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iTN201-R (C)
Hardware Description
(Rel_04)

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Notice

Preface

Objectives

This document describes the integrated equipment, components, Main Control Card (MCC), subcards, and cables of the iTN201-R, including features and functions provided by components. This document also describes the appearance of cables used by the device and the technical specifications. 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	Hardware version
iTN201-4GF-R	P100R001 or later	C or later
iTN201-2XG-R	P100R001 or later	C 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.

Symbol	Description
	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	Buttons and navigation path are in **Boldface**.
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 04 (2016-10-20)

Fourth commercial release

- Added the iTN200-SUB-OBP.
- Added the iTN200-SUB-GPS-BL.
- Added the iTN200-PWE3-8E1-BL
- Added the E1 cable.
- Added the iTN200-SUB-4FX.

Issue 03 (2016-01-20)

Third commercial release

- Fixed known bugs.

Issue 02 (2015-08-20)

Second commercial release

- Added the iTN201-2XG-R.

- Added the iTN200-SUB-2XG.

Issue 01 (2015-03-20)

Initial commercial release

Contents

Figures

Tables

1 Overview

This chapter describes the iTN201-R, including the following sections:

- Introduction
- Appearance
- Technical parameters

1.1 Introduction

The iTN201-R is an Internet Protocol Radio Access Network (IP RAN) device developed by Raisecom. It is mainly designed for the carrier's Packet-based Mobile Backhaul (P-MBH) services and leased-line service access solutions based on the carrier-grade Ethernet technology. Together with Raisecom IP RAN local devices, it can provide a complete IP RAN solution.

Components of the iTN201-R include the chassis, power supply, fan, Main Control Card (MCC), subcards, and cables.

The iTN201-R adopts -48/+24 VDC power supplies or 220 VAC power supplies. It also supports hybrid DC/AC power supplies. The iTN201-R supports 1+1 power supply backup when it is equipped with the DC or AC power supply.

The iTN201-R must be equipped with the fan. Otherwise, performance degradation and service interruption may occur when the iTN201-R is running.

1.1.1 Installation scenarios

The iTN201-R can be installed in the following scenarios of a telecom equipment room:

- ETSI 600-mm cabinet
- 19-inch 450-mm cabinet
- 19-inch 600-mm cabinet
- Open rack
- Workbench

1.1.2 General safety precautions

Electrostatic safety

Wear an Electro-Static Discharge (ESD) wrist strap whenever you contact the iTN201-R. The ESD wrist strap should well contact your skin, with the plug plugged into the ESD socket of the iTN201-R.

High-voltage safety

When the iTN201-R is powered on, do not install or uninstall it; otherwise unpredictable personal injury may occur.

Grounding safety

Before installation, connect the ground terminal of the iTN201-R to the ground bar in the equipment room. Do not install the iTN201-R without being grounded.

1.2 Appearance

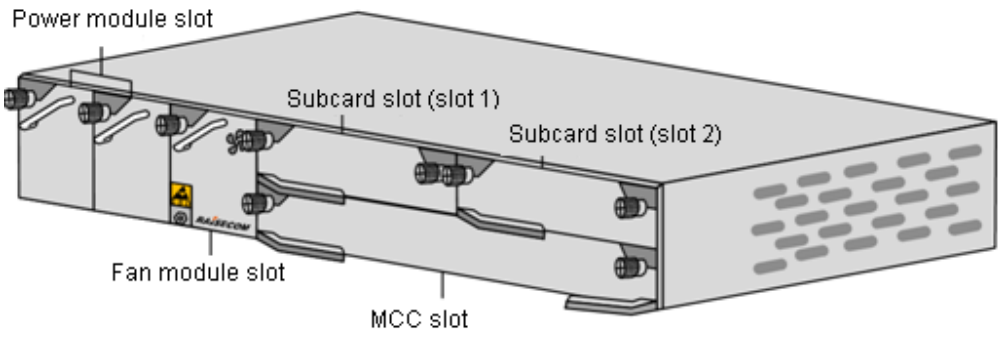
1.2.1 Chassis

Dimensions of the iTN201-R are 440 mm (Width) × 266 mm (Depth) × 44 mm (Height) (1U = 44 mm). There is a backplane in the rear and 6 slots on the front panel of the iTN201-R, as shown below:

- 1 MCC slot
- 2 extension subcard slots
- 1 fan module slot
- 2 power module slots

Figure 1-1 shows the appearance of the iTN201-R.

Figure 1-1 Appearance of iTN201-R

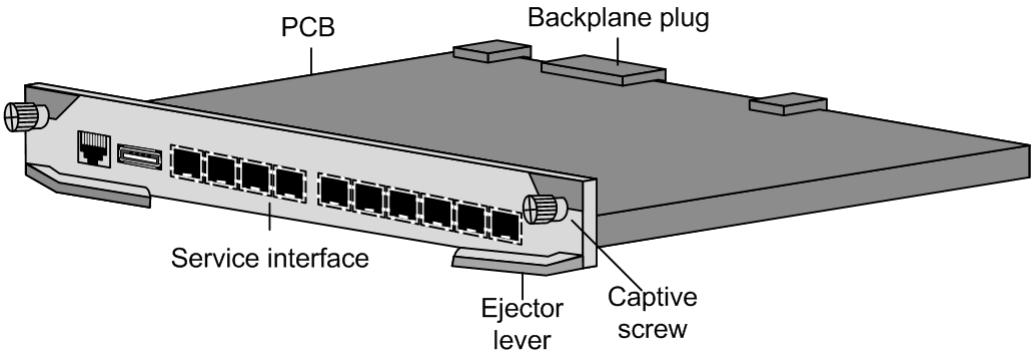


1.2.2 MCC

iTN201-4GF-R

Figure 1-2 shows the iTN201-4GF-R.

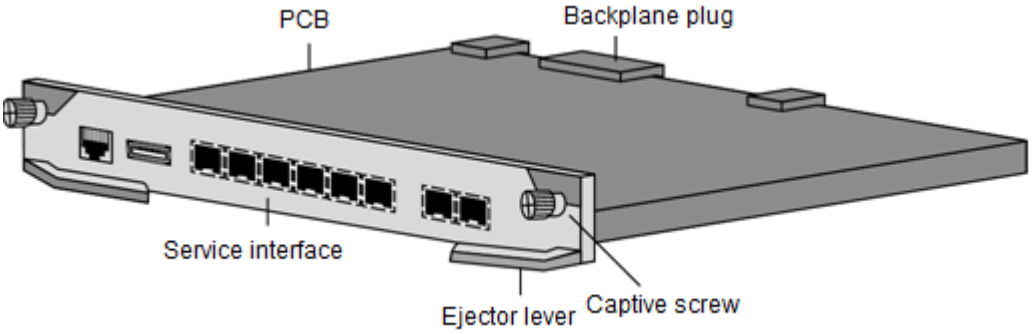
Figure 1-2 iTN201-4GF-R



iTN201-2XG-R

Figure 1-3 shows the iTN201-2XG-R.

Figure 1-3 iTN201-2XG-R

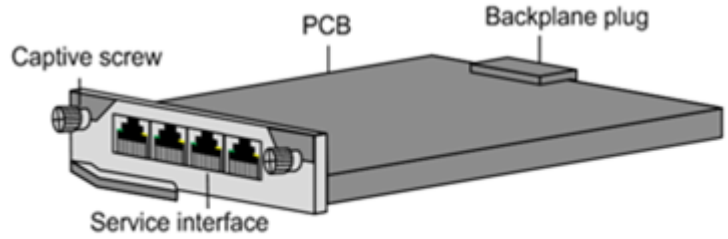


1.2.3 Subcards

iTN200-SUB-4GE

Figure 1-4 shows the iTN200-SUB-4GE.

Figure 1-4 iTN200-SUB-4GE

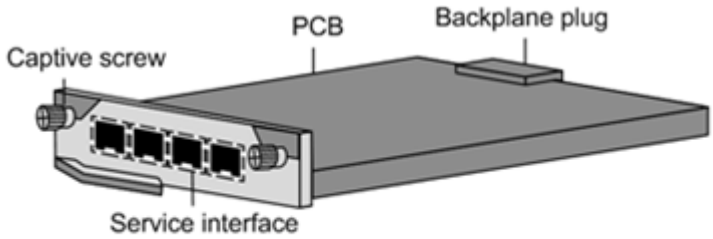


1000 Mbit/s electrical interface Ethernet subcard

iTN200-SUB-4GF

Figure 1-5 shows the iTN200-SUB-4GF.

Figure 1-5 iTN200-SUB-4GF

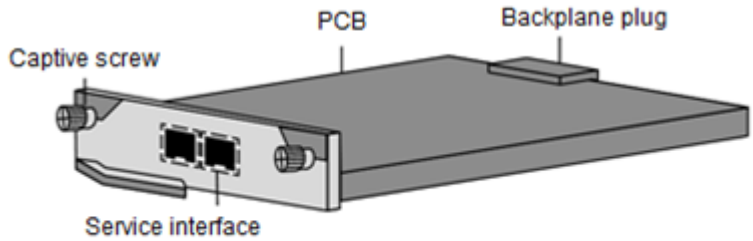


1000 Mbit/s optical interface Ethernet subcard

iTN200-SUB-2XG

Figure 1-6 shows the iTN200-SUB-2XG.

Figure 1-6 iTN200-SUB-2XG

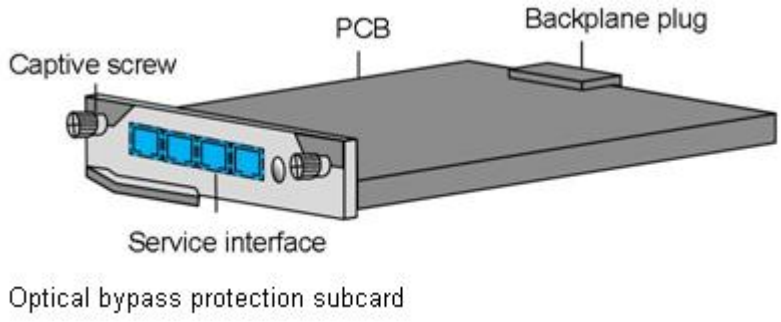


10Gbit/s optical interface Ethernet subcard

iTN200-SUB-OBP

Figure 1-7 shows the iTN200-SUB-OBP

Figure 1-7 iTN200-SUB-OBP

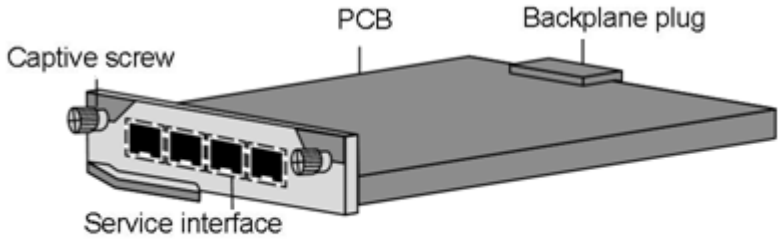


Optical bypass protection subcard

iTN200-SUB-4FX

Figure 1-8 shows the iTN200-SUB-4FX.

Figure 1-8 iTN200-SUB-4FX

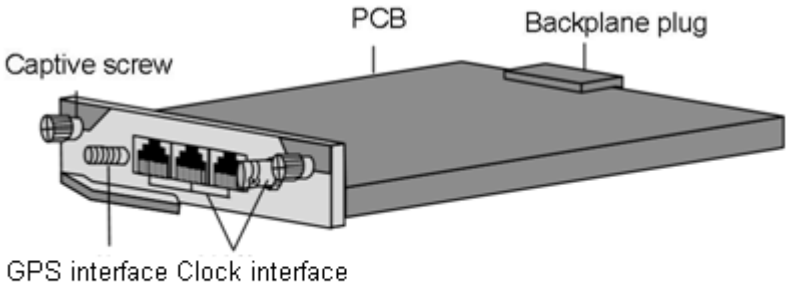


100 Mbit/s optical interface Ethernet subcard

iTN200-SUB-GPS-BL

Figure 1-9 shows the iTN200-SUB-GPS-BL.

Figure 1-9 iTN200-SUB-GPS-BL

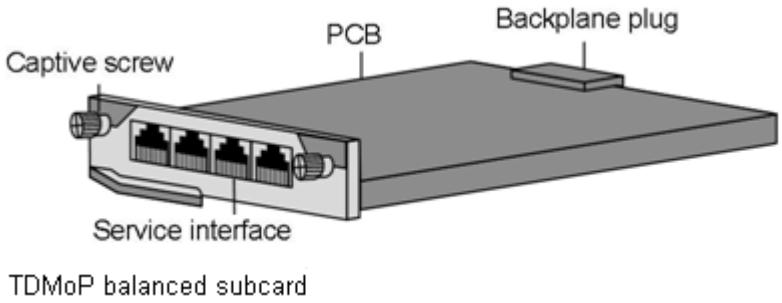


Balanced GPS subcard

iTN200-PWE3-8E1-BL

Figure 1-10 shows the iTN200-PWE3-8E1-BL.

Figure 1-10 iTN200-PWE3-8E1-BL



1.2.4 Power supply and fan

Power supply

The iTN201-R supports the DC power supply and AC power supply, as shown in Figure 1-11 and Figure 1-12.

