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iTN8800 (P100R002) Hardware Description (Rel_06)

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Notice

Preface

Objectives

This document describes overview, components, and cables of the iTN8800, mainly including features and hardware indexes. The appendix lists terms, acronyms, and abbreviations involved in this document.

Versions

The following table lists the product versions related to this document.

Product name	Product version	Chassis version	System software version
iTN8800	P100R002C20	A.00 or later	V6.4.17 or later

Conventions

Symbol conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicate a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.
	Indicate a potentially hazardous situation that, if not avoided, could cause equipment damage, data loss, and performance degradation, or unexpected results.
	Provide additional information to emphasize or supplement important points of the main text.
	Indicate a tip that may help you solve a problem or save time.

General conventions

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Arial	Paragraphs in Warning, Caution, Notes, and Tip are in Arial.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Lucida Console`	Terminal display is in `Lucida Console`.
Book Antiqua	Heading 1, Heading 2, Heading 3, and Block are in Book Antiqua.

Change history

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Issue 06 (2018-02-10)

Sixth commercial release

- Added chapter Optical card and added card iTN8800-OMD8.
- Added card iTN8800-RXG8.
- Added card iTN8800-RX2 (B).
- Added the DWDM channel list in the appendix.
- Added chassis iTN8800-II-AC.
- Added AC power supply RPA1202-U220S48.
- Added chapter Smart probe card and added cards iTN8800-SLAG8 and iTN8800-SLAX2.

Issue 05 (2017-03-30)

Fifth commercial release

- Updated the lookup table of optical module metrics.
- Updated the software information of the corresponding cards.

Issue 04 (2016-09-30)

Fourth commercial release

- Updated the working temperature of the card and the maximum power consumption of the chassis.

- Added the iTN8800-8GT, iTN8800-RF8, iTN8800-II-NXU (version C), and iTN8800-TAU.

Issue 03 (2015-08-20)

Third commercial release

- Added the iTN8800-RS4.

Issue 02 (2015-03-20)

Second commercial release

- Added the iTN8800-RG16E, iTN8800-RE16 and iTN8800-RE16-BL.
- Added related descriptions of the debugging cable.

Issue 01 (2014-01-20)

Initial commercial release

Contents

Figures

Tables

1 Overview

This chapter describes overview of the iTN8800, including the following sections:

- Introduction
- Components
- Operating conditions

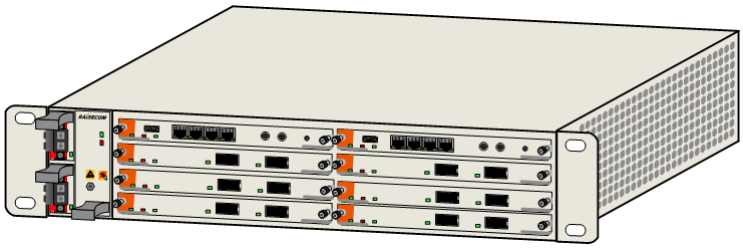
1.1 Introduction

The iTN8800 is an IP RAN device developed by Raisecom, orientating to the edge of the IP RAN aggregation layer of the carrier.

The 2U-high iTN8800 supports being inserted with 8 cards, 2 power modules, and 1 fan module. It features high integration level and supports hot swapping. The iTN8800 adopts -48 V power supply and supports 1+1 power protection. The iTN8800 adopts the front outgoing line design, which makes it easy to be maintained.

Figure 1-1 shows the appearance of the iTN8800.

Figure 1-1 Appearance of the iTN8800



1.2 Components

The iTN8800 is mainly composed of the chassis, power module, fan, and cards.

Chassis

The iTN8800 chassis is a standard 2U chassis, compliant with the IEC297 specifications.

Power module

The iTN8800 uses a plug-in power module RPD1351-S-48S48, supporting dual power supply redundancy.

Fan

The iTN8800 uses a plug-in intelligent fan module FANS331.

Cards

Table 1-1 lists cards used by the iTN8800.

Table 1-1 iTN8800 card list

Card classification	Card model
MCC	iTN8800-II-NXU
Clock card	iTN8800-TAU
Interface card	iTN8800-RG8
	iTN8800-RX2
	iTN8800-RXG8
	iTN8800-RG8T
	iTN8800-RE16
	iTN8800-RE16-BL
	iTN8800-RS4
	iTN8800-RF8
Optical card	iTN8800-OMD8

Cables

For cables used by the iTN8800, see chapter 9 Cables. Partial cables need to be purchased separately.

Pluggable modules

The iTN8800 supports the SFP module and XFP module. To know the module type used by each card, refer to related descriptions of interfaces on each card. For index of each module, see section 10.2 Lookup table of optical module indexes.

Caution

We recommend using the modules verified by Raisecom. Raisecom assumes no responsibility for any device damage caused by usage of unverified modules.

1.3 Operating conditions

Table 1-2 lists operation conditions of the iTN8800.

Table 1-2 Operating conditions of the iTN8800

Item		Parameter
DC input voltage (V)	Rated voltage	-48
	Voltage range	-40 to -57
Operating temperature (℃)		-5 to +55
Operating humidity		10%–90% RH (indoor, non-condensing)
Operating air pressure (kPa)		86–106
Lightning protection level	DC power supply	• Differential mode: 0.5 kV • Common mode: 1 kV
	NEG, EXT1, and EXT2 interfaces (iTN8800-II-NXU)	Common mode: 1 kV

2 Chassis

This chapter describes chassis of the iTN8800, including the following sections:

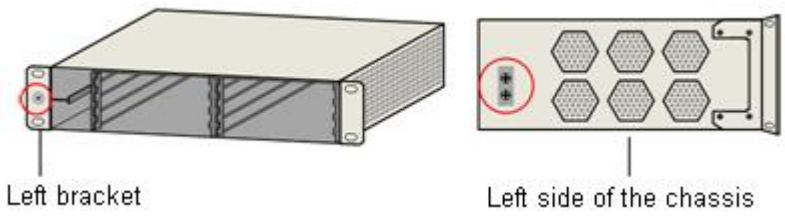
- Structure
- Slots

2.1 Structure

The structure of the iTN8800 chassis meets design specifications of the IEC297 2U standard chassis.

The iTN8800 chassis adopts a left-to-right ventilation design. The brackets at both the left and right sides of the chassis are equipped with ground terminals to ground the device in different installation environments. Figure 2-1 shows the location of the ground terminal.

Figure 2-1 Location of the ground terminal



The iTN8800-II chassis supports two models: iTN8800-II-DC and iTN8800-II-AC. The services supported by the two chassis are the same. The only difference lies in the power supply mode and the power slot (refer to section 2.2 Slots). Unless otherwise stated, the iTN8800-II refers to the two models (devices) in this document.

Figure 2-2 and Figure 2-2 show structures of the two models.

Figure 2-2 Structure of the iTN8800-II-DC chassis

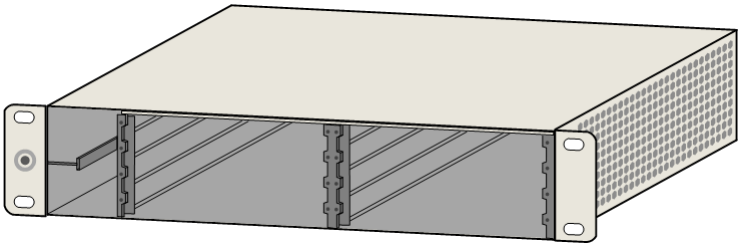
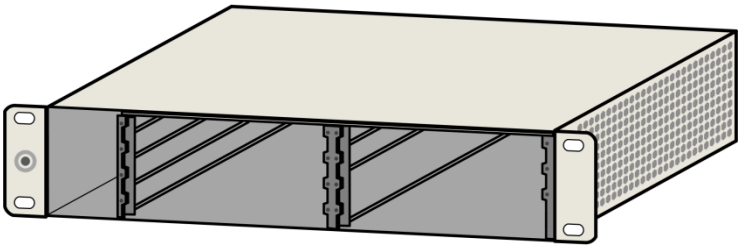


Figure 2-3 Structure of the iTN8800-II-AC chassis



2.2 Slots

The iTN8800-II chassis supports two models: iTN8800-II-DC and iTN8800-II-AC. The services supported by the two chassis are the same. The only difference lies in the power supply mode and the power slot.

2.2.1 iTN8800-II-DC

The iTN8800-II-DC provides the following slots:

- 8 card slots
- 2 power slots
- 1 fan slot

The iTN8800-II-DC has 11 slots in total, with descriptions shown in Figure 2-4 and Table 2-1.

Figure 2-4 Slot description of the iTN8800-II-DC

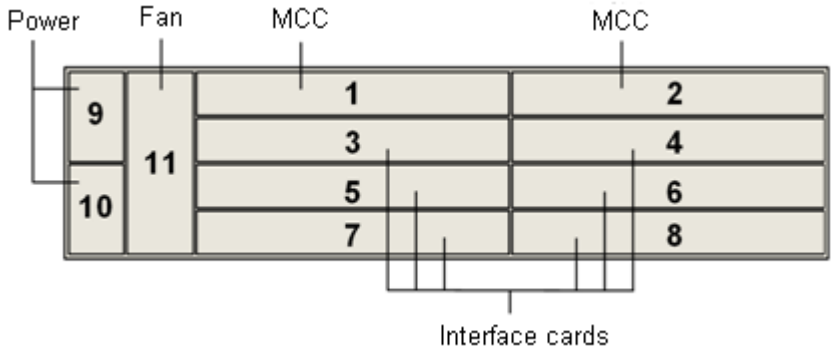


Table 2-1 Slot description of the iTN8800-II-DC

Type	Name	Slot	Description
DC power	RPD1351-S-48S48	9 and 10	Applicable to the iTN8800-II-DC
Fan	FANS331	11	–
MCC	iTN8800-II-NXU	1 and 2	NMS switching card If only one NXU card is used, we recommend inserting it into slot 1.
Clock card	iTN8800-TAU	4	–
PTN card	iTN8800-RG8	3–8	Slot 7 and slot 8 are for interfaces 1–4 only. We recommend prioritizing slots 3–6.
	iTN8800-RG8T		Slot 7 and slot 8 are for interfaces 1–4 only. We recommend prioritizing slots 3–6.
	iTN8800-RX2		We recommend prioritizing slots 7 and slot 8.
	iTN8800-RE16		–
	iTN8800-RE16-BL		–
	iTN8800-RF8		–
	iTN8800-RXG8		–
	iTN8800-RS4		–
Optical card	iTN8800-OMD8	2–8	–

2.2.2 iTN8800-II-AC

The iTN8800-II-AC provides the following slots:

- 6 card slots
- 2 power slots
- 1 fan slot

The iTN8800-II-AC has 9 slots in total, with descriptions shown in Figure 2-5 and Table 2-2.

Figure 2-5 Slot description of the iTN8800-II-AC

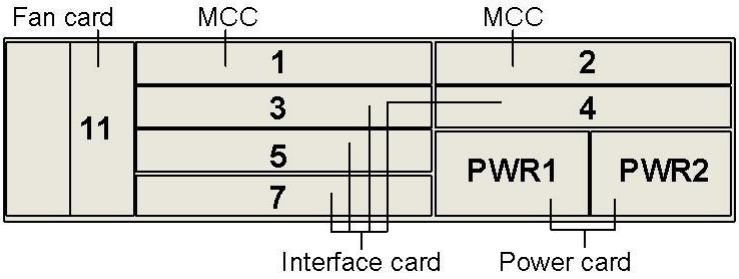


Table 2-2 Slot description of the iTN8800-II-AC

Type	Name	Slot	Description
AC power card	RPA1202-U220S48	PWR1 and PWR2	Applicable to the iTN8800-II-AC
Fan	FANS331	11	–
MCC	iTN8800-II-NXU	1 and 2	NMS switching card If only one NXU card is used, we recommend inserting it into slot 1.
Clock card	iTN8800-TAU	4	–
PTN card	iTN8800-RG8	3–5, and 7	Slot 7 is for interfaces 1–4 only. We recommend prioritizing slots 3–5.
	iTN8800-RG8T		Slot 7 is for interfaces 1–4 only. We recommend prioritizing slots 3–5.
	iTN8800-RX2		We recommend prioritizing slots 7.
	iTN8800-RE16		–
	iTN8800-RE16-BL		–
	iTN8800-RF8		–
	iTN8800-RXG8		–
	iTN8800-RS4		–
Optical card	iTN8800-OMD8	2–5, and 7	–

3 Power module and fan

This chapter describes power module and fan used by the iTN8800, including the following sections:

- DC RPD1351-S-48S48
- AC RPA1202-U220S48
- FANS331

3.1 DC RPD1351-S-48S48

3.1.1 Version

Table 3-1 lists the version of the RPD1351-S-48S48.

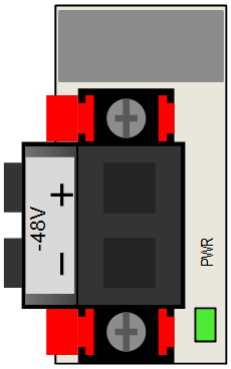
Table 3-1 Version of the RPD1351-S-48S48

Model	Version
RPD1351-S-48S48	A.00 or later, applicable to the iTN8800-II-DC

3.1.2 Appearance

Figure 3-1 shows the panel of the RPD1351-S-48S48.

Figure 3-1 Panel of the RPD1351-S-48S48



3.1.3 Features

The RPD1351-S-48S48 features:

- -48 VDC power access and initial filtering
- Dual power supply redundancy
- Index monitoring when the power supply is in place
- Detection of whether the device is powered on and reporting alarms
- 0.5 kV (differential mode), 1 kV (common mode) surge protection, and 2 kV Electrical Fast Transient Burst (EFTB) protection
- Hot swapping

3.1.4 Slots

The RPD1351-S-48S48 can be inserted into slot 9 or slot 10.

3.1.5 LEDs

Table 3-2 lists the LED on the RPD1351-S-48S48.

Table 3-2 LED on the RPD1351-S-48S48

LED	Status	Description
PWR	Green	Power input LED • Green: the power input is normal. • Off: there is no power input or the power supply is reversely connected.

3.1.6 Technical specifications

Table 3-3 lists technical specifications of the RPD1351-S-48S48.

Table 3-3 Technical specifications of the RPD1351-S-48S48

Parameter	Value
Rated input voltage (V)	-48
Input voltage range (V)	-40 to -57
Input impulse current (A)	30
No-load power consumption (W)	0.5

3.2 AC RPA1202-U220S48

3.2.1 Version

Table 3-4 lists the version of the RPA1202-U220S48.

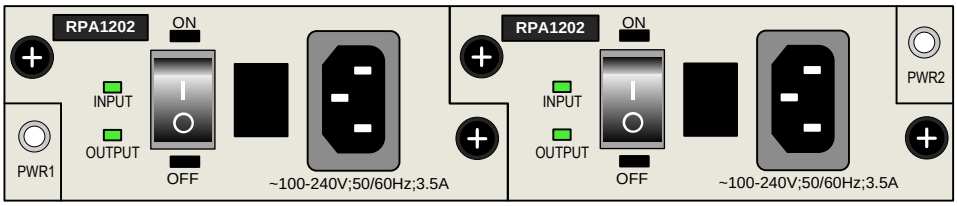
Table 3-4 Version of the RPA1202-U220S48

Model	Version
RPA1202-U220S48	A.00 or later, applicable to the iTN8800-II-AC

3.2.2 Appearance

Figure 3-1 shows the panel of the RPA1202-U220S48.

