TJ1400-7 eNodeB

Hardware Description Guide

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Revision history

Version	Document ID and issue date	Updates
2.0	142-DOC000XXX-E 30-Oct-2023	Added: • Enhanced eNodeB features • eNodeB connectivity • Slot allotment • FTU20 GNSS • WPS • CEF12T • CEF12
1.0	142-DOC000234-E 30-Jun-2023	Standard release

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1 Document overview

This document provides information on eNodeB hardware configuration, limitations, and the physical characteristics of TJ1400-7 eNodeB Baseband Unit (BBU) and RRH.

1.1 Target audience

This guide is intended for network planners and system administrators to understand the hardware features of the Tejas eNodeB product.

1.2 Additional resources

Document name and version	Description
TJ1400-7 eNodeB Feature Description Guide v2.0	This document describes the functions, features, capabilities, and specification of the product.
TJ1400-7 eNodeB Installation and Commissioning Guide v2.0	This document details the procedures involved in installing the product and configure it up initially, until the point where its appropriate operation within the network is confirmed.
TJ1400-7 eNodeB Alarm Clearing Procedure Guide v2.0	This document provides the list of alarms, causes, and the procedure to clear the alarm.

1.3 Chapter organization

This document is organized as follows:

Chapter	Scope
Introduction	This chapter covers TJ1400-7 eNodeB BBU product overview and its key features.
TJ1400-7 eNodeB BBU	This chapter details the TJ1400-7 eNodeB BBU specifications and slot allotment.
FTU20 GNSS	This chapter details Fan Tray Unit (FTU) and OAM interfaces supported on TJ1400-7 eNodeB BBU.
WPS	This chapter details Power Supply Unit (PSU) and its specifications supported on TJ1400-7 eNodeB BBU.
CEF12T	This chapter details the functions and interfaces of CEF12T card supported on TJ1400-7 eNodeB BBU.
CEF12	This chapter details the functions and interfaces of CEF12T card supported on TJ1400-7 eNodeB BBU.

RAC card	This chapter details the functions and interfaces of RAC card supported on TJ1400-7 eNodeB BBU.
Chapter	**Scope**
RRH	This chapter details the functions and interfaces of RRH supported on TJ1400-7 eNodeB BBU.
Optical interface specifications	This appendix details the optical interface specifications supported on the cards in TJ1400-7 eNodeB BBU.
Regulatory standard compliance	This lists the regulatory standard compliances supported on TJ1400-7 eNodeB BBU.

2 Introduction

The TJ1400-7 eNodeB enables LTE network on a highly scalable future proof and multi-technology platform. TJ1400-7 eNodeB baseband is offered on the TJ1400-7 platform. TJ1400-7 eNodeB is the radio base station for the 4th Generation Long Term Evolution (4G-LTE) network which provides the wireless access to subscriber terminals or UE. It enables high speed data access, aggregate of 100 Mbps or more per sector and very low latencies of the order of a few tens of milliseconds, providing a DSL-like user experience over a wireless network.

2.1 Key features

- **Effective upgradation and scalability**: Cell sites with fiber backhaul can seamlessly integrate transport and LTE access with the added benefit of unified OAM, space, and power savings. eNodeB baseband scales from three sector deployment up to fifteen sectors (five 3-sector eNodeB) on the same TJ1400-7 platform.
- **Flexible**: The RAC card can act as a coordinated 3-sector eNodeB or as three independently deployed single sector eNodeB with configuration flexibility in the Multiple Input Multiple Output (MIMO) order carrier bandwidth and carrier.
- **Customized access scheduling**: Multiple Radio Access and Controller (RAC) cards are populated in a single eNodeB with each RAC card acting either as Frequency Duplex Division (FDD) eNodeB BBU or Time Duplex Division (TDD) eNodeB BBU with full flexibility in configuration of the band of operation.
- **Backhaul optimization**: Optical backhaul is integrated in order to maximize end-to-end LTE performance.
- **Upgrade options**: TJ1400-7 eNodeB platform offers future upgrades with only addition of appropriate cards in the chassis (and adding new radios as required), enabling a quick and easy upgrade to new technologies. Upgrades to new

technologies is done without disturbing existing operation, allowing a seamless transition, and scalability of service.

2.2 Enhanced eNodeB features

- The TJ1400-7 BBU has an integrted GPS receiver in the FTU20 GNSS module. The FTU20 GNSS decides the synchronization signals (1PPS and 10PPS) and sends to the CEF12T.
- The CEF12T distributes the GPS synchronized clock to all the RAC cards in the BBU.
- RAC card synchronization is from the CEF12T backplane as it do not have individual GPS inputs and the synchronization happens through CEF12T from backplane.

2.3 eNodeB connectivity

An eNodeB is composed of one BBU, and up to three RRHs that are connected.

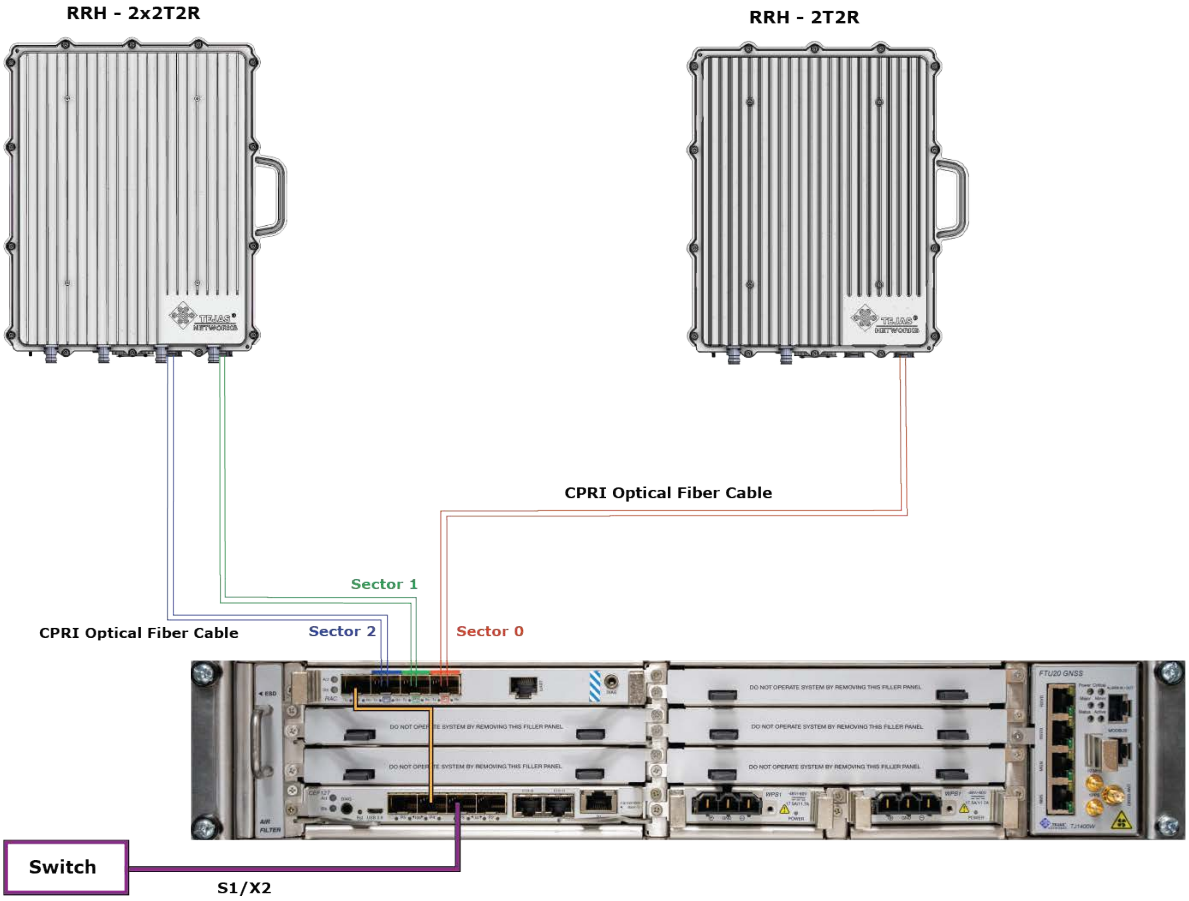
The following are the different configurations between RAC and RRH.

