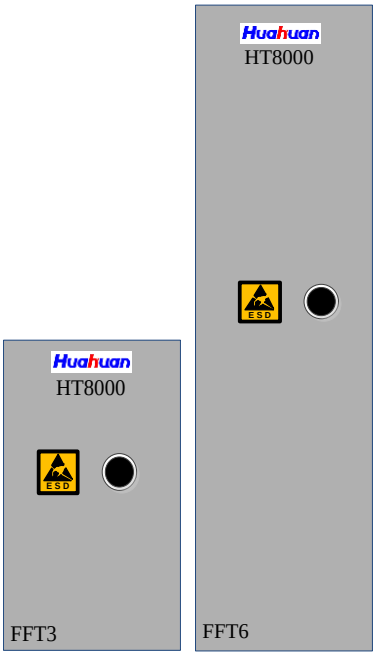
FFT30 is a 3-fan card for HT8000-I device; FFT6 is a 6-fan card for HT8000-II/HT8000-VI device. FFT3/FFT6 provides heat dissipation function for the equipment, making it operates normally and efficiently at the designed temperature.

FFT3/FFT6 supports manual speed adjustment and automatic speed adjustment. Manual speed adjustment can manually adjust the fan speed to achieve the manual control of low speed, medium speed and high speed. Automatic speed adjustment realizes fan intelligent speed control within

the equipment temperature range, so as to ensure the stability of card heat dissipation, it features low noise and low energy consumption.

The front panel diagrams are shown in Figure 2-42.

Figure 2-42 The front panel diagrams of FFT3/FFT6



3 Deployment and Maintenance

3.1 Device Monitoring

The deployment, running, and maintenance of HT8000-I/HT8000-II/ HT8000-VI device reply on network element/subnet management system. This section gives a brief description of our company's EzView network element/subnet management software. For more details, please refer to *EzView User's Manual* and the online help.

EzView is a GUI based NE/SN management software. It is connected to the monitored NE through Ethernet. HT8000-I/HT8000-II/HT8000-VI device uses Ethernet to connect local network management computer. The other nodes in the network can realize remote management through ESC/OSC channel. When remote management is achieved through ESC channels, you need to enable GCC functions of the corresponding interface.

The factory default IP address of the device is: 192.192.4.2. In actual networking, each end of device must be assigned an IP address first. The IP addresses of nodes in the network must be unique.

3.1.1 IP Address/Subnet Mask Query and Settings

HT8000-I/HT8000-II/HT8000-VI device needs to log in Telnet via Ethernet monitoring interface for IP address query and setting. If the factory out-of-band IP address is modified and the current address is forgotten, you can log in hyper terminal via CONSOLE monitoring interface to get the real address of the device.

After logging device through Telnet or Console port, you can carry out the following command to query and set the out-of-band IP and MASK. Telnet command format: Telnet IP, default login username is admin and password is Admin123.

Query IP/MASK address:

Hios(config)#interface gigabitethernet 1/0/1

Hios(config-gigabitethernet1/0/1)#show ip address

Set IP/MASK address:

Hios(config)#interface gigabitethernet 1/0/1

Hios(config-gigabitethernet1/0/1)#ip address 192.192.43.45/24

Note: In order to avoid configuration loss after power failure and restart, after information is modified, you must use write command under the **config** node to save configuration. Such as Hios(config)#write.

3.2 Monitoring Software

For detailed usage of network management monitoring software, please refer to the online help of network management software.

CAUTION

For security reasons, you'd better change the password in time when you use the device for the first time.

4 Cable Introduction

This chapter introduces various equipment cables, including optical fiber, power cord and management cable.

4.1 Optical Fiber

Optical fiber has many types of connectors and many lengths.

4.1.1 Fiber Types

The connector and required length of the optical fiber should be selected according to site survey results.