Figure 3-2 Panel of the RPA1202-U220S48



3.2.3 Features

The RPA1202-U220S48 features:

- A wide range of AC input, from 90 to 264 VAC
- Up to 200 W load for a single power supply and 400 W for the entire card
- Dual power supply redundancy
- In-place monitoring
- Power-on detection and alarm reporting
- Input under-voltage protection, output over-current protection, short-circuit protection, over-voltage protection, and over-temperature protection

- 3 kA in differential mode and 5 kA in common mode for lightning protection under 8/20us impact current

3.2.4 Slots

The RPA1202-U220S48 can be inserted into slots PWR1 and PWR2 of the iTN8800-II-AC.

The RPA1202-U220S48 can be inserted into slots PWR1 and PWR2 of the iTN8800-II-AC, which do not work in conjunction with the corresponding DC slots. That is:

- When AC power in slot PWR1 works, do not insert a DC power supply into slot 9.
- When AC power in slot PWR2 works, do not insert a DC power supply into slot 10.

3.2.5 LEDs

Table 3-5 lists LEDs on the RPA1202-U220S48.

Table 3-5 LEDs on the RPA1202-U220S48

LED	Status	Description
INPUT	Green/Red	AC input LED • Green: AC inputs are within the normal range. • Red: abnormal AC inputs, such as under voltage or over voltage • Off: no AC input
OUTPUT	Green/Red	DC output LED • Green: DC inputs are within the normal range. • Red: abnormal DC inputs, such as input under voltage, input over voltage, output over current, over temperature, or over voltage • Off: no DC output caused by no AC input

3.2.6 Technical specifications

Table 3-6 lists technical specifications of the RPA1202-U220S48.

Table 3-6 Technical specifications of the RPA1202-U220S48

Parameter	Value
Input voltage (VAC)	90–264
Input voltage frequency (Hz)	47–63 (typical value 50/60)
Maximum input current (A)	3.5
Input impact current (A)	≤ 40
Power factor	≥ 0.95
Output voltage range (VDC)	-51.895 to -55.105

Parameter	Value
Output rated voltage (VDC)	Typical value: -53.5
Output power (W)	400 W

3.2.7 Cable

Table 3-7 lists cables delivered with the RPA1202-U220S48.

Table 3-7 Cables delivered with the RPA1202-U220S48

Accessory	Name	Description
Ground cable	POL-ground cable-RNB5.5-4S/stripped-4.0mm^2-4m/RoHS	–
AC input cable	POL-AC-Chinese 3-pin/C13 connector-0.75mm^2-1.5m/RoHS	–

3.3 FANS331

3.3.1 Version

Table 3-8 lists the version of the FANS331.

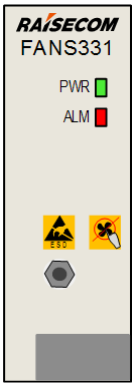
Table 3-8 Version of the FANS331

Model	Version
FANS331	A.00 or later

3.3.2 Appearance

Figure 3-3 shows the panel of the FANS331.

Figure 3-3 Panel of the FANS331



3.3.3 Features

The FANS331 features:

- 6 built-in fans
- Intelligent speed adjustment, which means that the rotation speed of the fan can be adjusted automatically according to the temperature
- Rotation speed feedback
- Manual configuration of rotation speeds with up to four gears
- Index monitoring when the fan is in place
- Hot swapping
- Fan failure alarm, including alarms for fan stalling and revolution drop caused by fan aging

3.3.4 Slots

The FANS331 module can be inserted into slot 11.

3.3.5 ESD plughole

There is an Electrostatic Discharge (ESD) plughole on the front panel of the FANS331 module.

When installing or maintaining the iTN8800, you need to wear the ESD wrist strap and insert the plug of the strap into the ESD plughole to release static electricity on human body, thus protecting the device from the influences of static electricity.

3.3.6 LEDs

Table 3-9 lists LEDs on the FANS331.

Table 3-9 LEDs on the FANS331

LED	Status	Description
PWR	Green	Power supply LED • Green: the power supply is normal. • Off: the power supply is abnormal.

LED	Status	Description
ALM	Red	Alarm LED • Red: the fan fails. • Off: the fan works properly.

3.3.7 Techinical specifications

Table 3-10 lists technical specifications of the FANS331.

Table 3-10 Technical specifications of the FANS331

Parameter	Value
Quantity of fans	6
Highest rotation speed (r/min)	12400

4 MCC

This chapter describes the Main Control Card (MCC) used by the iTN8800, including the following sections:

- iTN8800-II-NXU

4.1 iTN8800-II-NXU

4.1.1 Version

Table 4-1 lists the version of the iTN8800-II-NXU.

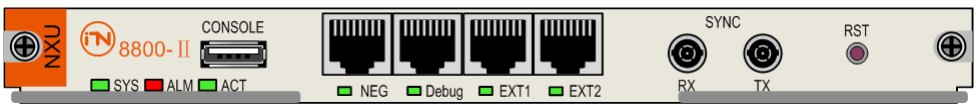
Table 4-1 Version of the iTN8800-II-NXU

Model	Product version	Software version
iTN8800-II-NXU	• B.01 or later • C.01 or later	V6.3.29 or later

4.1.2 Appearance

Figure 4-1 shows the panel of the iTN8800-II-NXU.

Figure 4-1 Panel of the iTN8800-II-NXU



4.1.3 Features

Table 4-2 lists features of the iTN8800-II-NXU.

Table 4-2 Features of the iTN8800-II-NXU

Feature	Description
Basic	• Support basic management for the MCC, including user management, time management, and log management. • Support managing configurations, alarms, performance, and faults of each card in the system. • Support forwarding management information among NEs. Support establishing management channels and forwarding management information in the system. • Support in-band DCN and out-of-band management. • Support processing and forwarding synchronization information in the system. • Support managing and monitoring the power module and fan.
Service feature	• Support Ethernet services, such as MAC address table, VLAN, QinQ, and LLDP. • Support IP services, such as ACL and ARP. • Support IP routing, such as OSPF, ISIS, and BGP. • Support MPLS, such as static LSP, LDP, RSVP-TE, and GRE. • Support VPN, such as MPLS L2VPN and MPLS L3VPN. • Support QoS, such as priority trust and mapping, traffic classification, traffic policy, congestion avoidance, queue shaping, MPLS QoS, and L3VPN QoS. • Support reliability, such as G.8031, G.8032, and VRRP. • Support OAM, such as EFM, CFM, BFD, and SLA. • Support security, such as CPU CAR and pot mirroring.
Device cascade	Provide 2 cascade interfaces.

Note

The iTN8800-II-NXU (C or later) supports GRE.

4.1.4 Slots

The iTN8800-II-NXU can be inserted into slot 1 or 2.

4.1.5 Interfaces

Interface type

Table 4-3 lists interfaces on the iTN8800-II-NXU.

Table 4-3 Interfaces on the iTN8800-II-NXU

Print	Type	Description
CONSOLE	USB	Debugging interface
NEG	RJ45	Network management interface, supporting out-of-band DCN
Debug	RJ45	Internal debugging interface

Print	Type	Description
EXT1	RJ45	Reserved
EXT2	RJ45	Reserved
SYNC RX	CC3 male interface	BITS clock input interface
SYNC TX	CC3 male interface	BITS clock output interface

Interface parameters

Parameters of the NEG interface, Debug interface, EXT1 interface, and EXT2 interface are identical, as listed in Table 4-4.

Table 4-4 Parameters of NEG/Debug/EXT1/EXT2 interface on the iTN8800-II-NXU

Parameter	Description
Connector type	RJ45
Interface rate	10/100 Mbit/s auto-negotiation
Duplex mode	Full duplex mode
Wiring	Auto MDI/MDIX
Standard	IEEE 802.3-compliant

Parameters of the SYNC-RX interface and SYNC-TX interface are identical, as listed in Table 4-5.

Table 4-5 Parameters of SYNC-RX/SYNC-TX interface on the iTN8800-II-NXU

Parameter	Description
Connector type	CC3 male interface (unbalanced)
Signal rate	2048 Kbit/s or 2048 kHz
Interface impedance	75 Ω
Electrical feature	Comply with ITU-TG.703 recommendations.

4.1.6 Buttons

Table 4-6 lists buttons on the iTN8800-II-NXU.

Table 4-6 Buttons on the iTN8800-II-NXU

Print	Name	Description
RST	Reset button	Be used to reset the card.

4.1.7 LEDs

Table 4-7 lists LEDs on the iTN8800-II-NXU.

Table 4-7 LEDs on the iTN8800-II-NXU

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
ACT	Green	Master/Slave card LED • Green: this NMS card is the master card or there is only one NMS card. • Off: this NMS card is the slave card.
LNK/ACT (NEG, Debug, EXT1, or EXT2)	Yellow	Interface working LED • Yellow: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking yellow: the interface is transmitting data.
100M (NEG, Debug, EXT1, or EXT2)	Green	Interface rate LED • Green: the interface is working at 100 Mbit/s. • Off: the interface is working at 10 Mbit/s.

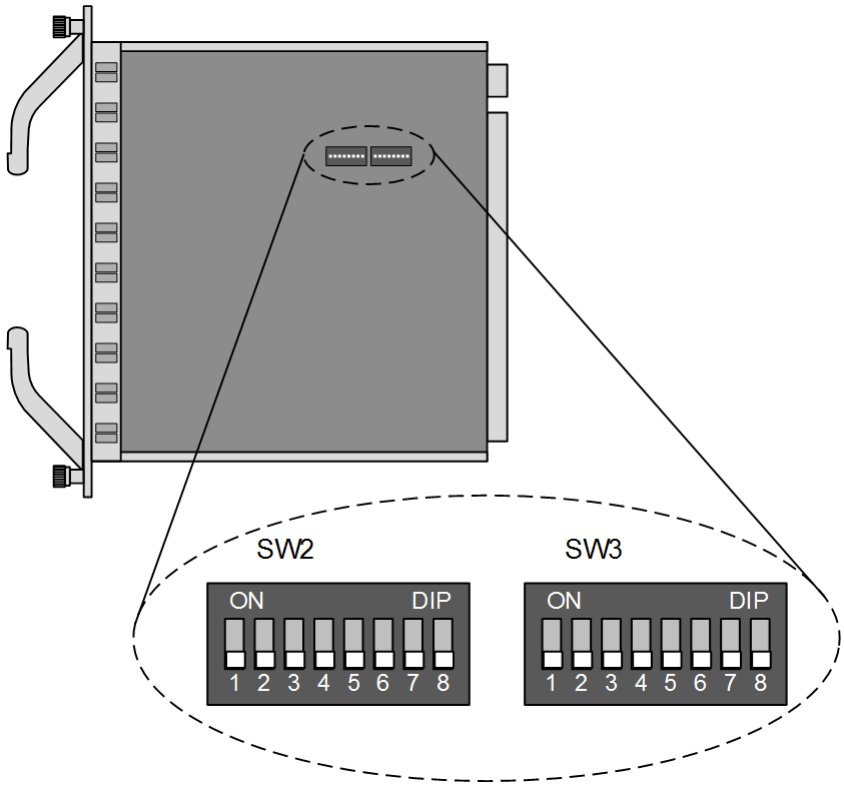
4.1.8 DIP switch

There are two DIP switches to be configured on the iTN8800-II-NXU, namely, SW2 and SW3. Each DIP switch has 8 positions.

Position

Figure 4-2 shows the position of SW2 and SW3.

Figure 4-2 Position of SW2 and SW3



Features

Table 4-8 lists features of SW2 and Table 4-9 list features of SW3.

Table 4-8 Features of SW2

Position	Feature	Status	Description	Default configuration
1	Configure the device as the master device or cascade device.	ON	The device is the cascade device.	All OFF
		OFF	The device is the master device.	
2–4	Configure the serial number of the device when the device works as the cascade device.	ON/ON/ON	Serial number: 1	
		ON/ON/OFF	Serial number: 2	
		ON/OFF/ON	Serial number: 3	
		ON/OFF/OFF	Serial number: 4	
		OFF/ON/ON	Serial number: 5	
		OFF/ON/OFF	Serial number: 6	
		OFF/OFF/ON	Serial number: 7	
		OFF/OFF/OFF	Serial number: 8	

Position	Feature	Status	Description	Default configuration
5–8	If the IP address of the NEG interface is X.Y.Z.W, these positions are used to configure the value of Z. X.Y is fixed as 192.168.	–	• When the position is ON, it indicates the binary number 0. • When the position is OFF, it indicates the binary number 1. • When positions 5–8 are in different status, it indicates the binary number from 0000 to 1111, namely, the decimal number from 0 to 15. For example, when positions 5–8 are all ON, it indicates the binary number 0000, namely, the decimal number 0.	

Table 4-9 Features of SW3

Position	Feature	Status	Description	Default configuration
1–8	If the IP address of the NEG interface (NMS interface) is X.Y.Z.W, these positions are used to configure the value of W. X.Y is fixed as 192.168.	–	• When the position is ON, it indicates the binary number 0. • When the position is OFF, it indicates the binary number 1. • When positions 1–8 are in different status, it indicates the binary number from 00000000 to 11111111, namely, the decimal number from 0 to 255. **Caution** Positions 1–8 cannot be all OFF.	All OFF

Note

When using the DIP switch to configure the IP address of the NEG interface, you only configure the IP address without including the mask. The mask is fixed as 255.255.255.0.

5 Clock card

This chapter describes the clock card used by the iTN8800, including the following section:

- iTN8800-TAU

5.1 iTN8800-TAU

5.1.1 Version

Table 5-1 lists the version of the iTN8800-TAU.

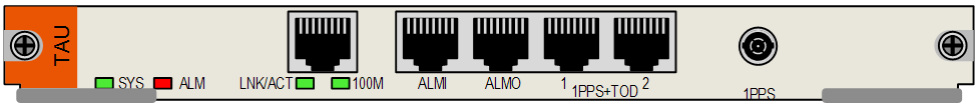
Table 5-1 Version of the iTN8800-TAU

Model	Product version	Software version
iTN8800-TAU	A.00 or later	V6.3.29 or later

5.1.2 Appearance

Figure 5-1 shows the panel of the iTN8800-TAU

Figure 5-1 Panel of the iTN8800-TAU



5.1.3 Features

Table 5-2 lists features of the iTN8800-TAU.

Table 5-2 Features of the iTN8800-TAU

Feature	Description
Basic features	• Support configuring the PTP clock source as the synchronous EEC input source. • Support configuring the PTP clock source to join EEC clock selection algorithm. • Support PTP time synchronization processing.
Clock synchronization	• Provide 1PPS+TOD input/output interface. • Support the BC, OC, E2ETC, and E2ETC+OC clock modes. • Support establishing connections between the master and multiple slaves. • Support BMC algorithm. • Support Onestep and Twostep for PTP. • Support modifying the interval for sending Sync packets, Delay-Req packets, and Announce packets. • Support delay compensation: – Provide PTP interface path asymmetric delay compensation. – Provide 1PPS+TOD interface input/output cable delay compensation. • Support managing clock synchronization. • Support the ETH or UDP mode for encapsulating PTP packets. Support unicast, multicast, and auto-negotiation. • The NNI and UNI interface on the RG8 and RX2 support sending and receiving PTP packets. • Support configuring the referential frequency for clock synchronization to the EEC clock source or the clock obtained by controlling the local PLL through PTP (namely, synchronous Ethernet and PTP run independently. The device implements frequency synchronization through the synchronous Ethernet and time synchronization through PTP).
PS frequency restoration	• Support the bidirectional frequency restoration mode. • Support establishing connections between the master and slave through auto-negotiation.
Protection switching	• Support protection switching of 1PPS+TOD referential sources. • Support protection switching of tracing paths (namely, the path for transmitting PTP time information).
Clock synchronization performance	• The interval for sending PTP packets complies with CMCC specifications. • Meet 3G backhaul application requirements.
Hot swapping	Supported

5.1.4 Slots

The iTN8800-TAU can be inserted into slot 4 only.