- **Split mode RRH configuration:**

  The backhaul connection for CEF card is through a switch and a port from CEF card is connected to port 4 of RAC card. In the split mode configuration of RRH, sector 0 is connected to 2T2R RRH and sector 1 and 2 are connected to single band of 2x2T2R split mode configuration RRH.

Note: Either band 3, band 5, or band 28 RRH is used with RAC card.

Figure 1: Split mode RRH configuration

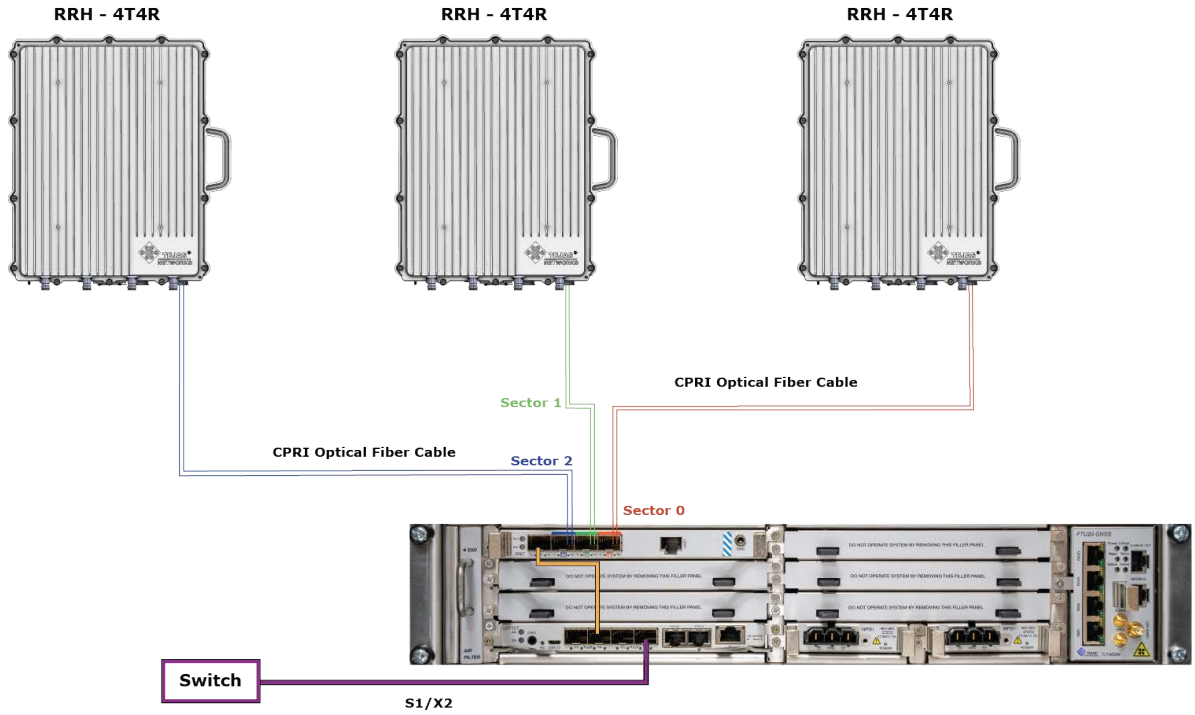


- **Single mode RRH configuration**

The backhaul connection for CEF card is through a switch and a port from CEF card is connected to port 4 of RAC card. In this configuration, sectors 0, 1, and 2 are connected to a different 4T4R RRH.

Note: Band 41 is used with RAC card.

Figure 2: Single mode RRH configuration



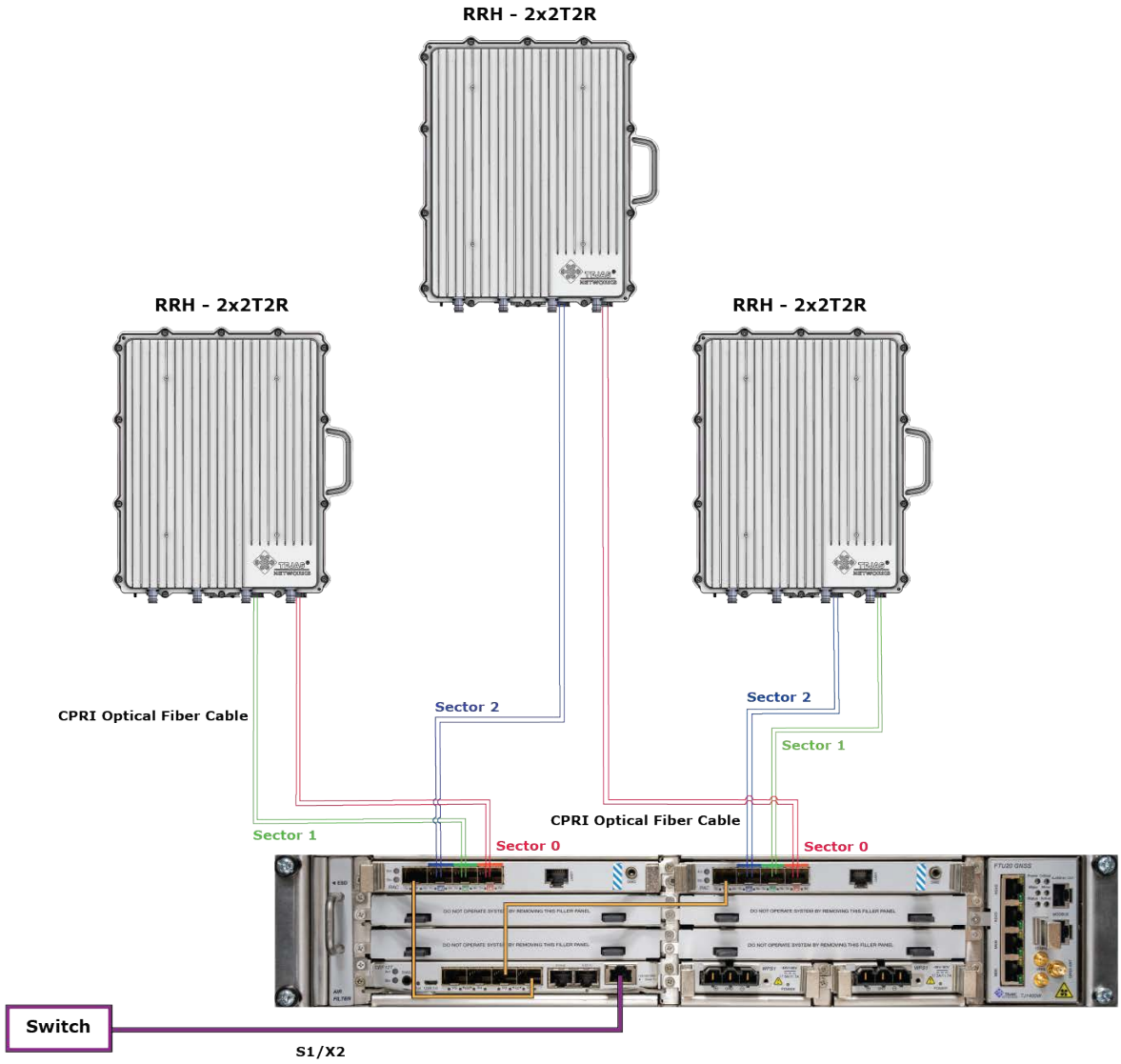
- **Split mode and single mode RRH configuration**

