E840-TTL (EC05-DNE) User Manual

Chengdu Ebyte Electronic Technology Co.,Ltd.

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1. 1 Overview

1.1 Product introduction

E840-TTL (EC05-DNE) is a small 4G TTL pin module developed by Chengdu Ebyte Electronic Technology Co., Ltd. using 4G CAT1 technology for the Asia-Pacific region, Australia, New Zealand and other regions. It has small size and high speed. , low latency, easy to use, simple configuration can realize the serial device networking function (two-way transparent transmission between the serial device and the network server). The product adopts 2.0mm pin header, which is easy to debug. Simple configuration can realize the serial port networking process, which is very convenient to integrate into the Internet of Things project.
The module supports two sockets, the MQTT protocol, and supports access to the Alibaba Cloud, OneNet, Baidu Cloud and Huawei Cloud Platform, making it easy to implement IoT applications.

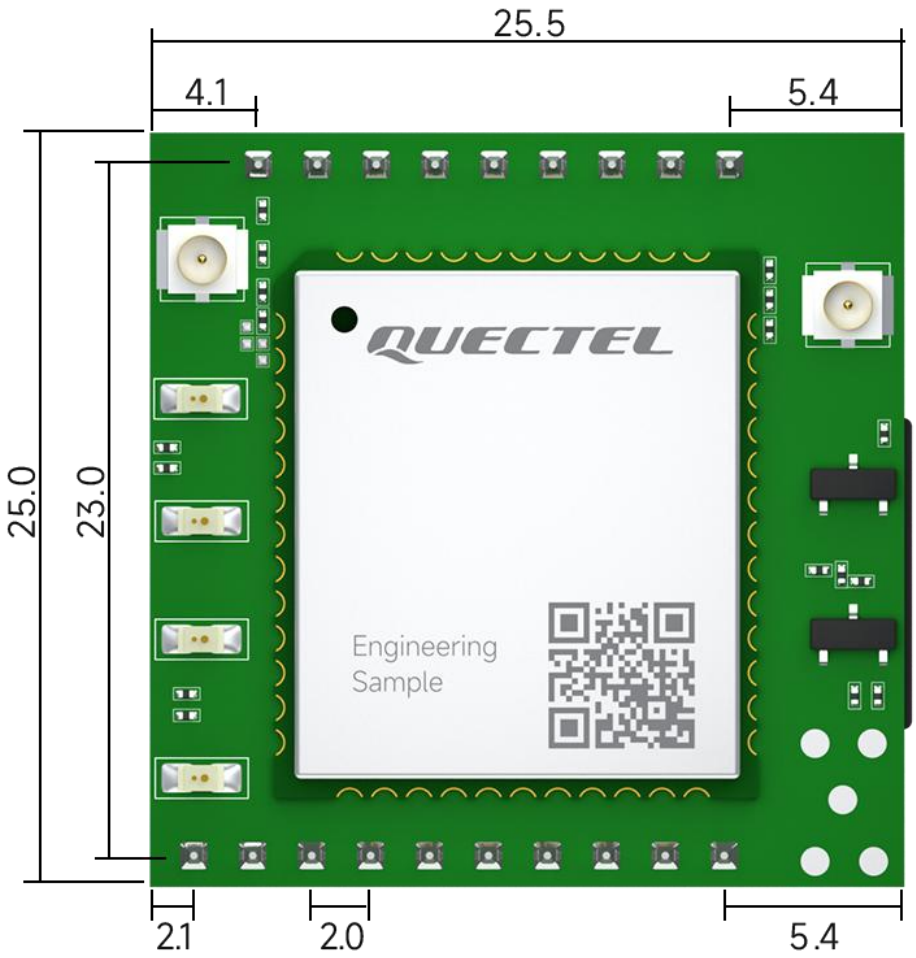
1.2 Features

- Adopts 4G CAT1 solution with millisecond-level latency to meet various data transmission application scenarios;
- Supports 4G full network;
- Supports transparent transmission of data;
- Supports TCP, UDP, MQTT, HTTP network protocols;
- Supports connection to Alibaba Cloud, Baidu Cloud, Huawei Cloud, Tencent Cloud, ONE Net and other standard MQTT3.1.1 servers;
- Supports heartbeat package and registration package;
- Supports simultaneous transmission and reception of two Socket links, and each Socket supports primary/standby connection information settings;
- Supports automatic conversion between Modbus RTU and Modbus TCP;
- Supports fast AT commands;
- Supports network, serial port, SMS AT command configuration;
- Supports the configuration of security mechanisms, and the password can be set by yourself;
- Computer-side parameter configuration software is convenient and flexible;
- Supports transparent transmission of network and SMS data, and supports phone number filtering;
- The module supports restart without data and reconnection after disconnection;
- Supports APN;
- Supports DC4.5~18 V wide voltage power supply or DC3.3~4.3V lithium battery power supply , adapting to a variety of application scenarios.

