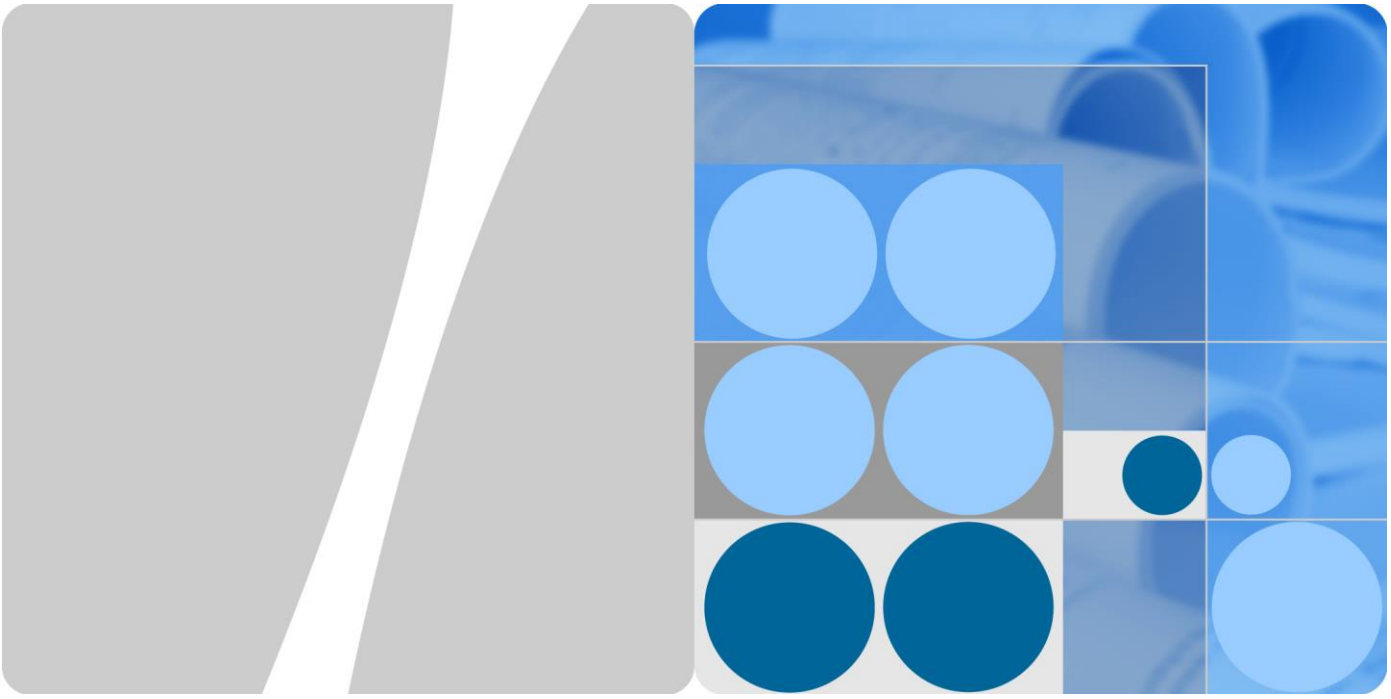

RRU3936 Description

Issue 03

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Contents

1 Introduction

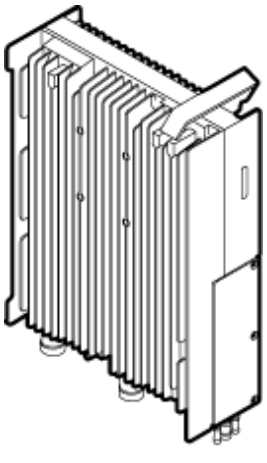
The RRU3936 is an outdoor remote radio unit. It is the radio frequency (RF) part of a distributed base station and can be located near antennas. The RRU3936 can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal data. With the Software Defined Radio (SDR) technology, the RRU3936 can work either in GU or GL dual-mode through software configuration modification.

The software of the RRU3936 is backward compatible with the MBTS, MBSC, and OSS of the N-1 and N-2 versions, where N indicates the current version number, for example, SRAN8.0 in this document. In addition, the software package of the three versions includes the RRU3936 software components. Therefore, the RRU3936 of SRAN8.0 can be used for SRAN6.0, SRAN7.0, and SRAN8.0, without affecting KPIs.

1.1 Appearance

Figure 1-1shows the appearance of the RRU3936.

Figure 1-1 Appearance of the RRU3936



1.2 Physical Ports

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

Figure 1-2 and Table 1-1show the physical ports on the RRU3936.