  In this configuration:

  * Sector 0 and 1 of RAC card with band 1 are connected to split mode RRH configuration
  * Sector 1 and 2 of RAC card with band 28 are connected to split mode RRH configuration
  * Sector 2 from RAC card with band 1 and sector 0 from RAC card with band 28 are connected to dual band 2T2R RRH

Note: Band 1 and band 28 are used for dual band with RAC card.

Figure 3: Split mode and single mode RRH configuration



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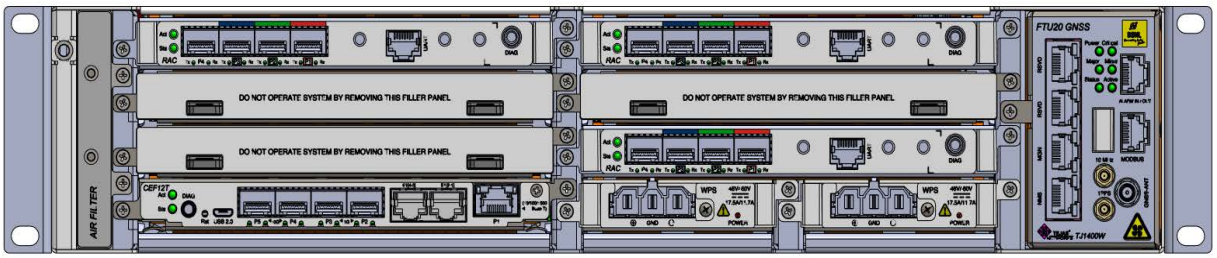
3 TJ1400-7 eNodeB BBU

This chapter gives an overview of the TJ1400-7 eNodeB BBU. It also details the physical dimensions, slot allotment, an overview of the common cards namely, RAC card, controller card, Power Supply Unit (PSU), and OAM card used in TJ1400-7 eNodeB BBU chassis.

TJ1400-7 eNodeB BBU is a 2RU chassis with 19” sub-rack width. It supports 3 tributary card slots, 1 slot to support switch fabric and control redundancy, 2 power supply slots to support power supply redundancy, and 1 Fan Tray Unit (FTU) slot.

Figure 4: TJ1400-7 eNodeB BBU – front panel



3.1 System specification

The following are the eNodeB BBU specifications:

Table 1: TJ1400-7 eNodeB BBU specifications

Type	Parameter		Value
Installation rack	Rack width		19” (inch)
	Rack height		2 Rack Unit (RU)
	Air flow direction in the chassis		Left to right
MTBF	Chassis and backplane		147.3 years
Mechanical specifications	Height		88.5mm
	Width	With mount angles	482.6mm
		Without mount angles	444mm
	Depth	Excluding air filter latch handle	237mm
	Weight	Chassis with mount angles, backplane, and air filter unit	5.5kg
Electrical specifications	Power consumption		600W maximum (with DPU23)
	Input voltage range		-40V DC to -72V DC (with DPU23)

Table 1: TJ1400-7 eNodeB BBU specifications

Type	Parameter	Value
Environmental specifications	Operating temperature range	0 °C to 50 °C (Normal operation) -5 °C to 55 °C (Short-term operation)
	Relative humidity	5% to 95% RH
Scalability	Number of sectors added per sector per RAC card	3 sectors per RAC card (one RRH per sector). 9 sectors for 3 RAC cards per TJ1400-7 BBU chassis.

Note: A temperature from -5°C to 55°C is permissible for short term operation and should not exceed the following:

- Duration: 96 continuous hours.

- Days: 15 days in one year.

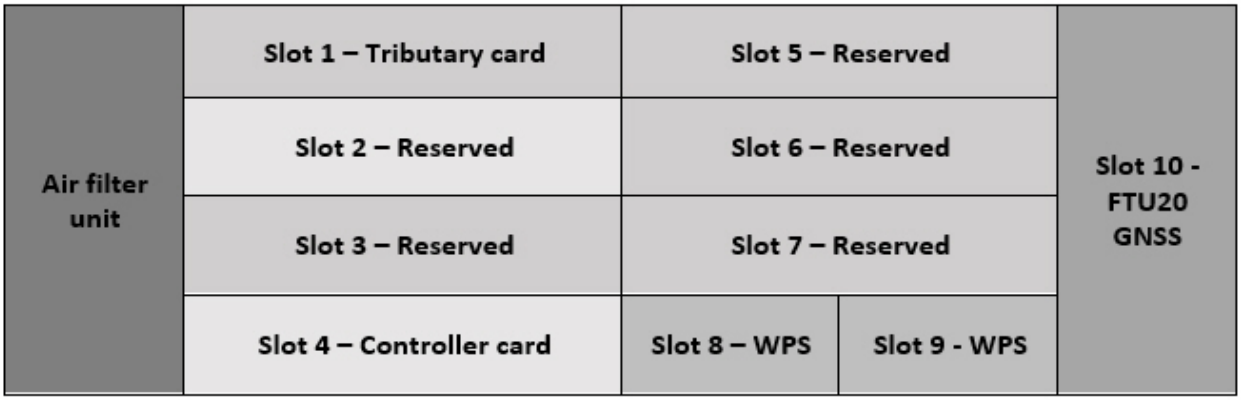
- Occurrences: 15 times during a one year period.

3.2 Slot allotment

The CEF and RAC card are populated on BBU depending upon the FDD and TDD sector used.

When a single RAC card and CEF card are populated on BBU as 3-sector FDD, the recommended slot allotment is shown in the figure TJ1400-7 eNodeB BBU slot allotment for 3-sector FDD.

