LS5405 RRU

5G 4*5W

一、Overview

1.1 Introduction

At present, the mature products of Lopcomm ARM platform are mainly based on the research and development of NXP LX2160A, and the domestic ARM platform solution is still in the pre-research stage. The main advantages of ARM platform are low power consumption, strong customization and high integration, which is suitable for industrial applications and can also be used for operators to cover some remote areas.

The integrated base station developed by Lopcomm based on LX2160A adopts the integrated design of 5G BBU and RRU, and based on the completely independently developed protocol stack, realizes the complete 5G NR wireless access function, which can provide users with high reliability 5G wireless coverage network quickly and quickly.

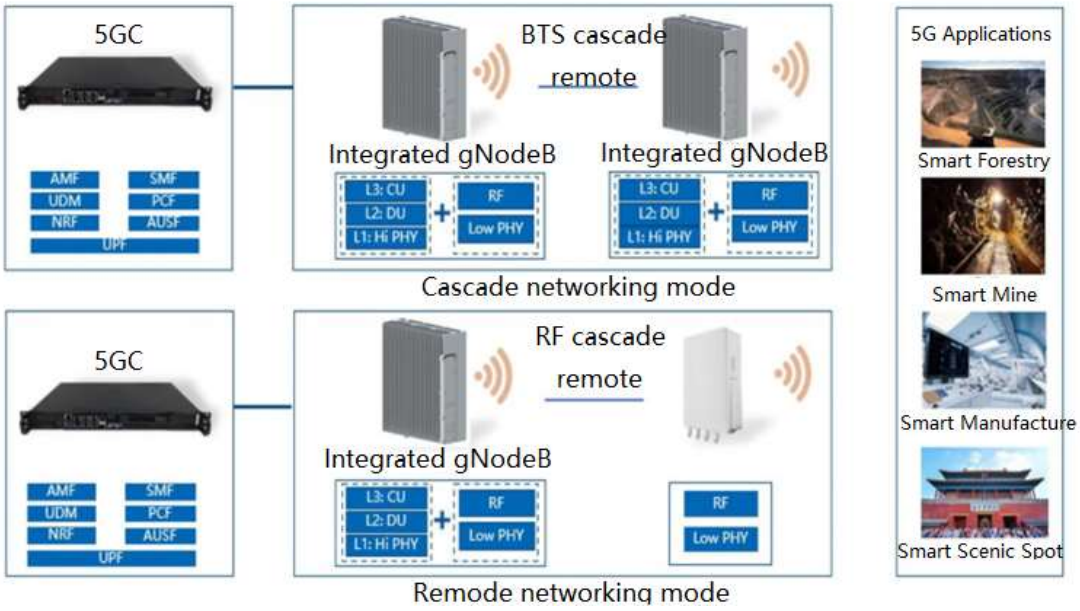

Figure 1-1 Architecture diagram

1.2 Equipment/program highlights

- Green environment protection: Easy deployment, flexible return, low power consumption, and low maintenance cost, effectively reducing construction/O&M pressure.
- Supports BBU expansion, RRU remote deployment, and distributed applications. It provides flexible networking and convenient engineering construction.
- It's based on completely self-developed protocol stack and system software.
- A flexible clock synchronization scheme that supports GPS/Beidou/1588V2

1.3 Application Scenarios

According to public data, most of the usage of data traffic occurs indoors. As a micro base station suitable for improving the depth of indoor network coverage, it will have more obvious advantages over Acer stations in the 5G era. Microbase stations have more advantages than macro stations in indoor environments because of their small size, light weight, easy installation, high energy efficiency and flexible deployment. The integrated micro base station is mainly used in 5G edge coverage, such as tourist attractions, high-end villa groups, temporary need to provide 5G coverage area; 5G vertical industry applications, such as smart mine, underground mine, smart factory, etc., are some typical application scenarios.

