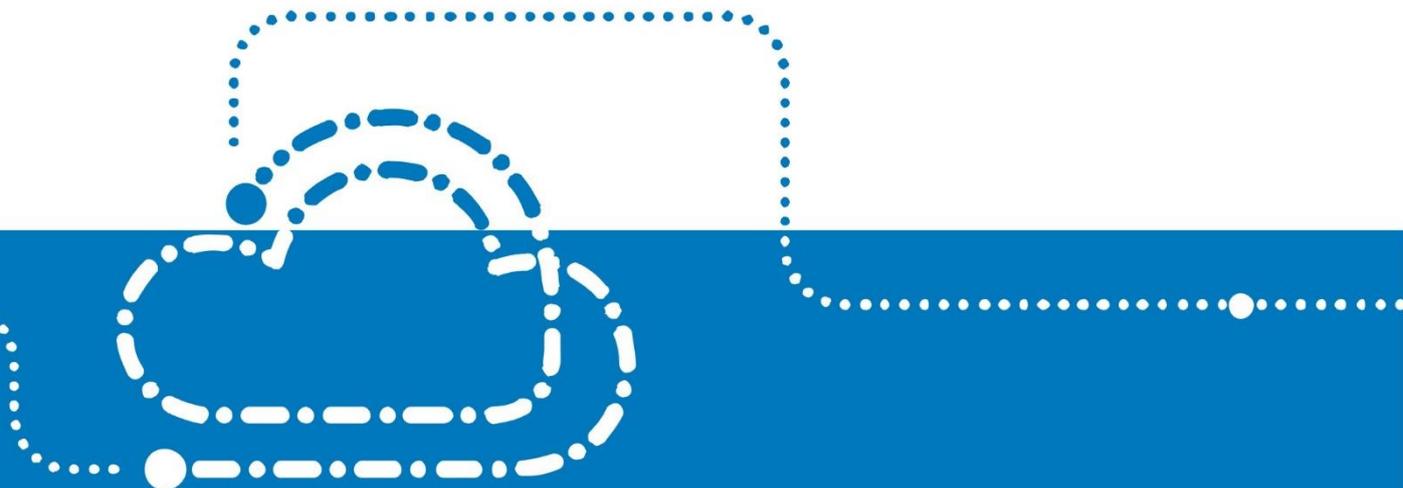




Operator Logo

ZXSDR R8854 Product Description

UniRAN 18



ZXSDR R8854 Product Description

Version	Date	Author	Reviewer	Notes
V1.00	2018/07/14	Yang Lisha		Not open to the third party
V1.10	2018/12/26	He Li		1. Revise the architecture 2. Refine technique parameters

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1 Overview

1.1 Introduction

This document provides a high level description of ZTE ZXSDR R8854 (hereinafter R8854), which is a new compact 4T4R RRU (Remote Radio Unit) used in ZTE wireless total solution. R8854 provides 4-way transmission and 4-way reception to implement LTE 4T4R. The RRU is based on ZTE common RRU platform, and works in GSM, UMTS, LTE, NB-IoT single mode or multi-mode through software configuration.

R8854 in band 1, band 3, band 10 and band 7 (2100/1800/1700/2600 MHz) are introduced in this document. R8854 S2100 supports UMTS/LTE dual-mode in band 1, R8854 S1800 supports GSM/LTE dual-mode in band 3, R8854 S1700 supports LTE single-mode in band 10, and R8854 S2600 supports LTE single mode in band 7. The appearance is shown in Figure 1-1.

Figure 1-1 Physical Appearance



The document is designed to give an overview of R8854 characteristics, its key benefits, the architecture, functionality and services, as well as the system capabilities.

This device is restricted to use and put into service due to the need for a spectrum license and/or the conditions attached to authorization for the use of frequencies within all European Union countries (BE/BG/CZ/DK/DE/EE/IE/EL/ES/FR/HR/IT/CY/LV/LT/LU/HU/MT/NL/AT/PL/PT/RO/SI/SK/FI/SE/UK).

NOTE: In this document, G is short for GSM. U is short for UMTS, and L is short for FDD LTE.

Note: To be compliant with Radio Equipment Directive (RED) of European Union, this device is restricted to use and put into service due to the need for a spectrum license and/or the conditions attached to authorization for the use of frequencies within all European Union countries (BE/BG/CZ/DK/DE/EE/IE/EL/ES/FR/HR/IT/CY/LV/LT/LU/HU/MT/NL/AT/PL/PT/RO/SI/SK/FI/SE/UK).