5.1.5 Interfaces

Interface type

Table 5-3 lists interfaces on the iTN8800-TAU.

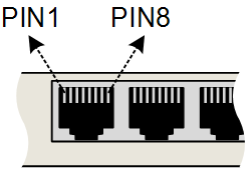
Table 5-3 Interfaces on the iTN8800-TAU

Print	Type	Description
–	RJ45	Qx interface, which can serve as a NMS interface for out-of-band network management
ALMI	RJ45	Alarm input interface, inputting 4 ways of alarms
ALMO	RJ45	Alarm output interface, outputting 4 ways of alarms
1PPS+TOD (1)	RJ45	1PPS+TOD interface, inputting or outputting 1PPS+TOD signals
1PPS+TOD (2)	RJ45	1PPS+TOD interface, inputting or outputting 1PPS+TOD signals or TOD signals only (in this case, the 1PPS interface should be used.)
1PPS	CC3 male interface	1PPS interface, inputting or outputting 1PPS signals

PIN definitions

Table 5-4 lists PIN definitions of the alarm interface and clock interface.

Table 5-4 PIN definitions of the alarm interface and clock interface

PIN	ALMI	ALMO	1PPS+TOD (1)	1PPS+TOD (2)	Description
1	ALMI1	ALMO1	Suspended	P3_TOD_TXD (232 level)	PIN definitions of these four alarms are the same, as shown below: 
2	GND	GND	Suspended	P3_TOD_RXD (232 level)	
3	ALMI2	ALMO2	P1_1PPS-	P2_1PPS-	
4	GND	GND	GND	GND	
5	ALMI3	ALMO3	GND	GND	
6	GND	GND	P1_1PPS+	P2_1PPS+	
7	ALMI4	ALMO4	P1_TOD-	P2_TOD-	
8	GND	GND	P1_TOD+	P2_TOD+	

5.1.6 LEDs

Table 5-5 lists LEDs on the iTN8800-TAU.

Table 5-5 LEDs on the iTN8800-TAU

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is not working or working improperly. • Blinking green: the system is working properly.
ALM	–	System alarm status LED • On: the system is being powered on or in the Bootrom phase. • Off: the system is already started and working properly.
LNK/ACT	Green	Extended NMS interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or connected improperly. • Blinking green: the interface is transmitting data.
100M	Green	Extended NMS interface rate LED • Green: the interface is working at 100 Mbit/s. • Off: the interface is working at 10 Mbit/s.

5.1.7 DIP switch

N/A

5.1.8 Cables

Table 5-6 lists the cable used by each interface.

Table 5-6 Cable used by each interface

Interface	Cable	Description
Extended NMS interface	N/A	Supporting auto-MDI/MDIX, adaptive to the straight-through cable and crossover cable
ALMI	N/A	Make it according to PIN definitions.
ALMO	N/A	Make it according to PIN definitions.
1PPS+TOD (1)	N/A	Make it according to PIN definitions.
1PPS+TOD (2)	N/A	Make it according to PIN definitions.
1PPS	N/A	Delivered with a local connector with the model of 75Ω-CC3 head-straight, made by yourself

6 Interface card

This chapter describes interface cards used by the iTN8800, including the following section:

- iTN8800-RG8
- iTN8800-RG8T
- iTN8800-RX2
- iTN8800-RE16
- iTN8800-RE16-BL
- iTN8800-RS4
- iTN8800-RF8
- iTN8800-RXG8

6.1 iTN8800-RG8

6.1.1 Version

Table 6-1 lists the version of the iTN8800-RG8.

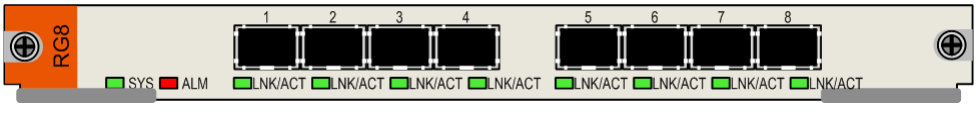
Table 6-1 Version of the iTN8800-RG8

Model	Product version	Software version
iTN8800-RG8	B.02 or later	V6.3.32 or later

6.1.2 Appearance

Figure 6-1 shows the panel of the iTN8800-RG8.

Figure 6-1 Panel of the iTN8800-RG8



6.1.3 Features

Table 6-2 lists features of the iTN8800-RG8.

Table 6-2 Features of the iTN8800-RG8

Feature	Description
Basic	• Support accessing 8 ways of GE packet services. • Support interconnecting with 8 ways of FE/GE services of active/standby MCC and support active/standby selection. • Support choosing the suitable optical/electrical module according to the application scenario.
Interface	• Support enabling/disabling the interface. • Support full duplex mode. • Support querying and modifying the interface mode (switch and router). • Support configuring the MTU of the interface and Tx/Rx packet statistics. • Support querying the interface status, interface type, etc.
Service type	• 1000BASE-T • 1000BASE-SX • 1000BASE-LX • 1000BASE-ZX
Performance and alarm monitoring	• Support PHY-layer alarm detection and related performance statistics. • Support MAC-layer performance detection. • Support optical module DDM.
Optical module management	• Support DDM. • Support hot swapping.

6.1.4 Slots

The iTN8800-RG8 can be inserted into slots 3–8. When the iTN8800-RG8 is inserted into slot 7 or 8, it can access 4 ways of GE packet services through interfaces 1–4 only.

6.1.5 Interfaces

Interface type

Table 6-3 lists interfaces on the iTN8800-RG8.

Table 6-3 Interfaces on the iTN8800-RG8

Print	Type	Description
1–8	SFP	• Service-side interface • Each interface transmits 1 way of GE services.

Interface parameters

Table 6-4 lists parameters of interfaces 1–8 on the iTN8800-RG8.

Table 6-4 Parameters of interfaces 1–8 on the iTN8800-RG8

Parameter	Description
Interface rate	GE
Duplex mode	Full duplex mode
MTU	9600 bytes
Flow control	Support IEEE 802.3x flow control in full duplex mode.
Applicable optical module	Support SFP electrical/optical module, which complies with standards as below: • 1000BASE-T • 1000BASE-SX • 1000BASE-LX • 1000BASE-ZX

6.1.6 LEDs

Table 6-5 lists LEDs on the iTN8800-RG8.

Table 6-5 LEDs on the iTN8800-RG8

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
LNK/ACT (1–8)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking green: the interface is transmitting data.

6.2 iTN8800-RG8T

6.2.1 Version

Table 6-6 lists the version of the iTN8800-RG8T.

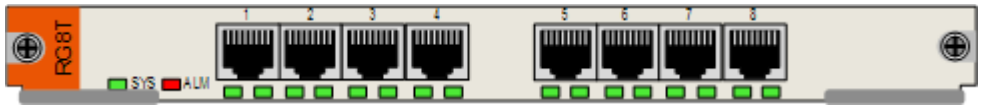
Table 6-6 Version of the iTN8800-RG8T

Model	Product version	Software version
iTN8800-RG8T	A.01 or later	V6.3.32 or later

6.2.2 Appearance

Figure 6-2 shows the panel of the iTN8800-RG8T.

Figure 6-2 Panel of the iTN8800-RG8T



6.2.3 Features

Table 6-7 lists features of the iTN8800-RG8T.

Table 6-7 Features of the iTN8800-RG8T

Feature	Description
Basic	• Support accessing 8 ways of FE/GE packet services at full rate. • Support interconnecting with 8 ways of FE/GE services of active/standby MCC and support active/standby selection. • The 8 GE interfaces can serve as the UNIs and the NNIs (do not support hybrid interfaces).
Interface	• Support enabling/disabling the interface. • Support full/half duplex mode. • Support querying and modifying the interface mode (UNI/NNI). • Support configuring the MTU of the interface, flow control on the interface, Tx/Rx packet statistics, interface loopback mode, interface status query, and so on.
Service type	• 10BASE-T • 100BASE-T • 1000BASE-T
Performance and alarm monitoring	• Support PHY-layer alarm detection and related performance statistics. • Support MAC-layer performance detection.
Clock synchronization	• Support synchronous Ethernet, which can extract the physical clock signals on the interface. The quality of the clock can meet the requirements of the clock source. • Support sending and receiving SSM by the synchronous Ethernet interface (working together with the NXU card). • Support IEEE 1588 v2 clock (working together with the NXU and TAU cards)
Link aggregation	Support 16 LAGs with each one supporting up to 8 members.

Feature	Description
Loopback	• Support internal loopback and external loopback at the Ethernet interface PHY layer. • Support internal loopback at the Ethernet interface MAC layer (working together with the NXU card). • Support automatically releasing loopback (working together with NXU card).
ECC	Each interface supports one ECC.

6.2.4 Slots

The iTN8800-RG8T can be inserted into slots 3–8. When the iTN8800-RG8T is inserted into slot 7 or 8, it supports accessing 4 ways of GE packet services through interfaces 1–4 only.

6.2.5 Interfaces

Interface type

Table 6-8 lists interfaces on the iTN8800-RG8T.

Table 6-8 Interfaces on the iTN8800-RG8T

Print	Type	Description
1–8	RJ45	• Service-side interface • Each interface accesses 1 way of 100/1000 Mbit/s services.

Interface parameters

Table 6-9 lists parameters of interfaces 1–8 on the iTN8800-RG8T.

Table 6-9 Parameters of interfaces 1–8 on the iTN8800-RG8T

Parameter	Description
Interface rate	10/100/1000 Mbit/s
Duplex mode	Full/Half duplex mode
MTU	9600 bytes
Flow control	Support IEEE 802.3x flow control in full duplex mode.

6.2.6 LEDs

Table 6-10 lists LEDs on the iTN8800-RG8T.

Table 6-10 LEDs on the iTN8800-RG8T

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
–	Green	Rate LED, located at the left side of the interface ID • Green: the rate is 1000 Mbit/s. • Off: the rate is 10/100 Mbit/s.
–	Green	Interface working LED, located at the right side of the interface ID • Green: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking green: the interface is transmitting data.

6.2.7 DIP switch

N/A

6.3 iTN8800-RX2

The iTN8800-RX2 can access 2 ways of 10GE packet services.

6.3.1 Version

Table 6-11 lists the version of the iTN8800-RX2.

Table 6-11 Version of the iTN8800-RX2

Model	Product version	Software version
iTN8800-RX2	A.04 or later	V6.3.32 or later
	B.00 or later	V6.4.14 or later

6.3.2 Appearance

Figure 6-3 shows the panel of the iTN8800-RX2 (A).

Figure 6-3 Panel of the iTN8800-RX2 (A)

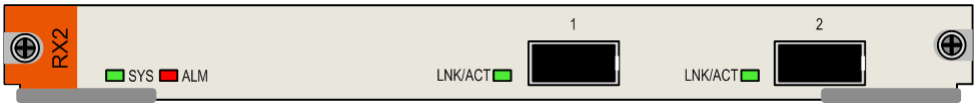


Figure 6-4 shows the panel of the iTN8800-RX2 (B).

Figure 6-4 Panel of the iTN8800-RX2 (B)

6.3.3 Features

Table 6-12 lists features of the iTN8800-RX2.

Table 6-12 Features of the iTN8800-RX2

Feature	Description
Basic	• Support accessing 2 ways of 10GE packet services. The interfaces can be configured concurrently as UNIs or NNIs. • Support interconnecting with 2 ways of 10GE services of active/standby MCC and support active/standby selection. • Support choosing the suitable optical module according to the application scenario.
Interface	• Support enabling/disabling the interface. • Support full duplex mode. • Support querying and modifying the interface mode (UNI and NNI). • Support querying the interface status, interface type, Tx/Rx packet statistics, and so on.
Interface aggregation	Supported
Service type	• 10GBASE-SR (0.3 km) • 10GBASE-LR (10 km) • 10GBASE-ER (40 km)
ALS	Supported
Performance and alarm monitoring	Support MAC-layer performance detection.
Loopback test	• Support internal loopback and external loopback at the Ethernet interface PHY layer. • Support internal loopback at the Ethernet interface MAC layer.
Optical module management	• Support DDM. • Support hot swapping.
Clock synchronization	• Support SyncE. • Support IEEE 1588v2.

6.3.4 Slots

The iTN8800-RX2 can be inserted into slots 3–8.

6.3.5 Interfaces

Interface type

Table 6-13 lists interfaces on the iTN8800-RX2 (A).

Table 6-13 Interfaces on the iTN8800-RX2 (A)

Print	Type	Description
1–2	XFP	• Service-side interface • Each interface transmits 1 way of 10GE services.

Table 6-14 lists interfaces on the iTN8800-RX2 (B).

Table 6-14 Interfaces on the iTN8800-RX2(B)

Print	Type	Description
1–2	SFP+	• Service-side interface • Each interface accesses 1 way of 10GE services.

Interface parameters

Table 6-15 lists parameters of 10GE interfaces 1–2 on the iTN8800-RX2.

Table 6-15 Parameters of 10GE interfaces 1–2 on the iTN8800-RX2

Parameter	Description
Interface rate	10 Gbit/s
Line coding	64B/66B
Duplex mode	Full duplex mode
Frame length	64–9600 bytes
Flow control	Support IEEE 802.3x flow control in full duplex mode.
Applicable optical module	Support XFP optical module (version A) or SFP+ optical module (version B),which complies with the following standards: • 10GBASE-SR • 10GBASE-LR • 10GBASE-ER

6.3.6 LEDs

Table 6-16 lists LEDs on the iTN8800-RX2.

Table 6-16 LEDs on the iTN8800-RX2

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. It is always green when the device is being started. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
LNK/ACT (1–2)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking green: the interface is transmitting data.

6.3.7 DIP

N/A

6.4 iTN8800-RE16

6.4.1 Version

Table 6-17 lists the version of the iTN8800-RE16.

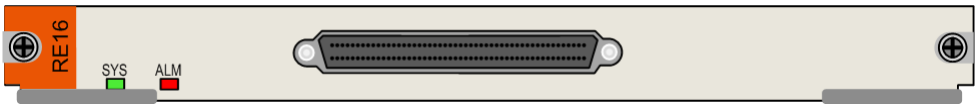
Table 6-17 Version of the iTN8800-RE16

Model	Product version	Software version
iTN8800-RE16	A.04 or later	V6.3.29 or later

6.4.2 Appearance

Figure 6-5 shows the panel of the iTN8800-RE16.

Figure 6-5 Panel of the iTN8800-RE16



6.4.3 Features

Table 6-18 lists features of the iTN8800-RE16.

Table 6-18 Features of the iTN8800-RE16

Feature	Description
Basic	The iTN8800-RE16 is the E1 CES card, used to emulate 16 ways of E1 services into packet services.
TDM	• Support accessing up to 16 ways of unbalanced E1 signals. • Support emulating unframed E1 and framed E1, including PCM30, PCM30 CRC, PCM31, and PCM31 CRC. • The E1 line clock mode can be external clock, differential clock, and adaptive clock. • Support E1 line external loopback and local internal loopback. • Support E1 link fault detection and link-state tracking. • Support E1 bit error performance detection and transparent transmission.
Emulation	• The PSN supports MPLS, MEF, and UDP/IP encapsulation formats. • PWE3 encapsulation mode supports SAToP and CESoPSN encapsulation protocols. • Support configuring the service encapsulation frame number and buffer depth. • Support control word and RTP. • Support clock recovery mechanism, including external clock, differential clock, and adaptive clock. • Support up to 64 Tunnels and up to 64 PWs. • Support configuring the jitter buffer time (375–50000μs). • Support configuring the packet encapsulation time (125–5000μs).
Hot swapping	Supported

6.4.4 Slots

The iTN8800-RE16 can be inserted into slots 3–8.