Figure 1-11 DC power module

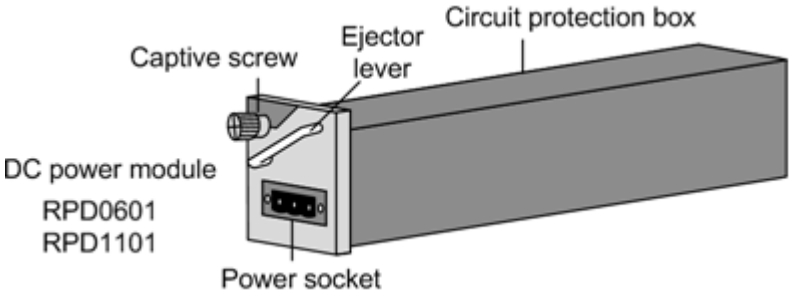
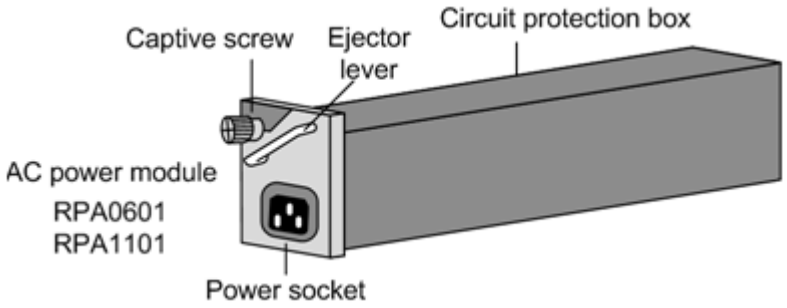


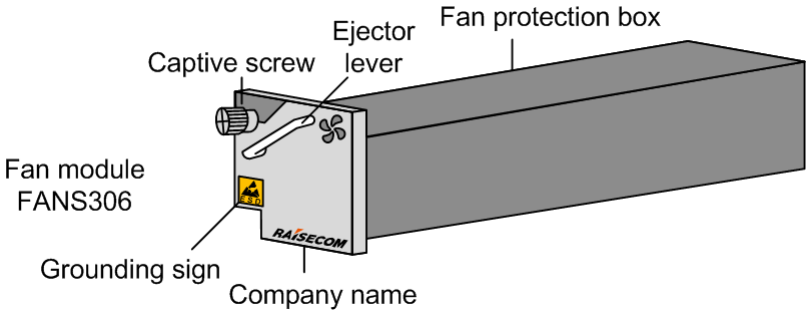
Figure 1-12 AC power module



Fan

Figure 1-13 shows the fan module FANS306.

Figure 1-13 Fan module



1.3 Technical parameters

Table 1-1 lists technical parameters of the iTN201-R.

Table 1-1 Technical parameters of iTN201-R

Parameter		Description
Dimensions (mm)		440 (Width) × 266 (Depth) × 44 (Height)
Power consumption	Maximum power consumption of iTN201-4GF-R (W)	55 (full-rate fan+MCC+2 subcards)
	Maximum power consumption of iTN201-2XG-R (W)	70 (full-rate fan+MCC+2 subcards)
	Minimum power consumption (W)	40 (full-rate fan+MCC)
Weight (kg)		≤ 6
DC input voltage 1	Rated voltage (V)	-48
	Voltage range (V)	-36 to -72
DC input voltage 2	Rated voltage (V)	+24
	Voltage range (V)	+18 to +36
AC input voltage	Rated voltage (V)	100–240
	Voltage range (V)	90–264 (50/60 Hz)
Operating temperature (℃)		-5 to 50
Operating humidity		10%–93% (RH, non-condensing)
Power lightning protection level (kV)		• Differential mode: 6 • Common mode: 6
ESD		• Contact discharge: ±8 kV • Air discharge: ±15 kV

Parameter		Description
NEBS requirement		NEBS Level 3
Overall switching capacity	iTN201-4GF-R	Bidirectional forwarding bandwidth: 48 Gbit/s (non-blocking)
	iTN201-2XG-R	Bidirectional forwarding bandwidth: 80 Gbit/s (non-blocking)

2 MCC

This chapter describes functions, appearance, interfaces, LEDs, and technical specifications of the iTN201-R MCC, including the following section:

- iTN201-4GF-R
- iTN201-2XG-R

2.1 iTN201-4GF-R

2.1.1 Functions

The iTN201-4GF-R is the main service access and processing unit of the iTN201-R. It accesses and processes up to 16 ways of Ethernet services. The iTN201-4GF-R can be inserted into the MCC slot only.

The iTN201-4GF-R provides the following features:

- Provide sixteen 1000 Mbit/s Ethernet optical interfaces among which 12 interfaces are provided through the TSFP optical module; support loopback interface.
- Provide a RJ45 out-of-band SNMP interface.
- Provide a Universal Serial Bus (USB) Console interface, complying with the USB 2.0 standard.
- Support Digital Diagnostics Monitoring (DDM) of the Small Form-factor Pluggable (SFP) and Two-channel compact Small Form-factor Pluggable (TSFP) modules.
- Support hot swapping between the MCC and the backplane/subcard.
- Support interface configuration and status inquiry.
- Support 802.1Q Virtual Local Area Network (VLAN).
- Support basic QinQ and selective QinQ.
- Support global 32×1024 Medium Access Control (MAC) addresses, including 200 static MAC addresses.
- Support Multi-Protocol Label Switching (MPLS) L2 Virtual Private Network (VPN) and Layer 3 VPN.
- Support Layer 3 IP services, such as Address Resolution Protocol (ARP) and Dynamic Host Configuration Protocol (DHCP).

- Support routing, such as Intermediate System to Intermediate System (ISIS), Open Shortest Path Frist (OSPF), and Border Gateway Protocol (BGP).
- Support Layer 2 and Layer 3 Quality of Service (QoS), such as priority trust and mapping, traffic classification, traffic policy, congestion avoidance, queue shaping, MPLS QoS, and L3 VPN QoS.
- Support Access Control List (ACL).
- Support basic functions, such as storm control, port mirroring, and link aggregation.
- Support 802.3ah Operation, Administration and Maintenance (OAM), Connectivity Fault Management (CFM), Service Level Agreement (SLA), MPLS-TP OAM, and Bidirectional Forwarding Detection (BFD).
- Support G.8031 Ethernet Linear Protection Switching (ELPS), G.8032 Ethernet Ring Protection Switching (ERPS), G.8131 MPLS-TP linear protection switching, PW redundancy protection, and Virtual Router Redundancy Protocol (VRRP).
- Support clock synchronization based on SyncE and IEEE 1588v2 (PTP). Support inputting/outputting GPS clock signals.

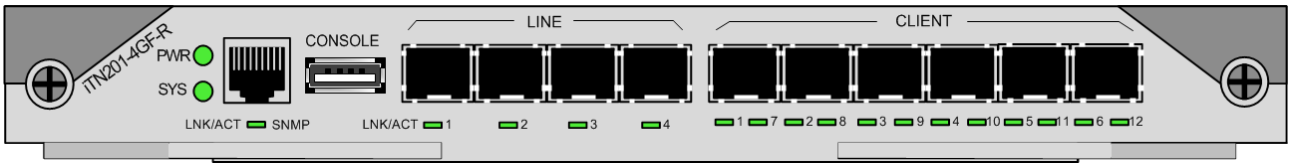
Note

Raisecom TSFP is called Compact SFP (CSFP) in the telecommunication industry. To distinguish it from another Raisecom CWDM SFP (CSFP) and highlight its dual-channel design, Raisecom names all compact SFPs as Two-channel compact SFPs (TSFPs).

2.1.2 Appearance

Figure 2-1 shows the appearance of the iTN201-4GF-R.

Figure 2-1 Appearance of iTN201-4GF-R



2.1.3 Interfaces

There are 10 interfaces on the iTN201-4GF-R, with types and usage being listed in Table 2-1.

Table 2-1 Interfaces on iTN201-4GF-R

Interface	Type	Purpose	Description	Quantity
LINE 1–4	SFP	Service uplink interface	Support being inserted with SFP electrical and optical modules. Types of available SFP optical modules: • 1000Base-SX (multimode) • 1000Base-LX • 1000Base-ZX • 100Base-FX Types of available SFP electrical modules: • 1000Base-T • 100/1000Base-T	4
CLIENT 1–12	SFP	Service downlink interface	Support being inserted with SFP electrical and optical modules. Types of available SFP optical modules: • 1000Base-SX (multimode) • 1000Base-LX • 1000Base-ZX • 100Base-FX Types of available TSFP optical modules: • 1000Base-BX • 100Base-BX Types of available SFP electrical modules: • 1000Base-T • 100/1000Base-T	6 (12 for a TSFP optical module)
CONSOLE	USB	Console interface	9600 baud serial interface	1
SNMP	RJ45	Network management interface	10/100 Mbit/s auto-negotiation electrical interface	1

The USFP-GE-R and USFP-GE/AN-R SFP electrical modules are available.

2.1.4 LEDs

There are 19 LEDs on the iTN201-4GF-R, as described in Table 2-2.

Table 2-2 LEDs on iTN201-4GF-R

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
SYS	Green	Management IP address status LED • Normal blinking green (1/s): interfaces are configured with IP addresses. • Slow blinking green: no interface is configured with the IP address. • Fast blinking green: the system is applying for the IP address. • Green/Off: the system is working improperly.
LNK/ACT	Green	SNMP interface working LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is sending/receiving data. • Off: the SNMP interface is disconnected or improperly connected.
Line 1–4: LNK/ACT	Green	Line 1–4 SFP interface working LED • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.
Client 1–6: LNK/ACT	Green	Client 1–6 SFP interface working LED • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.
Client 7–12: LNK/ACT	Green	Client 7–12 SFP interface working LED (available for the TSFP optical module) • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.

2.1.5 Technical specifications

Table 2-3 lists technical specifications of the iTN201-4GF-R.

Table 2-3 Technical specifications of iTN201-4GF-R

Parameter	Description
Dimensions (mm)	259.3 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.8
Power consumption (W)	37

2.2 iTN201-2XG-R

2.2.1 Functions

The iTN201-2XG-R is the main service access and processing unit of the iTN201-R. It realizes up to 12 ways of Ethernet services and accesses and processes 2 ways of 10 GE services in uplink. The iTN201-2XG-R is inserted into the slot for the MCC.

The iTN201-2XG-R provides the following features:

- Provide 2 uplink 10 Gbit/s Ethernet optical interfacesand 6/12 downlink 1000 Mbit/s Ethernet optical interfaces (using TSFP); Support loopback interface.
- Provide a RJ45 out-of-band SNMP interface.
- Provide a Universal Serial Bus (USB) Console interface, complying with the USB 2.0 standard.
- Support Digital Diagnostics Monitoring (DDM) of the Small Form-factor Pluggable (SFP) and Two-channel compact Small Form-factor Pluggable (TSFP) modules.
- Support hot swapping between the MCC and the backplane/subcard.
- Support interface configuration and status inquiry.
- Support IEEE 802.1Q Virtual Local Area Network (VLAN).
- Support mapping between basic QinQ and VLAN.
- Support global 32×1024 Medium Access Control (MAC) addresses, including 200 static MAC addresses.
- Support MPLS L2VPN and L3VPN.
- Support Layer 3 IP services such as Address Resolution Protocol (ARP) and Dynamic Host Configuration Protocol (DHCP).
- Support Intermediate System to Intermediate System (ISIS), Open Shortest Path Frist (OSPF), and Border Gateway Protocol (BGP).
- Support Layer 2 and Layer 3 Quality of Service (QoS), including priority trust and mapping, traffic classification, traffic policy, congestion avoidance, queue shaping, MPLS QoS, L3 VPN QoS, and so on.
- Support access Control List (ACL).
- Support basic functions, such as storm control, port mirroring, and link aggregation.
- Support 802.3ah Operation, Administration and Maintenance (OAM), Connectivity Fault Management (CFM), Service Level Agreement (SLA), MPLS-TP OAM, and Bidirectional Forwarding Detection (BFD).
- Support G.8031 Ethernet Linear Protection Switching (ELPS), G.8032 Ethernet Ring Protection Switching (ERPS), G.8131 MPLS-TP linear protection switching, PW redundancy protection, and Virtual Router Redundancy Protocol (VRRP).

- Support synchronous Ethernet.

2.2.2 Appearance

Figure 2-2 shows the appearance of the iTN201-2XG-R.

Figure 2-2 Appearance of iTN201-2XG-R

2.2.3 Interfaces

There are 10 interfaces on the iTN201-2XG-R, with types and usage listed in Table 2-4.

Table 2-4 Interfaces on iTN201-2XG-R

Interface	Type	Purpose	Description	Quantity
LINE 1–2	XFP	Service uplink interface	Support being inserted with XFP optical modules. Types of available XFP optical modules: • 10GBase-LR • 10GBase-SR • 10GBase-ER • 10GBase-ZR	2
CLIENT 1–12	SFP	Service downlink interface	Support being inserted with SFP electrical and optical modules. Types of available SFP optical modules: • 1000Base-SX (multimode) • 1000Base-LX • 1000Base-ZX • 100Base-FX Types of available TSFP optical modules: • 1000Base-BX • 100Base-BX Types of available SFP electrical modules: • 1000Base-T • 100/1000Base-T	6 (12 for a TSFP optical module)
CONSOLE	USB	Console interface	9600 baud serial interface	1

Interface	Type	Purpose	Description	Quantity
SNMP	RJ45	Network management interface	10/100 Mbit/s auto-negotiation electrical interface	1

Note

The USFP-GE-R and USFP-GE/AN-R SFP electrical modules are available.

2.2.4 LEDs

There are 17 LEDs on the iTN201-2XG-R, as described in Table 2-5.

Table 2-5 LEDs on iTN201-2XG-R

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
SYS	Green	Management IP address status LED • Normal blinking green (1/s): interfaces are configured with IP addresses. • Slow blinking green: no interface is configured with the IP address. • Fast blinking green: the system is applying for the IP address. • Green/Off: the system is working improperly.
SNMP:LNK/ACT	Green	SNMP interface working LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is sending/receiving data. • Off: the SNMP interface is disconnected or improperly connected.
Line 1–2: LNK/ACT	Green	Line 1–2 SFP interface working LED • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.