1.3 System parameters

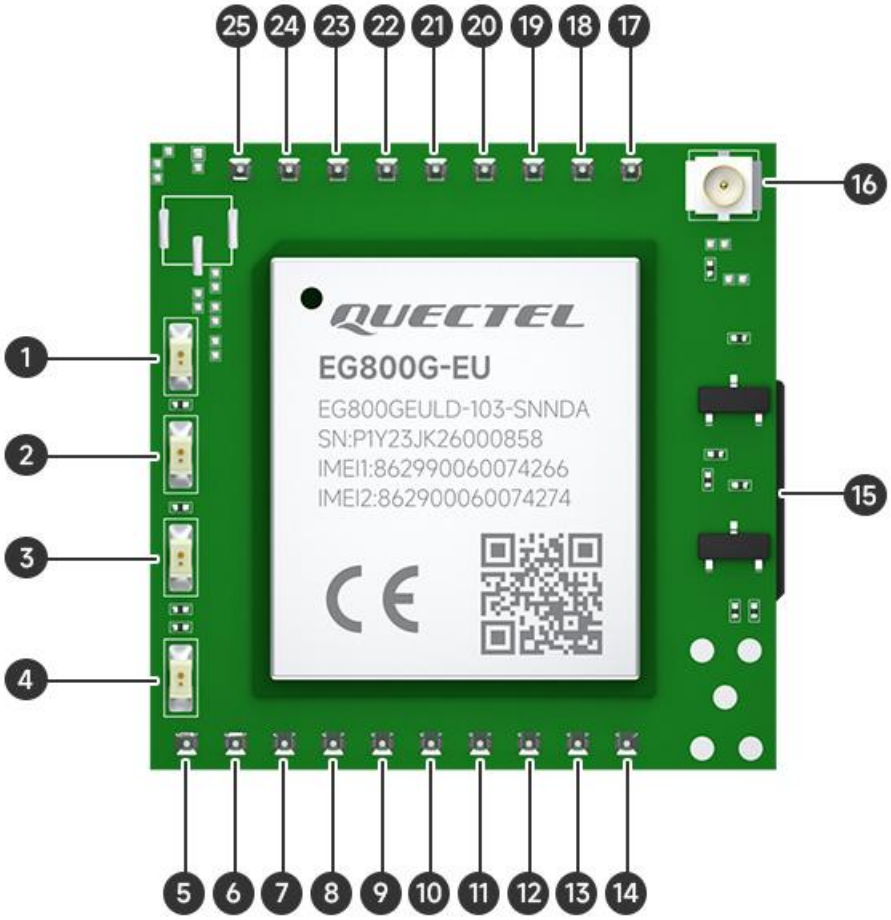
Parameter name	Parameter value	Remarks
Characteristic parameters	Supported frequency band	LTE-FDD: B1/B3/B5/B7/B8/B20/B28
	Network protocol characteristics	Support TCP/UDP/ MQTT/HTTP/DNS protocols
	RF interface	Generation 1 IPEX interface
Hardware features	Data interface	3.3V TTL level
	Baud rate	1200-230400 , default 115200 bps
	Data bits	8
	Stop bit	1 (default), 2
	Parity	None (default), Odd, Even
	Operating Voltage	VCC1: DC 4.5 ~ 18V VCC2:3.3 ~ 4.3V Note: VCC1 and VCC2 cannot be powered at the same time, it is recommended to use the VCC1 pin
	Working current	Peak - VCC1 pin: 2000mA@5V/1000mA@12V Peak - VCC2 pin : 2500mA@3.3V/2300mA@4.2V Standby - VCC1 pin: 50mA@5V/30mA@12V Standby - VCC 2 pin 80mA@3.3V/60mA@4.2V
	Operating temperature	-40 ~ +85℃
	Dimensions	25.5× 25mm
	product weight	4.3± 0.2g
Indicator light	PWR (blue)	Lights up when power is on
	STATE (orange)	Off: The module is powered on and searching for the SIM card; Flashing: The module detects the correct SIM card and is attaching to the network; Steady on: The module is successfully attached to the network;
	DATA (green)	Flashing : When the serial port is sending/receiving data
	LINK (orange)	Steady on: The module is successfully connected to the server; Off: The module failed to connect to the server successfully;

1.4 Product Size



Unit : mm
Tolerance value : ±0.1mm

1.5 Pin definition



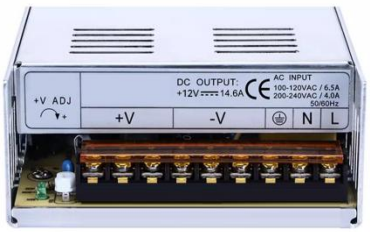
Serial number	Name	Function	Remarks
1	DATA	Data indicator	Off: No data is sent or received through the serial port. Flashing : When the serial port is sending/receiving data
2	LINK	Link indicator	Steady on: Any link is successfully connected to the server; Off: The module failed to connect to the server successfully;
3	STATE	Network access status indicator light	Off: The module is powered on and searching for the SIM card; Flashing: The module detects the correct SIM card and is attaching to the network; Steady on: The module is successfully attached to the network;
4	POWER	Power Indicator	Lights up when power is on
5	GND	Ground pin	Can be used as power ground
6	VCC1	4.5 ~ 18V input	If the voltage supply is 4.5V and above (pay attention to the module operating voltage range), the VCC1 pin must be used, and the VCC1 power supply load capacity is recommended to be 2A @5V or above. It is forbidden to supply power with VCC2 at the same time! ! !
7	NC	Empty pin	Use it as normal IO when customizing, just leave it floating

