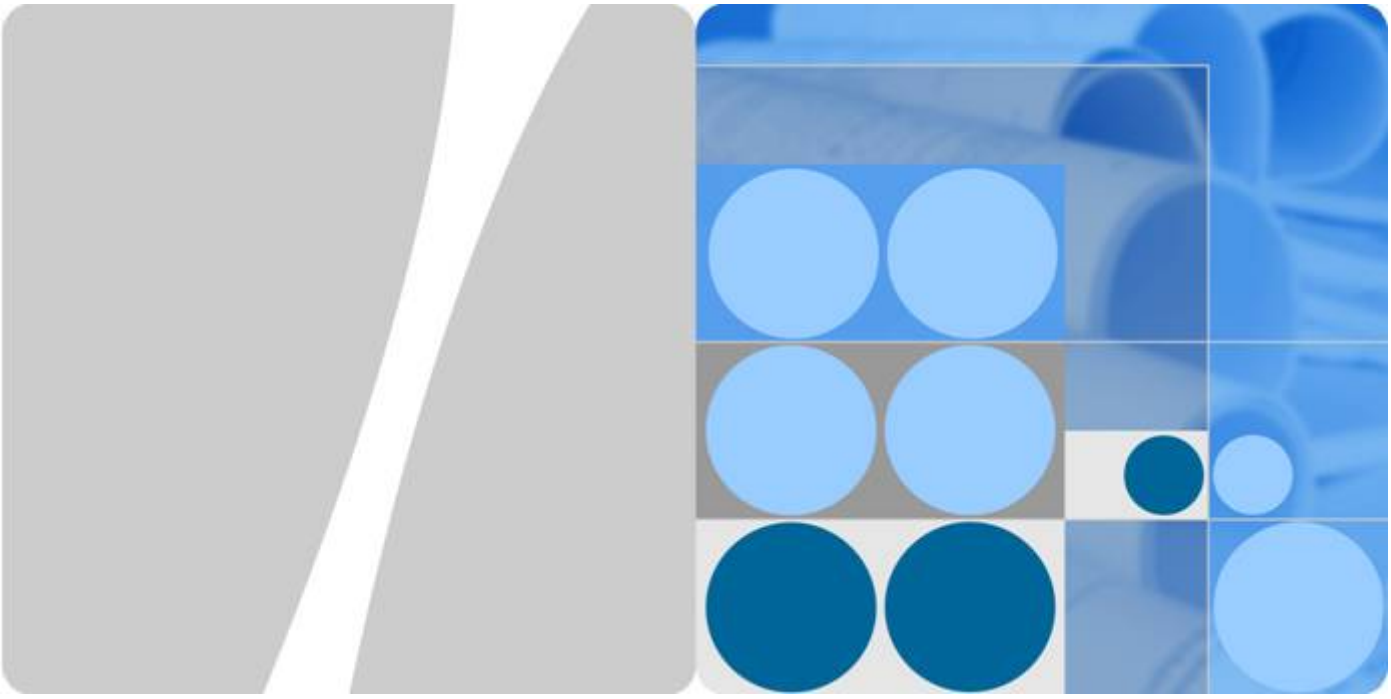

NodeB

V200R013

Technical Description

Issue 06

Date 2011-09-30

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About This Document

Purpose

This document describes the NodeB in terms of functions, logical structure, hardware configuration, topologies, clock synchronization modes, operation and maintenance, and reliability.

Product Versions

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

Product Name	Product Version
BTS3900 WCDMA (hereinafter referred to as BTS3900)	V200R013
BTS3900A WCDMA (hereinafter referred to as BTS3900A)	V200R013
BTS3900L WCDMA (hereinafter referred to as BTS3900L)	V200R013
DBS3900 WCDMA (hereinafter referred to as DBS3900)	V200R013
iDBS3900 WCDMA (hereinafter referred to as iDBS3900)	V200R013
BTS3900C WCDMA (hereinafter referred to as BTS3900C)	V200R013

Intended Audience

This document is intended for:

- Network planners

- Field engineers
- System engineers

Organization

1 Changes in the NodeB Technical Description

This section describes the changes in the *NodeB Technical Description*.

2 Overview of the NodeB

Developed in compliance with the 3GPP R99/R4/R5/R6/R7/R8/R9 protocols, Huawei 3900 series NodeBs use the advanced fourth-generation base station platform.

3 Logical Structure of the NodeB

This describes the logical structures of the BBU3900, RRU, WRFU, RHUB3808, and pRRU3801.

4 Hardware Configurations of the NodeB

This section describes the typical, 4-way receive diversity, transmit diversity, 2x2 MIMO, and 2T4R configurations of the NodeB.

5 NodeB Configuration Management

NodeB configuration management consists of the initial configuration and reconfiguration. At the initial stage of network deployment, the CME can be used to configure the basic data for all NodeBs in the network. After the NodeB is in service, the CME or MML commands can be used to reconfigure the NodeB data, such as add, delete, or modify the NodeB data. The CME is recommended.

6 Topologies of the NodeB

This describes the topologies of the NodeB, which consists of the networking on the Iub interface and networking on the CPRI interface.

7 Clock Synchronization Mode of the NodeB

The NodeB supports multiple reference clock sources, including the E1/T1 clock, GPS clock, BITS clock, IP clock, and synchronous Ethernet clock. If no external clock source is available, the NodeB uses the free-run clock.

8 Surge Protection Specifications for Ports on the NodeB

This section describes the surge protection specifications for the ports on the BTS3900, BTS3900A, BTS3900L, BTS3900C, BBU3900, RRU, and RFU.

9 Operation and Maintenance of the NodeB

The OM subsystem of the NodeB manages, monitors, and maintains the software, hardware, and configuration of the NodeB. In addition, the OM subsystem provides various OM modes and multiple maintenance platforms to meet different maintenance requirements.

10 Reliability of the NodeB

The NodeB features a new system architecture and a complete redundancy design. In addition, the NodeB takes advantage of Huawei large-capacity ASIC chips to enhance the integration of modules and to reduce the number of parts, thus significantly improving the system reliability.

11 Technical Specifications

This section provides technical specifications for RF modules.

Conventions

Symbol Conventions

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

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
 CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 TIP	Indicates a tip that may help you solve a problem or save time.
 NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

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

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Courier New`	Examples of information displayed on the screen are in Courier New.

Command Conventions

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

Convention	Description
Boldface	The keywords of a command line are in **boldface**.

Convention	Description
Italic	Command arguments are in *italics*.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x | y | ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x | y | ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x | y | ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x | y | ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

GUI Conventions

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

Convention	Description
Boldface	Buttons, menus, parameters, tabs, window, and dialog titles are in **boldface**. For example, click **OK**.
>	Multi-level menus are in **boldface** and separated by the ">" signs. For example, choose **File** > **Create** > **Folder**.

Keyboard Operations

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

Format	Description
Key	Press the key. For example, press **Enter** and press **Tab**.
Key 1+**Key 2**	Press the keys concurrently. For example, pressing **Ctrl**+**Alt** +**A** means the three keys should be pressed concurrently.
Key 1, **Key 2**	Press the keys in turn. For example, pressing **Alt**, **A** means the two keys should be pressed in turn.

Mouse Operations

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

Action	Description
Click	Select and release the primary mouse button without moving the pointer.
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Contents

1 Changes in the NodeB Technical Description

This section describes the changes in the *NodeB Technical Description*.

06 (2011-09-30)

This is the sixth commercial release.

Compared with issue 05 (2011-08-30), this issue includes the following new topics:

- **11 Technical Specifications**
- **11.1 Technical Specifications for RFUs**
- **11.1.1 Technical Specifications for WRFU**
- **11.1.2 Technical Specifications for MRFU**
- **11.1.3 Technical Specifications for WRFUd**
- **11.1.4 Technical Specifications for MRFUd**
- **11.2 Technical Specifications for RRUs**
- **11.2.1 Technical Specifications for RRU3804**
- **11.2.2 Technical Specifications for RRU3801E**
- **11.2.3 Technical Specifications for RRU3806**
- **11.2.4 Technical Specifications for RRU3805**
- **11.2.5 Technical Specifications for RRU3808**
- **11.2.6 Technical Specifications for RRU3828**
- **11.2.7 Technical Specifications for RRU3908**
- **11.2.8 Technical Specifications for RRU3928**
- **11.2.9 Technical Specifications for RRU3929**

Compared with issue 05 (2011-08-30), this issue does not exclude any topics., this issue incorporates the following changes:

Topic	Description
6.2 Topologies on the CPRI Interface	**Number of Supported Carriers** in the **CPRI interface specifications of different RF modules** has been deleted.

Topic	Description
8 Surge Protection Specifications for Ports on the NodeB	Surge protection specifications for the ports on RF modules has been deleted.

Compared with issue 05 (2011-08-30), this issue does not exclude any topics.

05 (2011-08-30)

This is the fifth commercial release.

Compared with issue 04 (2011-08-10), this issue does not include any new topics.

Compared with issue 04 (2011-08-10), this issue incorporates the following changes:

Topic	Description
6.2 Topologies on the CPRI Interface	The mapping between the CPRI data rate and the number of supported cells is added.
8 Surge Protection Specifications for Ports on the NodeB	The label of Ver. B cabinet is added.

Compared with issue 04 (2011-08-10), this issue does not exclude any topics.

04 (2011-08-10)

This is the fourth commercial release.

Compared with issue 03 (2011-07-08), this issue does not include any new topics.

Compared with issue 03 (2011-07-08), this issue incorporates the following changes:

Topic	Description
3.2 Logical Structure of the RRU	The explanations of the DPD and A-Doherty are added.
3.2 Logical Structure of the RRU	The logical structure of the RRU3929 is added.
6.2 Topologies on the CPRI Interface	The description of CPRI interface specifications of the RRU3929 is added.
8 Surge Protection Specifications for Ports on the NodeB	The description of the surge protection specifications of the RRU3929 ports is added.

Compared with issue 03 (2011-07-08), this issue does not exclude any topics.

03 (2011-07-08)

This is the third commercial release.

Compared with issue 02 (2011-06-10), this issue does not include any new topics.

Compared with issue 02 (2011-06-10), this issue incorporates the following changes:

Topic	Description
3.2 Logical Structure of the RRU	The logical structure of the RRU3928, and RRU3828 is added.
3.3 Logical Structure of the RFU	The logical structure of the WRFUd, MRFU, and MRFUd is added.
4 Hardware Configurations of the NodeB	The description of the RRU3828, and WRFUd hardware configurations is added.
6.2 Topologies on the CPRI Interface	The description of CPRI interface specifications and restrictions on the WRFUd, RRU3908, RRU3828, RRU3928, MRFU, and MRFUd is added.
8 Surge Protection Specifications for Ports on the NodeB	Surge protection specifications for the ports on the BTS3900 (Ver.C), BTS3900L (Ver.C), BTS3900A (Ver.C), RRU3806 (AC), WRFUd, RRU3908, RRU3828, RRU3928, MRFU, and MRFUd are added.

Compared with issue 02 (2011-06-10), this issue does not exclude any topics.

02 (2011-06-10)

This is the second commercial release.

Compared with issue 01 (2011-04-10), this issue does not include any new topics.

Compared with issue 01 (2011-04-10), this issue incorporates the following changes:

Topic	Description
4.4 2x2 MIMO Configuration	Description in one note is modified.
5 NodeB Configuration Management	The description of Reconfiguration is optimized.
9.2 OM Functions of the NodeB	141 test is deleted.

Compared with issue 01 (2011-04-10), this issue does not exclude any topics.

01 (2011-04-10)

This is the initial commercial release.

Compared with issue Draft A (2011-01-30), this issue does not include any new topics.

Compared with issue Draft A (2011-01-30), this issue incorporates the following changes:

Topic	Description
4.3 Transmit Diversity Configuration	Description in one note is modified.
4.4 2x2 MIMO Configuration	Description in one note is modified.
8 Surge Protection Specifications for Ports on the NodeB	Surge protection specifications for the ports on the RRU3806 (AC) are added.

Compared with issue Draft A (2011-01-30), this issue does not exclude any topics.

Draft A (2011-01-30)

This is the Draft A release of V200R013.

Compared with issue 10 (2010-12-30) of V200, this issue does not include any new topics.

Compared with issue 10 (2010-12-30) of V200, this issue incorporates the following changes:

Topic	Description
4 Hardware Configurations of the NodeB	The hardware descriptions of the BTS3900, BTS3900A, BTS3900C, BTS3900L, and DBS3900 are combined.
7 Clock Synchronization Mode of the NodeB	The description of clock synchronization is modified.
9.1 OM Modes of the NodeB	The description of the AACP protocol is added.

Compared with issue 10 (2010-12-30) of V200, this issue excludes the following topics:

- Monitoring principles of the NodeB

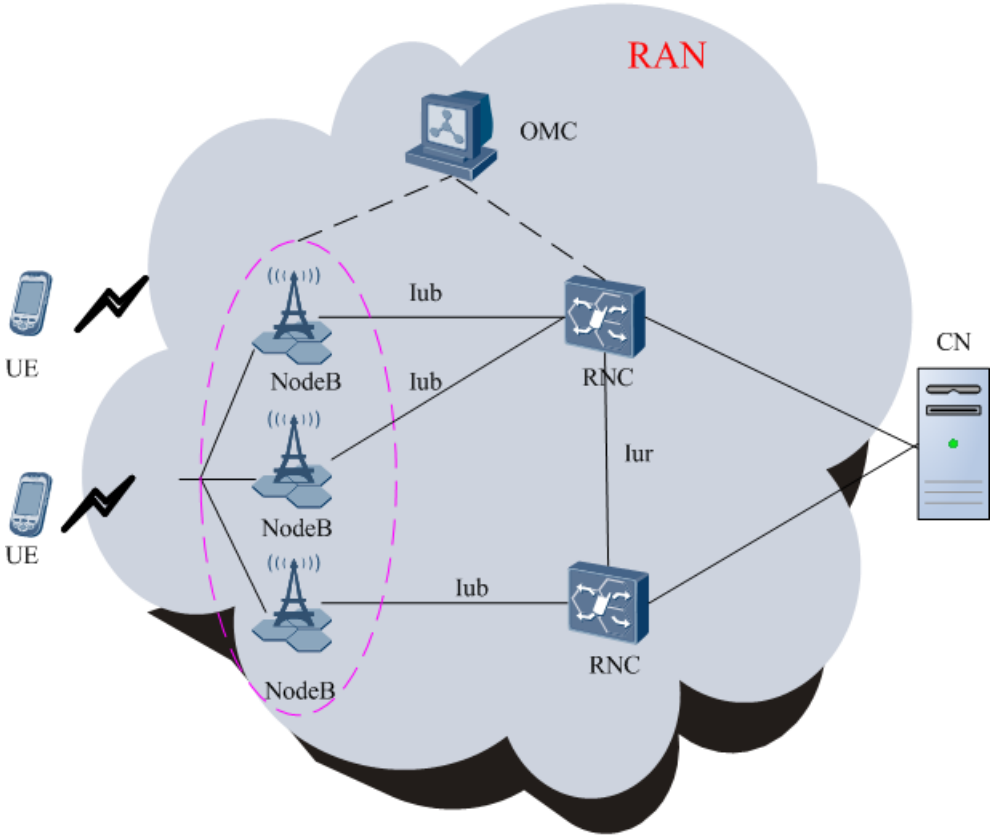
2 Overview of the NodeB

Developed in compliance with the 3GPP R99/R4/R5/R6/R7/R8/R9 protocols, Huawei 3900 series NodeBs use the advanced fourth-generation base station platform.

Architecture

Figure 2-1 shows the WCDMA RAN system architecture and the position of the NodeB in the system.

Figure 2-1 System architecture of the WCDMA RAN



Introduction to the NodeB

The 3900 series NodeBs use the advanced wideband, multi-mode system, and modular design, and have features such as the compact size, high integration, low power consumption, and easy and quick deployment. The innovative design and flexible combinations of the function modules and auxiliary devices encourage Huawei to diversify multi-mode NodeB products.

Various forms of 3900 series NodeB products allow network deployment in different application scenarios, thus providing a solution for operators. Huawei 3900 series NodeBs have the following models:

- Indoor macro NodeB BTS3900 and BTS3900L: applies to indoor scenarios where population density is high, traffic is large, lease expense of equipment rooms is high, and space is limited.
- Outdoor macro base station BTS3900A: applies to outdoor scenarios in urban, suburb, and rural areas where large-capacity coverage is required.
- Distributed NodeB DBS3900: applies to outdoor scenarios where wide coverage is required and site construction is difficult.
- Mini NodeB BTS3900C: applies to outdoor scenarios and hotspot areas.

- Indoor distributed base station IDBS3900: applies to large-capacity or middle small indoor scenarios coverage.

3 Logical Structure of the NodeB

About This Chapter

This describes the logical structures of the BBU3900, RRU, WRFU, RHUB3808, and pRRU3801.

3.1 Logical Structure of the BBU3900
The BBU3900, which features a modular design, consists of the control subsystem, baseband subsystem, transport subsystem, and power module.

3.2 Logical Structure of the RRU
The RRU, which features a modular design, consists of the interface module, transceiver (TRX), Power Amplifier (PA), filter, Low Noise Amplifier (LNA), extended interface, and power module.

3.3 Logical Structure of the RFU
The RFU, which features a modular design, consists of the interface module, transceiver (TRX), Power Amplifier (PA), filter, Low Noise Amplifier (LNA), extended interface, and power module.

3.4 Logical Structure of the RHUB3808
This describes the logical structure of the RHUB3808. The RHUB3808 has a modular design and consists of the BB interface unit, combining and dividing unit, RRU interface unit, and power supply unit.

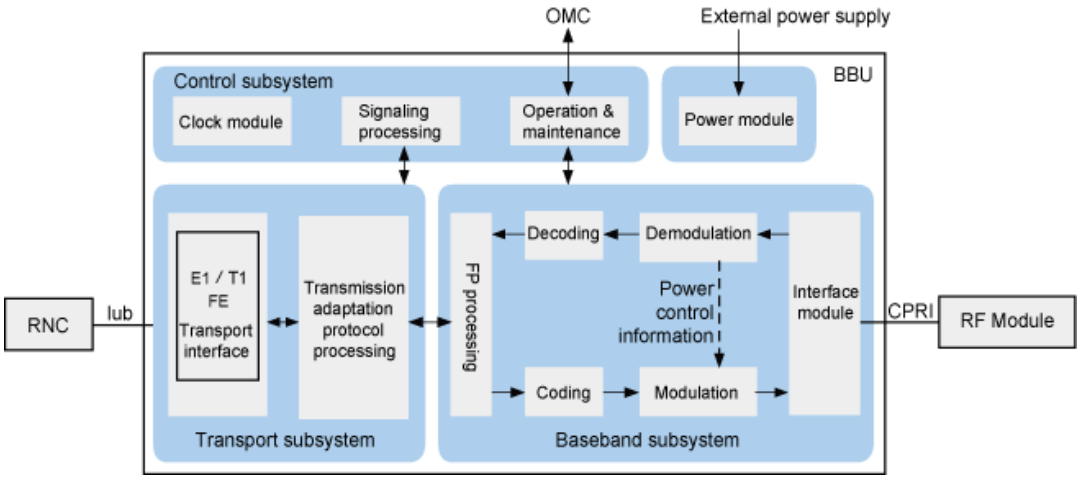
3.5 Logical Structure of the pRRU3801
This describes the logical structure of the pRRU3801. The pRRU3801, which features a modular design, consists of the interface unit, TRX, High Power Amplifier (HPA), LNA, duplexer, and power supply unit.

3.1 Logical Structure of the BBU3900

The BBU3900, which features a modular design, consists of the control subsystem, baseband subsystem, transport subsystem, and power module.

Figure 3-1 shows the logical structure of the BBU3900.

Figure 3-1 Logical structure of the BBU3900



Control Subsystem

The functions of the control subsystem are implemented by the WMPT.

The control subsystem performs centralized management of the entire NodeB in terms of OM and signaling processing and provides the system clock.

- The OM functions involve equipment management, configuration management, alarm management, software management, and commissioning management.
- The signaling processing functions involve NodeB Application Part (NBAP) signaling processing, Access Link Control Application Part (ALCAP) processing, Stream Control Transmission Protocol (SCTP) processing, and logical resource management.
- The clock module provides the system clock for the NodeB. The clock module supports synchronization with external clocks such as the Iub clock, GPS clock, BITS clock, and IP clock, which ensures that clock accuracy meets the requirements.

Baseband Subsystem

The functions of the baseband subsystem are implemented by the WBBP.

The baseband subsystem processes UL and DL baseband signals. This subsystem consists of the following modules:

- UL baseband data processing module: consists of the demodulation unit and the decoding unit. In this module, despreading soft decision symbols is got after uplink baseband data is processed into access channel searching, access channel demodulation, and dedicated

channel demodulation. The symbols are then sent to the RNC through the transport subsystem after decoding and Frame Protocol (FP) processing.

- DL baseband data processing module: consists of the modulation unit and the encoding unit. The module receives the service data from the transport subsystem and sends the service data to the FP processor for FP processing. The signals are finally sent to the interface module after encoding, transport channel mapping, physical channel generating, framing, spreading, modulation, and power control combination.

In the baseband subsystem, the BBU3900 has an integrated CPRI interface module that connects the BBU3900 to the RF module.

Transport Subsystem

The functions of the transport subsystem are implemented by the WMPT and UTRP. The transport subsystem performs the following functions:

- Provides ports for communication between the NodeB and the RNC.
- Provides maintenance channels between the BBU3900 and the LMT or the M2000 to operate and maintain the BBU3900.

Power Module

The power module converts +24 V DC or -48 V DC power into the power required by the boards and provides external monitoring ports.

3.2 Logical Structure of the RRU

The RRU, which features a modular design, consists of the interface module, transceiver (TRX), Power Amplifier (PA), filter, Low Noise Amplifier (LNA), extended interface, and power module.

Figure 3-2 shows the logical structure of the RRU3804, RRU3801E, or RRU3806.

Figure 3-2 Logical structure of the RRU3804, RRU3801E, or RRU3806

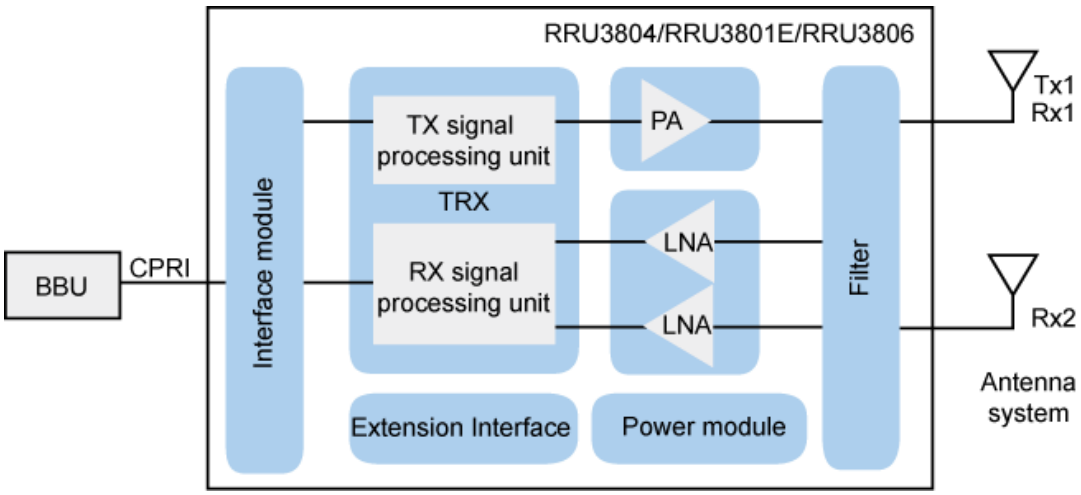
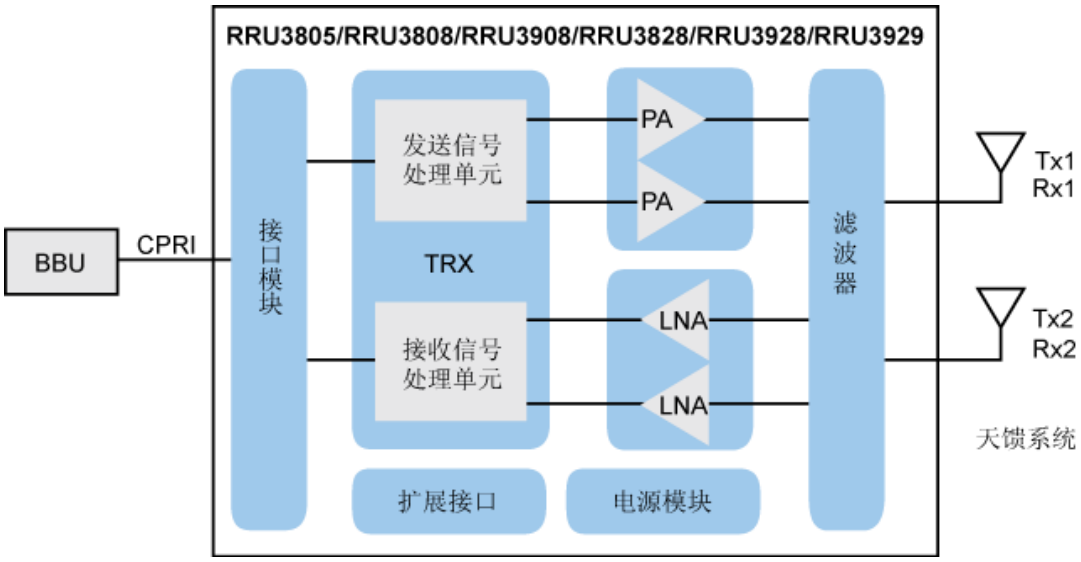


Figure 3-3 shows the logical structure of the RRU3805, RRU3808, RRU3908, RRU3828, RRU3928, or RRU3929.