LED	Status	Description
Client 1–6: LNK/ACT	Green	Client 1–6 SFP interface working LED • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.
Client 7–12: LNK/ACT	Green	Client 7–12 SFP interface working LED (available for the TSFP optical module) • Green: the SFP interface is properly connected. • Blinking green: the SFP interface is sending/receiving data. • Off: the SFP interface is disconnected or improperly connected.

2.2.5 Technical specifications

Table 2-6 lists technical specifications of the iTN201-2XG-R.

Table 2-6 Technical specifications of iTN201-2XG-R

Parameter	Description
Dimensions (mm)	259.3 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.72
Power consumption (W)	≤50

3 Subcards

This chapter describes functions, appearance, interfaces, LEDs, and technical specifications of subcards of the iTN201-R, including the following sections:

- iTN200-SUB-4GE
- iTN200-SUB-4GF
- iTN200-SUB-2XG
- iTN200-SUB-OBP
- iTN200-SUB-4FX
- iTN200-SUB-GPS-BL
- iTN200-PWE3-8E1-BL

3.1 iTN200-SUB-4GE

3.1.1 Functions

The iTN200-SUB-4GE, designed for the iTN201, is an expansion subcard to support Ethernet interfaces. It provides four 1000 Mbit/s electrical interfaces, enhancing the access capability of Ethernet services. The iTN200-SUB-4GE can be inserted into slot 1 and slot 2 of the iTN201.

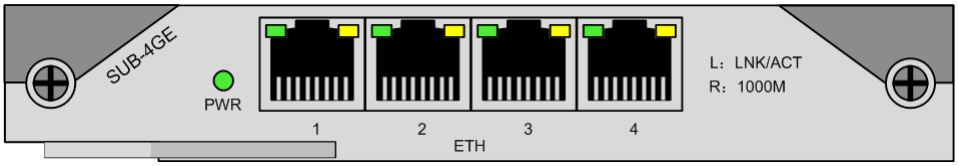
The iTN200-SUB-4GE provides the following features:

- Provide four 1000 Mbit/s Ethernet electrical interfaces.
- Support hot swapping of subcards from the backplane or MCC.
- Support auto-negotiation to 100 Mbit/s full duplex or half duplex.
- Support auto-negotiation to 1000 Mbit/s full duplex.
- Support Auto-MDI/MDI-X.
- Support 100/1000 Mbit/s auto-negotiation.

3.1.2 Appearance

Figure 3-1 shows the appearance of the iTN200-SUB-4GE.

Figure 3-1 Appearance of iTN200-SUB-4GE



3.1.3 Interfaces

There are 4 interfaces on the iTN200-SUB-4GE, with types and usage listed in Table 3-1.

Table 3-1 Interfaces on iTN200-SUB-4GE

Interface	Type	Purpose	Description
ETH 1–4	RJ45	1000 Mbit/s Ethernet service electrical interface	100/1000Base-T auto-negotiation electrical interface

3.1.4 LEDs

There are 5 LEDs on the iTN200-SUB-4GE, as described in Table 3-2.

Table 3-2 LEDs on iTN200-SUB-4GE

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
L:LNK/ACT 1–4	Green	Line interface working LED • Green: the line interface is properly connected. • Blinking green: the line interface is sending/receiving data. • Off: the line interface is disconnected or improperly connected.
R:1000M	Yellow	Electrical interface working speed LED • Yellow: the electrical interface is working at 1000 Mbit/s. • Off: the electrical interface is working at 10/100 Mbit/s.

3.1.5 Specifications

Table 3-3 lists technical specifications of the iTN200-SUB-4GE.

Table 3-3 Technical specifications of iTN200-SUB-4GE

Parameter	Description
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)

Parameter	Description
Weight (kg)	0.18
Power consumption (W)	4

3.2 iTN200-SUB-4GF

3.2.1 Features

The iTN200-SUB-4GF, designed for the iTN201-R, is an expansion subcard supporting Ethernet interfaces. It provides four 1000 Mbit/s Ethernet optical interfaces, enhancing the access capability of services. The iTN200-SUB-4GF can be inserted into slot 1 or slot 2 on the iTN201-R.

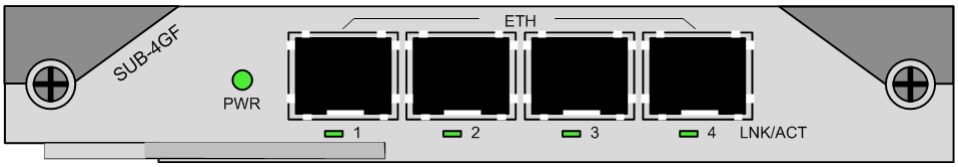
The iTN200-SUB-4GF provides the following features:

- Provide four 1000 Mbit/s Ethernet optical interfaces.
- Support hot swapping of subcards from the backplane or MCC.
- Support 1000Base-SX, 1000Base-LX, 1000Base-ZX, and 100Base-FX SFP optical modules.

3.2.2 Appearance

Figure 3-2 shows the appearance of the iTN200-SUB-4GF.

Figure 3-2 Appearance of iTN200-SUB-4GF



3.2.3 Interfaces

There are 4 interfaces on the iTN200-SUB-4GF, with types and usage listed in Table 3-4.

Table 3-4 Interfaces on iTN200-SUB-4GF

Interface	Type	Purpose	Description
ETH 1–4	SFP	1000 Mbit/s Ethernet service optical interface	Support SFP optical modules. The USFP-GE-R is available. Types of available SFP optical modules: • 1000Base-SX • 1000Base-LX • 1000Base-ZX • 100Base-FX

3.2.4 LEDs

There are 5 LEDs on the iTN200-SUB-4GF, as described in Table 3-5.

Table 3-5 LEDs on iTN200-SUB-4GF

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
LNK/ACT 1–4	Green	Line interface working LED • Green: the line interface is properly connected. • Blinking green: the line interface is sending/receiving data. • Off: the line interface is disconnected or improperly connected.

3.2.5 Technical specifications

Table 3-6 lists technical specifications of the iTN200-SUB-4GF.

Table 3-6 Technical specifications of iTN200-SUB-4GF

Parameter	Description
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.16
Power consumption (W)	6

3.3 iTN200-SUB-2XG

Note

- The iTN200-SUB-2XG can be only inserted into slot 2.
- The iTN200-SUB-2XG is compatible with the iTN201-2XG-R only.

3.3.1 Features

The iTN200-SUB-2XG, designed for the iTN201-R, is a subcard supporting Ethernet interfaces. It provides two 10 Gbit/s Ethernet optical interfaces, enhancing the access capability of services. The iTN200-SUB-2XG can be inserted into slot 2 on the iTN201-R.

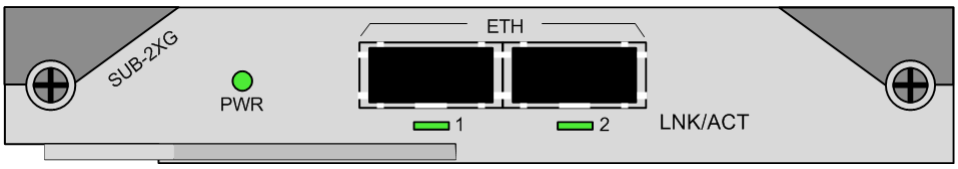
The iTN200-SUB-2XG provides the following features:

- Provide two 10 Gbit/s Ethernet optical interfaces.
- Support hot swapping of subcards from the backplane or MCC.
- Support 10GBase-SX, 10GBase-LX, and 10GBase-EX XFP optical modules.

3.3.2 Appearance

Figure 3-3 shows the appearance of the iTN200-SUB-2XG.

Figure 3-3 Appearance of iTN200-SUB-2XG



3.3.3 Interfaces

There are 2 interfaces on the iTN200-SUB-2XG, with types and usage listed in Table 3-7

Table 3-7 Interfaces on iTN200-SUB-2GX

Interface	Type	Purpose	Description
ETH 1–2	XFP	10 Gbit/s Ethernet service optical interface	The XFP optical module is available. Types of available XFP optical modules: • 10GBase-LR • 10GBase-SR • 10GBase-ER • 10GBase-ZR

3.3.4 LEDs

There are 3 LEDs on the iTN200-SUB-2XG, as described in Table 3-8.

Table 3-8 LEDs on iTN200-SUB-2XG

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
LNK/ACT 1–2	Green	Line interface working LED • Green: the line interface is properly connected. • Blinking green: the line interface is sending/receiving data. • Off: the line interface is disconnected or improperly connected.

3.3.5 Technical specifications

Table 3-9 lists technical specifications of the iTN200-SUB-2XG.

Table 3-9 Technical specifications of iTN200-SUB-2XG

Parameter	Description
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.4
Power consumption (W)	8

3.4 iTN200-SUB-OBP

Note

The iTN200-SUB-OBP is compatible with the iTN201-2XG-R only.

3.4.1 Features

The iTN200-SUB-OBP, designed for the iTN201-R, is an expansion subcard supporting optical bypass protection. When the iTN201-R fails or powers off, the subcard switches the optical signals to the bypass link to detour the failure device, thus preserving network connectivity. The iTN200-SUB-OBP provides 4 line-side optical interfaces and 4 client-side optical interfaces. The iTN200-SUB-OBP can be inserted into slot 1 and slot 2 on the iTN201-R.

The iTN200-SUB-OBP provides the following features:

- Provide 4 line-side optical interfaces with 2 bound to the east and 2 to the west. Provide 4 client-side optical interfaces with 2 bound to the east and 2 to the west. The interfaces mentioned above are provided through the 4 dual-LC/UDP flanges.
- Support single-fiber bidirectional application with 4 effective optical interfaces.

- Support dual-fiber bidirectional application with 8 effective optical interfaces.
- Provide a subcard bypass control button. Press the button to enable the bypass protection. Release the button to return to the MCC control.
- When the button is pressed down, the iTN201-R supports power failure bypass protection, which means that the subcard works in the master link if the iTN201-R runs normally and the subcard switches to the bypass link if the device fails.
- When the button is released, the iTN201-R supports the MCC control, which controls in which state (master or bypass) the subcard works.
- Support hot swapping.

3.4.2 Appearance

Note

When adopting the single-fiber bidirectional feature, the following 4 optical interfaces are effective.

- RX of the LINE-WEST
- TX of the CLIENT-WEST
- RX of the CLIENT-EAST
- TX of the LINE-EAST

Figure 3-4 shows the appearance of the iTN200-SUB-OBP.

Figure 3-4 Appearance of iTN200-SUB-OBP

3.4.3 Interfaces

There are 8 interfaces on the iTN200-SUB-OBP, with types and usage listed in Table 3-10.

Table 3-10 Interfaces on iTN200-SUB-OBP

Interface	Type	Purpose	Description
LINE-WEST	LC/UPC	Westward line-side interface	Connecting the LC fiber, single fiber or dual fiber
CLIENT-WEST	LC/UPC	Westward client-side interface	Connecting the LC fiber, single fiber or dual fiber
CLIENT-EAST	LC/UPC	Eastward client-side interface	Connecting the LC fiber, single fiber or dual fiber
LINE-EAST	LC/UPC	Eastward line-side interface	Connecting the LC fiber, single fiber or dual fiber

3.4.4 Button

There is 1 subcard bypass button on the iTN200-SUB-OBP, as described in Table 3-11.

Table 3-11 Button on iTN200-SUB-OBP

Name	Print	Usage	Description
Bypass button	-	Configuring the bypass status • PRI: releasing the button, MCC control • BPS: pressing the button, subcard bypass	• MCC control: the MCC controls the subcard to be in the bypass link or the master link. • Subcard bypass: whether the subcard works in the bypass link or master link depends on the power condition of the device.

3.4.5 LEDs

There are 2 LEDs on the iTN200-SUB-OBP, as described in Table 3-12.

Table 3-12 LEDs on iTN200-SUB-OBP

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
BPS	Red	Bypass status LED • Green: the device is working in the bypass link. • Off: the device is working in the master link.

3.4.6 Technical specifications

Table 3-12 lists technical specifications of the iTN200-SUB-OBP.

Table 3-13 Technical specifications of iTN200-SUB-OBP

Parameter	Description
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.4
Power consumption (W)	< 1

3.5 iTN200-SUB-4FX

3.5.1 Functions

The iTN200-SUB-4FX, designed for the iTN201-R, is an Ethernet subcard which supports RCLink (Raisecom remote management). It provides four 100 Mbit/s Ethernet optical interfaces, which are connected downstream to media converters for managing remote converters. The iTN200-SUB-4FX can be inserted into Slot 1/2 of the iTN201-R.

The iTN200-SUB-4FX provides the following features:

- Provide four 100 Mbit/s Ethernet optical interfaces.
- Support RCLink protocol.
- Support managing media converters remotely.
- Support hot swapping.

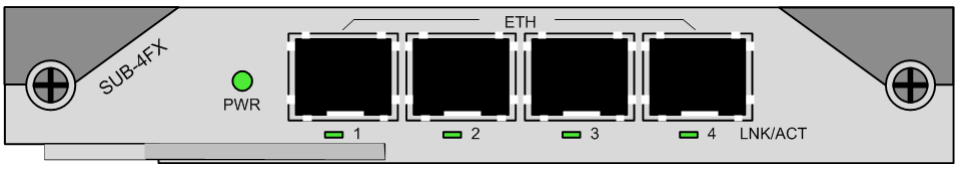
The iTN200-SUB-4FX can be connected downstream to the following media converters.

