MR7901 Positing Base Station Communication Protocol

V1.6

（2017.09.19）

SHENZHEN MARKTRACE CO.,LTD

Contents

1.Purpose

This document mainly introduces the communication format and precautions between MR7901 and platform server, and provides reference for engineers to complete MR7901 platform software development.

2.Normative References

1) Common access standard for industrial IOT equipment.--SHENZHEN MARKTRACE CO.,LTD

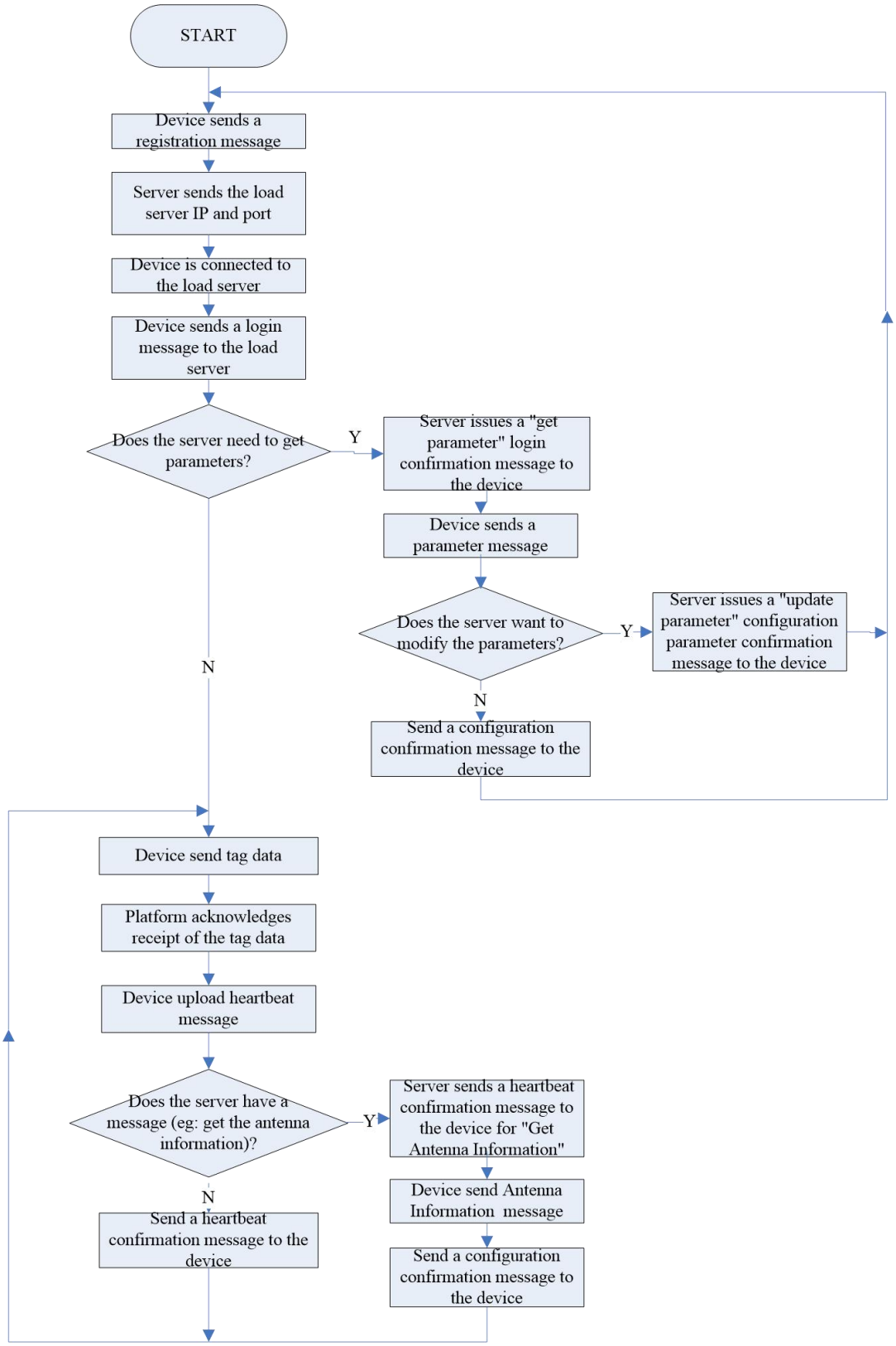
3.Need to explain

1) MR7901 and platform direct communication methods are: GPRS, LAN or other means；
2) Server: Platform software；
3) Terminal / Equipment: MR7901；
4) Load Balancing Server: The server that MR7901 sends the registration message；
5) Load server: The server that MR7901 sends messages such as login, heartbeat, data, configuration, etc.

4.COMMUNICATION PROCESS

The communication uses the "client" - "server" mode, Platform is server and MR7901 is client. The communication is initiated by the client to the server.

After MR7901 power on, you need to submit a registration application to the platform. After the registration is successful, you can log in to the platform. After the login is successful, the data can be exchanged. Data interaction is initiated by the device, the platform responds. The following is a business process diagram:



Examples of communication processes

5. COMMUNICATION PACKET FORMAT

5.1 Packet format

The communication packet between the terminal and the platform is composed of four parts: the Start Flag, the Message Header, the Service Content and the Check. The start flag is fixed to 0x55, 0xAA. The check is the CRC16 check of the header and the service content,

The format is as follows

Start Flag	Message Header	Service Content	Check
2 Bytes	28 Bytes	Variable length	2 Bytes

explanation :

Start Flag: fixed to 0x55,0xAA

THE LENGTH OF THE PACKET HEADER IS FIXED TO 28BYTES;

THE LENGTH OF THE Service Content **IS VARIABLE;**

Check **IS IN ACCORDANCE WITH CRC16 CCITT STANDARD -0X1021 (INITIAL VALUE IS 0XFFFF),**check **ALGORITHM IS DESCRIBED IN THE FOLLOWING SECTIONS**

。Check **IS THE CALCULATION OF THE HEADER AND THE** service content **PART**

5.2 Message header

The packet header is composed of message length, command code, protocol version, terminal serial number (or device ID). The header format is as follows:

Message Header (28 Bytes)			
SN	Field	Length (byte)	Description
1	Total message length	2	Contains from the beginning itself, until the end of the message (only the header and the service content)
2	Command code	2	Indicates the command to be executed or answered, such as login, data reporting, update, and so on.
3	Message serial number	4	0x00000000 to 0xFFFFFFFF, The sender to maintain their own serial number, each successful

			communication, automatically add 1.
4	Message protocol version	2	
5	Message security flag	2	Unencrypted messages default to 0x0000
6	Device ID	16	16-bit ASCII code

explanation:

Command code definition format: The highest bit of the command code sent by the MR7901 to the platform is 0, and the command code that platform responds to the MR79601 at the highest position 1.For example, if the command code of device initiates a registration request to the platform is 0x0008, and the command code for the platform response is 0x8008.

egg: 55 AA 00 22 00 08 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 01 78 56 34 12 A7 5C

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	22	00	08	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
00	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	desc_code (H)	desc_code (L)	reg_code (MSB)			reg_code (LSB)
39	36	00	01	01	78	56	32	12
crc16(H)	crc16(L)							
A7	5C							

among them, message header is: 00 22 00 08 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00

5.3 Service Content

The service content, according to the different command code, contains the service content is different, the specific format look at the instructions behind.

6. DATA INTERACTION

Note:

When device send message to server, the server must have a corresponding response, otherwise the device will repeatedly send the same message.

6.1 Registered （0x0008/ 0x8008）

6.1.1 Command frame definition

Initiated by the device to the platform, the command code: 0x0008, platform confirmation code: 0x8008.

The device sends a registration message to the server (load balancing server)

After the server receives, respond to the registration status with the load server's IP and port.

Note:

If the device registration is unsuccessful, the registration message will continue to be sent.

The service content of the device registration includes a 2-byte device type description and a 4-byte registration code. The registration code is calculated by the device ID through a fixed algorithm. The specific algorithm is defined separately by the system.

Command code: 0x0008

Service content: As shown in the table below

Data segment	Bytes	Description
Device description	2	The high byte is the device type **0x01** ——Data gateway **0x02** —— RFID reader **0x03** —— Computer The low byte is the device model code **0x01** —— MR7901
Registration	4	Reserved

code		

egg: 55 AA 00 22 00 08 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 01 78 56 34 12 A7 5C

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	22	00	08	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
00	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	desc_code (H)	desc_code (L)	reg_code (MSB)			reg_code (LSB)
39	36	00	01	01	78	56	32	12
crc16(H)	crc16(L)							
A7	5C							

Start flag

Start flag sof : 0x55AA

Message header

message length len : 0x0022

command code cmd : 0x0008

Message serial number seq : 0x00000000

protocol version pro_ver : 0x0001 (V0.1)

security flag seq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (Change to a string: "861694034205896")

Service content

Device description desc_code : 01 01 (device type: 01 IOT gateway, model type: 01)

Registration codereg_code : 78 56 34 12

Check

crc16 : 0xA75C

6.1.2 Platform validation package definition

Platform validation service content includes the registration result and the current real time, and the load server IP and port assigned to the device login.