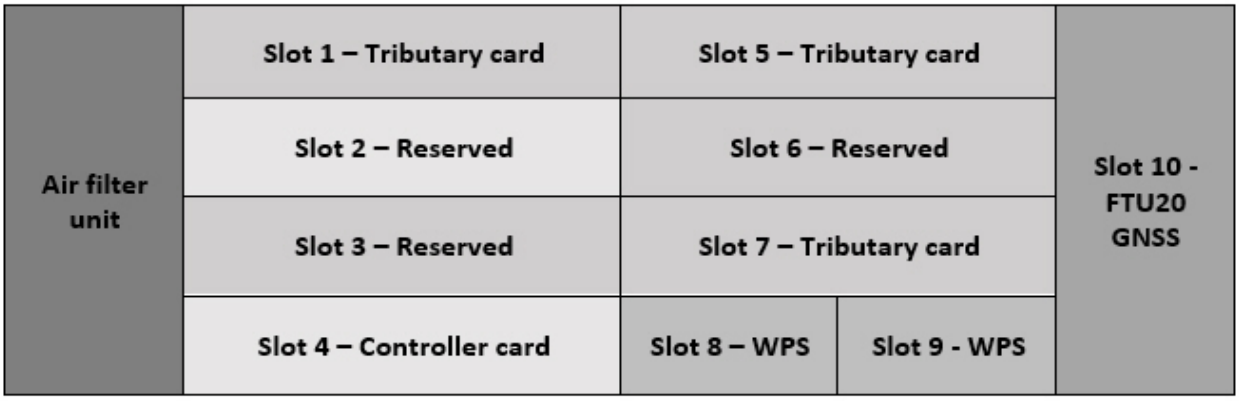
Figure 1: TJ1400-7 eNodeB BBU slot allotment for 3-sector FDD



- Slots 1: RAC card
- Slot 2, 3, 5, 6, and 7: Reserved
- Slots 4: CEF
- Slots 8 and 9: WPS
- Slot 10: FTU20 GNSS

If three RAC cards and single CEF card are populated on BBU as 3-sector FDD, the recommended slot allotment is shown in the figure TJ1400-7 eNodeB BBU slot allotment for 3-sector FDD.

Figure 2: TJ1400-7 eNodeB BBU slot allotment for 3-sector FDD



- Slots 1, 5, and 7: RAC card
- Slot 4: CEF
- Slots 2, 3, and 6: Reserved

- Slots 8 and 9: WPS
- Slot 10: FTU20 GNSS

Note: It is recommended to use slot-4 for controller card in the deployment scenarios.

Note: Bands 1,3,5,28, and 41 are used along with the RAC cards.

4 FTU20 GNSS

The FTU20 GNSS is used in the TJ1400-7 eNodeB BBU chassis to cool the equipment.

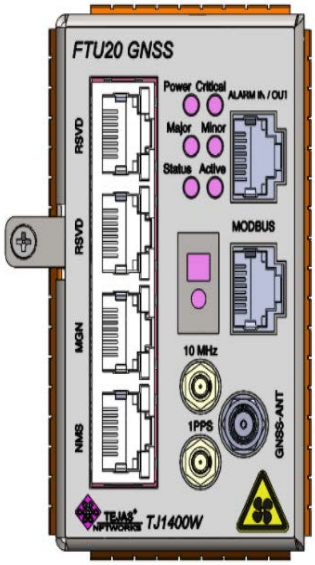
The following are the features of FTU20 GNSS:

- The FTU20 GNSS supports six fans.
- Fuse on each fan power supply to isolate any failed fan from other fans.
- Fan speed monitoring and control through software, based on the temperature sensed.
- Temperature monitoring on the airflow path.

Front panel

The FTU also consists of OAM interfaces. Refer OAM interfaces for more details.

Figure 5: FTU20 GNSS – Front panel



Card specifications:

The following are the FTU20 GNNSS card specifications:

Table 2: FTU20 GNSS – Card specifications

Specification	Range
MTBF	44.77 years
Input voltage	12V
Power consumption	75W maximum

Visual indication details

Power LED indicates the status of the power supply to the FTU20 GNSS.

The following visual indicators on the OAM includes Active, Status, and Alarm LEDs.

Table 3: Visual LED indicators

LED	Color	Significance
Power	Green	The power received is within the range.
	Red	Faulty condition or the power received is out of range.
	Off	No input power.

Table 4: FTU20 GNSS – Status and active LED indications

Card State	Status LED	Active LED
Card initialization: State before the card initialize is complete on card insertion.	Amber (Steady)	Amber (Steady)
Card in service: Initialization complete and card in service.	Green (Steady)	Green (Steady)
Card mismatch: Node has already configured the slot with some other card.	Amber	Amber
Card failed during boot up.	Red	Amber
Card failed while in-service.	Red	Green
Hard Reset: All devices reset, FPGAs cleared and reprogrammed. Node goes to initializing state next.	Amber	Amber

There are three alarm visual indications:

- Critical alarm
- Major alarm
- Minor alarm

FTU20 GNSS – Alarm LED indications

LED	Color	LED Status
Critical	Red	Critical alarm detected by the node.
	Off	Default state, no critical alarm detected.
Major	Red	Major alarm detected by the node.
	Off	Default State, no major alarm detected.

FTU20 GNSS – Alarm LED indications

LED	Color	LED Status
Minor	Amber	Minor alarm detected by the node.
	Off	Default State, no minor alarm detected.

4.1 OAM interfaces

The OAM interfaces are included with the FTU20 GNSS in the TJ1400-7 eNodeB BBU.

Functional description

The OAM provides static user interfaces for configuration and visual indications. The features of OAM are:

- Provides NMS, MGN, Alarm-In/Out, 1PPS, 10MHz, and MODBUS interfaces
- Alarm LEDs (critical, major, and minor)
- Power, Active and Status LEDs
- User configurable alarm inputs (eight environmental alarms)
- GNSS-ANT (Antenna is connected
- Alarm outputs for critical, major, and minor

External alarms interface

The OAM provides one external alarm input and one Potential Free Contact (PFC) external alarm outputs. It also supports eight alarm-in over RS485 based MODBUS interface.

- **Physical Alarm-in:** The alarm inputs connect external triggers for events (when ODC fails) to the OAM. When an event occurs, which activates the trigger connected to the external alarm input, the node raises an ODC alarm. The Alarm-in interface is through a RJ-45 connector.
- **Physical Alarm-out:** The alarm output can be used to trigger the operation of external equipment, such as generator, fan or audible alarm. The alarm outputs are caused by alarms detected by the NE. The **Alarm-Out** interface is through a RJ45 connector.

There are three LEDs on the faceplate of OAM for alarm out is displayed:

* Critical alarm
* Major alarm
* Minor alarm

The contact ratings for the alarm out interface are:

- Max 1A at 30V DC

- Max 0.7A at 60V DC

8 Alarm-In interface through ODC

8 alarm-in are supported in Outdoor Cabinet (ODC). ODC have all these alarms connected to FTU20GNSS over RS485 interface which runs MODBUS protocol. Severity, alarm text, and the SNMP trap ID are edited through the EMS. These alarm inputs are enabled or disabled through EMS.