- RC512-FE (B) and RC512-FE (H)
- RC512-FE-S (B) and RC512-FE-S (H)
- RC532-FE (A) and RC532-FE (H)
- RC531-FE (A) and RC531-F (H)
- RC513-FE (B) and RC513-FE (H)
- RC522E-FE (A) and RC522E-FE (H)
- RC521E-FE (A) and RC521E-FE (H)
- RC521H-FE (A) and RC521H-FE (H)
- RM531-FE (A) and RM531-FE (B)
- RM531I-FE (B) and RM531I-FE (H)

3.5.2 Appearance

Figure 3-5 shows the appearance of the iTN200-SUB-4FX.

Figure 3-5 Appearance of iTN200-SUB-4FX



3.5.3 Interfaces

There are 4 interfaces on the iTN200-SUB-4FX, with interface type and usage as listed in Table 3-14.

Table 3-14 Interfaces on the iTN200-SUB-4FX

Interface	Type	Purpose	Description
ETH 1–4	SFP	100 Mbit/s Ethernet optical interface	100Base-FX optical interface

3.5.4 LEDs

There are 2 LEDs on the iTN200-SUB-4FX, as described in Table 3-15.

Table 3-15 LEDs on the iTN200-SUB-4FX

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
L:LNK/ACT 1–4	Green	Optical interface working LED • Green: the optical interface is properly connected. • Blinking green: the optical interface is sending/receiving data. • Off: the optical interface is disconnected or improperly connected.

3.5.5 Specifications

Table 3-16 lists technical specifications of the iTN200-SUB-4FX.

Table 3-16 Technical specifications of the iTN200-SUB-4FX

Parameter	Description
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.18
Power consumption (W)	4

3.6 iTN200-SUB-GPS-BL

3.6.1 Functions

The iTN200-SUB-GPS-BL is a GPS balanced subcard for the iTN201, providing a GPS antenna for receiving GPS signals and inputting/outputting 1PPS+TOD clock signals.

The iTN200-SUB-GPS-BL provides the following features:

- Support inputting 1 way of GPS clock signals for GPS timing.
- Support inputting/outputting 2 ways of 1PPS+TOD level signals, with the interface type of RJ45.
- Support inputting/outputting 1 way of 1PPS signals, which is configurable, with the interface type of BNC.
- Provide an E1 external clock interface in the form of RJ45. It inputs/outputs 2.048 MHz or Mbit/s clock signals. The electrical features comply with ITU-T G.703 standards.
- Support IEEE 1588v2 and thus support receiving and processing IEEE 1588 v2 packets; support OC master/slave clock mode, BC clock mode, and TC clock mode.
- Support hot swapping.

3.6.2 Appearance

Figure 3-6 shows the appearance of the iTN200-SUB-GPS-BL.

Figure 3-6 Appearance of the iTN200-SUB-GPS-BL

3.6.3 Interfaces

There are 4 interfaces on the iTN200-SUB-GPS-BL, with interface type and usage as listed in Table 3-17.

Table 3-17 Interfaces on the iTN200-SUB-GPS-BL

Interface	Type	Description	Quantity
GPS IN	SMA	GPS clock signal input interface	1
1PPS+TOD (I/O) 1–2	RJ45	1PPS+TOD clock interface, configurable to input or output	2
1PPS (I/O)	BNC	1PPS clock interface, configurable to input or output	1
E1	RJ45	2 Mbit/s or MHz external clock synchronization input/output interface	1

3.6.4 LEDs

There are 3 LEDs on the iTN200-SUB-GPS-BL, as described in Table 3-18.

Table 3-18 LEDs on the iTN200-SUB-GPS-BL

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
GPS	Green	GPS clock signal locking LED • Green: the interface has locked GPS clock signals. • Off: the interface has not locked GPS clock signals.
SD	Green	E1 clock interface working LED • Green: the interface is inputting clock signals. • Off: the interface is not inputting clock signals.

3.6.5 Specifications

Table 3-19 lists technical specifications of the iTN200-SUB-GPS-BL.

Table 3-19 Technical specifications of the iTN200-SUB-GPS-BL

Item	Value
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.4
Power consumption (W)	≤ 8

3.7 iTN200-PWE3-8E1-BL

3.7.1 Functions

The iTN200-PWE3-8E1-BL is a balanced TDMoP subcard, implementing circuit emulation services based on PWE3 and providing balanced E1 interfaces. It can be inserted into Slot 1 or Slot 2 on the iTN201-R.

The iTN200-PWE3-8E1-BL provides the following features:

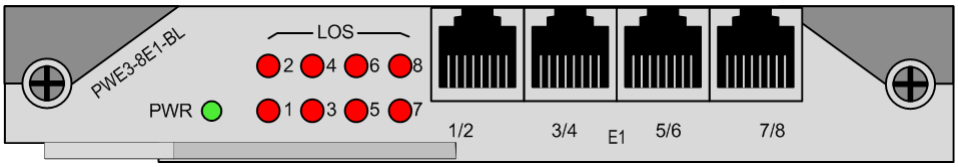
- Provide 8 balanced E1 interfaces, which are provided through 4 RJ45 interfaces.
- Support configuring the E1 interface to framed, multiframed, and unframed mode.
- Support creating and deleting Tunnels.
- Support creating and deleting PWs.
- Support configuring up to 64 PWs.
- Support MPLS, MEF, UDP/IP Tunnels.

- Support unstructured and structured encapsulation modes, such as SAToP (Structure-Agnostic TDM over Packet, TDM circuit emulation services with unkown structure) and CESoPSN (Structure-Aware TDM Circuit Emulation Service over Packet-Switched Network, TDM circuit emulation services with known structure).
- Support configuring the packet encapsulation time.
- Support configuring the jitter buffer space.
- Support enabling RTP.
- Support querying the PW status and statistics.
- Support controlling QoS.
- Support E1 alarms.
- Support TDMoP clock recovery mechanism, such as adaptive clock, differential clock, line recovery clock, system clock, and external clock. Comply with the ITU-TG.8261 standard.
- Support hot swapping.

3.7.2 Appearance

The iTN200-PWE3-8E1-BL can be inserted into Slot 1 and Slot 2 on the iTN201-R. Figure 3-7 shows the appearance of the iTN200-PWE3-8E1-BL.

Figure 3-7 Appearance of iTN200-PWE3-8E1-BL



3.7.3 Interfaces

There are 4 interfaces on the iTN200-PWE3-8E1-BL, with interface type and usage as listed in Table 3-20.

Table 3-20 Interfaces on the iTN200-PWE3-8E1-BL

Interface	Type	Description
1/2, 3/4, 5/6, 7/8	RJ45	Each RJ45 interface supports 2 ways of E1 services.

3.7.4 LEDs

There are 9 LEDs on the iTN200-PWE3-8E1-BL, as described in Table 3-21.

Table 3-21 LEDs on the iTN200-PWE3-8E1-BL

LED	Status	Description
PWR	Green	Power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.

LED	Status	Description
LOS (1–8)	Red	LOS alarm LED • Red: input signals of 1–8 ways of E1 services are lost. • Off: no signal of 1–8 ways of E1 services is lost.

3.7.5 Specifications

Table 3-22 lists technical specifications of the iTN200-PWE3-8E1-BL.

Table 3-22 Technical specifications of the iTN200-PWE3-8E1-BL

Item	Value
Dimensions (mm)	129.4 (Width) × 243.4 (Depth) × 19.8 (Height)
Weight (kg)	0.25
Power consumption (W)	≤ 5

4 Power supply and fan

This chapter describes functions, appearance, LEDs, and technical specifications of the power supply and fan of the iTN201-R, including the following sections:

- AC power module RPA0601
- DC power module RPD0601
- AC power module RPA060101
- DC power module RPD0601
- Fan module FANS306

This device has multiple power inputs. Disconnect all power inputs while cutting down the power supply.

4.1 AC power module RPA0601

Functions

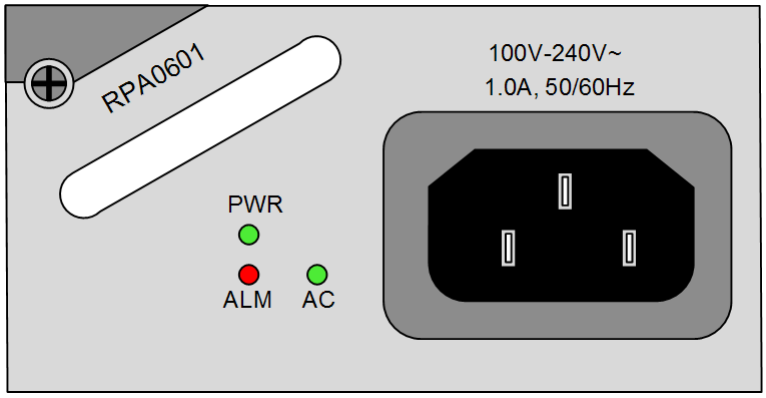
The AC power module RPA0601 is for the iTN201-4GF-R. It can be inserted into the power module slot. It has the following functions:

- Provide 100–240 VAC power, and support dual power redundant backup.
- Support hot swapping.
- Support hybrid AC/DC power supplies.
- Support overvoltage and undervoltage detection.

Appearance

Figure 4-1 shows the appearance of the AC power module RPA0601.

Figure 4-1 Appearance of AC power module RPA0601



Slots

The AC power module RPA0601 can be inserted into power slot 1 and power slot 2.

Interface

There is only one interface on the AC power module RPA0601, with the type and usage listed in Table 4-1.

Table 4-1 Interface on AC power module RPA0601

Interface	Description
100V–240V	AC power interface

LEDs

There are 3 LEDs on the AC power module RPA0601, as listed in Table 4-2.

Table 4-2 LEDs on AC power module RPA0601

LED	Status	Description
PWR	Green	AC power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
ALM	Red	Power alarm LED • Red: the power supply is working improperly and alarms are generated. • Off: the power supply is working properly.
AC	Green	Power working LED • Green: the AC power input is normal. • Off: no AC power input.

Technical specifications

Table 4-3 lists technical specifications of the AC power module RPA0601.

Table 4-3 Technical specifications of AC power module RPA0601

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	54
Rated input voltage (V)	110/220
Input voltage range (V)	100–240
Rated output voltage (V)	12
Maximum output current (A)	4.5

4.2 DC power module RPD0601

Functions

The DC power module RPD0601 is for the iTN201-4GF-R. It can be inserted into the power module slot. It has the following functions:

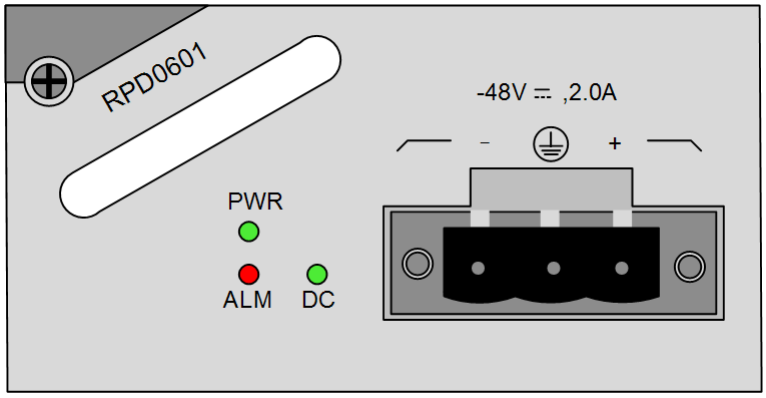
- Provide -48 or +24 VDC power, and support dual power redundant backup.
- Support hot swapping.
- Support hybrid of AC/DC power supplies.
- Support overvoltage and undervoltage detection.

Appearance

The DC power module RPD0601 has the following two models according to input power type:

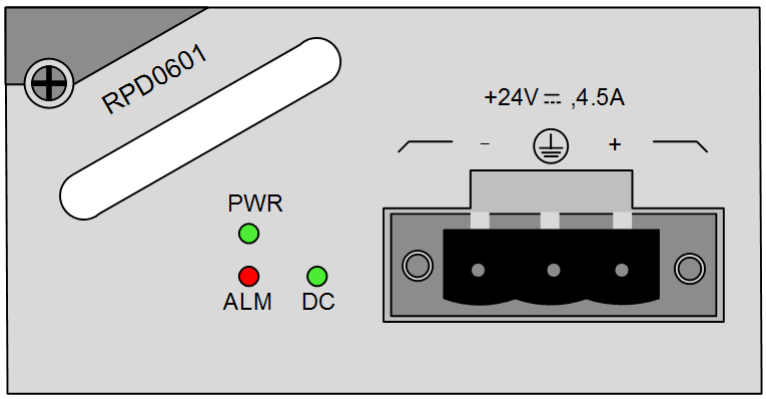
- RPD0601-48S12: access standard -48 VDC voltage, as shown in Figure 4-2.

Figure 4-2 Appearance of DC power module RPD0601-48S12



- RPD0601-24S12: access standard +24 VDC voltage, as shown in Figure 4-3.

Figure 4-3 Appearance of DC power module RPD0601-24S12



Slots

The DC power module RPD0601 can be inserted into power slot 1 and power slot 2.

Interface

There is only one interface on the DC power module RPD0601-48S12, with types and usage listed in Table 4-4.

Table 4-4 Interface on DC power module RPD0601-48S12

Print	Description
+	BGND power input interface
–	-48 V power input interface
⏚	Ground interface

There is only one interface on the DC power module RPD0601-24S12, with types and usage being listed in Table 4-5.

Table 4-5 Interface on DC power module RPD0601-24S12

Print	Description
+	+24V power input interface
–	BGND power input interface
⏚	Ground interface

LEDs

There are 3 LEDs on the DC power module RPD0601, as listed in Table 4-6.