Validation code: 0x8008

Service content:

Data segment	Bytes	Description

Registration results	1	0x00 — — Registered successfully (if the registration is successful, return to the load server IP and port) 0xFE ——Registration code error 0xFF ——Registration refused
Real time	6	Year Month Day Hours Minutes Seconds, year is 2000
IP Load server IP	32	String type egg: “218.17.157.214”
Load the server port	2	Unsigned integer Low byte first, high byte in the post eg:4501

egg: 55 AA 00 45 80 08 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 00 11 01 0E 11 16 32 32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 24 13 B6 41

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	45	80	08	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev id(MSB)			
00	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev id(LSB)	reg_status	time (MSB)				
39	36	00	00	11	01	0E	11	16
time (LSB)	IP(MSB)	…	IP(LSB)	port(H)	port(L)	crc16(H)	crc16(L)	
32	32	…	00	24	13	B6	41	

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0045

command code cmd : 0x8008

Message serial number seq : 0x00000000

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : “861694034205896”)

Service content

Registration results reg_status : 00 registration success

Time time : 11 01 0E 11 16 32 The current time of the platform, corresponding to the year, month, day, hour, minute, second, the starting time is 2000 (January 14, 2017, 17:22:50)

Load server IP : 32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ("218.17.157.214")

Load server port : 24 13 is 0x1324 (Decimal for 4900) (Note: low byte first)

Check

crc16 : 0xB641

6.2 Logon (0x0001/ 0x8001)

Initiated by the device to the platform, command code:0x0001, platform validation code: 0x8001。

After the device sends a registration message to the load balancing server, the load balancing server issues the ip and port of the load server, After receiving the ip and port of the load service, the device sends a login message to the ip and port server (load server).

Note:

If the device fails to log in (without receiving the correct response), it will send 10 logon request messages (command code0x0001) repeatedly. After 10 times, the device will send a registration message again to the load balancing server.

6.2.1 Command package definition

Login service content includes the software version number of the device and the CRC16 check of the device's configuration parameter list.

command code: 0x0001

Service content: As shown in the table below

Data segment	Bytes	Description
software version	2	main-version number and minor-version number
CRC16 check of the device's configuration parameter	2	The CRC16 check of the configuration parameter list. The server may decide whether or not to update the parameters accordingly.

eg: 55 AA 00 20 00 01 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 02 07 02 69 C5 0C

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	20	00	01	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
00	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (MSL)	ver (H)	ver (L)	parm_crc 16(H)	parm_crc 16(L)	crc16 (H)	crc16 (L)
39	36	00	02	07	02	69	C5	0C

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0020

command code cmd : 0x0001

Message serial number seq : 0x00000000

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

software version ver : 02 07 (device software version is V2.7)

CRC16 check of the device's configuration parameter: 02 69

Check

crc16 : 0xC50C

6.2.2 Platform validation package definition

The platform validation service content includes the login result (1 byte) and the current real time

Validation code: 0x8001

Service content: As shown in the table below

Data segment	Bytes	Description
Log in results	1	**0x00** ——Login successful, no operation request **0x02** ——The login is successful and requires the firmware to be updated **0x03** ——Login is successful, request to upload device hardware information **0x10** ——The login is successful and requires

		updating the user configuration parameters 0xFE ——Login error 0xFF ——Login refused (the device received a deny login message, 3 minutes later to send a registration message)
Real time	6	Year Month Day Hours Minutes Seconds, year 2000

eg: 55 AA 00 23 80 01 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 00 11 01 0E 11 17 1E F6 C5

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	23	80	01	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
00	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	login_status	time (MSB)				
39	36	00	00	11	01	0E	11	17
time (LSB)	crc16 (H)	crc16 (L)						
1E	F6	C5						

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0023

command code cmd : 0x8001

Message serial number seq : 0x00000000

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

Login status login_status : 00 (login successful)

Real time time : 11 01 0E 11 17 1E corresponding year, month, day, hour, minute, second, the starting time is 2000 (January 14, 2017, 17:23:30)

Check

crc16 : 0xF6C5

The validation package of requests device update

eg2: 55 AA 00 23 80 01 00 00 00 00 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 02 11 01 14 10 14 22 70 96

6.3 Heartbeat（0x0003/ 0x8003）

Initiated by the device to the platform, command code:0x0003, plat validation code: 0x8003。

Note：

If the device does not receive the correct response message after sending the heartbeat message, it will send 5 times the heartbeat message (command code0x0003). After 5 times, the device will send the login message (command code0x0001) again to the load service.

6.3.1 Command package definition

The heartbeat service content includes the working status of the device (2 bytes) and the current state of the device.

command code: 0x0003

Service content: As shown in the table below

Data segment	Bytes	Description
Device working status	2	FORMAT SPECIFICATION： Low 4 byte, connection:: The 0bit： GPRS connection， 1 effective The 1bit： LAN connection， 1 effective The 2bit： reserved The 3bit： reserved The 4bit： Tag transmission flag ， 0：transfer tag records to platform；1： Do not transfer tag records to the platform The 5bit： Device power failure flag，为 0： device normal power supply， 1： device external power supply is disconnected The 6～7bit：reserved The 8～11bit： battery voltage，0～10， respectively, there are 0 to 100% of the electricity. (This function will be achieved in MR7901 V3.2 or above version, the corresponding relationship between battery and battery voltage refer to Chapter 11)

		The 12～15bit：reserved eg: 00 01 ——GPRS connection, reported tag data 00 11 ——GPRS connection, do not report tag data 08 03 ——80%GPRS connection, wired connection, report tag data, battery power 80%
Device status	2	（E-bike V2.9,V3.0 and above） 0～7bit ： gprs signal strength, the normal range: 0～31, if value is 99, the access signal strength failure 8～11bit： Packet transmission mode (only one bit valid) 8bit ： Send packets through gprs 9bit ： Send packets over a wired network 10bit ： reserved 11bit ： reserved 12～15bit：reserved eg: 11 01 ——gprs signal strength 17,send this heartbeat packet via gprs
Device version	2	
Device time	6	Year, month, day, hour, minute, second

eg: 55 AA 00 28 00 03 00 00 00 01 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 00 01 11 95 02 07 11 01 0E 11 17 1D DE 46（V2.6,V2.7, V2.8）

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	28	00	03	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
01	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	work_status (H)	work_status (L)	parm_crc16 (H)	parm_crc16 (L)	ver(H)	ver(L)
39	36	00	00	01	11	95	02	07
time (MSB)					time (LSB)	crc16 (H)	crc16 (L)	
11	01	0E	11	17	1D	DE	46	

Start flag

Start flagsof ： 0x55AA

Message header

message lengthlen ： 0x0028

command code cmd : 0x0003
Message serial number seq : 0x00000001
protocol versionpro_ver : 0x0001 (V0.1)
security flagseq_flag: 0x0000
device ID dev_id :
38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

device work status work_status: 00 01 (gprs connection, reporting tag)
CRC16 check of the device's configuration parameter: 11 95 (Temporarily unused)
software version ver : 02 07 (device software version V2.7)
device time time : 11 01 0E 11 17 1D Respectively, the year, month, day, hour, minute, second, the starting time is 2000 (January 14, 2017, 17:23:29))

Check

crc16 : 0xDEC6

Following heartbeat package is V3.2 and above version's

eg2: 55 AA 00 28 00 03 00 00 00 03 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 0A 01 10 01 03 02 11 06 01 0F 2C 28 BD CE

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0028
command code cmd : 0x0003
Message serial number seq : 0x00000003
protocol versionpro_ver : 0x0001 (V0.1)
security flagseq_flag: 0x0000
device ID dev_id :
38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

device work status work_status: 0A 01
0x0A01: gprs connection
Upload the tag data
External power supply is normal
Battery power is 10, means 100%
device status : 10 01
0x10 : gprs signal strength, is 16
0x01 : gprs transmission
software version ver : 03 02 (device software version V3.2)
Device time time : 11 06 01 0F 2C 28 Respectively, the corresponding year, month, day, hour, minute, second, the starting time is 2000 (June 1, 2017, 15:44:40)

Check

crc16 : 0xBDCE

6.3.2 Platform validation package definition

Platform validation service content includes the operation indication (1 byte) and the current real time time (6 bytes, year, month, hour, minute, year 2000)

validation code: 0x8003

Service content: As shown in the table below

Data segment	Bytes	Description
Operation instructions	1	**0x00** ——There is no operational indication **0x02** ——Requires updating firmware **0x03** ——Reset device (device received, do not respond, restart directly) **0x04** ——Update the antenna firmware **0x05** ——Get antenna information (version and gain) **0x06** ——Set device time (after the device is received, set the time, do not respond) **0x08** ——Clear tag data buffer (after the device is received, clear tag data buffer, do not respond) **0x10** ——Request to update the user configuration parameters (V2.7 above supports) **0x11** ——Get device status (V2.8 and above version supports) **0x12** ——Request to upload device hardware information (V3.1and above version supports)
Real time	6	year, month, hour, minute, second. year is 2000

eg: 55 AA 00 23 80 03 00 00 00 01 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 00 11 01 0E 11 17 1F 70 FC

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	23	80	03	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
01	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	ack	time (MSB)				
39	36	00	00	11	01	0E	11	17
time	crc16	crc16						

(LSB)	(H)	(L)
1F	70	FC

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0023

command code cmd : 0x8003

Message serial number seq : 0x00000001

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

Operation instructions ask : 00 No operation

Platform real time time : 11 01 0E 11 17 1F Respectively, the year, month, day, hour, minute, second, the starting time is 2000 (January 14, 2017, 17:23:31)

Check

crc16 : 0x70FC

6.4 Data reporting (0x0004/ 0x8004)

Initiated by the device to the platform, command code:0x0004, plat validation code: 0x8004。

Note:

If the device sends a data message but does not receive the correct response message from the platform, it will send 5 times data messages (command code0x0004)

After 5 times,it will send login message to load server (command code0x0001)

6.4.1 Command package definition

The data reporting service content includes several data TLVs

command code: 0x0004

Service content: As shown in the table below

Data segment	Bytes	Description
TLV	2+2+17	Tag type (2Bytes), tag data length (2Btyes), tag data (length reference Chapter 7 TLV index)

		Defined by the specific data content, the specific format see Chapter 7 (label format description)
TLV	2+2+17	
……		

TLV structure is as follows:

TLV type (2 bytes)	LENGTH(2 bytes)	VALUE(The length is defined by LENGTH)

eg: 55 AA 00 46 00 04 00 00 00 8D 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 8B 01 00 11 01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 8B 01 00 11 01 20 EB 14 4A 33 64 00 00 00 B8 11 01 0E 13 26 09 83 3F

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	46	00	04	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
8D	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	TLV (MSB)		…	TLV (MSL)	crc16 (H)	crc16 (L)
39	36	00	8B	01	…	09	83	3F

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0046

command code cmd : 0x0004

Message serial number seq : 0x0000008D

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

TLV data : 8B 01 00 11 01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 8B 01 00 11 01 20 EB 14 4A 33 64 00 00 00 B8 11 01 0E 13 26 09 There are two tag records, the specific format, please see Chapter 7 label instructions)

The first TLV is: 8B 01 00 11 01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 (as follows:

TLV type : 0x8B01 RFID tag

TLV data length : 0x0011

TLV data : 01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 The format is described in the tag data format)

Check

crc16 : 0x833F

6.4.2 Platform validation package definition

validation code: 0x8004

Service content: same as heartbeat service content。

6.5 Firmware update (0x000D/ 0x800D)

The device sends a firmware download request to the platform, command code: 0x000D, platform validation code: 0x800D.