Figure 3-3 Logical structure of the RRU3805, RRU3808, RRU3908, RRU3828, RRU3928, or RRU3929



Interface Module

The interface module performs the following functions:

- Receives the downlink baseband data from the BBU.
- Transmits the uplink baseband data to the BBU.
- Forwards data from the cascaded RRUs.

Transceiver (TRX)

The TRX of the RRU3804, RRU3801E, or RRU3806 provides two RX channels and one TX channel for RF signals.

The TRX of the RRU3805, RRU3808, RRU3908, RRU3828, RRU3928, or RRU3929 provides two RX channels and two TX channels for RF signals.

- The TRX performs the following functions at the RX channels:
  - Down-converts the received signals to Intermediate Frequency (IF) signals.
  - Amplifies the IF signals.
  - Performs Analog-to-Digital Conversion (DAC).
  - Performs digital down-conversion.
  - Performs matched filtering.
  - Performs Digital Automatic Gain Control (DAGC).
- The TRX performs the following functions at the TX channels:
  - Shapes and filters downlink spread spectrum signals.

- Performs Digital-to-Analog Conversion (DAC).
- Up-converts IF signals to the TX band.

Power Amplifier (PA)

The PA adopts the Digital Pre-Distortion (DPD) and Advanced-Doherty (A-Doherty) technologies to amplify the low-power RF signals from the TRX.

Filter

The filter of the RRU3804, RRU3801E, or RRU3806 consists of a duplex filter and an RX filter.

The filter of the RRU3805, RRU3808, RRU3908, RRU3828, RRU3928, or RRU3929 consists of two duplex filters.

The filter performs the following functions:

- The duplex filter multiplexes one RX and one TX signals over RF channels so that they can share one antenna channel. In addition, it filters RX and TX signals.
- The RX filter filters one RX signal.

LNA

The LNA amplifies the signals received from the antenna system.

Power Module

The power module supplies power to other modules of the RRU.

3.3 Logical Structure of the RFU

The RFU, which features a modular design, consists of the interface module, transceiver (TRX), Power Amplifier (PA), filter, Low Noise Amplifier (LNA), extended interface, and power module.

Figure 3-4 shows the logical structure of the WRFU and MRFU.

Figure 3-4 Logical structure of the WRFU and MRFU

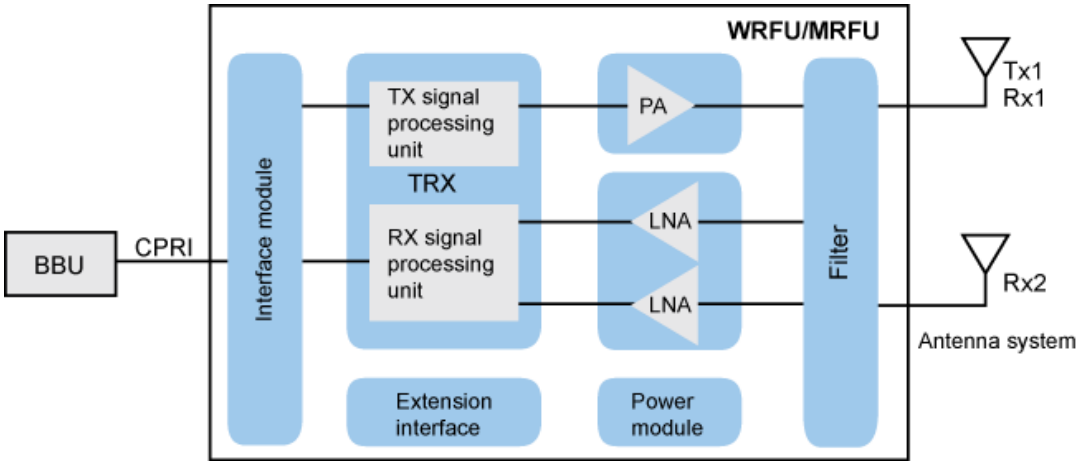
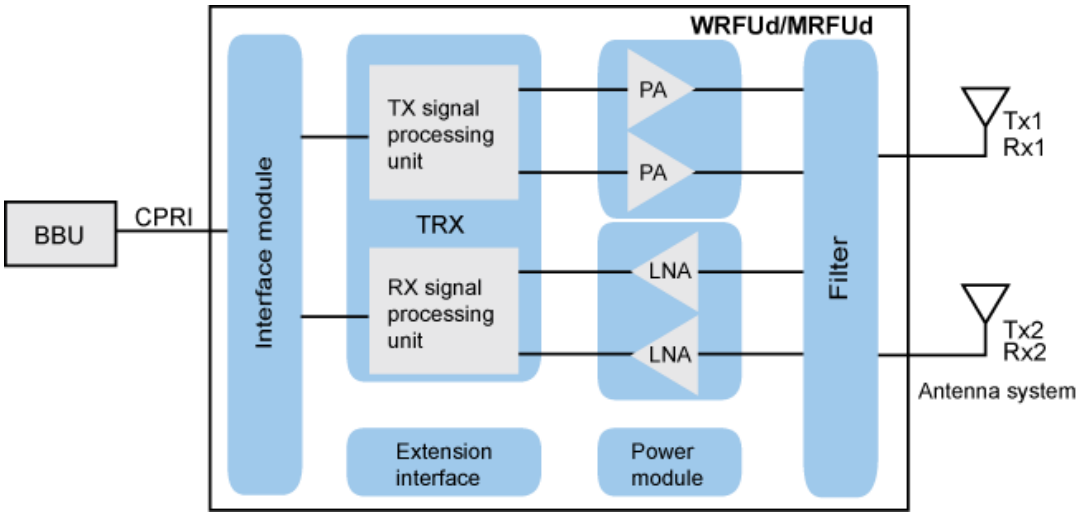


Figure 3-5 shows the logical structure of the WRFUd and MRFUd.

Figure 3-5 Logical structure of the WRFUd and MRFUd



Interface Module

The interface module performs the following functions:

- Receives the downlink baseband data from the BBU.
- Transmits the uplink baseband data to the BBU.
- Forwards data from the cascaded RFUs.

Transceiver (TRX)

The TRX of the WRFU or MRFU provides two RX channels and one TX channel for RF signals.

The TRX of the WRFUd or MRFUd provides two RX channels and two TX channels for RF signals.

- The TRX performs the following functions at the RX channels:
  - Down-converts the received signals to Intermediate Frequency (IF) signals.
  - Amplifies the IF signals.
  - Performs Analog-to-Digital Conversion (DAC).
  - Performs digital down-conversion.
  - Performs matched filtering.
  - Performs Digital Automatic Gain Control (DAGC).
- The TRX performs the following functions at the TX channels:
  - Shapes and filters downlink spread spectrum signals.
  - Performs Digital-to-Analog Conversion (DAC).
  - Up-converts IF signals to the TX band.

Power Amplifier (PA)

The PA adopts the Digital Pre-Distortion (DPD) and Advanced-Doherty (A-Doherty) technologies to amplify the low-power RF signals from the TRX.

Filter

The filter of the WRFU or MRFU consists of a duplex filter and an RX filter.

The filter of the WRFUd or MRFUd consists of two duplex filters.

The filter performs the following functions:

- The duplex filter multiplexes one RX and one TX signals over RF channels so that they can share one antenna channel. In addition, it filters RX and TX signals.
- The RX filter filters one RX signal.

LNA

The LNA amplifies the signals received from the antenna system.

Power Module

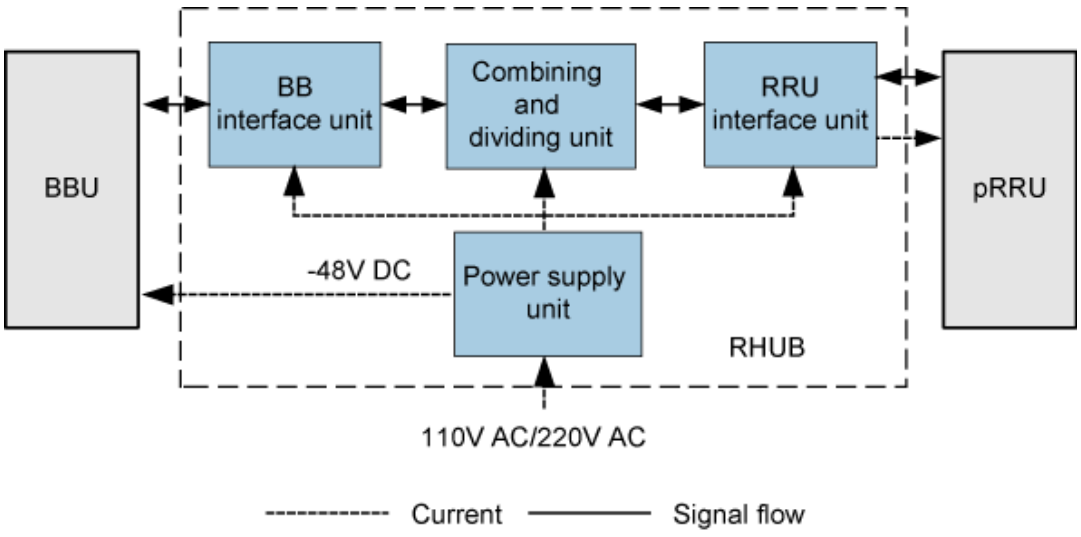
The power module supplies power to other modules of the RFU.

3.4 Logical Structure of the RHUB3808

This describes the logical structure of the RHUB3808. The RHUB3808 has a modular design and consists of the BB interface unit, combining and dividing unit, RRU interface unit, and power supply unit.

Figure 3-6 shows the logical structure of the RHUB3808.

Figure 3-6 Logical structure of the RHUB3808



The functions of each unit are as follows:

- BB interface unit: Provides the transmission interface for the BBU3900.
- Combining and dividing unit: Combines and divides the baseband IQ data and performs the Digital Automatic Gain Control (DAGC) function.
- RRU interface unit: Provides the transmission port and -48 V DC power port for the pRRU3801 with electrical port.
- Power supply unit: Supplies power to internal modules of the RHUB3808 and eight pRRU3801s with electrical ports connected to the RHUB3808 when the unit obtains 110 V AC input power from the external power system. This unit can also supply -48 V DC power to the BBU3900 when the unit obtains 220 V AC input power from the external power system.

3.5 Logical Structure of the pRRU3801

This describes the logical structure of the pRRU3801. The pRRU3801, which features a modular design, consists of the interface unit, TRX, High Power Amplifier (HPA), LNA, duplexer, and power supply unit.

Figure 3-7 and **Figure 3-8** show the logical structures of the pRRU3801 with optical ports and the pRRU3801 with electrical port.

Figure 3-7 Logical structure of the pRRU3801 with optical ports

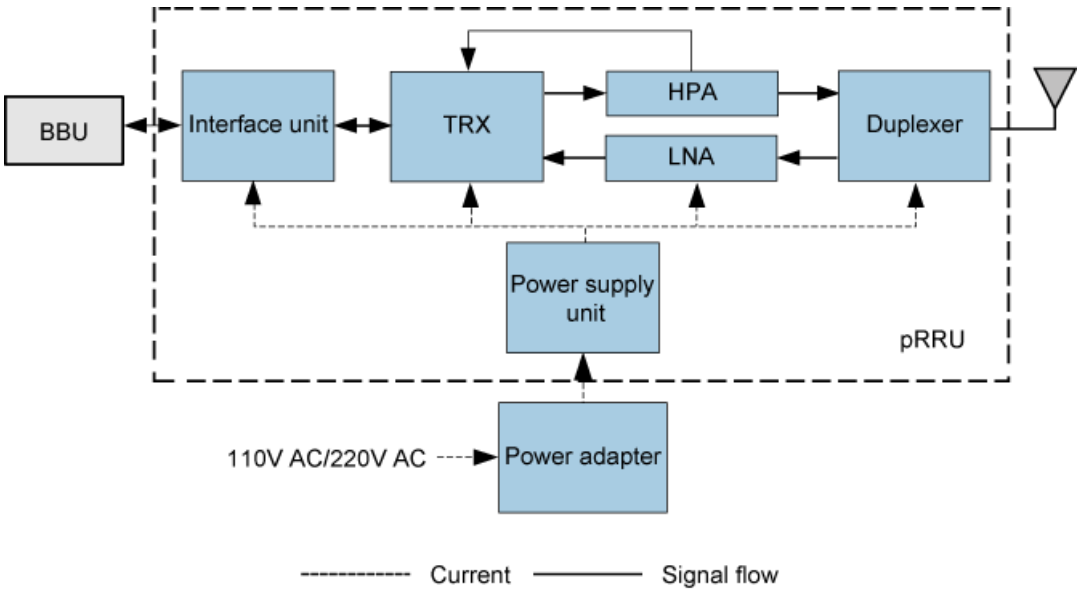
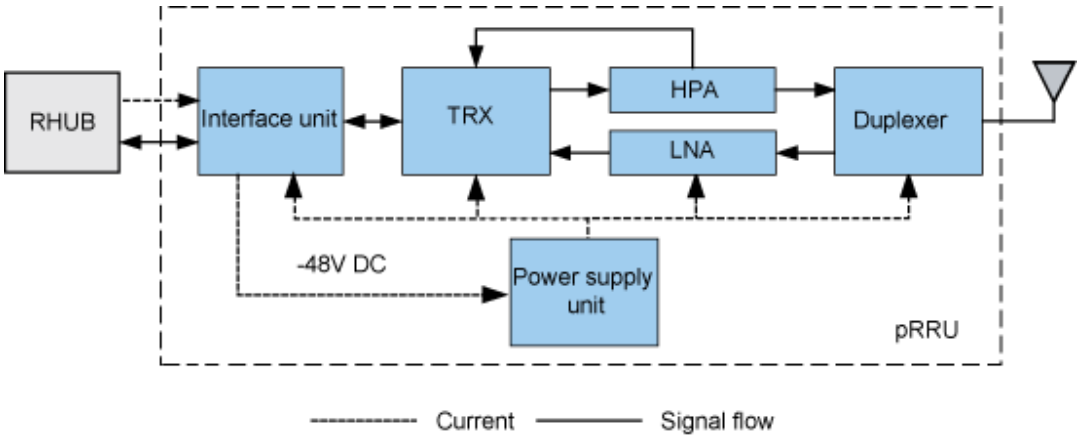


Figure 3-8 Logical structure of the pRRU3801 with electrical ports



The functions of each unit are as follows:

- Interface unit:
  - provides the CPRI interface for the connection between the pRRU3801 with optical ports and the BBU3900;
  - provides the RJ45 Ethernet port for supplying power for pRRU, and connecting the pRRU3801 with electrical port and the RHUB3808;

  NOTE

  - Through the interface unit, the pRRU3801 with optical ports can connect to the BBU3900 and cascade with another pRRU3801.
  - Through the interface unit, the pRRU3801 with electrical port can connect to only the RHUB3808, and then the RHUB3808 can connect to the BBU3900 through the CPRI port.
- TRX: provides one RX channel and one TX channel, and processes the IF signals.
- HPA: receives the low-power RF signals from the TRX and amplifies these signals.
- LNA: amplifies the signals received by the antenna.
- Duplexer: multiplexes the RX signals and TX signals. This enables the RX signals and TX signals to share one antenna channel.
- Power supply unit: distributes -48 V DC power in the pRRU3801.

4 Hardware Configurations of the NodeB

About This Chapter

This section describes the typical, 4-way receive diversity, transmit diversity, 2x2 MIMO, and 2T4R configurations of the NodeB.

4.1 Typical Configurations

The NodeB supports omni-directional, 2-sector, 3-sector, and 6-sector configurations. The BTS3900, BTS3900A, and DBS3900 support smooth capacity expansion from 1x1 to 6x4 or to 3x8. The BTS3900L supports a maximum configuration of 6x4 or 12x2. The BTS3900C supports a maximum configuration of 1x3.

In typical configurations, the NodeB consists of the WMPT, WBBP, and RFU or RRU. The WMPT and WBBP are installed in the BBU3900.

The WBBP supports three or six cells. The following takes the WBBP supporting six cells, WRFU supporting 80 W, RRU3804 supporting 60 W, RRU3808 supporting 2 x 40 W, and RRU3828 supporting 2 x 40 W as examples to describe typical configurations.

Number of Modules

Table 4-1 lists the number of modules used for the NodeB in typical configurations.

Table 4-1 Number of modules used for the NodeB in typical configurations

Site Type	Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs (No Transmit Diversity)	Number of RRU3804s, RRU3808s, or RRU3828s (No Transmit Diversity)
● BTS3900 ● BTS3900A ● BTS3900L ● DBS3900	3×1	1	1	3	3
	3×2	1	1	3	3
	3×3	1	2	3	3
	3×4	1	2	3	3
BTS3900C	1×1	1	1	-	1
	1×2	1	1	-	1
	1×3	1	1	-	1

NOTE

N x M = sector x carrier. For example, 3x1 indicates that each of the three sectors has one carrier.

Cable Connections

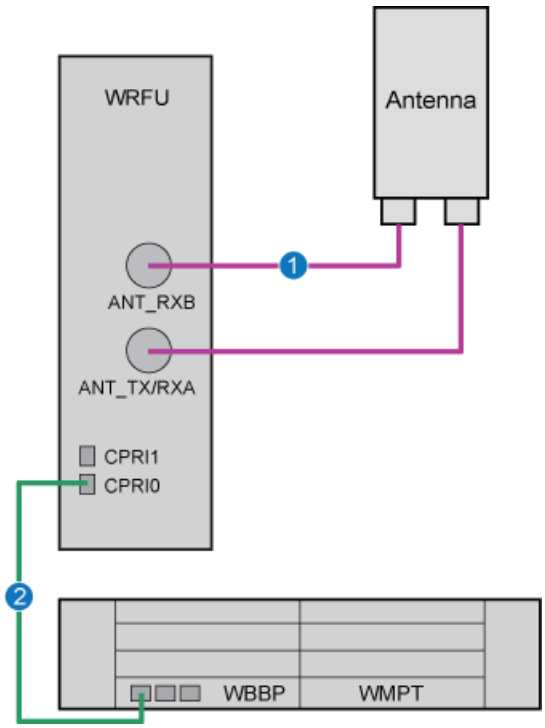
The following takes the 3x1 and 3x4 configurations as examples to describe the cable connections of the BTS3900, BTS3900A, BTS3900L, and DBS3900 in typical configurations.

Figure 4-1 and **Figure 4-2** show the cable connections when the WRFU is configured. **Figure 4-3** and **Figure 4-4** show the cable connections when the RRU3804 is configured. **Figure 4-5** and **Figure 4-6** show the cable connections when the RRU3808, or RRU3828 is configured.

NOTE

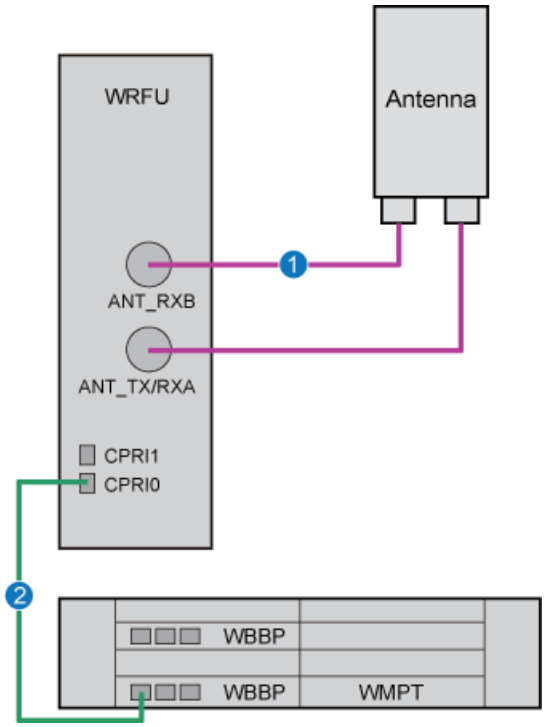
- A single sector is taken as an example to describe the cable connections.
- It is recommended that the WBBP not using the CPRI interface not be installed in slot 2 or 3. For detailed description of the BBU3900 slots, see the *BBU3900 Hardware Description*.

Figure 4-1 Cable connections of the NodeB in 3x1 configuration (WRFU configured)



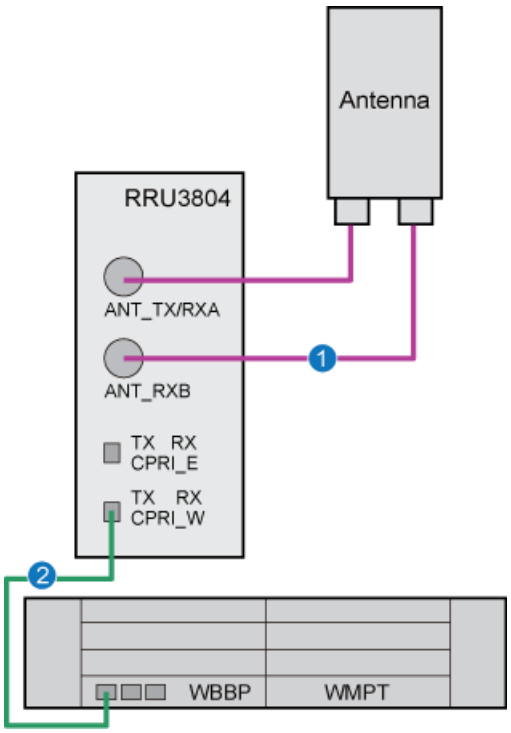
(1) RF jumper (2) CPRI electrical cable

Figure 4-2 Cable connections of the NodeB in 3x4 configuration (WRFU configured)



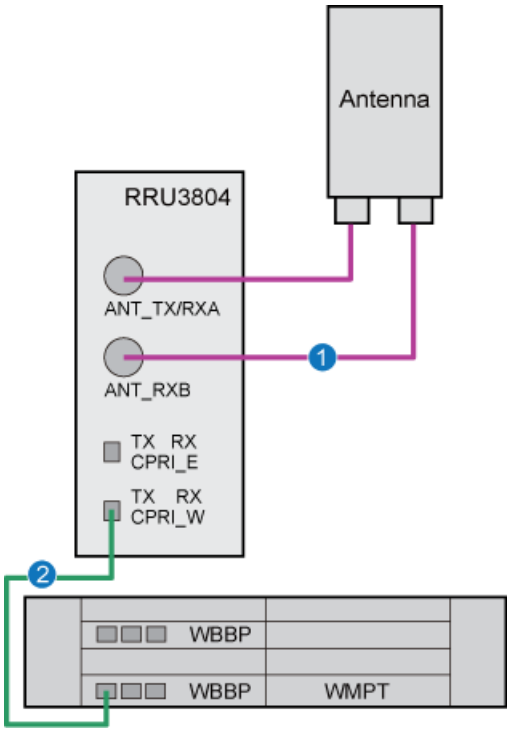
(1) RF jumper (2) CPRI electrical cable

Figure 4-3 Cable connections of the NodeB in 3x1 configuration (RRU3804 configured)



(1) RF jumper (2) CPRI optical cable

Figure 4-4 Cable connections of the NodeB in 3x4 configuration (RRU3804 configured)

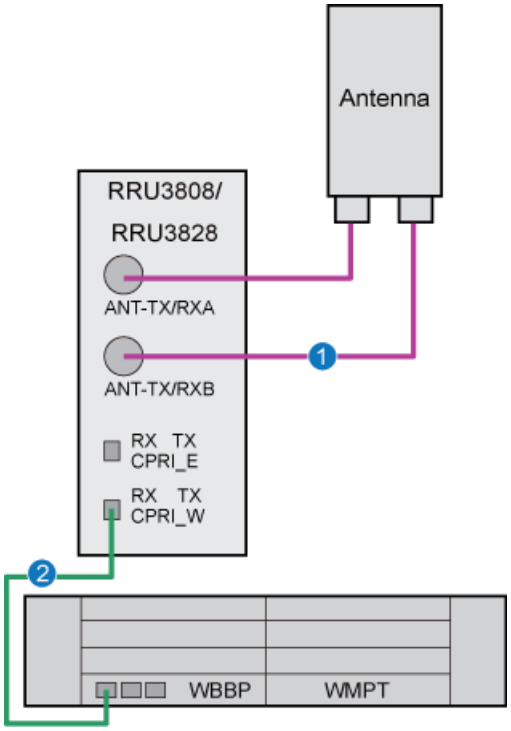


(1) RF jumper (2) CPRI optical cable

NOTE

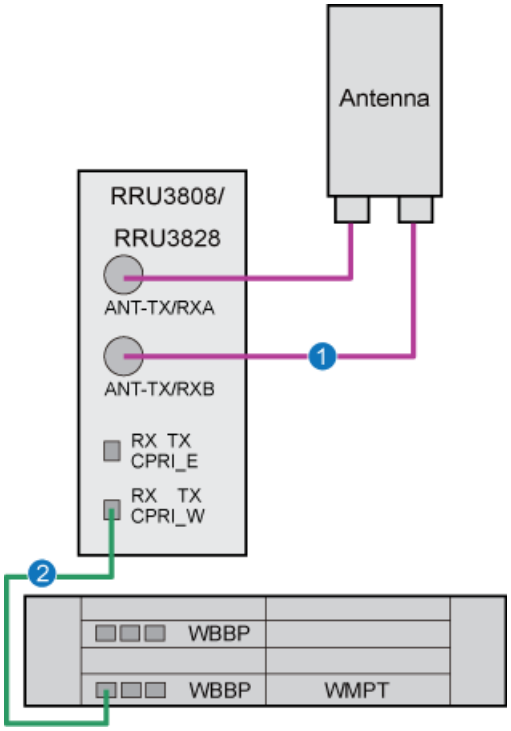
The RRU3804 supports a maximum of 15 W transmit power per carrier in the 4-carrier configuration.

