POE version of the network card reading base station WE-RWN300

Document version: V1.01 2025-04-22

1. Overview

WE-RWN300 network card reading base station can be powered by POE or DC, and can be quickly deployed in places where there is a WiFi signal by WiFi wireless or POE Ethernet access network. The reader detects the tag at a distance of up to 100 meters, which can not only read the ID value of the electronic tag, but also calculate the actual distance of the tag by measuring the strength of the wireless signal field of the electronic tag. Several base stations (card readers) work together, which can determine the specific location of electronic tags within the effective range, realize real-time monitoring of the location of people and items, and facilitate the tracking and search of people and items.

WE-RWN300 network card reader base station can be connected to four card reading antennas, one main and three standby, and any one of them can be used. A base station installation point can also be connected by two card reader antennas or four card reader antennas, one to the left and one to the right; four card reading antennas, one to the left and one to the right; One forward and one backward, so that the card reading angle is wider and the positioning is more accurate. Label positioning is widely used in many application fields such as intelligent warehouse management, logistics tracking, indoor navigation, and personnel management.

2. Main characteristics

◆ It can detect 1000 electronic tags at the same time, and the antenna detection distance can reach 100 meters in the air.

◆The communication distance with the WiFi hotspot (50mW) is not less than 80 meters, and the networking is simple.

◆ The wireless signal field strength of the electronic tag can be measured and the actual distance of the label can be calculated.

◆You can call the tag for sound and light reminder (only applicable to sound and light tag)

◆ It can be connected to 4 card reading antennas, with a wider reading angle and more accurate positioning.

◆The card reading antenna can be extended by 30 meters (115200bps), which is easy to install and deploy.

◆Provide open protocol, third-party systems can easily communicate with the card reader through the network.

◆SDK development kit is provided to facilitate users to develop their own tag positioning management system.

◆POE power supply or 10~26V wide voltage power supply, each card reader consumes no more than 800mA (12V).

3. Technical parameters

project	specification
Light	[BT]: Bluetooth operation indicator Solid light: Bluetooth connection is normal Always off: Bluetooth disconnected
	[RUN], the system operation indicator Constant light (occasional flash): The connection is normal Constant extinction (occasional flash): Abnormal online connection
	[WiFi], WiFi wireless working indicator
	Solid on: The connection to the WiFi hotspot is normal.
	Constant Off: Abnormal connection to WiFi hotspot.
	[Mode], mode indicator Solid light: WIFI mode. Constant extinction: Ethernet mode.
	[ANT], the card reading antenna 0 indicator, read the label and flash it once.
Ethernet interface	10M/100M adaptive
	POE power supply
	DHCP and UDP protocols are supported
	SDK development kits are provided to support access to third-party systems
WiFi wireless	Wireless protocol: 802.11 b/g/n
	Transmitting power: 100mW
	Operating frequency: 2.4~2.4835GHz
	Provide open application communication protocols and support access to third-party systems
Card reading antenna	Communication interface: RS232 serial port
	Baud rate: 115200, 57600, 38400, 19200, 9600bps
	Interface specifications: 4P terminal header (5V, GND, TXD, RXD)
USB parameter setting	USB-mini interface, CH340 driver virtual serial port, Windows setup software.
Bluetooth parameter settings	It supports BLE 4.2 specification communication distance of 30 meters (depending on the environment).
Operating temperature	-40℃~85℃
Operating humidity	Humidity less than 95% (no condensation)
Installation method:	Ceiling mounting / wall mounting (wall mounting, holding rod, hoop, rail mounting)
Power supply	POE, 12V (1A), supports DC12V-DC26V wide voltage supply
size	Length 121mm× width 78mm× height 51.4mm
Water and dust resistant	IP67
weight	530g

4. Product appearance

interface	name	specification	illustrate
WiFi antenna	WiFi	SMA external screw inner hole	Connect a 2.4GWiFi antenna
Card reading antenna (ANT0/4)	G	Power Ground (Output)	3.5mm terminal block for WE-TX20 card reader antenna.
	R	RS232 data reception	
	T	RS232 data transmission	
	V	Power Supply 5V (Output)	
Light	BT	Bluetooth operation indicator	Solid light: Bluetooth connection is normal Always off: Bluetooth disconnected
	RUN	Equipment operation indicator	Constant light (occasional flash): The connection is normal Constant extinction (occasional flash): Abnormal online connection
	WIFI	WIFI connection indicator	When the card reader is connected to a WIFI network, the light will turn on.
	Mode	Mode indicator	WIFI/Ethernet mode indication
	ANT0	Card reading antenna 0 indicator	Every time the card reading antenna reads the label, it flashes.
POE interface	POE	Standard 48VPOE interface	Built-in step-down voltage, 48V to 12V
	LAN	10/100M adaptive	Report label data through the network interface
Power interface DC12V	+	Power Positive (12V)	3.5mm terminal block, voltage range 10V~26V (12V recommended)
	-	Power Supply	

5. Networking instructions

The WE-RWN300 card reader can report the read tag information to the location server, and the location server will comprehensively calculate the data to obtain the specific location of the tag.

WE-RWN300 network card reader can be connected to 4 card reader antennas, 4 interfaces are mutually reserved, and 1 interface is connected to the card reader antenna by default. In the occasion where omnidirectional card reading is required, 2 or 4 card reading antennas can be connected, one facing left, one facing right, one facing forward, and one facing backward, which is more comprehensive in card reading and more accurate positioning.

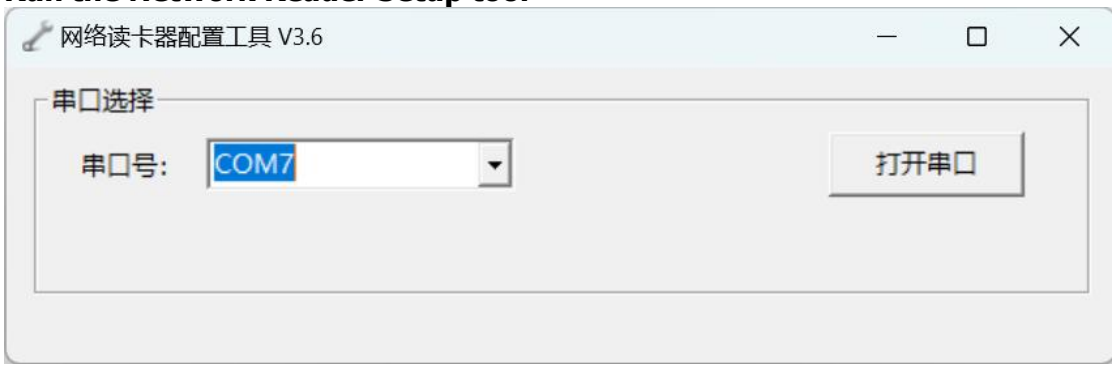
6. Parameter setting

1. USB interface "SET" to connect to the computer

Check the serial slogan for the connected network card reader on your computer. Open the computer device manager, find the "USB-SERIAL CH340" device under the "Ports" category, and note the COM number of the port.

If the computer cannot recognize the USB serial device, you need to install the corresponding driver.

Run the Network Reader Setup tool



After selecting the corresponding serial number, click the "Open Serial Port" button, and the software will display the firmware version number and current parameters of the network card reader. It is divided into two configurations: wired and WiFi, and users can click "Apply" after modifying the corresponding parameters of the device.

The default is "Waiting for platform connection", this mode is to communicate with the location server, and the "device ID" defaults to 1 (generally does not need to be modified). Then the device waits for the location server management system software to connect.

When the platform connects multiple devices, the "device ID" can be used to distinguish different devices, of course, you can also directly distinguish devices based on different IP addresses without device ID, so that there is no need to modify the device ID.

If the connection mode is changed to Active Connection to the Platform, you need to set the IP address, platform port number, device name, and device password of the platform you need to log into. In this mode, the reader can be deployed in the local area network to actively connect to a server in the cloud and send card reading data.