			when not in use.
8	GND	Ground pin	Can be used as power ground
9	SIM_VDD	External SIM card pin	External SIM card VDD, used to connect external cards
10	SIM_CLK	External SIM card pin	External SIM card CLK, used to connect external cards
11	SIM_RST	External SIM card pin	External SIM card RST, used to connect external cards
12	SIM_DATA	External SIM card pin	External SIM card DATA, used to connect external cards
13	GND	Ground pin	Can be used as power ground
14	RESRT	Reset pin	Pull it low to restart the module. It is recommended to pull it up externally when not in use.
15	SIM	SIM card holder	NaNo SIM card holder, when inserting the card, the chip faces upward and the notch faces inward.
16	ANT	Antenna interface	1st generation IPEX
17	VCC2	3.3 ~ 4.3V input	4.2V battery system power supply (pay attention to the module operating voltage range) , VCC2 power supply load capacity is recommended to be 2.5A @4V or above. It is prohibited to supply power to VCC1 at the same time, and reverse connection is prohibited! ! !
18	GND	Ground pin	Power ground
19	LINK	LINK indicator light external pin	Use external LED, common cathode connection method
20	DATA	LINK indicator light external pin	Use external LED, common cathode connection method
21	STATE	LINK indicator light external pin	Use external LED, common cathode connection method
22	RELOAD	Restore factory settings pins	Press and hold for 3-5 seconds to restore factory settings . All indicators light up to indicate success. Press and hold the button to power on and enter the upgrade mode, all indicators will flash.
23	RS485_EN	RS485 chip enable pin	RS485 enable control pin, set high when the serial port sends data, and normally low;
24	TXD	Serial port sending pin	Connect to MCU or TTL debugger RXD
25	RXD	Serial port receiving pin	Connect with MCU or TTL debugger TXD

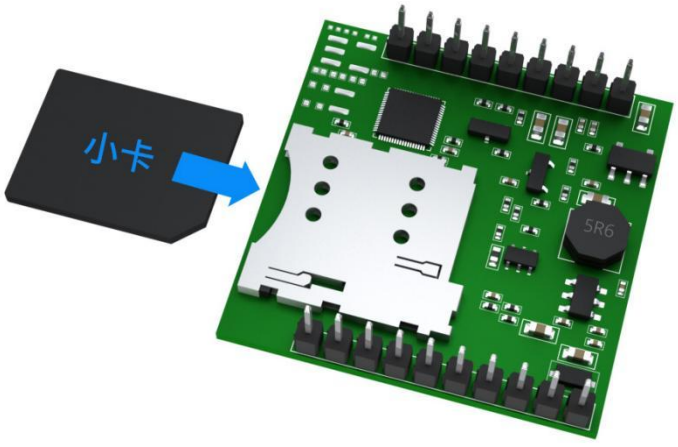
2 Quick start

2.1 Hardware preparation

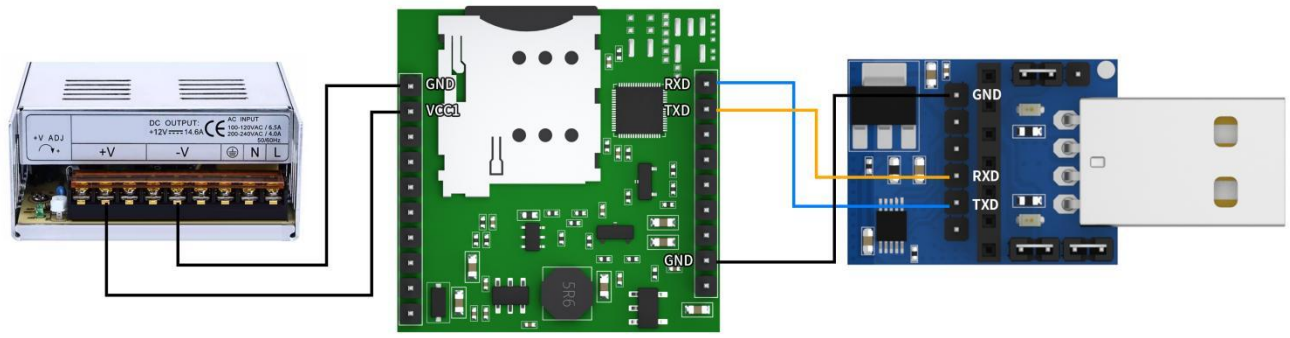
The hardware required for this test is as follows:

		
E840-TTL (EC05-DNC)	12V switching power supply	NaNo SIM card (small card)
		
USB to TTL module	4G / LTE sucker antenna and IPEX to SMA adapter cable	Some connecting wires

1. Insert the SIM card into the module. Note that it is a Nano SIM card (small card), with the notch facing inward and the chip facing upward;



2. Connect the IPEX end of the IPEX adapter cable to the device, connect the SMA end to the 4G antenna, and keep the antenna vertically upward;
3. Use a connecting cable to connect the UDB to TTL TXD interface to the module RXD interface, connect the UDB to TTL RXD interface to the module TXD interface, and connect the UDB to TTL GND interface to the module GND interface ;



4. Connect the USB to the computer (CH340 driver needs to be installed);
5. Use a connecting wire to connect the positive pole of the 12V switching power supply to the module VCC1, and connect the negative pole of the 12V switching power supply to the module GND;
6. Connect power;
7. Wait for the module STATE light to change from off to flashing, and finally to solid light.

2.2 Parameter configuration

Note: Since the module is linked to the Ebyte test server by default, you can ignore this step if you only want to verify communication.

To modify the module parameter configuration to connect to the user server, you need to know the server IP (or domain name) and port in advance. Here we take connecting to the TCP server as an example. The parameter configuration software can be downloaded from Yibyte official website. After the download is completed, double-click to run the software.