6.4.5 Interfaces

Interface type

Table 6-19 lists interfaces on the iTN8800-RE16.

Table 6-19 Interfaces on the iTN8800-RE16

Print	Type	Description
–	SCSI100 female interface	Access 16 ways of unbalanced E1 signals.

Interface parameters

Table 6-20 lists parameters of the SCSI100 interface.

Table 6-20 Parameters of the SCSI100 interface

Parameter	Description
Nominal rate	2048 Kbit/s ±50 ppm
Coding type	HDB3
Interface impedance	75 Ω
Electrical feature	Comply with ITU-T G.703 recommendations.
Frame structure	Comply with ITU-T G.704 recommendations.
Jitter feature	Comply with ITU-T G.823 recommendations.

6.4.6 LEDs

Table 6-21 lists LEDs on the iTN8800-RE16.

Table 6-21 LEDs on the iTN8800-RE16

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: some LOS/AIS alarm is generated on the E1 interface. • Off: no LOS/AIS alarm is generated on the E1 interface.

6.5 iTN8800-RE16-BL

6.5.1 Version

Table 6-22 lists the version of the iTN8800-RE16-BL

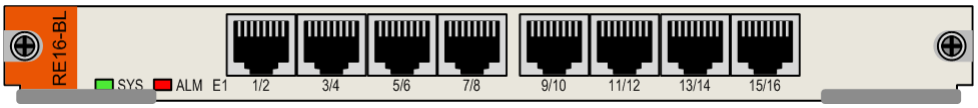
Table 6-22 Version of the iTN8800-RE16-BL

Model	Product version	Software version
iTN8800-RE16-BL	A.02 or later	V6.3.29 or later

6.5.2 Appearance

Figure 6-6 shows the panel of the iTN8800-RE16-BL.

Figure 6-6 Panel of the iTN8800-RE16-BL



6.5.3 Features

Table 6-23 lists features of the iTN8800-RE16-BL.

Table 6-23 Features of the iTN8800-RE16-BL

Feature	Description
Basic	The iTN8800-RE16-BL is the E1 CES card, used to emulate 16 ways of E1 services (accessed through the balanced interface) into packet services.
TDM interface	• Support accessing up to 16 ways of E1 signals. • Support emulating unframed E1 and framed E1, including PCM30, PCM30 CRC, PCM31, and PCM31 CRC. • The E1 line clock mode can be external clock, differential clock, and adaptive clock. • Support E1 line external loopback and local internal loopback. • Support E1 link fault detection and link-state tracking. • Support E1 bit error performance detection and transparent transmission.
Emulation	• Support carrying PW packets through MPLS, MEF, or UDP/IP to traverse the corresponding PSN. • PWE3 encapsulation mode supports SAToP and CESoPSN encapsulation protocols. • Support configuring the service encapsulation frame number and buffer depth. • Support control word and RTP. • Support clock recovery mechanism, including external clock, differential clock, and adaptive clock. • Support up to 64 Tunnels and up to 64 PWs. • Support configuring the jitter buffer time (375–50000μs). • Support configuring the packet encapsulation time (125–5000μs).
Hot swapping	Supported

6.5.4 Slots

The iTN8800-RE16-BL can be inserted into slots 3–8.

6.5.5 Interfaces

Interface type

Table 6-24 lists interfaces on the iTN8800-RE16-BL.

Table 6-24 Interfaces on the iTN8800-RE16-BL

Print	Type	Description
1/2, …… 15/16	RJ45	Each RJ45 interface accesses 2 ways of E1 signals

Interface parameters

Table 6-25 lists parameters of the E1 interface.

Table 6-25 Parameters of the E1 interface

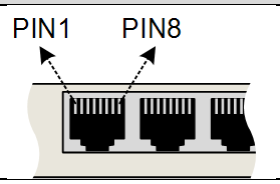
Parameter	Description
Nominal rate	2048 Kbit/s ±50 ppm
Coding type	HDB3
Interface impedance	120 Ω
Electrical feature	Comply with ITU-T G.703 recommendations.
Frame structure	Comply with ITU-T G.704 recommendations.
Jitter feature	Comply with ITU-T G.823 recommendations.

PIN definitions

Table 6-26 lists PIN definitions of the E1 interface.

Table 6-26 PIN definitions of the E1 interface

PIN	Definition	Description
1	OUT1+	• The No. 1 way of signal refers to the odd-numbered E1. The No. 2 way of signal refers to the even-number E1. For example, for interface 3/4: – The No. 1 way of signal (IN1+, IN1-, OUT1+, and OUT1-) refers to the No.3 way of E1. – The No. 2 way of signal (IN2+, IN2-, OUT2+, and OUT2-) refers to the No.4 way of E1. • PIN numbers of the E1 interface are as below:
2	OUT1-	
3	IN2+	
4	IN1+	
5	IN1-	
6	IN2-	
7	OUT2+	

PIN	Definition	Description
8	OUT2-	

6.5.6 LEDs

Table 6-27 lists LEDs on the iTN8800-RE16-BL.

Table 6-27 LEDs on the iTN8800-RE16-BL

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: some LOS/AIS alarm is generated on the E1 interface. • Off: no LOS/AIS alarm is generated on the E1 interface.

6.5.7 DIP switch

N/A

6.6 iTN8800-RS4

6.6.1 Version

Table 6-28 lists the version of the iTN8800-RS4.

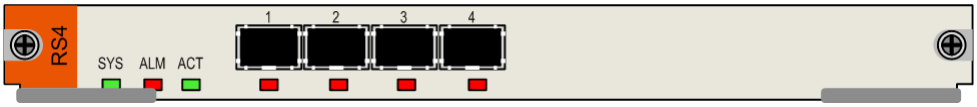
Table 6-28 Version of the iTN8800-RS4

Model	Product version	Software version
iTN8800-RS4	A.04 or later	V6.3.29 or later

6.6.2 Appearance

Figure 6-7 shows the panel of the iTN8800-RS4.

Figure 6-7 Panel of the iTN8800-RS4



6.6.3 Features

Table 6-29 lists features of the iTN8800-RS4.

Table 6-29 Features of the iTN8800-RS4

Feature	Description
Basic	The iTN8800-RS4 is the STM-1 CES card, used to channelize 4×63 ways of E1 services into PS services.
SDH	• Provide 4 SFP interfaces on the front panel to access 4 ways of STM-1 services. • Support mapping up to 252 ways of E1 services to SDH. E1 services are mapped in VC12 mode. Each VC12 carries 1 way of E1 service. SDH supports fixed timeslots for mapping. • Support extracting clock signals from any STM-1 interface as the system clock through the NXU on the backplane. • Support configuring the SDH Tx clock source as the external clock. • Support the inner loop and outer loop of the SDH interface. • Support configuring the threshold for adjusting positive and negative AU pointer: 1–65535. • Support configuring the EXE alarm threshold for the regeneration section, multiplex section, and HP of STM-1: 1E-3, 1E-4, and 1E-5. • Support enabling/disabling MS-AIS insertion. • Support configuring the C2/J0/J1/J2/S1/K1/K2 overhead bytes. • Support configuring the SD threshold for the regeneration section, multiplex section, and HP: 1E-6, 1E-7, and 1E-8. • Support configuring the ES and SES threshold for the regeneration section, multiplex section, and HP: 1–900s.
E1	• Support emulating unframed E1 and framed E1, including PCM30, PCM30 CRC, PCM31, and PCM31 CRC; support configuring the E1 framed mode. • The E1 line clock mode can be external clock, differential clock, adaptive clock, and loopback clock. • Support internal loopback on the E1 interface.
Emulation	• The PSN supports MPLS encryption mode. • PWE3 encapsulation mode supports SAToP and CESoPSN encapsulation protocols. • Support configuring the number of frames for encrypting services and loading time. • Support configuring the jitter buffer time (375–100000μs). • Support configuring E1 timeslots. • Support control word and RTP. • Support configuring service Tag. • Support configuring VLANs. • Support configuring service priority. • Support transmitting CES service alarms.

Feature	Description
Performance monitoring and alarm monitoring	• Support optical module DDM. • Support E1 alarms: AIS, LOF, and RAI. • Support SDH alarms: – Regeneration section alarms: LOS, LOF, B1_EXC, B1_SD, OOF, and J0 RS_TIM. – Multiplex section alarms: MS_RDI, B2_EXC, AU_LOP, MS_AIS, AU_AIS, and B2_SD. – HP alarms: J1 HP_TIM, HP-UNEQ, HP-RDI, B3_EXC, HP-PLM, B3_SD, and AU_AIS. – LP alarms: LP-TIM, LP-UNEQ, LP-RDI, LP-EXC, LP-SD, LP-PLM, TU_LOP, and LP-AIS. – Support detecting B1, B2, and B3 errored codes. – Support AU pointer adjustment threshold alarms: PJC+ and PJC-.
ALS	Supported
Hot swapping	Supported

6.6.4 Slots

The iTN8800-RS4 can be inserted into slots 3–8.

6.6.5 Interfaces

Interface type

Table 6-30 lists interfaces on the iTN8800-RS4.

Table 6-30 Interfaces on the iTN8800-RS4

Print	Type	Description
14	SFP	Each SDH interface accesses 1 way of STM services.

Interface parameters

Table 6-31 lists parameters of interfaces 1–4 on the iTN8800-RS4.

Table 6-31 Parameters of interfaces 1–4 on the iTN8800-RS4

Parameter	Description
Interface type	SFP
Interface rate	STM-1
Coding type	NRZ
Multiplex structure	Comply with ITU-T G.707 recommendations.

Parameter	Description
Optical interface feature	Comply with ITU-T G.957/ITU-T G.691 recommendations.
Frame structure	Comply with ITU-T G.825 recommendations.
Adaptive optical module	SFP optical modules (15 km, 40 km, and 80 km)

6.6.6 LEDs

Table 6-32 lists LEDs on the iTN8800-RS4.

Table 6-32 LEDs on the iTN8800-RS4

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	• Red: a LOS/LOF/OOF/MS-AIS alarm is generated. • Off: no LOS/LOF/OOF/MS-AIS alarm is generated.
ACT	Green	Interface working LED • Green: the card is the master card when it is configured to inter-card protection mode. • Off: the card is the slave card when it is configured to inter-card protection mode.
LOS1–LOS4	Red	LOS alarm LED • Red: a LOS alarm is generated. • Off: no LOS alarm is generated. **Note** The LOS LED keeps off when STM services are accessed from the backplane regardless of the interface status on the front panel.

6.6.7 DIP switch

N/A

6.7 iTN8800-RF8

6.7.1 Version

Table 6-33 lists the version of the iTN8800-RF8.

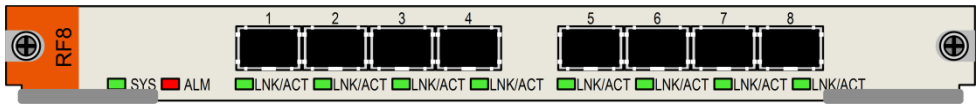
Table 6-33 Version of the iTN8800-RF8

Model	Product version	Software version
iTN8800-RF8	A.01 or later	V6.3.31 or later

6.7.2 Appearance

Figure 6-8 shows the panel of the iTN8800-RF8.

Figure 6-8 Panel of the iTN8800-RF8



6.7.3 Features

Table 6-34 lists features of the iTN8800-RF8.

Table 6-34 Features of the iTN8800-RF8

Feature	Description
Basic	• Support accessing 8 ways of FE packet services. • Support RC-Link optical interface management protocol, which can manage the customer's RC-Link transceiver or other 100Base-FX interface devices. The transceivers which can be managed through RC-Link are: – RC512-FE(B), RC512-FE(H) – RC512-FE-S(B), RC512-FE-S(H) – RC532-FE(A), RC532-FE(H) – RC531-FE(A), RC531-FE(H) – RC513-FE(B), RC513-FE(H) – RC522E-FE(A), RC522E-FE(H) – RC521E-FE(A), RC521E-FE(H) – RC521H-FE(A), RC521H-FE(H) – RC511-4FE(B), RC511-4FE(H) – RM531-FE(A), RM531-FE(B) – RM531i-FE(B), RM531i-FE(H)
Interface	• Support enabling/disabling the interface. • Support configuring flow control on the interface, Rx/Tx packet statistics, and interface loopback mode. • Support querying interface status. • Support interface isolation.
Service type	• 100BASE-LX 10 km • 100BASE-LX 40 km • 100BASE-ZX 80 km
Performance and alarm monitoring	• Support PHY-layer alarm detection and related performance statistics. • Support optical-layer alarm detection and related performance statistics.

Feature	Description
Loopback	• Support internal loopback at the Ethernet interface MAC layer. • Support internal loopback and external loopback at the Ethernet interface PHY layer.
ALS	Supported
Optical module management	• Support DDM. • Support status monitoring when the card is in place. • Support opening or shutting down the laser manually. • Support hot swapping.
Hot swapping	Supported

6.7.4 Slots

The iTN8800-RF8 can be inserted into slots 3–8.

- When the iTN8800-RF8 is inserted into slot 7 or 8, it supports accessing 4 ways of FE packet services through interfaces 1–4 only.
- When the iTN8800-RF8 is inserted into slots 3–6, it supports accessing 8 ways of FE packet services through interface 1–8. We recommend prioritizing slots 3–6.

6.7.5 Interfaces

Interface type

Table 6-35 lists interfaces on the iTN8800-RF8.

Table 6-35 Interfaces on the iTN8800-RF8

Print	Type	Description
1–8	SFP	• Optical interface • Each interface accesses 1 way of FE services.

Interface parameters

Table 6-36 lists parameters of interfaces 1–8 on the iTN8800-RF8.

Table 6-36 Parameters of interfaces 1–8 on the iTN8800-RF8

Parameter	Description
Interface rate	FE
Optical module	Support SFP optical modules, which should meet the following standards: • 100BASE-LX • 100BASE-ZX

Note

We recommend using the following optical modules: USFP-FE/AN-R, USFP-03/M-D-R, USFP-03/S1-D-R, USFP-03/S2-D-R, USFP-03/S3-D-R, USFP-03/SS13-D-R, USFP-03/SS15-D-R, USFP-03/SS23-D-R, USFP-03/SS25-D-R, USFP-03/SS34-D-R, and USFP-03/SS35-D-R.

6.7.6 LEDs

Table 6-37 lists LEDs on the iTN8800-RF8.

Table 6-37 LEDs on the iTN8800-RF8

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is not working or working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: one or more interface generates LOS alarm. • Off: no LOS alarm is generated.
LNK/ACT (1–8)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or connected improperly. • Blinking green: the interface is transmitting data.

6.7.7 DIP switch

N/A

6.8 iTN8800-RXG8

The iTN8800-RXG8 card can access 1 way of 10 Gbit/s services and 8 ways of 100/1000 Mbit/s services concurrently.

6.8.1 Version

Table 6-38 lists the version of the iTN8800-RXG8.