Figure 4-5 Cable connections of the NodeB in 3x1 configuration (RRU3808, or RRU3828 configured)



(1) RF jumper (2) CPRI optical cable

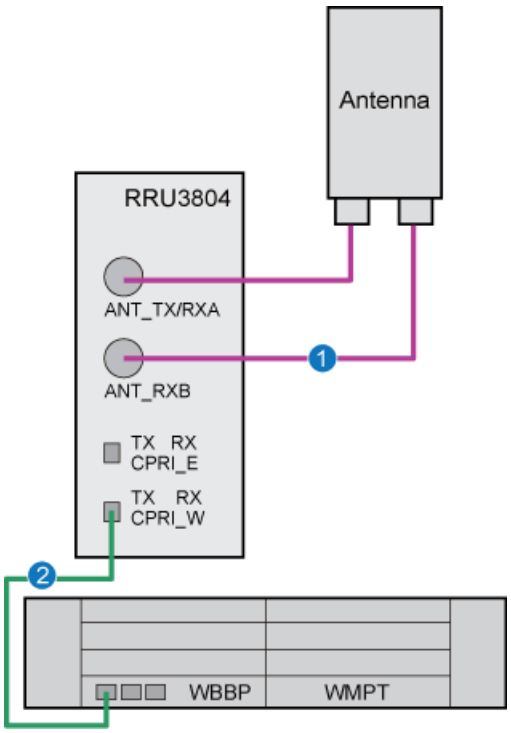
Figure 4-6 Cable connections of the NodeB in 3x4 configuration (RRU3808, or RRU3828 configured)



(1) RF jumper (2) CPRI optical cable

Figure 4-7 shows the cable connections of the BTS3900C in 1x3 configuration.

Figure 4-7 Cable connections of the BTS3900C in 1x3 configuration



(1) RF jumper (2) CPRI optical cable

4.2 4-Way Receive Diversity Configuration

The BTS3900, BTS3900A, BTS3900L, and DBS3900 support 4-way receive diversity.

In the 4-way receive diversity configuration, the NodeB consists of the WMPT, WBBP, and RFU or RRU. The WMPT and WBBP are installed in the BBU3900.

The WBBP supports three or six cells. The following takes the WBBP supporting six cells, WRFU supporting 80 W, RRU3804 supporting 60 W, RRU3808 supporting 2 x 40 W, and RRU3828 supporting 2 x 40 W as examples to describe the 4-way receive diversity configuration.

Number of Modules

Table 4-2 lists the number of modules used for the NodeB supporting 4-way receive diversity.

Table 4-2 Number of modules used for the NodeB supporting 4-way receive diversity

Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs	Number of RRU3804s, RRU3808s, or RRU3828s
3×1	1	1	6	6

Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs	Number of RRU3804s, RRU3808s, or RRU3828s
3×2	1	2	6	6

NOTE

In 4-way receive diversity configurations, the WBBP that originally supports six cells supports only three cells; the processing capability of the WBBP that supports three cells remains unchanged.

Cable Connections

The following takes the 3x1 configuration as an example to describe the cable connections of the NodeB supporting 4-way receive diversity. **Figure 4-8** shows the cable connections when the WRFU is configured. **Figure 4-9** shows the cable connections when the RRU3804 is configured. **Figure 4-10** shows the cable connections when the RRU3808, or RRU3828 is configured.

NOTE

- A single sector is taken as an example to describe the cable connections.
- It is recommended that the WBBP not using the CPRI interface not be installed in slot 2 or 3. For detailed description of the BBU3900 slots, see the *BBU3900 Hardware Description*.

Figure 4-8 Cable connections of the NodeB supporting 4-way receive diversity (WRFU configured)

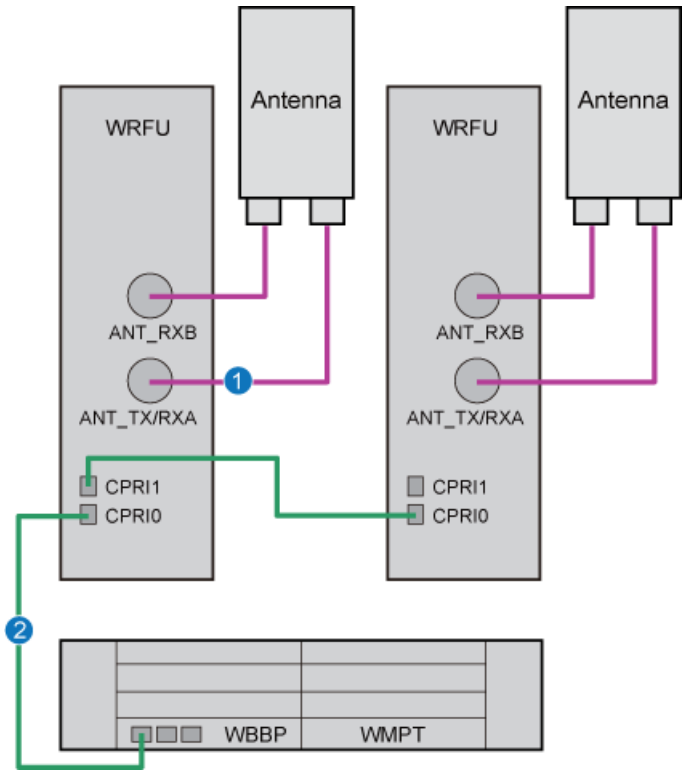


Figure 4-9 Cable connections of the NodeB supporting 4-way receive diversity (RRU3804 configured)

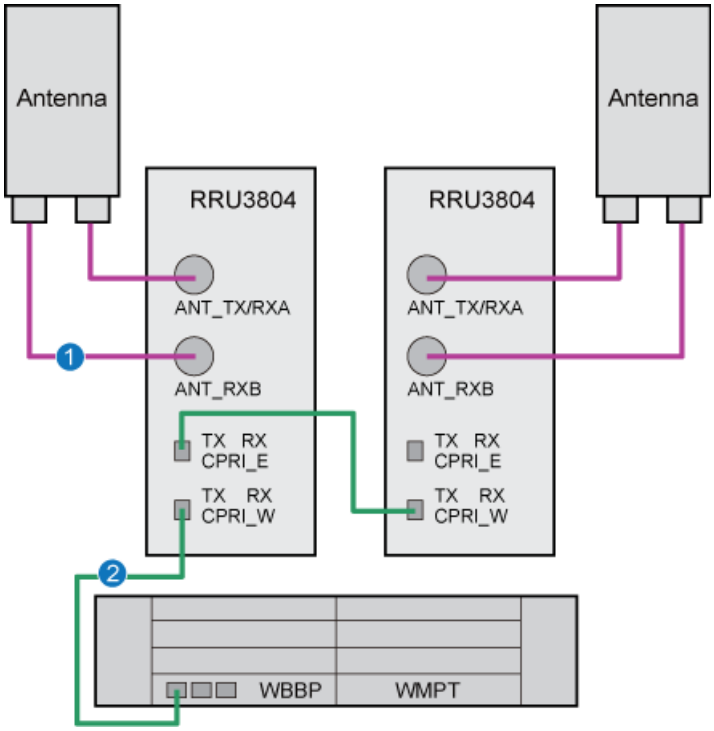
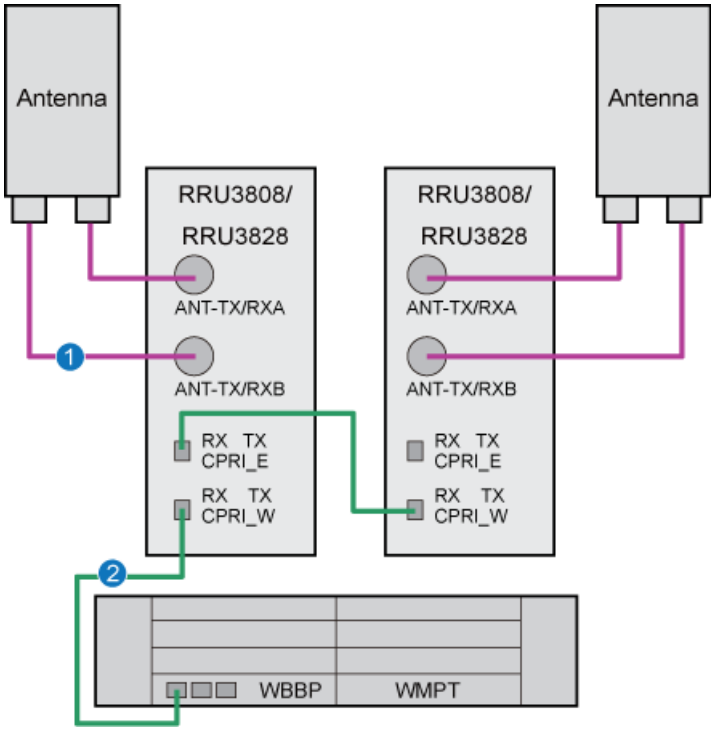


Figure 4-10 Cable connections of the NodeB supporting 4-way receive diversity (RRU3808, or RRU3828 configured)



(1) RF jumper (2) CPRI optical cable

4.3 Transmit Diversity Configuration

The BTS3900, BTS3900A, BTS3900L, and DBS3900 support transmit diversity.

In the transmit diversity configuration, the NodeB consists of the WMPT, WBBP, and RFU or RRU. The WMPT and WBBP are installed in the BBU3900.

The WBBP supports three or six cells. The following takes the WBBP supporting six cells, WRFU supporting 80 W, WRFUd supporting 60 W, RRU3804 supporting 60 W, RRU3808 supporting 2 x 40 W, and RRU3828 supporting 2 x 40 W as examples to describe the transmit diversity configuration.

Number of Modules

Table 4-3 lists the number of modules used for the NodeB supporting transmit diversity.

Table 4-3 Number of modules used for the NodeB supporting transmit diversity

Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs or RRU3804s	Number of WRFUds, RRU3808s, or RRU3828s
3×1	1	1	6	3
3×2	1	2	6	3

NOTE

In transmit diversity, the WBBP that originally supports six cells supports only three cells; the processing capability of the WBBP that supports three cells remains unchanged.

Cable Connections

The following takes the 3x1 configuration as an example to describe the cable connections of the NodeB supporting transmit diversity. **Figure 4-11** shows the cable connections when the WRFU is configured. **Figure 4-12** shows the cable connections when the WRFUd is configured. **Figure 4-13** shows the cable connections when the RRU3804 is configured. **Figure 4-14** shows the cable connections when the RRU3808, or RRU3828 is configured.

NOTE

- A single sector is taken as an example to describe the cable connections.
- It is recommended that the WBBP not using the CPRI interface not be installed in slot 2 or 3. For detailed description of the BBU3900 slots, see the *BBU3900 Hardware Description*.
- When different types of RRUs are interconnected, incorrect Received Total Wideband Power (RTWP) values should be rectified. The method is as follows:
  - View the main and diversity RTWP values of an RRU.
  - Use the **DSP RXBRANCH**command to query the initial RTWP correct value. By default, the value is 0.
  - If the default initial correct value is 0, use the **MOD RXBRANCH**command to set the RTWP initial correct value so that the RTWP values become normal.

Figure 4-11 Cable connections of the NodeB supporting transmit diversity (WRFU configured)

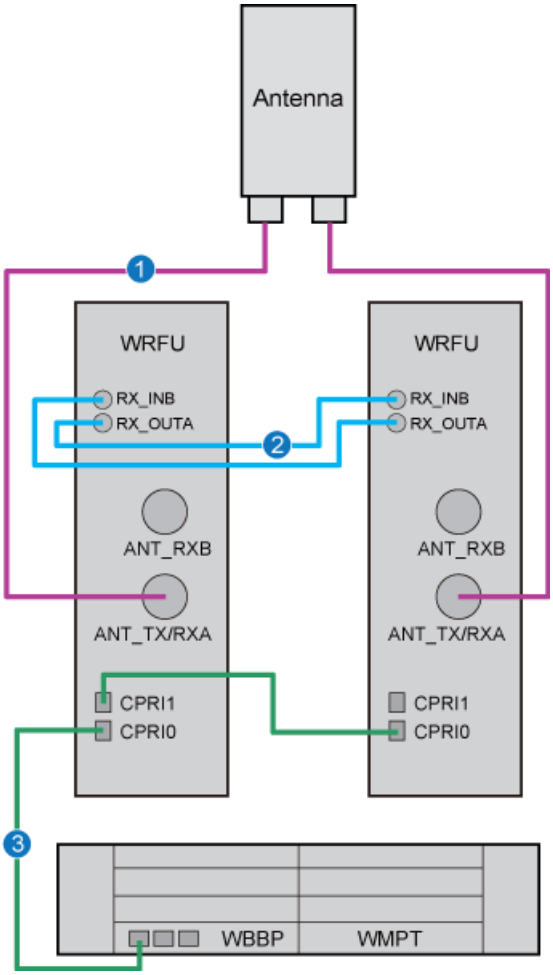
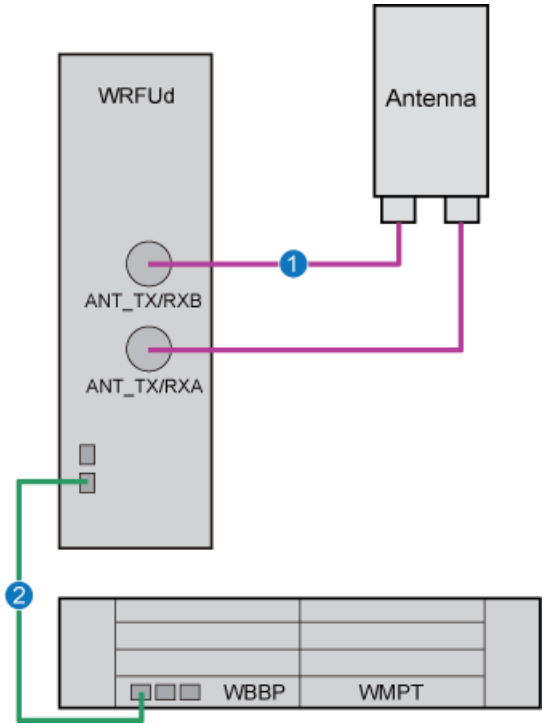


Figure 4-12 Cable connections of the NodeB supporting transmit diversity (WRFUd configured)



(1) RF jumper (2) CPRI electrical cable

Figure 4-13 Cable connections of the NodeB supporting transmit diversity (RRU3804 configured)

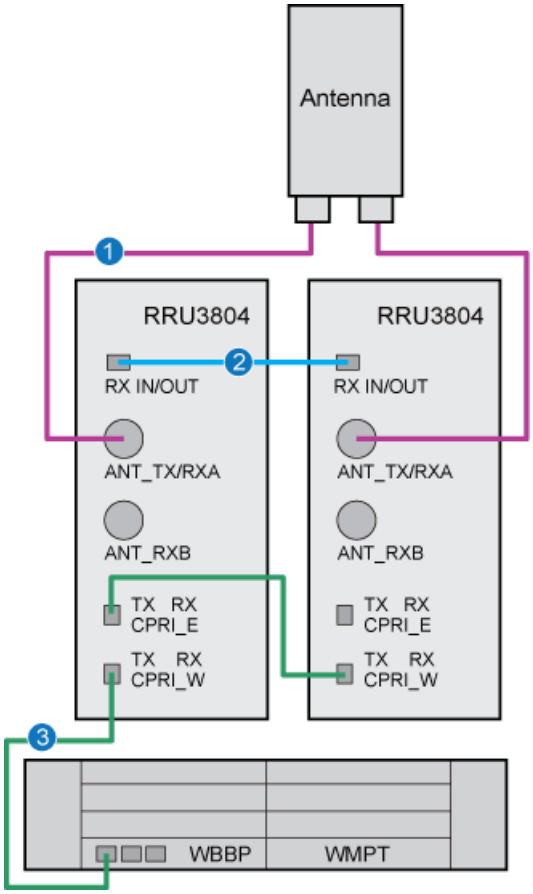
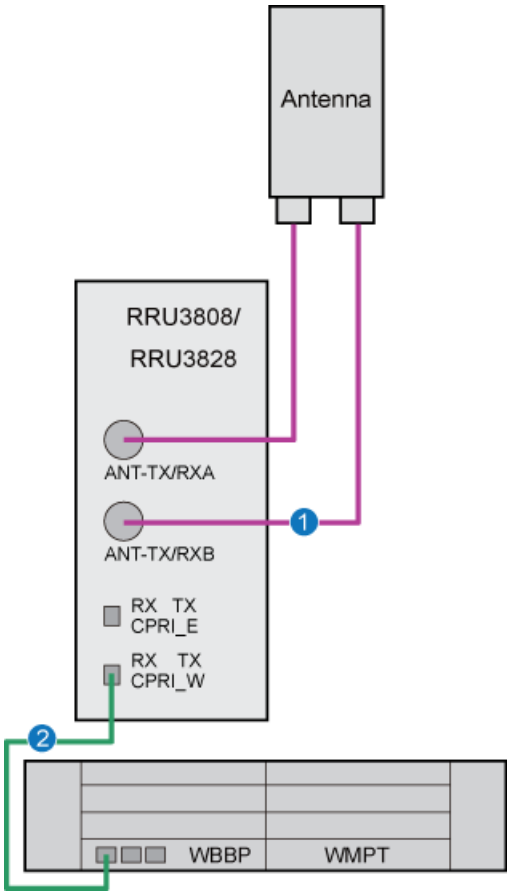


Figure 4-14 Cable connections of the NodeB supporting transmit diversity (RRU3808, or RRU3828 configured)



(1) RF jumper (2) CPRI optical cable

4.4 2x2 MIMO Configuration

2x2 MIMO configuration indicates that two channels that can transmit and receive data are configured. BTS3900, BTS3900A, BTS3900L, and DBS3900 support 2x2 MIMO configuration.

In 2x2 MIMO configuration, the NodeB mainly consists of the WMPT board, WBBP board, and RFU or RRU. The WMPT and WBBP boards are installed in BBU3900.

The WBBP supports three or six cells. The following takes the WBBP supporting six cells, WRFU supporting 80 W, WRFUd supporting 2 x 60 W, RRU3804 supporting 60 W, RRU3808 supporting 2 x 40 W, and RRU3828 supporting 2 x 40 W as examples to describe the 2x2 MIMO configuration.

Number of Modules

Table 4-4 lists the number of modules used for the NodeB supporting 2x2 MIMO.

Table 4-4 Number of modules used for the NodeB supporting 2x2 MIMO

Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs or RRU3804s	Number of WRFUds, RRU3808s, or RRU3828s
3×1	1	1	6	3
3×2	1	2	6	3

NOTE

The WBBPa board doesn't support MIMO configuration.

In 2x2 MIMO configuration, the WBBP board that originally supports six cells supports only three cells; the processing capability of the WBBP board that originally supports three cells remains unchanged.

Cable Connections

The following takes the 3x1 configuration as an example to describe the cable connections of the NodeB supporting 2x2 MIMO. **Figure 4-15** shows the cable connections when the WRFU is configured. **Figure 4-16** shows the cable connections when the WRFUd is configured. **Figure 4-17** shows the cable connections when the RRU3804 is configured. **Figure 4-18** shows the cable connections when the RRU3808, or RRU3828 is configured.

NOTE

- The following part takes a single sector as an example to describe the cable connections.
- It is recommended that the WBBP board where CPRI ports are in idle state should not be installed in slot 2 or 3. For details on the slots of BBU3900, see the *BBU3900 Hardware Description*.
- When two RF modules are used to achieve receive diversity, inter-RFU RF signal cables or inter-RRU RF cables, configured by default, are used to connect two RFUs or RRUs. From the version V200R012 onwards, users can set **RF Interconnection Mode**to **FALSE**if the inter-RFU RF signal cables or inter-RRU RF cables are not configured to achieve receive diversity.
- When different types of RRUs are interconnected, perform the following operations to rectify incorrect Received Total Wideband Power (RTWP) values:
  - View the main and diversity RTWP values of an RRU.
  - Run the **DSP RXBRANCH**command to query the initial RTWP rectification value. By default, the value is 0.
  - If the default initial rectification value is 0, run the **MOD RXBRANCH**command to set the RTWP initial rectification value so that the RTWP value is correct.