When the platform needs to send new firmware (such as host firmware, antenna firmware) to the device, fill in the firmware update operation instruction code in the login package, heartbeat packet, and packet confirmation package. After the device receives the update operation instruction, the device requests the firmware update to the platform with command code0x000D.

6.5.1 Command package definition

firmware update includes update host firmware and antenna firmware,service content definition as follows:

command code: 0x000D

Service content: As shown in the table below

Data segment	Bytes	Description
file_type	1	**0x01** ——host firmware **0x02** ——antenna firmware Other files are not yet defined
data_type	1	mask flag: **0x00** ——Application file information, including file version, file name, crc16 check, size; **0x01** ——Application file content,when this bit is 1, the following two data segments (block size / block serial

		number) is valid; **0x02** ——The upgrade is complete (followed by 3 bytes, where the first byte is the upgrade status, 0x01: the upgrade is successful, 0x00: the upgrade failed; the second and third bytes are the upgraded version information).
Block size	2	This section is valid when the application category is "0x01 - Request File Content"Each packet carries the file block size,Unit: Byte
Block index	2	This section is valid when the application category is "0x01 - Request File Content" The file block number applied to the platform

1,Application file information

When the device receives the upgrade instruction code, it sends the request message of the upgrade file information to the server, that is, the application file information.

Service content: As shown in the table below

Data segment	Bytes	Description
file_type	1	**0x01** ——host firmware **0x02** ——antenna firmware Other files are not yet defined
data_type	1	mask flag: **0x00** ——Application file information, including file version, file name, crc16 check, size;
Reserved	4	00 00 00 00

eg1: 55 AA 00 22 00 0D 00 00 00 01 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 00 00 00 00 00 5E 5E

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	22	00	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
01	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	file_type	data_type	Reserved (MSB)			Reserved (LSB)
39	36	00	01	00	00	00	00	00
crc16 (H)	crc16 (L)							

5E	5E

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0022

command code cmd : 0x000D

Message serial number seq : 0x00000001

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （change to string : “861694034205896”）

Service content

Request upgrade file type **file_type** : 01 (update host firmware)

Request data type data_type : 00 (Request upgrade file information)

reserved Reserved : 00 00 00 00 （Temporarily unused）

Check

crc16 : 0x5E5E

1,Application file content

After receiving the correct upgrade file information from the platform, the device sends the "application file content" message to the platform.

Service content: As shown in the table below

Data segment	Bytes	Description
file_type	1	**0x01** —— host firmware **0x02** —— antenna firmware
data_type	1	**0x01** —— Application file content
block_size	2	Transfer block size of update file. The server according to this value, read the size of the block_size data sent to the device, the last packet is less than block_size, filled with 0. The version before V2.9 is 20 00 (512Bytes) V2.9 and above version is 01 DD (477Bytes)
block_index	2	The block index of file

eg2: 55 AA 00 22 00 0D 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 01 02 00 00 00 26 CD

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		

55	AA	00	22	00	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	file_type	data_type	block_size(H)	block_size (L)	block_index(H)	block_index(L)
39	36	00	01	01	02	00	00	00
crc16 (H)	crc16 (L)							
26	CD							

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0022

command code cmd : 0x000D

Message serial number seq : 0x00000002

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

request update file type **file_type** : 01 (update host firmware)

request update data type data_type : 01 (Request to upgrade the contents of the file)

block size block_size : 0x0200 (send block size of update file content is 0x200Bytes)

Block index block_index : 0x0000 (update block 0 on file)

Check

crc16 : 0x26CD

1, The upgrade is complete

After host and antenna update file transfer are completed, will send update successful message to server. (V2.7 and previous version will send this message only antenna update success.

Data segment	Bytes	Description
file_type	1	**0x01** ——host firmware **0x02** ——antenna firmware
data_type	1	**0x02** ——update completed

update_flag	1	Used to mark whether the upgrade file is received correctly by the device 00 : Upgrade failed 01 : update successed
update_ver	2	The firmware version after the upgrade(V2.8 and above version supports this function) eg: 02 09 : updated firmware is V2.9
reserved	1	

eg3 : 55 AA 00 22 00 0D 00 00 00 5E 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 02 01 02 08 00 05 C6

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	22	00	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
5E	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	file_type	data_type	update_ flag	updat e_ver (MSB)	update _ver (LSB)	Reserved
39	36	00	01	02	01	02	08	00
crc16 (H)	crc16 (L)							
05	C6							

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x0028

command code cmd : 0x000D

Message serial number seq : 0x0000005E

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

request update file type **file_type** : 01 (update host firmware)

request update data type data_type : 02 (update completed)

Upgrade the reception completion flag update_flag : 01 （Receive the upgrade file successfully）

updated firmware version update_ver : 02 08（The version of the upgrade file received is V2.8）

Reserve **Reserved** : 00 (reserve)

Check

crc16 : 0x05C6

6.5.2 Platform validation package definition

Platform validation service content based on content application

validation code: 0x800D

Service content: As shown in the table below

Data segment	Bytes	Description
data_type	1	**0x01** ——Host file basic information **0x02** ——Host file content data **0x03** ——Antenna file basic information **0x04** ——Antenna file content data **0x05** ——The upgrade file ends
File basic information	16	When the data type is 0x01 / 0x03, this data segment exists 5 bytes file name, 3 byte extension, 2 byte file version, 2 byte file crc16 check (reserved), 4 byte file size
data length	2	
data		

1, Response to application file information

When the platform receives the "Request File Message" sent from the device, the information of the upgrade file is sent to the device.

Service content: As shown in the table below

Data segment	Bytes	Description
data_type	1	**0x01** ——Host firmware file basic information 0x03 — — Antenna firmware file basic information
file_name	5	
file_ext	3	
file_version	2	
file_crc16	2	The overall CRC16 checksum for the bit upgrade file

		(See Chapter 9 for the calibration algorithm)
file_size	4	High byte first

eg1：55 AA 00 2D 80 0D 00 00 00 01 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 01 00 00 00 00 00 00 00 00 00 00 B5 87 00 01 0A EE 5F 29

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	2D	80	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
01	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	data_type	file_name	file_ext	file_version	file_crc16	file_size
39	36	00	01	00 00 00 00 00	00 00 00	00 00	B5 87	00 01 0A EE
crc16 (H)	crc16 (L)							
5F	29							

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x002D

command code cmd : 0x800D

Message serial number seq : 0x00000001

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （change to string：“861694034205896”）

Service content

request update file type **file_type** : 01 (update host firmware)

update file name file_name : 00 00 00 00 00 (5Byes, update file name)

Upgrade file extension file_ext : 00 00 00 （3Byes, Upgrade the file extension）

Upgrade the file version file_version : 00 00 （2Byes, Upgrade the file version）

Upgrade file crc16 check file_crc16: B5 87 (2Byes, Upgrade file crc16 check is 0xB587)

Upgrade file size file_size : 00 01 0A EE （4Byes, Upgrade file size is 0x00010AEE）

Check

crc16 : 0x5F29

response application file content

When the platform receives the "Request File Content" message from the device, the content of the upgrade file is issued according to the application file block size.

Data segment	Bytes	Description
data_type	1	0x02 ——Host firmware file content data 0x04 ——Antenna firmware file content data
block_size	2	This package contains the block size of the upgrade file data The version before V2.9 is 20 00 (512Bytes) V2.9 and above version is 01 DD (477Bytes)
data update_data	block_size	update file data The data length is determined by block_size

eg2: 55 AA 02 1F 80 0D 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 02 02 00 F0 17 … 11 3C 49

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	02	1F	80	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	data_type	block_size(H)	block_size(L)	update_data (MSB)	…	update_data (LSB)
39	36	00	01	02	00	F0	…	11
crc16 (H)	crc16 (L)							
3C	49							

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x021F

command code cmd : 0x800D

Message serial number seq : 0x00000002

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （change to string：“861694034205896”）

Service content

Respond to the requested data type **data_type** : 02 (Host firmware file contents)

Block size block_size : 02 00 (2Byes, The upgrade package size is 0x0200)

Note:

1. The version before V2.9 is 20 00 (512Bytes)

2. V2.9 and above version is 01 DD (477Bytes)

update file data update_data : F0 … 11 (Upgrade the contents of the file)

Check

crc16 : 0x3C49

1. **Respond to upgrade complete**

After the device receives the upgrade file, it will send the upgrade complete message to the platform,The platform receives a confirmation message.