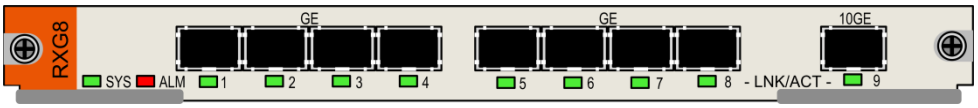
Table 6-38 Version of the iTN8800-RXG8

Model	Product version	Software version
iTN8800-RXG8	A.00 or later	V6.4.10 or later

6.8.2 Appearance

Figure 6-9 shows the panel of the iTN8800-RXG8.

Figure 6-9 Panel of the iTN8800-RXG8



6.8.3 Features

Table 6-39 lists features of the iTN8800-RXG8.

Table 6-39 Features of the iTN8800-RXG8

Feature	Description
Basic	• Accessing 1 way of 10 Gbit/s services and 8 ways of 100/1000 Mbit/s services concurrently • Interconnecting with the active/standby MCC and active/standby selection
Interface	• Configuring interface status (enable or disable) • Configuring interface MTU, interface flow control, statistics on sent and received packets, interface loopback mode, interface status, interface mode (UNI/NNI), interface type query, and so on.
Service type	Support the following optical modules: • 10GBASE-SR (0.3 km) • 10GBASE-LR (10 km) • 10GBASE-ER (40 km) • 1000BASE-SX (0.5 km) • 1000BASE-LX (10 km) • 1000BASE-LX (40 km) • 1000BASE-ZX (80 km) • 100BASE-LX (10 km) • 100BASE-LX (40 km) • 100BASE-ZX (80 km)
ALS	Supported
Loopback	• Internal and external loopback at the Ethernet interface PHY layer. • Internal loopback at the Ethernet interface MAC layer.
Performance and alarm monitoring	• MAC-layer performance monitoring • PHY-layer alarm detection and related performance statistics • Alarm detection and related performance statistics of optical/electrical modules
Optical module management	• DDM. • Hot swapping • SyncE for GE/FE services • IEEE1588v2 for 10 Gbit/s services

6.8.4 Slots

The iTN8800-RXG8 can be inserted into slots 7 and 8.

6.8.5 Interfaces

Interface type

Table 6-40 lists interfaces on the iTN8800-RXG8.

Table 6-40 Interfaces on the iTN8800-RXG8

Print	Type	Description
1–8	SFP	• 1 way of 100/1000 Mbit/s services for each interface • 100/1000 Mbit/s optical modules • 100/1000 Mbit/s electrical modules
9	SFP+	Accessing 1 way of 10 Gbit/s services

Interface parameters

Interfaces 1–8 can behave as 1000 Mbit/s interfaces or 100 Mbit/s interfaces based on the accessed services.

Table 6-41 lists parameters of 1000 Mbit/s interfaces 1–8 on the iTN8800-RXG8.

Table 6-41 Parameters of 1000 Mbit/s interfaces 1–8 on the iTN8800-RXG8

Parameter	Description
Interface rate	1000 Mbit/s
Duplex mode	Full duplex
Frame length	64–9600 bytes
Traffic control	Flow control based on IEEE 802.3x
Applicable optical module	SFP optical modules, which comply with the following standards: • 1000BASE-SX (0.5 km) • 1000BASE-LX (10 km) • 1000BASE-LX (40 km) • 1000BASE-ZX (80 km)

Table 6-42 lists parameters of 100 Mbit/s interfaces 1–8 on the iTN8800-RXG8.

Table 6-42 Parameters of 100 Mbit/s interfaces 1–8 on the iTN8800-RXG8

Parameter	Description
Interface rate	100 Mbit/s

Parameter	Description
Duplex mode	Full duplex
Frame length	64–9600 bytes
Traffic control	Flow control based on IEEE 802.3x
Applicable optical module	SFP optical modules, which comply with the following standards: • 100BASE-LX (10 km) • 100BASE-LX (40 km) • 100BASE-ZX (80 km)

Table 6-43 lists parameters of 10 Gbit/s interface 9 on the iTN8800-RXG8.

Table 6-43 Parameters of 10 Gbit/s interface 9 on the iTN8800-RXG8

Parameter	Description
Interface rate	10 Gbit/s
Duplex mode	Full duplex
Frame length	64–9600 bytes
Traffic control	Flow control based on IEEE 802.3x
Applicable optical module	SFP+ optical modules, which comply with the following standards: • 10GBASE-SR (0.3 km) • 10GBASE-LR (10 km) • 10GBASE-ER (40 km)

6.8.6 LEDs

Table 6-44 lists LEDs on the iTN8800-RXG8.

Table 6-44 LEDs on the iTN8800-RXG8

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: alarms are generated. • Off: no alarm is generated.
LNK/ACT (1–9)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or connected improperly. • Blinking green: the interface is transmitting data.

6.8.7 DIP switch

N/A

7 Smart probe card

This chapter describes the smart probe cards used by the iTN8800, including the following section:

- iTN8800-SLAG8
- iTN8800-SLAX2

7.1 iTN8800-SLAG8

7.1.1 version

Table 7-1 lists the version of the iTN8800-SLAG8.

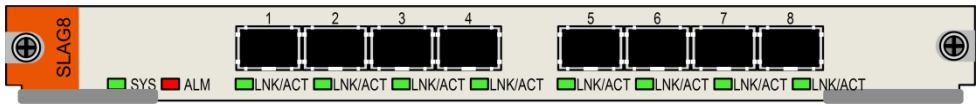
Table 7-1 Version of the iTN8800-SLAG8

Model	Product version	Software version
iTN8800-SLAG8	B.03 or later	V6.4.10 or later

7.1.2 Appearance

Figure 7-1 shows the panel of the iTN8800-SLAG8.

Figure 7-1 Panel of the iTN8800-SLAG8



7.1.3 Features

Table 7-2 lists features of the iTN8800-SLAG8.

Table 7-2 Features of the iTN8800-SLAG8

Feature	Description
Basic	• Support accessing 8 ways of GE packet services. • Support interconnecting with 8 ways of FE/GE services of active/standby MCC and support active/standby selection. • Support choosing the suitable optical/electrical module according to the application scenario.
Interface	• Support enabling/disabling the interface. • Support full duplex mode. • Support querying and modifying the interface mode (switch and router). • Support configuring the MTU of the interface and Tx/Rx packet statistics. • Support querying the interface status, interface type, etc.
Service type	• 1000BASE-T • 1000BASE-SX • 1000BASE-LX • 1000BASE-ZX
Performance and alarm monitoring	• Support PHY-layer alarm detection and related performance statistics. • Support MAC-layer performance detection. • Support optical module DDM.
Optical module management	• Support DDM. • Support hot swapping.

7.1.4 Slots

The iTN8800-SLAG8 can be inserted into slots 3–8. When the iTN8800-SLAG8 is inserted into slot 7 or 8, it supports accessing 4 ways of GE packet services through interfaces 1–4 only.

7.1.5 Interfaces

Interface type

Table 7-3 lists interfaces on the iTN8800-SLAG8.

Table 7-3 Interfaces on the iTN8800-SLAG8

Print	Type	Description
1–8	SFP	• Service-side interface • Each interface transmits 1 way of GE services.

Interface parameters

Table 7-4 lists parameters of interfaces 1–8 on the iTN8800-SLAG8.

Table 7-4 Parameters of interfaces 1–8 on the iTN8800-SLAG8

Parameter	Description
Interface rate	GE
Duplex mode	Full duplex mode
MTU	9600 bytes
Flow control	Support IEEE 802.3x flow control in full duplex mode.
Applicable optical module	Support SFP electrical/optical module, which complies with the following standards: • 1000BASE-T • 1000BASE-SX • 1000BASE-LX • 1000BASE-ZX

7.1.6 LEDs

Table 7-5 lists LEDs on the iTN8800-SLAG8.

Table 7-5 LEDs on the iTN8800-SLAG8

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
LNK/ACT (1–8)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking green: the interface is transmitting data.

7.2 iTN8800-SLAX2

The iTN8800-SLAX2 can access 2 ways of 10 Gbit/s packet services.

7.2.1 Version

Table 7-6 lists the version of the iTN8800-SLAX2.

Table 7-6 Version of the iTN8800-SLAX2

Model	Product version	Software version
iTN8800-SLAX2	A.05 or later	V6.3.32 or later
	B.00 or later	V6.4.14 or later

7.2.2 Appearance

Figure 7-2 shows the panel of the iTN8800-SLAX2 (A).

Figure 7-2 Panel of the iTN8800-SLAX2 (A)

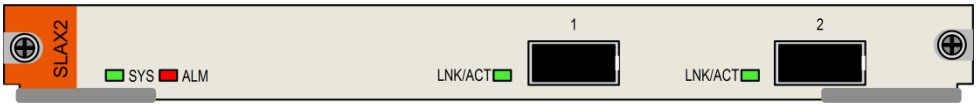


Figure 7-3 shows the panel of the iTN8800-SLAX2 (B).

Figure 7-3 Panel of the iTN8800-SLAX2 (B)

7.2.3 Features

Table 7-7 lists features of the iTN8800-SLAX2.

Table 7-7 Features of the iTN8800-SLAX2

Feature	Description
Basic	• Support accessing 2 ways of 10 Gbit/s packet services and the 2 interfaces can be configured to UNI interfaces or NNI interfaces concurrently. • Support interconnecting with 2 ways of 10 Gbit/s services of active/standby MCC and support active/standby selection. • Support choosing the suitable optical module according to the application scenario
Interface	• Support enabling/disabling the interface. • Support full duplex mode. • Support querying and modifying the interface mode (UNI and NNI). • Support querying the interface status, interface type, Tx/Rx packet statistics, and so on.
Interface aggregation	Supported

Feature	Description
Service type	Support the following optical modules: • 10GBASE-SR (0.3 km) • 10GBASE-LR (10 km) • 10GBASE-ER (40 km)
ALS	Supported
Performance and alarm monitoring	Support MAC-layer performance detection.
Loopback test	• Support internal loopback and external loopback at the Ethernet interface PHY layer. • Support internal loopback at the Ethernet interface MAC layer.
Optical module management	• Support DDM. • Support hot swapping.
Clock synchronization	• Support SyncE. • Support IEEE 1588v2.

7.2.4 Slots

The iTN8800-SLAX2 can be inserted into slots 3–8.

7.2.5 Interfaces

Interface type

Table 7-8 lists interfaces on the iTN8800-SLAX2 (A).

Table 7-8 Interfaces on the iTN8800-SLAX2 (A)

Print	Type	Description
1–2	XFP	• Service-side interface • Each interface accesses 1 way of 10GE services.

Table 7-9 lists interfaces on the iTN8800-SLAX2 (B).

Table 7-9 Interfaces on the iTN8800-SLAX2 (B)

Print	Type	Description
1–2	SFP+	• Service-side interface • Each interface accesses 1 way of 10GE services.

Interface parameters

Table 7-10 lists parameters of the 10GE interfaces 1–2 on the iTN8800-SLAX2 (B).

Table 7-10 Parameters of the 10GE interfaces 1–2 on the iTN8800-SLAX2 (B)

Parameter	Description
Interface rate	10 Gbit/s
Line coding	64B/66B
Duplex mode	Full duplex mode
Frame length	64–9600 bytes
Flow control	Support IEEE 802.3x flow control in full duplex mode
Applicable optical module	Support XFP optical module (version A) or SFP+ optical module (version B),which complies with the following standards: • 10GBASE-SR • 10GBASE-LR • 10GBASE-ER

7.2.6 LEDs

Table 7-11 lists LEDs on the iTN8800-SLAX2.

Table 7-11 LEDs on the iTN8800-SLAX2

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. It is always green when the device is being started. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Red	General alarm LED • Red: any critical or major alarm is generated. • Blinking red: any minor alarm is generated. • Off: no alarm is generated.
LNK/ACT (1–2)	Green	Interface working LED • Green: the interface is connected properly. • Off: the interface is disconnected or is connected improperly. • Blinking green: the interface is transmitting data.

7.2.7 DIP

N/A

8 Optical card

This chapter describes the optical card used by the iTN8800, including the following section:

- iTN8800-OMD8

8.1 iTN8800-OMD8

The iTN8800-OMD8 is an 8-wave Coarse Wavelength Division Multiplexing (CWDM) card.

8.1.1 Version

Table 8-1 lists the version of the iTN8800-OMD8.

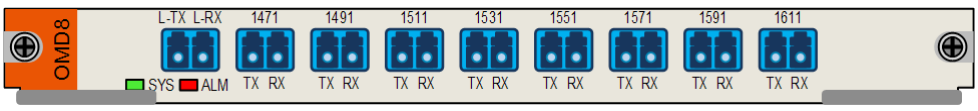
Table 8-1 Version of the iTN8800-OMD8

Model	Product version	Software version
iTN8800-OMD8	A.00 or later	V6.4.17 or later

8.1.2 Appearance

Figure 8-1 shows the panel of the iTN8800-OMD8.

Figure 8-1 Panel of the iTN8800-OMD8



8.1.3 Features

Table 8-2 lists features of the iTN8800-OMD8.

Table 8-2 Features of the iTN8800-OMD8

Feature	Description
Basic	Multiplexing and demultiplexing 8 ways of bidirectional services, with the wavelengths of 1471 nm, 1491 nm, 1511 nm, 1531 nm, 1551 nm, 1571 nm, 1591 nm, and 1611 nm respectively
Information query	• Basic information about cards • Basic information about interfaces
Upgrade	Online upgrade of system software
Hot swapping	Supported

8.1.4 Slots

The iTN8800-OMD8 can be inserted into slots 2–8 of the iTN8800-II.

8.1.5 Interfaces

Interface type

Table 8-3 lists interfaces on the iTN8800-OMD8.

Table 8-3 Interfaces on the iTN8800-OMD8

Print	Type	Description
L-TX	Flange (LC/PC)	Line-side Tx interface
L-RX	Flange (LC/PC)	Line-side Rx interface
1471-TX–1611-TX	Flange (LC/PC)	Client-side Tx interface
1471-RX–1611-RX	Flange (LC/PC)	Client-side Rx interface

Interface parameters

Table 8-4 lists optical parameters of the iTN8800-OMD8.

Table 8-4 Optical parameters of the iTN8800-OMD8

Parameter	Description
Channel spacing (GHz)	20
-0.5 dB channel width (nm)	≥ 15
Channel flatness (dB)	≤ 0.5

Parameter		Description
Channel insertion loss (dB)	CHxx→COM	≤ 3.0
Adjacent channel isolation (dB)		≥ 30
Non-adjacent channel isolation (dB)		≥ 40
Polarization Dependent Loss (dB)		≥ 0.2
Return loss (dB)		≥ 45
Directivity (dB)		≥ 50

8.1.6 LEDs

Table 8-5 lists LEDs on the iTN8800-OMD8.