Figure 4-15 Cable connections of the NodeB in 2x2 MIMO configuration (WRFU configured)

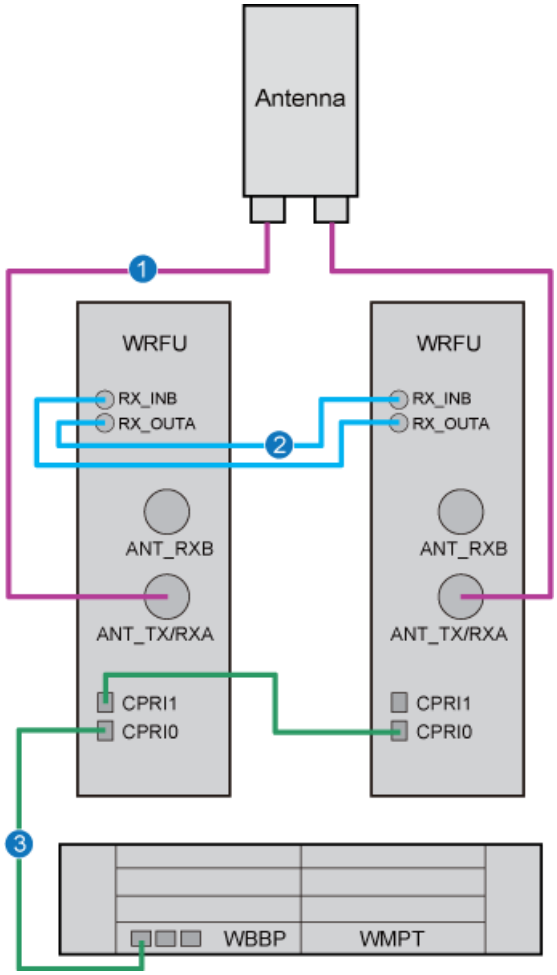
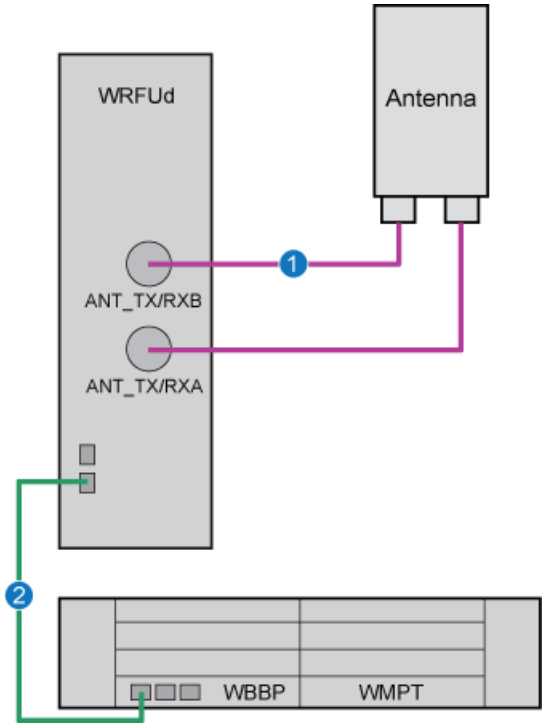


Figure 4-16 Cable connections of the NodeB supporting 2x2 MIMO (WRFUd configured)



(1) RF jumper (2) CPRI electrical cable

Figure 4-17 Cable connections of the NodeB in 2x2 MIMO configuration (RRU3804 configured)

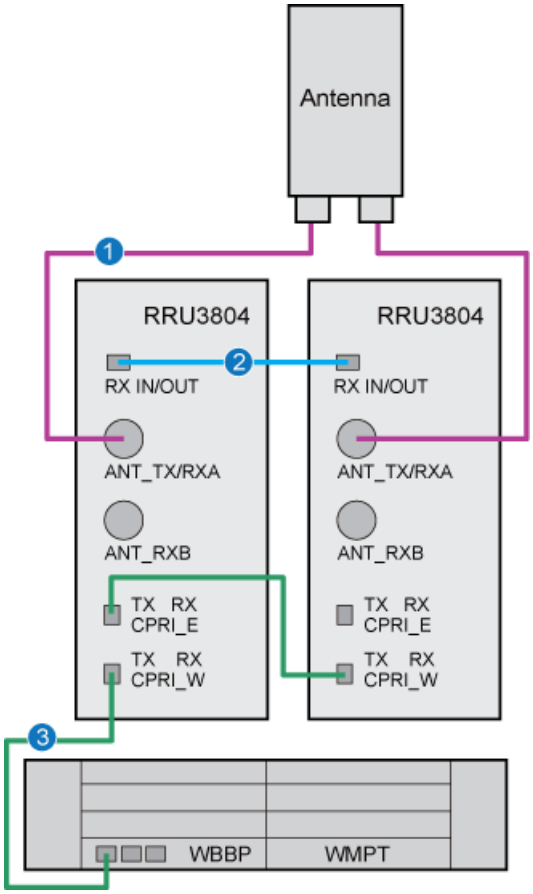
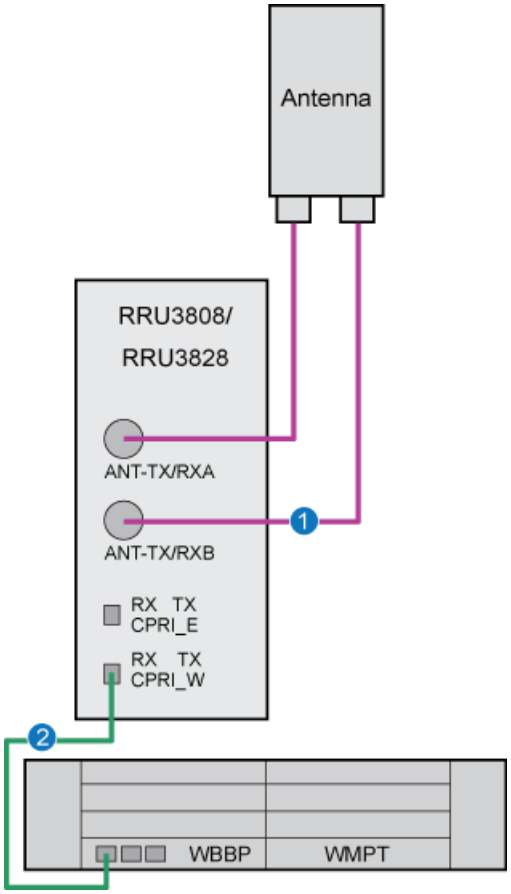


Figure 4-18 Cable connections of the NodeB supporting 2x2 MIMO (RRU3808, or RRU3828 configured)



(1) RF jumper (2) CPRI optical cable

4.5 2T4R Configuration

The BTS3900, BTS3900A, BTS3900L, and DBS3900 support both transmit diversity and 4-way receive diversity, that is, 2T4R.

In the 2T4R configuration, the NodeB consists of the WMPT, WBBP, and RFU or RRU. The WMPT and WBBP are installed in the BBU3900.

The WBBP supports three or six cells. The following takes the WBBP supporting six cells, WRFU supporting 80 W, and RRU3804 supporting 60 W as examples to describe 2T4R configurations.

Number of Modules

Table 4-5 lists the number of modules used for the NodeB in 2T4R configurations.

Table 4-5 Number of modules used for the NodeB in 2T4R configurations

Configuration Type	Number of WMPTs	Number of WBBPs (Supporting Six Cells)	Number of WRFUs	Number of RRU3804s
3×1	1	1	6	6
3×2	1	2	6	6

NOTE

In 2T4R configurations, the WBBP that originally supports six cells supports only three cells; the processing capability of the WBBP that supports three cells remains unchanged.

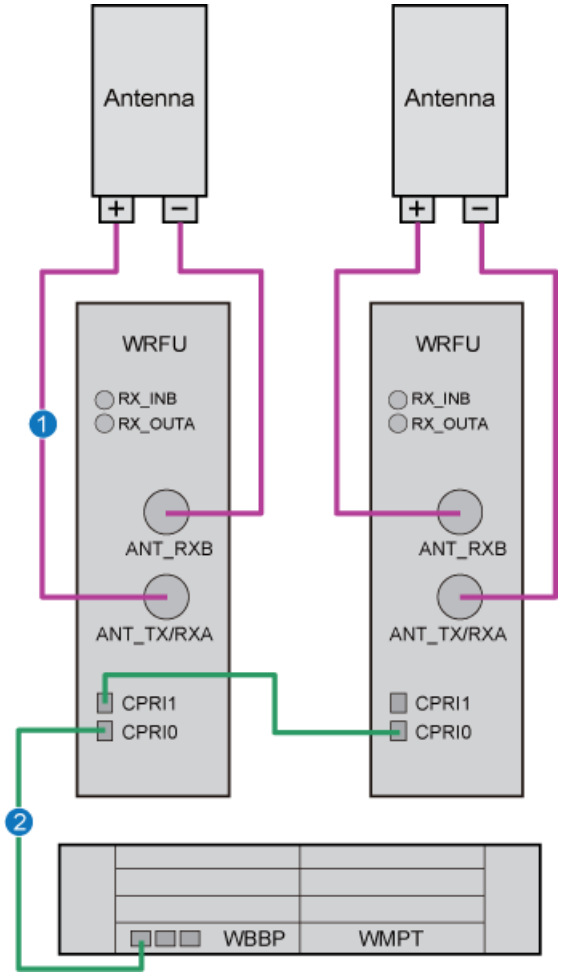
Cable Connections

The following takes the 3x1 configuration as an example to describe the cable connections of the NodeB in the 2T4R configuration. **Figure 4-19** shows the cable connections when the WRFU is configured. **Figure 4-20** shows the cable connections when the RRU3804 is configured.

NOTE

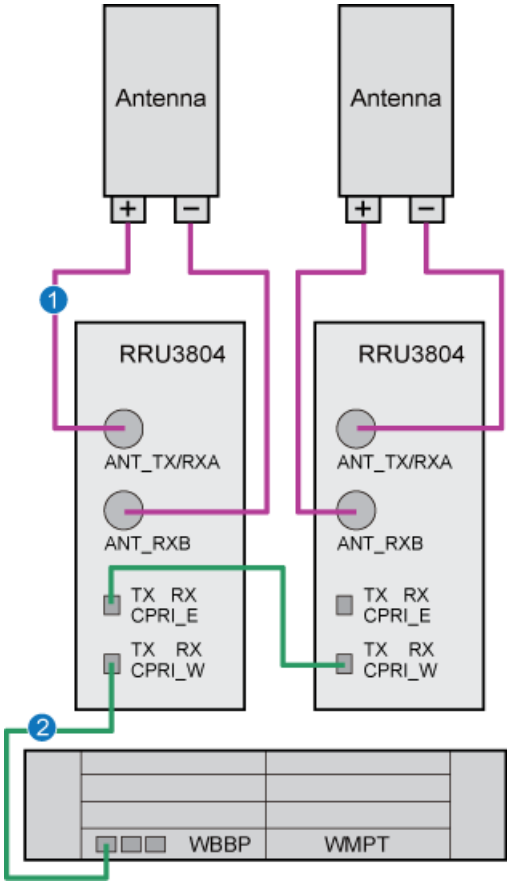
- A single sector is taken as an example to describe the cable connections.
- It is recommended that the WBBP not using the CPRI interface not be installed in slot 2 or 3. For detailed description of the BBU3900 slots, see the *BBU3900 Hardware Description*.

Figure 4-19 Cable connections of the NodeB in 2T4R configuration (WRFU configured)



(1) RF jumper (2) CPRI electrical cable

Figure 4-20 Cable connections of the NodeB in 2T4R configuration (RRU3804 configured)



(1) RF jumper (2) CPRI optical cable

5 NodeB Configuration Management

NodeB configuration management consists of the initial configuration and reconfiguration. At the initial stage of network deployment, the CME can be used to configure the basic data for all NodeBs in the network. After the NodeB is in service, the CME or MML commands can be used to reconfigure the NodeB data, such as add, delete, or modify the NodeB data. The CME is recommended.

Initial Configuration

At the initial stage of the UMTS network deployment or network capacity expansion stage, the CME is used to configure the basic NodeB data, after transmission channel is ready, the NodeB hardware devices can run successfully, then NodeB can run properly and provide basic services. The CME can be used to configure the basic data in following three modes:

- GUI mode: Applies to scenarios with a single NodeB deployment or reconfiguration of the existing NodeB data.
- Template file: The NodeB template file for a new NodeB site should be ready. You can obtain the NodeB template file in the following two ways:
  - Import the template file provided with the CME, adjust the template file in GUI mode, and save the self-defined NodeB template for other new NodeB sites.
  - Create a new NodeB in GUI mode according to the planning data, and save the configuration data as the self-defined NodeB template for other new NodeB sites.
- Iub negotiation configuration: The planning data should be obtained and the Iub interface planning data template should be filled in. You can obtain the Iub interface planning data template in the following two ways:
  - Directly obtain the empty Iub interface planning data template from the CME installation directory and fill in the template according to the planning data.
  - Create a new NodeB according to the actual planning data, and save the configuration data as the self-defined Iub interface planning data template (including the physical NodeB data) for other new NodeB sites.

For details about the NodeB initial configuration, see the *NodeB Initial Configuration Guide* .

Reconfiguration

After initial configuration of the NE data is complete and the NEs can provide basic services and run properly, the NE data can be adjusted and optimized through reconfiguration, including adjustment and optimization on the NE equipment data, transmission data, and radio data.

Reconfiguration applies to the following scenarios:

- Network optimization: The system running data is obtained through performance counter statistics or driving tests during the network running. Adjustment and optimization are performed on the basis of the obtained running data.
- Capacity expansion: New hardware is added to the existing network or system configuration is modified so that services are provided for more users.
- Feature configuration: Key parameters for the optional features are configured to activate the features.

You can use the CME or MML commands on the M2000 to reconfigure the NodeB. The CME is recommended.

For details about NodeB reconfiguration, see the *RAN Reconfiguration Guide*.

6 Topologies of the NodeB

About This Chapter

This describes the topologies of the NodeB, which consists of the networking on the Iub interface and networking on the CPRI interface.

6.1 Topology on the Iub Interface

The NodeB supports multiple topologies on the Iub interface, such as ATM-based and IP-based topologies.

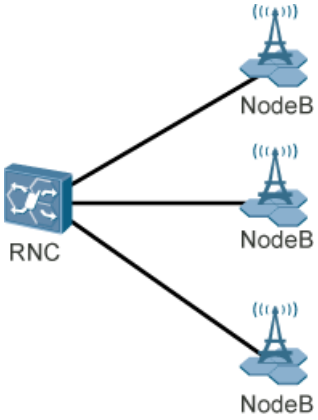
6.1.1 ATM-Based Topologies

The NodeB supports multiple topologies, such as star, tree, and chain, when the ATM protocol stack is applied.

Star Topology

The star topology is the most common topology and is adopted in densely populated areas. **Figure 6-1** shows the star topology.

Figure 6-1 Star topology



Advantages:

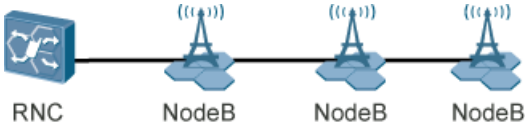
- The NodeB is directly connected to the RNC. Therefore, the star topology features easy maintenance, engineering, and capacity expansion.
- Each NodeB directly transmits data to and receives data from the RNC. Signals travel through only a few nodes, and therefore line reliability is high.

Disadvantages: Compared with other topologies, the star topology requires more transmission resources.

Chain Topology

The chain topology is applicable to belt-shaped and sparsely populated areas, such as areas along highways and railways. **Figure 6-2** shows the chain topology.

Figure 6-2 Chain topology



Advantages: This topology helps reduce the costs of transmission equipment, construction, and transmission line lease.

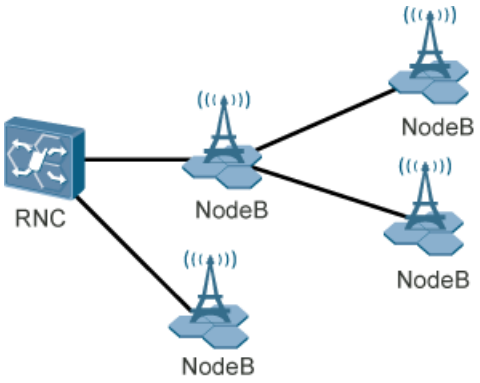
Disadvantages:

- Signals travel through many nodes, and therefore line reliability is low.
- A faulty NodeB may affect the operation of its lower-level NodeBs.
- The number of levels in a chain topology cannot exceed five.

Tree Topology

The tree topology is applicable to areas where the network architecture, site distribution, and subscriber distribution are complicated, for example, hot spot areas in which subscribers are widely distributed. **Figure 6-3** shows the tree topology.

Figure 6-3 Tree topology



Advantages: The tree topology requires fewer transmission cables than the star topology.

Disadvantages:

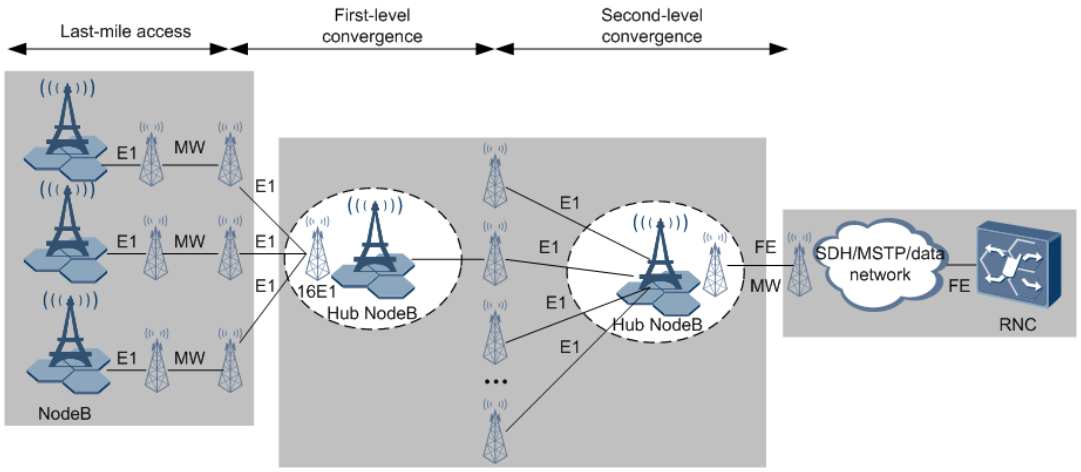
- Signals travel through many nodes, and therefore line reliability is low and engineering and maintenance are difficult.
- A faulty NodeB may affect the operation of lower-level NodeBs.
- Capacity expansion is difficult because it may require changes in the network architecture.
- The number of levels in a tree topology cannot exceed five.

6.1.2 IP-Based Topologies

In terms of IP-based topologies, the NodeB is enhanced to support the IP hub topology in addition to the star, chain, and tree topologies.

Transmission devices can be placed at the conjunctions of each tree topology. Typically, the hub NodeB is used for the first-level convergence. Based on capacity requirements, the hub NodeB or the transmission gateway can be used for the second-level convergence. **Figure 6-4** shows the IP hub networking.

Figure 6-4 IP hub topology



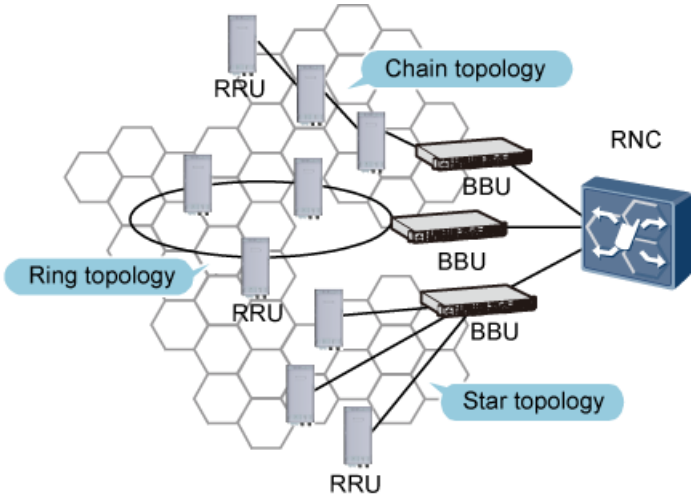
6.2 Topologies on the CPRI Interface

The BBU3900 and the RRUs are connected in the star, chain, or ring topology on the CPRI interface.

Topology Between the BBU3900 and the RRUs

The BBU3900 and the RRUs can be connected in the star, chain, or ring topology, as shown in **Figure 6-5**.

Figure 6-5 Topology between the BBU3900 and the RRUs



The topologies on the CPRI interface are classified into two types, depending on the distance between the BBU3900 and the RRUs.

- In a short-distance scenario, the longest distance between an RRU and the BBU on a CPRI chain should not exceed 100 m.
- In a long-distance scenario, the longest distance between an RRU and the BBU on a CPRI chain should range from 100 m to 40,000 m.

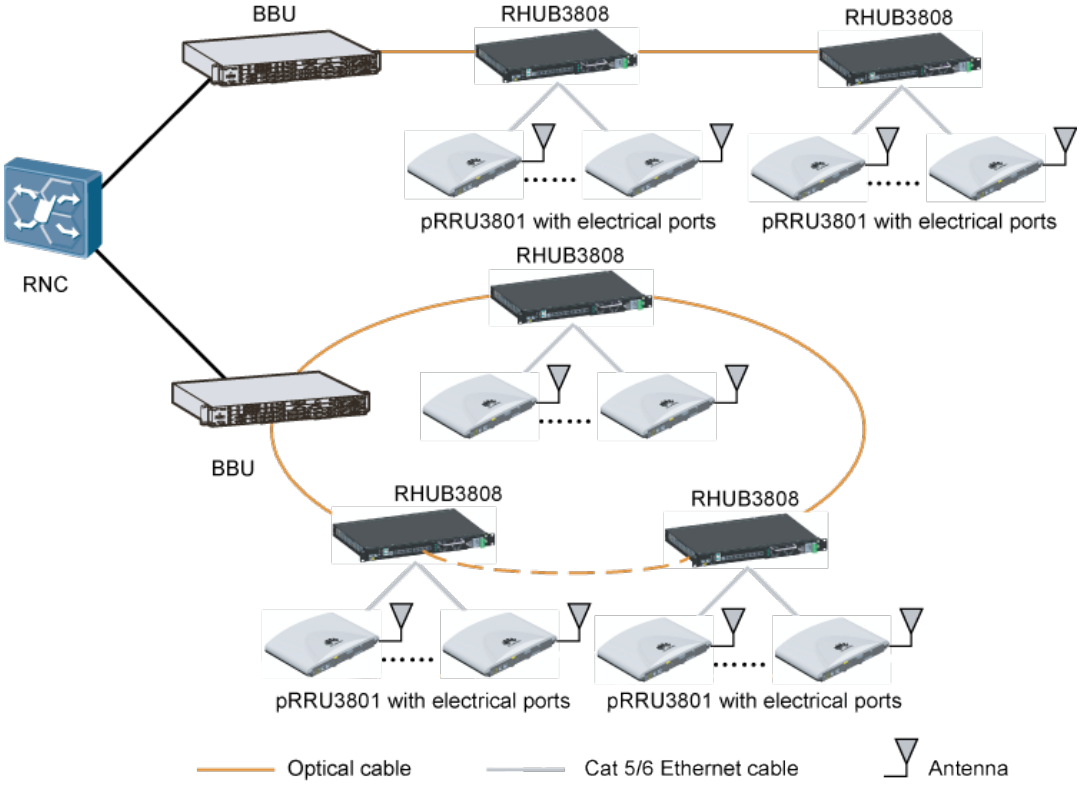
Different CPRI optical cables are used in the preceding two scenarios. For details, see the chapter CPRI Optical Cable in the *BBU3900 Hardware Description*.

Topology Between the BBU3900, RHUB3808, and pRRU with an Electrical Port

The pRRU3801 with an electrical port is connected to the BBU3900 through the RHUB3808 to form the iDBS3900.

The BBU3900 and the RHUB3808 can be connected in the chain or ring topology, and the RHUB3808 and the pRRU3801 with an electrical port can be connected in the star topology, as shown in **Figure 6-6**.

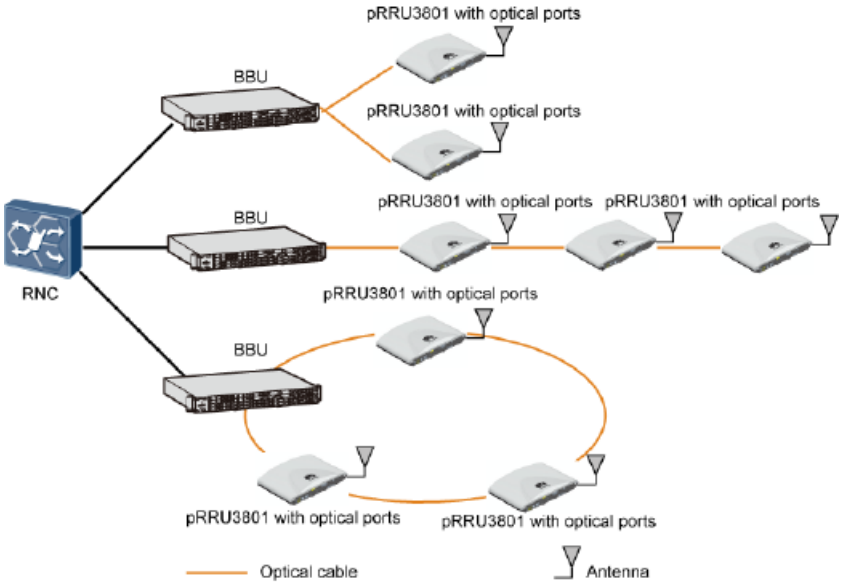
Figure 6-6 Topology between the BBU3900, RHUB3808, and pRRU with an electrical port



Topology Between the BBU3900 and the pRRU with Optical Ports

The BBU3900 and the pRRU3801 with optical ports can be connected in the star, chain, or ring topology, as shown in **Figure 6-7**.

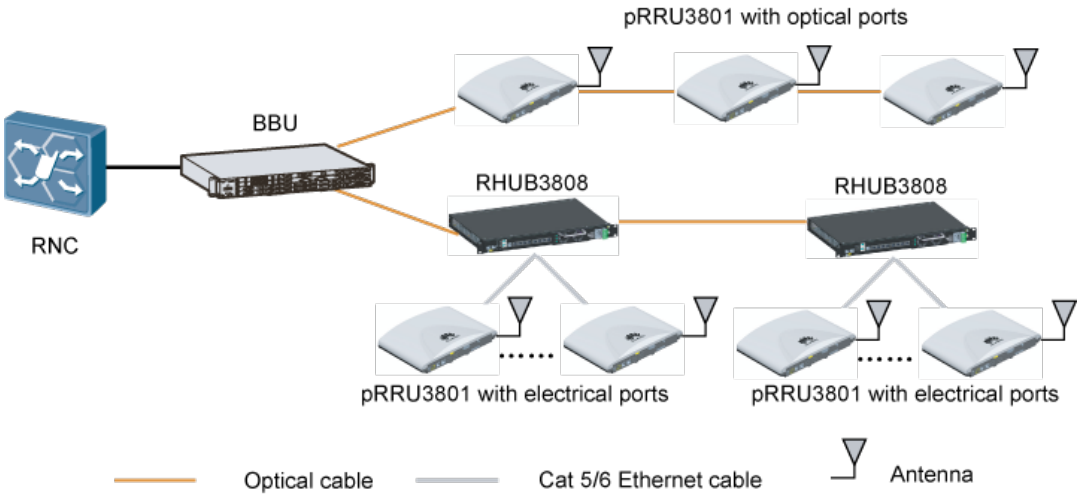
Figure 6-7 Topology between the BBU3900 and the pRRU with optical ports



BBU3900, RHUB3808, pRRU with an Electrical Port, and pRRU with Optical Ports in the Hybrid Topology

The BBU3900, RHUB3808, pRRU3801 with an electrical port, and pRRU3801 with optical ports are connected in the hybrid topology, as shown in **Figure 6-8**.