Data segment	Bytes	Description
data_type	1	**0x05**——The upgrade file ends

eg3: 55 AA 00 1D 80 0D 00 00 00 18 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 05 47 04

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	1D	80	0D	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
18	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	data_type	crc16 (H)	crc16 (L)			
39	36	00	05	47	04			

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x001D

command code cmd : 0x800D

Message serial number seq : 0x00000018

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id ：
38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （change to string ：“861694034205896”）

Service content

Response request data type data_type : 05 (Upgrade complete confirmation)

Check

crc16 : 0x4704

6.6 Configuration parameters （0x000A/ 0x800A）

Initiated by the device to the platform，command code:0x000A，platform validation code：0x800A。

When the platform needs to acquire or configure the device parameters, the operation instructions are filled in the login packet, heartbeat packet, and packet response. After receiving the operation instruction code, the equipment sends the corresponding parameter information to the platform.

6.6.1 Command package definition

Service content includes parameter type and parameters

command code： 0x000A

Service content： As shown in the table below

SN	Data segment	Bytes	Description
1	param_type	1	**0x02** ——report antenna info（version, gain,rssi） **0x10** ——report user parameters(V2.7 and above version support) **0x11** ——report device statues(V2.8 and above version support) **0x12** ——report device hardware info (V3.1 and above version support) **0x80** —— report config confirmation (V2.8 and above support)
2	Parameters	x	**when the first byte is 0x02：** 12Bytes, Corresponds to the version of the four antennas、gain、rssi **when the first byte is 0x03：**

			1Byte, 1 Do not report tag data, 0 report tag data **when the first byte is 0x10:** 182Bytes, User configuration parameters, the specific format description see Chapter 8 configuration parameter format description **when the first byte is 0x11:** 106Byte, The current status information for the device **when the first byte is 0x12:** 127Byte, device hardware info **when the first byte is0x80:** 1Byte, 1 The configuration parameters are successful, 0 : Configuration failed

1. Report antenna info 0x02

The antenna information contains the current version of the 4 antennas, gain, and filter the RSSI threshold.

Service content: As shown in the table below

SN	Data segment	Bytes	Description
1	param_type	1	0x02 ——report antenna info
2	ant_fw_ver	8	1 to 4 antenna version information, each antenna version in 2 bytes If it is FF FF, it means that the antenna version information of the channel is not read
3	ant_gain	4	1 ~ 4 antenna gain (range 0 ~ 31) If it is FF, it means that the antenna gain of the channel is not read
4	ant_rssi	4	1 ~ 4 antenna filter threshold (range -1 ~ -128) If it is 01, it means that the RSSI of the channel is not read

eg1: 55 AA 00 2D 00 0A 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 02 01 06 01 06 01 06 FF FF 1F 1F 1F FF A8 A8 A8 01 83 F3

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	2D	00	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id	param_ty	ant1_fw_	ant1_fw	ant2_fw	ant2_fw	ant3_fw

		(LSB)	pe	ver(H)	_ver(L)	_ver(H)	_ver(L)	_ver(H)
39	36	00	02	01	06	01	06	01
ant3_fw_ver(L)	ant4_fw_ver(H)	ant4_fw_ver(L)	ant1_gain	ant2_gain	ant3_gain	ant4_gain	ant1_rssi	ant2_rssi
06	FF	FF	1F	1F	1F	FF	*A8*	*A8*
ant3_rssi	ant4_rssi	crc16(H)	crc16(L)					
A8	*01*	83	F3					

Start flag

Start flagsof : 0x55AA

Message header

message lengthlen : 0x002D

command code cmd : 0x000A

Message serial number seq : 0x00000002

protocol versionpro_ver : 0x0001 (V0.1)

security flagseq_flag: 0x0000

device ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (change to string : "861694034205896")

Service content

parameter type param_type : 02 (antenna info)

antenna version ant_version : 01 06 01 06 01 06 FF FF 1 to 4 antenna version information, each antenna version in 2 bytes If it is FF FF, it means that the antenna version information of the channel is not read)

explain:

antenna 1 firmware; V1.6

antenna 2 firmware; V1.6

antenna 3 firmware; V1.6

Antenna 4 did not get the firmware version information.

antenna gain ant_gain : 1F 1F 1F FF (1 ~ 4 antenna gain (range 0 ~ 31) FF, invalid)

explain:

antenna 1 gain: 31

antenna 2 gain: 31

antenna 3 gain: 31

antenna 4 gain: not get

Antenna filter signal strength ant_rssi: A8 A8 A8 01 1 ~ 4 antenna filter threshold (range -1 ~ -128) 0 is not filter.1 means that the RSSI of the channel is not read)

explain:

antenna 1 rssi: -88

antenna 2 gain: -88

antenna 3 gain: -88

antenna 4 gain: not get

Check

crc16 : 0x83F3

2. Report user configuration parameters 0x10

The body of the report: As shown in the table below

Item	Data segment	The No. of bytes	Description
1	Parameter type param_type	1	0x10 —— Reporting system parameters
2	Parameter	182	Take Chapter 8 for the reference.

eg2: 55 AA 00D300 0A 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 001055010 2 090100B4 0038 36 31 36 39 34 30 33 34 32 30 35 38 39 36 0000 00 01 C0 A8 01 C7 FF FF FF 00C0 A8 01 0164 0032 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0024 1332 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00F8 1100 2E 12 3C 00 2500 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0001 06 01 06 01 06 FF FF104D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 00A8 A8 A8 A81F 1F 1F 1F00A100 00 00 0030 47

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	01	0D	00	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	data …	crc16 (H)	crc16 (L)		
39	36	00	10	…	30	47		

Starting logo Starting logo

Starting logosof : 0x55AA

Message header Message header

len : 0x00D3

cmd : 0x000A

seq : 0x00000002

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (Convert to string: "861694034205896")

Service Content

param_type : 10 (User configuration parameters)

data : (For a specific format, see chapter 8 for configuration parameters)

55 : 1. The 32 bytes in the frame, the parameter eigenvalues, read the configuration parameters, fixed to 0x55

01 : 2. The 33rd byte in the frame, the working mode is: GPRS transmission, and the label record is transmitted to the platform（Four definitions：0x01: GPRS 0x02: LAN）

02 09 : 3. The 34th byte of the frame starts, firmware version V2.9 (The major version number 2， ubversion9)

01 : 4. The 36th byte of the frame, the buzzer logo, opens the buzzer（0x00: close， 0x01： open）

00 : 5. The 37th byte in the frame, reserved 1

B4 00 : 6. At the beginning of the 38th byte in the frame, the label is to refilter time 0x00B4, which is 180 seconds（Low byte ahead，, high byte after），To determine the time to leave the base station above V3.0

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 : 7. The 40 bytes in the frame start, the device ID,"861694034205896"

00 00: 8. At the beginning of the 56th byte in the frame, the base station stops periodically to report the function shutdown（V3.3 version）

01 : 9. The 58th byte of the frame, DHCP enabled （0x00: close， 0x01：open, for LAN）

C0 A8 01 C7 : 10. At the 59th byte of the frame, LAN local IP，192.168.1.199

FF FF FF 00 : 11. The 63rd byte of the frame begins, the LAN subnet mask 255.255.255.0

C0 A8 01 01 : 12. The 67 bytes in the frame start, the LAN gateway 192.168.1.1

64 00 : 13. The 71st byte of the frame begins, LAN local IP port 0x0064，is 100（Low byte ahead, high byte after）

32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 : 14. At 73 bytes in frame, the IP of GPRS server 1，“218.17.157.214”， Platform IP（Balance server address）

F8 11 : 15. The 105th byte of the frame begins with the port of GPRS server 1, 0x11F8 is 4600 （Low byte ahead, high byte after），Platform port

32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00：16. The 107th byte in the frame starts, LAN server 1's IP,“218.17.157.214”， Platform IP（Balance server address

F8 11 : 17. At the beginning of the 139 bytes in the frame, the port of LAN server 1, 0x11F8, is 4600（Low byte ahead, high byte after）

00 2E 12 3C 00 25: 18. The 141st byte of the frame begins, LAN local MAC address 00-2E-12-3C-00-25

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 : 19. The 147 bytes in the frame start and remain 3

01 06 01 06 01 06 FF FF : 20. The 175th byte of the frame begins with the firmware version of the antenna, which corresponds to the firmware version of the antenna 1 ~ 4. Each antenna version occupies 2 bytes, if it is FF FF, Indicates failure to read the modified antenna version. the firmware version 1 ~ 4 is the firmware version：V1.6, V1.6, V1.6,（The

no. 4 antenna reading failed, probably no. 4 channel with no antenna）

10 : 21. In frame 183 bytes, GPRS signal strength 0x10(16)

4D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 00: 22. The 184th byte at the beginning of the frame, the device number "*MR7901-003C0025*"

A8 A8 A8 A8 : 23. The 200 bytes of the frame start, the antenna 1,2,3,4 rssi filter threshold， Namely, respectively, -88dBm, -88dBm, -88dBm, -88dBm

1F 1F 1F 1F : 24. The 204 bytes of the frame start, the antenna 1,2,3,4 gain, that is, respectively 31dBm, 31dBm,31dBm,31dBm

00 : 25. The 208th byte of the frame, the bluetooth output tag identifier, 0x00 not output the label, 0x01 output label

A1 : 26. 209 bytes of the frame, the communication connection status, 0 xa1: device platform has been established through GPRS communication connection (if it is 0 xa2: equipment and the platform through the LAN communication connections, 0 xa3: equipment and platform through GPRS, LAN the two communication connection)