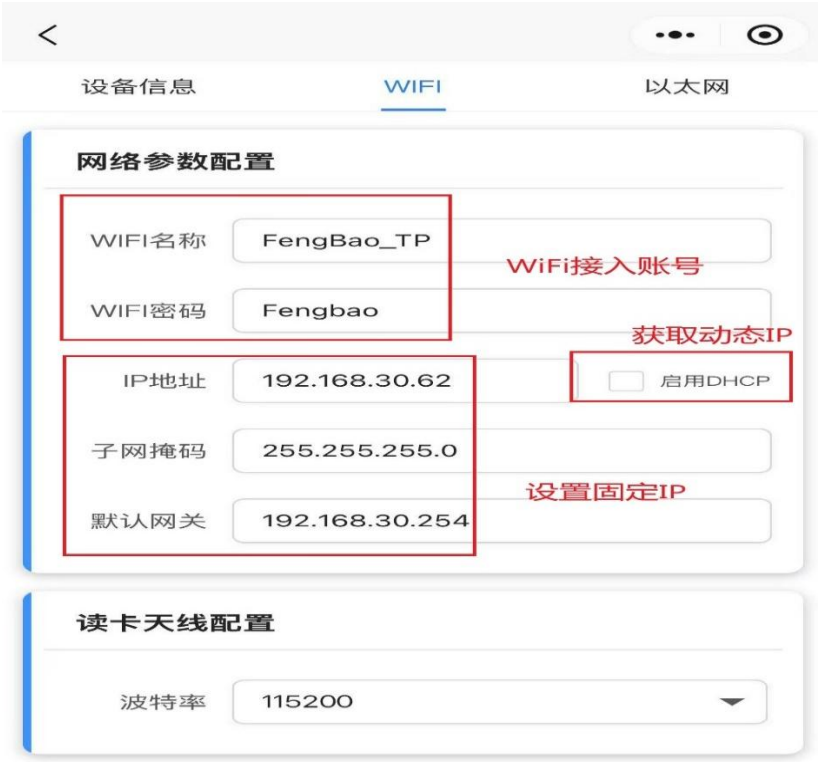
2. Bluetooth connection to WeChat mini program configuration

Turn on Bluetooth in advance on your mobile phone, enter the WeChat applet coderNan and click "Search", find the device WE-RWN300 Bluetooth name (find-*******) and click to enter.

Go to the Bluetooth configuration interface homepage and select the device's network mode, WiFi mode, or Ethernet mode. You can also modify the Bluetooth display name.

2.1 WiFi Mode Settings

In this mode, users need to enter the WiFi account information and the IP information of the device (enable DHCP to automatically obtain the IP address assigned by the router), and then actually fill in the obtained IP address to bind the device, observe the "WiFi" indicator light on the panel, if the "WiFi" light is on, it means that it has been connected to the WIFI network.



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When the platform connects multiple devices, the "device ID" can be used to distinguish different devices, of course, you can also directly distinguish devices based on different IP addresses without device ID, so that there is no need to modify the device ID.

You can also select Active Connection to Platform, and you need to set the IP address, platform port number, device name, and device password of the platform you need to log into. In this mode, the reader can be deployed within the local area network, actively connecting to a server in the cloud or a third-party server and sending card reading data.

After selecting the connection mode, click "Apply" at the bottom of the page to save the information, then wait for 5 seconds to reset the device button from gray to blue, then click the "Reset Device" button to restart the device, and click "Query" to ensure that the modification information is correct.

2.2 Ethernet mode

In this mode, the user needs to enter the IP information of the device (enabling DHCP can automatically obtain the IP address assigned by the router), and then actually fill in the obtained IP address to bind the device (note: the subnet mask and default gateway need to be filled).

The default is "Waiting for platform connection", this mode is to communicate with the location server, and the "device ID" defaults to 1 (generally does not need to be modified). Then the device waits for the location server management system software to connect.

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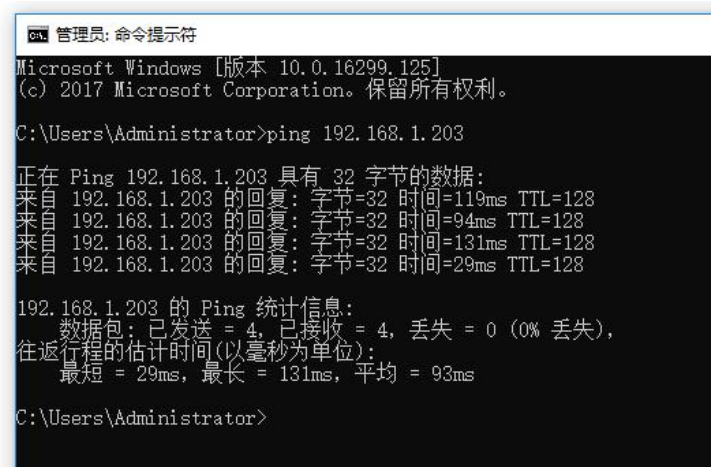
7. Card reader test

1. Test that the network connection is normal

According to the set IP address, open a command line window on the computer, ping this address, and test whether the card reader device is reachable by the network.



Run the Network Card Reader Test Tool, enter the IP address of the network reader, and click Start:

Check the Device Status to see if it's Connected. You can see the "total number of tags" and "number of drops" read, and the dropped tags are tags that have been read but cannot be read now. The specific information of the detected labels is displayed in the list.

The specific information of the detected labels is displayed in the list.

1、Card Number: The ID of the detected tag

2、Substation: Which base station substation detected it. WE-RWN0300 card reading base station fixed substation 0 for itself.

3、Undervoltage status: Green is electron normal, red is undervoltage (the tag is about to expire). The time from undervoltage to true failure is not less than one month.

4、Additional data: Reported tags can carry up to 7 bytes of custom data.

5、Distance: The distance between the tag and the substation (antenna).

6、Online Time: The duration for which the tag was detected.

Sound and light reminder:

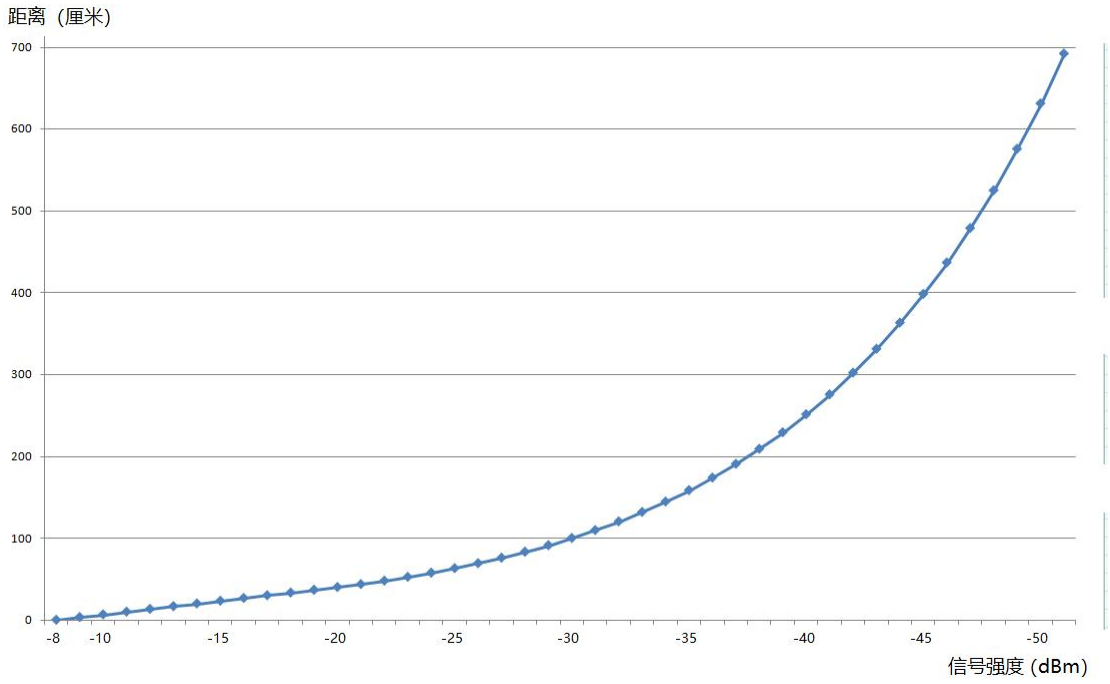
In the tested tag, if there is an electronic tag with a sound and light reminder, you can enter the station number and tag ID to call it.