Figure 1-2 Application scenario

二、System architecture

The product networking application of the integrated base station is shown in the figure below:

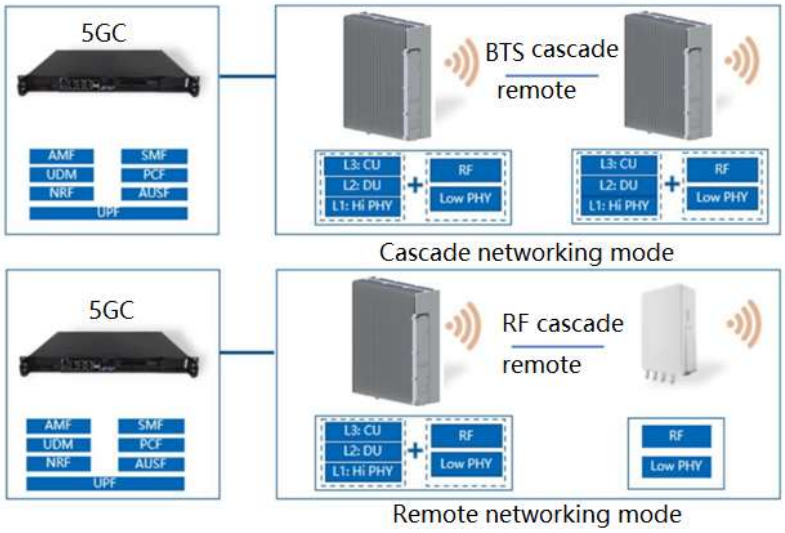

Figure 2-1 Networking of a 5G integrated base station

2.1 Product appearance

Figure 2-2 Product appearance

2.2 Hardware Architecture

The hardware of the machine is composed of three parts, which is responsible for the interface circuit of the interface and the clock part, and mainly realizes the functions of clock synchronization, 1588V2 and data forwarding. Responsible for running 5G gNB stack and OAM CPU small system circuit; An RF circuit responsible for transmitting and processing RF signals. As shown below:

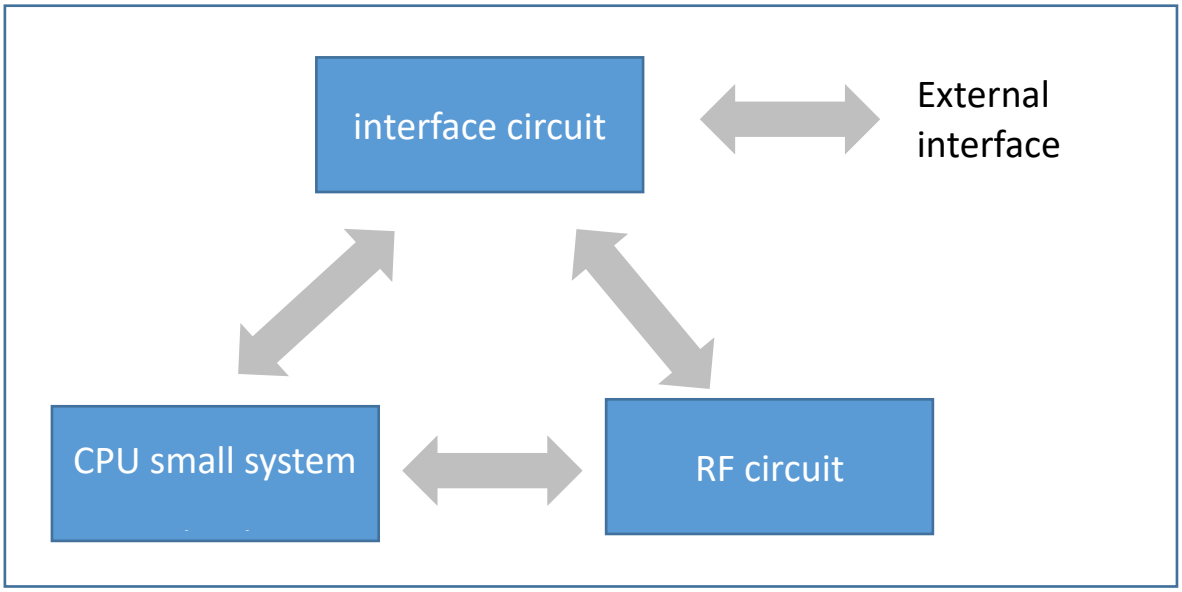

Figure 2-3 Hardware architecture

2.2.1 Machine Details

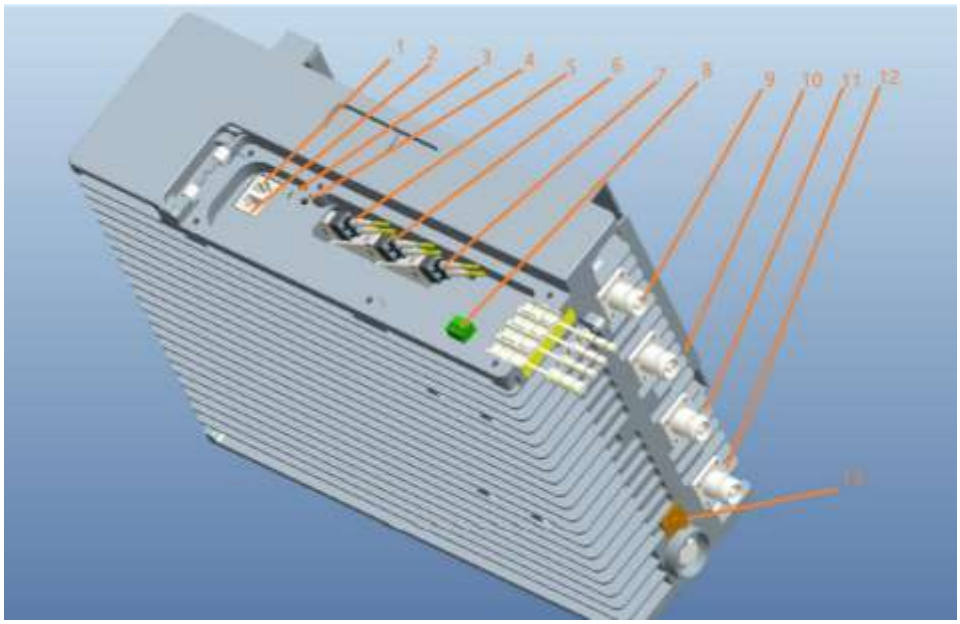

Figure 2-4.External interface diagram

Number	Module	Function	Description
1	DEUG Ethernet port	Debugging and parameter modification	
2	rGPS Ethernet port	GPS second w pulse and time message transmitted at 422 level. Network port indicator: The left side indicates 1pps of GPS and the right side indicates 1PP of rGPS.	Do not insert common network devices
3	Indicator light	From top to bottom, they are: power: Bright indicates that the power supply is normal. run: Flashing indicates that the system starts normally GPS: GPS pulse indicator, flashing in seconds. alarm: Off, the system is normal. Bright indicates that the system has an alarm.	

4	Reset button	System reset button	
5	10G SFP	SFP+ form, remote interface, connect to external RRU or EU	
6	10G SFP	SFP+ form, cascade port, connect to the next level of base station	
7	10G SFP	SFP+ form, return interface, connect to the core network	
8	Input Power	Ac 220v	
9	ANT1	5G NR antenna 1	N-junction，KFK
10	ANT2	5G NR antenna 2	N-junction，KFK
11	ANT3	5G NR antenna 3	N-junction，KFK
12	ANT4	5G NR antenna 4	N-junction，KFK
13	GPS ANT	GPS Antenna connector with 3.3V power output	SMA Receptacle

2.3software architecture

The 5G software architecture is shown below：

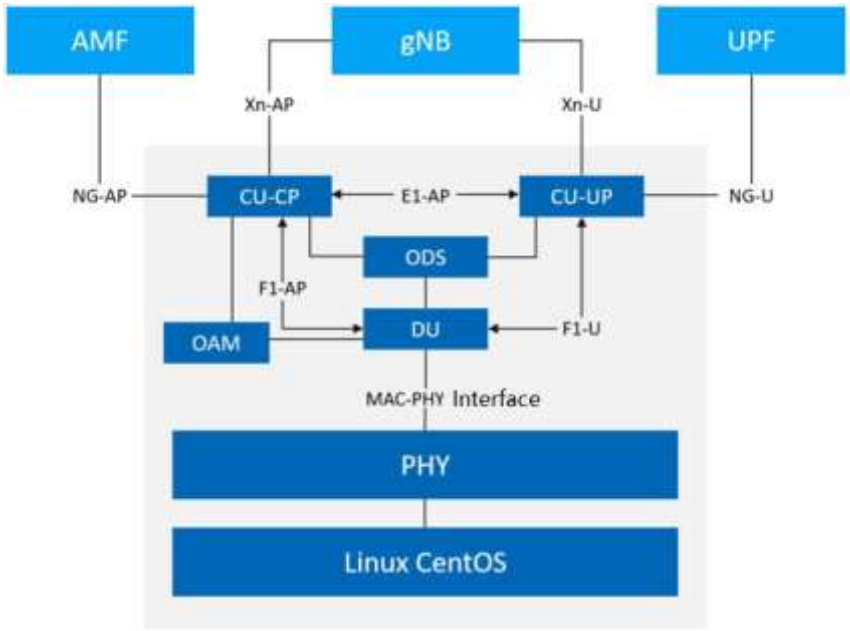

Figure 2-6 5G software architecture diagram

● Linux CentOS is the operating system of the hardware platform, and the system software runs on it.