00 00 00 00: 27. The 210 bytes in the frame start, reserved 4

Checksum

crc16 : 0x5C66

3. Report equipment status 0x11

Used to obtain the current state of the device

The style: as shown in the table below

Item	Data segment	Byte	Description
1	param_type	1	**0x11** —— eport equipment status
2	fw_version	2	eg: 03 00 —— Host firmware version V3.0
3	gprs_ip	32	**String type** eg: "218.17.157.214"
4	gprs_port	2	Low byte ahead
5	gprs_link_status	1	**0x00** —— No connection to the platform **0x01** —— The platform has connections
6	lan_ip	32	**String type**
7	lan_port	2	Low byte ahead
8	lan_link_status	1	**0x00** —— No connection to the platform **0x01** —— The platform has connections
9	gprs_bffer_cnt	2	The number of tags sent to the platform via GPRS Low byte ahead
10	lan_bffer_cnt	2	Number of tags sent to the platform via wire Low byte ahead
11	tag_filt_cnt	2	The number of labels used to filter or pre-judge

			Low byte ahead
12	ant_fw_version	8	The version information of 1 ~ 4 antenna, the version information of each antenna occupies 2 bytes The version information that is not read to the antenna is not read for FF FF
13	ant_gain	4	1 ~ 4 antenna gain Settings Value range: 0～31 In the case of FF, the antenna gain is not obtained
14	ant_rssi	4	Rssi threshold setting for antenna 1 ~ 4 antenna Range of values: -1 ~ 128 (band symbol single-byte, singed char) At 1, the rssi is not obtained
15	gprs_flash_tag_cnt	4	Stored in flash, the number of tags to be sent to the platform via GPRS Low byte ahead
16	lan_flash_tag_cnt	4	Stored in flash, ready to be sent to the platform by wire. Low byte ahead
17	flash_log_cnt	4	Low byte ahead

eg6: 55 AA 00 8700 0A 00 00 00 03 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 001103 0032 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0024 130132 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0025 130018 0018 0008 00FF FF FF FF 01 06 FF FFFF FF 01 FF01 01 D8 0100 00 00 0000 00 00 0074 00 00 00 D9 AA

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	1E	00	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
03	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	data	crc16 (H)	crc16 (L)		
39	36	00	11	…	D9	AA		

Starting logoStarting logo

Starting logoStarting logo sof : 0x55AA

Message headerMessage header

len : 0x001E

cmd : 0x000A
seq : 0x00000003
pro_ver : 0x0001 (V0.1)
seq_flag : 0x0000
ID dev_id :
38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （string：“861694034205896”）

Service Content

param_type : 11 1. (Report equipment status)
firmware : 03 00 2. (Host firmware version V3.0)
IP : 32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 3. (Current device GPRS connection ip，“218.17.157.214”)
IP port : 24 13 4. (IP ports currently connected to GPRS，0x1324, Is 4900, Low byte ahead)
gprs connection status : 01 5. (The current device is connected to the platform through GPRS)
Cable connectionIP : 32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 6. (Current device wired IP，“218.17.157.214”)
IP port : 25 13 7. (The current wired IP port，0x1325, is 4901, Low byte ahead)
Connection status : 00 8. (The current device has no connection through cable and platform)
Gprs tag number : 18 00 9. (The number of tags sent to the platform via GPRS in the cache 0x0018, Low byte ahead)
Cable connection tag No. : 18 00 10. (The number of tags sent to the platform by wire in the cache 0x0018, Low byte ahead)
Tag filter : 08 00 11. (The number of tags sent to the platform by wire in the cache 0x0018, Low byte ahead)
Ant firmware : FF FF FF FF 01 06 FF FF 12. (1 ~ 4 antenna version information, among：
No. 1 antenna was not read
No. 2 antenna was not read
The version 3 antenna is V1.6
No. 4 antenna was not read version)
Ant gain setting : FF FF 01 FF 13. (1 ~ 4 antenna gain Settings，其中 among：
Antenna no. 1 has no gain value
Antenna no. 2 has no gain value
The gain of antenna 3 is set to 1
Antenna no. 4 has no gain value)
rssi : 01 01 D8 01 14. (Rssi threshold setting for antenna 1 ~ 4 antenna, among：
No. 1 antenna has not been read to rssi values
Antenna no. 2 has not read the rssi value
The rssi of antenna 3 antenna is set to 0xD8, which is -40 symbol single-byte number，singed char
No. 4 antenna did not read the rssi value)

Flash gprs tag no. : 00 00 00 00 15. (In flash, the number of tags sent to the platform via GPRS 0x000000, Low byte ahead)

flash cable tag No. : 00 00 00 00 16. (In flash, the number of tags sent to the platform via wire 0x000000, Low byte ahead)

flash log No. : 74 00 00 00 17. (In flash, the number of tags sent to the platform via wire 0x000074, Low byte ahead)

checksum

crc16 : 0xD9AA

4. Report equipment hardware information 0x12

Equipment hardware information, current communication equipment ID, hardware ID, product number, GPRS module IMEI, SIM card CCID, battery power, external power identification, etc

Report: 128 bytes, the following table

Item	Data segment	Bytes	Descritption
1	param_type	1	0x12 —— Report device hardware information
2	cur_device_id	16	String, the ID used in the current communication header, the last byte is 0
3	mcu_device_id	16	The string, the last byte is 0
4	product_sn	16	The string, the last byte is 0
5	gprs_imei	16	The string, the last byte is 0
6	sim_ccid	21	The string, the last byte is 0
7	battery_level	1	Value: 0 ~ 10, 10 represents 100% electricity
8	power_link_status	1	0: external power supply normal, 1: external power supply disconnect
9	reserved	40	Reserved

eg7: 55 AA 00 9C00 0A 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00123 8 36 31 36 39 34 30 33 34 32 30 35 38 39 36 0034 33 35 35 31 30 35 30 30 33 43 30 30 32 35 004D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 0038 36 31 36 39 34 30 33 34 32 30 35 38 39 36 0038 39 38 36 30 32 62 31 31 39 31 36 39 30 30 30 32 33 32 39 00090000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0025 3E

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	01	9C	00	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	data …	crc16 (H)	crc16 (L)		

39	36	00	12	…	25	3E

Starting logoStarting logo

Starting logoStarting logo sof : 0x55AA

Message header

len : 0x009C

cmd : 0x000A

seq : 0x00000002

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

ID dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （ “861694034205896”）

Service Content

param_type : 12 1.（**Report device hardware information**) the 31st byte of the frame (calculated from 0)

cur_device_id : 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 2. “861694034205896”（Start at 32 bytes in the frame）

mcu_device_id : 34 33 35 35 31 30 35 30 30 33 43 30 30 32 35 00 3. “43551050003C0025”（Start at 48 bytes in the frame）

product_sn: 4D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 00 4. “MR7901-003C0025” （Start at 64 bytes in the frame）

gprs_imei: 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 5. “861694034205896” （Start at 80 bytes in the frame）

sim_ccid : 38 39 38 36 30 32 62 31 31 39 31 36 39 30 30 30 32 33 32 39 00 6. “898602b1191690002329” （Start at 96 bytes in the frame）

battery_level : 09 7. Battery power 90%（Start at 117 bytes in the frame）

power_link_status : 00 8. External power supply（Start at 118 bytes in the frame）

reserved : 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 9. Start at 119 bytes in the frame）

Checksum

crc16 : 0x253E

5. Confirmation of information 0x80

When the configuration message of the platform is received, such as configuring the user configuration parameter, configuring the antenna parameter, and so on, the device will respond to the following message to the platform, responding to the result of the configuration parameters of the platform.

Note: after the device responds to this message, it will be restarted immediately and run with the correct parameters configured.

Report: the following table

Item	Data segment	bytes	Description
1	param_type	1	**0x80** —— Report configuration confirmation message (V2.8 support)
2	return_opt	1	**0x01** —— Configuration parameter success **0x00** —— Configuration parameter failed

eg8: 55 AA00 1E00 0A 00 00 00 06 00 01 00 00 34 33 35 35 31 30 33 30 30 33 45 30 30 33 39 0080 0147 84

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	1E	00	0A	00	00	00
seq (LSB)	**pro_ver (H)**	**pro_ver (L)**	**sec_flag (H)**	**sec_flag (L)**	**dev_id (MSB)**			
06	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	**param_type**	**return_opt**	**crc16 (H)**	**crc16 (L)**		
39	36	00	80	01	47	84		

Starting logo Starting logo

Starting logosof : 0x55AA

Message header

len : 0x001E

cmd : 0x000A

seq : 0x00000006

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （转为字符串为Convert to string: “861694034205896”）

Service Content Service Content

param_type : 80 Platform confirmation message The configuration parameters have been received for the device platform)

return_opt : 01 Configuration parameter success

check sum

crc16 : 0x4784

6.6.2 platform validation package definition

After the platform receives the message of configuration parameters sent on the device (the command code is 0x000A), configure the configuration message, such as the configuration parameter system parameter, configuration antenna parameter, and so on, as needed.

Service Content: Contains parameter types and parameters

Confirmation code: 0x800A

Service Content: The following table

Item	Data segment	bytes	Description
1	Type	1	**0x02** : gain,rssi Configure antenna gain,rssi **0x10** : Configure user parameters (V2.7 support) **0x80** : Platform confirmation message (V2.8 support)
2	Parameter	x	**he first byte is 0x02** 8Bytes antenna gain and RSSI **The first byte is 0x10** 182Bytes, user configuration parameters **The first byte is 0x80:** 1Byte, 1: the platform received the configuration parameter success; Zero:

1. **Set the antenna parameter 0x02**

Gain gain for configuring the antenna to filter the RSSI threshold.