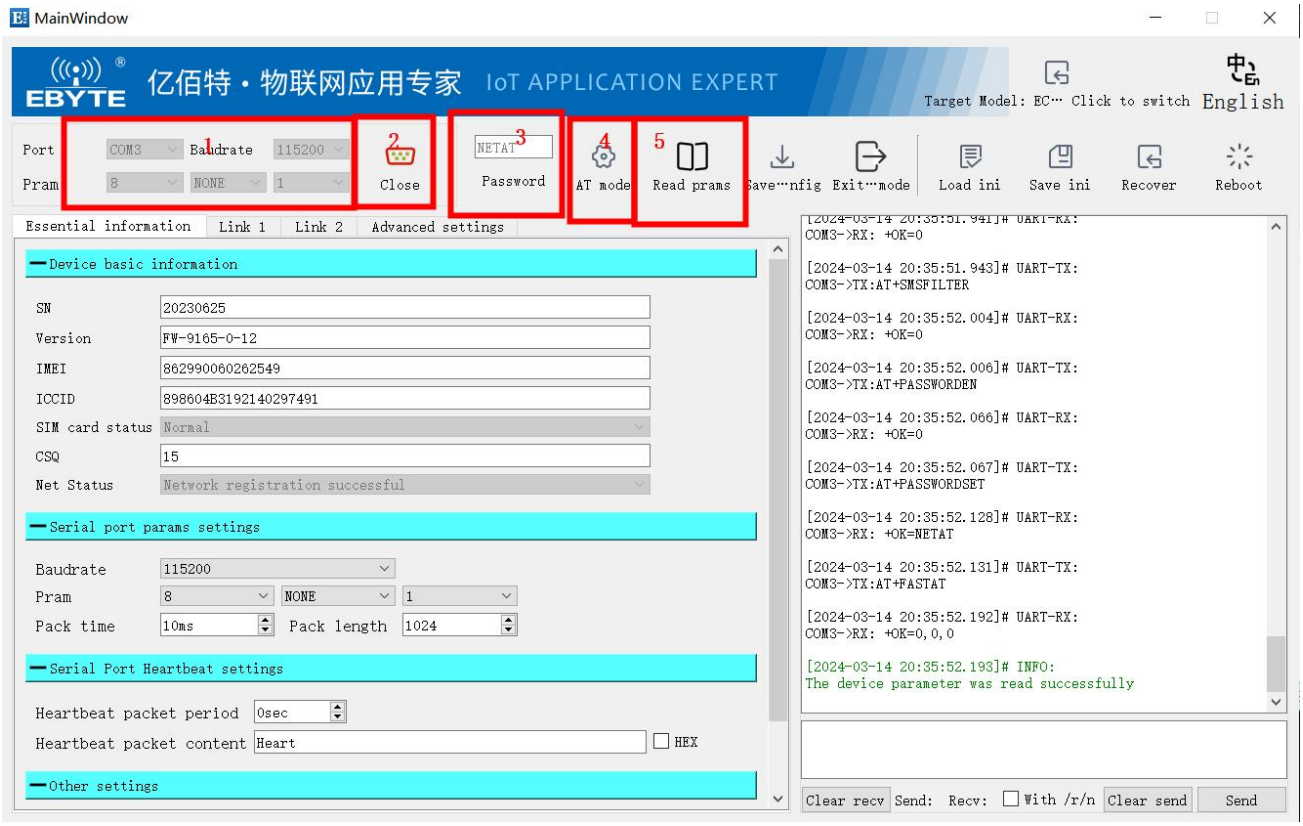
1、Select the COM port corresponding to the adapter (if not found, please go to the serial port adapter website to download and install the driver), select the corresponding baud rate, data bits, stop bits, and check bits (the default is 115200,8,N1);

2、Click "Open Serial Port" and it will display as "Close Serial Port" after opening.

3、Enter the corresponding "configuration password". If the password has not been changed, please ignore it. If you forget the password, please press and hold the Reload button of the test baseboard (pull down the module Reload pin) for 5 seconds to restore the factory;

4、Click "Enter Configuration"

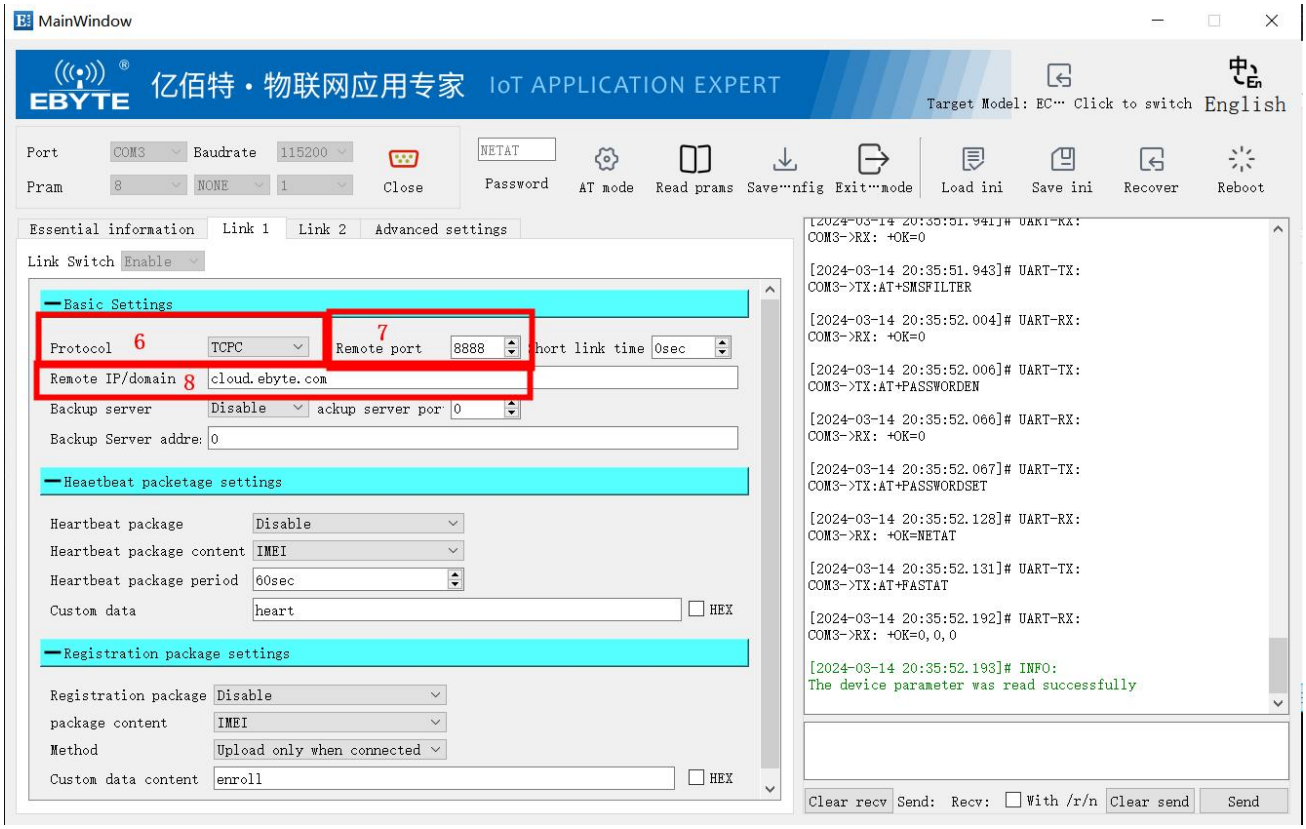
5、Click "Read Parameters"