Table 8-5 LEDs on the iTN8800-OMD8

LED	Status	Description
SYS	Green	System working LED • Green: the system is working improperly. • Off: the system is working improperly. • Blinking green: the system is working properly.
ALM	Reserved	

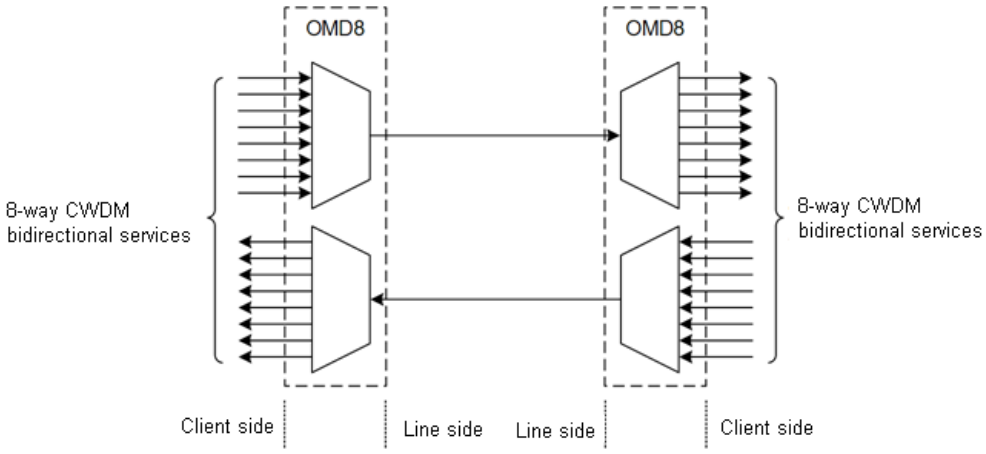
8.1.7 DIP

N/A

8.1.8 Application

The iTN8800-OMD8 card features multiplexing and demultiplexing. When the iTN8800-OMD8 cards at the two sides are connected point to point, they can multiplex and demultiplex 8 ways of bidirectional services, as shown in Figure 8-2.

Figure 8-2 Application of the iTN8800-OMD8



9 Cables

This chapter describes cables used by the iTN8800, including the following sections:

- Fiber
- Ethernet cable
- Clock cable
- DC power cable
- Ground cable
- Debugging cable

9.1 Fiber

Usage scenario

Table 9-1 lists fiber and connector types used by the iTN8800.

Table 9-1 Fiber and connector types

Local connector	Remote connector	Type
LC/PC	LC/PC	2-mm SM fiber
		2-mm MM fiber
	FC/PC	2-mm SM fiber
		2-mm MM fiber
	SC/PC	2-mm SM fiber
		2-mm MM fiber

Note

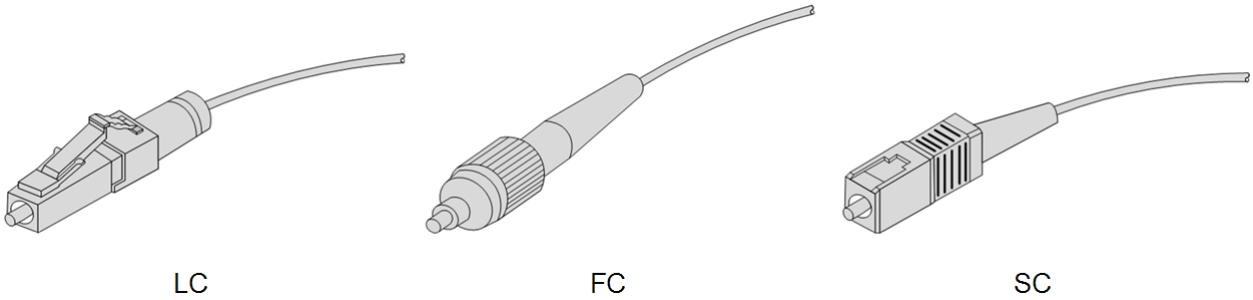
The type of the fiber and connector used by the card depends on the following information:

- For the optical module type that can be used by the interface, see descriptions of interfaces on each card.
- For information about the optical module, see section 10.2 Lookup table of optical module indexes.

Appearance

Figure 9-1 shows the appearance of LC/FC/SC fiber connector.

Figure 9-1 LC/FC/SC fiber connector



9.2 Ethernet cable

Usage scenario

Table 9-2 lists usage scenario of the Ethernet cable. You can use the Ethernet cable provided by Raisecom, which should be purchased separately, or you can make it on site.

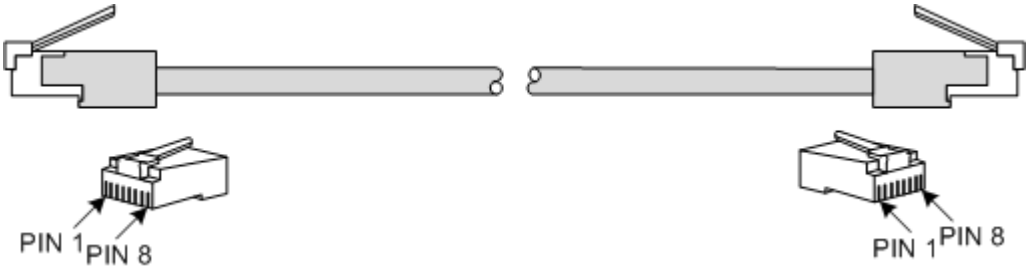
Table 9-2 Usage scenario of the Ethernet cable

Card	Print	Connector	Usage	Description
iTN8800-II-NXU	NEG	RJ45	Network management interface	• 10/100 Mbit/s auto-negotiation • Auto MDI/MDIX
	Debug	RJ45	Ethernet interface, through which you can directly telnet the service card	
	EXT1	RJ45	Reserved	
	EXT2	RJ45	Reserved	

Appearance

Figure 9-2 shows the appearance of the Ethernet cable.

Figure 9-2 Ethernet cable



Wiring scheme

Figure 9-3, Figure 9-4, and Figure 9-5 show wiring of the straight-through cable, 100 Mbit/s crossover cable, and 1000 Mbit/s crossover cable respectively.

Figure 9-3 Wiring of the straight-through cable

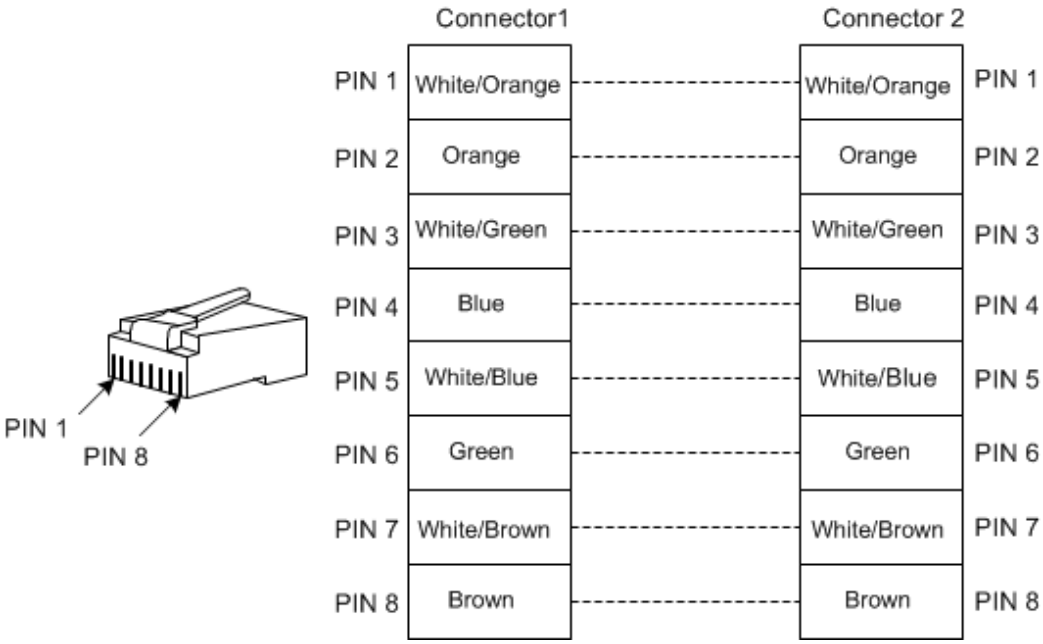


Figure 9-4 Wiring or the 100 Mbit/s crossover cable

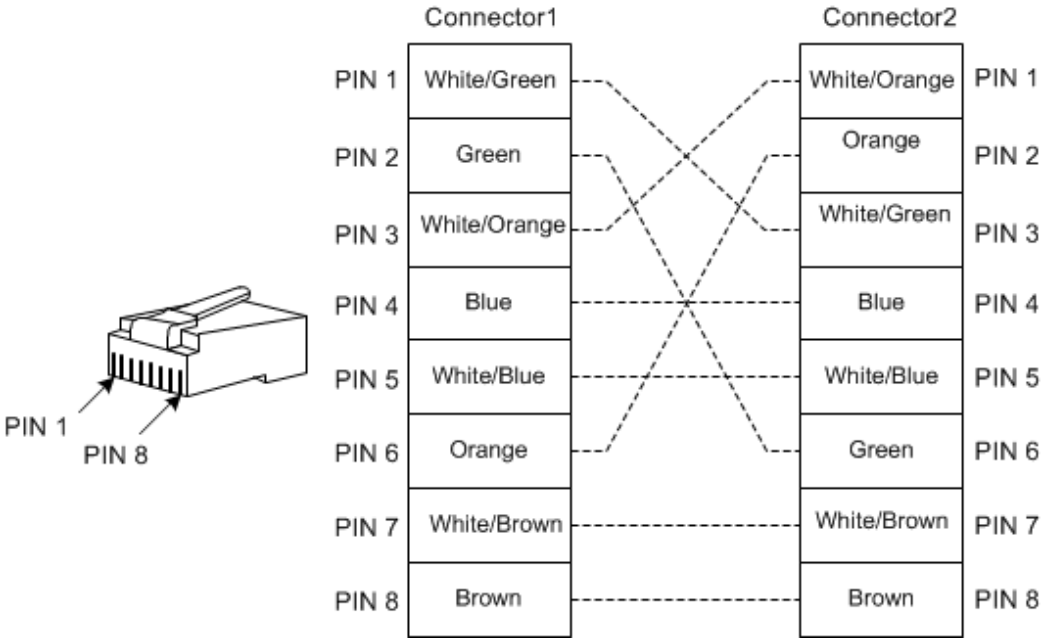
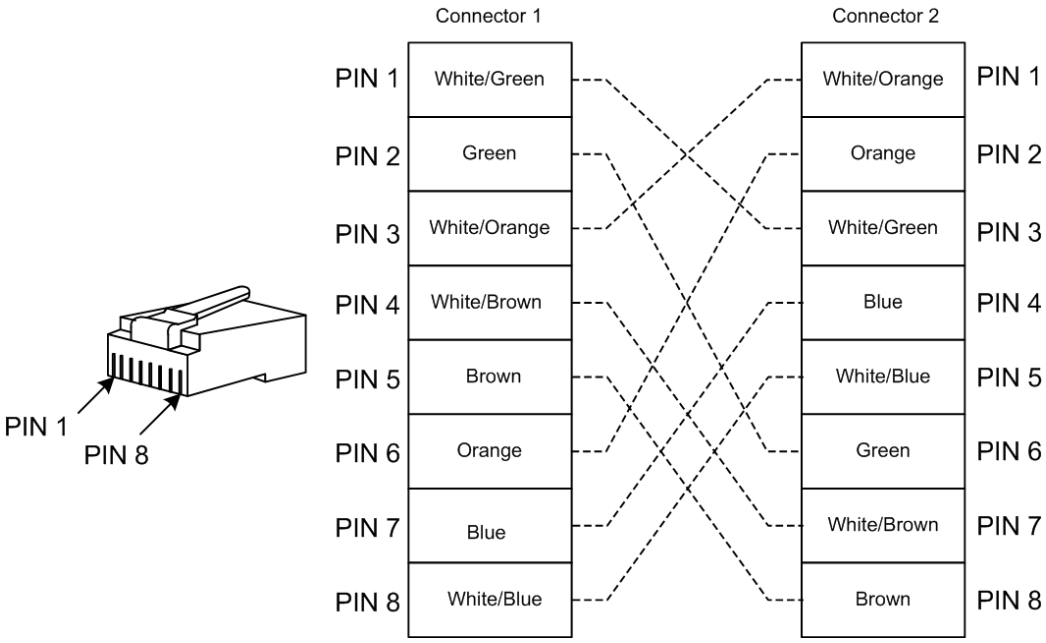


Figure 9-5 Wiring of the 1000 Mbit/s crossover cable



Technical specifications

Table 9-3 lists technical specifications of the straight-through Ethernet cable.

Table 9-3 Technical specifications of the straight-through Ethernet cable

Item	Description
Name	Straight-through cable: CBL-ETH-RJ45/RJ45-D

Item	Description
Connector	RJ45
Model	Cat 5 or better UTP cables (UTP-5 and UTP-5e), or STP cables
Number of cores	8
Length	The letter D indicates the length, which is customized. For example, if the customer requires 2-meter cables, they are named CBL-ETH-RJ45/RJ45-2m.

9.3 Clock cable

The BITS clock interface used by the iTN8800-II-NXU is CC3 male interface.

The iTN8800-II-NXU is delivered with the local connector used to make the clock cable instead of the clock cable. The model of the local connector is 75Ω-CC3 head-straight/RoHS. You can make the clock cable by yourself or purchase the Raisecom clock cable separately. The name of the clock cable provided by Raisecom is CBL-E1-CC3/BNCF.

Usage scenario

Table 9-4 lists usage scenario of the clock cable.

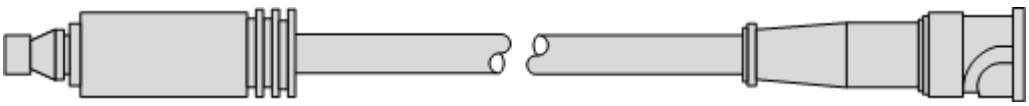
Table 9-4 Usage scenario of the clock cable

Card	Interface	Connector	Usage
iTN8800-II-NXU	SYNC RX	CC3 male interface	BITS clock input
	SYNC TX	CC3 male interface	BITS clock output

Appearance

Figure 9-6 shows the appearance of the CBL-E1-CC3/BNCF.

Figure 9-6 Appearance of the CBL-E1-CC3/BNCF



Technical specifications

Table 9-5 lists technical specifications of the clock cable.

Table 9-5 Technical specifications of the clock cable

Item	Description
Name	CBL-E1-CC3/BNCF
Connector	• CC3 female-interface connector • BNC female-interface connector
Model	1C+B coaxial cable

9.4 DC power cable

Usage scenario

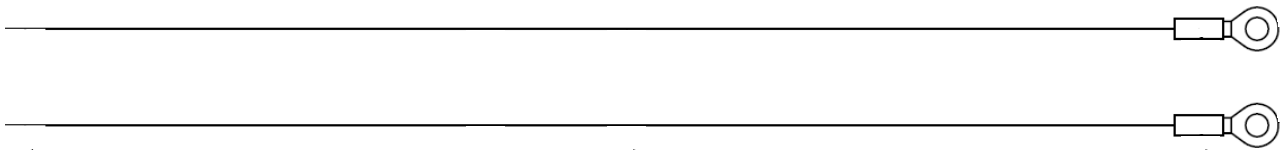
The RPD1351-S-48S48 is the DC power module used by the iTN8800 and it is used to transmit -48 VDC power.

Table 9-6 lists power adapter and power cable delivered with the iTN8800.

Table 9-6 Power adapter and power cable

Accessory	Model
Power adapter	35A-1*2-power connector-straight female adapter/RoHS
Power cable	POL-DC-OT terminal/stripped end-18AWG-D/RoHS

Appearance



Technical specifications

Table 9-7 lists technical specifications of the POL-DC-OT terminal/stripped end-18AWG-D/RoHS cable.