GNSS Interface

The GNSS interface supports L1 and L5 bands. The GNSS constellations GPS plus NavIC satellites are received simultaneously. The GNSS ANT connects at 50ohm SMA connector, which has ESD/Surge protection on front panel.

MGN interface

The MGN interface helps to connect the node to a PC terminal with an Ethernet cable of RJ-45 connector type. It supports Dynamic Host Configuration Protocol (DHCP), a network protocol that enables a server to automatically assign an IP address to a PC/ Laptop from a defined range of numbers configured for a given network.

NMS interface

The NMS Interface provides a CSMA/CD based LAN transceiver of an Ethernet link. This is available through RJ-45 connector.

The NMS interface is associated with two LEDs: Green and Amber.

Table 5: NMS interface – LED indications

Card Status	NMS LED (Green)	NMS LED (Amber)
Link speed 10 Mbps	--	--
Link speed 100 Mbps	--	On
NMS port up	On	--
Receiver Activity	Blink on packet received	--

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5 WPS

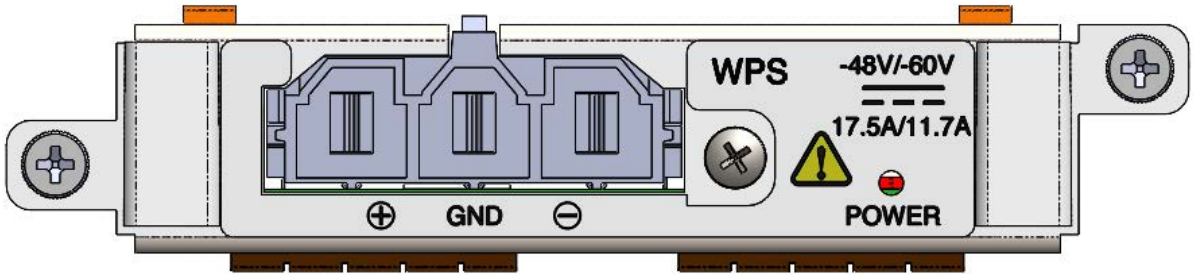
The Wireless Power Supply (WPS) in TJ1400-7 eNodeB BBU supports load sharing on redundancy basis, if one PSU fails then the other PSU is the active load driver and provides a stable DC power to other cards in the system. The input is fed through a connector provided on the PSU front panel.

The WPS consists of a single output DC-DC converter, hot-swap controller, and buck converters as required. DC power supply unit supplies a stable power to other cards/ units present in the TJ1400-7 eNodeB BBU chassis.

5.1 Front panel

The front panel of the WPS provides a power connector and a local safety ground connection.

Figure 6: WPS - Front panel



5.2 Visual indicator details

The LED visual indicators on the WPS displays the WPS status based on the color code mentioned in the following table.

Table 6: WPS - LED indications

LED	Color	Remarks
With redundant power supply in the system		
Power	Red	• Output voltage is out of range. • Red blinks, if card goes for over current protection.
	Green	• Card is working fine. • Green blinks when the card goes down due to input voltage protection.
	Red and green	Red and green blinks alternatively if card goes for over temperature protection.
Without redundant power supply in the system		

Table 6: WPS - LED indications

LED	Color	Remarks
Power	Red	• Output voltage is out of range. • LED is off in over current protection.
	Green	• Card is working fine. • Green blinks when the card goes down due to input voltage protection.
	Blank	If input is not present.
	Red and Green	LED is off in over temperature protection.

5.3 Operational specifications

The following table describes the operational specifications of WPS:

Table 7: WPS - Operational specifications

Specification	Range
MTBF	143.72 years
Input voltage range	-40V to -72V DC
Reverse polarity protection	Continuous
Input current	17.5A continuous at -40V input voltage
Operating temperature range	• -40°C to 40°C full power • Up to 65°C with derating
Output voltage	12.45V nominal
Output power	600W at -40°C to 40°C and 500W at -40°C to 65°C
Ripple	$120mV_{p-p}$
Dynamic response	$500mV_{p-p}$ (50% to 100% Load step)
Efficiency	≥80% at >50% Load when input is -48V
Fuse	25A Fast acting fuse
Under voltage protection	• **Recovery:** -38V ± 2V • **Shutdown:** Recovery – 4V
Over voltage protection	• **Recovery:** -74V ± 2V • **Shutdown:** Recovery + 2V

Table 7: WPS - Operational specifications

Specification	Range
EMI/EMC, Safety, and Environment Compliance	• EN55022 Class A • EN 55032 Class A • IEC61000-4-2 (6.0kV contact discharge and 8.0kV Air Discharge) • IEC61000-4-3 (80-690MHz, level 2 (3V/m), 690-6Hz, level 3(10V/m) • IEC61000-4-4 (±1000V) • IEC 61000-4-5 (DM ±500V) • IEC61000-4-6, level 2(3V) (0.15MHz • – 80MHz) • IEC 62368-1 / EN 62368-1 • IEC 60950-1 /EN 60950-1 • UL 62368-1 • UL 60950-1 • In-rush Current limiting as per ETSI EN 300 132-2 • ETSI EN 300 019 Part 1-1 • QM333
Hold-up time (Interruption)	> 0.5ms at -54V
Power interface	**Input:** One number of 3-pin, 50A Mini-FIT series connector Output: • Card edge connector (TE connectivity) • Female FCI connector- two numbers
Protections	• Surge • Inrush current limit • Over-temperature (Auto-recovery) • Output Short-Circuit (Retry Mode) • Output Over-Current (125% Retry Mode) • Output Over-Voltage (13.6± 0.6V Latched Mode) • Input Reverse Polarity protection • Input Under-voltage (Retry Mode) • Input Over voltage (Retry Mode)

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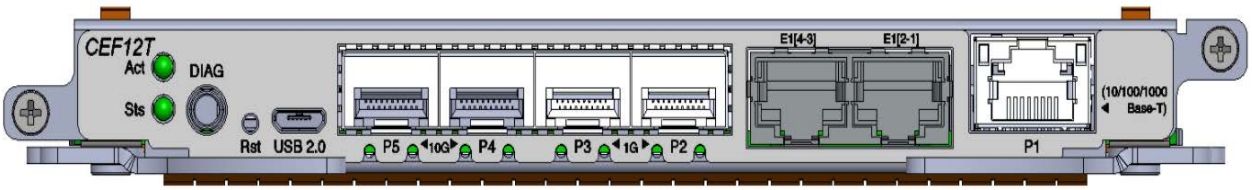
6 CEF12T

CEF12T is an integrated transport and controller card in TJ1400-7 eNodeB baseband unit. It supports 2X10GE optical ports with SFP+, 2X1GE optical ports with SFP, 10/100/1000 Base-T, and E1(1-2)and E1(3-4) interfaces. P1 supports 1G electrical interface, P2 and P3 supports 1G optical interfaces, and P4 and P5 supports 10GE optical ports. The CEF12T card has uplink capacity of 23Gbps.