We provide the C++ source code of the "Network Reader Test Software", and customers can refer to our source code to develop their own applications.

In order to further facilitate the rapid development of users, we provide SDK development packages and demonstration programs in C# language, which is more convenient and faster for users to integrate card reading functions in their own software.

8. Distance measurement formula

This product calculates the distance between the electronic tag and the antenna by measuring the wireless signal field strength of the tag, and the exponential curve relationship between the distance and the wireless signal strength is as follows:



Due to chart size limitations, only correspondence within 7 meters is displayed

In the above figure, there are 3 values that need to be measured and calibrated repeatedly.

1、 L0: Signal strength at a distance of 0 cm from the tag and the reader, measured at -8 dBm.

2、 L1: Signal strength at a distance of 40 cm from the tag and reader, measured at -20 dBm.

3、 L2: Signal strength at a distance of 100 cm from the tag and the reader, measured at -30 dBm.

Based on these three values, the derived formula is as follows:

1、信号强度大于等于L0，距离直接判定为0厘米。

2、信号强度大于等于L1，距离可以根据线性运算。

距离 = 【(L0-信号强度) / (L0-L1)】 * 40

3、信号强度小于L1，距离可以根据指数曲线运算。

$$距离 = 10^{【(L2-信号强度)/25】} * 100$$

For specific algorithm implementation, please refer to our DEMO software source code.

9. Data communication protocol

9.1. Overview of the agreement

The card reader is responsible for receiving messages from nearby electronic tags and reporting them to the user's application software (the customer's own platform software) in a timely manner. The user application software receives the tag information reported by each card reader, and calculates the actual position of the tag according to the distance between the electronic tag and each antenna, so as to realize various location-related applications.

The network card reader supports two modes: one is waiting to be connected, that is, server-side mode; The other is to actively initiate the connection, which is the client mode.

In the server mode, after the user application logs in on the network card reader device, the card reader will actively report the received tag information to the application software, during which the card reader needs to send heartbeat instructions to the application software at regular intervals to keep the connection effective. The specific operation is that the application software needs to send a "login request" to the card reader first, and the card reader returns to the "login answer" to confirm. There is a heartbeat cycle time in the "Login Request" message, and after each time, the card reader sends a "heartbeat request" message, and the application software replies with a "heartbeat response" message, and each question and answer maintains this connection. If the application does not receive a response from the application software to send a request message three times during the card reader's heartbeat cycle, the connection is considered to be invalid and the tag information is stopped.

In client mode, the network reader actively initiates a connection to the user application. Considering the usage scenarios and data security of this mode, the encryption authentication method is adopted. The specific operation is that the network card reader sends a "login platform request" message with the "device name" as the parameter, and the application software returns the "login platform answer" message, which contains a string of random numbers. The network card reader uses random numbers to encrypt the password into ciphertext through the MD5 algorithm, sends a "password verification request" message, and if the

application software verifies passes, it will send a "password verification response" message to agree to log in, otherwise it will refuse to log in. There is a heartbeat cycle time in the "Password Verification Answer" message, and the mechanism of keeping the heartbeat connected is exactly the same as that of the server mode, so I will not go into details.

9.2. Description of the agreement

1 Network protocol

The UDP protocol in the TCP/IP protocol cluster is used as the basic protocol for providing services.

The port number of the UDP protocol server is tentatively set to 4099.

2 Network transmission sequence

For double-byte, quad-byte, or multi-byte content, send the high byte first and then the low byte.

When sending a byte of content, send the high bits first, and then the low bits.

3 Message formats

Information unit	Length (bytes)	remark
Agreement discrimination	4	0x44535246 (ASCII "DSRF")
Protocol version number	1	Current version "4"
Message ID	1	
CRC16-bit check	2	16-digit CRC checksis (including content length)
Message content length	2	
Message content	N	

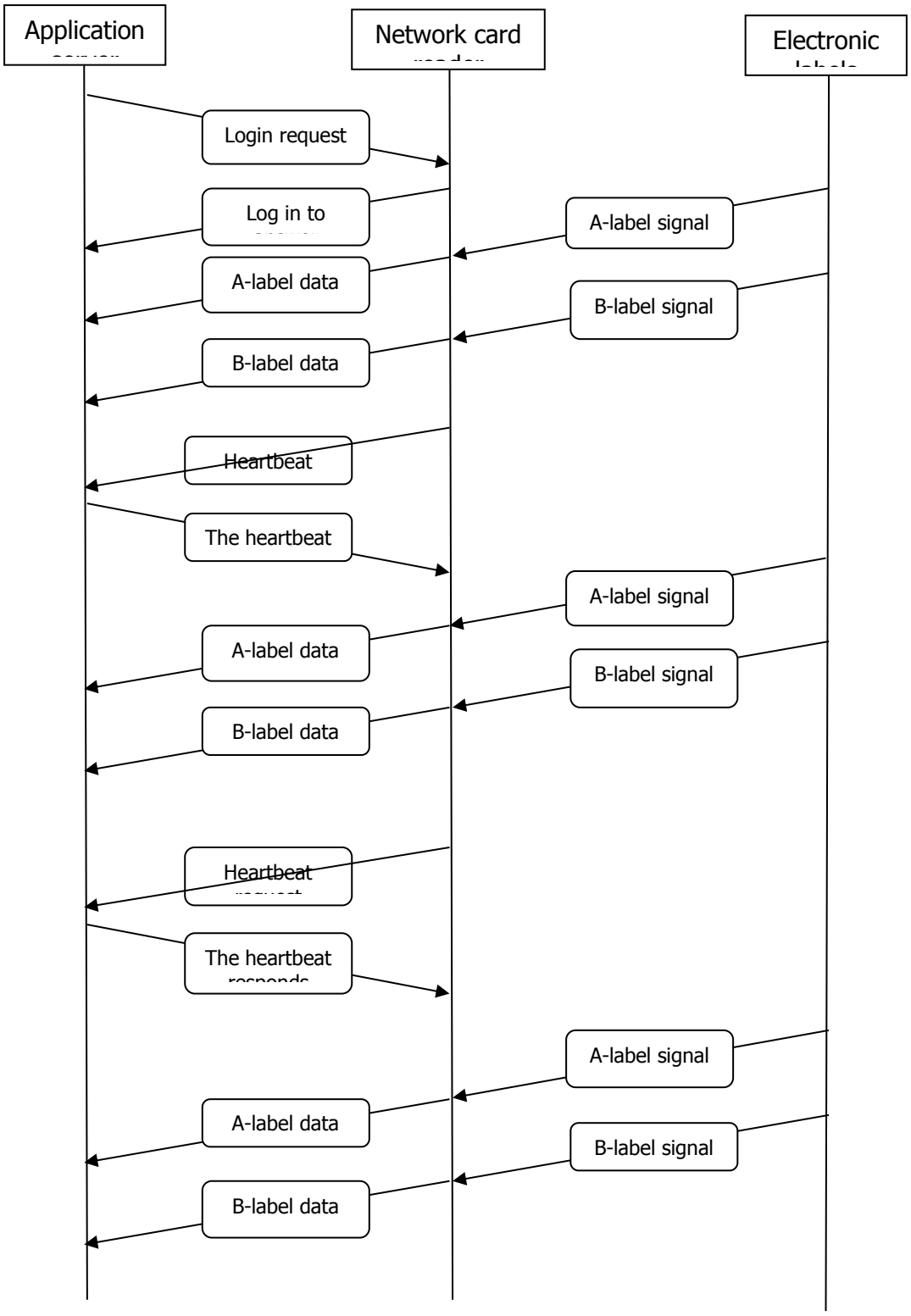
4. Message ID definition

Message name	Card reader mode	Data flow direction	value
Login request	server	Application software→ reader	1
Login confirmation	server	Card reader → application	2

