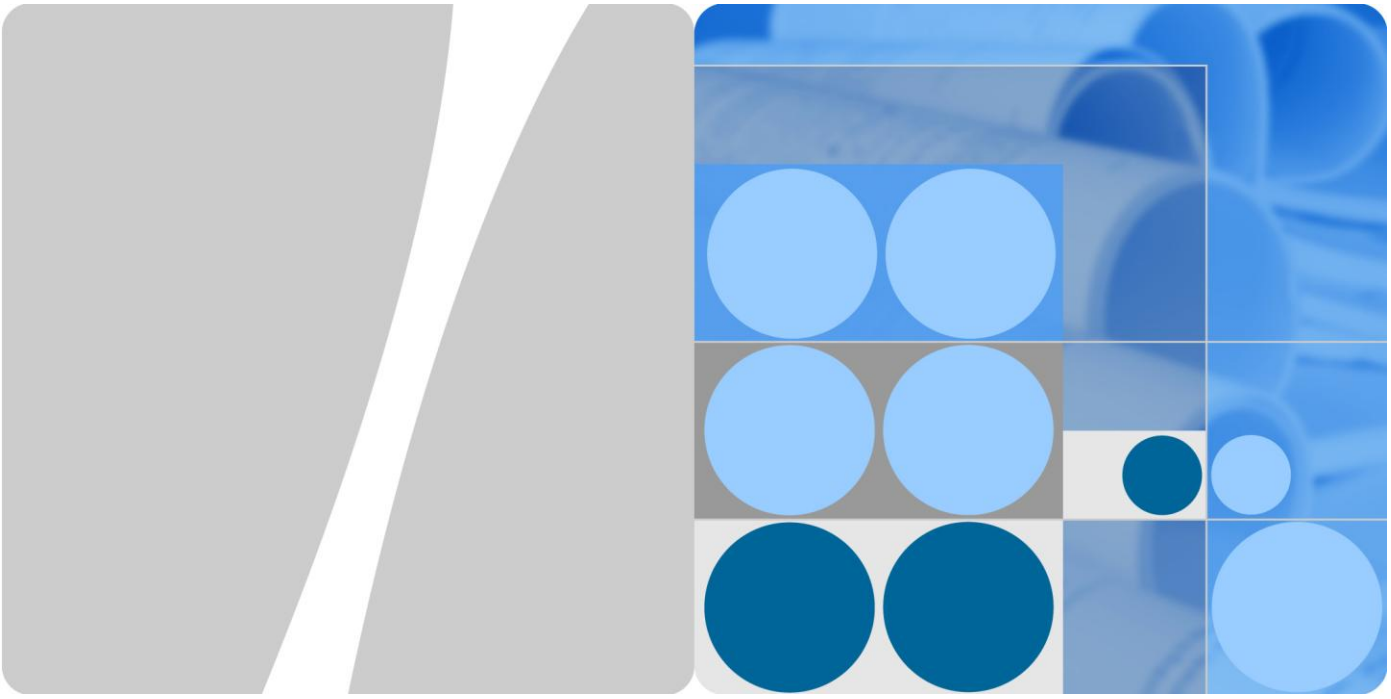

RRU3928 Description

Issue V1.2

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Contents

1 Introduction

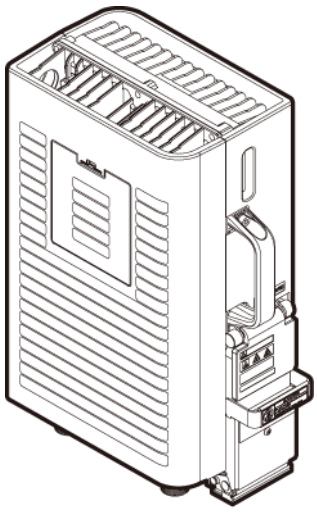
The RRU3928 is an outdoor remote radio unit. It is the radio frequency (RF) part of a distributed base station and can be located near antennas. The RRU3928 can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal data. With the Software Defined Radio (SDR) technology, the RRU3928 supports the dual-mode operation of any two modes of GSM, UMTS, and LTE through software configuration modification.

RRU3928 has a dual-transmitter and dual-receiver structure, which supports higher output power and carrier capacity.

1.1 Appearance

Figure 1-1 shows the appearance of the RRU3928.

Figure 1-1 Appearance of the RRU3928



RRU3928

1.2 Physical Ports

RRUs have a modular design. Its external ports are located in the cabling cavity or at the bottom of the module.

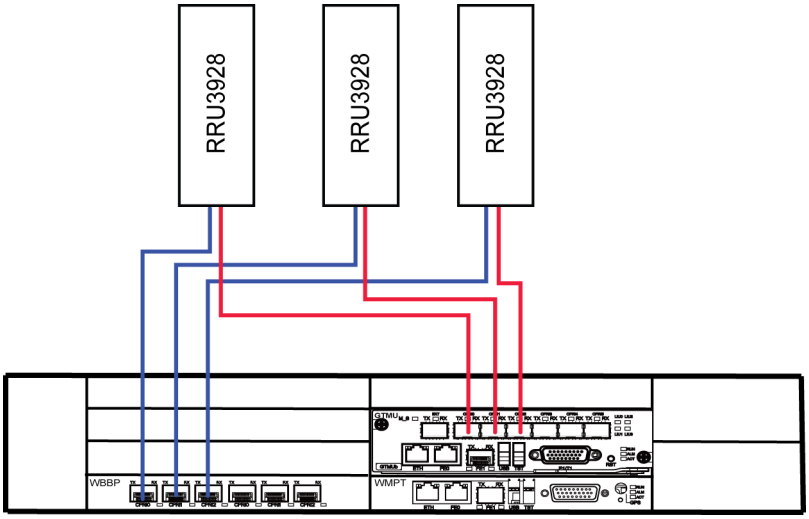
Table 1-1 Physical ports on the RRU3928

Port	Connector	Quantity	Function
RF port	DIN	2	Connects to an antenna
Interconnection port for receiving RF signals	DB2W2	1	Connects to the another RF module
Common public radio interface (CPRI) port	DLC	2	Connects to the baseband unit (BBU3900)
Power supply socket	Easy power receptacle (pressfit type)	1	Receives -48 V DC power
RET port	DB9	1	Connects to a remote control unit (RCU)
MON port	DB15	1	Port for monitoring and maintenance

A BBU3900 and RRU3928 are connected through a CPRI port using an electrical or optical cable to transmit CPRI signals.