● PHY is the physical layer protocol.

● DU mainly implements radio resource scheduling.

● CU-CP provides RRC, NGAP, XnAP, X2AP, F1AP, E1AP protocol processing.

● The CU-UP module provides PDCP and SDAP protocol processing.

● ODS stands for Online Debug Service, through which engineers can access, Monitor and adjust each module, mainly used for software module testing.

● OAM provides configuration management, alarm management, performance management, and OMC (Operation and Maintenance Center).

三、technical indicator

3.1Main indicators of base stations

project	indicator
Wireless protocol	Support 3GPP R15 standard
Network Architecture	Support SA
Carrier bandwidth	TDD:100MHz/60MHz/40MH
Subcarrier spacing	TDD:30kHz
capacity	Two 2T2R cells with 100MHz bandwidth are supported Or support 1 4T4R cell with 100MHz bandwidth
NR Peak rate	TDD:

(measured)	5ms frame structure (DDDDDDDSUU), special sub-frame ratio 6:4:4 4 channels 1.35Gbps downlink and 200Mbps uplink 2 channel downlink 700Mbps, uplink 200Mbps 2.5ms Dual-Period Typical Frame Structure (DDDSUDDSUU) The peak rate is 1.2Gbps for four downlink streams and 300Mbps for two uplink streams. The downlink 2 stream has a peak rate of 650Mbps and the uplink two streams have a peak rate of 300Mbps.
Number of community users	The number of RRC active users supported per cell is ≥400 The number of RRC connected users supported per cell is ≥1200
synchronization	Support GPS/ Beidou, 1588V2 synchronization

3.2 Main RF indicator

Rf requirements	specification	remarks
Frequency of operation	1) N41：2515MHZ~2675MHz 2) N78：3300MHz~3600MHz 3) N77: 3800 MHz~4000MHz 4) N79：4900MHz-5000MHz	
IBW	100MHZ	5G NR carrier bandwidth
Rf output power	4*5W	

Output power accuracy	-40℃~+15℃: +/-1.5dB; +15℃~+30℃: +/-1dB; +30℃~+55℃: +/-1.5dB;	
Carrier configuration	5G NR: single carrier 40MHz/60MHz/100MHz	The instantaneous bandwidth is =100MHZ
Error vector magnitude	QPSK:<18.5% 16QAM:<13.5% 64QAM:<5% 256QAM:<3.5%	
Adjacent channel leakage power	<-47dBc	PAR: ~8.2dB Filter Loss: 0.7dB(TBD, Room Temp.
Frequency error	<0.05ppm	
The working frequency band is useless to transmit	TS 36.104&&TS 38.104 6.6.4.2.4 Category B	
Stray emission	TS 36.104&&TS 38.104 6.6.5.2.1 Category B	
Emission output dynamics	>10dB	0.1dB Step Size
Transmitter standard	Meet 3GPP TS 36.104&&TS 38.104	
Receiver sensitivity level	-95dBm@room temp -94dBm@over temp	
The receiver	Meet 3GPP TS 38.141-1 table	

emits spurious	7.6.5	
RSSI measurement accuracy	+/-3dB@-55dBm~-77dBm	High temperature
Maximum input signal (undamaged)	0dBm	Continuous wave signal, lasting 1 minute
Accept blocking	Meet 3GPP TS 36.104&&TS 38.104	
Receiver standards	Meet 3GPP TS 36.104&&TS 38.104	

3.3 Physical indicators

Model	Size	Weight
TDD/5W	340mmx285mmx143mm	16KG

3.4 Power indicators

3.4.1 Voltage indicators

Voltage requirements	Description	Remarks
220V AC (100V～264V)	Ac power module	

3.4.2 Power consumption indicators

Configuration	Power consumption (W)
1x4T4R cell 100MHz NR 5W output	<240W

3.5 Environmental Indicators

Type	Indicator
Ambient temperature	- 40 ~ +55° C
Ambient humidity	5% ~ 95%
Waterproof and dustproof grade	IP65
Range of air pressure	70 ~ 106 kPa

3.6 Electromagnetic compatibility indicator

Comply with 3GPP TS 38.113 (2017-12 R15) requirements.

3.7 Reliability index

Annual failure rate <2%