

RRU3958 Description

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1 Overview

The RRU3958 is an outdoor remote radio unit which is powered by a power cabinet. It is the RF part of a distributed base station and can be installed near the antenna. The RRU3958 performs modulation, demodulation, data processing, and combination and division of baseband signals and RF signals. With the software-defined radio (SDR) technology, the RRU3958 can work in GU or UL dual mode through software configuration.

The RRU3958 adopts a dual-transmitter and dual-receiver design, which further improves the output power and carrier capacity.

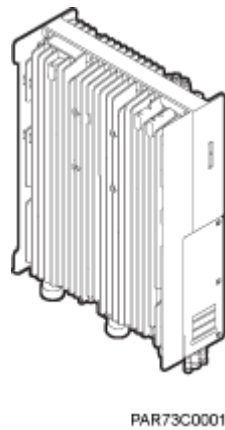
The software version of the RRU3958 (2100 MHz) is SRAN11.0, which is compatible with the N – 1 and N – 2 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3958 can be used with products of SRAN9.0, SRAN10.1, and SRAN11.0 versions. All these three versions include the RRU3958 software components. The RRU3958 used in these versions has no impact on the KPIs of products.

The software version of the RRU3958 (900 MHz) is SRAN12.1, which is compatible with the N – 1 and N – 2 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3958 can be used with products of SRAN10.1, SRAN11.1, and SRAN12.1 versions. All these three versions include the RRU3958 software components. The RRU3958 used in these versions has no impact on the KPIs of products.

1.1 Appearance

Figure 1-1 shows the appearance of the RRU3958.

Figure 1-1 Appearance of the RRU3958



1.2 Physical Ports

The RRU has a modular design. Its external ports are located at the bottom of the module and in the cabling cavity.

Figure 1-2 shows the physical ports on the RRU3958 and Table 1-1 describes these ports.

Figure 1-2 Physical ports on the RRU3958

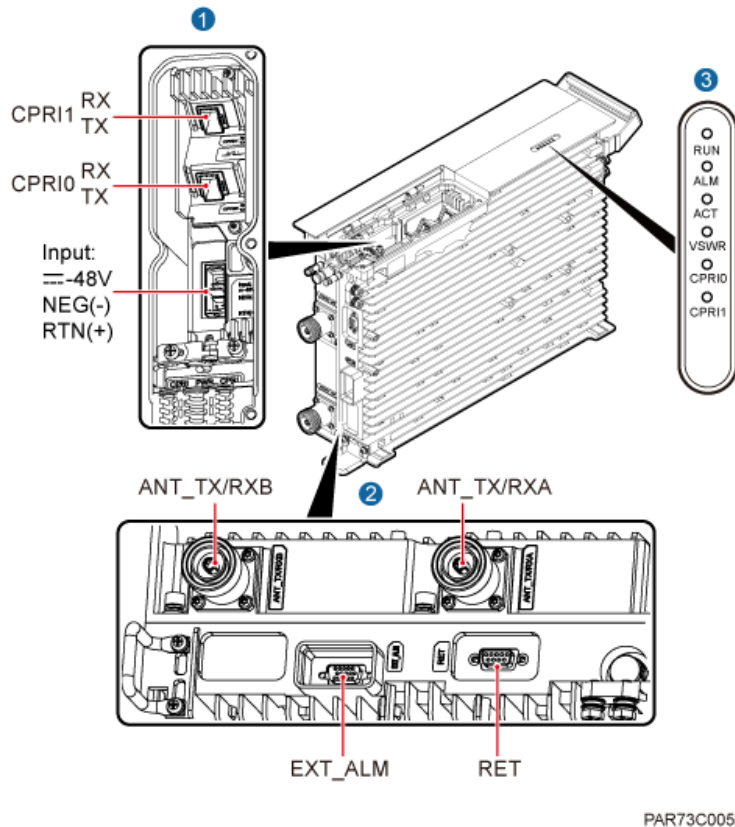


Table 1-1 Physical ports of the RRU3958

Port	Connector	Quantity	Description
RF port	DIN connector	2	Connects to the antenna system.
CPRI port	DLC connector	2	Connects to a BBU.
Power supply port	Tool-less female connector (pressfit type)	1	Supplies –48 V power.
RET port	DB9 connector	1	Connects to a remote control unit (RCU).
Alarm port	DB15 connector	1	Receives alarm signals from external devices.

2 Technical Specifications

2.1 Frequency Band

Table 2-1 Frequency band

Mode	Frequency Band	RX Frequency Band (MHz)	TX Frequency Band (MHz)	IBW (MHz)
RRU3958	900 PGSM	890 to 915	935 to 960	25
	900 EGSM	880 to 915	925 to 960	35
	2100	1920 to 1980	2110 to 2170	60

2.2 Capacity

Table 2-2 Single-mode capacity

Mode	Capacity
GSM	Each RRU3958 (900 MHz frequency band only) supports 8 TRXs.
UMTS	Each RRU3958 supports: <ul style="list-style-type: none"> • 6 carriers without MIMO • 4 carriers with MIMO
LTE	Each RRU3958 (2100 MHz frequency band only) supports 2 carriers and the LTE bandwidth can be 5 MHz, 10 MHz, 15 MHz, or 20 MHz.