1.2 Benefits

- **4T4R Supported, Better Performance**

With four-way transmitting and four-way receiving channels, R8854 supports LTE 4*4 MIMO to improve coverage, data throughput and peak download speed. With 4*4 MIMO technology and CA solution, the peak downlink throughput of single user achieves higher than 1 Gbps.

- **Faster deployment**

R8854 is 12 L in volume and 17 kg in weight. It is portable to transport and flexible to install on the pole, tower and wall, thus reducing OPEX.

- **High Efficiency, Lower TCO**

It supports dynamic adaptive PA power supply due to the output power, which reduces power consumption.

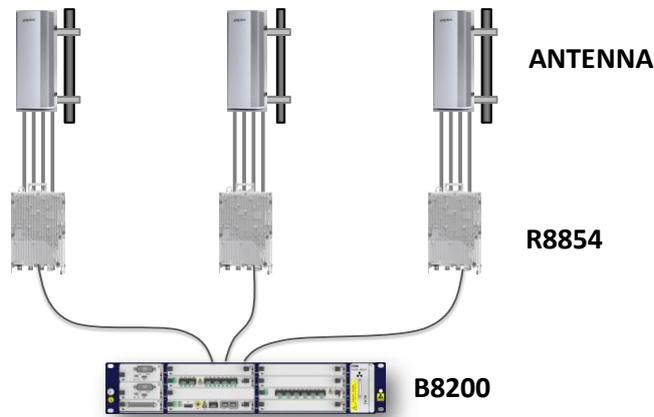
The passive dissipation solution helps to save power consumption and reduce environment noise.

1.3 Application Scenarios

Radio unit R8854 together with baseband unit ZXSDR B8200 comprises distributed macro eNodeB. It is mostly used in LTE application with high order MIMO requirements.

Typical application scenario of R8854 is shown in Figure 1-2.

Figure 1-2 Application Scenarios



1.4 Functionality

R8854 is a remote radio unit of distributed base station. The signal is transmitted through R8854 to base band processing unit for further processing via standard CPRI interface. The antenna should be installed and operated with minimum distance 4.55m between the radiator and human body.

By applying the distributed system, the feeder loss will be eliminated when the radio unit is positioned close to the antenna. The coverage is enlarged with this solution.

The functions of R8854 include:

- Supports E-UTRA operating bands of band 1/band 3/band 10/band 7.
- Supports LTE channel bandwidth of 1.4/3/5/10/15/20 MHz in band 3 and 5/10/15/20 MHz in band 1/band 7 and 5/20MHz in band 10.
- Supports 4T4R in one box which can optimize spectrum efficiency greatly and improve network uplink performance.
- Support 256QAM in LTE downlink and 64QAM in uplink.
- Supports transmit power report function for every carrier.
- Supports overload protection function for power amplifier.

- Supports transmit channel switching on/off function.
- Supports non-disruptive system services of BBU and other RRUs in case of software failure in R8854 connecting with them.

2 Technical Specifications

2.1 Physical Specifications

Table 2-1 Physical Specifications

Item	Specifications
Size (Length*Width*Depth)	415 * 296 * 104 mm, 12.8 L
Weight	17 kg
Color	Silver gray

2.2 Performance Specifications

2.2.1 Operation Frequency Band

Table 2-2 Operation Frequency Band

RRU Type	Operation Radio Frequency Band (MHz)
R8854 S2100	Rx: 1920 – 1980 Tx: 2110 – 2170
R8854 S1800	Rx: 1710 – 1785 Tx: 1805 – 1880
R8854 S1700	Rx: 1710 – 1770 Tx: 2110 – 2170
R8854 S2600	Rx: 2500 – 2570 Tx: 2620 – 2690

2.2.2 Capacity

Capacities of R8854 in different bands are given in the following table.