Table 4-6 LEDs on DC power module RPD0601

LED	Status	Description
PWR	Green	DC power LED • Green: the power supply is working properly. • Off: the power supply is working improperly or off.
ALM	Red	Power alarm LED • Red: the power supply is working improperly and alarms are generated. • Off: the power supply is working properly.
DC	Green	Power working LED • Green: the DC power input is normal. • Off: no DC power input

Technical specifications

Technical specifications of the DC power module RPD0601 are listed in Table 4-7 and 0 respectively.

Table 4-7 Technical specifications of DC power module RPD0601-48S12

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	75
Rated input voltage (V)	-48
Input voltage range (V)	-36 to -72
Rated output voltage (V)	12

Parameter	Description
Maximum output current (A)	6.3

Table 4-8 Technical specifications of DC power module RPD0601-24S12

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	54
Rated input voltage (V)	+24
Input voltage range (V)	18–36
Rated output voltage (V)	12
Maximum output current (A)	4.5

4.3 AC power module RPA1101

Functions

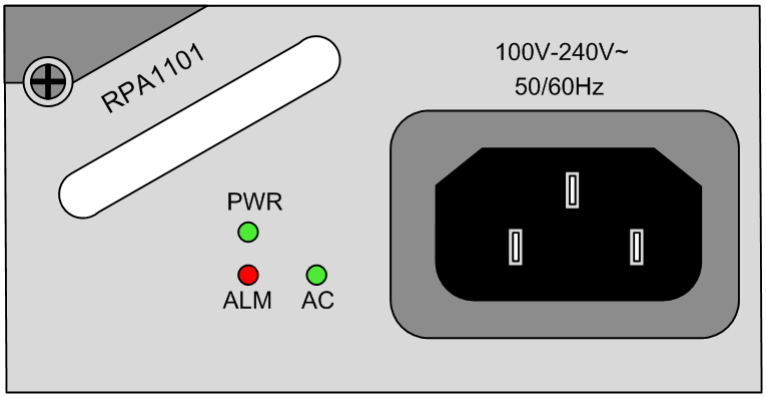
The AC power module RPA1101 is for the 10GE iTN201-2XG-R. The GE iTN201-4GF-R also can use it. It has the following functions:

- Provide 100-240 VAC power, and support dual power redundant backup.
- Support hot swapping.
- Support hybrid AC/DC power supplies.
- Support overvoltage and undervoltage detection.

Appearance

The appearance of the RPA1101 power module is shown in Figure 4-4.

Figure 4-4 Appearance of the AC power module RPA1101



Slots

The AC power module RPA1101 can be inserted into power slot 1 and power slot 2.

Interface

There is only one interface on the AC power module RPA1101, with the type and usage listed in Table 4-9.

Table 4-9 Interface on AC power module RPA1101

Print	Description
100-240V	AC power interface

LEDs

There are 3 LEDs on the AC power module RPA1101, as listed in Table 4-10.

Table 4-10 LEDs on AC power module RPA1101

LED	Status	Description
PWR	Green	AC power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
ALM	Red	Power alarm LED • Red: the power supply is working improperly and alarms are generated. • Off: the power supply is working properly.
AC	Green	Power working LED • Green: the AC power input is normal. • Off: no AC power input.

Technical specifications

Table 4-11 lists technical specifications of the AC power module RPA1101.

Table 4-11 Technical specifications of AC power module RPA1101

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	100
Rated input voltage (V)	110/220
Input voltage range (V)	100–240
Rated output voltage (V)	12
Maximum output current (A)	8.33

4.4 DC power module RPD1101

Functions

The DC power module RPD1101 is for the 10GE iTN201-2XG-R. The GE iTN201-4GF-R can use it too. It has the following functions:

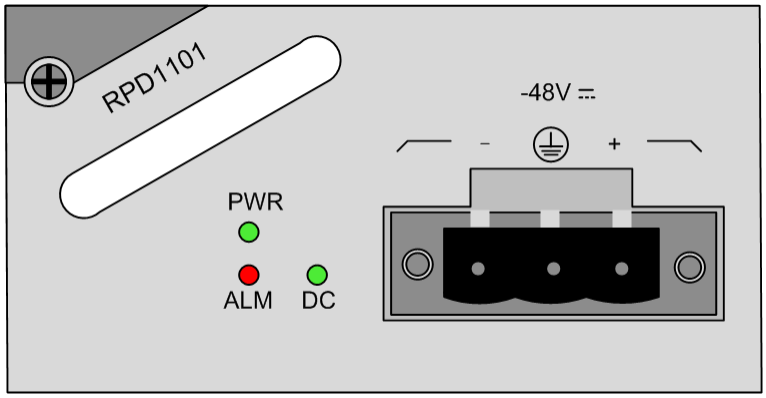
- Provide -48 or +24 VDC power, and support dual power redundant backup.
- Support hot swapping.
- Support overvoltage and undervoltage detection.
- Support 100 W output power.

Appearance

The DC power module RPD1101 has the following two models according to the input power type:

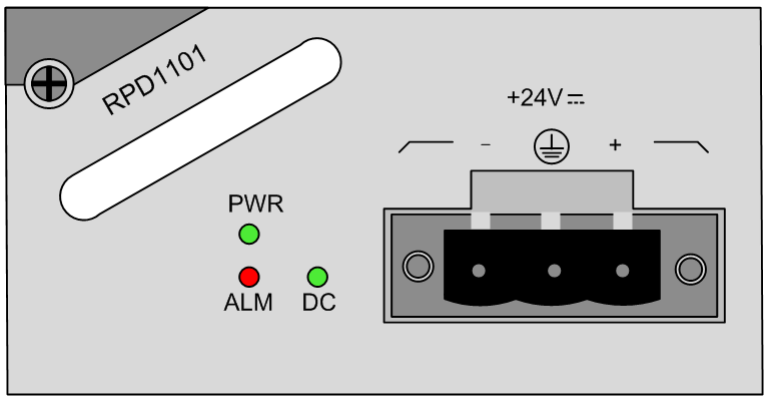
- RPD1101-48S12: access standard -48 VDC, as shown in Figure 4-5.

Figure 4-5 Appearance of DC power module RPD1101-48S12



- RPD1101-24S12: access standard 24 VDC, as shown in Figure 4-5.

Figure 4-6 Appearance of DC power module RPD1101-24S12



Slots

The DC power module RPD1101 can be inserted into power slot 1 and power slot 2.

Interface

There is only one interface on the DC power module RPD1101-48S12, with the type and usage listed in Table 4-12.

Table 4-12 Interface on DC power module RPD1101-48S12

Print	Description
+	BGND power input interface
–	-48 V power input interface
⏚	Ground interface

There is only one interface on the DC power module RPD1101-24S12, with types and usage listed in Table 4-13.

Table 4-13 Interface on DC power module RPD1101-24S12

Print	Description
+	24 V power input interface
–	BGND power input interface
⏚	Ground interface

LEDs

There are 3 LEDs on the DC power module RPD1101, as listed in Table 4-14.

Table 4-14 LEDs on the DC power module RPD1101

LED	Status	Description
PWR	Green	DC power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
ALM	Red	Power alarm LED • Red: the power supply is working improperly and alarms are generated. • Off: the power supply is working properly.
DC	Green	Power working LED • Green: the DC power input is normal. • Off: no DC power input

Technical specifications

Technical specifications of the DC power module RPD1101 are listed in Table 4-15 and Table 4-16 respectively.

Table 4-15 Technical specifications of DC power module RPD1101-48S12

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	100
Rated input voltage (V)	-48
Input voltage range (V)	-36 to -72
Rated output voltage (V)	12

Parameter	Description
Maximum output current (A)	8.33

Table 4-16 Technical specifications of DC power module RPD1101-24S12

Parameter	Description
Dimensions (mm)	65.6 (Width) × 243.4 (Depth) × 41.2 (Height)
Weight (kg)	0.6
Output power (W)	100
Rated input voltage (V)	24
Input voltage range (V)	18-36
Rated output voltage (V)	12
Maximum output current (A)	8.33

4.5 Fan module FANS306

Functions

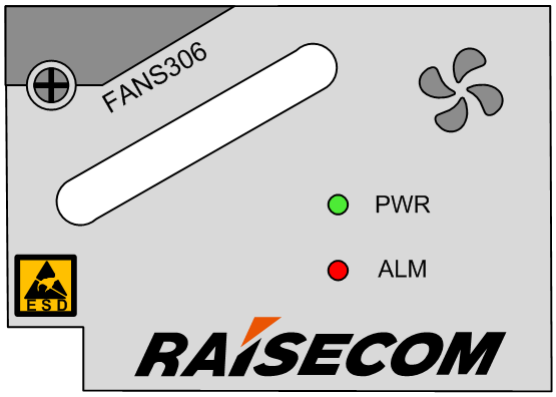
The FANS306 is the fan unit of the iTN201-R. It can be inserted into the fan module slot. It has the following functions:

- Support fan monitoring and automatic adjustment of rotational speed.
- Support hot swapping.

Appearance

Figure 4-7 shows the appearance of the fan module FANS306.

Figure 4-7 Appearance of fan module FANS306



LEDs

There are 2 LEDs on the fan module FANS306, as listed in Table 4-17.

Table 4-17 LEDs on fan module FANS306

LED	Status	Description
PWR	Green	Fan power LED • Green: the power supply is working properly. • Off: the power supply is working improperly.
ALM	Red	Fan alarm LED • Red: the fan is working improperly and alarms are generated. • Off: the fan is working properly.

Technical specifications

Table 4-18 lists technical specifications of the fan module FANS306.

Table 4-18 Technical specification of fan module FANS306

Parameter	Description
Dimensions (mm)	41.9 (Width) × 230.1 (Depth) × 41.1 (Height)
Weight (kg)	0.3
Power consumption (W)	3

5 Fiber and cables

This chapter describes the fiber and cables available for interfaces of the iTN201-R, including the following sections:

- Fiber
- Ethernet cable
- E1 cable
- Clock cable
- Configuration cable
- DC power cable
- AC power cable
- Ground cable

Note

Before installing and operating the iTN201-R, check accessories contained in the packing box based on the *Packing List*. The followings are cables required for the iTN201-R. However, some cables are not delivered with the iTN201-R. If required, prepare them based on the technical specifications.

5.1 Fiber

5.1.1 Introduction

The iTN201-R supports Single-mode Fiber (SMF) and Multimode Fiber (MMF).

Table 5-1 lists fiber connectors.

Table 5-1 Fiber connectors

Local connector	Remote connector	Fiber
LC/PC	LC/PC	2 mm SMF
		2 mm MMF
LC/PC	FC/PC	2 mm SMF

Local connector	Remote connector	Fiber
		2 mm MMF
LC/PC	SC/PC	2 mm SMF
		2 mm MMF

Note

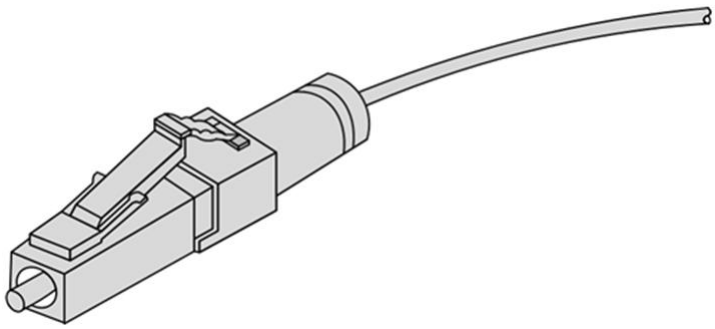
Choose the fiber and fiber connector properly as required on site.

The iTN201-R uses the LC/PC fiber connector.

5.1.2 Appearance

Figure 5-1 shows the LC/PC fiber connector used by the iTN201-R.

Figure 5-1 LC/PC fiber connector



When connecting or removing the LC/PC fiber connector, align the fiber connector with the optical interface, and do not rotate the fiber. Note the following points:

- To insert the fiber, align the fiber head with the optical interface and insert it into the optical interface properly.
- To remove the fiber, press the latch on the connector, and pull the fiber out.

5.2 Ethernet cable

5.2.1 Introduction

For the iTN201-R, the Ethernet cable connects:

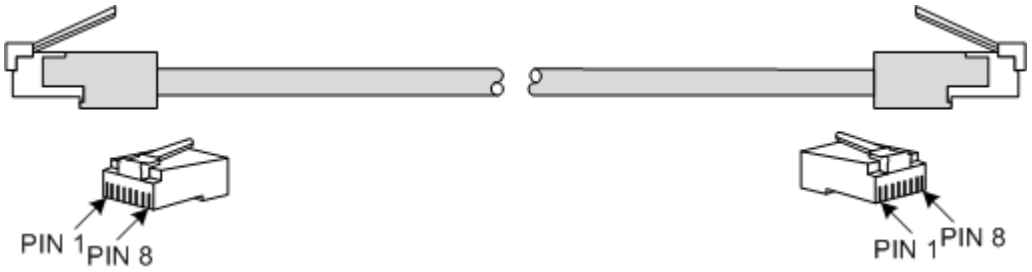
- The Ethernet electrical interface of the iTN201-R to other devices
- The SNMP interface of the iTN201-R to the NMS

The Ethernet interface on the iTN201-R is adaptive to straight-through cable and crossover cable. Therefore, both cables are available for the Ethernet interface.

5.2.2 Appearance

Figure 5-2 shows the Ethernet cable.

Figure 5-2 Ethernet cable



5.2.3 Technical specifications

The Ethernet cable has two types:

- Straight-through cable: used to connect devices of different type, such as the PC and switch or the switch and router.
- Crossover cable: used to connect devices of the same type, such as PCs, switches, routers, the PC and router (the PC and router are in the same group).