Table 2-3 Multimode capacity

Mode	Capacity
GSM+UMTS	(Supported only by the 900 MHz frequency band) For details, see Table 2-6 and Table 2-7.

UMTS+LTE	(Supported only by the 2100 MHz frequency band) For details, see Table 2-9.
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2.3 Receiver Sensitivity

Table 2-4 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 (theoretical value)
UMTS	900	-125.8	-128.6	-131.3
	2100	-126.1	-128.9	-131.6
LTE	2100	-106.9	-109.7	-112.4

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured at the antenna connector on condition that the channel rate reaches 13 kbit/s and the bit error rate (BER) does not exceed 0.02.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on condition that the channel rate reaches 12.2 kbit/s and the BER does not exceed 0.001.
- The receiver sensitivity of LTE, as recommended in 3GPP TS 36.104, is measured 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

- An RRU3958 working in GSM mode and operating in the 900 MHz frequency band complies with the EN 301 502 V9.2.1 standard.
- An RRU3958 working in UMTS, LTE, or MSR mode and operating in the 2100 MHz frequency band complies with the 3GPP TS 37.104 V10.4.0 and TS 37.141 V10.4.0 standards.
- If an RRU3958 is located at an altitude of 3500 to 4500 meters, its power reduces by 1 dB. If an RRU3958 is located at an altitude of 4500 to 6000 meters, its power reduces by 2 dB.
- The output power per carrier in the output power tables indicates the maximum output power supported to ensure network performance.
- When two LTE carriers are configured, it is recommended that the power spectrum density (PSD) be set to the same value for the two carriers. Power spectrum density = Carrier output power/Carrier bandwidth (1.4 MHz and 3 MHz bandwidths are considered as 5 MHz bandwidth in this formula.)

Table 2-5 Typical output power of the RRU3958 (900 MHz, single mode)

Number of GSM TRXs	Number of UMTS Carriers	Output Power per GSM TRX (W)	Output Power per UMTS Carrier (W)
1	0	40	0
2	0	40	0
3	0	20	0
4	0	20	0
5	0	13	0
6	0	13	0
7	0	10	0
8	0	10	0
0	1	0	40
0	2	0	40
0	3	0	20
0	4	0	20
0	1 (MIMO)	0	2x40
0	2 (MIMO)	0	2x20
0	3 (MIMO)	0	2x10
0	4 (MIMO)	0	2x10

Table 2-6 Typical output power of the RRU3958 (900 MHz, GU non-MSR)

Number of GSM TRXs	Number of UMTS Carriers	Output Power per GSM TRX (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
2	2	20	20
3	2	13	20
4	2	10	20

Table 2-7 Typical output power of the RRU3958 (900 MHz, GU MSR)

Number of GSM TRXs	Number of UMTS Carriers	Output Power per GSM TRX (W)	Output Power per UMTS Carrier (W)
1	1	10	10
3	1	20	20
4	1	13	20
5	1	10	20
6	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 output power of the RRU3958 (2100 MHz, single mode)

Number of UMTS Carriers	Number of LTE Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)	Bandwidth of an LTE Cell (MHz)
1	0	40	0	/
2	0	40	0	/
3	0	20	0	/
4	0	20	0	/
5	0	13	0	/
6	0	13	0	/
1 (MIMO)	0	2x40	0	/
2 (MIMO)	0	2x20	0	/
3 (MIMO)	0	2x13	0	/
4 (MIMO)	0	2x10	0	/
2 + 1 (MIMO)	0	Non-MIMO carrier: 20 MIMO carrier: 2x20	0	/
2 + 2 (MIMO)	0	Non-MIMO carrier: 13 MIMO carrier: 2x13	0	/
2 + 3 (MIMO)	0	Non-MIMO carrier: 10 MIMO carrier: 2x10	0	/
4 + 1 (MIMO)	0	Non-MIMO carrier: 13 MIMO carrier: 2x13	0	/
4 + 2 (MIMO)	0	Non-MIMO carrier: 10 MIMO carrier: 2x10	0	/
6 + 1 (MIMO)	0	Non-MIMO carrier: 10 MIMO carrier: 2x10	0	/
0	1 (MIMO)	0	2x40	5, 10, 15, 20

Number of UMTS Carriers	Number of LTE Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)	Bandwidth of an LTE Cell (MHz)
0	2 (MIMO)	0	2x20	5, 10, 15, 20

Table 2-9 Typical output power of the RRU3958 (2100 MHz, UL MSR)