Service Content: The following table

Item	Data segment	bytes	Description
1	param_type	1	**0x02** —— Reported antenna information
2	ant_gain	4	Gain of antenna 1 ~ 4 (range 0 ~ 31) If it is FF, it indicates that the antenna gain is not read to the channel
3	ant_rssi	4	1 ~ 4 antenna filter threshold value (range -1 ~ 128) If it is 01, it indicates that the antenna is not read to the channel RSSI

eg3: 55 AA 00 2580 0A 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00021F 1F 1F 1FA8 A8 A8 A8C4 88

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq		

						(MSB)		
55	AA	00	25	80	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	ant1_gain	ant2_gain	ant3_gain	ant4_gain	ant1_rssi
39	36	00	02	1F	1F	1F	1F	*A8*
ant2_rssi	ant3_rssi	ant4_rssi	crc16 (H)	crc16 (L)				
A8	*A8*	*A8*	C4	88				

Starting logo

Starting logosof : 0x55AA

Message header

len : 0x002D

cmd : 0x800A

seq : 0x00000002

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （Convert to string: “861694034205896”）

Service Content

param_type : 02 (Set antenna information)

ant_gain : 1F 1F 1F 1F （The gain of 1 ~ 4 of the antenna is respectively corresponding to the range of 0 ~ 31）

analysis

Antenna 1 gain: 31

Antenna2 gain: 31

Antenna3 gain: 31

Antenna4 gain: 31

ant_rssi: A8 A8 A8 A8 （The filter threshold of the signal strength of the antenna 1 ~ 4 is respectively corresponding to the range of value: 0 ~ -128）

Analysis

Antennal rssi: -88

Antenna2 gain: -88

Antenna3 gain: -88

Antenna4 gain: -88

Checksum

crc16 : 0xC488

2. Set the transmission label data identification

0x03

Used to configure whether the device reports label data to the platform.

Service Content: The following table

Item	Data segment	bytes	Description
1	param_type	1	0x03 —— Submit the transmission label data identification
2	Tag no.	1	00 Report the label data to the platform 01 Do not report the label data to the platform

eg4: 55 AA 00 1E80 0A 00 00 00 03 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 03016A CD

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	1E	80	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
03	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	data	crc16 (H)	crc16 (L)		
39	36	00	03	01	6A	CD		

Starting logo

Starting logosof : 0x55AA

Message header

len : 0x001E

cmd : 0x800A

seq : 0x00000003

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (Convert to string: "861694034205896")

Service Content

param_type : 03 (Report the label data identification)

data :

01 : Do not report the label data to the platform (0x00 reports the label data to the platform, 0x01 does not report the label data to the platform)

Checksum

crc16 : 0x6ACD

3. Set user configuration parameters 0x10

Service Content: The following table

Item	Data segment	bytes	Description
1	param_type	1	0x10 —— Reporting system parameters
2	Parameter	182	For a specific format, see chapter 8, configuration parameters

Note: the device will be restarted after receiving the correct message.

eg5: 55 AA 00D380 0A 00 00 00 02 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 0010 55 0102 0701013C 0038 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 00 0001 C0 A8 01 C7FF FF FF 00C0 A8 01 02DC FF32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0024 134D 54 49 49 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0236D 74 69 32 36 35 34 36 33 39 32 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0000 00 00 00 00 00 00 00 0014 4D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 00A8 A8 A8 A81F 1F 1F 1F00A100 00 00000E 47

sof (H)	sof (L)	len (H)	len (L)	cmd (H)	cmd (L)	seq (MSB)		
55	AA	01	0D	80	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
02	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	data …	crc16 (H)	crc16 (L)		
39	36	00	10	…	0E	47		

Starting logosof : 0x55AA

Message header

len : 0x00D3

cmd : 0x800A

seq : 0x00000002

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 (Convert to string: “861694034205896”)

Service Content

param_type : 10 (User configuration parameters)

data : (For a specific format, see chapter 8 for configuration parameters)

55 : 1. The 32 bytes in the frame, the parameter eigenvalues, read the configuration parameters, fixed to 0x55

01 : 2. The working mode is the 33rd byte in the frame, which is transmitted by GPRS, and the label record is transmitted to the platform (low four definitions: 0x01: GPRS 0x02: LAN).

02 09 : 3. The 34th byte of the frame begins, firmware version V2.9 (main version 2, sub version 9)

01 : 4. The 36th byte of the frame, the buzzer logo, opens the buzzer (0x00: close, 0x01: open)

00 : 5. In frame 37 bytes, reseve 1

B4 00 : 6. At the beginning of the 38th byte in the frame, the label is to refilter time 0x00B4, which is 180 seconds (Low byte at the front Low byte ahead, high byte), and above V3.0 to determine the time to leave the base station

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 : 7. Start of the 40th byte in frame, device ID, "861694034205896"

00 00: 8. The 56th byte of the frame begins, and the base station stops periodically to report the function shutdown (V3.3 version).

01 : 9. The 58th byte of the frame, DHCP enabled (0x00: close, 0x01: open, applicable to LAN)

C0 A8 01 C7 : 10. At the 59th byte of the frame, LAN local IP, 192.168.1.199

FF FF FF 00 : 11. **At the beginning of the 63 bytes in the frame, the LAN subnet mask is 255.255.255.0**

C0 A8 01 01 : 12. The 67th byte of the frame starts, and the LAN gateway is 192.168.1.1

64 00 : 13. At the beginning of the 71st byte in the frame, LAN local IP port 0x0064, or 100（Low byte ahead， High byte behind）

32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 : 14. Start of 73 bytes in frame, IP of GPRS server 1, "218.17.157.214", platform IP (balanced server address)

F8 11 : 15. The 105th byte of the frame begins, the port of GPRS server 1, 0x11F8 is 4600 （Low byte ahead， High byte behind）

32 31 38 2E 31 37 2E 31 35 37 2E 32 31 34 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00: 16. The 107th byte of the frame begins, LAN server 1 IP, "218.17.157.214", platform IP (balanced server address)

F8 11 : 17. Start at 139 bytes in frame, LAN server 1 port, 0x11F8, or 4600 （Low byte ahead， High byte behind）

00 2E 12 3C 00 25: 18. At the start of the 141 bytes in the frame, LAN local MAC address 00-2e-12-3c -00-25

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 : 19. The 147 bytes in the frame start and reseved 3

01 06 01 06 01 06 FF FF : 20. Firmware version 175 bytes of the frame, antenna, respectively corresponding to the firmware version of 1 ~ 4 antenna version of 2 bytes, each antenna for FF FF, said reading change antenna version failed. The firmware version 1 ~ 4 is: V1.6, V1.6, V1.6, no (no 4 antenna reading failed, may be no. 4 channel without antenna)

10 : 21. In frame 183 bytes, GPRS signal strength 0x10(16)

4D 52 37 39 30 31 2D 30 30 33 43 30 30 32 35 00: 22. Starting with the 184 bytes in the frame, the device number "mr791-003c0025"

A8 A8 A8 A8 : 23. At the beginning of the 200 bytes in the frame, the rssi filter threshold of 1,2,3 and 4, namely, -88dbm, -88dbm, -88dbm, -88dbm

1F 1F 1F 1F : 24. The 204 bytes of the frame start, the antenna 1,2,3,4 gain, that is 31dBm,31dBm, 31dBm,31dBm

00 : 25. The 208th byte of the frame, the bluetooth output tag identifier, 0x00 not output the label, 0x01 output label

A1 : 26. 209 bytes of the frame, the communication connection status, 0 xa1: device platform has been established through GPRS communication connection (if it is 0 xa2: equipment and the platform through the LAN communication connections, 0 xa3: equipment and platform through GPRS, LAN the two communication connection)

00 00 00 00: 27. The 210 bytes in the frame start and reseved 4

checksum

crc16 : 0xOE47

4. Confirmation of the platform 0x80

The platform receives configuration parameter information from the device, such as report user configuration parameter, antenna information, etc. Used to inform the device platform that the reported configuration message has been received.

Service Content: The following table

Item	Data segment	bytes	Description
1	param_type	1	0x80 —— Report configuration confirmation message (V2.8 support)

eg6: 55 AA 00 1D80 0A 00 00 00 03 00 01 00 00 38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 80A6 E0

sof(H)	sof(L)	len(H)	len(L)	cmd(H)	cmd(L)	seq (MSB)		
55	AA	00	1D	80	0A	00	00	00
seq (LSB)	pro_ver (H)	pro_ver (L)	sec_flag (H)	sec_flag (L)	dev_id (MSB)			
03	00	01	00	00	38	36	31	36
39	34	30	33	34	32	33	35	38
		dev_id (LSB)	param_type	crc16 (H)	crc16 (L)			
39	36	00	80	A6	E0			

Starting logo

Starting logosof : 0x55AA

Message header

len : 0x001E

cmd : 0x800A

seq : 0x00000003

pro_ver : 0x0001 (V0.1)

seq_flag: 0x0000

dev_id :

38 36 31 36 39 34 30 33 34 32 30 35 38 39 36 00 （Convert to string: “861694034205896”）

Service Content

param_type : 80 Platform confirmation message (for response device, notification device platform has received configuration parameters)

checksum

crc16 : 0xA6E0

7.TLV INDEX

7.1 TLV Type list and format

7.1.1 format

TLV 2bytes	LENGTH 2bytes	VALUE

7.1.2 type index

TLV type	TAG	LENGTH	VALUE
RFID item monitor	0x8801	16	1 byte of signal strength +4 byte reader ID+1 byte reader state +4 byte tag ID+ 6 byte collection time The reader state 0 is normal and 1 is removed
Current tag monitor	0x8901	16	1 byte signal strength +4 byte tag ID +5 byte tag sensor information +6 byte acquisition time
Wristband tag data	0x8A01	18	1 byte signal strength +4 byte bracelet ID+1 byte type +2 bytes bytes +6 byte acquisition time +6 byte reception time
tag	0x8B01	17	Antenna Channel(1byte)+ tag type (1byte)+ id(4bytes)+sum(1byte)+ incentive address (2bytes)+ voltage state (1Bytes) +rssi(1byte) + receive time (6bytes)
Attendance tag	0x8B02	17	(1byte)+ id(4bytes)+sum(1byte)+ incentive address (2bytes)+ voltage state (1Bytes) +rssi(1byte) + receiving time (6bytes)

tag egl: 8B 0100 1101 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09

TLV type	TAG	LENGTH
8B 01	00 11	01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09