Table 4-1 Fiber types

Types	Parameters
LC/PC	Simple module-G.657
SC/PC	Simple module-G.657
FC/PC	Simple module-G.657

4.1.2 Connectors

LC/PC type optical interface is used at optical interface on the card, which is matched with LC/PC type fiber connector. SC/PC type or FC/PC type optical interface is used at optical interface of the ODF in the machine room, which is matched with SC/PC type and FC/PC type fiber connector.

Table 4-2 Fiber connector types

Types	Descriptions
LC/PC	Clamped square optical fiber connector
SC/PC	Square optical fiber connector
FC/PC	Circular optical fiber connector

Figure 4-1 LC/PC fiber connector

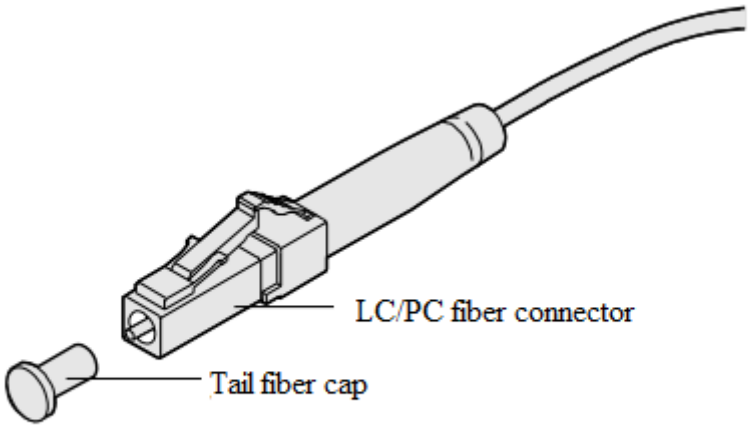


Figure 4-2 SC/PC fiber connector

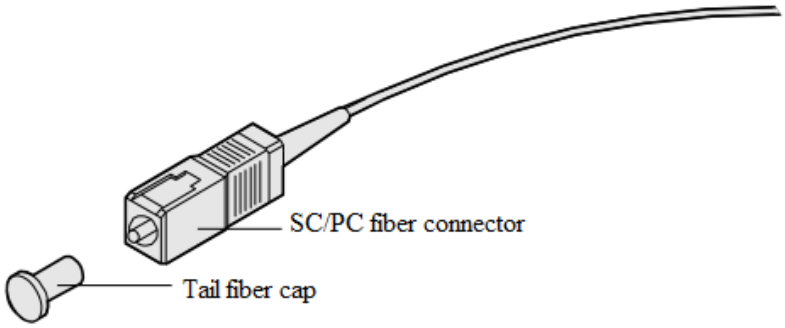
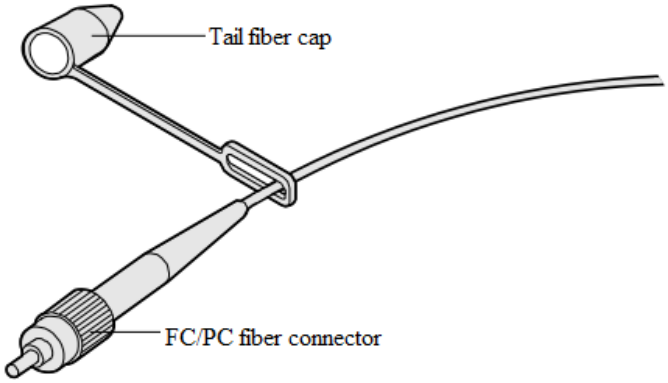


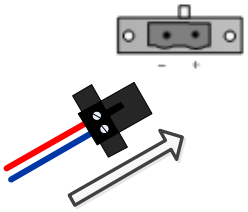
Figure 4-3 FC/PC fiber connector



4.2 Power Cord

Please align the DC power cord head to the socket and insert it with moderate force.

Figure 4-4 Connecting -48V DC power cord



CAUTION

Red wire is for high potential, connecting to the "+"; Blue is for low potential, connecting to "-".