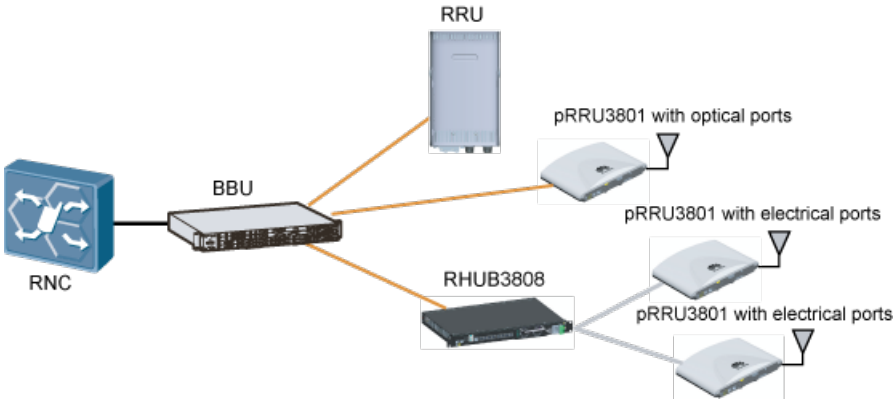
Figure 6-8 BBU3900, RHUB3808, pRRU with an electrical port, and pRRU with optical ports in the hybrid topology



BBU3900, RRU, and pRRU in the Hybrid Topology

The BBU3900, RRU, and pRRU are connected in the hybrid topology, as shown in **Figure 6-9**.

Figure 6-9 BBU3900, RRU, and pRRU in the hybrid topology



CPRI Interface Specifications

Table 6-1 provides the CPRI interface specifications of the WBBP.

Table 6-1 CPRI interface specifications of the WBBP board

Board	Number of CPRI Ports	CPRI Data Rate	Network Topology	Number of Cells Supported (Not Enabled with MIMO or 4-Way Receive Diversity)
WBBPa	3	1.25 Gbit/s	Star, chain, or ring	3
WBBPb1/ WBBPb2	3	1.25 Gbit/s or 2.5 Gbit/s	Star, chain, or ring	3
WBBPb3/ WBBPb4	3	1.25 Gbit/s or 2.5 Gbit/s	Star, chain, or ring	6
WBBPd	6	1.25 Gbit/s or 2.5 Gbit/s	Star, chain, or ring	6

When the WBBP board works in 4-way receive diversity, each board supports three four-antenna cells. When the WBBPb or WBBPd board is enabled with MIMO, each board supports three MIMO cells.

Table 6-2 provides the mapping between the CPRI data rate and the number of supported cells.

Table 6-2 Mapping between the CPRI data rate and the number of supported cells

CPRI Data Rate (Gbit/s)	Number of Cells Supported (Not Enabled with MIMO or 4-Way Receive Diversity)
1.25	4
2.5	8

In the chain or ring topology, configure the number of supported cells according to the corresponding CPRI data rate.

Table 6-3 provides the CPRI interface specifications of different RF modules.

Table 6-3 CPRI interface specifications of different RF modules

Module	Number of CPRI Ports	CPRI Data Rate (Gbit/s)	Network Topology	Number of Cascading Levels	Maximum Distance from the BBU
WRFU	2	1.25/2.5	Star or chain	2 (serving the same sector)	N/A
WRFUd	2	1.25/2.5	Star	N/A	N/A
MRFU	2	1.25/2.5	Star	N/A	N/A
MRFUd	2	1.25/2.5	Star	N/A	N/A
RRU3908	2	1.25/2.5	Star	N/A	40 km
RRU3928	2	1.25/2.5	Star	N/A	40 km
RRU3929	2	1.25/2.5	Star	N/A	40 km
RRU3828	2	1.25/2.5	Star, chain, or ring	● 4 at 1.25 Gbit/s ● 8 at 2.5 Gbit/s	40 km
RRU3804/ RRU3806/ RRU3808	2	1.25/2.5	Star, chain, or ring		
RRU3801E	2	1.25/2.5	Star, chain, or ring		
RRU3805	2	1.25	Star, chain, or ring		
pRRU3801 with optical ports	2	1.25	Star, chain, or ring	8 (serving the same cell)	40 km

Module	Number of CPRI Ports	CPRI Data Rate (Gbit/s)	Network Topology	Number of Cascading Levels	Maximum Distance from the BBU
pRRU3801 with an electrical port	1	N/A	N/A	N/A	100 m
RHUB3808	● 2 for connecting the BBU3900 ● 8 for connecting the electrical ports of pRRU3801s	N/A	Chain or ring	N/A	N/A

NOTE

- WRFUds, MRFUds, RRU3828s, RRU3928s, and RRU3929s cannot be interconnected using RF signal cables.
- Limited by the transmission bandwidth of CPRI ports, one RRU supports only one cell having one TX channel and two RX channels at the maximum cascading level.

7 Clock Synchronization Mode of the NodeB

The NodeB supports multiple reference clock sources, including the E1/T1 clock, GPS clock, BITS clock, IP clock, and synchronous Ethernet clock. If no external clock source is available, the NodeB uses the free-run clock.

E1/T1 Clock

The NodeB can directly extract clock signals from the E1/T1 interface and synchronize its clock with the clock source of the upper-level NE, such as the RNC.

GPS Clock

When the upper-level clock is unstable or unavailable, the NodeB can use the GPS clock as the clock source. In this case, the NodeB needs to be configured with the Universal Satellite Card and Clock Unit (USCU). The NodeB receives the GPS clock signals from the GPS antenna and then sends them to the USCU. The USCU processes the clock signals and then sends them to the clock module.

BITS Clock

The NodeB can synchronize its clock with an external reference clock such as the 2.048 MHz clock. The reference clock can be a BITS clock or a 2.048 MHz clock from transmission equipment.

IP Clock

The NodeB can obtain IP clock signals from an all-IP network. This provides a highly cost-effective clock solution for IP transmission. The NodeB supports the IP clock through software upgrade without adding hardware.

Synchronous Ethernet Clock

When the NodeB works in IP over FE mode and the transport network supports the synchronous Ethernet clock, the NodeB obtains Ethernet clock signals from the transport network.

Free-Run Clock

The NodeB adopts a high-accuracy Oven-Controlled Crystal Oscillator (OCXO) as the free-run clock, together with advanced algorithms and software phase-lock technologies. This enables

the performance of the system clock to reach the stratum-3 clock standard. When no external clock source is available, the free-run clock allows the NodeB to work normally for at least 90 days.

8 Surge Protection Specifications for Ports on the NodeB

This section describes the surge protection specifications for the ports on the BTS3900, BTS3900A, BTS3900L, BTS3900C, BBU3900, RRU, and RFU.

NOTE

- Unless otherwise specified, the surge protection specifications are based on the surge waveform of 8/20 μs.
- All the items, unless otherwise specified as the maximum discharge current, refer to the nominal discharge current.

Surge Protection Specifications for the Ports on the BTS3900 (Ver.B)

Table 8-1 describes the surge protection specifications for the ports on the BTS3900 (Ver.B).

Table 8-1 Surge protection specifications for the ports on the BTS3900 (Ver.B)

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	1 kA
	Common mode	2 kA
Port for 220 V AC power	Differential mode	3 kA
	Common mode	5 kA

Surge Protection Specifications for the Ports on the BTS3900 (Ver.C)

Table 8-2 describes the surge protection specifications for the ports on the BTS3900 (Ver.C).

Table 8-2 Surge protection specifications for the ports on the BTS3900 (Ver.C)

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	2 kV (surge waveform of 1.2/50 μs)
	Common mode	4 kV (surge waveform of 1.2/50 μs)
Port for 220 V AC power	Differential mode	● 5 kA ● 2 kV (surge waveform of 1.2/50 μs)
	Common mode	● 5 kA ● 4 kV (surge waveform of 1.2/50 μs)

Surge Protection Specifications for the Ports on the BTS3900A (Ver.B)

Table 8-3 describes the surge protection specifications for the ports on the BTS3900A (Ver.B).

Table 8-3 Surge protection specifications for the ports on the BTS3900A (Ver.B)

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	10 kA
	Common mode	15 kA
Port for 220 V AC power	Differential mode	60 kA
	Common mode	60 kA

Surge Protection Specifications for the Ports on the BTS3900A (Ver.C)

Table 8-4 describes the surge protection specifications for the ports on the BTS3900A (Ver.C).

Table 8-4 Surge protection specifications for the ports on the BTS3900A (Ver.C)

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	● 10 kA ● 2 kV (surge waveform of 1.2/50 μs)
	Common mode	● 10 kA ● 4 kV (surge waveform of 1.2/50 μs)

Port	Surge Protection Mode	Specification
Port for 220 V AC power	Differential mode	● 40 kA ● 2 kV (surge waveform of 1.2/50 μs)
	Common mode	● 40 kA ● 4 kV (surge waveform of 1.2/50 μs)

Surge Protection Specifications of the BTS3900L (Ver.B) Ports

Table 8-5 describes the surge protection specifications for the ports on the BTS3900L (Ver.B).

Table 8-5 Surge protection specifications of the BTS3900L (Ver.B) ports

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	1 kA
	Common mode	2 kA

Surge Protection Specifications for the Ports on the BTS3900L (Ver.C)

Table 8-6 describes the surge protection specifications for the ports on the BTS3900L (Ver.C).

Table 8-6 Surge protection specifications for the ports on the BTS3900L (Ver.C)

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	1 kA
	Common mode	2 kA

Surge Protection Specifications for the Ports on the BTS3900C

Table 8-7 describes the surge protection specifications for the ports on the BTS3900C.

Table 8-7 Surge protection specifications for the ports on the BTS3900C

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	10 kA
	Common mode	15 kA
Port for 220 V AC power	Differential mode	40 kA

Port	Surge Protection Mode	Specification
	Common mode	40 kA

Surge Protection Specifications for the Ports on the BBU3900

Table 8-8 describes the surge protection specifications for the ports on the BBU3900.

Table 8-8 Surge protection specifications for the ports on the BBU3900

Port	Surge Protection Mode	Specification
Port for -48 V DC power	Differential mode	1 kA
	Common mode	2 kA
E1 port	Differential mode	250 A
	Common mode	250 A
E1 port (configured with the UELP)	Differential mode	3 kA
	Common mode	5 kA
FE port	Differential mode	500 V (surge waveform of 1.2/50 μs)
	Common mode	2000 V (surge waveform of 1.2/50 μs)
FE port (configured with the UFLP)	Differential mode	1 kA
	Common mode	2 kA
GPS port (configured with a GPS surge protector)	Differential mode	8 kA
	Common mode	40 kA
Port for dry contact alarms	Differential mode	250 A
	Common mode	250 A

9 Operation and Maintenance of the NodeB

About This Chapter

The OM subsystem of the NodeB manages, monitors, and maintains the software, hardware, and configuration of the NodeB. In addition, the OM subsystem provides various OM modes and multiple maintenance platforms to meet different maintenance requirements.

9.1 OM Modes of the NodeB

The NodeB can be maintained on the Local Maintenance Terminal (LMT) and M2000.

Three OM modes supported by the NodeB

- Local maintenance: The NodeB is maintained on the LMT through the maintenance Ethernet port of the NodeB.
- Remote maintenance: The NodeB is maintained on the M2000 in a centralized management center or on the LMT in an RNC equipment room.
- Reverse maintenance: A NodeB under an RNC is maintained on the LMT through the service Ethernet port of another NodeB under the same RNC. That is, IP routes between the RNC and the two NodeBs are used to perform OM.

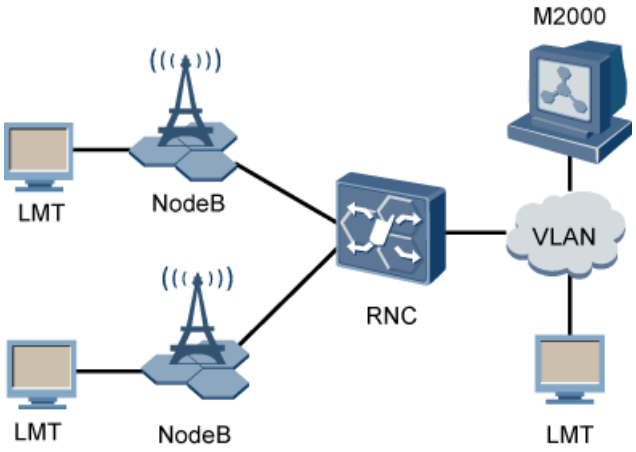
Characteristics of the NodeB OM modes

- The NodeB supports the Bootstrap Protocol (BOOTP), Dynamic Host Configuration Protocol (DHCP), and Adaptive and Active Cache Pool (AACP). When no data is configured for the system or when the system is faulty, the OM channel can be automatically set up. This enhances the system reliability and facilitates remote troubleshooting.
- Baseline configuration is supported to simplify the configuration rollback procedure and improve the rollback reliability.
- The intelligent out-of-service function is provided. Before the NodeB becomes out of service, it hands over the UEs to other 2G or 3G cells by gradually reducing the cell Common Pilot Channel (CPICH) power to avoid service interruption.
- The RRU network topology is automatically monitored in real time, reducing manual operations.
- The NodeB provides a complete system self-check function, and therefore local commissioning is not required.

Components of the NodeB OM subsystem

Figure 9-1 shows the OM subsystem of the NodeB.

Figure 9-1 OM subsystem of the NodeB



The OM subsystem of the NodeB consists of the following components:

- LMT: The LMT is installed with the LMT software package and is connected to the OM network of network elements (NEs). You can operate and maintain a NodeB through the LMT.
- NodeB: maintained object.
- M2000: used to maintain multiple NodeBs.
- OM channel: channel between the NodeB and the LMT or M2000.

9.2 OM Functions of the NodeB

The OM subsystem of the NodeB provides functions such as commissioning management, equipment management, software management, alarm management, security management, and environment monitoring.

Commissioning Management

Commissioning management provides the following functions:

- Equipment performance tests, such as CPU usage test, clock source quality test, and power test.
- Routine test, such as E1/T1 performance measurement.
- Service performance tests, such as uplink channel scanning, and statistics for service resource usage.

Equipment Management

Equipment management consists of equipment maintenance and data configuration. Equipment management has the following functions:

- Equipment maintenance includes the maintenance of equipment or boards, for example, resetting boards, managing the status of equipment, performing self-check on the equipment, performing an active/standby switchover, and calibrating the clock.
- Data configuration includes configuration, query, and backup of equipment parameters, for example, configuring the parameters of the NodeB hardware, parameters of the NodeB clock, algorithm parameters, and RF parameters.

Software Management

Software management provides the following functions:

- Activating the software
- Checking the compatibility of software and hardware versions
- Managing versions, for example, querying hardware and software versions
- Upgrading the software version, cold patch, and hot patch

Alarm Management

Alarm management involves equipment alarm management and environment alarm management.

- Equipment alarm management

  The alarm management system detects and reports information about faults in real time. The LMT or M2000 then displays the alarm information and provides appropriate handling suggestions.

  The alarm management system of the M2000 connects to an alarm box through a serial port and supports audible and visual alarms through the LEDs or the alarm box. The maintenance personnel can subscribe to specific alarms. When related alarms are generated, the alarm information is forwarded to the handsets or pagers of the maintenance personnel so that they can rectify the faults in time.

- Environment alarm management

  Generally, equipment rooms of NodeBs are unattended and distributed over a large area. The equipment works in a relatively adverse environment, and emergency cases may incur. To help you handle such emergencies, the NodeB provides a complete alarm management system.

Alarm management provides the following functions:

- Alarm detecting
- Alarm reporting
- Alarm shielding
- Alarm acknowledging
- Alarm pre-processing
- Alarm correlation processing
- Alarm help processing

Security Management

The operation rights of maintenance personnel are classified into multiple levels when both NodeB and M2000 are applied. This ensures that the running equipment is free from misoperations.

Environment Monitoring

The environment monitoring system provides customized solutions regarding door control, infrared, smoke, water immersion, humidity, and temperature.

10 Reliability of the NodeB

The NodeB features a new system architecture and a complete redundancy design. In addition, the NodeB takes advantage of Huawei large-capacity ASIC chips to enhance the integration of modules and to reduce the number of parts, thus significantly improving the system reliability.

System Reliability

The NodeB has a reliability design with features such as load sharing and redundancy configuration. It adopts the optimized fault detection and isolation technology for the boards and system, thus greatly enhancing system reliability.

Redundancy design

- The main control board, transmission board, power supply unit, and FAN unit in the NodeB all support redundancy. The BBU supports load sharing. The RF module supports backup.
- The CPRI port between the BBU and the RF modules supports the ring topology. When one CPRI link is faulty, the NodeB can automatically switch to another CPRI link.
- The key data such as software versions and data configuration files in the NodeB supports redundancy.

Reliability design

- The NodeB can automatically perform self-detection and diagnose hardware failures and environment problems, and then report alarms. It also attempts to conduct self-healing to clear faults. If the self-healing fails, the faulty unit is automatically isolated.
- The function of route load sharing at the IP layer is optimized, and the protection at the route level is supported.
  - This function is implemented through combination with the end-to-end detection mechanism.
  - With this function, the NodeB can help the RNC to ensure that the users on the faulty links, in the case of load sharing, can switch to normal links. In this way, the NodeB can implement user switch among different interfaces on the same board.

Hardware Reliability

Anti-misinsertion design of boards

When a board is incorrectly inserted into the slot of another board, the mistaken board cannot be connected to the backplane, and in this way, the equipment is free from damage.

Overtemperature protection

When the ambient temperature of the PA on the RF module is excessively high, the NodeB generates an overtemperature alarm and immediately shuts down the PA to prevent any damage.

Reliable power supply

- The NodeB has wide-range voltage and surge protection functions.
- The NodeB provides power failure protection for programs and data.
- The boards protect power supply against overvoltage, overcurrent, and reverse connection of positive and negative poles.

All-round surge protection design

The NodeB takes surge protection measures on AC and DC power sockets, input and output signal ports (E1 port, interconnection port, and Boolean alarm port), antenna connectors, and GPS ports.

Software Reliability

The software reliability is embodied in the redundancy of key files and data and the powerful error tolerance of software.

Redundancy

The NodeB provides the backup function for key files and data, such as software and data configuration files, to ensure proper operation of the NodeB when errors occur in these files and data.

- Redundancy of software versions: The NodeB provides separate redundancy for software versions including the BootROM software version to avoid version problems. If one version becomes faulty, the NodeB switches to the backup version.
- Redundancy of data configuration files: The NodeB provides separate redundancy for data configuration files to avoid interrupting the running of the files. If the current file becomes faulty, the NodeB can continue working properly by loading the backup file.

Error tolerance capability

When the software is faulty, it does not affect the entire NodeB because the system is capable of self-healing. The software error tolerance of the NodeB covers the following aspects:

- Scheduled detection of key resources: The NodeB performs occupancy check on software resources. If resource hang-up occurs due to software faults, the NodeB can release the unavailable resources in time and export logs and alarms.
- Task monitoring: During the running of software, the NodeB monitors the internal errors of all software and some hardware faults, if any. The NodeB also has a monitoring process to monitor running status and report alarms when the system is faulty, and try to restore the task by self-healing.
- Data check: The NodeB performs scheduled or event-triggered data consistency check and restores the data consistency preferably or preferentially. In addition, the NodeB generates related logs and alarms.
- Watchdog: When a software error occurs, the NodeB detects the error through the software watchdog and hardware watchdog and automatically resets the system.

11 Technical Specifications

About This Chapter

This section provides technical specifications for RF modules.

11.1 Technical Specifications for RFUs
This section provides technical specifications for RFUs, including supported modes, frequency bands, RF specifications, surge protection specifications, and antenna capabilities.

11.2 Technical Specifications for RRUs
This section provides technical specifications for RRUs, including supported modes, frequency bands, RF specifications, engineering specifications, and antenna capabilities.

11.1 Technical Specifications for RFUs

This section provides technical specifications for RFUs, including supported modes, frequency bands, RF specifications, surge protection specifications, and antenna capabilities.

11.1.1 Technical Specifications for WRFU

This section provides technical specifications for WRFU.

Supported Modes and Frequency Bands

Table 11-1 shows the modes and frequency bands supported by the WRFU.

Table 11-1 Modes and frequency bands supported by the WRFU

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
80W WRFU	UMTS	2100	1920~1980	2110~2170
		850	824~835	869~880
40W WRFU		2100	1920~1980	2110~2170

RF Specifications

Table 11-2 shows RF specifications for the WRFU.

Table 11-2 RF specifications for the WRFU

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	Sensitivity (dBm) 4-Way Receiver Sensitivity (dBm)		
WRFU	1T2R	● 80W WRFU:four carriers ● 40W WRFU:two carriers	● -125.8 (Frequency Band: 2100 MHz) ● -125.6 (Frequency Band: 850** MHz)	● -128.6 (Frequency Band :2100 MHz) ● -128.4 (Frequency Band: 850** MHZ)	● -131.3 (Frequency Band :2100 MHz) ● -131.1 (Frequency Band: 850** MHz)	**Output power of Typical 80W WRFU configuration** **Output power of Typical 40W WRFU configuration**	**Power consumption of the BTS3900** **Power consumption of the BTS3900A** **Power consumption of the BTS3900L**

NOTE

- As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.
- **:Measurement value of the sub-band at 850 MHz.

The 80W WRFU supports four carriers and Uneven power configuration, and its output power at the antenna port reaches 80 W.

Table 11-3 Output power of Typical 80W WRFU configuration

Number of Carriers	Output Power per Carrier (W)
1	60
2	40*

Number of Carriers	Output Power per Carrier (W)
3	20
4	20

NOTE

- Maximum output power = Maximum output power of the PA - Internal losses. The maximum output power is measured at the antenna port of the RF module.
- * indicates the maximum output power in the typical configuration.

The 40W WRFU supports two carriers, and its output power at the antenna port reaches 40 W.

Table 11-4 Output power of Typical 40W WRFU configuration

Number of Carriers	Output Power per Carrier (W)
1	40
2	20

NOTE

The 40 W WRFU supports only the 2100 MHz band class.

Table 11-5 Power consumption of the BTS3900

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				50Ah	92Ah	184Ah
3x1	20W	410	520	5.2	10.8	21.5
3x2	20W	470	670	4.4	9.2	18.8
3x3	20W	610	830	3.3	6.9	14.5
3x4	20W	760	1110	2.5	5.1	11.62

Table 11-6 Power consumption of the BTS3900A

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				50Ah	92Ah	184Ah
3x1	20W	455	525	4.7	9.5	19.4
3x2	20W	525	690	3.9	8.2	16.8
3x3	20W	680	870	2.9	6	13
3x4	20W	845	1180	2.2	4.5	10.5

Table 11-7 Power consumption of the BTS3900L

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)
3x1	20W	430	570
3x2	20W	500	720
3x3	20W	640	880
3x4	20W	790	1170

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- In the 3x1 or 3x2 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPb4 units and one WMPT are configured.

Surge Protection Specifications

Table 11-8 shows the surge protection specifications for the ports on the WRFU.

Table 11-8 Surge protection specifications for the ports on the WRFU

Port	Surge Protection Mode	Specification
RF port	Differential mode	8 kA
	Common mode	40 kA

Antenna Capabilities

Table 11-9 shows antenna capabilities for the WRFU.

Table 11-9 Antenna capabilities for the WRFU

Type	TMA Capabilites	RET Antenna Capabilities
WRFU	Supported	Supports AISG2.0

NOTE

For RFUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.1.2 Technical Specifications for MRFU

MRFUs are classified into MRFU V1, MRFU V2 and MRFU V2a. Adopting the software-defined radio (SDR) technology, MRFU modules can work in different modes with different configurations.

Supported Modes and Frequency Bands

Table 11-10 shows the modes and frequency bands supported by an MRFU.

Table 11-10 Modes and frequency bands supported by an MRFU

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
MRFU V1	GSM UMTS	900	890-915	935-960
		1800	1710-1755	1805-1850
			1740-1785	1835-1880
		1900	1850-1890	1930-1970
			1870-1910	1950-1990
MRFU V2	GSM UMTS LTE	850	824-846.5	869-891.5
		900	890-915	935-960
			880-915	925-960
		1800	1710-1770	1805-1865
			1725-1785	1820-1880
MRFU V2a	GSM UMTS LTE	900	885-910	930-955
		1800	1710-1755	1805-1850

RF Specifications

Table 11-11 shows RF specifications for an MRFU.