Number of UMTS Carriers	Number of LTE Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)	Bandwidth of an LTE Cell (MHz)
1	1 (MIMO)	20	2x20	5, 10, 15, 20
2	1 (MIMO)	20	2x20	5, 10, 15, 20
3	1 (MIMO)	13	2x13	5, 10, 15, 20
4	1 (MIMO)	13	2x13	5, 10, 15, 20
6	1 (MIMO)	10	2x10	5, 10, 15, 20
1 (MIMO)	1 (MIMO)	2x20	2x20	5, 10, 15, 20
2 (MIMO)	1 (MIMO)	2x13	2x13	5, 10, 15, 20
3 (MIMO)	1 (MIMO)	2x10	2x10	5, 10, 15, 20
2	2 (MIMO)	13	2x13	5, 10, 15, 20
4	2 (MIMO)	10	2x10	5, 10, 15, 20

2.5 Power Consumption

NOTE

- The typical power consumption and the maximum power consumption are measured when the ambient temperature is 25°C.
- The typical power consumption for GSM is measured when the load is 30%. The maximum power consumption for GSM is measured when the load is 100%.
- The typical power consumption for UMTS is measured when the load is 40%. The maximum power consumption for UMTS is measured when the load is 100%.
- The typical power consumption for LTE is measured when the load is 50%. The maximum power consumption for LTE is measured when the load is 100%.
- This section describes the power consumption of an entire base station. Board configurations in a BBU are as follows:
 - GSM: one GTMU
 - UMTS: one UMPTb1 and one WBBPf3 in 3x1 and 3x2 scenarios; one UMPTb1 and two WBBPf3s in 3x3 and 3x4 scenarios.
 - LTE FDD: one UMPTb1 and one LBBPd1 when one carrier is configured.

Table 2-10 Power consumption of a DBS3900 (Ver.D) (-48 V) (configured with the RRU3958, 900 MHz)


Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	515	615
	S4/4/4	20	700	995
UMTS	3x1	20	470	535
	3x2	20	550	690
GSM+UMTS	GSM S2/2/2 + UMTS 3x1	GSM: 20 UMTS: 20	770	940
	GSM S3/3/3 + UMTS 3x1	GSM: 20 UMTS: 20	825	1095

Table 2-11 Power consumption of a DBS3900 (Ver.D) (-48 V) (configured with the RRU3958, 2100 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
UMTS	3 x 1	20	425	490
	3 x 2	20	490	590
	3 x 3	20	655	850
	3 x 4	20	730	970
LTE	3 x 10 MHz, 1 carrier	2x20	535	655
UMTS+LTE	UMTS 3 x 1+LTE 3 x 10 MHz, 1 carrier	UMTS: 20 LTE: 2 x 20	655	835
	UMTS 3 x 2+LTE 3 x 10 MHz, 1 carrier	UMTS: 20 LTE: 2 x 20	715	940

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 RRU3958 supports AC power supply when connected to an external AC/DC power module or an OPM15M. For details, see <i>AC/DC Power Module User Guide</i> and <i>OPM15M User Guide</i> .

2.7 Equipment Specifications

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	≤ 15 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, 2.5 Gbit/s, 4.9 Gbit/s, or 9.8 Gbit/s
CPRI topology	Star, chain, or dual-star
Cascading level	CPRI MUX: <ul style="list-style-type: none"> • GU: 6 • UL: 4

Maximum distance from a BBU	<ul style="list-style-type: none"> • GU (dual-star/ CPRI MUX): 40 km • In UL (dual-star/CPRI MUX) mode, the maximum distance from a BBU varies with the type of LTE baseband processing board configured: <ul style="list-style-type: none"> ▪ LBBPd1/UBBPd3: 20 km ▪ LBBPd2/UBBPd4: 40 km ▪ LBBPd3/UBBPd5/UBBPd6: <ul style="list-style-type: none"> - Number of LTE cells \leq 3: 40 km - Number of LTE cells $>$ 3: 20 km
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2.9 Environment Specifications

Table 2-15 Environment specifications

Item	Specifications
Operating temperature	<p>–40°C to +50°C (with solar radiation)</p> <p>–40°C to +55°C (without solar radiation)</p>
Relative humidity	5% RH to 100% RH
Absolute humidity	1 g/m ³ to 30 g/m ³
Atmospheric pressure	70 kPa to 106 kPa
Operating environment	<p>The following standards must be complied with:</p> <ul style="list-style-type: none"> • 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

Table 3-1 Acronyms and abbreviations

Acronym and Abbreviation	Full Name
3GPP	3rd Generation Partnership Project
BBU	baseband control unit
BER	bit error rate
CPRI	common public radio interface
DTX	discontinuous transmission
GTMU	GSM transmission and timing and management unit
LBBP	LTE baseband processing unit
LTE	Long Term Evolution
MIMO	multiple-input multiple-output
MSR	multi-standard radio
RAN	radio access network
RRU	remote radio unit
SDR	software defined radio
UBRI	universal baseband radio interference board
UMPT	universal main processing and transmission unit
UMTS	Universal Mobile Telecommunications System
WBBP	WCDMA baseband processing unit