Table 5-2 lists wirings of EIA/TIA 568A and EIA/TIA 568B standards.

Table 5-2 Wirings of EIA/TIA 568A and EIA/TIA 568B standards

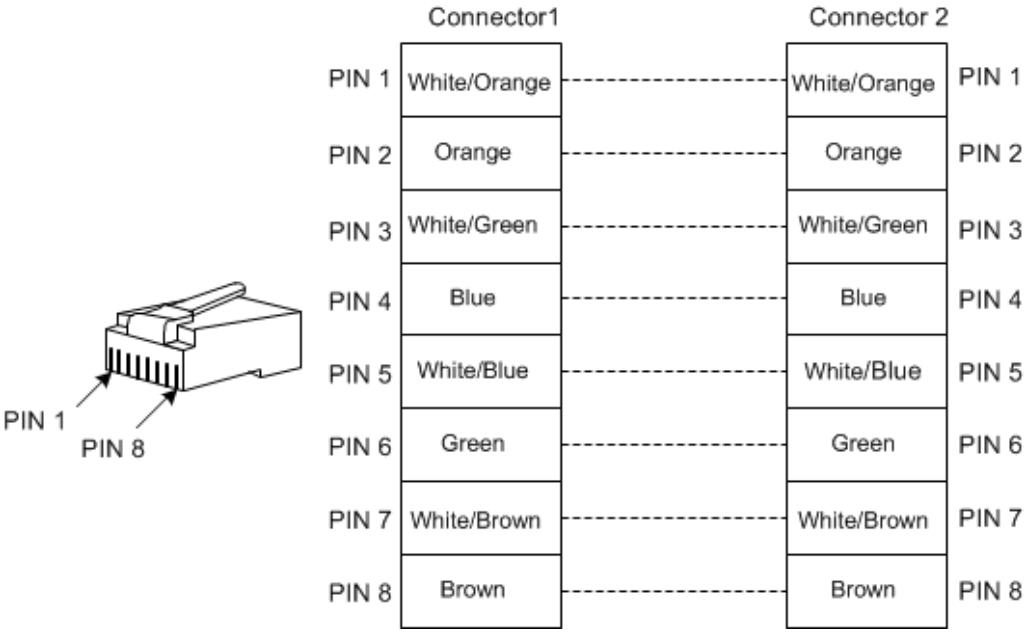
Connector 1 (RJ45)	EIA/TIA 568A	Connector 2 (RJ45)	EIA/TIA 568B
PIN 1	White/Green	PIN 1	White/Orange
PIN 2	Green	PIN 2	Orange
PIN 3	White/Orange	PIN 3	White/Green
PIN 4	Blue	PIN 4	Blue
PIN 5	White/Blue	PIN 5	White/Blue
PIN 6	Orange	PIN 6	Green
PIN 7	White/Brown	PIN 7	White/Brown
PIN 8	Brown	PIN 8	Brown

Straight-through cable

Both 2 RJ45 connectors of the straight-through cable use the same wiring. Generally, they follow the EIA/TIA568B standard.

Figure 5-3 shows the wiring of the straight-through cable.

Figure 5-3 Wiring of the straight-through cable

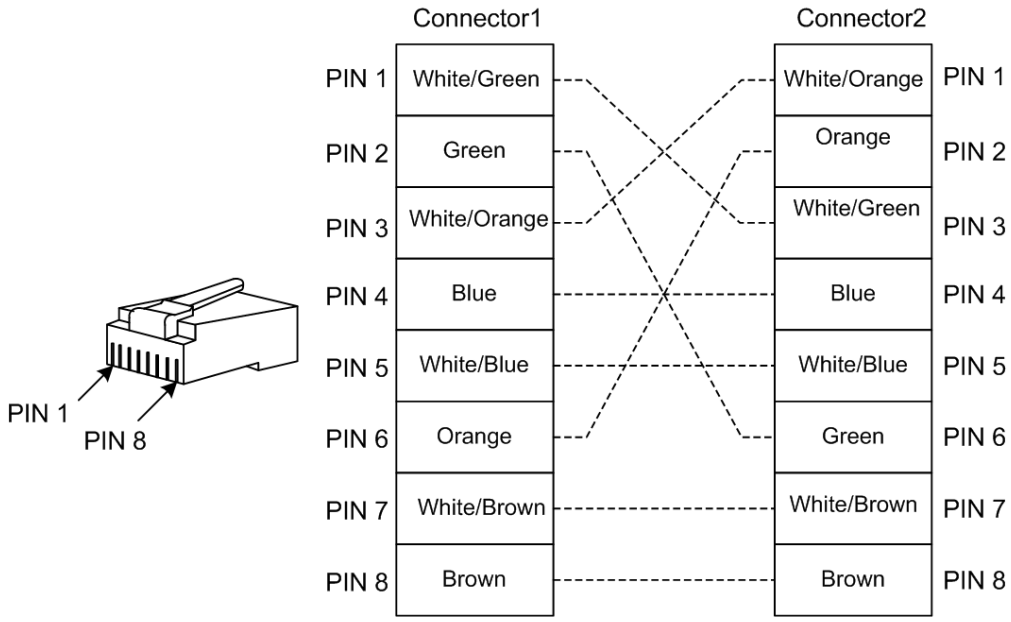


Crossover cable

The wiring for 100 Mbit/s crossover cable is different from that of 1000 Mbit/s crossover cable.

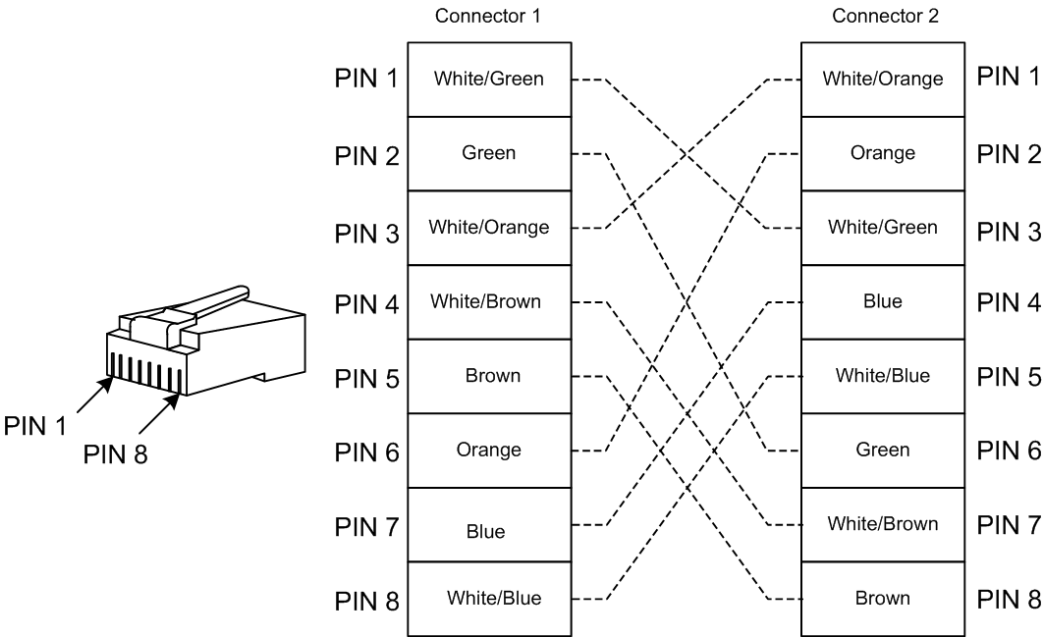
One RJ45 connector of the 100 Mbit/s crossover cable follows EIA/TIA 568A standard; the other RJ45 connector follows EIA/TIA 568B standard. Figure 5-4 shows the wiring of the 100 Mbit/s crossover cable.

Figure 5-4 Wiring of 100 Mbit/s crossover cable



The 1000 Mbit/s crossover cable uses all 8 pins of the twisted-pair cable. The crossover is PIN 1 to PIN 3, PIN 2 to PIN 6, PIN 4 to PIN 7, and PIN 5 to PIN 8, as shown in Figure 5-5.

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



Raisecom provides the straight-through cable and 100 Mbit/s crossover cable which are only different in name. The straight-through cable is named as CBL-ETH-RJ45/RJ45-D while the crossover cable is named as CBL-ETH-RJ45/RJ45-X-D.

Table 5-3 lists technical specifications of the Ethernet cable.

Table 5-3 Technical specifications of Ethernet cable

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

5.3 E1 cable

5.3.1 E1-RJ45 cable

Introduction

The iTN200-PWE3-8E1-BL provides the RJ45 E1 interface. One RJ45 interface transmits 2 ways of E1 signals, which is connected through the E1-RJ45 cable, as listed in Table 5-4.

Table 5-4 E1-RJ45 cable

Model	Description
CBL-E1-RJ45/RJ45	One RJ45 interface is connected with one RJ45 connector to transmit 2 ways of E1 signals.
CBL-E1-RJ45/2RJ45	One RJ45 interface is connected with two RJ45 connectors to transmit 2 ways of E1 signals. One RJ45 connector is connected with the E1 interface of the TDMoP card to carry 2 ways of signals. Both RJ45 connectors are connected to E1 interfaces of the TDM device for carrying 1 way of signals respectively.

Note

The E1-RJ45 cable is not delivered with the iTN201-R. You can make it on site as required. The appearance and wiring described in this section are for your reference to make the E1-RJ45 cable.

Appearance

Figure 5-6 shows the appearance of the CBL-E1-RJ45/RJ45 E1 balanced cable.

Figure 5-6 CBL-E1-RJ45/RJ45 E1 balanced cable

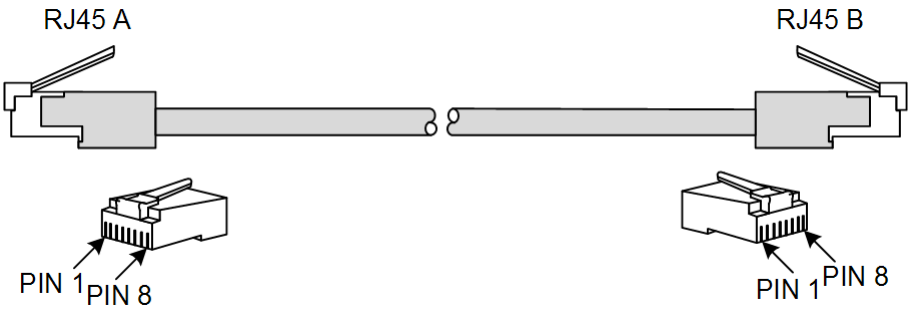
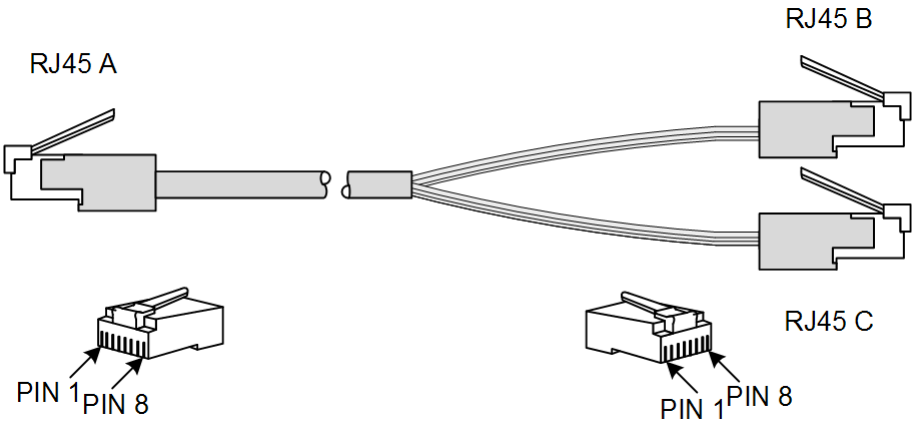


Figure 5-7 shows the appearance of the CBL-E1-RJ45/2RJ45 E1 balanced cable.

Figure 5-7 CBL-E1-RJ45/2RJ45 E1 balanced cable



Wiring

Table 5-5 lists the wiring of the CBL-E1-RJ45/RJ45 E1 balanced cable.

Table 5-5 Wiring of the CBL-E1-RJ45/RJ45 E1 balanced cable

RJ45 PIN definition	Pin of RJ45 A	Color of RJ45 A	Pin of RJ45 B	Color of RJ45 B
OUT1+	PIN1	White/Orange	PIN1	Blue
OUT1-	PIN2	Orange	PIN2	White/Blue
IN2+	PIN3	White/Green	PIN3	White/Brown
IN1+	PIN4	Blue	PIN4	White/Orange
IN1-	PIN5	White/Blue	PIN5	Orange
IN2-	PIN6	Green	PIN6	Brown
OUT2+	PIN7	White/Brown	PIN7	White/Green
OUT2-	PIN8	Brown	PIN8	Green

Table 5-6 lists the wiring of the CBL-E1-RJ45/2RJ45 E1 balanced cable.

Table 5-6 Wiring of the CBL-E1-RJ45/2RJ45 E1 balanced cable

RJ45 PIN definition	Pin of RJ45 A	Color of RJ45 A	Pin of RJ45 B	Color of RJ45 B	Pin of RJ45 C	Color of RJ45 C
OUT1+	PIN1	White/Orange	PIN1	Blue	PIN1	White/Green
OUT1-	PIN2	Orange	PIN2	White/Blue	PIN2	Green
IN2+	PIN3	White/Green	PIN3	NC	PIN3	NC
IN1+	PIN4	Blue	PIN4	White/Orange	PIN4	White/Brown
IN1-	PIN5	White/Blue	PIN5	Orange	PIN5	Brown

RJ45 PIN definition	Pin of RJ45 A	Color of RJ45 A	Pin of RJ45 B	Color of RJ45 B	Pin of RJ45 C	Color of RJ45 C
IN2-	PIN6	Green	PIN6	NC	PIN6	NC
OUT2+	PIN7	White/Brown	PIN7	NC	PIN7	NC
OUT2-	PIN8	Brown	PIN8	NC	PIN8	NC

Technical specifications

Table 5-7 lists the technical specifications of the CBL-E1-RJ45/RJ45 cable.