The BBU3900 and the RRU3928 are connected in dual-star topology. In this topology, the CPRI port on the GTMU or UBRI is connected to CPRI0 on the RRU3928, and the CPRI port on the WBBP or LBBP is connected to CPRI1 on the RRU3928, as shown in Figure 1-2.

Figure 1-2 Dual-star topology



2 Technical Specifications

2.1 Frequency Band

Table 2-1 RRU3928 frequency band

Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
900	880–915	925–960
1800	1710–1785	1805–1880

2.2 Capacity

Table 2-2 Single-mode capacity

Mode	Capacity
GSM	Each RRU3928 supports 8 TRXs.
UMTS	Each RRU3928 supports 4 TRXs.
LTE	Each RRU3928 supports 1 TRX. The LTE bandwidth is 1.4, 3, 5, 10, 15, or 20 MHz.

Table 2-3 Dual-mode capacity

Mode	Capacity
GSM + UMTS	For detailed specifications, see Table 2-6 and Table 2-7.
GSM + LTE	For detailed specifications, see Table 2-8.

2.3 Receiver Sensitivity

Table 2-4 RRU3928 receiver sensitivity

Mode	Frequency Band (MHz)	1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)
GSM	900	-113.7	-116.5	-119.2
	1800	-114	-116.8	-119.5
UMTS	900/1800	-125.8	-128.6	-131.3

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.

2.4 Output Power

NOTE

- RRU3928 modules operating in GSM mode and in the 900 or 1800 MHz frequency band comply with the srandard EN 301 502 V9.2.1.
- RRU3928 modules operating in UMTS, LTE, or Multi-Standard Radio (MSR) mode and in 900 or 1800 MHz frequency band comply with the standard ETSI EN 301 908 V5.2.1.
- 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.
- 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.
- Power sharing assumes a random distribution of UEs in the cell.

Table 2-5, Table 2-6, Table 2-7, and Table 2-8 list the typical configurations of the RRU3928.

Table 2-5 Typical RRU3928 configuration (900 MHz/1800 MHz, single-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)
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
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
0	2 (MIMO)	0	0	0	2x20	0
0	3 (MIMO)	0	0	0	2x10	0
0	4 (MIMO)	0	0	0	2x10	0
0	0	1	0	0	0	2x40

Table 2-6 Typical RRU3928 configuration (900 MHz/1800 MHz, GU Non-MSR)

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

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
2	2	20	20
3	2	13	20
4	2	10	20

Table 2-7 Typical RRU3928 configuration (900 MHz/1800 MHz, GU MSR)

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
3	1	20	20
4	1	13	20
5	1	10	20
1	1 (MIMO)	20	2x20
2	1 (MIMO)	20	2x20
3	1 (MIMO)	10	2x20
4	1 (MIMO)	10	2x20
1	2 (MIMO)	20	2x10
2	2 (MIMO)	20	2x10
3	2 (MIMO)	10	2x10
4	2(MIMO)	10	2x10

Table 2-8 Typical RRU3928 configuration (900 MHz/1800 MHz, GL MSR)

Number of GSM Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Power per LTE Carrier (W)
1	1 (MIMO)	20	2x20
2	1 (MIMO)	20	2x20
3	1 (MIMO)	10	2x20
3	1 (MIMO)	15	2x10
4	1 (MIMO)	10	2x20
4	1 (MIMO)	15	2x10
5	1 (MIMO)	10	2x10

Number of GSM Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Power per LTE Carrier (W)
6	1 (MIMO)	10	2x10

2.5 Power Consumption

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 for LTE is reached when the base station works with 50% load. The maximum power consumption for LTE is reached when the base station works with 100% load. The 2 x 2 MIMO configuration is applied on the LTE side. The output power of each carrier is 40 W and the bandwidth of each carrier is 10 MHz.

Table 2-9 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 2-10 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
	3x4	20	755	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

2.6 Input Power

Table 2-11 Input power

Item	Specifications
Input power	–48 V DC; voltage range: –36 V DC to –57 V DC

2.7 Equipment Specifications

Table 2-12 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	400 mm x 240 mm x 160 mm (with the housing)
Weight	15 kg (with the housing)

2.8 Environment Specifications

Table 2-13 Environment specifications

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

3 Acronyms and Abbreviations

Abbreviation	Full Name
3GPP	3rd Generation Partnership Project
BBU	Baseband Unit
BER	Bit Error Ratio
CPRI	Common Public Radio Interface
DTX	Discontinuous Transmission
GSM	Global Service Mobile
GTMU	GSM Timing and Main Control Unit
LBBP	LTE BaseBand Processing Unit
LTE	Long Term Evolution
MIMO	Multi-input and Multi-output
MSR	Multi-Standard Radio
RAN	Radio Access Network
SDR	Software Defined Radio
UBRI	Universal Baseband Radio Interference Board
UMTS	Universal Mobile Telecommunications System
WBBP	WCDMA Baseband Processing unit