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE should be obtained from the LTE marketing personnel.
- The MRFU complies with ETSI EN 301 908 V5.2.1 standards.

Table 11-11 RF specifications for an MRFU

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
MRFU V1	1T 2R	GSM: 6 carriers UMTS: 4 carriers	GSM (900 PGSM/ 1800): -113 UMTS (900 PGSM/ 1800): -125.5	GSM (900 PGSM/ 1800): -115.8 UMTS (900 PGSM/ 1800): -128.3	GSM (900 PGSM/ 1800): -118.5 UMTS (900 PGSM/ 1800): -131	**Output Power of an MRFU V1 (900 MHz/ 1800 MHz/ 1900 MHz)**	**Power consumption (configured with MRFU V1, 900 MHz)**
MRFU V2	1T 2R	GSM: 6 carriers UMTS: 4 carriers LTE: ● 900 MHz: 1 x	GSM: ● 900 PGSM: -113.5 ● 900 EGSM: -113.3 ● 1800: -113.8	GSM: ● 900 PGSM: -115.8 ● 900 EGSM: -116.1 ● 1800: -116.6	GSM: ● 900 PGSM: -118.5 ● 900 EGSM: -118.8 ● 1800: -119.3	**Output Power of an MRFU V2 (900 MHz/ 1800 MHz)**	**Power consumption (configured with MRFU V2, 900 MHz)**

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
MRFU V2a		(1.4, 3, 5, 10, 15, 20 MHz) per PA ● 1800 MHz: 1 x (5, 10, 15, 20 MHz) per PA	UMTS: ● 900 PGSM/ 1800: -125.5 ● 900 EGSM: -125.3	UMTS: ● 900 PGSM/ 1800: -128.3 ● 900 EGSM: -128.1	UMTS: ● 900 PGSM/ 1800: -131 ● 900 EGSM: -130.8		

NOTE

- * indicates that the UMTS mode is supported in terms of hardware.
- Power sharing assumes a random distribution of UEs in the cell.
- The output power is 1 dB lesser than the standard power when the MRFU is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the MRFU is located at a height of 4500 m to 6000m.
- The GSM power is measured when the modulation scheme is GMSK. If the modulation scheme is 8PSK, the output power is 1.8 dB less than that in GMSK mode. When one to three TRXs of an MRFU V2 (900 MHz PGSM) are used, the GSM power in 8PSK mode is the same as that in GMSK mode.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, power sharing cannot be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, or enhanced measurement report. In GBSS9.0, power sharing can be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, and enhanced measurement report. In GBSS8.1 and GBSS9.0, power sharing cannot be used together with IBCA, dynamic MAIO, RAN sharing, or double-slot cell.

Table 11-12 Output Power of an MRFU V1 (900 MHz/1800 MHz/1900 MHz)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
GSM	1	0	60	60	0
	2	0	40	40	0
	3	0	27	31	0
	4	0	20	27	0
	5	0	12	20	0
	6	0	10	16	0
UMTS	0	1	0	0	60
	0	2	0	0	40
	0	3	0	0	27*
	0	4	0	0	20*

Table 11-13 Output Power of an MRFU V2 (900 MHz/1800 MHz)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
GSM	1	0	60	60	0
	2	0	40	40	0
	3	0	27	31	0
	4	0	20	27	0
	5	0	16	20	0
	6	0	12	20	0
UMTS	0	1	0	0	60
	0	1	0	0	2x60 (MIMO with 2 MRFUs)
	0	2	0	0	40
	0	2	0	0	2x40 (MIMO with 2 MRFUs)
	0	3	0	0	27*
	0	3	0	0	2x27 (MIMO with 2 MRFUs)*
	0	4	0	0	20*
	0	4	0	0	2x20 (MIMO with 2 MRFUs)*
LTE	0	1	0	0	1x60

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25°C.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption is a value obtained when the LTE load reaches 50%. The maximum power consumption is a value obtained when the LTE load reaches 100%. The 2x2 MIMO configuration is applied to RF modules working in LTE mode and the power of each carrier is 40 W.
- The power consumption for GSM is calculated based on the sharing power.

Table 11-14 Power consumption (configured with MRFU V1, 900 MHz)

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900 (Ver.B) (-48V)	GSM	3x2	20	700	900
		3x4	27	950	1350
		3x6	16	840	1180
	UMTS	3x1	20	540	670
		3x2	20	800	1020
		3x3	20	1040	1330
		3x4	20	1150	1450
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/40	1150	1440
		GSM 3x4 + UMTS 3x1	15/10	970	1260
		GSM 3x4 + UMTS 3x2	10/10	930	1190
BTS3900 A (Ver.B) (AC)	GSM	3x2	20	800	1040
		3x4	27	1070	1540
		3x6	16	950	1340
	UMTS	3x1	20	660	840
		3x2	20	950	1220
		3x3	20	1210	1560
		3x4	20	1340	1700
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/40	1340	1690
		GSM 3x4 + UMTS 3x1	15/10	1140	1490
		GSM 3x4 + UMTS 3x2	10/10	1100	1410

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900L (Ver.B) (-48V)	GSM	3x2	20	745	960
		3x4	27	995	1410
		3x6	16	885	1240
	UMTS	3x1	20	585	730
		3x2	20	845	1080
		3x3	20	1085	1390
		3x4	20	1195	1510
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/40	1195	1500
		GSM 3x4 + UMTS 3x1	15/10	1015	1320
		GSM 3x4 + UMTS 3x2	10/10	975	1250

Table 11-15 Power consumption (configured with MRFU V2, 900 MHz)

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900 (Ver.B) (-48V)	GSM	3x2	20	630	850
		3x4	20	810	1300
		3x6	12	710	1190
	UMTS	3x1	20	610	770
		3x2	20	660	940
	LTE	3x1	2x60	1570	2150
BTS3900 A (Ver.B) (AC)	GSM	3x2	20	630	870
		3x4	20	810	1320
		3x6	12	710	1200

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900L (Ver.B) (-48V)	UMTS	3x1	20	570	750
		3x2	20	670	960
	LTE	3x1	2x60	1570	2170
	GSM	3x2	20	650	910
		3x4	20	840	1360
		3x6	12	740	1240
	UMTS	3x1	20	600	790
		3x2	20	690	1000
	LTE	3x1	2x60	1570	2170

Surge Protection Specifications

Table 11-16 shows the surge protection specifications for the ports on an MRFU.

NOTE

- Unless otherwise specified, the surge protection specifications depend on the surge waveform of 8/20 μs.
- All the surge current items, unless otherwise specified as **Maximum discharge current**, refer to **Nominal discharge current**.

Table 11-16 Surge protection specifications for the ports on an MRFU

Port	Usage Scenario	Surge Protection Mode		Specification
DC port	Applicable to all scenarios	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	10 kA
			Common mode	20 kA
AC port	Applicable to the scenario where RF modules are	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)

Port	Usage Scenario	Surge Protection Mode		Specification
	placed indoors	Surge current	Differential mode	5 kA
			Common mode	5 kA
	Applicable to the scenario where RRUs are used or RF modules are placed outdoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	40 kA
			Common mode	40 kA
Antenna port	Applicable to all scenarios	Surge current	Differential mode	8 kA
			Common mode	40 kA
CPRI port	Applicable to all scenarios	Surge		250 A
RGPS port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
RET antenna port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
Dry contact or RS485 alarm port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA

Port	Usage Scenario	Surge Protection Mode	Specification
I2C port on a local power monitoring device and an alarm port	Applicable to the scenario where batteries under monitoring and RRUs are installed back to back or the scenario where the distance between them is shorter than 1 m	Surge	250 A

Antenna Capabilities

Table 11-17 shows antenna capabilities for an MRFU.

Table 11-17 Antenna capabilities for an MRFU

Type	TMA Capabilites	RET Antenna Capabilities
MRFU V1	Supported	Supports AISG2.0
MRFU V2	Supported	Supports AISG2.0

NOTE

For RFUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.1.3 Technical Specifications for WRFUd

This section provides technical specifications for WRFUd.

Supported Modes and Frequency Bands

Table 11-18 shows the modes and frequency bands supported by the WRFUd.

Table 11-18 Modes and frequency bands supported by the WRFUd

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
WRFUd	UMTS	2100	1920~1980	2110~2170

RF Specifications

Table 11-19 shows RF specifications for the WRFUd.

Table 11-19 RF specifications for the WRFUd

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	Sensitivity (dBm) 4-Way Receiver Sensitivity (dBm)		
WRFUd	2T2R	● MIMO:four carriers ● non-MIMO:six carriers	-126.1	-128.9	-131.6	**Output power of the WRFUd in non-MIMO configuration** **Output power of the WRFUd in MIMO configuration** **Output power of the WRFUd in hybrid configuration**	**Power consumption of the BTS3900** **Power consumption of the BTS3900A** **Power consumption of the BTS3900L**

NOTE

As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.

One WRFUd supports 6 carriers in non-MIMO configuration, and supports 4 carriers in MIMO configuration, its output power at the antenna port reaches 2×60 W.

NOTE

- The WRFUd supports one TX channel, MIMO, and combination of one TX channel and MIMO.
- The WRFUd supports differentiated power configured for each carrier.

Table 11-20 Output power of the WRFUd in non-MIMO configuration

Number of PA1 Carriers	Number of PA2 Carriers	Output Power per Carrier (W)
1	0	60
2	0	30
3	0	20
4	0	15
1	1	60
2	2	30
3	3	20

Table 11-21 Output power of the WRFUd in MIMO configuration

Number of Carriers	Output Power per Carrier (W)
1	50+50
2	30+30
3	20+20
4	15+15

Table 11-22 Output power of the WRFUd in hybrid configuration

Number of Carriers	Output Power per Carrier (W)
1	5
2	4
3	2

NOTE

In hybrid configurations, each TX channel supports a maximum of four carriers, with maximum output power of 60 W.

Table 11-23 Power consumption of the BTS3900

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				50Ah	92Ah	184Ah
3x1	20W	500	575	4.1	8.7	17.7
3x2	20W	595	740	3.5	7.1	14.8
3x3	20W	765	990	2.5	5.1	11.6
3x4	20W	975	1275	1.8	3.9	8.9

Table 11-24 Power consumption of the BTS3900A

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				50Ah	92Ah	184Ah
3x1	20W	530	610	3.9	8.2	16.7
3x2	20W	630	780	3.2	6.7	14
3x3	20W	805	1040	2.4	4.9	11
3x4	20W	1025	1340	1.7	3.7	8.4

Table 11-25 Power consumption of the BTS3900L

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				50Ah	92Ah	184Ah
3x1	20W	545	620	3.8	7.9	16.2
3x2	20W	640	785	3.1	6.6	13.8
3x3	20W	810	1035	2.4	4.9	10.9
3x4	20W	1020	1320	1.7	3.7	8.5

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- In the 3x1 or 3x2 configuration, one WBBPd2 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPd2 units and one WMPT are configured.

Surge Protection Specifications

Table 11-26 shows the surge protection specifications for the ports on the WRFUd.

Table 11-26 Surge protection specifications for the ports on the WRFUd

Port	Surge Protection Mode	Specification
RF port	Differential mode	8 kA
	Common mode	40 kA

Antenna Capabilities

Table 11-27 shows antenna capabilities for the WRFUd.

Table 11-27 Antenna capabilities for the WRFUd

Type	TMA Capabilites	RET Antenna Capabilities
WRFUd	Supported	Supports AISG2.0

NOTE

For RFUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.1.4 Technical Specifications for MRFUd

Adopting the software-defined radio (SDR) technology, MRFUd modules can work in different modes with different configurations.

Supported Modes and Frequency Bands

Table 11-28 shows the modes and frequency bands supported by an MRFUd.

Table 11-28 Modes and frequency bands supported by an MRFUd

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
MRFUd	GSM	900	890-915	935-960

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
	UMTS LTE GSM + UMTS		880-915	925-960
		1800	1710-1785	1805-1880

RF Specifications

Table 11-29 shows RF specifications for an MRFUd.

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE should be obtained from the LTE marketing personnel.
- The MRFUd complies with ETSI EN 301 908 V5.2.1 standards.
- **A and B using separated PA** indicates that A data is carried on one transmit channel of an RF module while B data is carried on the other transmit channel of the RF module.

Table 11-29 RF specifications for an MRFUd

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
MRFUd	2T 2R	GSM: 8 carriers UMTS: ● Non-MIMO: 6 carriers ● MIMO: 4 carriers LTE: ● 1 x (1.4, 3, 5, 10, 15, 20 MHz) per PA ● 2 x (1.4, 3, 5, 10, 15, 20 MHz) per PA	GSM: ● 900: -113.7 ● 1800: -114 UMTS (900/1800): -125.8	GSM: ● 900: -116.5 ● 1800: -116.8 UMTS (900/1800): -128.6	GSM: ● 900: -119.2 ● 1800: -119.5 UMTS (900/1800): -131.3	**Output Power of an MRFUd (900 MHz/ 1800 MHz, GSM and UMTS using separated PA)**	**Power consumption (configured with MRFUd, 900 MHz)** **Power consumption (configured with MRFUd, 1800 MHz)**

NOTE

- Power sharing assumes a random distribution of UEs in the cell.
- The output power is 1 dB lesser than the standard power when the MRFUd is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the MRFUd is located at a height of 4500 m to 6000m.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, power sharing cannot be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, or enhanced measurement report. In GBSS9.0, power sharing can be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, and enhanced measurement report. In GBSS8.1 and GBSS9.0, power sharing cannot be used together with IBCA, dynamic MAIO, RAN sharing, or double-slot cell.

Table 11-30 Output Power of an MRFUd (900 MHz/1800 MHz, GSM and UMTS using separated PA)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
GSM	1	0	0	80	80	0	0
	2	0	0	80	80	0	0
	3	0	0	40	40	0	0
	4	0	0	40	40	0	0
	5	0	0	27	30	0	0
	6	0	0	27	30	0	0
	7	0	0	20	27	0	0
	8	0	0	20	27	0	0
UMTS	0	1	0	0	0	80	0
	0	2	0	0	0	80	0
	0	3	0	0	0	40	0
	0	4	0	0	0	40	0
	0	5	0	0	0	25	0
	0	6	0	0	0	25	0
	0	1 (MIMO)	0	0	0	2x60	0
	0	2 (MIMO)	0	0	0	2x40	0
	0	3 (MIMO)	0	0	0	2x25	0

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
	0	4 (MIMO)	0	0	0	2x20	0
LTE	0	0	1	0	0	0	5/10/15/20 MHz: 2x60
	0	0	2	0	0	0	Carrier1: 2x40 Carrier2: 2x40
GSM + UMTS (GSM and UMTS using separated PA)	1	1	0	80	0	80	0
	2	1	0	40	0	80	0
	3	1	0	27	0	80	0
	4	1	0	20	0	80	0
	5	1	0	16	0	80	0
	6	1	0	12	0	80	0
	1	2	0	80	0	40	0
	2	2	0	40	0	40	0
	3	2	0	27	0	40	0
	4	2	0	20	0	40	0
	5	2	0	16	0	40	0
	6	2	0	12	0	40	0
	1	3	0	80	0	25	0
	2	3	0	40	0	25	0
	3	3	0	27	0	25	0
	4	3	0	20	0	25	0
	5	3	0	16	0	25	0
	2	4	0	40	0	20	0
	3	4	0	27	0	20	0
	4	4	0	20	0	20	0

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25°C.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption is a value obtained when the LTE load reaches 50%. The maximum power consumption is a value obtained when the LTE load reaches 100%. The 2x2 MIMO configuration is applied to RF modules working in LTE mode and the power of each carrier is 40 W.
- The power consumption for GSM is calculated based on the sharing power.

Table 11-31 Power consumption (configured with MRFUd, 900 MHz)

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900 (Ver.C) (-48V)	GSM	3x2	20	620	725
		3x4	20	770	1115
		3x6	20	995	1580
		3x8	20	1100	1880
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	820	1015
		GSM 3x3 + UMTS 3x1	20/20	865	1165
		GSM 3x4 + UMTS 3x1	20/20	1045	1450
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1260	1635
		GSM 3x3 + LTE 3x1	20/2x40	1320	1815
		GSM 3x4 + LTE 3x1	20/2x40	1380	1995
	UMTS	3x1	20	510	570
		3x2	20	585	750
	LTE	3x1	2x40	945	1245
BTS3900L (Ver.C) (-48V)	GSM	3x2	20	650	755
		3x4	20	800	1145
		3x6	20	1025	1610

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
		3x8	20	1130	1910
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	850	1045
		GSM 3x3 + UMTS 3x1	20/20	895	1195
		GSM 3x4 + UMTS 3x1	20/20	1075	1480
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1290	1665
		GSM 3x3 + LTE 3x1	20/2x40	1350	1845
		GSM 3x4 + LTE 3x1	20/2x40	1410	2025
	UMTS	3x1	20	540	600
		3x2	20	615	780
	LTE	3x1	2x40	975	1275
BTS3900A (Ver.C) (-48V)	GSM	3x2	20	650	755
		3x4	20	800	1145
		3x6	20	1025	1610
		3x8	20	1130	1910
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	850	1045
		GSM 3x3 + UMTS 3x1	20/20	895	1195
		GSM 3x4 + UMTS 3x1	20/20	1075	1480
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1290	1665
		GSM 3x3 + LTE 3x1	20/2x40	1350	1845
		GSM 3x4 + LTE 3x1	20/2x40	1410	2025
	UMTS	3x1	20	540	600

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
		3x2	20	615	780
	LTE	3x1	2x40	975	1275

Table 11-32 Power consumption (configured with MRFUd, 1800 MHz)

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
BTS3900 (Ver.C) (-48V)	GSM	3x2	20	620	740
		3x4	20	770	1130
		3x6	20	1025	1610
		3x8	20	1115	1955
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	835	1030
		GSM 3x3 + UMTS 3x1	20/20	880	1195
		GSM 3x4 + UMTS 3x1	20/20	1045	1450
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1365	1755
		GSM 3x3 + LTE 3x1	20/2x40	1410	1920
		GSM 3x4 + LTE 3x1	20/2x40	1425	2070
	UMTS	3x1	20	510	585
		3x2	20	600	795
	LTE	3x1	2x40	960	1275
BTS3900L (Ver.C) (-48V)	GSM	3x2	20	650	770
		3x4	20	800	1160
		3x6	20	1115	1640
		3x8	20	1145	1985

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	865	1060
		GSM 3x3 + UMTS 3x1	20/20	910	1225
		GSM 3x4 + UMTS 3x1	20/20	1075	1480
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1395	1785
		GSM 3x3 + LTE 3x1	20/2x40	1440	1950
		GSM 3x4 + LTE 3x1	20/2x40	1455	2100
	UMTS	3x1	20	540	615
		3x2	20	630	825
	LTE	3x1	2x40	990	1305
BTS3900A (Ver.C) (-48V)	GSM	3x2	20	650	770
		3x4	20	800	1160
		3x6	20	1115	1640
		3x8	20	1145	1985
	GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	865	1060
		GSM 3x3 + UMTS 3x1	20/20	910	1225
		GSM 3x4 + UMTS 3x1	20/20	1075	1480
	GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1395	1785
		GSM 3x3 + LTE 3x1	20/2x40	1440	1950
		GSM 3x4 + LTE 3x1	20/2x40	1455	2100
	UMTS	3x1	20	540	615
		3x2	20	630	825

Cabinet	Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
	LTE	3x1	2x40	990	1305

Surge Protection Specifications

Table 11-33 shows the surge protection specifications for the ports on an MRFUd.

NOTE

- Unless otherwise specified, the surge protection specifications depend on the surge waveform of 8/20 μs.
- All the surge current items, unless otherwise specified as **Maximum discharge current**, refer to **Nominal discharge current**.

Table 11-33 Surge protection specifications for the ports on an MRFUd

Port	Usage Scenario	Surge Protection Mode		Specification
DC port	Applicable to all scenarios	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	10 kA
			Common mode	20 kA
AC port	Applicable to the scenario where RF modules are placed indoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	5 kA
			Common mode	5 kA
	Applicable to the scenario where RRUs are used or RF modules are	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	40 kA

Port	Usage Scenario	Surge Protection Mode		Specification
	placed outdoors		Common mode	40 kA
Antenna port	Applicable to all scenarios	Surge current	Differential mode	8 kA
			Common mode	40 kA
CPRI port	Applicable to all scenarios	Surge		250 A
RGPS port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
RET antenna port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
Dry contact or RS485 alarm port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
I2C port on a local power monitoring device and an alarm port	Applicable to the scenario where batteries under monitoring and RRUs are installed back to back or the scenario where the distance between them is shorter than 1 m	Surge		250 A

Antenna Capabilities

Table 11-34 shows antenna capabilities for an MRFUd.

Table 11-34 Antenna capabilities for an MRFUd

Type	TMA Capabilites	RET Antenna Capabilities
MRFUd	Supported	Supports AISG2.0

NOTE

For RFUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2 Technical Specifications for RRUs

This section provides technical specifications for RRUs, including supported modes, frequency bands, RF specifications, engineering specifications, and antenna capabilities.

11.2.1 Technical Specifications for RRU3804

This section provides technical specifications for RRU3804.

Supported Modes and Frequency Bands

Table 11-35 shows the modes and frequency bands supported by the RRU3804.

Table 11-35 Modes and frequency bands supported by the RRU3804

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
DC RRU3804	UMTS	2100	192 to 1980	2110 to 2170
		1900	1850 to 1910	1930 to 1990
		AWS	1710 to 1755	2110 to 2155
		850	824 to 849	869 to 894
			835 to 849	880 to 894
AC RRU3804		2100	1920 to 1980	2110 to 2170

RF Specifications

Table 11-36 shows RF specifications for the RRU3804.

Table 11-36 RF specifications for the RRU3804

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3804	1T2R	4 carriers	-125.8 (Frequency Band: 2100MHz/ AWS)	-128.6 (Frequency Band: 2100MHz/AWS)	-131.3 (Frequency Band: 2100MHz/AWS)	**RRU3804 output power**	**Power consumption of the DBS3900 (configured with DC RRU3804)** **Power consumption of the DBS3900 (configured with AC RRU3804)** **Power consumption of the BTS3900C (configured with DC RRU3804)**
			-125.3 (Frequency Band: 1900MHz)	-128.1 (Frequency Band: 1900MHz)	-130.8 (Frequency Band: 1900MHz)		
			-125.6 (Frequency Band: 850MHz **)	-128.4 (Frequency Band: 850MHz **)	-131.1 (Frequency Band: 850MHz **)		

NOTE

- As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.
- **: Measurement value of the sub-band at 850 MHz.

The RRU3804 supports four carriers. The maximum output power is 60 W.

Table 11-37 RRU3804 output power

Number of Carriers	Maximum Output Power per Carrier (W)
1	60
2	30
3	20
4	15

NOTE

The maximum output power equals the maximum output power of the PA minus the internal loss. The maximum output power is measured at the antenna port of the RF module.

Table 11-38 Power consumption of the DBS3900 (configured with DC RRU3804)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				24Ah	50Ah	92Ah
3x1	20	390	480	2.4	5.7	11.3
3x2	20	480	650	1.7	4.3	9.0
3x3	20	630	860	1.2	3.1	6.7
3x4	15	630	860	1.2	3.1	6.7

Table 11-39 Power consumption of the DBS3900 (configured with AC RRU3804)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
3x1	20	435	540
3x2	20	555	740
3x3	20	720	980
3x4	15	720	980

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- In 3 x4 configurations, the typical and maximum power consumption are reached when the output power per carrier at the antenna port is 15 W.
- In the 3x1 or 3x2 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPb4 units and one WMPT are configured.

Table 11-40 Power consumption of the BTS3900C (configured with DC RRU3804)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
1x1	20	190 W	240 W
1x2	20	220 W	290 W
1x3	20	260 W	350 W

NOTE

- The typical power consumption is the BTS3900C works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the BTS3900C works with a 100% load at 25°C ambient temperature.
- One WBBPb4 and one WMPT are configured.

Engineering Specifications

Table 11-41 shows equipment specifications for the RRU3804.

Table 11-41 Equipment Specifications of the RRU3804

Type	Input Power	Dimensions (H x W x D)	Weight(Kg)
DC RRU3804	• –48 V DC, voltage range: –36 V DC to –57 V DC • 200 V AC to 240 V AC single phase, voltage range: 176 V AC to 290 V AC • 100/200 V AC to 120/240 V AC two phases, voltage range: 90/180 V AC to 135/270 V AC	• 480 mm x 270 mm x 140 mm (without housing and connectors) • 485 mm x 285 mm x 170 mm (with housing)	• Without housing: 15 kg • With housing: 17 kg
AC RRU3804		• 480 mm x 270 mm x 220 mm (without housing and connectors) • 485 mm x 285 mm x 250 mm (with housing)	• Without housing: 20.5 kg • With housing: 22.5 kg

Table 11-42 shows environment specifications for the RRU3804.