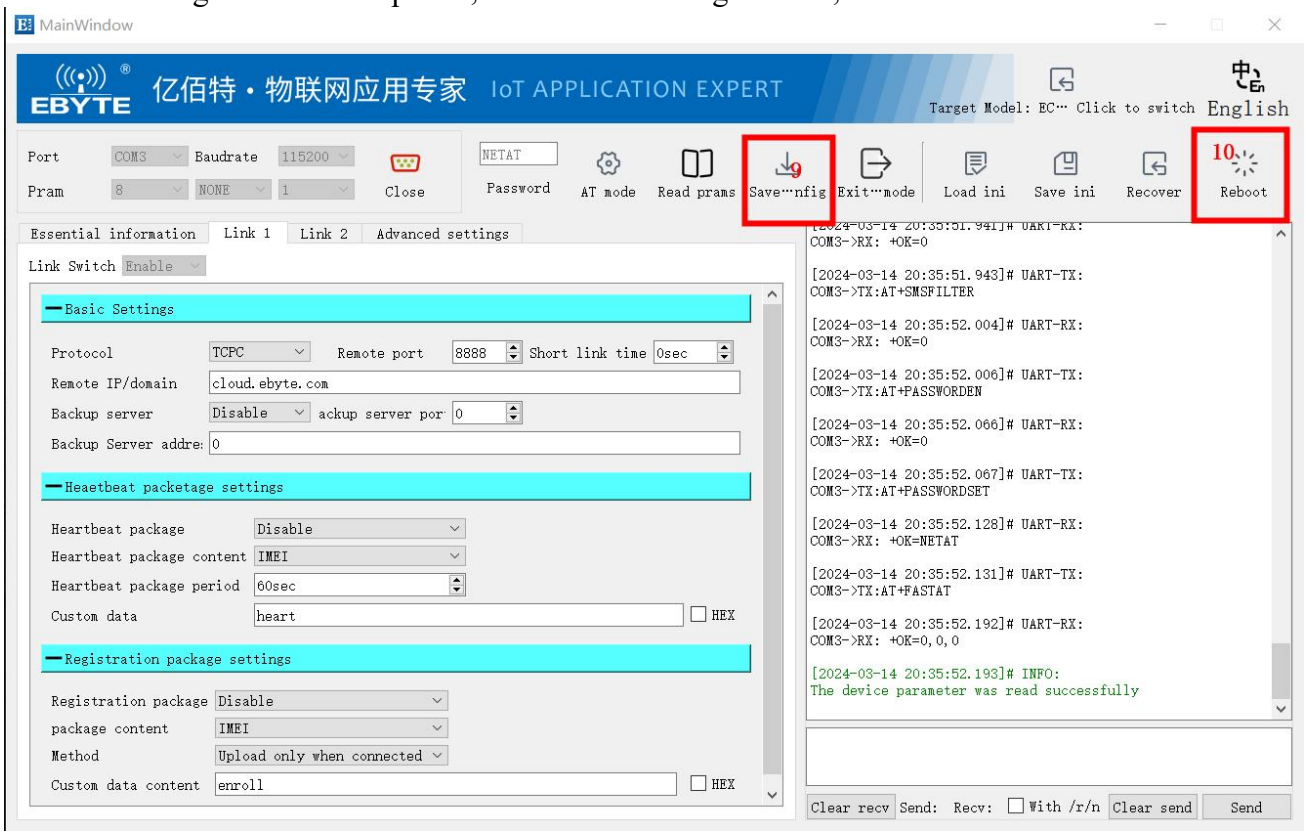
6、Select "Link 1" and configure the link "Connection Type". Here we take TCPC (TCP Client) as an example;

7、Set the server "target port";

8、Set the "server address" (target IP or domain name, the domain name can be up to 128 bytes), here we take a special test server as an example, target IP: cloud.ebyte.com; target port: 8888; function: send arbitrary data to the server , will receive any data back.