Table 5-7 Technical specifications of the CBL-E1-RJ45/RJ45 cable

Item	Description
Cable name	CBL-E1-RJ45/RJ45
Connector	One RJ45 connector is connected to one RJ45 connector, transmitting 2 ways of E1 signals.
Length	1 m

Table 5-8 lists the technical specifications of the CBL-E1-RJ45/2RJ45 cable.

Table 5-8 Technical specifications of the CBL-E1-RJ45/2RJ45 cable

Item	Description
Cable name	CBL-E1-RJ45/2RJ45-2.5m/RoHS
Connector	One RJ45 connector is connected to two RJ45 connectors.
Length	2.5 m

5.4 Clock cable

The iTN200-SUB-GPS-BL provide clock interfaces, including 2 1PPS+TOD (I/O) interfaces, 1 1PPS (I/O) interface, and 1 GPS IN interface, which use different cables. Table 5-9 lists the clock cable.

Table 5-9 Clock cable

Interface	Cable	Description
GPS IN	–	The connector type is SMA which is not equipped. You can prepare the GPS antenna as required.

Interface	Cable	Description
1PPS+TOD (1)	Not equipped	You can make it according to the clock PIN.
1PPS+TOD (2)	Not equipped	You can make it according to the clock PIN.
1PPS	Not equipped	The local end connector is equipped with the type of 50Ω-long BNC header-straight-female interface/RoHS. You can make the cable by yourself.

Note

The clock cable is not delivered with the iTN201-R. You can make or order one as required.

5.5 Configuration cable

5.5.1 Introduction

The configuration cable is used to connect the Console interface on the iTN201-R to the RS-232 serial interface on the maintenance console, transmitting configuration data. You can debug and maintain the local device through the Console interface on the maintenance console.

The connectors at both ends of the configuration cable are as below:

- USB: connecting the USB Console interface
- USB: connecting the USB interface on the maintenance console

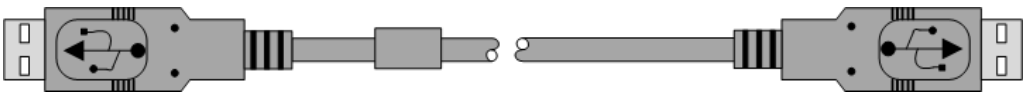
Note

Before accessing the iTN201-R through the USB interface, install the driver on the PC for converting the USB interface into the Universal Asynchronous Receiver/Transmitter (UART) interface. To download the driver, visit http://www.raisecom.com.cn/support.php and then click USB_Console_Drive.

5.5.2 Appearance

Figure 5-8 shows the appearance of the configuration cable.

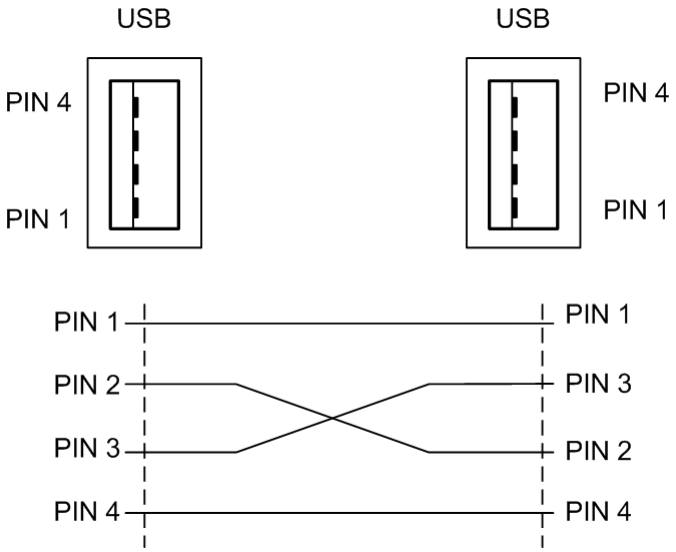
Figure 5-8 Configuration cable



5.5.3 Wiring

Table 5-10 shows terminal PINs and wiring.

Table 5-10 Terminal PINs and wiring



5.5.4 Technical specifications

Table 5-11 lists technical specifications of the configuration cable used by the iTN201-R.

Table 5-11 Technical specifications of configuration cable

Parameter	Description
Name	CBL-USB-USB-AM/USB-AM-1.5m/RoHS
Connector type	USB2.0 AM connector + USB2.0 AM connector
Cable type	UL2725
Length	1.5 m

5.6 DC power cable

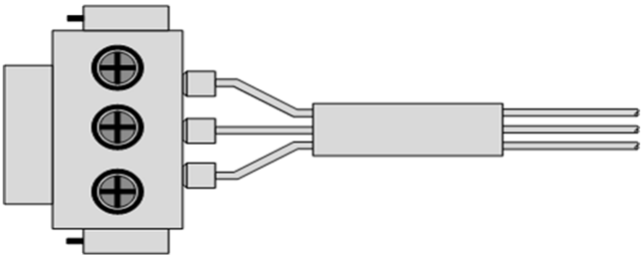
5.6.1 Introduction

The DC power cable supplies -48 or +24 VDC power from the power souring equipment to the power interface on the iTN201-R, thus powering the entire device.

5.6.2 Appearance

The DC power cable is composed of DC connectors and coaxial cable, as shown in Figure 5-9.

Figure 5-9 DC power cable



5.6.3 Technical specifications

Table 5-12 lists technical specifications of the DC power cable used by the iTN201-R.

Table 5-12 Technical specifications of DC power cable

Parameter	Description
Name	POL-DC-unstripped/stripped-1.0mm^2-D/RoHS
Cable	• 3-wire ordinary RVV • 3 × 1.0 mm^2 60227 IEC 53 (RVV) • Flame-retardant tube equipped at the stripped end • +Vin: brown • -Vin: blue • PGND: yellow green
Rated voltage (V)	300/500
Insulation and voltage resistance (core to sheath)	2000 VAC, 5min
Insulation and voltage resistance (core)	1500 VAC, 5min
Authentication	CCC
RoHS	Compliant
Customized length	Supported, D represents the cable length.

Note

For international market, we provide DC power connector only instead of the power cable.

5.7 AC power cable

5.7.1 Introduction

The AC power cable supplies 100–240 VAC power from the power souring equipment to the power interface on the iTN201-R, thus powering the entire device.

The AC power cables used by the iTN201-R vary with countries or regions, as lists in Table 5-13.

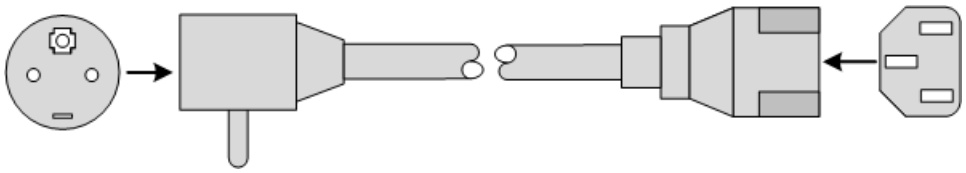
Table 5-13 AC power cables

Regional standard	Cable
Europe	POL-AC-European 3-pin/receptacle-0.75mm^2-D/RoHS
America	POL-AC-American 3-pin/receptacle -18AWG-D/RoHS

5.7.2 Appearance

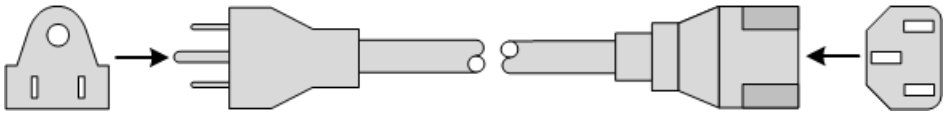
The AC power cable which meets European standard is composed of the European French-mode 3-pin plug and 3-pin receptacle connector, as shown in Figure 5-10.

Figure 5-10 European AC power cable



The AC power cable which meets American standard is composed of the American 3-pin plug and 3-pin receptacle connector, as shown in Figure 5-11.

Figure 5-11 American AC power cable



5.7.3 Technical specifications

Table 5-14 lists technical specifications of the European AC power cable.

Table 5-14 Technical specifications of European AC power cable

Parameter		Description
Name		POL-AC-European 3-pin/receptacle-0.75mm^2-D/RoHS
Connector type 1		European 3-pin plug
Connector type 2		IEC60320-C13 receptacle
Cable color	Inner	Black (PVC insulation layer)

Parameter		Description
	Outer	Blue (N), brown (L), and yellow/green strip (E)
Conductor gauge		3×0.75 mm^2
Cable length		The D in the cable model represents the cable length, which can be customized. For example, if the length of the customized cable is 1.5 m, the cable name will be POL-AC-French 3-pin/receptacle-0.75mm^2-1.5 m/RoHS.

Table 5-15 lists technical specifications of the American AC power cable.

Table 5-15 Technical specifications of American AC power cable

Item		Description
Name		POL-AC-American 3-pin/receptacle-18AWG-D/RoHS
Connector type 1		NMEA5-15 American 3-pin plug
Connector type 2		IEC60320-C13 receptacle
Cable color	Inner	Black (PVC insulation layer)
	Outer	White (N), black (L), and green (E)
Conductor gauge		18AWG/3C
Cable length		The D in the cable model represents the cable length, which can be customized. For example, if the length of the customized cable is 1.5 m, the cable name will be POL-AC-American 3-pin/receptacle-18AWG-1.5 m/RoHS.

5.8 Ground cable

Connecting the ground cable properly is an important guarantee for lightning protection, anti-electric shock, and anti-interference. The iTN201-R must be grounded with the ground cable correctly during installation, which helps to avoid personal injury and equipment damage.

5.8.1 Introduction

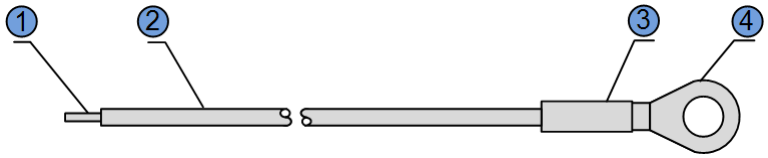
The ground cable is used to connect the iTN201-R to the ground.

The ground terminal on the device is connected to the ground cable. The device can also be grounded through the power cable. The device is a Class 1 device.

5.8.2 Appearance

The ground cable is composed of ground terminals and the coaxial cable. Generally, ground terminals are OT non-insulated terminals, and the coaxial cable is a yellow/green copper soft flame-retardant cable. Figure 5-12 shows the ground cable and Figure 5-13 shows the OT terminal.

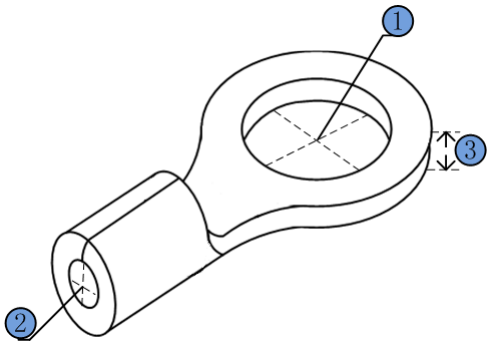
Figure 5-12 Ground cable



1: stripped end (connected to the OT terminal or ground bar)	2: conducting wire
3: insulating sheath	4: OT terminal

Figure 5-13 shows the OT terminal.

Figure 5-13 OT terminal



1: Inner diameter of soldering lug	2: Inner diameter of the stripped wire	3: Thickness of the soldering lug

5.8.3 Technical specifications

Table 5-16 lists technical specifications of the ground cable.

Table 5-16 Technical specifications of ground cable

Parameter	Description
Model	PIL-ground cable-Φ4-D/RoHS
Cable standard	Comply with the UL standard and RoHS requirements.

Conducting wire	• Yellow/Green multistrand copper 16AWG (1×1.25mm^2) wire • Comply with UL1007 or UL1005 standard..
Stripped end	10 mm long and tinning
Cable length	70 mm, 105 mm, or customized The D in the cable model represents the cable length, which can be customized. For example, if the length of the customized cable is 2 m, the cable name will be PIL-ground cbale-Φ4-200 mm/RoHS.

Table 5-17 lists technical specifications of the OT terminal.

Table 5-17 Technical specifications of OT terminal

Parameter	Description
Model	Protective grounding pressed round terminal (M4)/RoHS
Specifications	• 4.3 soldering terminal • Inner diameter: 4 mm • Outer diameter: ≤ 8 mm • Diameter of the stripped wire: 2.1 mm • Thickness of the soldering lug: ≥ 0.6 mm
Cross-section area of the conducting wire	16–15 AWG (1.2–1.5 mm^2)

Note

- An OT terminal will be randomly delivered with the iTN201-R. However, the ground cable is not delivered with the iTN201-R. You need to prepare or make the ground cable on site as required.
- The length of the ground cable cannot be greater than 30 m and should be as short as possible. If the length exceeds 30 m, use a ground bar instead.

6 Appendix

This chapter describes terms, acronyms, and abbreviations involved in the document, including the following sections:

- Interface parameters lookup table
- Optical/Electrical module feature lookup table
- Terms
- Acronyms and abbreviations

6.1 Interface parameters lookup table

6.1.1 SFP optical interface

Table 6-1 lists parameters of the 1000Base-X SFP optical interface.