Table 2-3 Capacity

RRU Type	Mode	RRU Capacity
R8854 S2100	LTE single mode	2*20 MHz 4T4R cells
	UMTS/LTE dual-mode	4*1 UMTS CSs + 2*20MHz LTE 4T4R cells
R8854 S1800	LTE single mode	<ul style="list-style-type: none"> ● 2*20 MHz 4T4R cells ● 2*20 MHz 2T4R cells ● 4*20 MHz 2T2R cells
	GSM/LTE dual-mode	<ul style="list-style-type: none"> ● 4*2 GSM TRXs + 2*20 MHz LTE 4T4R cell (IBW=47.5 MHz) ● 4*1 GSM TRXs + 1*20 MHz LTE 4T4R cell (IBW=75 MHz)
	LTE/NB-IoT dual-mode	8 NB-IoT carriers + 2*20 MHz LTE 4T4R cells
	GSM/LTE/NB-IoT multi-mode	8 GN carriers + 2*20 MHz LTE 4T4R cells
R8854 S1700	LTE single mode	2*5 MHz 4T4R cells 2*20 MHz 4T4R cells
R8854 S2600	LTE single mode	<ul style="list-style-type: none"> ● 2*20 MHz 4T4R cells ● 2*20 MHz 2T4R cells ● 4*20 MHz 2T2R cells

Note: A GN carrier means a GSM TRX or a NB 1T2R carrier. When the NB carrier supports 1T2R, NB 1T2R carrier number : GSM TRX number = 1:1; When the NB carrier supports 2T2R/2T4R, NB 2T2R/2T4R carrier number : GSM TRX (or NB 1T2R carrier) number = 1:2. UN is the same as GN.

2.2.3 Bandwidth

R8854 supports all types of LTE channel bandwidths.

Table 2-4 LTE Channel Bandwidth

E-UTRA Operating Band	LTE Channel Bandwidth (MHz)
Band 3	1.4/3/5/10/15/20
Band 1/7	5/10/15/20
Band 10	5/20

2.2.4 ToC Output Power

Table 2-5 ToC Output Power

RRU Type	TOC Output Power (W)
R8854	4*40

Note: The TOC here means the max capability of the hardware. The specific TOC output power is limited by the license.

2.2.5 Static Receiver Sensitivity

The static receiver sensitivity of R8854 in different frequency bands is shown in Table 2-6.

Table 2-6 Receiver Sensitivity

Mode	E-UTRA Operating Band	Single Antenna (dBm)	Dual Antennas (dBm)	Four Antennas (dBm)	Note
GSM	Band 3	-113.5	-115.5	N/A	
UMTS	Band 1	-126.5	-129.2	N/A	Typical Value: receiver sensitivity of 12.2K AMR
UMTS	Band 1	-125.9	-128.6	N/A	Typical Value: receiver sensitivity of 3GPP 25.141's specification
LTE	Band 1/3/10/7	-106.4	-109.2	-112	
NB-IoT	Band 3				-133.5dBm@15kHz -139.5dBm@3.75kHz

2.3 Power Specifications

2.3.1 Power Requirements

The following table describes the power supply and the fluctuation range.

Table 2-7 Power Supply

Item	Specifications
Power Supply	DC: -48 V (-37 V – -57 V DC)

R8854 supports integrated lightning protection module for DC power supply. Its protection level is 20 KA.

2.3.2 Power Consumption

Power consumption of R8854 in LTE single mode, GSM/LTE dual-mode and UMTS/LTE dual-mode are listed in Table 2-8, Table 2-9 and Table 2-10.

For GSM mode, the average power consumption is measured when the BCCH TRX load is 100% and the load of other TRXs is 20%. The peak power consumption is measured at 100% system load.

For LTE mode, the average power consumption is measured at 50% system load. The peak power consumption is measured at 100% system load.

Table 2-8 Power Consumption in LTE Single Mode

Configuration: 2L 4T4R, 4PA, 4*20 W/LTE, Total 4*40 W		
RRU Type	Average Power Consumption (W)	Peak Power Consumption (W)
R8854 S1800/S2100/S1700	290	515
R8854 S2600	315	560

Table 2-9 Power Consumption in G/L Dual-mode

Configuration: 8G+1L 4T4R, 4PA, 4*20 W/LTE, 10 W/GSM TRX, Total 4*40 W		
RRU Type	Average Power Consumption (W)	Peak Power Consumption (W)
R8854 S1800	320	525

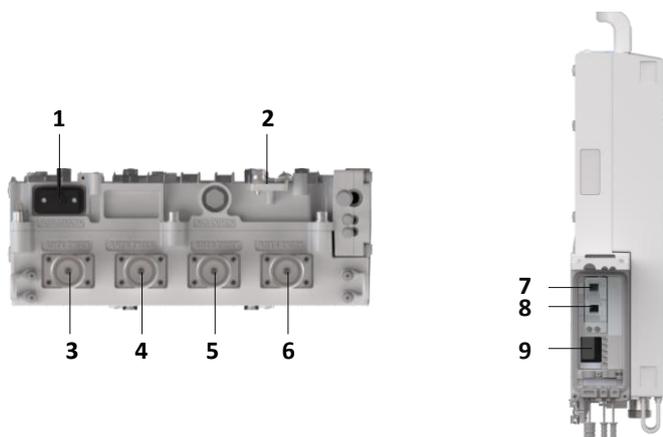
Table 2-10 Power Consumption in U/L Dual-mode