Figure 1-2 Ports on the RRU3936 panels

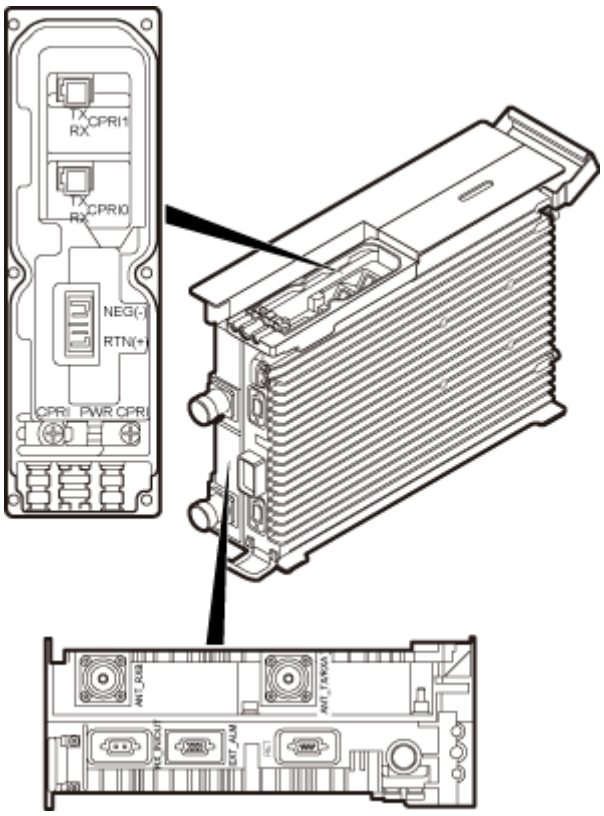


Table 1-1 Physical ports on the RRU3936

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

2 Technical Specifications

2.1 Frequency Band

Table 2-1 RRU3936 frequency band

Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
850	824 to 849	869 to 894
900	880 to 915	925 to 960
	890 to 915	935 to 960
1800	1710 to 1785	1805 to 1880
1900	1850 to 1910	1930 to 1990

2.2 Capacity

Table 2-2 Single-mode capacity

Mode	Capacity
GSM	Each RRU3936 supports 8 TRXs.
UMTS	Each RRU3936 supports 6 carriers.
LTE	1800 MHz (SRAN 7.0): Each RRU3936 supports 2 carriers.

Table 2-3 Dual-mode capacity

Mode	Capacity
GSM+UMTS	For detailed specifications, see Table 2-7.

GSM+LTE	1800 MHz (SRAN 7.0): For detailed specifications, see Table 2-8.
UMTS+LTE	For detailed specifications, see Table 2-9.

2.3 Receiver Sensitivity

Table 2-4 RRU3936 receiver sensitivity

Mode	Frequency Band (MHz)	1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)
GSM	850	-113.4	-116.2	-118.9 (theoretical value)
	900	–113.7	–116.5	–119.2 (theoretical value)
	1800	–114	–116.8	–119.5 (theoretical value)
	1900	-113.7	-116.5	-119.2 (theoretical value)
UMTS	850	-125.5	-128.3	-131.0
	900	–125.8	–128.6	–131.3
	1800	–126.1	–128.9	–131.6
	1800	–106.6	–109.4	–112.1
	1900	-125.8	-128.6	-131.3
LTE	1900	-106.3	-109.1	-111.8

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured 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 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 is measured, as recommended in 3GPP TS 36.104, under a 5 MHz channel bandwidth based on the FRC A1-3 in Annex A.1 (QPSK, R = 1/3, 25 RBs) standard.

2.4 Typical Output Power

NOTE

- RRU3936 modules operating in GSM mode and in the 900 or 1800 MHz frequency band comply with the standard EN 301 502 V9.2.1.
- RRU3936 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 and 3GPP TS 37.104.
- For the RRU3936 working in GSM mode: when the S1 configuration is applied, the maximum output power of each carrier on the RRU3936 is 80 W. If the output power of 60 W or 80 W is required, the related license must be obtained. After design optimization, the 8PSK and GMSK modulation schemes enable the same output power for each carrier on the RRU3936 when the S1, S2, or S3 configuration is used. When any of the S4 through S8 configurations is used, the license controlling the GBFD-118104 Enhanced EDGE Coverage feature must be obtained. Otherwise, the 8PSK and GMSK modulation schemes cannot enable the same output power for each carrier on the RRU3936.
- The output power is 1 dB lesser than the standard power when the RRU3936 is located at a height of 3500 m to 4500 m; and is 2 dB lesser than the standard power when the RRU3936 is located at a height of 4500 m to 6000 m.
- 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, the dynamic power sharing feature is mutually exclusive with the GBFD-113201 Concentric Cell, GBFD-114501 Co-BCCH Cell, GBFD-118001 BCCH Dense Frequency Multiplexing, and GBFD-117501 Enhanced Measurement Report (EMR) features. In GBSS9.0 and later versions, the dynamic power sharing feature can be used together with these features. However, the dynamic power sharing feature currently cannot be used together with the GBFD-117002 IBCA (Interference Based Channel Allocation), GBFD-117001 Flex MAIO, GBFD-118701 RAN Sharing, and GBFD-114001 Extended Cell features in GBSS8.1, GBSS9.0, and later versions.
- Power sharing assumes a random distribution of UEs in the cell.
- *: The UMTS mode is supported in terms of hardware.