The analysis is as follows:

The TLV type : 0x8B01

TLV data length : 0x0011

The TLV data : 01 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 (take the electronic tag data format specification for example)

Attendance tag eg2: 8B 0200 1181 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09

TLV type	TAG	LENGTH
8B 02	00 11	81 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09

The analysis is as follows:

The TLV type : 0x8B02

TLV data length: 0x0011

The TLV data : 81 20 78 2B 6A A4 2F 00 00 00 A9 11 01 0E 13 26 09 (take the electronic tag data format specification for example)

7.1.3 description of electronic tag format

Electronic tag (type 0x8B01) (17 bytes)

eg : 0120 E3 AF 22 32 FA 00 00 00 B211 01 0E 13 26 09

channel (1byte)	Tag data (10Bytes)	time (6bytes)
01	20 E3 AF 22 32 FA 00 00 00 B2	11 01 0E 13 26 09

Description:

01 : Access to base station status/antenna Channel number (Channel), this Byte The state of the base station;

low digit 4bit (0 ~ 3bit) : antenna number, 1,2,3,4 corresponding to the east, south, west, and north 4 antennas.

Exit base station status/antenna Channel			
7 bit	6 bit	5,4 bit	3～0 bit
Base station status: 1 : Read range from base station 0 : Read the range out the base station	Station stop sign 1 : Base station for 0 : It's not a base station stop	reserve	Read the tag's antenna channel number

0x01 , in， Read from antenna no. 1

Note:

1. To judge the need for the base station, 7bit and 6bit should be considered simultaneously.

2. When the base station is marked as 1, the base station status is invalid.

20 E3 AF 22 32 FA 00 00 00 B2 : Please refer to chapter 7.2 for the label data

11 01 0E 13 26 09 : The label receives (reads) time, namely year, month, day, hour, minute, second, year is based on 2000, January 14, 2017 19:38:09

7.1.4 The attendance tag format description

The attendance tag (type 0x8B02) format specification (17 bytes).

eg ： 8120 E3 AF 22 32 FA 00 00 00 B211 01 0E 13 26 09

Attendance/antenna channel no (1byte)	tag data (10Bytes)	attendance time (6bytes)
81	20 E3 AF 22 32 FA 00 00 00 B2	11 01 0E 13 26 09

81 ： Attendance/antenna Channel; In this 1Byte, the highest (8bit) indicates attendance or the coming out, of which 1 is in and 0 is out

Attendance/antenna Channel			
7 bit	6 bit	5,4 bit	3～0 bit
Sign in and out of attendance: 1 ： in 0 ： out	Identification of unilateral attendance 1 ： unilateral attendance 0 ： not unilateral attendance	reserved	Read the tag's antenna channel number

0x81 ， Enter the door, read from the antenna no. 1

Note：

1. It is necessary to consider the 7bit and 6bit for the entry and exit

2. When the unilateral attendance mark is 1, the attendance check mark is invalid

20 E3 AF 22 32 FA 00 00 00 B2 ： Please refer to chapter 7.2 for the label data

11 01 0E 13 26 09 : The label receives (reads) time, namely year, month, day, hour, minute, second, year is based on 2000, January 14, 2017 19:38:09

7.2 tag format description

The tag data is fixed to 10 bytes. The specific format is defined as follows:

Lenth(Byte) / tag type	type (1Byte)	tag ID (4Bytes)	CC (1Byte)	RSV (2Bytes)	Status (1Byte)	version (1Byte)
student card	0x20	Use IC card number	Check sum of front 5Btyes (frame head, card number)		Bit0: low pressure indication (0: normal, 1: low voltage) Bit4: key	Version number Bit7: Special mark
electric bike tag	0x30	Production batch number + serial number, production batch number is four				

		decimal number, the actual use hex storage and transport, such as 1708, the actual 0 x17 0 x08 serial number to four decimal number, such as 1012, the actual data of 0 x10 and 0 x12.			state (0: press the button, 1: press without a button)	
Electric bike key card	0x31	Production batch number + flow number, rule same				

eg : 20E3 AF 22 32FA00 0000B2

tag type （1byte）	ID （4byte）	Checksum （1byte）	Incentives to address （2byte）	Low pressure alarm （1byte）	RSSI （1byte）
20	E3 AF 22 32	FA	00 00	00	B2

20 : tag type, student card

E3 AF 22 32 : Tag ID,

FA : 20 E3 AF 22 32 and checksum (check algorithm to see chapter 8 calibration algorithm)

00 00 : Motivational address, not motivational

00 : No voltage alarm (low voltage is 0x01, normal is 00

B2 : Signal strength, -78dbm (symbols for single byte)

8. CONFIGURATION PARAMETER FORMAT DESCRIPTION

The following is the configuration parameter format of the device (182Bytes).

Item	Data segment	bytes	Read and write attribute	type	Description
1	Parameter eigenvalue	1	R/W	value	When writing, keep 0x55 constant, but normal configuration parameters When written, it is not 0x55, that is, the factory default parameter is restored When read, it is fixed at 0x55
2	Communication mode	1	R/W	value	Low 4 bits, read only, transmission mode: 1bit: read only, GPRS connection, 1 valid No. 2bit: read-only, LAN connection, 1 valid 3bit: retention No. 4bit: reservation No. 5bit: read and write, tag transfer mark, 0: transmit tag records to the platform; 1: no label record is transmitted to the platform 6-8bit: reservations eg： 0x11, which represents the GPRS connection, does not transmit tag records to the platform eg: 0x01, identifies the GPRS connection and transmits the label record to the platform
3	Firmware version	2	R	value	Firmware version, the main version number is in front eg: 02 07， V2.7
4	The buzzer logo	1	R/W	value	1. Start the buzzer, 0: turn off the buzzer
5	reserved 1	1	-	-	
6	To heavy window (leave base station to judge time)	2	R/W	value	20～65535 TAB to refilter window, unit: second; 0x0000 does not filter, Low byte at the front Low byte ahead, high byte in the back Range: 20 ~ 65535
7	Device ID	16	R/W	string	The 15bit is product serial number Item is ASCII, followed by 1 byte at 0x00 eg: “861694034205896”
8	The base	2	R/W	value	The tag stays at the base station and is reported

	station stays over time				to the platform at the interval time (the V3.3 version only has this) low byte before and after high byte Unit: second Value range: 0, 60 ~ 65535 0: do not use this feature 60 ~ 65535: timeout period
9	DHCP able	1	R/W	value	1： open, 0: closed, for LAN
10	LAN local IP	4	R/W	value	Used for LAN network parameter configuration
11	LAN Mask	4	R/W	value	Used for LAN network parameter configuration
12	LAN gateway	4	R/W	value	Used for LAN network parameter configuration
13	LAN local port	2	R/W	value	Local IP port, applicable to LAN, low byte before, high byte after (value range 0 ~ 65536) eg: *24 13 , is 0x1324(HEX) = 4900 (DEC)*
14	GPRS server 1 IP	32	R/W	string	IP or domain name, string
15	G GPRS server 1 port	2	R/W	value	low byte before, high byte after (value range 0 ~ 65536)
16	LAN server 1 IP	32	R/W	string	IP or domain name, string
17	LAN server 1 port	2	R/W	value	low byte before, high byte after (value range 0 ~ 65536)
18	LAN local mac	6	R/W	value	Used for LAN network parameter configuration
19	Reserved 3	28	-	-	-
20	Antenna version	8	R	value	he firmware version corresponding to four antennas The version of each antenna occupies two bytes eg： 0106 is V1.6, if FF FF indicates that the read antenna version failed (probably not connected to the antenna)
21	GPRS rssi	1	R	value	00 or 99 means GPRS no signal 99 indicates failure to read the GPRS signal The normal range is 0 ~ 31
22	Device ID	16	R	string	eg: “MR7901-003C0025”
23	Antenna RSSI threshold	4	R/W	Signed value	Value range: -1 ~ -128 The signal strength RSSI filter threshold of 1,2,3 and 4 corresponding to the antenna is respectively. eg: -88
24	Antenna gain	4	R/W	value	The value range is 0~ 31, corresponding to the signal gain value of the antenna 1,2,3 and 4
25	Bluetooth output label identification	1	R/W	value	0: the label cannot be exported via bluetooth 1: the label can be exported via bluetooth, and the tag that the antenna reads will only be

					exported via bluetooth. GPRS and LAN are forbidden to export labels
26	Communicate status	1	R	value	Direct connection to the platform Low 4 bits, connection mode 1bit: read only, GPRS connection, 1 valid No. 2bit: read-only, LAN connection, 1 valid 3bit: retention No. 4bit: reservation It's 4 digits high, fixed as A 0 xa0 connectionless 0xA1 has GPRS connections 0xA2 has a LAN connection 0xA3 has GPRS, LAN connections
27	Reserved 4	4	-	-	

9.SUMMARY OF THE COMMANDS

Item	cmd	Description
1	0x0008	Terminal registration request
2	0x8008	Platform confirmation terminal registration
3	0x0001	Terminal login request
4	0x8001	The platform confirms the terminal login
5	0x0003	Terminal heartbeat
6	0x8003	Platform confirm heartbeat
7	0x0004	The terminal sends the tag data
8	0x8004	The platform acknowledges receipt of the tag
9	0x000D	To upgrade the firmware
10	0x800D	Platform to confirm upgrade firmware