4.3 Management Cable

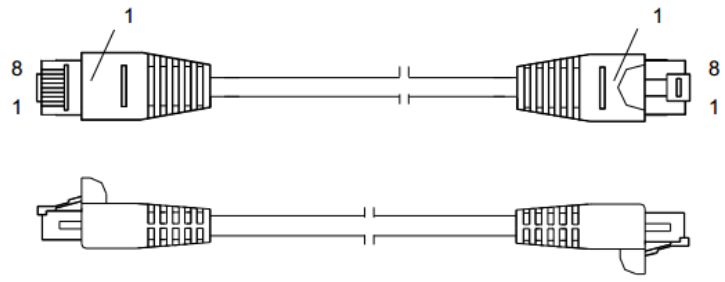
4.3.1 Straight-through Network Cable

Both ends of the straight-through network cable are RJ-45 connectors, respectively connecting devices at both ends.

Structure

The structure of straight-through network cable is shown in Figure 4-5.

Figure 4-5 The structure of straight-through network cable



1. Network port connector

Pin Assignments

Table 4-3 Pin assignments of straight-through network cable

Connector X1	**Connector** X2	**Relationship**
X1.2	X2.2	Pair
X1.1	X2.1	
X1.6	X2.6	Pair
X1.3	X2.3	
X1.4	X2.4	Pair
X1.5	X2.5	
X1.8	X2.8	Pair
X1.7	X2.7	

Technical Specifications

Table 4-4 Technical specifications of straight-through network cable

Items	Descriptions
Connector X1/X2	Network port connector-8PIN-8bit- shield-crystal plug
Cable type	Symmetrical twisted-pair cable-100ohm-enhanced Category-5 cable, aluminum foil shield-0.52mm-24AWG-8 cores 4 pairs-PANTONE 430U
Quantity of cores	8

4.3.2 Crossover Network Cable

The device management interface has self-adaptive function.

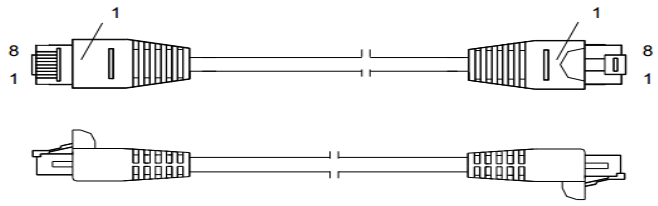
Crossover network cable can be used as NM connection cable.

Both ends of the crossover network cable are RJ-45 connectors, respectively connecting devices at both ends.

Structure

The structure of crossover network cable is shown in Figure 4-6.

Figure 4-6 The structure of crossover network cable



Pin Assignments

Table 4-5 Pin assignments of crossover network cable

Connector X1	**Connector** X2	**Relationship**
X1.6	X2.2	Pair
X1.3	X2.1	
X1.2	X2.6	Pair
X1.1	X2.3	
X1.4	X2.4	Pair
X1.5	X2.5	
X1.8	X2.8	Pair
X1.7	X2.7	

Technical Specifications

Table 4-6 Technical specifications of crossover network cable

Items	**Descriptions**
Connector X1/X2	Network port connector-8PIN-8bit-shield-crystal plug
Cable type	Symmetrical twisted-pair cable-100ohm-enhanced Category-5 cable, aluminum foil shield-0.52mm-24AWG-8 cores 4 pairs-PANTONE 430U

Items	Descriptions
Quantity of cores	8

5 Technique Specifications

5.1 Monitoring Ports

SNMP port	
Plug	RJ-45
Rate	10/100M
Port protocol	SNMP protocol

Console port	
Plug	RJ-45
Electrical specification	RS-232

5.2 External Clock Input/Output Port

Specification	Description
External clock input	2MHz, 2Mbit/s

Specification	Description
External clock output	2MHz, 2Mbit/s
Plug	RJ45
Interface standard	G.703