Configuration: 4U+1L 4T4R, 4PA, 4*20 W/LTE, 20 W/UMTS CS, Total 4*40 W		
RRU Type	Average Power Consumption (W)	Peak Power Consumption (W)
R8854 S2100	345	525

2.4 Interface Specifications

The external interfaces of the R8854 are located at the bottom and on the front side of the module.

Figure 2-1 External Interfaces Demonstration



For a description of the external interfaces at the bottom of the R8854 module, refer to Table 2-11.

Table 2-11 Description of the External Interfaces at the Bottom

No.	Label	Interface	Interface Type/Connector
1	AISG/MON	AISG equipment interface MON external monitoring interface LMT O&M Ethernet interface	DB15 connector
2	GND	Protective grounding interface	16 mm ² yellow-green round Terminal
3	ANT1 (TX/RX)	TX/RX antenna interface Built-in NSBT	50 Ω DIN-mode connector
4	ANT2 (TX/RX)	TX/RX antenna interface	50 Ω DIN-mode connector
5	ANT3 (TX/RX)	TX/RX antenna interface	50 Ω DIN-mode connector
6	ANT4 (TX/RX)	TX/RX antenna interface	50 Ω DIN-mode connector

For a description of the external interfaces on the right side of the R8854 module, refer to Table 2-12.

Table 2-12 Description of the External Interfaces on the Right Side

No.	Label	Interface	Interface Type/Connector
7	OPT1	Communication between RRU and BBU, or RRU cascading interface	LC-type optical interface (IEC 874)
8	OPT2	RRU cascading interface	LC-type optical interface (IEC 874)
9	PWR	Power input interface	2-pin customized connector

Additionally, R8854 provides 6 LED indicators. The indicators on the R8854 panel indicate the operating status of the RRU.

2.5 Transmission

R8854 is connected to BBU through CPRI interfaces. For more information about CPRI interfaces, refer to Table 2-13.

Table 2-13 CPRI Interfaces

Item	Quantity	Interface Type	Speed	Standard
CPRI interface	2	SFP (LC)	9.8 Gbps	CPRI V5.0

Note: The speed here refers to the max capability of the hardware. The specific speed depends on the optical module configuration.

2.6 Working Environment Specifications

Table 2-14 Environment Specifications

Item	Specifications
Temperature	-40°C – +55°C
Relative Humidity	5% – 100%
Atmosphere Pressure	70 – 106 kPa
Waterproof/Dustproof	IP65
Ground	≤5 Ω; earth resistance can be less than 10 Ω in thunder-less areas where thunderstorm days are less than 20 per year.

2.7 Electromagnetic Compatibility Specifications

Table 2-15 Electromagnetic Compatibility Specifications

Item	Specifications
Static Discharge Immunity	Contact Discharge: ±6000 V Air Discharge: ±8000 V
Surge Impact Immunity	DC Power port Line to line: ±2000 V

Item	Specifications
	DC Power port Line to ground: ± 4000 V

2.8 Reliability Specifications

Table 2-16 Reliability Specifications

Item	Specifications
MTBF	$\geq 499,000$ hours
MTTR	1 hour
Availability	$\geq 99.999800\%$
Down duration	≤ 1.053 min/year

3 Glossary

Abbreviations	Full Name
BBU	Base Band processing Unit
CPRI	Common Public Radio Interface
DFL	Duplexer & Filters
LMT	Local Maintenance Terminal
LNA	Low-Noise-Amplifier
LTE	Long Term Evolution
MIMO	Multi Input Multi Output
MTBF	Mean Time Between Failures
MTTR	Mean Time To Recovery
OAM	Operating And Maintenance
OPEX	Operation Expenditure
PA	Power Amplifier
PWR	Power
QTR	Quad-channel Transceiver
RF	Radio Frequency
RRU	Remote Radio Unit
SDR	Software Defined Radio
ToC	Top of Cabinet
UE	User Equipment
VSWR	Voltage Standing Wave Ratio