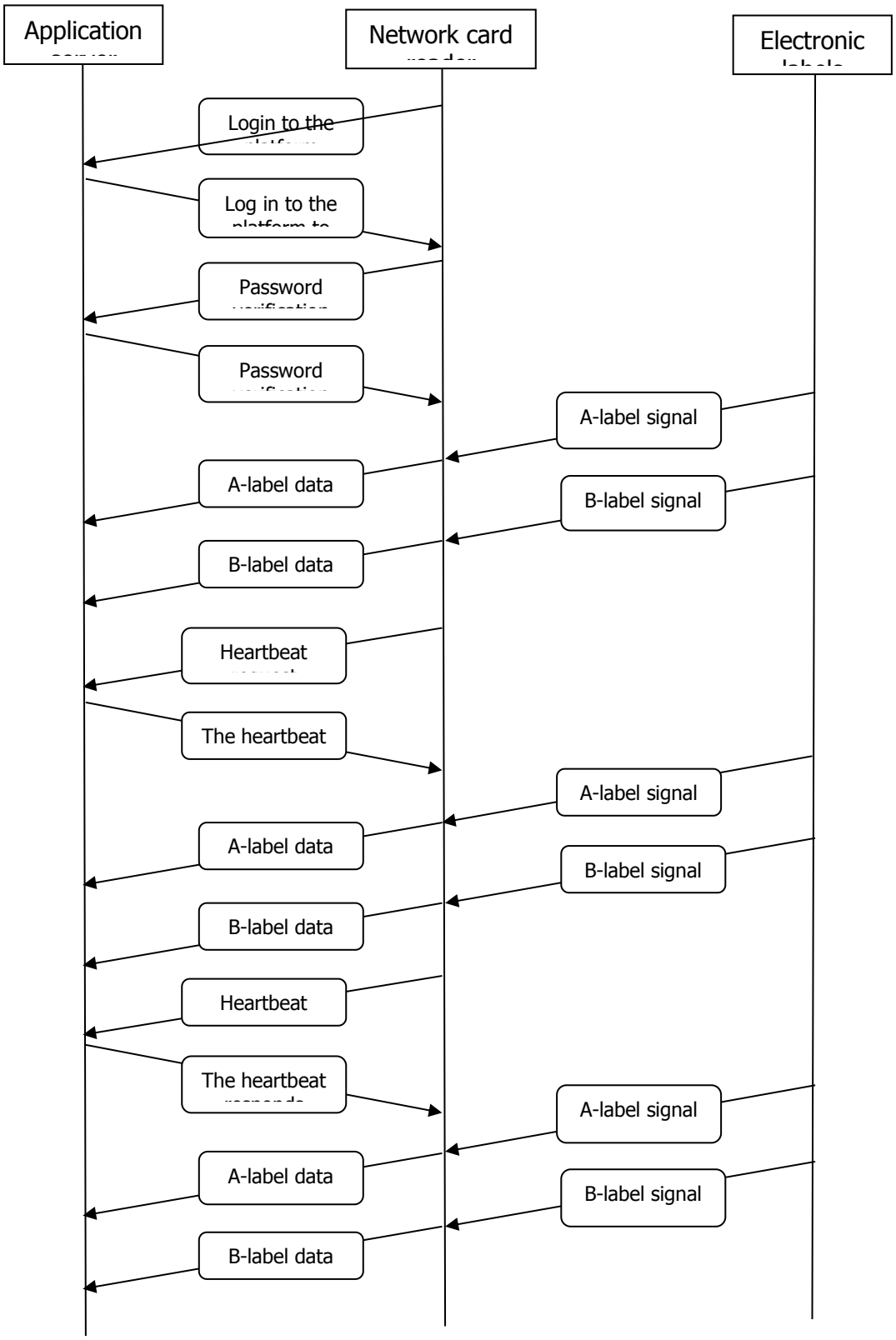
Send electronic label information	server	Card reader → application	3
Call tag requests	server	Application software→ reader	6
Call tag confirmation	server	Card reader → application	7
Call label declined	server	Card reader → application	8
Send an SMS request	server	Application software→ reader	9
Send SMS confirmation	server	Card reader → application	10
Send an SMS to decline	server	Card reader → application	11
Bulk call tag requests	server	Application software→ reader	12
Bulk call label confirmation	server	Card reader → application	13
Bulk call label decline	server	Card reader → application	14
Send a heartbeat request	server	Card reader → application	15
Heartbeat request confirmation	server	Application software→ reader	16
retain			
Login to the platform request	client	Card reader → application	32
Log in to the platform to answer	client	Application software→ reader	33
Password verification request	client	Card reader → application	34
Password verification response	client	Application software→ reader	35
Send electronic label information	client	Card reader → application	36
Send a heartbeat request	client	Card reader → application	37
Heartbeat request confirmation	client	Application software→ reader	38
Call tag requests	client	Application software→ reader	39
Call tag confirmation	client	Card reader → application	40
Call label declined	client	Card reader → application	41
Send an SMS request	client	Application software→ reader	42
Send SMS confirmation	client	Card reader → application	43
Send an SMS to decline	client	Card reader → application	44
Bulk call tag requests	client	Application software→ reader	45
Bulk call label confirmation	client	Card reader → application	46
Bulk call label decline	client	Card reader → application	47

9.3. Message interaction process

The Device Waiting to Connect process



Device Active Connection process



9.4. Message content description

———————————— [Card Reader Waiting for Connection Mode]———————————

1 Login request (0x01).

Illustrate:

The user application software sends a login request to the card reader

Message content:

Length (bytes)	content
16	Username (string).
16	Password (string).
1	Heart cycle time, in seconds

Username/password

The default user name of the card reader is "admin" and the default password is "888888".

A string is a string of characters with the character '\0' (0x00) as the cutoff.

Heartbeat cycle time

The reader needs to send a "heartbeat request" message to the software platform after the heartbeat cycle time has expired. If the application does not receive a reply message from the application software for three heartbeat cycles, the connection is considered to be invalid and the tag information is stopped.

Message example:

44 53 52 46 04 01 5C 82 00 21 61 64 6D 69 6E 00 00 00 00 00 00 00 00 00 00 38 38 38 38 38 38 38 00 00 00 00 00 00 00 00 00 0A

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
01 ：消息命令（登录请求）
5C 82 ：长度和内容的 CRC16（ModBus）校验值
00 21 ：消息内容长度（33）

61 64 6D 69 6E 00 00 00 00 00 00 00 00 00 00 00 ：用户名“admin”
38 38 38 38 38 38 00 00 00 00 00 00 00 00 00 00 ：密码“888888”
0A ：心跳周期 10 秒

2. Login answer (0x02).

Illustrate:

The card reader confirms the login request of the application software

Message content:

Length (bytes)	content
1	Login result (0 succeeds, other values fail)
4	Device ID

Message example:

44 53 52 46 04 02 95 DA 00 05 00 00 00 00 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
02 ：消息命令（登录应答）
95 DA ：长度和内容的 CRC16（ModBus）校验值
00 05 ：消息内容长度（5）

00 ：登录结果
00 00 00 01 ：设备 ID

3. Electronic label data (0x03).

Illustrate:

The reader sends the read electronic tag data to the application software

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number
1	Electronic label attributes
0~7	Expand data bytes
1	Wireless Signal Field Strength (dBm)

Substation address code: 1 byte, the substation number of the tag data read by the card reader antenna 0 is 0, and the branch number of the tag data read by the card reader antenna 1 is 1.

Electronic tag card number: 4 bytes, ID code of the read electronic tag.

Electronic tag attributes: 1 byte, which stores the label type, undervoltage flag, extended data length, etc.