Table 6-1 Parameters of 1000Base-X SFP optical interface

Parameter	Description
Connector	LC/PC
Technical specifications of optical interface	Depend on the selected SFP optical module.
Coding type	8B/10B
Transmission speed	1.25 Gbit/s or 155 Mbit/s
Working mode	Full duplex mode
Supported MTU	13000 bytes
Compliant standard	IEEE 802.3
Supported frame format	Ethernet-II, Ethernet-SAP, and Ethernet-SNAP
Supported network protocol	IP

6.1.2 XFP optical interface

Table 6-2 lists parameters of 10GBASE-SR XFP optical interface.

Table 6-2 Parameters of 10GBASE-SR XFP optical interface

Parameter	Description
Connector	XFP (LC/PC)
Technical specifications of optical interface	Depend on the selected SFP optical module.
Coding type	64B/66B
Transmission speed	10.3125 Gbit/s
Working mode	Full duplex mode
Supported MTU	13000 bytes
Compliant standard	IEEE 802.3ae
Supported frame format	Ethernet-II, Ethernet-SAP, and Ethernet-SNAP
Supported network protocol	IP

6.1.3 Ethernet interface

Table 6-3 lists parameters of 100/1000Base-T RJ 45 electrical interface.

Table 6-3 Parameters of 100/1000Base-T RJ 45 electrical interface

Parameter	Description
Connector	RJ45
Interface speed	100/1000 Mbit/s, auto-negotiation
Working mode	• Support 100 Mbit/s full duplex or half duplex, auto-negotiation. • Support 1000 Mbit/s full duplex, auto-negotiation.
Cable connection	Support AUTO MDI/MDI-X.
Cable specifications	8-core cable. We recommend using Cat-5e STP cable.
Compliant standard	IEEE 802.3
Supported frame format	Ethernet-II, Ethernet-SAP, and Ethernet-SNAP
Supported network protocol	IP

6.1.4 E1 interface

E1 balanced interface

Table 6-4 lists the E1 balanced interface.

Table 6-4 E1 balanced interface

Property	Description
Connector type	RJ45
Impedance	120 Ω balanced interface
Rate	2.048 Mbit/s
Coding type	HDB3
Supported frame format	Unframed, framed, framed with CRC-4, multiframe, multiframe with CRC-4
Clock	Comply with the ITU-TG.823 recommendations.
Jitter	Comply with the ITU-TG.823 recommendations.
Frame structure	Comply with the ITU-TG.703/ITU-TG.704 recommendations.
Electrical feature	Comply with the ITU-TG.703 recommendations. Support short distance.
Transfer feature	Comply with the ITU-TG.823 recommendations.

6.1.5 Clock interface

1PPS+TOD (I/O) interface

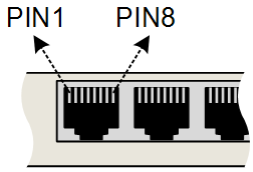
Table 6-5 lists the interface property of the 1PPS+TOD (I/O) interface.

Table 6-5 Interface property of 1PPS+TOD (I/O) interface

Property	Description
Connector type	RJ45
Electrical feature	RS-422 or RS-232
Baud rate	9600 baud
Cable specification	8-core shielded cable

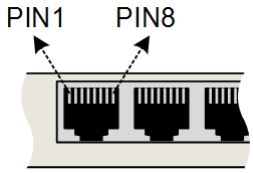
1PPS+TOD (I/O) Port 1 is RJ45 type. Table 6-7 lists the wiring.

Table 6-6 1PPS+TOD (I/O) Port 1 wiring

PIN	Signal definition	Description
1	Dangling	PIN number is as below. 
2	Dangling	
3	P1_1PPS-	
4	GND	
5	GND	
6	P1_1PPS+	
7	P1_TOD-	
8	P1_TOD+	

1PPS+TOD (I/O) Port 2 is RJ45 type. Table 6-7 lists the wiring.

Table 6-7 1PPS+TOD (I/O) Port 2 wiring

PIN	Signal definition	Description
1	P3_TOD_TXD (232 level)	PIN number is as below. 
2	P3_TOD_RXD (232 level)	
3	P2_1PPS-	
4	GND	
5	GND	
6	P2_1PPS+	
7	P2_TOD-	
8	P2_TOD+	

1PPS (I/O) interface

Table 6-8 shows the 1PPS (I/O) interface property.

Table 6-8 1PPS (I/O) interface property

Property	Description
Connector type	BNC
Impedance	50 Ω
Rate	1 Hz
Electrical feature	TTL level

Property	Description
Cable specification	50 Ω coxial cable

GPS interface

Table 6-9 lists the GPS interface property.

Table 6-9 GPS interface property

Property	Description
Connector type	SMA
Connector model	Not equipped
Interface rate	1575 MHZ

6.1.6 Console interface

USB interface

Table 6-10 lists parameters of the Console interface.

Table 6-10 Parameters of Console interface

Parameter	Description
Connector	USB
Working mode	Duplex UART
Electrical feature	USB
Baud rate	9600 baud
Cable specification	4-core cable

Note

Before accessing the iTN201-R through the USB interface, install the driver on the PC for converting the USB interface into the UART interface. To download the driver, visit http://www.raisecom.com.cn/support.php and then click USB_Console_Driver.

6.1.7 SNMP interface

Table 6-11 lists parameters of the SNMP interface.

Table 6-11 Parameters of SNMP interface

Parameter	Description
Connector	RJ45
Interface speed	Support 10/100 Mbit/s, auto-negotiation.
Wiring	Support Auto-MDI/MDIX.
Cable specification	8-core cable. We recommend using the Cat 5e STP cable.
Compliant standard	IEEE 802.3

6.2 Optical/Electrical module feature lookup table

6.2.1 1000BASE-X SFP optical module

Table 6-12 lists technical specifications of the 1000BASE-X SFP optical module.

Table 6-12 Technical specifications of 1000BASE-X SFP optical module

Model	Wavelength (nm) (laser type)	Receiver type	Tx optical power (dBm)	Min. overload (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-Gb/M-D-R	850 (VCSEL)	PIN	-10 to -3	-3	9	< -15	0.55
USFP-Gb/S1-D-R	1310 (FP)	PIN	-10 to -3	-3	9	< -21	15
USFP-Gb/S2-D-R	1550 (DFB)	PIN	-3 to 2	-3	9	< -21	40
USFP-Gb/S3-D-R	1550 (DFB)	APD	-3 to 2	-9	9	< -30	80
USFP-Gb/LH1-D-R	1310 (DFB)	PIN	-4 to 0	-3	9	< -21	40
USFP-Gb/ZX-D-R	1550 (DFB)	PIN	-2 to 3	-3	9	< -22	80
USFP-Gb/EX-D-R	1550 (DFB)	APD	0–5	-9	9	< -30	120
USFP-Gb/SS13-D-R	TX1310/RX1550 (FP/DFB)	PIN	-10 to -3	-3	9	< -21	15
USFP-Gb/SS15-D-R	TX1550/RX1310 (FP/DFB)	PIN	-10 to -3	-3	9	< -21	15
USFP-Gb/SS24-D-R	TX1490/RX1550 (DFB)	PIN	-3 to 2	-3	9	< -21	40
USFP-Gb/SS25-D-R	TX1550/RX1490(DFB)	PIN	-3 to 2	-3	9	< -21	40

Model	Wavelength (nm) (laser type)	Receiver type	Tx optical power (dBm)	Min. overload (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-Gb/SS34-D-R	TX1490/RX1550 (DFB)	PIN	-3 to 2	-3	9	< -29	100
USFP-Gb/SS35-D-R	TX1550/RX1490 (DFB)	PIN	-3 to 2	-3	9	< -29	100

6.2.2 100BASE-FX SFP optical module

Table 6-13 lists technical specifications of the 100BASE-FX SFP optical module.

Table 6-13 Technical specifications of 100BASE-FX SFP optical module

Model	Wavelength (nm) (laser type)	Receiver type	Tx optical power (dBm)	Min. overload (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-03/M-D-R	1310 (LED)	PIN	-20 to -10	-14	9	< -29	2
USFP-03/S1-D-R	1310 (FP)	PIN	-15 to -8	-8	9	< -34	15
USFP-03/S2-D-R	1310 (DFB)	PIN	-5 to 0	-8	9	< -34	40
USFP-03/S3-D-R	1550 (DFB)	PIN	-5 to 0	-10	9	< -34	80
USFP-03/SS13-D-R	TX1310/RX1550 (FP/DFB)	PIN	-15 to -8	-8	9	< -28	15
USFP-03/SS15-D-R	TX1550/RX1310 (FP/DFB)	PIN	-15 to -8	-8	9	< -28	15
USFP-03/SS23-D-R	TX1310/RX1550 (FP/DFB)	PIN	-5 to 0	-8	8.2	< -32	40
USFP-03/SS25-D-R	TX1550/RX1310 (FP/DFB)	PIN	-5 to 0	-8	8.2	< -32	40
USFP-03/SS34-D-R	TX1490/RX1550 (FP/DFB)	PIN	-3 to 2	-8	8.2	< -32	80
USFP-03/SS35-D-R	TX1550/RX1490 (FP/DFB)	PIN	-3 to 2	-8	8.2	< -32	80

6.2.3 1000BASE-T SFP electrical module

Table 6-14 lists technical specifications of the 1000BASE-T SFP electrical module.

Table 6-14 Technical specifications of 1000BASE-T SFP electrical module

Model	Speed	Transmission distance	Remark
USFP-GE-R	1.25 Gbit/s	100m	• 1000BASE-T • Auto-negotiation: disabled • SerDes interface
USFP-GE/AN-R	1.25 Gbit/s	100m	• 10/100/1000BASE-T • Auto-negotiation: enabled • SGMII interface

6.2.4 TSFP optical module

Table 6-15 lists technical specifications of the TSFP optical module.

Table 6-15 Technical specifications of TSFP optical module

Model	Wavelength (nm) (laser type)	Receiver type	Tx optical power (dBm)	Min. overload (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Max. Transmission distance (km)
TSFP-03/DS15-3	1550 (FP)	PIN	-10 to -3	-8	8.2	-28	15
TSFP-Gb/DS14-3	1490 (DFB)	PIN	-10 to -3	-3	9	-21	15

6.2.5 XFP optical module

Table 6-16 lists technical specifications of the XFP optical module.

Table 6-16 Technical specifications of XFP optical module

Model	Name	Description	Compliant standard
UXFP-192/M	10 Gbit/s multimode XFP optical module	• Speed: 10 Gbit/s • Wavelength: 850 nm • Fiber: MMF • Transmission distance: 300 m • DDM: supported • RoHS: comply with RoHS.	• 10GBASE-SR/SW • 1200-MX-SN-I

Model	Name	Description	Compliant standard
UXFP-192/S1	10 Gbit/s single-mode S1 XFP optical module	• Speed: 10 Gbit/s • Wavelength: 1310 nm • Fiber: SMF • Transmission distance: 10 km • DDM: supported • RoHS: comply with RoHS.	• I-64.1 • 10GBASE-LR/LW • 1200-SM-LL-L
UXFP-192/S2	10 Gbit/s single-mode S2 XFP optical module	• Speed: 10 Gbit/s • Wavelength: 1550 nm • Fiber: SMF • Transmission distance: 40 km • DDM: supported • RoHS: comply with RoHS.	• S-64.2b • 10GBASE-ER/EW
UXFP-192/S3	10 Gbit/s single-mode S3 XFP optical module	• Speed: 10 Gbit/s • Wavelength: 1550 nm • Fiber: SMF • Transmission distance: 80 km • DDM: supported • RoHS: comply with RoHS.	• P1L1-2D2 • 10GBASE-ZR/ZW

6.3 Terms

A

Auto-negotiation	The Ethernet interface automatically chooses the supported highest rate and duplex mode according to auto-negotiation result.

B

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

E

ETSI 600 standard cabinet	600-mm-wide and 600-mm-deep cabinet, complying with ETSI standards

F

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

G	
Ground cable	Connecting the device to the ground, usually a yellow/green coaxial cable
I	
IEEE	American Institution of Electrical and Electronic Engineers
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
L	
Laser safety level	Laser products are divided into 4 levels by safety level to the user. Level 1 laser is the safest and its power is within 1 mW; under normal conditions, it does not result in harmful radiation or fire.
M	
Multimode Fiber (MMF)	In this fiber, multi-mode optical signals are transmitted.
R	
RS232	In synchronization transfer mode, no handshaking signals, able to communicate with RS232 or RS422 devices point to point, in transparent transmission, with a maximum rate of 19.2 Kbit/s
S	
Single-mode Fiber (SMF)	In this fiber, single-mode optical signals are transmitted.
U	
1U	Unit of dimension, short for unit. It takes 44.45 mm as basic unit; namely 1 U = 44.45 mm

6.4 Acronyms and abbreviations

A	
ACL	Access Control List
APD	Avalanche Photo Diode

AWG	American wire gauge
B	
BPDU	Bridge Protocol Data Unit
C	
CFM	Connectivity Fault Management
E	
ESD	ElectroStatic Discharge
ETSI	European Telecommunications Standards Institute
L	
LOS	Loss of Signal
M	
MAC	Medium Access Control
MDI	Medium Dependent Interface
MDI-X	Medium Dependent Interface cross-over
O	
ODF	Optical Distribution Frame
OAM	Operation Administration and Maintenance
Q	
QoS	Quality of Service
R	
RH	Relative Humidity
S	
SLA	Service-Level Agreement

T

TOD	Time of Day
TSFP	Two-channel compact Small Form-factor Pluggable converter

U

UART	Universal Asynchronous Receiver/Transmitter

V

VLAN	Virtual Local Area Network

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