5.3 External Time Synchronization Port

Specification	Description
Electrical specification	RS422
Plug	RJ45

5.4 Wavelength Conversion Service Port

Items	Description
UNI-side port rate	100Mbit/s～10Gbit/s
Plug	O2A8-D: SFP/SFP+ O4M4/O2M2-P: SFP+
Optical interface technical parameters	It depends on the optical module

Items	Description
NNI-side port rate	10Gbit/s

Items	Description
Plug	SFP+
Optical interface technical parameters	It depends on the optical module

5.5 DWDM MUX/DEMUX Port

D1GH-S-LD2136 Card

Items		Unit	Specification
Operating frequency range		THz	192.10～196.00
Adjacent channel separation		GHz	100
The working wavelength of the 1510nm channel		nm	1510
Insertion loss	OSC	dB	≤0.9
	DWDM		≤3.8
	2-way		≤7.6

D1G8-SE-LD2128/D1G8-SE-LD2936/D1G8-SE-LD3744/D1G8-SE-LD4552/D1G8-SE-LD5360 Card

Items	Unit	Specification
Operating frequency range	THz	192.10～196.00
Adjacent channel	GHz	100

Items		Unit	Specification
separation			
The working wavelength of the 1510nm channel		nm	1510
Insertion loss	DWDM	dB	≤3.8
	OSC		≤0.9
	EXP		≤1.0

D1MF-S-LD2160/ D1DF-S-LD2160 Card

Items		Unit	Specification
Operating frequency range		THz	192.10～196.00
Adjacent channel separation		GHz	100
The working wavelength of the 1510nm channel		nm	1510
Insertion loss	OSC	dB	≤0.8
	DWDM		≤6.5

D1GD-S-LD2132/D1GD-S-LD3344/D1GD-S-LD4556

Items	Unit	Specification
Operating frequency range	THz	192.10～196.00
Adjacent channel separation	GHz	100
The working wavelength of the 1510nm channel	nm	1510

Items		Unit	Specification
Insertion loss	OSC	dB	≤0.9
	DWDM		≤4.5

5.6 CWDM MUX/DEMUX Port

C1G8-S-LC4761 Card

Items		Unit	Specification
Wavelength channel		nm	1470/1490/1510/1530/1550 /1570/1590/1610, OSC:1450
Adjacent channel separation		nm	20
Insertion loss	CWDM	dB	≤3.0
	2-way		≤3.9
	OSC		≤3.3
	OSC 2-way		≤6.6

C1GX-LC4361 Card

Items		Unit	Specification
Wavelength channel		nm	1431～1611
Adjacent channel separation		nm	20
Insertion	CWDM	dB	≤4.5

Items		Unit	Specification
loss	2-way		≤5.3

C1G2-BSE-LC5157 Card

Items		Unit	Specification
Operating wavelength range		nm	1260～1620
Adjacent channel separation		nm	20
Insertion loss	1430,1450 (OSC)	dB	≤1.2
	1510-1570		≤2.2
	EXP		≤2.0

C2G1-E-LC51 Card

Items		Unit	Specification
Operating wavelength range		nm	1270～1610
Adjacent channel separation		nm	20
Insertion loss	1510	dB	≤0.9
	EXP		≤0.7

C1G3-BSE-LC2737/C1G3-BSE-LC3727 Card

Items	Unit	Specification
Operating wavelength	nm	1260～1620

Items		Unit	Specification
range			
Adjacent channel separation		nm	20
Insertion loss	1430, 1450	dB	≤3.0
	1270-1370		≤2.4
	EXP		≤3.3

5.7 Optical Booster Amplifier Port

A2GC-SM-P21.P17 Card

Items	Unit	Specification
Working wavelength range	nm	1529～1567
Total input power range	dBm	-21～0
Maximum total output power	dBm	21
Noise figure	dB	≤6.2
Channel gains	dB	9-21
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GC-SM-P17.P12 Card