Bit 0 undervoltage sign. 1: Undervoltage 0: Normal

Bit1-3 Label type. 0: Normal Label 1: Sound and Light Label 2: SMS Label

Bit 4 Sport Sign. This bit is only valid for motion detection tags. 0: Tag stationary 1: Tag movement

Bits 5-7 extend the length of the data. If necessary, the tag can upload some extended data (such as humidity, humidity, etc.), and the extended data area follows the attribute bytes, and the length can be 0-7 bytes.

Extended data bytes: 0-7 bytes, the length of the extended data is explained in the attribute bytes, and can carry some tag-specific data, such as temperature, temperature, and other data. It can be up to 7 bytes or nothing.

Wireless signal field strength: 1 byte, the wireless field strength measured when reading the electronic tag signal, and the distance of the tag can be calculated according to the field strength value. range (-128dBm~0dBm).

The larger the byte value, the greater the actual wireless signal strength, and the closer the tag is to the reader.

Message example:

44 53 52 46 04 03 64 1B 00 0B 00 00 00 01 01 00 1B 81 7A 00 AB

消息解析

44 53 52 46	：通信协议标识
04	：协议版本号
03	：消息命令（标签信息）
64 1B	：长度和内容的 CRC16（ModBus）校验值
00 0B	：消息内容长度（11）
00 00 00 01	：设备 ID
01	：分站号
00 1B 81 7A	：标签 ID（1802618）
00	：属性（普通标签 电压正常 没有扩展字节）
AB	：信号强度（-85db）

4 Call Tag Request (0x06)

Illustrate:

When the application software needs to specify a tag to emit light, it needs to send a call tag request message.

Message content:

Length (bytes)	content
1	Substation address code
4	Electronic tag card number
1	Effective reminder duration (seconds)
1	Reminder mode

Reminder validity duration:

After sending a reminder command, the reminder operation remains valid for how long it lasts. (After the reminder operation fails, the label will still remind for 10 seconds until the timeout is over.))

Reminder mode:

The general definitions are as follows *(the definition of each sound and light label may vary slightly).*

Call mode	illustrate
0	Only the green light flashes
1	Green light flashing + buzzer
2	Only the red light flashes
3	Red light flashing + buzzer
4	Only red and green flash
5	Red and green flash alternately +
255	Stop reminders

Message example:

44 53 52 46 04 06 2C F5 00 07 00 00 1D 0E 54 3C 00

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
06 ：消息命令（呼叫标签请求）
2C F5 ：长度和内容的 CRC16（ModBus）校验值
00 07 ：消息内容长度（7）

00	：分站号
00 1D 0E 54	：标签 ID（1904212）
3C	：呼叫时长（60 秒）
00	：提醒模式（发光、不发声）

5. Call tag acknowledgment (0x07).

Illustrate:

The card reader acknowledges the call tag request message for the application software. If the application sends a "Call Tag Request" message but does not receive a "Call Tag Confirmation", it needs to resend the request message.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number

Message example:

44 53 52 46 04 07 83 42 00 09 00 00 00 01 00 00 1D 0E 54

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
07 ：消息命令（呼叫标签确认）
83 42 ：长度和内容的 CRC16（ModBus）校验值
00 09 ：消息内容长度（9）

00 00 00 01 ：设备 ID
01 ：分站号
00 1D 0E 54 ：标签 ID（1904212）

6 Call tag rejected (0x08).

Illustrate:

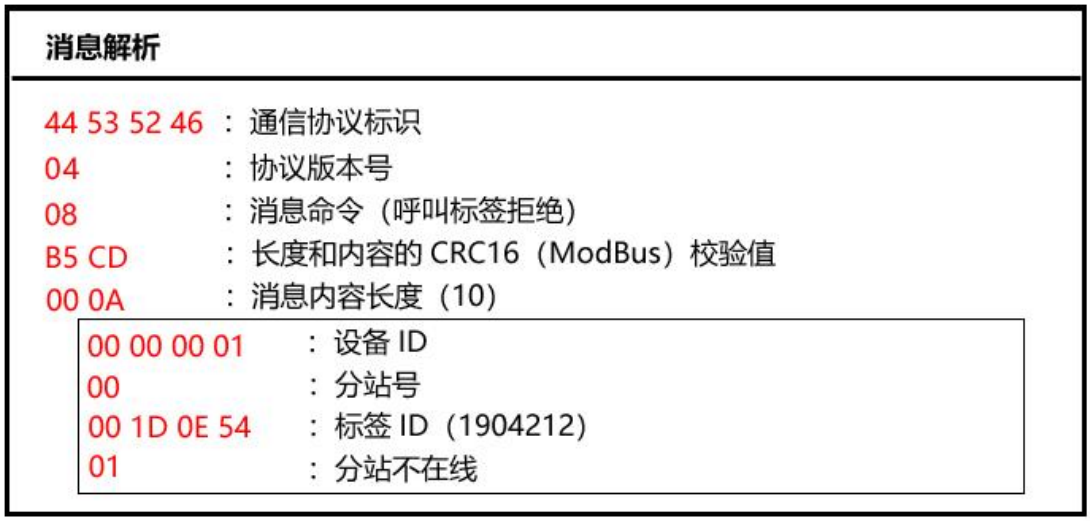
The reader cannot respond to the application's call tag request message, such as the substation is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number
1	Failure reason value

Message example:

44 53 52 46 04 08 B5 CD 00 0A 00 00 00 01 00 00 1D 0E 54 01



7. Send SMS requests (0x09).

Illustrate:

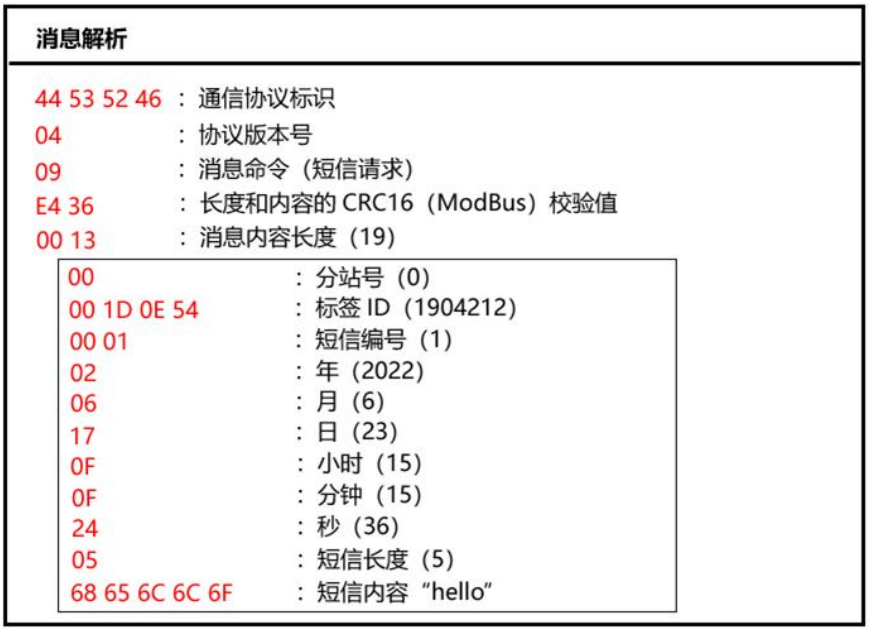
The application software sends an SMS to the specified tag (only SMS tags are valid).