Table 9-7 Technical specifications of the POL-DC-OT terminal/stripped end-18AWG-D/RoHS cable

Item	Description
Name	POL-DC-OT terminal/stripped end-18AWG-D/RoHS
Connector	Terminal (OT1–4)
Positive wire	UL3386 HF red (18AWG)

Item	Description
Negative wire	UL3386 HF black (18AWG)
Rated voltage (V)	600
Insulation and voltage resistance (cable)	2000 VAC, 1min
Compliance standard	UL758, UL1581
Authentication	UL
RoHS	Compliant
Customized length	Supported, with the cable length of D

9.5 Ground cable

Usage scenario

The protective cable is for grounding the device. There are ground terminals on the left side and left bracket respectively, thus facilitating grounding the device in different installation environments. The ground cable is composed of two OT terminals and the coaxial cable

Table 9-8 lists OT terminals and ground cable delivered with the iTN8800.

Table 9-8 OT terminal and ground cable

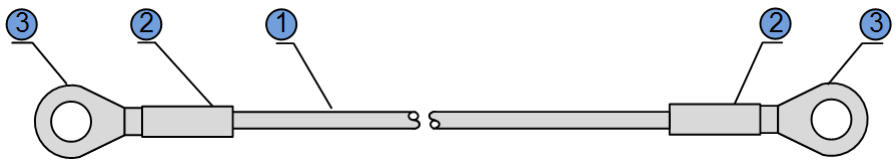
Accessory	Model
OT terminal	Protective ground round pressed terminal (M4)
Grounding cable	PIL-ground cable-Φ4/Φ4-D/RoHS

Appearance

The ground cable is composed of ground lugs and the coaxial cable. The ground lug is usually an OT non-insulated terminal. The coaxial cable is a yellow/green copper soft flame-retardant conducting wire. Figure 9-7 and Figure 9-8 show the ground cable and OT terminal.

Figure 9-7 shows the appearance of the ground cable.

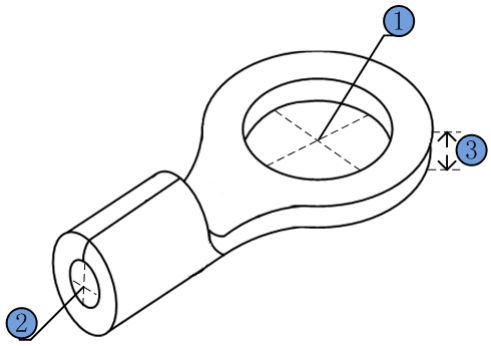
Figure 9-7 Appearance of the ground cable



1	Conducting wire	2	Insulating sheath
3	OT terminal		

Figure 9-8 shows the appearance of the OT terminal.

Figure 9-8 Appearance of the OT terminal



1	Inner diameter of soldering lug	2	Outer diameter of soldering lug	3	Thickness of soldering terminal

Technical specifications

Table 9-9 lists technical specifications of the OT terminal.

Table 9-9 Technical specifications of the OT terminal

Item	Description
Model	OT 1.5-4 round non-insulated terminal
Standard	JB2436-78
Specifications	4.3 soldering lug • Inner diameter of soldering lug: 4 mm • Outer diameter of soldering lug: ≤ 8 mm • Inner diameter of sheath: 2.1 mm • Thickness of soldering lug: ≥ 0.6 mm
Cross-sectional area of conducting wire	16–15AWG (1.2–1.5 mm^2)

Table 9-10 lists technical specifications of the grounding cable.

Table 9-10 Technical specifications of the grounding cable

Item	Description
Model (recommended)	PIL-grounding cable-Φ4/Φ4-D/RoHS
Standard	Comply with the UL standard and meet RoHS requirements.
Conducting wire	Yellow/Green multi-strand copper-core conducting wire 16AWG (1.25 mm^2) Electronic wire UL1007 or UL1005 is used.
Stripped end	10 mm long and tinned
Insulating sheath	3.5/1.75 black heat-shrink tubing, which is a 20 mm long and shrinks when heated
Welding technology	The conducting wire and OT terminals adopt solderless pressed connection.
Error in length of conducting wire	±5 mm
Length of conducting wire	240 mm or customized, The letter D is the length, which indicates that the cable can be customized. For example, the customer requires a 2-m cable, and then you can name the cable PIL-ground cable-Φ4/Φ4-200mm/RoHS.

9.6 Debugging cable

Usage scenario

Table 9-11 lists usage scenario of the debugging cable.

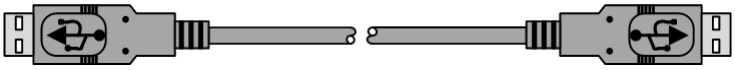
Table 9-11 Usage scenario of the debugging cable

Card	Print	Connector	Usage
iTN8800-II-NXU	CONSOLE	USB	Be used to connect the Console interface of the device and manage the USB interface of the PC. After logging in to the device through this method, you can debug the device.

Appearance

Figure 9-9 shows the appearance of the debugging cable.

Figure 9-9 Debugging cable



Technical specifications

Table 9-12 lists technical specifications of the debugging cable.

Table 9-12 Technical specifications of the debugging cable

Item	Description
Name	CBL-USB-A(M)/A(M)-1.5m/directly-connected/RoHS
Connector (two ends)	USB A-type male interface connector
Length	1.5m

10 Appendix

This chapter provides some reference information about the iTN8800, including the following sections:

- Lookup table of dimensions, weight, and power consumption
- Lookup table of optical module indexes
- DWDM channel list
- Terms
- Acronyms and abbreviations

10.1 Lookup table of dimensions, weight, and power consumption

Table 10-1 lists dimensions, weight, and power consumption of the iTN8800.

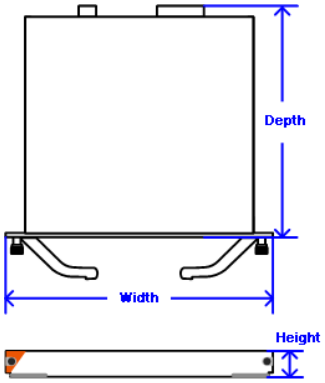
Table 10-1 Dimensions, weight, and power consumption of the iTN8800

Device	Dimensions (mm) (Width × Depth × Height)	Weight (kg)	Maximum power consumption (W)
Chassis	444 ×220 ×88.1	3.45	–
Maximum configuration of the whole device: chassis + power module ×2 + fan ×1 + NXU ×2 + RG8 ×4 + RXG8 ×2		9.54	264
RPD1351-S-48S48	20 ×208 ×42	0.15	0.5 (zero-load)
FANS331	28.9 ×206 ×85.7	0.45	22
iTN8800-II-NXU	193.8 ×208 ×19.8	0.76	48.2
iTN8800-RG8		0.61	17.2
iTN8800-RG8T		0.67	15.2
iTN8800-RX2 (A)		0.63	17.5

iTN8800-RX2 (B)		0.61	16.8
iTN8800-RG16E		0.63	35.8
iTN8800-RE16		0.63	16.8
iTN8800-RE16-BL		0.64	18.2
iTN8800-RS4		0.675	30
iTN8800-RXG8		0.69	24.5
iTN8800-OMD8		0.64	7
iTN8800-SLAX2 (A)		0.63	17.5
iTN8800-SLAX2 (B)		0.61	16.8
iTN8800-RF8		0.62	20

Note

- The width of the chassis (444 mm) does not include the width of the brackets at both sides.
- The dimensions of the card, power module, and fan are shown as below.



10.2 Lookup table of optical module indexes

All modules of Raisecom comply with RoHS and all optical modules support DDM.

10.2.1 CSFP optical module

Table 10-2 Corresponding relationship between CSFP module xx and Tx wavelength

xx	47	49	51	53	55	57	59	61
Tx wavelength (nm)	1471	1491	1511	1531	1551	1571	1591	1611

Table 10-3 Corresponding relationship between CSFP module yy and Tx wavelength

yy	27	29	31	33	35	37	39	41	43
Tx wavelength (nm)	1271	1291	1311	1331	1351	1371	1391	1411	1431
yy	**45**	**47**	**49**	**51**	**53**	**55**	**57**	**59**	**61**
Tx wavelength (nm)	1451	1471	1491	1511	1531	1551	1571	1591	1611

100 Mbit/s

Table 10-4 Metrics of the CSFP optical module (100 Mbit/s)

Model	Rate (Mbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
CSFP-03/L/xx-D-R	155	1xx1	1260–1620	-5.0 to 0	> -10.0	> 10.0	< -34.0	80	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant

1000 Mbit/s (LC/PC, dual-fiber and bidirectional)

Table 10-5 Indexes of the CSFP module (1000 Mbit/s)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
CSFP-Gb/S/xx-D-R	1.25	1xx1	1260 – 1620	-2.0 to 3.0	> -3.0	> 9.0	< -22.0	40	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant
CSFP-Gb/L/yy-D-R	1.25	1yy1	1260 – 1620	-2.0 to 3.0	> -9.0	> 10.0	< -30.0	80	LC/PC Dual-fiber, bidirectional	DFB	APD	Supported	Compliant

10.2.2 GSFP optical module

Table 10-6 Indexes of the GSFP optical module

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
GSFP-PX20DM-R	• Uplink: 1.25 • Downlink: 1.25	1490	1260–1360	2.5–7.0	> -6.0	> 9.0	< -30.0	SM	20	SC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant
GSFP-PX20DM-RI	• Uplink: 1.25 • Downlink: 1.25	1490	1260–1360	2.0–7.0	> -6.0	> 9.0	< -30.0	SM	20	SC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant
GSFP-CLBDM-R	• Uplink: 1.244 • Downlink: 2.488	1490	1260–1360	1.5–5.0	> -8.0	> 8.2	< -28.0	SM	20	SC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
GSFP-CLCDM-R	• Uplink: 1.244 • Downlink: 2.488	1490	1280–1360	3.0–7.0	> -12.0	> 8.2	< -30.0	SM	60	SC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant

10.2.3 TSFP optical module

100 Mbit/s

Table 10-7 Indexes of the TSFP optical module (100 Mbit/s)

Model	Rate (Mbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
TSFP-03/DS15-3	155	1550	1260–1360	-14.0 to -8.0	> -8.0	> 8.2	< -28.0	SM	15	LC/PC Single-fiber, bidirectional	FP	PIN	Supported	Compliant

1000 Mbit/s

Table 10-8 Indexes of the TSFP optical module (1000 Mbit/s)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
TSFP-Gb/DS14-3	1.25	1490	1260–1360	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Single-fiber, bidirectional	DFB	PIN	Supported	Compliant

10.2.4 USFP optical module

100 Mbit/s

Table 10-9 Indexes of USFP optical module (100 Mbit/s)

Model	Rate (Mbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-03/M-D-R	155	1310	1270–1380	-20.0 to -10.0	> -10.0	> 10.0	< -29.0	MM	2	LC/PC Dual-fiber, bidirectional	LED	PIN	Supported	Compliant
USFP-03/S1-D-R	155	1310	1260–1620	-15.0 to -8.0	> -8.0	> 10.0	< -34.0	SM	15	LC/PC Dual-fiber, bidirectional	FP	PIN	Supported	Compliant

Model	Rate (Mbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-03/S2-D-R	155	1310	1260 – 1620	-5.0 to 0	> -8.0	> 8.2	< -34.0	SM	40	LC/PC Dual-fiber, bidirectional	DFB/FP	PIN	Supported	Compliant
USFP-03/S3-D-R	155	1550	1260 – 1620	-5.0 to 0	> -10.0	> 10.0	< -34.0	SM	80	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant
USFP-03/SS13-D-R	155	1310	1480 – 1580	-15.0 to -8.0	> -8.0	> 8.2	< -28.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-03/SS15-D-R	155	1550	1260 – 1360	-15.0 to -8.0	> -8.0	> 8.2	< -28.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-03/SS23-D-R	155	1310	1500 – 1580	-5.0 to 0	> -8.0	> 8.2	< -32.0	SM	40	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-03/SS25-D-R	155	1550	1270 – 1350	-5.0 to 0	> -8.0	> 8.2	< -32.0	SM	40	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-03/SS34-D-R	155	1490	1530 – 1580	-3.0 to 2.0	> -8.0	> 8.2	< -32.0	SM	80	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant

Model	Rate (Mbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-03/SS35-D-R	155	1550	1470 – 1510	-3.0 to 2.0	> -8.0	> 8.2	< -32.0	SM	80	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant

1000 Mbit/s

Table 10-10 Indexes of the USFP optical module (1000 Gbit/s)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-Gb/M-D-R	1.25	850	830–870	-9.5 to -3.0	> 0	> 9.0	< -17.0	MM	0.55	LC/PC Dual-fiber, bidirectional	VCSEL	PIN	Supported	Compliant
USFP-Gb/S1-D-R	1.25	1310	1260 – 1620	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Dual-fiber, bidirectional	FP	PIN	Supported	Compliant
USFP-Gb/LH1-D-R	1.25	1310	1260 – 1620	-4.0 to 0	> -3.0	> 9.0	< -21.0	SM	40	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-Gb/S2-D-R	1.25	1550	1260 – 1620	-3.0 to 2.0	> -3.0	> 9.0	< -21.0	SM	60	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant
USFP-Gb/ZX-D-R	1.25	1550	1260 – 1620	-2.0 to 3.0	> -3.0	> 9.0	< -22.0	SM	80	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant
USFP-Gb/S3-D-R	1.25	1550	1260 – 1620	-3.0 to 2.0	> -9.0	> 9.0	< -30.0	SM	80	LC/PC Dual-fiber, bidirectional	DFB	APD	Supported	Compliant
USFP-Gb/EX-D-R	1.25	1550	1260 – 1620	0– 5.0	> -9.0	> 9.0	< -30.0	SM	120	LC/PC Dual-fiber, bidirectional	DFB	APD	Supported	Compliant
USFP-Gb/SS13-D-R	1.25	1310	1500 – 1610	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-Gb/SS15-D-R	1.25	1550	1260 – 1360	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-Gb/SS13-4	1.25	1310	1480 – 1500	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP-Gb/SS14-3	1.25	1490	1260 – 1360	-10.0 to -3.0	> -3.0	> 9.0	< -21.0	SM	15	LC/PC Single-fiber, bidirectional	FP/DFB	PIN	Supported	Compliant
USFP-Gb/SS24-D-R	1.25	1490	1530 – 1580	-3.0 to 2.0	> -3.0	> 9.0	< -21.0	SM	40	LC/PC Single-fiber, bidirectional	DFB	PIN	Supported	Compliant
USFP-Gb/SS25-D-R	1.25	1550	1450 – 1530	-3.0 to 2.0	> -3.0	> 9.0	< -21.0	SM	40	LC/PC Single-fiber, bidirectional	DFB	PIN	Supported	Compliant
USFP-Gb/SS34-D-R	1.25	1490	1530 – 1580	-2.0 to 3.0	> -9.0	> 9.0	< -30.0	SM	80	LC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant
USFP-Gb/SS35-D-R	1.25	1550	1450 – 1510	-2.0 to 3.0	> -9.0	> 9.0	< -30.0	SM	80	LC/PC Single-fiber, bidirectional	DFB	APD	Supported	Compliant

10.2.5 USFP electrical module

100 Mbit/s

Table 10-11 Indexes of the USFP electrical module (100 Mbit/s)

Model	Rate (Mbit/s)	Transmission distance (m)	Remark
USFP-FE/AN-R	125	100	10/100BASE-T, auto-negotiation enabled, SerDes interface, RoHS-compliant

1000 Mbit/s

Table 10-12 Indexes of USFP electrical module (1000 Mbit/s)

Model	Rate (Gbit/s)	Transmission distance (m)	Remark
USFP-GE-R	1.25	100	1000BASE-T, auto-negotiation disabled, SerDes interface, RoHS-compliant
USFP-GE/AN-R	1.25	100	10/100/1000BASE-T, auto-negotiation enabled, SGMII interface, RoHS-compliant