Items	Unit	Specification
Working wavelength range	nm	1529～1567
Total input power range	dBm	-22～-5
Maximum total output power	dBm	17
Noise figure	dB	≤6.2
Channel gains	dB	10-22
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GS-M-P17.P12 /A1BS-MC-P17/A1BS-M-P17 Card

Items	Unit	Specification
Working wavelength range	nm	1528.5～1562
Total input power range	dBm	-22～-5
Maximum total output power	dBm	17
Noise figure	dB	≤6.2
Channel gains	dB	18-22
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A1PS-MC-P12/A1PS-M-P12 Card

Items	Unit	Specification
Working wavelength range	nm	1528.5～1562

Items	Unit	Specification
Total input power range	dBm	-30～-18
Maximum total output power	dBm	12
Noise figure	dB	≤5.5
Channel gains	dB	26-30
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GS-NM-P21.P12 Card

Items	Unit	Specification
Working wavelength range	nm	1550.12
Total input power range	dBm	-22～0
Maximum total output power	dBm	21
Noise figure	dB	≤5.7
Channel gains	dB	18-21
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

5.8 Optical Preamplifier Port

A2GC-SM-P21.P17 Card

Items	Unit	Specification
Working wavelength range	nm	1529～1567
Total input power range	dBm	-30～-3
Maximum total output power	dBm	17
Noise figure	dB	≤5.5
Channel gains	dB	20-30
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GC-SM-P17.P12 Card

Items	Unit	Specification
Working wavelength range	nm	1529～1567
Total input power range	dBm	-35～-8
Maximum total output power	dBm	12
Noise figure	dB	≤5.5
Channel gains	dB	20-30
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GS-M-P17.P12 Card

Items	Unit	Specification
Working wavelength range	nm	1528.5～1562
Total input power range	dBm	-30～-18
Maximum total output power	dBm	12
Noise figure	dB	≤5.5
Channel gains	dB	26-30
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

A2GS-NM-P21.P12 Card

Items	Unit	Specification
Working wavelength range	nm	1550.12
Total input power range	dBm	-45～-25
Maximum total output power	dBm	12
Noise figure	dB	≤4.5
RL (return loss)	dB	40
Polarization dependent gain	dB	0.4
PMD	ps	0.4

5.9 Raman Optical Amplifier Card

A1RC-M-G14/A1RC-MC-G14

Items		Unit	Specification
Working wavelength range		nm	1528～1562
Total input power range		dBm	-43～-10
Maximum total output power		dBm	10 ±0.5
Signal power	Pump off	dBm	-43～+10 ±0.5
	Pump on	dBm	-30～+16 ±1.5
Reflection power		dBm	-30～+16 ±0.5
Total pump output		dBm	0～30 ±0.3
Output power monitoring port spectral ratio	MON		1%
	PMON		0.5%
RL (return loss)		dB	40
Polarization dependent gain		dB	0.3
PMD		ps	0.5

5.10 Dispersion Compensation Optical Fibers

DCM Module	Distance (km)	Max. Insertion Loss (dB)	DSCR	PMD (ps)	PDL (dB)	Max. Allowed Power (dBm)	Operating Wavelength (nm)
DCM(B)	40	4.7	90%～	0.5	0.1	20	1525～1568

DCM Module	Distance (km)	Max. Insertion Loss (dB)	DSCR	PMD (ps)	PDL (dB)	Max. Allowed Power (dBm)	Operating Wavelength (nm)
DCM(D)	80	8	110%	0.7	0.1	20	

5.11 Optical Line Protection Port

P1P1/P1P1-M Card

Items		Unit	Specification
Insertion Loss	TI-TO1 TI-TO2	dB	<4.0
	RI1-RO RI2-RO	dB	<1.5
Working wavelength range		nm	1260～1640
RL (return loss)		dB	>45
Polarization dependent loss		dB	<0.1
Power monitoring range		dBm	Transmitting: -30～+25 Receiving: -50～+10
Switching time		ms	<50
Optical power difference		dBm	+0.5
Switching type		dB	Power-down holdover