Message content:

Length (bytes)	content
1	Substation address code
4	Tag ID
2	SMS number(0~29999)
1	Year (Actual Year - 2020)
1	month
1	day
1	time
1	divide
1	second
1	SMS content length (0~110).
110	SMS content

Message example:

44 53 52 46 04 09 E4 36 00 13 00 00 1D 0E 54 00 01 02 06 17 0F 0F 24 05 68 65 6C 6C 6F



8. Send SMS confirmation (0x0A).

Illustrate:

The card reader acknowledges receipt of an SMS message from the application.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Tag ID

Message example:

44 53 52 46 04 0A 83 42 00 09 00 00 00 01 00 00 1D 0E 54

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
0A ：消息命令（短信确认）
83 42 ：长度和内容的 CRC16（ModBus）校验值
00 09 ：消息内容长度（9）

00 00 00 01 ：设备 ID
01 ：分站号
00 1D 0E 54 ：标签 ID（1904212）

9. Send SMS rejection (0x0B).

Illustrate:

The card reader receives an SMS message from the application software, but cannot send it, such as when the branch station is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Tag ID
1	Failure reason value

Message example:

44 53 52 46 04 0B B5 CD 00 0A 00 00 00 01 00 00 1D 0E 54 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
0B ：消息命令（短信拒绝）
B5 CD ：长度和内容的 CRC16（ModBus）校验值
00 0A ：消息内容长度（10）

00 00 00 01 ：设备 ID
00 ：分站号
00 1D 0E 54 ：标签 ID（1904212）
01 ：分站不在线

10 Bulk call tag requests (0x0C).

Illustrate:

When the application software needs to call a batch of tags at the same time, it needs to send a bulk call tag request message. A single message supports calls to up to 80 tags.

Message content:

Length (bytes)	content
1	Substation address code
1	Effective reminder duration (seconds)
1	Number of Labels(1~80)
4	Label 1 card number
1	Label 1 Reminder mode
4	Label 2 card number
1	Label 2 Reminder mode
……	
4	Label N card number
1	Label N Reminder Mode

Reminder validity duration:

After sending a reminder command, the reminder operation remains valid for how long it lasts. (After the reminder operation fails, the label will still remind for 10 seconds until the timeout is over.))

Call Mode:

The general definitions are as follows *(the definition of each sound and light label may vary slightly).*

Call mode	illustrate
0	Only the green light flashes
1	Green light flashing + buzzer sounding
2	Only the red light flashes
3	Red light flashing + buzzer sounding
4	Only red and green flash alternately
5	Red and green flash alternately + buzzer sound
255	Stop reminders

Message example:

44 53 52 46 04 0C 2B 2A 00 12 01 3C 03 00 1D 0E 54 00 00 1D 0E 55 00 00 1D 0E 56 00

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
0C ：消息命令（批量呼叫标签请求）
2B 2A ：长度和内容的 CRC16（ModBus）校验值
00 12 ：消息内容长度（18）

01	：分站号（1）
3C	：呼叫保持时间（60 秒）
03	：批量呼叫标签数量（3）
00 1D 0E 54	：第一个标签 ID（1904212）
00	：第一个标签提醒模式（绿灯闪）
00 1D 0E 55	：第二个标签 ID（1904213）
00	：第二个标签提醒模式（绿灯闪）
00 1D 0E 56	：第三个标签 ID（1904214）
00	：第三个标签提醒模式（绿灯闪）

11 Bulk call tag confirmation (0x0D).

Illustrate:

The card reader acknowledges the application's bulk call tag request message. If the application sends a Bulk Call Label Request message but does not receive a Bulk Call Tag Confirmation, it needs to resend the request message.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code

Message example:

44 53 52 46 04 0D 05 DB 00 05 00 00 00 01 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
0D ：消息命令（批量呼叫标签确认）
05 DB ：长度和内容的 CRC16（ModBus）校验值
00 05 ：消息内容长度（5）
00 00 00 01 ：设备 ID
01 ：分站地址码

12 Bulk call label rejection (0x0E)

Illustrate:

The reader cannot respond to the application's bulk call tag request message, such as the branch station is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
1	Failure reason value

Message example:

44 53 52 46 04 0E 9B B7 00 06 00 00 00 01 01 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号
0E ：消息命令（批量呼叫标签拒绝）
9B B7 ：长度和内容的 CRC16（ModBus）校验值
00 06 ：消息内容长度（6）

00 00 00 01 ：设备 ID
01 ：分站号
01 ：分站不在线

13 Heartbeat Request (0x0F).

Illustrate:

The application software and the card reader can send data to each other at any time only if they remain connected. In this way, the reader needs to periodically interact with the application software.

Message content:

Length (bytes)	content
4	Reader device ID
1	Number of substations (fixed value: 2)
1	Substation 0 status (card reading antenna 0)
1	Substation 1 status (card reading antenna 1)

State Definition:

0: Normal

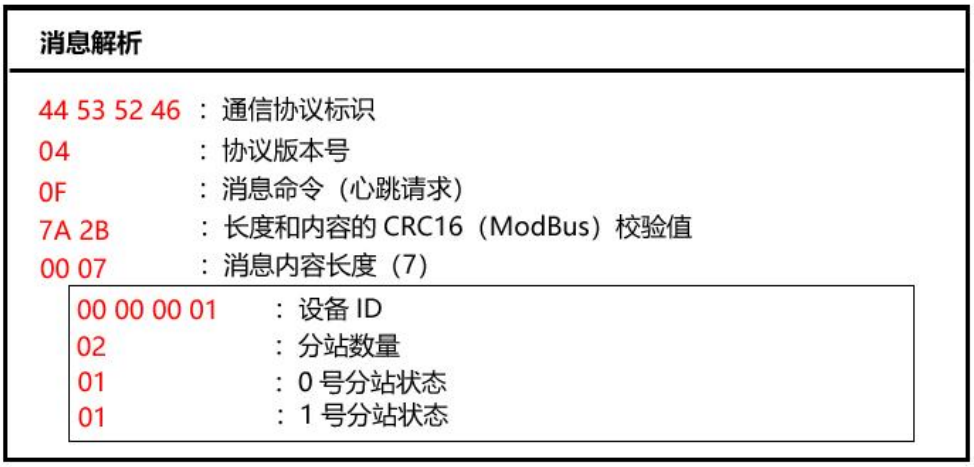
1: Locate the antenna fault

2: Faulty card reader

3: Card reader congestion (too many tags to send out in time, resulting in data loss).

Message example:

44 53 52 46 04 0F 7A 2B 00 07 00 00 00 01 02 01 01



14 Heartbeat response (0x10).

Illustrate:

The application software and the card reader can send data to each other at any time only if they remain connected. In this way, the reader needs to periodically interact with the application software.

Message content:

not

Message example:

44 53 52 46 04 10 B0 01 00 00

消息解析	
44 53 52 46	：通信协议标识
04	：协议版本号 V0.3
10	：消息命令（心跳应答）
B0 01	：长度和内容的 CRC16（ModBus）校验值
00 00	：消息内容长度（0）

[Card Reader Active Connection Mode]

1. Login to the platform request (0x20).

Illustrate:

The card reader actively logs in to the software platform according to the set platform address.

Message content:

Length (bytes)	content
32	Device name: string, ending character \0.
2	Device version: High bytes are the main version number, low bytes are the subversion number.
16	Version description: String, ending character '\0'.

Message example:

44 53 52 46 04 20 E1 69 00 32 64 65 76 30 30 31 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 02 00 56 32 2E 30 30 2E 32 32 30 36 30 36 00 00 00 00

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
20 ：消息命令（登录平台请求）
E1 69 ：长度和内容的 CRC16（ModBus）校验值
00 32 ：消息内容长度（50）
64 65 76 30 30 31 00 00 00 00 00 00 00 00 00 00 ：设备名称
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02 00 ：设备版本（2.00）
56 32 2E 30 30 2E 32 32 30 36 30 36 00 00 00 00 ：版本描述

2. Log in to the platform to answer (0x21).

Illustrate:

The software platform confirms whether the reader is allowed to log in.