10.2.6 USFP+ optical module

10 Gbit/s

Table 10-13 Indexes of the USFP+ optical module (10 Gbit/s)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP+-192/M	10	850	840–860	-8.2 to 1.0	> 1.0	> 4.5	< -11.1	MM	0.3	LC/PC Dual-fiber, bidirectional	VCSEL	PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
USFP+-192/S1	10	1310	1260–1600	-8.2 to 1.0	> 1.0	> 4.5	< -14.4	SM	10	LC/PC Dual-fiber, bidirectional	DFB	PIN	Supported	Compliant

10.2.7 GSFP+ optical module

10 Gbit/s

Table 10-14 Indexes of GSFP+ optical module

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
GSFP+-PR30U-R	Uplink: 10.3125 Downlink:10.3125	1270	1577	4.0–9.0	> -8.0	> 6.0	< -28.5	SM	20	SC/PC Single-fiber, bidirectional	DFB	APD/TIA	Not supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
GSFP+-PRX30U-R	Uplink: 1.25 Downlink:10.3125	1310	1577	0.62 – 5.62	> -8.0	> 6.0	< -28.5	SM	20	SC/PC Single-fiber, bidirectional	DFB	APD/TIA	Not supported	Compliant

10.2.8 CXFP optical module

10 Gbit/s 40 km

Table 10-15 Indexes of CXFP-192/S/xx optical module (10 Gbit/s 40 km)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm)(dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/S/47	10	1471	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	–

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800 ps/nm)(dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/S/49	10	1491	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	–
CXFP-192/S/51	10	1511	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	Recommended models for 4-wave system
CXFP-192/S/53	10	1531	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	
CXFP-192/S/55	10	1551	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	
CXFP-192/S/57	10	1571	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800 ps/nm)(dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/S/59	10	1591	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	–
CXFP-192/S/61	10	1611	1450–1620	-1.0 to 3.0	> 0.5	> 9.0	< -15.0	< -13.8	40	LC/PC dual-fiber bidirectional	CWDM wavelength EML	PIN	Supported	Compliant	–

10 Gbit/s 80 km/70 km

Table 10-16 Indexes of CXFP-192/L/xx optical module (10 Gbit/s 80 km/70 km)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/L/47	10	1471	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	–
CXFP-192/L/49	10	1491	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	–
CXFP-192/L/51	10	1511	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	Recommended models for 4-wave syste
CXFP-192/L/53	10	1531	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/L/55	10	1551	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	m
CXFP-192/L/57	10	1571	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -24.0	< -21.0	80	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	
CXFP-192/L/59	10	1591	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -23.0	< -21.0	70	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	These two mod

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS	Remark
CXFP-192/L/61	10	1611	1450–1620	-1.0 to 4.0	> -7.0	> 9.0	< -23.0	< -21.0	70	LC/PC dual-fiber bidirectional	CWDM wavelength EML	APD	Supported	Compliant	els are not recommended for systems earlier than 8-wave system

10.2.9 DXFP optical module

10 Gbit/s 40 km

Table 10-17 Indexes of DXFP-192/S/xx optical module (10 Gbit/s 40 km)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/21	10	1560.61	1260–1600	C21	192.1	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional	DWDM wavelength EML	PIN	Supported	Compliant
DXFP-192/S/22	10	1559.79	1260–1600	C22	192.2	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/23	10	1558.98	1260–1600	C23	192.3	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/24	10	1558.17	1260–1600	C24	192.4	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/25	10	1557.36	1260–1600	C25	192.5	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/26	10	1556.55	1260–1600	C26	192.6	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/27	10	1555.75	1260–1600	C27	192.7	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/28	10	1554.94	1260–1600	C28	192.8	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/29	10	1554.13	1260–1600	C29	192.9	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/30	10	1553.33	1260–1600	C30	193.0	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/31	10	1552.52	1260–1600	C31	193.1	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/32	10	1551.72	1260–1600	C32	193.2	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/33	10	1550.92	1260–1600	C33	193.3	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/34	10	1550.12	1260–1600	C34	193.4	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/35	10	1549.32	1260–1600	C35	193.5	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/36	10	1548.51	1260–1600	C36	193.6	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/37	10	1547.72	1260–1600	C37	193.7	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/38	10	1546.92	1260–1600	C38	193.8	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/39	10	1546.12	1260–1600	C39	193.9	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/40	10	1545.32	1260–1600	C40	194.0	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/41	10	1544.53	1260–1600	C41	194.1	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/42	10	1543.73	1260–1600	C42	194.2	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/43	10	1542.94	1260–1600	C43	194.3	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/44	10	1542.14	1260–1600	C44	194.4	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/45	10	1541.35	1260–1600	C45	194.5	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/46	10	1540.56	1260–1600	C46	194.6	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/47	10	1539.77	1260–1600	C47	194.7	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/48	10	1538.98	1260–1600	C48	194.8	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/49	10	1538.19	1260–1600	C49	194.9	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/50	10	1537.40	1260–1600	C50	195.0	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/51	10	1536.61	1260–1600	C51	195.1	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/52	10	1535.82	1260–1600	C52	195.2	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/53	10	1535.04	1260–1600	C53	195.3	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/54	10	1534.25	1260–1600	C54	195.4	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/55	10	1533.47	1260–1600	C55	195.5	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/56	10	1532.68	1260–1600	C56	195.6	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/57	10	1531.90	1260–1600	C57	195.7	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/58	10	1531.12	1260–1600	C58	195.8	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant
DXFP-192/S/59	10	1530.33	1260–1600	C59	195.9	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/S/60	10	1529.55	1260–1600	C60	196.0	-1.0 to 3.0	> -1.0	> 8.2	< -15.8	< -13.8	40	LC/PC dual-fiber bidirectional		PIN	Supported	Compliant

10 Gbit/s 80 km

Table 10-18 Indexes of DXFP-192/L/xx optical module (10 Gbit/s 80 km)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/21	10	1560.61	1260–1600	C21	192.1	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional	DWDM wavelength	APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/22	10	1559.79	1260–1600	C22	192.2	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional	EML	APD	Supported	Compliant
DXFP-192/L/23	10	1558.98	1260–1600	C23	192.3	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/24	10	1558.17	1260–1600	C24	192.4	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/25	10	1557.36	1260–1600	C25	192.5	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/26	10	1556.55	1260–1600	C26	192.6	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/27	10	1555.75	1260–1600	C27	192.7	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/28	10	1554.94	1260–1600	C28	192.8	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/29	10	1554.13	1260–1600	C29	192.9	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/30	10	1553.33	1260–1600	C30	193.0	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/31	10	1552.52	1260–1600	C31	193.1	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/32	10	1551.72	1260–1600	C32	193.2	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/33	10	1550.92	1260–1600	C33	193.3	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/34	10	1550.12	1260–1600	C34	193.4	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/35	10	1549.32	1260–1600	C35	193.5	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/36	10	1548.51	1260–1600	C36	193.6	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/37	10	1547.72	1260–1600	C37	193.7	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/38	10	1546.92	1260–1600	C38	193.8	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/39	10	1546.12	1260–1600	C39	193.9	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/40	10	1545.32	1260–1600	C40	194.0	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/41	10	1544.53	1260–1600	C41	194.1	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/42	10	1543.73	1260–1600	C42	194.2	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/43	10	1542.94	1260–1600	C43	194.3	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/44	10	1542.14	1260–1600	C44	194.4	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/45	10	1541.35	1260–1600	C45	194.5	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/46	10	1540.56	1260–1600	C46	194.6	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/47	10	1539.77	1260–1600	C47	194.7	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/48	10	1538.98	1260–1600	C48	194.8	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/49	10	1538.19	1260–1600	C49	194.9	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/50	10	1537.40	1260–1600	C50	195.0	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/51	10	1536.61	1260–1600	C51	195.1	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/52	10	1535.82	1260–1600	C52	195.2	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/53	10	1535.04	1260–1600	C53	195.3	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/54	10	1534.25	1260–1600	C54	195.4	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/55	10	1533.47	1260–1600	C55	195.5	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/56	10	1532.68	1260–1600	C56	195.6	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/57	10	1531.90	1260–1600	C57	195.7	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Channel ID	Rated central frequency (THz)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (EOL)(dBm)	Rx sensitivity (1600 ps/nm) (dBm)	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
DXFP-192/L/58	10	1531.12	1260–1600	C58	195.8	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/59	10	1530.33	1260–1600	C59	195.9	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant
DXFP-192/L/60	10	1529.55	1260–1600	C60	196.0	0–4.0	> -7.0	> 9.0	< -23.0	< -21.0	80	LC/PC dual-fiber bidirectional		APD	Supported	Compliant

10.2.10 UXFP optical module

10 Gbit/s

Table 10-19 Indexes of UXFP optical module (10 Gbit/s)

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Rx sensitivity (1600ps/nm) (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
UXFP-192/M	10	850	840–860	-7.3 to -1.0	> -1.0	> 3.0	< -9.9	–	–	MM	0.3	LC/PC dual-fiber bidirectional	VCSEL	PIN	Supported	Compliant
UXFP-192/S1	10	1310	1200–1600	-6.0 to -1.0	> 0.5	> 6.0	< -14.4	–	–	SM	10	LC/PC dual-fiber bidirectional	DFB	PIN	Supported	Compliant
UXFP-192/S2	10	1550	1200–1600	-1.0 to 2.0	> -1.0	> 8.2	< -15.8	< -13.8	–	SM	40	LC/PC dual-fiber bidirectional	EML	PIN	Supported	Compliant

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Rx sensitivity (800ps/nm) (dBm)	Rx sensitivity (1600ps/nm) (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
UXFP-192/S3	10	1550	1200–1600	0–4.0	> -9.0	> 9.0	< -24.0	–	< -22.0	SM	80	LC/PC dual-fiber bidirectional	EML	APD	Supported	Compliant

10.2.11 GXFP

10 Gbit/s/1.25 Gbit/s

Table 10-20 Indexes of GXFP optical module

Model	Rate (Gbit/s)	Tx wavelength (nm)	Rx wavelength (nm)	Tx optical power (dBm)	Overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Mode	Transmission distance (km)	Interface	Laser	Receiver	DDM	RoHS
GXFP-PR30DM-R	Uplink: 10.3125/1.25 Downlink: 10.3125/1.25	1577/1490	1260–1280 1280–1340	2.0–5.0 2.0–7.0	> -6.0 > -9.38	> 6.0 > 9.0	-28.0 (typical value) < -29.78	SM	20	SC/PC Single-fiber bidirectional	EML/DFB	APD/TIA	Supported	Compliant
GXFP-PRX30DM-R	Uplink: 1.25 Downlink: 10.3125/1.25	1577/1490	1260–1360	2.0–5.0 2.0–7.0	> -9.3	> 6.0 > 9.0	< -29.7	SM	20	SC/PC Single-fiber bidirectional	EML/DFB	APD/TIA	Supported	Compliant

10.3 DWDM channel list

Table 10-21 lists DWDM channels specified by the ITU-T standard.

Table 10-21 DWDM channel list

ITU-T channel No.	Central frequency (THz)	Central wavelength (nm)	ITU-T channel No.	Central frequency (THz)	Central wavelength (nm)
C21	192.1	1560.61	C22	192.2	1559.79
C23	192.3	1558.98	C24	192.4	1558.17
C25	192.5	1557.36	C26	192.6	1556.55
C27	192.7	1555.75	C28	192.8	1554.94
C29	192.9	1554.13	C30	193.0	1553.33
C31	193.1	1552.52	C32	193.2	1551.72
C33	193.3	1550.92	C34	193.4	1550.12
C35	193.5	1549.32	C36	193.6	1548.51
C37	193.7	1547.72	C38	193.8	1546.92
C39	193.9	1546.12	C40	194.0	1545.32
C41	194.1	1544.53	C42	194.2	1543.73
C43	194.3	1542.94	C44	194.4	1542.14
C45	194.5	1541.35	C46	194.6	1540.56
C47	194.7	1539.77	C48	194.8	1538.98
C49	194.9	1538.19	C50	195.0	1537.40
C51	195.1	1536.61	C52	195.2	1535.82
C53	195.3	1535.04	C54	195.4	1534.25
C55	195.5	1533.47	C56	195.6	1532.68
C57	195.7	1531.90	C58	195.8	1531.12
C59	195.9	1530.33	C60	196.0	1529.55

10.4 Terms

Numerics

1+1 protection	A 1+1 protection architecture has one normal traffic signal, one working transport entity, one protection transport entity, and a permanent bridge. At the source end, the normal traffic signal is permanently bridged to both the working and the protection transport entities. At the sink end, the normal traffic signal is selected from the better of the two transport entities. Due to the permanent bridging, the 1+1 protection architecture does not allow an unprotected extra traffic signal to be provided.

A

Auto-negotiation	The interface automatically chooses the rate and duplex mode according to the result of negotiation. The auto-negotiation process is: the interface adapts its rate and duplex mode to the highest performance according to the peer interface, that is, both ends of the link adopt the highest rate and duplex mode they both support after auto-negotiation.

B

Bracket	Small parts at both sides of the chassis, used to install the chassis into the cabinet

C

Card	An electronic module composed of the chip and other electronic components installed on a flat and hard Printed Circuit Board (PCB). The PCB has conductive circuits for connecting these components.

F

Full duplex	In a communication link, both parties can receive and send data concurrently.

G

Ground cable	The cable to connect the device to ground, usually a yellow/green coaxial cable. Connecting the ground cable properly is an important guarantee to lightning protection, anti-electric shock, and anti-interference.

I

Institute of Electrical and Electronics Engineers (IEEE)	A professional society serving electrical engineers through its publications, conferences, and standards development activities. The body responsible for the Ethernet 802.3 and wireless LAN 802.11 specifications.

ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
L	
Loopback	It is the process that a signal is sent out and then sent back to the sender. It is used to detect and analyze potential faults in a ring network.
Link-state tracking	Link-state tracking provides an interface linkage scheme, extending the range of link backup. Through monitoring upstream links and synchronizing downstream links, faults of the upstream device can be transferred quickly to the downstream device, and primary/backup switching is triggered. In this way, it avoids traffic loss because the downstream device does not sense faults of the upstream link.
M	
Multi-Mode Fiber (MMF)	In this fiber, multi-mode optical signals are transmitted.
S	
Single-Mode Fiber (SMF)	In this fiber, SM optical signals are transmitted.
U	
U	Unit of dimensions, short for unit. It takes 44.45 mm as a basic unit, namely, 1 U = 44.45 mm

10.5 Acronyms and abbreviations

A	
ACL	Access Control List
AWG	American wire gauge
B	
BITS	Building Integrated Timing Supply System
C	
CFM	Connectivity Fault Management

D

DCN	Data Communication Network

E

ELPS	Ethernet Linear Protection Switching
ESC	Electronic Supervisory Channel
ESD	Electro Static Discharge

I

IEC	International Electrotechnical Commission

M

MAC	Medium Access Control
MPLS	Multi-Protocol Label Switching
MPLS-TP	Multi-Protocol Label Switching in Transport Networks

N

NNI	Network to Network Interface
NRZ	Non Return to Zero

O

OAM	Operation, Maintenance, and Management

P

PTN	Packet Transport Network

Q

QinQ	802.1Q in 802.1Q
QoS	Quality of Service

R

RH	Relative Humidity

S

SFP	Small Form-factor Pluggable

U

UNI	User Network Interface

V

VLAN	Virtual LAN

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