6.1 Front panel

The following figure shows the front panel of the CEF12T card:

Figure 7: CEF12T - Front panel



Note: The **Reset** button and the **DIAG** (diagnostic) interface are meant for use by authorized Tejas Networks personnel only.

6.2 Card specifications

The CEF12T card specifications are shown in the following table:

Table 8: CEF12T - Card specifications

Specifications	Value
MTBF	20 years
Input voltage	12V nominal
Power consumption	45W (maximum)

6.3 Visual indicator details

The visual indicators on the CEF12T card include card level LEDs and port level LEDs. The CEF12T has **Sts** (Status) LED to indicate the status of the card and **Act** (Active) LED to indicate whether the card has become active.

Table 9: CEF12T - Status and Active LEDs indications

Card state	Status LED	Active LED
Card initialization: State before the card initialize is complete on card insertion.	Amber (Steady)	Amber (Steady)
Card in service: Initialization complete and card in service.	Green (Steady)	Green (Steady)
Card mismatch: Node has already configured the slot with some other card.	Amber	Amber
Card failed during boot up.	Red	Amber
Card failed while in-service.	Red	Green
Hard Reset: All devices reset, FPGAs cleared and reprogrammed. Goes to initializing state next.	Amber	Amber
Redundant card: Secondary CEF812T card after initialization.	Green (Steady)	Off

The LED for the optical interface indicates the admin status of the port. Each port has two single color LEDs, red, and green.

Table 10: CEF12T- SFP+ port LED indications

State	Green LED	Red LED
Module absent	Off	Off
Module present + LOS + with or without Tx enable	Off	On
Module present + no LOS + Tx disabled	Off	Blinks at ½Hz (0.5Hz)
Module present + no LOS + Tx enabled	On	Off

7 CEF12

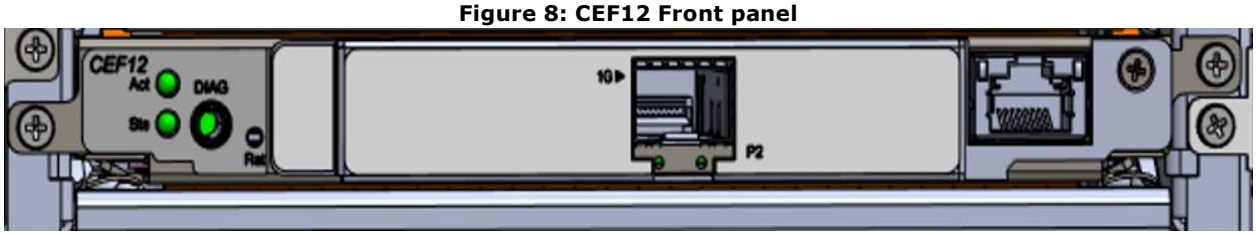
CEF12 is a Controller card in TJ1400-7 eNodeB BBU that supports 1X1GE optical port with SFP and10/100/1000 Base-T electrical interfaces. P1 supports 1G electrical interface and P2 supports 1G optical port.

The CEF12 card has uplink capacity of 2.5Gbps.

7.1 Front panel

The following figure shows the front panel of the CEF12 card.

Figure 8: CEF12 Front panel



Note: The Rst (reset) and DIAG (diagnostic) interface are meant for use by authorized Tejas Networks Personnel only.

7.2 Card specifications:

The CEF12 card specifications are shown in the following table:

Table 11: CEF12 specifications

Specifications	Value
MTBF	21 years
Input voltage	12V nominal
Power consumption	42W maximum

7.3 Visual indicator details:

The visual indicators on the CEF12card include card-level LEDs and port-level LEDs.

CEF12 has Sts (Status) LED to indicate the status of the card and Act (Active) LED to indicate whether the card has become active.

Table 12: CEF12 - Status and Active LEDs indications

Card state	Status LED	Active LED
Card initialization: State before the card initialize is complete on card insertion.	Amber (steady)	Amber (steady)
Card in service: Initialization complete and card in service.	Green (steady)	Green (steady)
Card mismatch: Node has already configured the slot with some other card.	Amber	Amber
Card failed during boot up.	Red	Amber
Card failed while in-service.	Red	Green
Hard Reset: All devices reset, FPGAs cleared and reprogrammed. Goes to initializing state next.	Amber	Amber
Redundant card: Secondary CEF12 card after initialization.	Green (steady)	Off

The LED for the optical interface indicates the admin status of the port. Each port has two single color LEDs, red and green.

Table 13: CEF12T- SFP+ port LED indications

State	Green LED	Red LED
Module absent	Off	Off
Module present + LOS + with or without Tx enable	Off	On
Module present + no LOS + Tx disabled	Off	Blinks at 0.5Hz
Module present + no LOS + Tx enabled	On	Off

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8 RAC card

The Radio Access Controller (RAC) card implements the eNodeB baseband function. Each RAC card acts as a 3 sector eNodeB when each of the sector is connected over a CPRI optical interface to Remote Radio Head (RRH).

The RAC card is capable of interfacing with both TDD and FDD RRHs.

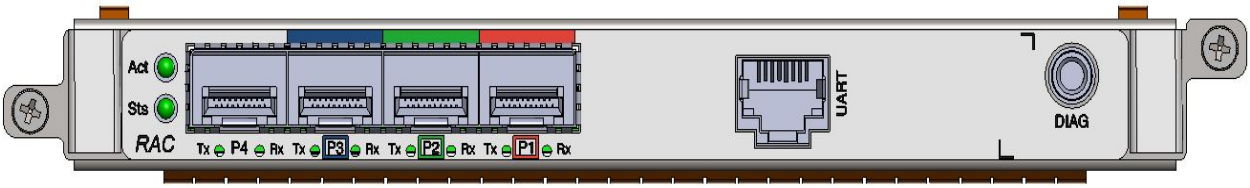
The RAC card has the following interfaces:

- Three CPRI interface ports (P1 to P3) to connect to RRH; line rate of 4.9Gbps with 10Gbps optical SFP.
- 1GE backhaul connectivity is optional. The default mode of backhaul connectivity is through CEF12T backplane.
- One Universal Asynchronous Receiver/Transmitter interface for timing synchronization.

8.1 Front panel

The following figure shows the front panel of the RAC card:

Figure 9: RAC - Front panel



Note: The **DIAG** interface is only for usage by personnel of Tejas Networks who has authorization.