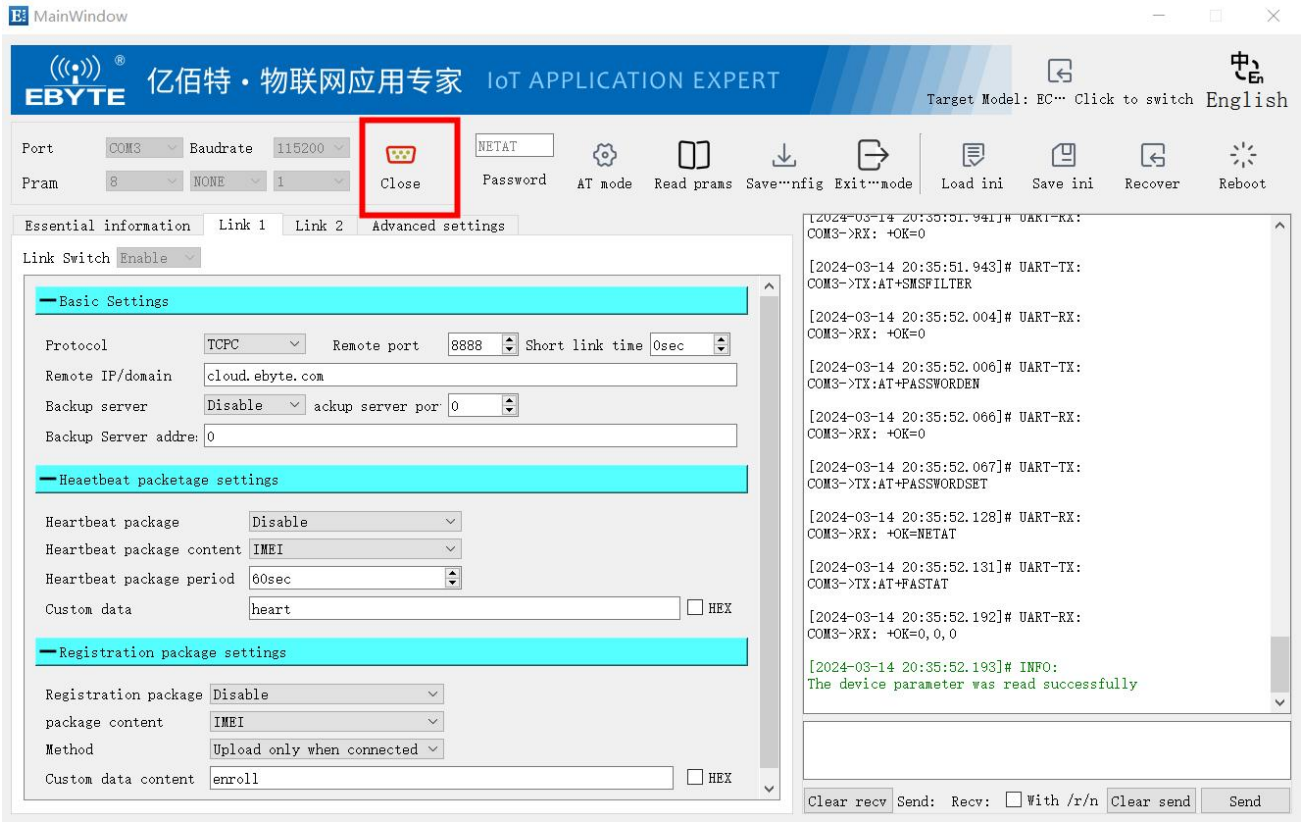


9、After the configuration is completed, click "Save Configuration";



10、Click "Restart Device" and the parameters will take effect after restarting.

11、Click "Close Serial Port"