P1R1/P1R1-M/P1R1-P/P1R1-MP Card

Items		Unit	Specification
Insertion loss	TI-TO1 TI-TO2	dB	<2.0
	RI1-RO RI2-RO	dB	<2.0
Working wavelength range		nm	1260～1640
RL (return loss)		dB	>50
Polarization dependent loss		dB	<0.1
Power monitoring range		dBm	Transmitting: -30～+25 Receiving: -50～+10
Switching time		ms	<50
Optical power difference		dBm	+0.5
Switching type		dB	Power-down holdover

5.12 Physical/Electrical Specifications

Physical/electrical specifications	
Dimensions	HT8000-I: 44mm×253mm×442mm (H×D×W) HT8000-II: 88mm×253mm×442mm (H×D×W) HT8000-VI: 264mm×253mm×442mm (H×D×W)
DC power supply	FPS7-D48: -48V (-36V ~ -60V)/700W FPS1-D48: -48V (-36V ~ -60V)/100W FPS1-A220: AC 220V (165V ~ 265V)

Physical/electrical specifications	
Power consumption	HT8000-I maximum power consumption (typical configuration): 125W HT8000-II maximum power consumption (typical configuration): 250W HT8000-VI maximum power consumption (typical configuration): 875W
Operating temperature	0°C~45°C
operating humidity	10-90%RH (non-condensation)

Appendix Terms and Abbreviations

This chapter introduces terms and abbreviations involved in this user's manual.

- Terms
- Abbreviations

Terms

C

Coarse Wavelength Division Multiplexing (CWDM)	CWDM is an optical signal transmission technology that multiplexes coarsely-spaced optical channels into a single optical fiber. Wavelength intervals are wide, typically several nanometers or larger. It does not support optical amplifiers. It is mainly used in short distance chain networks.

D

Dispersion Compensation Fiber (DCF)	DCF has inherent negative dispersion that can offset the positive dispersion of transmission fibers, so as to maintain the original shape of the signal pulse.
Dense Wavelength Division Multiplex(DWDM)	DWDM is an optical signal transmission technology utilizing high bandwidth and low loss characteristics of single-mode fibers. Multiple optical carrier channels with specific wavelength spacing can be combined and transmitted within a single optical fiber.

E

Electric Supervisory Channel (ESC)	ESC is a dedicated channel used to provide supervisory communication between all nodes within the optical transmission network. The ESC is part of the overhead of the transmission frame, transmitted together with the service signal.

M

Metropolitan Area Network	MAN is capable of connecting multiple LANs to a high-speed computer network covering the size of a metropolitan area. Its coverage is between a LAN and a WAN. MAN is regarded as a backbone network which uses optical fibers as transmission medium.

O

Optical Transponder Unit(OTU)	OTU refers to the device that converts the optical wavelength signal of the UNI side into the standard wavelength signal suitable for an open WDM system.
Optical Supervisory Channel（OSC）	OSC uses a specific wavelength as a dedicated optical channel for supervisory communication between different WDM nodes.

U

User Network Interface (UNI)	The interface between a user's device and a private or public network device, such as an ATM switch.

Abbreviations

B

BITS	Building Integrated Timing Supply

C

CWDM	Coarse Wavelength Division Multiplexing

D

DCC	Data Communication Channel
DWDM	Dense Wavelength Division Multiplexing)

E

ESC	Electric Supervisory Channel

N

NNI	Network Node Interface
NRZ	Non-Return to Zero

O

OSC	Optical Supervisory Channel
OTN	Optical Transport Network
OTU	Optical Transponder Unit

R

RH	Relative Humidity
RMON	Remote Network Monitoring

S

SFP	Small Form-factor Pluggable
SNMP	Simple Network Management Protocol

U

UNI	User Network Interface

W

WDM	Wavelength Division Multiplexing