Table 2-5, Table 2-6, Table 2-7, Table 2-8 and Table 2-9 list the typical output power of the RRU3936.

Table 2-5 Typical output power of RRU3936 (900 MHz/1800 MHz/850 MHz/1900 MHz, GSM and UMTS)

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)
1	0	80	80	0
2	0	40	40	0

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)
3	0	27	31	0
4	0	20	27	0
5	0	16	20	0
6	0	12	20	0
7	0	10	16	0
8	0	7	12	0
0	1	0	0	80
0	2	0	0	40
0	3	0	0	25
0	4	0	0	20
0	5*	0	0	16*
0	6*	0	0	12*

Table 2-6 Typical output power of RRU3936 (900 MHz/1800 MHz/1900 MHz, LTE)

Number of LTE Carriers	Output Power per LTE Carrier (W)
1	5/10/15/20MHz: 60 1.4/3MHz: 40
2	1.4/3/5/10MHz: 40

NOTE

① indicates that configuration is supported in SRAN7.0.

Table 2-7 Typical output power of RRU3936 (900 MHz/1800 MHz/850 MHz/1900 MHz, GU 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
1	2	40	20
2	1	30	20
2	1	20	40

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	1	20	20
3	2	16	10
3①	2①	13①	20①
4	1	12	20
4	2	12	10
5	1	10	20
5	2	10	10
6	1	10	10
6	2	8	10
7	1	8	10

NOTE

If there are less than 5 GSM carriers, LTE bandwidth is 5, 10, 15, or 20 MHz.

If there are more than 4 GSM carriers, LTE bandwidth is 5, 10, or 15 MHz.

Table 2-8 Typical output power of RRU3936 (1800 MHz/1900 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	40	40
2	1	20	40
2	1	30	20
3	1	20	20
4	1	12	20
5	1	10	20
6	1	10	10
7	1	8	10

Table 2-9 Typical output power of RRU3936 (1900 MHz, UL)

Number of UMTS Carriers	Number of LTE Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
1	1	40	40
2	1	20	40
2	1	30	20
3	1	20	20

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.

Table 2-10 Power consumption of the DBS3900(Ver.D) (-48V) (configured with RRU3936, 900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	540	635
	S4/4/4	20	655	965
UMTS	3 x 1	20	485	550
	3 x 2	20	580	715
GSM+ UMTS	GSM S2/2/2+UMTS 3 x 1	GSM: 20 UMTS: 20	750	910
	GSM S3/3/3+UMTS 3 x 1	GSM: 20 UMTS: 20	815	1070

Table 2-11 Power consumption of the DBS3900(Ver.D) (-48V) (configured with RRU3936, 1800 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	590	695
	S4/4/4	20	725	1020

2.6 Input Power

Table 2-12 Input power

Item	Specifications
Input power	–48 V DC; voltage range: –36 V DC to –57 V DC NOTE The RRU3936 supports AC applications after being configured with an AC/DC power module. For details, see the AC/DC Power Module User Guide.

2.7 Equipment Specifications

NOTE
RRU3936 does not have the housing by default.

Table 2-13 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	400 mm x 300 mm x 100 mm (without the housing)
Weight	13.5 kg (without the housing)

2.8 CPRI Port Specifications

Table 2-14 CPRI port specifications

Item	Specifications
Number of CPRI ports	2
CPRI data rate	1.25 Gbit/s or 2.5 Gbit/s

Item	Specifications
Topology	Star, chain, or dual-star
Cascading Levels	CPRI MUX: • GU: 6 • GL: 4
Maximum Distance from the BBU	• Dual-star: 40 km • CPRI MUX: The distance between every two RRUs must not exceed 10 km, the distance between the BBU and nearest RRU must not exceed 10 km, and the distance between the BBU and farthest RRU on a CPRI chain must not exceed 40 km. If only one RRU is on a CPRI chain, the distance between the RRU and BBU must not exceed 10 km.

2.9 Environment Specifications

Table 2-15 Environment specifications

Item	Specifications
Operating temperature	–40°C to +50°C (with solar radiation) –40°C to +55°C (without solar radiation)
Relative humidity	5% RH to 100% RH
Absolute humidity	1 g/m³ to 30 g/m³
Atmospheric pressure	70 kPa to 106 kPa
Operating environment	The RRU complies with the following standards: • 3GPP TS 45.005 • 3GPP TS 25.141 • 3GPP TS 36.141 • 3GPP TS 37.141 • 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
MSR	Multi-Standard Radio
RRU	Remote Radio Unit