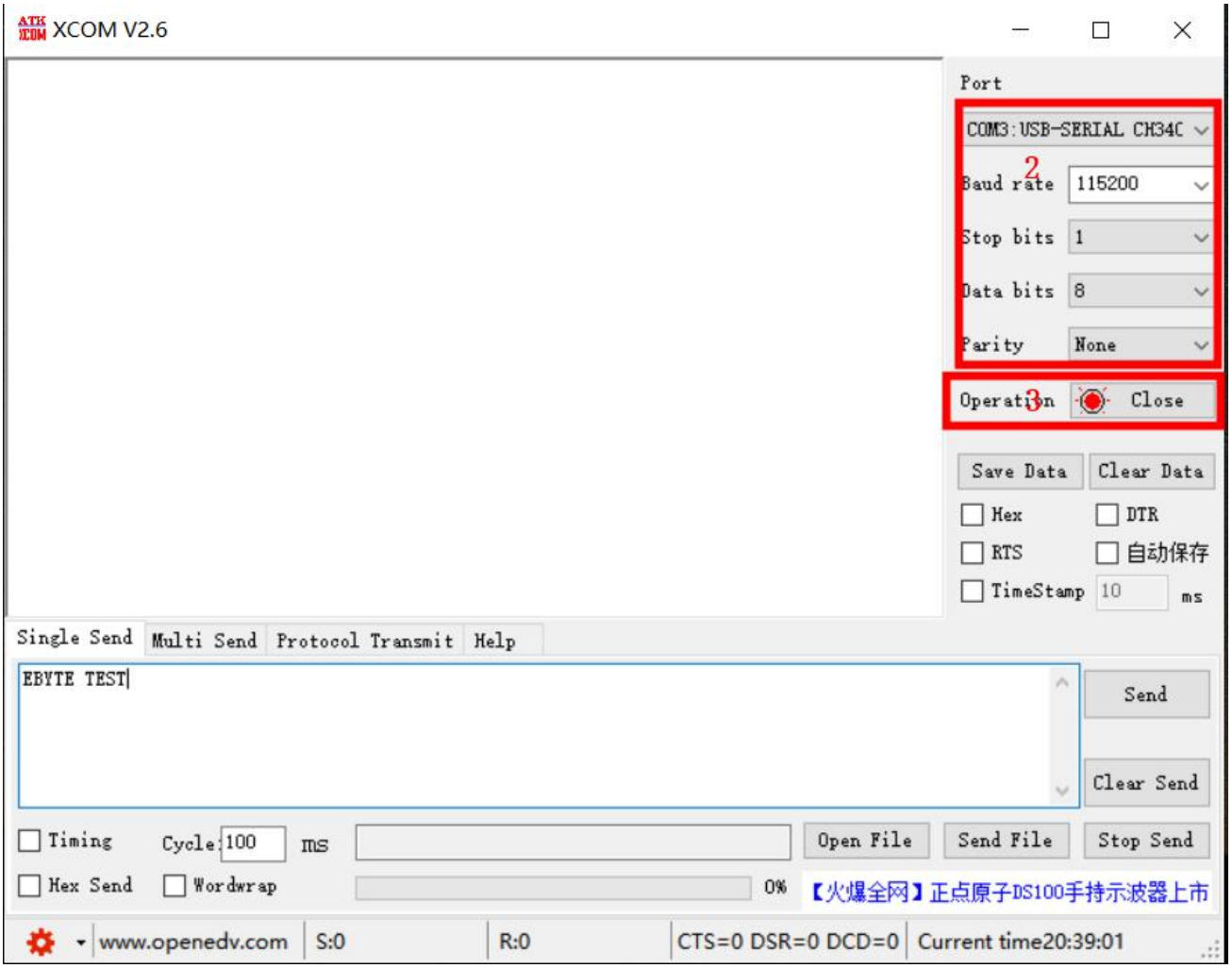


2.3 Communication test

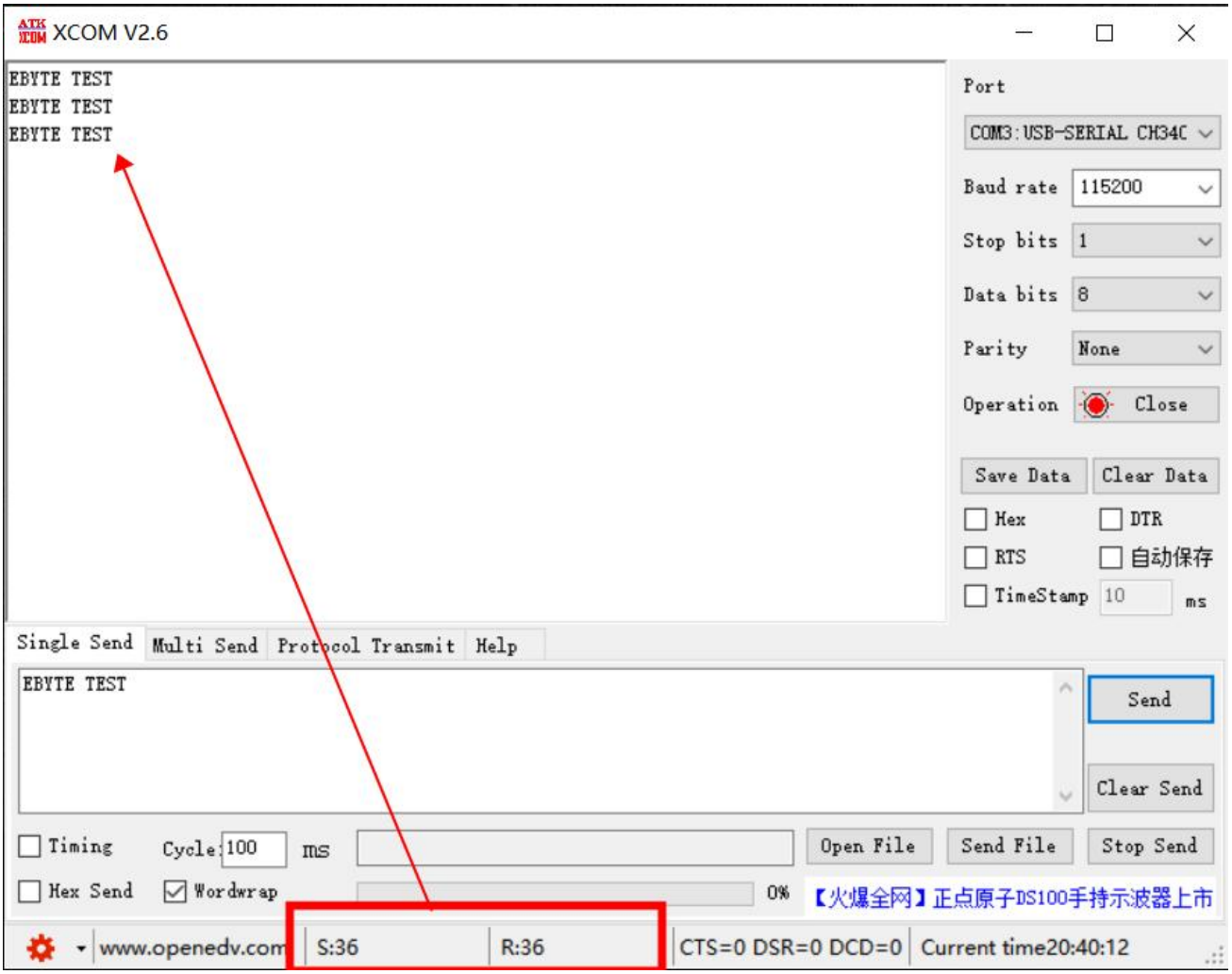
Note: This site is connected to the test server provided by Ebyte, which provides a backhaul service. Therefore, during the test, after the LINK light turns on, any data can be sent to the module, and the module will forward it to the server, and then the server will Use the original link to return the data to the module serial port to realize bidirectional transmission of data between the module and the server.