Table 14: RAC - Card specifications

Specifications	Value
MTBF	33.05 years
Input voltage	12V nominal
Power consumption	• 80W (typical) • 100W (maximum)

Table 15: RAC - Status and active LEDs indications

Card state	Sts LED	Act LED
Activity		
Commissioned	Amber (blinking)	Amber (steady)
One or more sectors active and other sectors in CONFIG state	Amber (blinking)	Green (blinking)
Partial operation	Green (blinking)	Green (steady)
All sectors operational	Green (steady)	Green (steady)
Upgrade in progress	Amber (blinking)	Amber (blinking)
Faults		
Clock sync not happened/lost	Red (blinking)	Not applicable
CPRI link down (one or many)	Amber (blinking)	Not applicable
One or more sectors failed and other sectors are active	Red/Green (blinking)	Not applicable
One or more sectors failed and other sectors in CONFIG state	Amber (blinking)	Red/Green (blinking)
All sectors failed	Red (steady)	Off
Slack mode	Red	Red

Table 16: RAC - CPRI port LED indications

State	Tx	Rx
System UP but no link detected (SFP or cable not connected/faulty)	Green	Amber
System UP and link UP	Green	Green
System Down or not UP (typically during initial boot-up)	Off	Off

9 RRH

Tejas LTE Remote Radio Head (RRH) is a durable outdoor unit mounted on the top of the tower or rooftop, which together with the RAC card on the TJ1400-7 chassis and is connected to base station through fiber cables, act as eNodeB.

The RRH connects to the RAC over a CPRI interface on 1310 nm single mode fiber and performs the Radio Frequencyn (RF) up/down conversion of the LTE sector. The RAC card controls the RRH.

The RRH provides a standard 4.3-10 type connector to which an external antenna is connected for deployment. The antenna can be selected based on the type of coverage required. Antenna beam widths typically range from 65 to 90 degrees.

Three RRHs connected to the RAC card together constitute the three sector eNodeB.

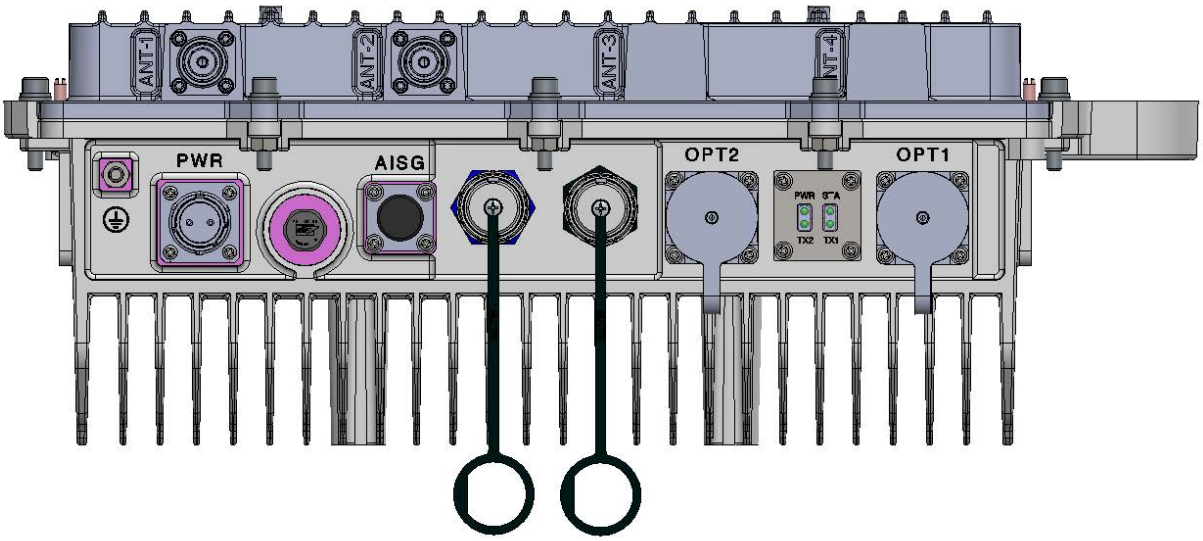
9.1 Types of RRH

The RRH is designed to support multiple antennas for transmitting and receiving data simultaneously, improving network capacity and performance. These are radio transceivers that use MIMO technology to improve the performance of network.

9.1.1 2T2R RRH

A 2T2R RRH has two antennas, one for transmitting data and another for receiving data.

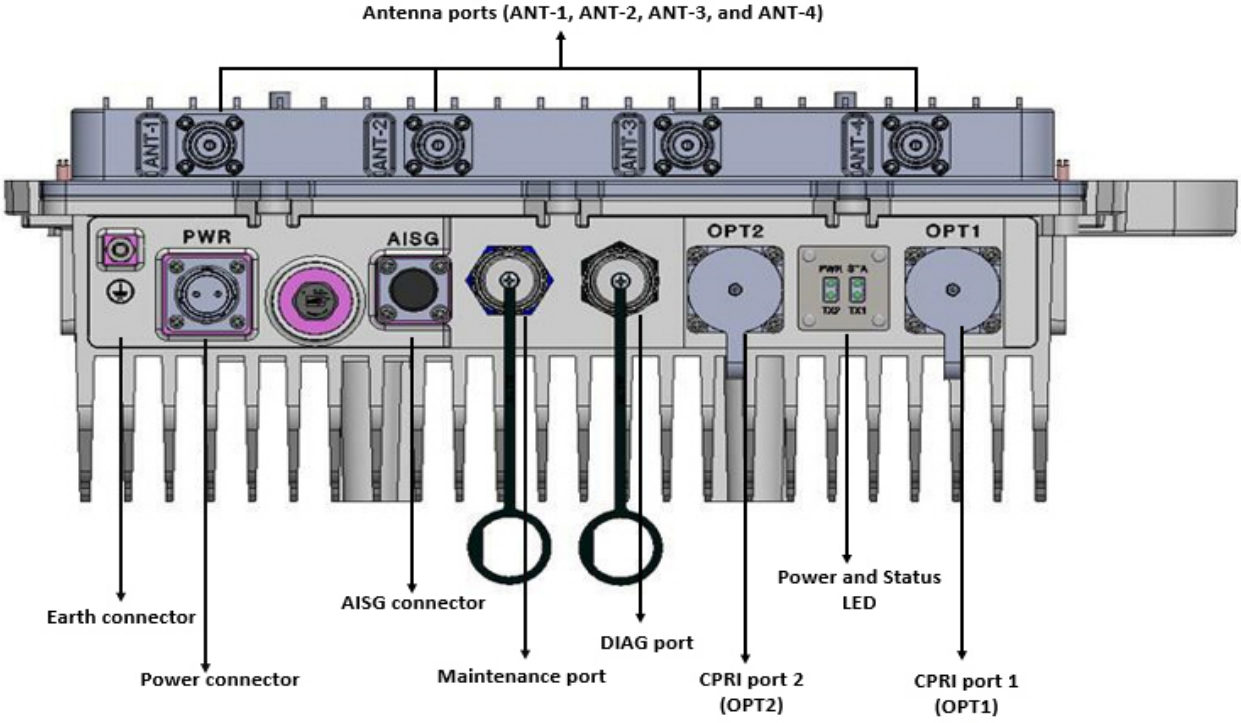
Figure 10: 2T2R RRH bottom view



9.1.2 4T4R RRH

A 4T4R RRH has four antennas for transmission and reception, allowing it to transmit and receive four data streams.