Message content:

Length (bytes)	content
1	Login result: Success is fixed to 0
256	Random number: Used for MD5 operations in the subsequent password verification process

Message example:

44 53 52 46 04 21 AC 94 01 01 00 12 1A F7 F4 F5 F5 1C A5 BB 57 16 94 9C EC F7 55 6C 80 64 CA 16 AD A7 E9 45 B7 FF BF 64 B4 3A B5 C9 F0 86 13 2D 8F 85 C2 60 74 9F 56 3A 62 9C 4C D5 61 72 8F F9 64 5B 41 D8 28 2B B9 FC 5F E1 C8 7D 0E 7C 41 77 34 10 B8 BB AC 18 89 C5 54 0E 1D EF 6F 39 68 E4 48 C7 B6 56 19 1B A8 F4 2A 68 79 96 3D 7F 86 BB 2A E5 0E 36 C7 29 36 24 0A 74 50 21 72 62 5C BC A2 10 CF 28 50 77 94 34 5D F8 51 7C 45 37 EB E1 BA 2D 4C 38 8C 79 64 3F CC F7 6D D5 31 94 74 6A BA 61 15 B4 95 E6 86 A3 40 B8 D7 98 EE 4E 77 D2 2C 10 FB 28 C4 B1 1B FE E2 BF FD 72 75 78 B7 D6 D8 E0 0F 63 B2 10 84 2B 1B D1 93 50 00 69 33 74 C8 B5 A2 70 37 78 63 49 93 F3 88 60 06 B6 2D E8 44 B5 45 9D 6D 9E 99 B3 35 6A 0D 0D 42 33 25 B0 D6 45 C9 77 AD 77 45 08 29 BC 94 06 AC F5 DE 89 45 09 3F CB 90 38 CA 24 D7 AC CE

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
21 ：消息命令（登录平台应答）
AC 94 ：长度和内容的 CRC16（ModBus）校验值
01 01 ：消息内容长度（257）

00 ：登录成功
12 1A F7 F4 F5 F5 1C A5 BB 57 16 94 9C EC F7 55 ：随机数
...
...

3 Password Verification Request (0x22)

Illustrate:

The card reader verifies the legitimacy to the software platform based on the set password.

Message content:

Length (bytes)	content
16	Password MD5: The MD5 value of a password with 256 bytes of random numbers and 32 password characters (less than 32 bytes in length, with 0 at the end).

Message example:

44 53 52 46 04 22 50 1A 00 10 D4 0C 63 F7 4B 7C B5 D2 82 BF 69 8A EA 1E 53 C5

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
22 ：消息命令（口令验证请求）
50 1A ：长度和内容的 CRC16（ModBus）校验值
00 10 ：消息内容长度（16）
D4 0C 63 F7 4B 7C B5 D2 82 BF 69 8A EA 1E 53 C5 ：口令 MD5

4. Password verification response (0x23).

Illustrate:

The software platform confirms whether the reader is allowed to log in.

Message content:

Length (bytes)	content
1	Verification result: Success is fixed to 0
1	Heart cycle time, in seconds
4	Reader device ID

Message example:

44 53 52 46 04 23 CA B3 00 06 00 0F 00 00 00 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
23 ：消息命令（口令验证应答）
CA B3 ：长度和内容的 CRC16（ModBus）校验值
00 06 ：消息内容长度（6）
  00 ：验证成功
  0F ：心跳周期
  00 00 00 01 ：读卡器设备 ID

Heartbeat cycle time

The reader needs to send a "heartbeat request" message to the software platform after the heartbeat cycle time has expired. If the application software does not receive a response message from the card reader for three heartbeat cycles, the connection is considered to be invalid and the tag information is stopped.

5 Electronic label data (0x24)

Illustrate:

The reader sends the read electronic tag data to the application software.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number
1	Electronic label attributes
0~7	Expand data bytes
1	Wireless Signal Field Strength (dBm)

Reader Device ID: 4 bytes, assigned reader device ID.

Substation address code: 1 byte, the encoding of the network reader itself and the connected RS485 card reader. If it is a label read by the network reader, the substation number is 0 or 1 (0 or 1 for the card reader antenna). If it is a tag read by an extended RS485 reader, the substation number is the address code of the RS485 reader +2 (2~33).

Electronic tag card number: 4 bytes, ID code of the read electronic tag.

Electronic tag attributes: 1 byte, which stores the label type, undervoltage flag, extended data length, etc.

Bit 0 undervoltage sign. 1: Undervoltage 0: Normal

Bit1-3 Label type. 0: Normal Label 1: Sound and Light Label 2: SMS Label

Bit 4 Sport Sign. This bit is only valid for motion detection tags. 0: Tag stationary 1: Tag movement

Bits 5-7 extend the length of the data. If necessary, the tag can upload some extended data (such as humidity, humidity, etc.), and the extended data area follows the attribute bytes, and the length can be 0-7 bytes.

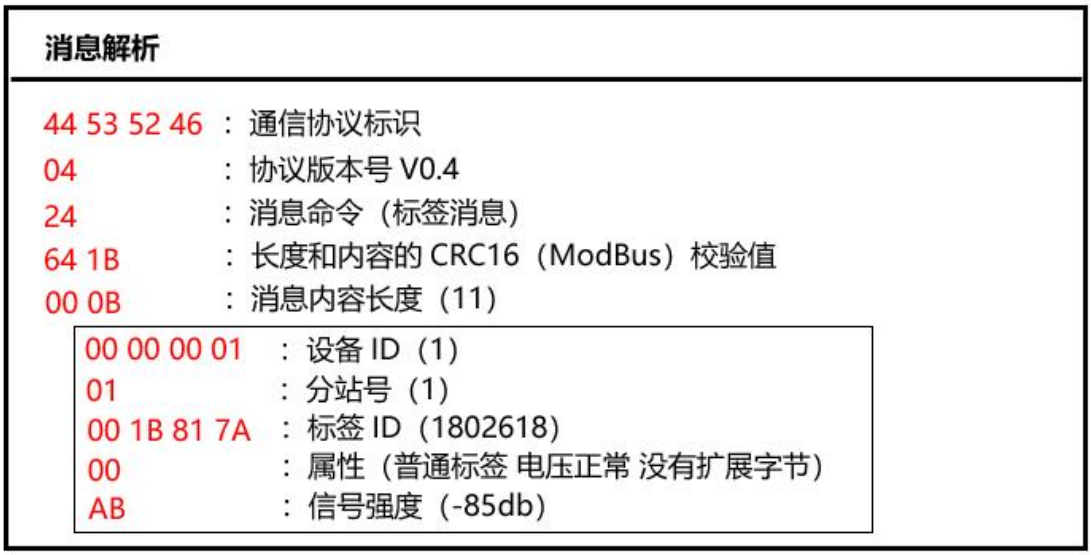
Extended data bytes: 0-7 bytes, the length of the extended data is explained in the attribute bytes, and can carry some tag-specific data, such as temperature, temperature, and other data. It can be up to 7 bytes or nothing.

Wireless signal field strength: 1 byte, the wireless field strength measured when reading the electronic tag signal, and the distance of the tag can be calculated according to the field strength value. range (-128dBm~0dBm).

The larger the byte value, the greater the actual wireless signal strength, and the closer the tag is to the reader.

Message example:

44 53 52 46 04 24 64 1B 00 0B 00 00 00 01 01 00 1B 81 7A 00 AB



6 Heartbeat Request (0x25)

Illustrate:

The application software and the card reader can send data to each other at any time only if they remain connected. In this way, the card reader needs to periodically interact with the application software.

Message content:

Length (bytes)	content
4	Reader device ID
1	Number of substations (fixed value: 2)
1	Substation 0 status (card reader antenna connected to the device itself, 0)
1	Substation 1 status (card reader antenna 1 connected to the device itself)

State Definition:

0: Normal

1: Locate the antenna fault

2: Faulty card reader

3: Card reader congestion (too many tags to send out in time, resulting in data loss).

Message example:

44 53 52 46 04 25 7A 2B 00 07 00 00 00 01 02 01 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
25 ：消息命令（心跳请求）
7A 2B ：长度和内容的 CRC16（ModBus）校验值
00 07 ：消息内容长度（7）

00 00 00 01 ：设备 ID（1）
02 ：分站数量（2）
01 01 ：0、1 号分站状态（读卡器自身的两个天线）

7. Heartbeat response (0x26).

Illustrate:

The application software and the card reader can send data to each other at any time only if they remain connected. In this way, the card reader needs to periodically interact with the application software.