Table 11-42 Environment Specifications of the RRU3804

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
DC RRU3804	● –40° C to +50° C (with 1120 W/m2 solar radiation) ● –40° C to +55° C (without solar radiation)	5% RH to 100% RH	1~30 g/m3	70 kPa to 106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65
AC RRU3804							IP55

Table 11-43 shows the surge protection specifications for the ports on the RRU3804.

Table 11-43 Surge protection specifications for the ports on the RRU3804

Port	Surge Protection Mode	Specification
Power supply port	Differential mode	10 kA
	Common mode	15 kA
RF port	Differential mode	8 kA
	Common mode	40 kA
Port for dry contact alarms	Differential mode	3 kA
	Common mode	5 kA
RS485 port	Differential mode	3 kA
	Common mode	5 kA
Port for the RET antenna communication	Differential mode	3 kA
	Common mode	5 kA

Antenna Capabilities

Table 11-44 shows antenna capabilities for the RRU3804.

Table 11-44 Antenna capabilities for the RRU3804

Type	TMA Capabilites	RET Antenna Capabilities
RRU3804	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.2 Technical Specifications for RRU3801E

This section provides technical specifications for RRU3801E.

Supported Modes and Frequency Bands

Table 11-45 shows the modes and frequency bands supported by the RRU3801E.

Table 11-45 Modes and frequency bands supported by the RRU3801E

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
DC RRU3801E	UMTS	2100	1920~1980	2110~2170

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
		1900	1850~1910	1930~1990
		850	824~835	869~880
AC RRU3801E		2100	1920~1980	2110~2170

RF Specifications

Table 11-46 shows RF specifications for the RRU3801E.

Table 11-46 RF specifications for the RRU3801E

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3801E	1T2R	2 carriers	-125.8 (Frequency Band: 2100MHz)	-128.6 (Frequency Band: 2100MHz)	-131.3 (Frequency Band: 2100MHz)	**RRU3801E output power**	**Power consumption of the DBS3900 (configured with DC RRU3801E)** **Power consumption of the DBS3900 (configured with AC RRU3801E)** **Power consumption of the BTS3900C**
			-125.3 (Frequency Band: 1900MHz)	-128.1 (Frequency Band: 1900MHz)	-130.8 (Frequency Band: 1900MHz)		

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
			-125.6 (Frequency Band: 850MHz **)	-128.4 (Frequency Band: 850MHz **)	-131.1 (Frequency Band: 850MHz **)		**(configured with DC RRU3801E)**

NOTE

- The receiver sensitivity is measured, as recommended in 3GPP TS 25.104, over the full band at the antenna connector on the condition that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) does not exceed 0.001.
- **: Measurement value of the sub-band at 850 MHz.

The RRU3801E supports two carriers. The maximum output power is 40 W.

Table 11-47 RRU3801E output power

Number of Carriers	Maximum Output Power per Carrier (W)
1	40
2	20

NOTE

The maximum output power equals the maximum output power of the PA minus the internal loss. The maximum output power is measured at the antenna port of the RF module.

Table 11-48 Power consumption of the DBS3900 (configured with DC RRU3801E)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)		
				24Ah	50Ah	92Ah
3x1	20	390	480	2.4	5.7	11.3
3x2	20	480	650	1.7	4.3	9

Table 11-49 Power consumption of the DBS3900 (configured with AC RRU3801E)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
3x1	20	390	480
3x2	20	480	650

Table 11-50 Power consumption of the BTS3900C (configured with DC RRU3801E)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
1x1	20	190	240
1x2	20	220	290

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- One WBBPb4 and one WMPT are configured.

Engineering Specifications

Table 11-51 shows equipment specifications for the RRU3801E.

Table 11-51 Equipment specifications for the RRU3801E

Type	Input Power	Dimensions (H x W x D)	Weight(Kg)
DC RRU3801E	● –48 V DC, voltage range: –36 V DC to –57 V DC ● 200 V AC to 240 V AC single phase, voltage range: 176 V AC to 290 V AC ● 100/200 V AC to 120/240 V AC two phases, voltage range: 90/180 V AC to 135/270 V AC	● 480 mm x 270 mm x 140 mm (without housing and connectors) ● 485 mm x 285 mm x 170 mm (with housing)	● Without housing: 15 kg ● With housing: 17 kg
AC RRU3801E		● 480 mm x 270 mm x 220 mm (without housing and connectors) ● 485 mm x 285 mm x 250 mm (with housing)	● Without housing: 20.5 kg ● With housing: 22.5 kg

Table 11-52 shows environment specifications for the RRU3801E.

Table 11-52 Environment specifications for the RRU3801E

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
DC RRU3801E	● –40° C to +50° C (with 1120 W/m2 solar radiation) ● –40° C to +55° C (without solar radiation)	5% RH~100 % RH	(1~30)g/m3	70 kPa~106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2	NEBS GR63 zone4	IP65

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
AC RRU3801E					(2003-04) Class 4.1: "Non-weatherprotected locations"		IP55

Table 11-53 describes the surge protection specifications for the ports on the RRU3801E.

Table 11-53 Surge protection specifications for the ports on the RRU3801E

Port	Surge Protection Mode	Specification
Power supply port	Differential mode	10 kA
	Common mode	15 kA
RF port	Differential mode	8 kA
	Common mode	40 kA
Port for dry contact alarms	Differential mode	3 kA
	Common mode	5 kA

Port	Surge Protection Mode	Specification
RS485 port	Differential mode	3 kA
	Common mode	5 kA
Port for the RET antenna communication	Differential mode	3 kA
	Common mode	5 kA

Antenna Capabilities

Table 11-54 shows antenna capabilities for the RRU3801E.

Table 11-54 Antenna capabilities for the RRU3801E

Type	TMA Capabilites	RET Antenna Capabilities
RRU3801E	Supported	Supports AISG1.1

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.3 Technical Specifications for RRU3806

This section provides technical specifications for RRU3806.

Supported Modes and Frequency Bands

Table 11-55 shows the modes and frequency bands supported by the RRU3806.

Table 11-55 Modes and frequency bands supported by the RRU3806

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3806	UMTS	2100	1920~1980	2110~2170

RF Specifications

Table 11-56 shows RF specifications for the RRU3806.

Table 11-56 RF specifications for the RRU3806

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3806	1T2R	4 carriers	-125.8	-128.6	-131.3	**RRU3806 Output Power**	**DBS3900 (BBU3900+DC RRU3806)Power consumption** **DBS3900 (BBU3900+AC RRU3806)Power consumption** **BTS3900C (BBU3900+DC RRU3806)Power consumption**

NOTE

As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.

The RRU3806 supports four carriers, and its output power at the antenna connector reaches 80 W.

Table 11-57 RRU3806 Output Power

Number of Carriers	Output Power per Carrier (W)
1	80
2	40
3	26

Number of Carriers	Output Power per Carrier (W)
4	20

NOTE

Maximum output power = Maximum output power of the PA - Internal losses. The maximum output power is measured at the antenna port of the RF module.

Table 11-58 DBS3900(BBU3900+DC RRU3806)Power consumption

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	20	400	480	5.5	11
3x2	20	490	650	4.2	8.8
3x3	20	630	860	3.16	6.6
3x4	20	710	1030	2.8	5.7

Table 11-59 DBS3900(BBU3900+AC RRU3806)Power consumption

Configuration	Output Power per Carrier (W)	Typical power consumption (W)	Maximum power consumption (W)
3x1	20	435	540
3x2	20	555	740
3x3	20	690	950
3x4	20	780	1130

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°Cambient temperature.
- In the 3x1 or 3x2 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPb4 units and one WMPT are configured.

Table 11-60 BTS3900C(BBU3900+DC RRU3806)Power consumption

Configuration	Output Power per Carrier (W)	Typical power consumption(W)	Maximum power consumption(W)
1x1	20	190	240
1x2	20	220	290
1x3	20	260	350

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- One WBBPb4 and one WMPT are configured.

Engineering Specifications

Table 11-61 shows equipment specifications for the RRU3806.

Table 11-61 Equipment Specifications of the RRU3806

Type	Input Power	Dimensions (H x W x D)	Weight (Kg)
DC RRU3806	● –48 V DC, voltage range: –36 V DC to –57 V DC ● 200 V AC to 240 V AC single phase, voltage range: 176 V AC to 290 V AC ● 100/200 V AC to 120/240 V AC two phases, voltage range: 90/180 V AC to 135/270 V AC	● 480 mm x 270 mm x 140 mm (without the housing and connectors) ● 485 mm x 285 mm x 170 mm (with the housing)	● Without the housing: 15 kg ● With the housing: 17 kg
AC RRU3806		● 480 mm X 270 mm X 220 mm (without the housing and connectors) ● 485 mm X 285 mm X 250 mm (with the housing)	● Without the housing: 20.5 kg ● With the housing: 22.5 kg

Table 11-62 shows environment specifications for the RRU3806.

Table 11-62 Environment Specifications of the RRU3806

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
DC RRU3806	● –40° C to +50° C (without solar radiation) ● –40° C to +45° C (with solar radiation)	5% RH~100% RH	(1~30)g/m3	70 kPa~106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65
AC RRU3806							IP55

Table 11-63 describes the surge protection specifications for the ports on the RRU3806.

Table 11-63 Surge protection specifications for the ports on the RRU3806

Type	Port	Surge Protection Mode	Specification
DC RRU3806	Power supply port	Differential mode	10 kA
		Common mode	15 kA

Type	Port	Surge Protection Mode	Specification
	RF port	Differential mode	8 kA
		Common mode	40 kA
	Port for dry contact alarms	Differential mode	3 kA
		Common mode	5 kA
	RS485 port	Differential mode	3 kA
		Common mode	5 kA
	Port for the RET antenna communication	Differential mode	3 kA
		Common mode	5 kA
AC RRU3806	Power supply port	Differential mode	5 kA
		Common mode	5 kA
	Power port (configured with an external surge protector)	Differential mode	60 kA
		Common mode	60 kA
	RF port	Differential mode	8 kA
		Common mode	40 kA
	Port for dry contact alarms	Differential mode	3 kA
		Common mode	5 kA
	RS485 port	Differential mode	3 kA
		Common mode	5 kA
	Port for the RET antenna communication	Differential mode	3 kA
		Common mode	5 kA

Antenna Capabilities

Table 11-64 shows antenna capabilities for the RRU3806.

Table 11-64 Antenna capabilities for the RRU3806

Type	TMA Capabilites	RET Antenna Capabilities
RRU3806	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.4 Technical Specifications for RRU3805

This section provides technical specifications for RRU3805.

Supported Modes and Frequency Bands

Table 11-65 shows the modes and frequency bands supported by the RRU3805.

Table 11-65 Modes and frequency bands supported by the RRU3805

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3805	UMTS	1800	1749.9~1764.9	1844.9~1859.9
		1900	1850~1890	1930~1970
			1870~1910	1950~1990
		850	835~849	88~894

RF Specifications

Table 11-66 shows RF specifications for the RRU3805.

Table 11-66 RF specifications for the RRU3805

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3805	2T2R	• One RRU3805 (1800 MHz) supports 4 carriers. • One RRU3805	-125.3 (Frequency Band: 1800 MHz)	-128.1 (Frequency Band: 1800 MHz)	-130.8 (Frequency Band: 1800 MHz)	**RRU3805 Output Power**	**Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3805,1800MHz)**

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
		(1900 MHz /850 MHz) supports 2	-125.2 (Frequency Band: 1900 MHz /	-128.0 (Frequency Band: 1900 MHz /	-130.7 (Frequency Band: 1900 MHz /		**Power consumption of the DBS3900 in MIMO configuration (configured with RRU3805,1800MHz)** **Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3805,1900MHz/ 850MHz)** **Power consumption of the DBS3900 in MIMO configuration (configured with RRU3805,1900MHz/**

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
		carriers.	850 MHz)	850 MHz)	850 MHz)		**850MHz)**

NOTE

As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.

The RRU3805(1800 MHz) supports 3 carriers, and the output power at the antenna port of the RF module is 2 x 60 W. The RRU3805(1900 MHz /850 MHz) supports 2 carriers, and the output power at the antenna port of the RF module is 2 x 30 W.

Table 11-67 RRU3805 Output Power

Type	Output Power
RRU3805 (1800 MHz)	The RRU3805 supports 3 carriers, and the output power at the antenna port of the RF module is 2 x 60 W. ● The RRU3805 supports one TX channel, MIMO, and combination of one TX channel and MIMO. ● One TX channel: maximum output power of a TX channel reaching 60 W ● MIMO: maximum output power reaching 60 W + 60 W ● Combination of one TX channel and MIMO: maximum output power of a TX channel reaching 60 W

Type	Output Power
RRU3805 (1900 MHz /850 MHz)	The RRU3805 supports 2 carriers, and the output power at the antenna port of the RF module is 2 x 30 W. ● The RRU3805 supports one TX channel, MIMO, and combination of one TX channel and MIMO. ● One TX channel: maximum output power of a TX channel reaching 40 W ● MIMO: maximum output power reaching 30 W + 30 W ● Combination of one TX channel and MIMO: maximum output power of a TX channel reaching 30 W

NOTE

Maximum output power = Maximum output power of the PA - Internal losses. The maximum output power is measured at the antenna port of the RF module.

Table 11-68 Power consumption of the DBS3900 in non-MIMO configuration(configured with RRU3805,1800MHz)

Configuration	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
			50Ah	92Ah
3x1	540	630	3.3	6
3x2	805	1045	2	3.6
3x3	1000	1300	1.6	2.9

Table 11-69 Power consumption of the DBS3900 in MIMO configuration(configured with RRU3805,1800MHz)

Configuration	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
			50Ah	92Ah
3x1	735	975	2.1	3.9
3x2	1045	1405	1.5	2.7

Table 11-70 Power consumption of the DBS3900 in non-MIMO configuration(configured with RRU3805,1900MHz/850MHz)

Configuration	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
			50Ah	92Ah
3x1	540	615	3.3	6.1
3x2	835	985	2.1	3.8

Table 11-71 Power consumption of the DBS3900 in MIMO configuration(configured with RRU3805,1900MHz/850MHz)

Configuration	Typical power consumption (W)	Maximum power consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
			50Ah	92Ah
3x1	540	615	3.3	6.1
3x2	835	985	2.1	3.8

Engineering Specifications

Table 11-72 shows equipment specifications for the RRU3805.

Table 11-72 Equipment specifications for the RRU3805

Type	Input Power	Dimensions (H x W x D)	Weight (Kg)
RRU3805	● 1800 MHz: –48 V DC, voltage range: –36 V DC to –57 V DC ● 1900 MHz/850 MHz: –48 V DC, voltage range:–38.4 V DC to –57 V DC	● 485 mm x 356 mm x 140 mm (without the connectors and housing) ● 485 mm x 380 mm x 170 mm (with the housing)	● 22 kg (without the housing) ● 24 kg (with the housing)

Table 11-73 shows environment specifications for the RRU3805.

Table 11-73 Environment specifications for the RRU3805

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
RRU3805	● –40° C to +50° C (without solar radiation) ● –40° C to +45° C (with solar radiation)	5% RH~100 % RH	(1~30)g/m3	70 kPa~106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65

Antenna Capabilities

Table 11-74 shows antenna capabilities for the RRU3805.

Table 11-74 Antenna capabilities for the RRU3805

Type	TMA Capabilites	RET Antenna Capabilities
RRU3805	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.5 Technical Specifications for RRU3808

This section provides technical specifications for RRU3808.

Supported Modes and Frequency Bands

Table 11-75 shows the modes and frequency bands supported by the RRU3808.

Table 11-75 Modes and frequency bands supported by the RRU3808

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3808	UMTS	2100	1920~1980	2110~2170
		AWS	1710~1755	2110~2155

RF Specifications

Table 11-76 shows RF specifications for the RRU3808.

Table 11-76 RF specifications for the RRU3808

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3808	2T2R	4 carriers	-125.8	-128.6	-131.3	**RRU3808 output power**	**Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3808,2100MHz)** **Power consumption of the DBS3900 in MIMO configuration (configured with RRU3808,2100MHz)** **Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3808,AWS)** **Power consum**

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
							ption of the DBS3900 in MIMO configuration (configured with RRU3808,AWS)

NOTE

As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.

One RRU3808 supports four carriers with 2*40 W output power at the antenna port of the RF module.

Table 11-77 RRU3808 output power

Type	Output Power
RRU3808	One RRU3808 supports four carriers with 2*40 W output power at the antenna port of the RF module. ● The RRU3808 supports one TX channel, MIMO, and combination of one TX channel and MIMO. ● One TX channel: maximum output power of a TX channel reaching 40 W ● MIMO: maximum output power reaching 40 W + 40 W ● Combination of one TX channel and MIMO: maximum output power of a TX channel reaching 40 W ● The RRU3808 supports differentiated power configured for each carrier.

NOTE

Maximum output power = Maximum output power of the PA - Internal loss. The maximum output power is measured at the antenna port of the RF module.

Table 11-78 Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3808,2100MHz)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	20W	410	490	5.2	10.7
3x2	20W	510	640	4	8.5
3x3	20W	740	950	2.6	5.5
3x4	20W	800	1060	2.4	4.9

NOTE

- In the 3x1 or 3x2 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPb4 units and one WMPT are configured.

Table 11-79 Power consumption of the DBS3900 in MIMO configuration (configured with RRU3808,2100MHz)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	10W+10W	460	570	4.5	9.4
3x2	10W+10W	580	730	3.6	7.2
3x3	10W+10W	730	950	2.6	5.6
3x4	10W+10W	800	1060	2.4	4.9

NOTE

- In the 3x1 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x2 configuration, two WBBPb4 units and one WMPT are configured.
- In the 3x3 configuration, three WBBPb4 units and one WMPT are configured.
- In the 3x4 configuration, four WBBPb4 units and one WMPT are configured.

Table 11-80 Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3808,AWS)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	20W	410	482	5.2	10.8
3x2	20W	518	632	4	8.4
3x3	20W	721	931	2.7	5.6
3x4	20W	835	1051	2.3	4.7

NOTE

- In the 3x1 or 3x2 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPb4 units and one WMPT are configured.

Table 11-81 Power consumption of the DBS3900 in MIMO configuration (configured with RRU3808,AWS)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	10W+10W	470	572	4.4	9.2
3x2	10W+10W	628	766	3.2	6.7
3x3	10W+10W	774	975	2.5	5.1
3x4	10W+10W	890	1109	2.1	4.3

NOTE

- In the 3x1 configuration, one WBBPb4 and one WMPT are configured.
- In the 3x2 configuration, two WBBPb4 units and one WMPT are configured.
- In the 3x3 configuration, three WBBPb4 units and one WMPT are configured.
- In the 3x4 configuration, four WBBPb4 units and one WMPT are configured.

Engineering Specifications

Table 11-82 shows equipment specifications for the RRU3808.

Table 11-82 Equipment specifications for the RRU3808

Type	Input Power	Dimensions (H x W x D)	Weight(Kg)
RRU3808	–48 V DC; voltage range: –36 V DC to –57 V DC	● 480 mm x 270 mm x 140 mm (without the connectors and housing) ● 485 mm x 285 mm x 170 mm (with the housing)	● 17 kg (without the housing) ● 19 kg (with the housing)

Table 11-83 shows environment specifications for the RRU3808.

Table 11-83 Environment specifications for the RRU3808

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
RRU3808	● –40° C to +50° C (without solar radiation) ● –40° C to +45° C (with solar radiation)	5% RH~100 % RH	(1~30)g/m3	70 kPa~106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65

Table 11-84 shows the surge protection specifications for the ports on the RRU3808.

Table 11-84 Surge protection specifications for the ports on the RRU3808

Port	Surge Protection Mode	Specification
Power supply port	Differential mode	10 kA
	Common mode	15 kA
RF port	Differential mode	8 kA

Port	Surge Protection Mode	Specification
	Common mode	40 kA
Port for dry contact alarms	Differential mode	3 kA
	Common mode	5 kA
RS485 port	Differential mode	3 kA
	Common mode	5 kA
Port for the RET antenna communication	Differential mode	3 kA
	Common mode	5 kA

Antenna Capabilities

Table 11-85 shows antenna capabilities for the RRU3808.

Table 11-85 Antenna capabilities for the RRU3808

Type	TMA Capabilites	RET Antenna Capabilities
RRU3808	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.6 Technical Specifications for RRU3828

This section provides technical specifications for RRU3828.

Supported Modes and Frequency Bands

Table 11-86 shows the modes and frequency bands supported by the RRU3828.

Table 11-86 Modes and frequency bands supported by the RRU3828

Type	Mode	Frequency Band(MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3828	UMTS	2100	1920~1980	2110~2170

RF Specifications

Table 11-87 shows RF specifications for theRRU3828.

Table 11-87 RF specifications for the RRU3828

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity(dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity	2-Way Receiver Sensitivity	4-Way Receiver Sensitivity		
RRU3828	2T2R	● MIMO:four carriers ● non-MIMO:six carriers	-126.1	-128.9	-131.6	**Output power of the RRU3828 in non-MIMO configuration** **Output power of the RRU3828 in MIMO configuration** **Output power of the RRU3828 in hybrid configuration**	**Power consumption of the DBS3900 in non-MIMO configuration (configured with RRU3828)** **Power consumption of the DBS3900 in MIMO configuration (configured with RRU3828)**

NOTE

As recommended in 3GPP TS25.104, the receiver sensitivity (full band) is measured at the antenna port provided that the channel rate reaches 12.2 kbit/s and the Bit Error Rate (BER) is within 0.001.

One RRU3828 supports 6 carriers in non-MIMO configuration, and supports 4 carriers in MIMO configuration, its output power at the antenna port reaches 2×40 W.

NOTE

- The RRU3828 supports one TX channel, MIMO, and combination of one TX channel and MIMO.
- The RRU3828 supports differentiated power configured for each carrier.

Table 11-88 Output power of the RRU3828 in non-MIMO configuration

Number of PA1 Carriers	Number of PA2 Carriers	Output Power per Carrier (W)
1	0	40
2	0	20
3	0	13
4	0	10
1	1	40
2	2	20
3	3	13

Table 11-89 Output power of the RRU3828 in MIMO configuration

Number of Carriers	Output Power per Carrier (W)
1	40+40
2	20+20
3	13+13
4	10+10

Table 11-90 Output power of the RRU3828 in hybrid configuration

Number of Carriers	Output Power per Carrier (W)
1	5
2	4
3	2

NOTE

In hybrid configurations, each TX channel supports a maximum of four carriers, with maximum output power of 40 W.

Table 11-91 Power consumption of the DBS3900 in non-MIMO configuration(configured with RRU3828)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	20W	421	493	5.1	10.5
3x2	20W	520	658	4	8.3
3x3	20W	785	977	2.5	5
3x4	20W	854	1109	2.2	4.5

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- In the 3x1 or 3x2 configuration, one WBBPd2 and one WMPT are configured.
- In the 3x3 or 3x4 configuration, two WBBPd2 units and one WMPT are configured.

Table 11-92 Power consumption of the DBS3900 in MIMO configuration(configured with RRU3828)

Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)	Power backup duration based on new batteries and typical power consumption (hour)	
				50Ah	92Ah
3x1	10W+10W	535	604	3.9	8.1
3x2	10W+10W	689	824	2.9	5.9
3x3	10W+10W	864	1053	2.1	4.4
3x4	10W+10W	1011	1266	1.7	3.8

NOTE

- The typical power consumption is the DBS3900 works with a 40% load at 25°C ambient temperature.
- The maximum power consumption is the DBS3900 works with a 100% load at 25°C ambient temperature.
- In the 3x1 configuration, one WBBPd2 and one WMPT are configured.
- In the 3x2 configuration, two WBBPd2 units and one WMPT are configured.
- In the 3x3 configuration, three WBBPd2 units and one WMPT are configured.
- In the 3x4 configuration, four WBBPd2 units and one WMPT are configured.

Engineering Specifications

Table 11-93 shows equipment specifications for the RRU3828.

Table 11-93 Equipment specifications for the RRU3828

Type	Input Power	Dimensions (H x W x D)	Weight(Kg)
RRU3828	–48 V DC; voltage range: –36 V DC to –57 V DC	● 400 mm x 220 mm x 140 mm (without the connectors and housing) ● 400 mm x 240 mm x 160 mm (with the housing)	● 14 kg (without the housing) ● 15 kg (with the housing)

Table 11-94 shows environment specifications for the RRU3828.