Figure 11: 4T4R RRH bottom view



9.2 RRH interfaces

Table 17: RRH interfaces

Interfaces	Specification
Power Connector	Use the power connector at the RRH end. Proceed with the connection only in the field.
CPRI Port 1 (OPT1) (primary)	Use the RFE2.0 connector at the RRH end (CPRI fiber cable). The CPRI cable has pre-connected connector, no need to connect the RFE2.0 connector.
CRPI Port 2 (OPT2) (secondary)	Not used in 2T2R RRH.
	Used only in 4T4R RRH.
AISG Connector	Use the AISG for RET control.

Table 17: RRH interfaces

Interfaces	Specification
Antenna Ports: • 2T2R: ANT1 and ANT2 • 4T4R: Ant1, Ant2, Ant3, and ANT4	• 2T2R: Two ports of RRH (Ant1 and Ant 2 ports) are connected to the two port antenna through RF cable • 4T4R: Four ports of RRH (ANT1, ANT2, ANT3, and ANT4) are connected to the four port antenna through RF cable.
Earth connector	Connection from Frame Ground (FG). The connector is also connected to earth strip.
Status LED panel	Displays status of the RRH.
Maintenance window	Specifies activity of the manufacture.

LED indicators

Table 18: LED indicators

Indication	PWR	STATUS	TX1 / CELL 1	TX2/CELL 2
Normal Indication				
Power on	Red blinking	OFF	OFF	OFF
Uboot Booting	Red blinking	OFF	OFF	OFF
Linux Booting	Red blinking	OFF	OFF	OFF
SW booted, waiting for BBU link	Green solid	Red blinking	OFF	OFF in **work**
				Red Green Blinking in **recovery**
CPRI Link Up	Green solid	Green blinking	OFF	OFF in **work**
				Red Green Blinking in **recovery**
Session Establishment by BBU	Green solid	Green solid	OFF	OFF in **work**
				Red Green Blinking in **recovery**
Tx1 start command received	Green solid	Green solid	Red Blinking	NA in **work**
				Red Green Blinking in **recovery**
Tx1 start ok	Green solid	Green solid	Green Solid	NA in **work**
				Red Green Blinking in **recovery**

Table 18: LED indicators

Indication	PWR	STATUS	TX1 / CELL 1	TX2/CELL 2
Tx1 stop command received from BBU	Green solid	Green Solid	Green Blinking	NA in **work**
				Red Green Blinking in **recovery**
Tx2 start command received	Green solid	Green Solid	NA	Red Blinking in **work**
				Red Green Blinking in **recovery**
Tx2 start ok	Green solid	Green Solid	NA	Green Solid in **work**
				Red Green Blinking in **recovery**
Tx2 stop command received from BBU	Green solid	Green Solid	NA	Green Blinking in **work**
				Red Green Blinking in **recovery**
Error indication or Maintenance				
Tx1 any failure/stopped	Green	Solid Red	Solid Red	NA in **work**
				Red Green Blinking in **recovery**
Tx2 any failure/stopped	Green	Solid Red	Solid Red	Solid Red in **work**
				Red Green Blinking in **recovery**
BBU session closed	Green solid	Green blinking	Red Green Blinking	OFF in **work**
				Red Green Blinking in **recovery**
Cpri Link Down	Green solid	Red blinking	OFF	OFF in **work**
				Red Green Blinking in **recovery**
SW Image Upgrade	Red Green Blinking	Red Green Blinking	OFF	OFF in **work**
				Red Green Blinking in **recovery**
Any Other Alarms	Red Green Blinking	Red Green Blinking	Red Green Blinking	OFF in **work**
				Red Green Blinking in **recovery**

Table 19: RRH specifications

Type	Parameter	Value
Mechanical specifications	Height	537 mm
	Width	465 mm
	Depth	177 mm
	Weight	31 Kg
Electrical specifications	Power consumption	2T2R: 430 W 4T4R: 660 W
	Input voltage	-48 V DC
Environmental specifications	Operating temperature range	-20 to 50 Degree Celsius
	Relative humidity	95%
Scalability	Number of sectors added per sector per RAC card	-

10 Optical interface specifications

This appendix provides the optical interface specifications.

10.1 1G optical interface specifications

Table 20: Specifications for 1 Gigabit (1G)

Specifications	1000BASE-SX	1000BASE-LX	1000BASE-LX10	1000BASE-EX	1000BASE-ZX
Minimum Output Power	-9 dBm	-9.5 dBm	-9 dBm	-5 dBm	-2 dBm
Maximum Output Power	-3 dBm	-3 dBm	-3 dBm	2 dBm	3 dBm
Receiver Sensitivity	-18 dBm	-20 dBm	-19.5 dBm	-23 dBm	-24 dBm
Receiver Overload	0 dBm	0 dBm	-3 dBm	-3 dBm	-3 dBm
Wavelength (nominal)	850 nm	1310 nm	1310 nm	1310 nm	1550 nm
Connector Type	Duplex LC	Duplex LC	Duplex LC	Duplex LC	Duplex LC
Optical pluggable slot-cage-packaging	SFP	SFP	SFP	SFP	SFP
Fiber Type	Multi mode	Single mode	Single mode	Single mode	Single mode

10.2 10G optical interface specifications

Table 21: Specifications for 10 Gigabit (10G)

Specifications	10GBASE-LR	10GBASE-ER	10GBASE-ZR
Minimum Output Power	-8.2 dBm	-4.7 dBm	0 dBm
Maximum Output Power	0.5 dBm	4 dBm	4 dBm
Receiver Sensitivity	-14.4 dBm	-15 dBm	-24 dBm
Receiver Overload	0.5 dBm	-1 dBm	-7 dBm
Wavelength (nominal)	1310 nm	1550 nm	1550 nm
Connector Type	Duplex LC	Duplex LC	Duplex LC
Optical pluggable slot-cage-packaging	SFP+	SFP+	SFP+
Fiber Type	Single mode	Single mode	Single mode

11 Regulatory standard compliance

The list of national and international electromagnetic compatibility, safety, reliability, and RoHS standards in this chapter is not exhaustive. The standards listed are generally regarded as the primary applicable standards. The conformity status on additional national and international standards not listed in this section are provided upon request.

Table 22: Regulatory standards compliance

Specification	Standard
EMI/EMC	• FCC Part-15, Subpart B, Class-A • ICES-003, Class-A • EN 55022 Class-A / CISPR-22 Class-A • EN 55032 Class-A / CISPR-32 Class-A • EN 55024 / CISPR-24 (EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11, EN 61000-4-29) • EN 61000-3-2 and EN 61000-3-3 (applicable to AC power supply products) • EN 301 489-1
Safety	• Certified for CB – scheme • IEC 60950-1 / EN 60950-1 • IEC 62368-1 / EN 62368-1 • UL 62368-1 • UL 60950-1
Laser Safety	• IEC 60825-1 / EN 60825-1 • IEC 60825-2 / EN 60825-2 • 21 Code of Federal Regulations (CFR)1040
Environment	• ETS 300 019-1-1, Class 1.2 storage • ETS 300 019-1-2, Class 2.3 transportation • ETS 300 019-1-3, Class 3.2 Operating stationary use • QM333 – Functional for environmental testing of electronic equipment's for transmission and switching use.
RoHS compliant	• Directive 2011/65/EU • 2015/863/EU