10. CHECKSUM ALGORITHM

10.1 CRC16 ALGORITHM

The data packet of communication with the platform, using CRC16 algorithm. The following two kinds of checking algorithms are introduced, which are recommended using method 2. Method 2 is used to check the table, which is 8 times faster than method 1

10.1.1 C#.net method 1

```
/*********************************************************************************
** Function name    :  crc16_ccitt
** Descriptions      :  Cyclic redundancy check -16 （CCITT standard-0x1021）
** input parameters  :  buf  The data to be checked
**                      len Check the length of the data
** output parameters :  None
** Returned value   :   value
*********************************************************************************/
uint16_t crc16_ccitt(uint8_t *buf, uint16_t len)
{
    uint16_t i, j;
    uint16_t crc_reg = 0xFFFF;
    uint16_t crc_val;

    for (i = 0; i < len; i++)
    {
        crc_val = buf[i] << 8;

        for (j = 0; j < 8; j++)
        {
            if (((int16_t)(crc_reg ^ crc_val)) < 0)
                crc_reg = (crc_reg << 1) ^ 0x1021;
            else
                crc_reg <<= 1;
            crc_val <<= 1;
        }
    }
    return crc_reg;
```

```
}
```

10.1.2 C#.net method 1 Look-up table method

```
/*********************************************************************************
** Function name    :  CRC16
** Descriptions      :  yclic redundancy check -16 （CCITT standard-0x1021）
** input parameters  :  buf  The data to be checked
**                      len Check the length of the data
** output parameters :  None
** Returned value   :   value
*********************************************************************************/
const uint16_t crc16_table[]=   //* CRC16 CCITT 标准-0x1021
{
    0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50a5, 0x60c6, 0x70e7,
    0x8108, 0x9129, 0xa14a, 0xb16b, 0xc18c, 0xd1ad, 0xe1ce, 0xf1ef,
    0x1231, 0x0210, 0x3273, 0x2252, 0x52b5, 0x4294, 0x72f7, 0x62d6,
    0x9339, 0x8318, 0xb37b, 0xa35a, 0xd3bd, 0xc39c, 0xf3ff, 0xe3de,
    0x2462, 0x3443, 0x0420, 0x1401, 0x64e6, 0x74c7, 0x44a4, 0x5485,
    0xa56a, 0xb54b, 0x8528, 0x9509, 0xe5ee, 0xf5cf, 0xc5ac, 0xd58d,
    0x3653, 0x2672, 0x1611, 0x0630, 0x76d7, 0x66f6, 0x5695, 0x46b4,
    0xb75b, 0xa77a, 0x9719, 0x8738, 0xf7df, 0xe7fe, 0xd79d, 0xc7bc,
    0x48c4, 0x58e5, 0x6886, 0x78a7, 0x0840, 0x1861, 0x2802, 0x3823,
    0xc9cc, 0xd9ed, 0xe98e, 0xf9af, 0x8948, 0x9969, 0xa90a, 0xb92b,
    0x5af5, 0x4ad4, 0x7ab7, 0x6a96, 0x1a71, 0x0a50, 0x3a33, 0x2a12,
    0xdbfd, 0xcbdc, 0xfbbf, 0xeb9e, 0x9b79, 0x8b58, 0xbb3b, 0xab1a,
    0x6ca6, 0x7c87, 0x4ce4, 0x5cc5, 0x2c22, 0x3c03, 0x0c60, 0x1c41,
    0xedae, 0xfd8f, 0xcdec, 0xddcd, 0xad2a, 0xbd0b, 0x8d68, 0x9d49,
    0x7e97, 0x6eb6, 0x5ed5, 0x4ef4, 0x3e13, 0x2e32, 0x1e51, 0x0e70,
    0xff9f, 0xefbe, 0xdfdd, 0xcffc, 0xbf1b, 0xaf3a, 0x9f59, 0x8f78,
    0x9188, 0x81a9, 0xb1ca, 0xa1eb, 0xd10c, 0xc12d, 0xf14e, 0xe16f,
    0x1080, 0x00a1, 0x30c2, 0x20e3, 0x5004, 0x4025, 0x7046, 0x6067,
    0x83b9, 0x9398, 0xa3fb, 0xb3da, 0xc33d, 0xd31c, 0xe37f, 0xf35e,
    0x02b1, 0x1290, 0x22f3, 0x32d2, 0x4235, 0x5214, 0x6277, 0x7256,
    0xb5ea, 0xa5cb, 0x95a8, 0x8589, 0xf56e, 0xe54f, 0xd52c, 0xc50d,
    0x34e2, 0x24c3, 0x14a0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
    0xa7db, 0xb7fa, 0x8799, 0x97b8, 0xe75f, 0xf77e, 0xc71d, 0xd73c,
    0x26d3, 0x36f2, 0x0691, 0x16b0, 0x6657, 0x7676, 0x4615, 0x5634,
    0xd94c, 0xc96d, 0xf90e, 0xe92f, 0x99c8, 0x89e9, 0xb98a, 0xa9ab,
    0x5844, 0x4865, 0x7806, 0x6827, 0x18c0, 0x08e1, 0x3882, 0x28a3,
    0xcb7d, 0xdb5c, 0xeb3f, 0xfb1e, 0x8bf9, 0x9bd8, 0xabbb, 0xbb9a,
```

```
    0x4a75, 0x5a54, 0x6a37, 0x7a16, 0x0af1, 0x1ad0, 0x2ab3, 0x3a92,
    0xfd2e, 0xed0f, 0xdd6c, 0xcd4d, 0xbdaa, 0xad8b, 0x9de8, 0x8dc9,
    0x7c26, 0x6c07, 0x5c64, 0x4c45, 0x3ca2, 0x2c83, 0x1ce0, 0x0cc1,
    0xef1f, 0xff3e, 0xcf5d, 0xdf7c, 0xaf9b, 0xbfba, 0x8fd9, 0x9ff8,
    0x6e17, 0x7e36, 0x4e55, 0x5e74, 0x2e93, 0x3eb2, 0x0ed1, 0x1ef0
};

uint16_t CRC16(uint8_t * Data, uint16_t Length)
{
    uint16_t crc;
uint8_t  da;

    crc = 0xFFFF;
    while(Length--!=0)
        {
    da=(uint8_t) (crc/256);
    crc <<= 8;
    crc ^= crc16_table[da^*Data];
    Data++;
    }

    return crc;
}
```

10.1.3 JAVA Method

```
/**************************************************************************
 * CRC-CCITT standard JAVA
 *
 *
 * data  Input: bytes of bytes required to add validation
 *
 * Output: returns a hexadecimal check code of 2 bytes
 **************************************************************************/
private static String getCrc(byte[] data) {
    int crc = 0xFFFF;        //crc

    for (int i = 0; i < data.length; i++) {
         crc = (data[i] << 8) ^ crc;
         for (int j = 0; j < 8; ++j) {
          if ((crc & 0x8000) != 0)
               crc = (crc << 1) ^ 0x1021;
          else
```

```
                crc <<= 1;
            }
        }
        return Integer.toHexString(crc & 0xFFFF).toUpperCase();
    }
```

10.2 Checksum algorithm

The tag data is used and verified.

10.2.1 C#.NET Calculation function

```
/******************************************************************************
** Function name       :   CheckSum
** Descriptions        :   checksum
** input parameters    :   uBuff he data to be checked
**                         uBuffLen Check the length of the data
** output parameters :   None
** Returned value     :    value
******************************************************************************/
 uint8    CheckSum(uint8 *uBuff, uint16 uBuffLen)
 {
     uint16 i;
     uint8 uSum=0;

    for(i=0;i<uBuffLen;i++)
    {
         uSum = uSum + uBuff[i];
    }
    uSum = (~uSum) + 1;

    return uSum;
 }
```

10.2.2 JAVA method

```
/*********************************************************
 * Check and JAVA algorithms in tag data
 *
 * @param sendbyte  You need to compute the checksum interval: 1 byte tag TYPE + 4 byte tag ID
```

```
 *
 * @return       Calculate the checksum
 *                20 E3 AF 22 32 checksum: FA(10 dex -6)
**********************************************************/
protected static byte sendRcvByteNum(byte[] sendbyte) {
        byte sum = 0;
        for (int i = 0; i < sendbyte.length; i++) {
            sum += sendbyte[i];
        }
        byte rebyte = (byte) (~sum + 1);
        System.out.println("校验位: " + rebyte);
        return rebyte;
    }

//Check sum of the calculated and 20 E3 AF 22 32: FA(10 is -6)
public static void main(String[] args) {
        byte[] b = new byte[5];
        b[0] = 0x20;
        b[1] = (byte) 0xE3;
        b[2] = (byte) 0xAF;
        b[3] = 0x22;
        b[4] = 0x32;
        sendRcvByteNum(b);
    }
```

11. THE APPENDIX

11.1 Relationship between battery power and battery voltage

The battery voltage on the MR7901 is shown as follows in relation to the battery charge in the heartbeat message (or in the upload device hardware information)

Battery power	battery voltage
10	≥ 8.00
9	≥ 7.75, ＜8.00
8	≥ 7.50, ＜7.75
7	≥ 7.25, ＜7.50
6	≥ 7.00, ＜7.25
5	≥ 6.75, ＜7.00
4	≥ 6.50, ＜7.75
3	≥ 6.25, ＜6.50
2	≥ 6.00, ＜6.25
1	≥ 5.75, ＜6.00
0	＜5.75

Note

1. The battery voltage is less than 5.75 V, that is, when the battery is less than 1, the equipment cannot work properly；

2. When the battery is less than 9, it can be judged that the external power supply has been switched off (or lost power).