Table 11-94 Environment Specifications of the RRU3828

Type	Operating temperature	Relative humidity	Absolute humidity	Atmospheric pressure	Operating environment	Shockproof protection	Ingress Protection (IP) rating
RRU3828	● –40° C to +50° C (without solar radiation) ● –40° C to +45° C (with solar radiation)	5% RH~100 % RH	(1~30)g/m3	70 kPa~106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65

Table 11-95 shows the surge protection specifications for the ports on the RRU3828.

Table 11-95 Surge protection specifications for the ports on the RRU3828

Type	Port	Surge Protection Mode	Specification
RRU3828	Power supply port	Differential mode	10 kA
		Common mode	20 kA

Type	Port	Surge Protection Mode	Specification
	RF port	Differential mode	8 kA
		Common mode	40 kA
	Port for dry contact alarms	Differential mode	3 kA
		Common mode	5 kA
	RS485 port	Differential mode	3 kA
		Common mode	5 kA
	Port for the RET antenna communication	Differential mode	3 kA
		Common mode	5 kA

Antenna Capabilities

Table 11-96 shows antenna capabilities for the RRU3828.

Table 11-96 Antenna capabilities for the RRU3828

Type	TMA Capabilites	RET Antenna Capabilities
RRU3828	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.7 Technical Specifications for RRU3908

RRU3908s are classified into RRU3908 V1 and RRU3908 V2. Adopting the software-defined radio (SDR) technology, RRU3908 modules can work in different modes with different configurations.

Supported Modes and Frequency Bands

Table 11-97 shows the modes and frequency bands supported by an RRU3908.

Table 11-97 Modes and frequency bands supported by an RRU3908

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3908 V1	GSM UMTS	850	824-849	869-894
		900	890-915	935-960

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
	LTE	1800	1710-1755	1805-1850
			1740-1785	1835-1880
		1900	1850-1890	1930-1970
			1870-1910	1950-1990
RRU3908 V2	GSM UMTS LTE	850	824-849	869-894
		900	890-915	935-960
			880-915	925-960

RF Specifications

Table 11-98 shows RF specifications for an RRU3908.

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE should be obtained from the LTE marketing personnel.
- The RRU3908 complies with ETSI EN 301 908 V5.2.1 standards.

Table 11-98 RF specifications for an RRU3908

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
RRU3908 V1	2T 2R	GSM: 6 carriers UMTS: 4 carriers LTE: 1 x (5, 10, 15, 20 MHz) per PA	GSM (900 PGSM/ 1800): -113 UMTS (900 PGSM/ 1800): -125.5	GSM (900 PGSM/ 1800): -115.8 UMTS (900 PGSM/ 1800): -128.3	GSM (900 PGSM/ 1800): -118.5 UMTS (900 PGSM/ 1800): -131	**Output Power of an RRU3908 V1 (850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz)**	**Power consumption of the DBS3900 (configured with RRU3908 V1, 900 MHz)**
RRU3908 V2	2T 2R	GSM: 8 carriers UMTS: 4 carriers LTE: 1 x (1.4, 3, 5, 10, 15, 20 MHz) per PA	GSM: ● 900 PGSM: -113.5 ● 900 EGSM: -113.3 UMTS: ● 900 PGSM: -125.5 ● 900 EGSM: -125.3	GSM: ● 900 PGSM: -115.8 ● 900 EGSM: -116.1 UMTS: ● 900 PGSM: -128.3 ● 900 EGSM: -128.1	GSM: ● 900 PGSM: -118.5 ● 900 EGSM: -118.8 UMTS: ● 900 PGSM: -131 ● 900 EGSM: -130.8	**Output Power of an RRU3908 V2 (850 MHz/ 900 MHz)**	**Power consumption of the DBS3900 (configured with RRU3908 V2, 850 MHz/ 900 MHz)**

NOTE

- * indicates that the UMTS mode is supported in terms of hardware.
- Power sharing assumes a random distribution of UEs in the cell.
- The output power is 1 dB lesser than the standard power when the RRU3908 is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the RRU3908 is located at a height of 4500 m to 6000m.
- The GSM power is measured when the modulation scheme is GMSK. If the modulation scheme is 8PSK, the output power is 1.8 dB less than that in GMSK mode.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, power sharing cannot be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, or enhanced measurement report. In GBSS9.0, power sharing can be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, and enhanced measurement report. In GBSS8.1 and GBSS9.0, power sharing cannot be used together with IBCA, dynamic MAIO, RAN sharing, or double-slot cell.

Table 11-99 Output Power of an RRU3908 V1 (850 MHz/900 MHz/1800 MHz/1900 MHz)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
GSM	1	0	40	40	0
	2	0	40	40	0
	3	0	20	20	0
	4	0	15	20	0
	5	0	12	12	0
	6	0	10	12	0
UMTS	0	1	0	0	40
	0	2	0	0	30
	0	3	0	0	20*
	0	4	0	0	15*
LTE	0	1	0	0	2 x30 (MIMO)

Table 11-100 Output Power of an RRU3908 V2 (850 MHz/900 MHz)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
GSM	1	0	40	40	0
	2	0	40	40	0
	3	0	20	20	0
	4	0	20	20	0
	5	0	13	15	0
	6	0	13	15	0
	7	0	10	13	0
	8	0	10	13	0
UMTS	0	1	0	0	60
	0	1	0	0	2x40 (MIMO)
	0	2	0	0	40
	0	2	0	0	2x20 (MIMO)
	0	3	0	0	20*
	0	3	0	0	2x10 (MIMO)*
	0	4	0	0	20*
	0	4	0	0	2x10 (MIMO)*
LTE	0	1	0	0	2x40 (MIMO)

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25°C.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption is a value obtained when the LTE load reaches 50%. The maximum power consumption is a value obtained when the LTE load reaches 100%. The 2x2 MIMO configuration is applied to RF modules working in LTE mode and the power of each carrier is 40 W.
- The power consumption for GSM is calculated based on the sharing power.

Table 11-101 Power consumption of the DBS3900 (configured with RRU3908 V1, 900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	3x2	20	760	910
	3x4	20	730	1070
	3x6	12	730	1070
UMTS	3x1	20	490	590
	3x2	20	640	790
	3x3	20	880	1100
	3x4	15	880	1110
GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	870	1090
	GSM 3x4 + UMTS 3x1	10/20	820	1050
	GSM 3x4 + UMTS 3x2	10/10	820	1050

Table 11-102 Power consumption of the DBS3900 (configured with RRU3908 V2, 850 MHz/ 900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	3x2	20	570	710
	3x4	20	760	1130
	3x6	13	730	1130
UMTS	3x1	20	420	520
	3x2	20	630	820
GSM + UMTS	GSM 3x2 + UMTS 3x1	20/40	770	1100
	GSM 3x3 + UMTS 3x1	15/40	730	1010
	GSM 3x4 + UMTS 3x1	10/40	890	1250
LTE	3x1	2x20	750	920

Engineering Specifications

Table 11-103 shows equipment specifications for an RRU3908.

Table 11-103 Equipment specifications for an RRU3908

Type	Power Supply	Dimension (H x W x D)	Weight (kg)
RRU3908 V1	-48 V DC; voltage range: -36 V DC to -57 V DC	485mm x 380mm x 170mm (with the housing)	23 (with the housing)
RRU3908 V2	-48 V DC; voltage range: -36 V DC to -57 V DC	485mm x 380mm x 170mm (with the housing)	23 (with the housing)

Table 11-104 shows environment specifications for an RRU3908.

Table 11-104 Environment specifications for an RRU3908

Type	Operating Temperature	Relative Humidity	Absolute Humidity	Atmospheric Pressure	Operating Environment	Shock Protection	Ingress Protection (IP) Rating
RRU3908 V1	-40°C to +50°C (without solar radiation) -40°C to +45°C (with solar radiation)	5% RH to 100% RH	1-30 g/m3	70 kPa to 106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprot	NEBS GR63 zone4	IP65

Type	Operating Temperature	Relative Humidity	Absolute Humidity	Atmospheric Pressure	Operating Environment	Shock Protection	Ingress Protection (IP) Rating
RRU3908 V2	-40°C to +55°C (without solar radiation) -40°C to +50°C (with solar radiation)				ected locations"		

Table 11-105shows the surge protection specifications for the ports on an RRU3908.

NOTE

- Unless otherwise specified, the surge protection specifications depend on the surge waveform of 8/20 μs.
- All the surge current items, unless otherwise specified as **Maximum discharge current**, refer to **Nominal discharge current**.

Table 11-105 Surge protection specifications for the ports on an RRU3908

Port	Usage Scenario	Surge Protection Mode		Specification
DC port	Applicable to all scenarios	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	10 kA
			Common mode	20 kA
AC port	Applicable to the scenario where RF modules are	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)

Port	Usage Scenario	Surge Protection Mode		Specification
	placed indoors	Surge current	Differential mode	5 kA
			Common mode	5 kA
	Applicable to the scenario where RRUs are used or RF modules are placed outdoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	40 kA
			Common mode	40 kA
Antenna port	Applicable to all scenarios	Surge current	Differential mode	8 kA
			Common mode	40 kA
CPRI port	Applicable to all scenarios	Surge		250 A
RGPS port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
RET antenna port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
Dry contact or RS485 alarm port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA

Port	Usage Scenario	Surge Protection Mode	Specification
I2C port on a local power monitoring device and an alarm port	Applicable to the scenario where batteries under monitoring and RRUs are installed back to back or the scenario where the distance between them is shorter than 1 m	Surge	250 A

Antenna Capabilities

Table 11-106 shows antenna capabilities for an RRU3908.

Table 11-106 Antenna capabilities for an RRU3908

Type	TMA Capabilites	RET Antenna Capabilities
RRU3908 V1	Supported	Supports AISG2.0
RRU3908 V2	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.8 Technical Specifications for RRU3928

Adopting the software-defined radio (SDR) technology, RRU3928 modules can work in different modes with different configurations.

Supported Modes and Frequency Bands

Table 11-107 shows the modes and frequency bands supported by an RRU3928.

Table 11-107 Modes and frequency bands supported by an RRU3928

Type	Mode	Frequency Band (MHz)	Receive Frequency Band (MHz)	Transmit Frequency Band (MHz)
RRU3928	GSM UMTS LTE GSM + UMTS	900	890-915	935-960
		1800	1710-1785	1805-1880

RF Specifications

Table 11-108 shows RF specifications for an RRU3928.

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE should be obtained from the LTE marketing personnel.
- The RRU3928 complies with ETSI EN 301 908 V5.2.1 standards.
- **A and B using separated PA** indicates that A data is carried on one transmit channel of an RF module while B data is carried on the other transmit channel of the RF module.

Table 11-108 RF specifications for an RRU3928

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
RRU3928 V2	2T 2R	GSM: 8 carriers UMTS: 4 carriers LTE: 1 x (1.4, 3, 5, 10, 15, 20 MHz) per PA	GSM: ● 900: -113.7 ● 1800: -114 UMTS (900/1800): -125.8	GSM: ● 900: -116.5 ● 1800: -116.8 UMTS (900/1800): -128.6	GSM: ● 900: -119.2 ● 1800: -119.5 UMTS (900/1800): -131.3	**Output Power of an RRU3928 (900 MHz/ 1800 MHz, GSM and UMTS using separated PA)**	**Power consumption of the DBS3900 (configured with RRU3928, 900 MHz)** **Power consumption of the DBS3900 (configured with RRU3928, 1800 MHz)**

NOTE

- Power sharing assumes a random distribution of UEs in the cell.
- The output power is 1 dB lesser than the standard power when the RRU3928 is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the RRU3928 is located at a height of 4500 m to 6000m.
- The GSM power is measured when the modulation scheme is GMSK. If the modulation scheme is 8PSK, the output power is 1.8 dB less than that in GMSK mode.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, power sharing cannot be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, or enhanced measurement report. In GBSS9.0, power sharing can be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, and enhanced measurement report. In GBSS8.1 and GBSS9.0, power sharing cannot be used together with IBCA, dynamic MAIO, RAN sharing, or double-slot cell.

Table 11-109 Output Power of an RRU3928 (900 MHz/1800 MHz, GSM and UMTS using separated PA)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
GSM	1	0	0	40	40	0	0
	2	0	0	40	40	0	0
	3	0	0	20	20	0	0
	4	0	0	20	20	0	0
	5	0	0	13	15	0	0
	6	0	0	13	15	0	0
	7	0	0	10	13	0	0
	8	0	0	10	13	0	0
UMTS	0	1	0	0	0	40	0
	0	2	0	0	0	40	0
	0	3	0	0	0	20	0
	0	4	0	0	0	20	0
	0	1 (MIMO)	0	0	0	2x40	0

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
	0	2 (MIMO)	0	0	0	2x20	0
	0	3 (MIMO)	0	0	0	2x10	0
	0	4 (MIMO)	0	0	0	2x10	0
LTE	0	0	1	0	0	0	2x40
GSM+UMTS (GSM and UMTS using separated PA)	1	1	0	40	0	40	0
	2	1	0	20	0	40	0
	3	1	0	13	0	40	0
	4	1	0	10	0	40	0
	1	2	0	40	0	20	0
	2	2	0	20	0	20	0
	3	2	0	13	0	20	0
	4	2	0	10	0	20	0

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25°C.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption is a value obtained when the LTE load reaches 50%. The maximum power consumption is a value obtained when the LTE load reaches 100%. The 2x2 MIMO configuration is applied to RF modules working in LTE mode and the power of each carrier is 40 W.
- The power consumption for GSM is calculated based on the sharing power.

Table 11-110 Power consumption of the DBS3900 (configured with RRU3928, 900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	3x2	20	560	650
	3x4	20	740	1025
UMTS	3x1	20	510	585
	3x2	20	585	720
LTE	3x1	2x40	900	1110
GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	820	985
	GSM 3x3 + UMTS 3x1	20/20	865	1120
GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	930	1140
	GSM 3x3 + LTE 3x1	20/2x40	870	1065
	GSM 3x4 + LTE 3x1	20/2x40	885	1140

Table 11-111 Power consumption of the DBS3900 (configured with RRU3928, 1800 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	3x2	20	560	665

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
	3x4	20	765	1040
UMTS	3x1	20	525	585
	3x2	20	600	735
LTE	3x1	2x40	915	1125
GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	835	1000
	GSM 3x3 + UMTS 3x1	20/20	880	1135
GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	945	1155
	GSM 3x3 + LTE 3x1	20/2x40	885	1095
	GSM 3x4 + LTE 3x1	20/2x40	900	1155

Engineering Specifications

Table 11-112 shows equipment specifications for an RRU3928.

Table 11-112 Equipment specifications for an RRU3928

Type	Power Supply	Dimension (H x W x D)	Weight (kg)
RRU3928	-48 V DC; voltage range: -36 V DC to -57 V DC	400mm x 240mm x 160mm (with the housing)	15 (with the housing)

Table 11-113 shows environment specifications for an RRU3928.

Table 11-113 Environment specifications for an RRU3928

Type	Operating Temperature	Relative Humidity	Absolute Humidity	Atmospheric Pressure	Operating Environment	Shock Protection	Ingress Protection (IP) Rating
RRU3928	-40°C to +50°C (without solar radiation) -40°C to +45°C (with solar radiation)	5% RH to 100% RH	1-30 g/m3	70 kPa to 106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65

Table 11-114 shows the surge protection specifications for the ports on an RRU3928.

NOTE

- Unless otherwise specified, the surge protection specifications depend on the surge waveform of 8/20 μs.
- All the surge current items, unless otherwise specified as **Maximum discharge current**, refer to **Nominal discharge current**.

Table 11-114 Surge protection specifications for the ports on an RRU3928

Port	Usage Scenario	Surge Protection Mode		Specification
DC port	Applicable to all scenarios	Surge	Differential mode	2 kV (1.2/50 μs)

Port	Usage Scenario	Surge Protection Mode		Specification
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	10 kA
			Common mode	20 kA
AC port	Applicable to the scenario where RF modules are placed indoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	5 kA
			Common mode	5 kA
	Applicable to the scenario where RRUs are used or RF modules are placed outdoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	40 kA
			Common mode	40 kA
Antenna port	Applicable to all scenarios	Surge current	Differential mode	8 kA
			Common mode	40 kA
CPRI port	Applicable to all scenarios	Surge		250 A
RGPS port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
RET antenna port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA

Port	Usage Scenario	Surge Protection Mode		Specification
Dry contact or RS485 alarm port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
I2C port on a local power monitoring device and an alarm port	Applicable to the scenario where batteries under monitoring and RRUs are installed back to back or the scenario where the distance between them is shorter than 1 m	Surge		250 A

Antenna Capabilities

Table 11-115 shows antenna capabilities for an RRU3928.

Table 11-115 Antenna capabilities for an RRU3928

Type	TMA Capabilites	RET Antenna Capabilities
RRU3928	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.

11.2.9 Technical Specifications for RRU3929

Adopting the software-defined radio (SDR) technology, RRU3929 modules can work in different modes with different configurations.

Supported Modes and Frequency Bands

Table 11-116 shows the modes and frequency bands supported by an RRU3929.

Table 11-116 Modes and frequency bands supported by an RRU3929

Type	Mode	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
RRU3929	GSM UMTS LTE GSM + UMTS	900	880-915	925-960
		1800	1710-1785	1805-1880

RF Specifications

Table 11-117 shows RF specifications for an RRU3929.

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE should be obtained from the LTE marketing personnel.
- The RRU3929 complies with ETSI EN 301 908 V5.2.1 standards.
- **A and B using separated PA** indicates that A data is carried on one transmit channel of an RF module while B data is carried on the other transmit channel of the RF module.

Table 11-117 RF specifications for an RRU3929

Type	Transmit and Receive Channels	Capacity	Receiver Sensitivity (dBm)			Output Power	Power Consumption
			1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)		
RRU3929	2T2R	GSM: 8 carriers UMTS: ● Non-MIMO: 6 carriers ● MIMO: 4 carriers LTE: ● 1 x (1.4, 3, 5, 10, 15, 20 MHz) per PA ● 2 x (1.4, 3, 5, 10, 15, 20 MHz) per PA	GSM: ● 900: -113.7 ● 1800: -114 UMTS (900/1800): -125.8	GSM: ● 900: -116.5 ● 1800: -116.8 UMTS (900/1800): -128.6	GSM: ● 900: -119.2 ● 1800: -119.5 UMTS (900/1800): -131.3	**Output Power of an RRU3929 (900 MHz/ 1800 MHz, GSM and UMTS using separated PA)**	**Power consumption of the DBS3900 (configured with RRU3929, 900 MHz/ 1800 MHz)**

NOTE

- Power sharing assumes a random distribution of UEs in the cell.
- The output power is 1 dB lesser than the standard power when the RRU3929 is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the RRU3929 is located at a height of 4500 m to 6000m.
- The GSM power is measured when the modulation scheme is GMSK. If the modulation scheme is 8PSK, the output power is 1.8 dB less than that in GMSK mode.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, power sharing cannot be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, or enhanced measurement report. In GBSS9.0, power sharing can be used together with functions concentric cell, Co-BCCH, tight BCCH frequency reuse, and enhanced measurement report. In GBSS8.1 and GBSS9.0, power sharing cannot be used together with IBCA, dynamic MAIO, RAN sharing, or double-slot cell.

Table 11-118 Output Power of an RRU3929 (900 MHz/1800 MHz, GSM and UMTS using separated PA)

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
GSM	1	0	0	60	60	0	0
	2	0	0	60	60	0	0
	3	0	0	30	30	0	0
	4	0	0	30	30	0	0
	5	0	0	20	25	0	0
	6	0	0	20	25	0	0
	7	0	0	15	20	0	0
	8	0	0	15	20	0	0
UMTS	0	1	0	0	0	60	0
	0	2	0	0	0	60	0
	0	3	0	0	0	30	0
	0	4	0	0	0	30	0
	0	5	0	0	0	20	0
	0	6	0	0	0	20	0
	0	1 (MIMO)	0	0	0	2x60	0

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
	0	2 (MIMO)	0	0	0	2x30	0
	0	3 (MIMO)	0	0	0	2x20	0
	0	4 (MIMO)	0	0	0	2x15	0
LTE	0	0	1	0	0	0	5/10/15/20 MHz: 2x60
	0	0	2	0	0	0	Carrier1: 2x30 Carrier2: 2x30
	0	0	2	0	0	0	Carrier1: 2x20 Carrier2: 2x40
GSM + UMTS (GSM and UMTS using separated PA)	1	1	0	60	0	60	0
	1	2	0	60	0	30	0
	1	3	0	60	0	20	0
	2	1	0	30	0	60	0
	2	2	0	30	0	30	0
	2	3	0	30	0	20	0
	2	4	0	30	0	15	0
	3	1	0	20	0	60	0
	3	2	0	20	0	30	0
	3	3	0	20	0	20	0
	3	4	0	20	0	15	0
	4	1	0	15	0	60	0
	4	2	0	15	0	30	0
	4	3	0	15	0	20	0

Mode	Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
	4	4	0	15	0	15	0
	5	1	0	10	0	60	0
	5	2	0	10	0	30	0
	5	3	0	10	0	20	0
	6	1	0	7	0	60	0
	6	2	0	7	0	30	0

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25°C.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption is a value obtained when the LTE load reaches 50%. The maximum power consumption is a value obtained when the LTE load reaches 100%. The 2x2 MIMO configuration is applied to RF modules working in LTE mode and the power of each carrier is 40 W.
- The power consumption for GSM is calculated based on the sharing power.

Table 11-119 Power consumption of the DBS3900 (configured with RRU3929, 900 MHz/1800 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	3x2	20	675	795
	3x4	20	915	1260
	3x6	20	1005	1530
UMTS	3x1	20	585	675
	3x2	20	660	840
LTE	3x1	2x40	990	1290

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM + UMTS	GSM 3x2 + UMTS 3x1	20/20	850	1030
	GSM 3x3 + UMTS 3x1	20/20	1060	1360
	GSM 3x4 + UMTS 3x1	20/20	1105	1495
GSM + LTE	GSM 3x2 + LTE 3x1	20/2x40	1305	1660
	GSM 3x3 + LTE 3x1	20/2x40	1155	1525
	GSM 3x4 + LTE 3x1	20/2x40	1215	1660

Engineering Specifications

Table 11-120 shows equipment specifications for an RRU3929.

Table 11-120 Equipment specifications for an RRU3929

Type	Power Supply	Dimension (H x W x D)	Weight (kg)
RRU3929	-48 V DC; voltage range: -36 V DC to -57 V DC	485mm x 380mm x 170mm (with the housing)	25 (with the housing)

Table 11-121 shows environment specifications for an RRU3929.

Table 11-121 Environment specifications for an RRU3929

Type	Operating Temperature	Relative Humidity	Absolute Humidity	Atmospheric Pressure	Operating Environment	Shock Protection	Ingress Protection (IP) Rating
RRU3929	-40°C to +50°C (without solar radiation) -40°C to +55°C (with solar radiation)	5% RH to 100% RH	1-30 g/m3	70 kPa to 106 kPa	The RRU complies with the following standards: ● 3G TS25.141 V3.0.0 ● ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weatherprotected locations"	NEBS GR63 zone4	IP65

Table 11-122 shows the surge protection specifications for the ports on an RRU3929.

NOTE

- Unless otherwise specified, the surge protection specifications depend on the surge waveform of 8/20 μs.
- All the surge current items, unless otherwise specified as **Maximum discharge current**, refer to **Nominal discharge current**.

Table 11-122 Surge protection specifications for the ports on an RRU3929

Port	Usage Scenario	Surge Protection Mode		Specification
DC port	Applicable to all scenarios	Surge	Differential mode	2 kV (1.2/50 μs)

Port	Usage Scenario	Surge Protection Mode		Specification
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	10 kA
			Common mode	20 kA
AC port	Applicable to the scenario where RF modules are placed indoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	5 kA
			Common mode	5 kA
	Applicable to the scenario where RRUs are used or RF modules are placed outdoors	Surge	Differential mode	2 kV (1.2/50 μs)
			Common mode	4 kV (1.2/50 μs)
		Surge current	Differential mode	40 kA
			Common mode	40 kA
Antenna port	Applicable to all scenarios	Surge current	Differential mode	8 kA
			Common mode	40 kA
CPRI port	Applicable to all scenarios	Surge		250 A
RGPS port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
RET antenna port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA

Port	Usage Scenario	Surge Protection Mode		Specification
Dry contact or RS485 alarm port	Applicable to all scenarios	Surge current	Differential mode	3 kA
			Common mode	5 kA
I2C port on a local power monitoring device and an alarm port	Applicable to the scenario where batteries under monitoring and RRUs are installed back to back or the scenario where the distance between them is shorter than 1 m	Surge		250 A

Antenna Capabilities

Table 11-123 shows antenna capabilities for an RRU3929.

Table 11-123 Antenna capabilities for an RRU3929

Type	TMA Capabilites	RET Antenna Capabilities
RRU3929	Supported	Supports AISG2.0

NOTE

For RRUs supporting RET antennas, the feed voltage is 12 V and feed current is 2.3 A.