Message content:

not

Message example:

44 53 52 46 04 26 B0 01 00 00

消息解析	
44 53 52 46	：通信协议标识
04	：协议版本号 V0.4
26	：消息命令（心跳应答）
B0 01	：长度和内容的 CRC16（ModBus）校验值
00 00	：消息内容长度（0）

8 Call Tag Request (0x27)

Illustrate:

When the application software needs to specify a tag to emit light, it needs to send a call tag request message.

Message content:

Length (bytes)	content
1	Substation address code
4	Electronic tag card number
1	Effective reminder duration (seconds)
1	Reminder mode

Reminder validity duration:

After sending a reminder command, the reminder operation remains valid for how long it lasts. (After the reminder operation fails, the label will still remind for 10 seconds until the timeout is over.))

Call Mode:

The general definitions are as follows *(the definition of each sound and light label may vary slightly).*

Call mode	illustrate
0	Only the green light flashes
1	Green light flashing + buzzer
2	Only the red light flashes
3	Red light flashing + buzzer
4	Only red and green flash
5	Red and green flash alternately +
255	Stop reminders

Message example:

44 53 52 46 04 27 2C F5 00 07 00 00 1D 0E 54 3C 00

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
27 ：消息命令（呼叫标签请求）
2C F5 ：长度和内容的 CRC16（ModBus）校验值
00 07 ：消息内容长度（7）

00	：分站号（0）
00 1D 0E 54	：标签 ID（1904212）
3C	：有效时间（60 秒）
00	：提醒模式（发光 不发声）

9 Call Tag Confirmation (0x28)

Illustrate:

The card reader acknowledges the call tag request message for the application software. If the application sends a "Call Tag Request" message but does not receive a "Call Tag Confirmation", it needs to resend the request message.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number

Message example:

44 53 52 46 04 28 83 42 00 09 00 00 00 01 00 00 1D 0E 54

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
28 ：消息命令（呼叫标签确认）
83 42 ：长度和内容的 CRC16（ModBus）校验值
00 09 ：消息内容长度（9）
00 00 00 01 ：设备 ID（1）
00 ：分站号（0）
00 1D 0E 54 ：标签 ID（1904212）

10 Call Label Rejected (0x29)

Illustrate:

The reader cannot respond to the application's call tag request message, such as the substation is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Electronic tag card number
1	Failure reason value

Message example:

44 53 52 46 04 29 B5 CD 00 0A 00 00 00 01 00 00 1D 0E 54 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
29 ：消息命令（呼叫标签拒绝）
B5 CD ：长度和内容的 CRC16（ModBus）校验值
00 0A ：消息内容长度（10）

00 00 00 01 ：设备 ID（1）
00 ：分站号（0）
00 1D 0E 54 ：标签 ID（1904212）
01 ：分站不在线

11 Sending SMS Requests (0x2A)

Illustrate:

The application software sends an SMS to the specified tag (only SMS tags are valid).

Message content:

Length (bytes)	content
1	Substation address code
4	Tag ID
2	SMS number(0~29999)
1	Year (Actual Year - 2020)
1	month
1	day
1	time
1	divide
1	second
1	SMS content length (0~110).
110	SMS content

Message example:

44 53 52 46 04 2A E4 36 00 13 00 00 1D 0E 54 00 01 02 06 17 0F 0F 24 05 68 65 6C 6C 6F

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2A ：消息命令（短信请求）
E4 36 ：长度和内容的 CRC16（ModBus）校验值
00 13 ：消息内容长度（19）

00	：分站号（0）
00 1D 0E 54	：标签 ID（1904212）
00 01	：短信编号（1）
02	：年（2022）
06	：月（6）
17	：日（23）
0F	：小时（15）
0F	：分钟（15）
24	：秒（36）
05	：短信长度（5）
68 65 6C 6C 6F	：短信内容“hello”

12 Send SMS confirmation (0x2B)

Illustrate:

The card reader acknowledges receipt of an SMS message from the application.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Tag ID

Message example:

44 53 52 46 04 2B 83 42 00 0900 00 00 01 00 00 1D 0E 54

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2B ：消息命令（短信确认）
83 42 ：长度和内容的 CRC16（ModBus）校验值
00 09 ：消息内容长度（9）

00 00 00 01 ：设备 ID（1）
00 ：分站号（0）
00 1D 0E 54 ：标签 ID（1904212）

13 Send SMS Rejection (0x2C)

Illustrate:

The card reader receives an SMS message from the application software, but cannot send it, such as when the branch station is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
4	Tag ID
1	Failure reason value

Message example:

44 53 52 46 04 2C B5 CD 00 0A 00 00 00 01 00 00 1D 0E 54 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2C ：消息命令（短信拒绝）
B5 CD ：长度和内容的 CRC16（ModBus）校验值
00 0A ：消息内容长度（10）

00 00 00 01 ：设备 ID（1）
00 ：分站号（0）
00 1D 0E 54 ：标签 ID（1904212）
01 ：分站不在线

14 Bulk Call Tag Requests (0x2D)

Illustrate:

When the application software needs to call a batch of tags at the same time, it needs to send a bulk call tag request message. A single message supports calls to up to 80 tags.

Message content:

Length (bytes)	content
1	Substation address code
1	Effective reminder duration (seconds)
1	Number of Labels(1~80)
4	Label 1 card number
1	Label 1 Reminder mode
4	Label 2 card number
1	Label 2 Reminder mode
……	
4	Label N card number
1	Label N Reminder Mode

Reminder validity duration:

After sending a reminder command, the reminder operation remains valid for how long it lasts. (After the reminder operation fails, the label will still remind for 10 seconds until the timeout is over.))

Call Mode:

The general definitions are as follows *(the definition of each sound and light label may vary slightly).*

Call mode	illustrate
0	Only the green light flashes
1	Green light flashing + buzzer
2	Only the red light flashes
3	Red light flashing + buzzer
4	Only red and green flash

5	Red and green flash alternately +
255	Stop reminders

Message example:

44 53 52 46 04 2D 2B 2A 00 12 01 3C 03 00 1D 0E 54 00 00 1D 0E 55 00 00 1D 0E 56 00

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2D ：消息命令（批量呼叫标签请求）
2B 2A ：长度和内容的 CRC16（ModBus）校验值
00 12 ：消息内容长度（18）

01	：分站号（1）
3C	：呼叫保持时间（60 秒）
03	：批量呼叫标签数量（3）
00 1D 0E 54	：第一个标签 ID（1904212）
00	：第一个标签提醒模式（绿灯闪）
00 1D 0E 55	：第二个标签 ID（1904213）
00	：第二个标签提醒模式（绿灯闪）
00 1D 0E 56	：第三个标签 ID（1904214）
00	：第三个标签提醒模式（绿灯闪）

15 Bulk call tag acknowledgment (0x2E)

Illustrate:

The card reader acknowledges the application's bulk call tag request message. If the application sends a Bulk Call Label Request message but does not receive a Bulk Call Tag Confirmation, it needs to resend the request message.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code

Message example:

44 53 52 46 04 2E 05 DB 00 05 00 00 00 01 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2E ：消息命令（批量呼叫标签确认）
05 DB ：长度和内容的 CRC16（ModBus）校验值
00 05 ：消息内容长度（5）
00 00 00 01 ：设备 ID（1）
01 ：分站号（1）

16 Bulk call label rejection (0x2F)

Illustrate:

The reader cannot respond to the application's bulk call tag request message, such as the branch station is not online.

Message content:

Length (bytes)	content
4	Reader device ID
1	Substation address code
1	Failure reason value

Message example:

44 53 52 46 042F 9B B7 00 06 00 00 00 01 01 01

消息解析

44 53 52 46 ：通信协议标识
04 ：协议版本号 V0.4
2F ：消息命令（批量呼叫标签拒绝）
9B B7 ：长度和内容的 CRC16（ModBus）校验值
00 06 ：消息内容长度（6）
00 00 00 01 ：设备 ID（1）
01 ：分站号（1）
01 ：分站不在线