1. Double-click to run XCOM V2.6

2. Select the serial port number of the current module connection, and select the correct baud rate, stop bit, data bit, and check bit (default 115200/1/8, N)
3. Open serial port



4. Send any data and you can see the data returned in about a second.



5. Finished test

3 Product Features

3.0 Data transparent transmission mode

In this mode, the user's serial port device can send data to the designated server on the network through this module . The module can also accept data from the server and forward the information to the serial device.

Supports 2- way Socket independent configuration.

This product supports TCP client (TCPC), UDP client (UDPC), TCP server (TCPS), and UDP server (UDPS) transparent transmission communication .

(TCPS and UDPS require the support of the APN card, and ordinary IoT cards cannot use server mode)

Users do not need to pay attention to the data conversion process between serial port data and network data packets. Through simple parameter settings, transparent data communication between the serial port device and the network server can be achieved.

Quick steps:

1、Select the corresponding link

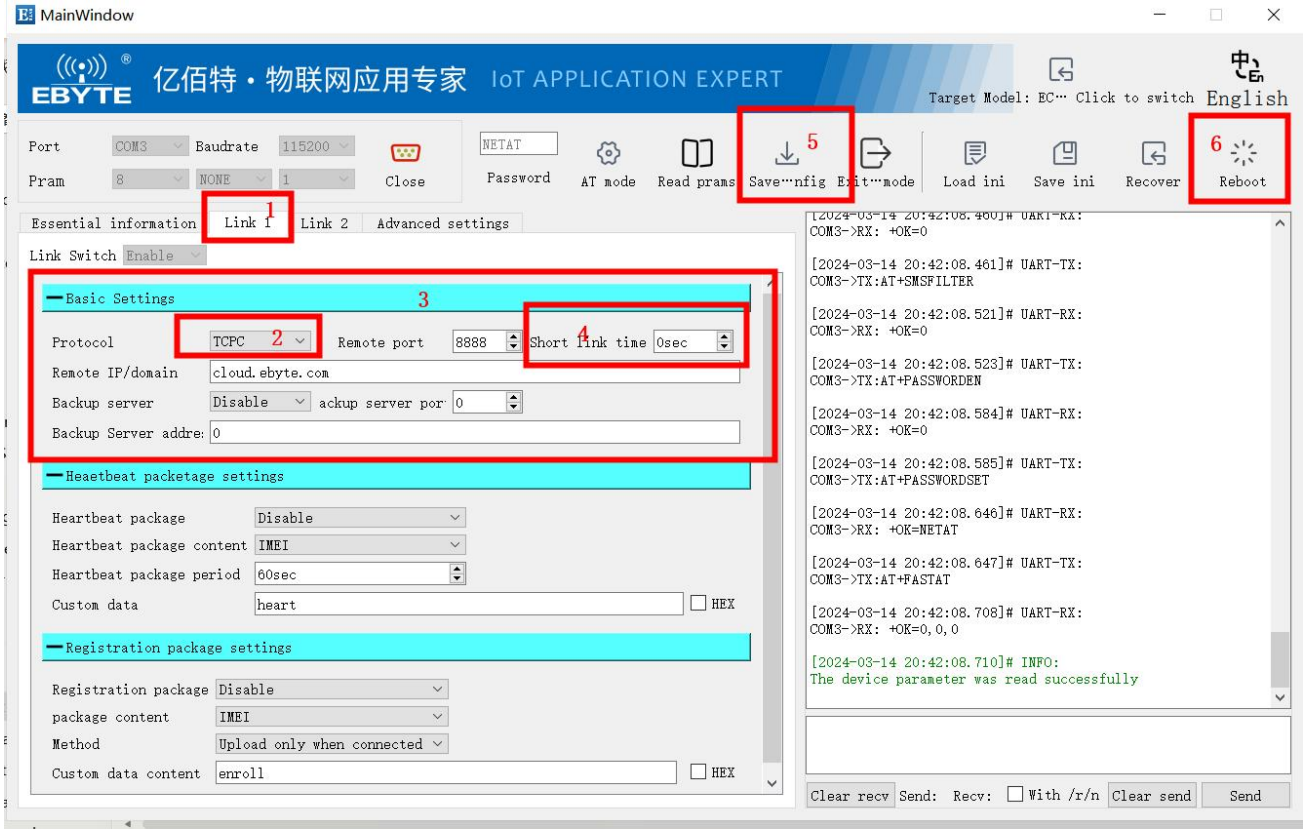
2、Configure connection type

3、Enter the target address/domain name and target port to set up a backup server

4、If you need to set a short connection, set the short connection time (0 means long connection)

5、Click to save configuration

6、Click to restart the device



the module is connected to the network, it can automatically connect to the set server.

3.1.1 Heartbeat packet

Heartbeat packets support network heartbeat packets and serial port heartbeat packets. Network heartbeat packets are sent to the server, and serial port heartbeat packets are sent to the serial port.

Network heartbeat packet

In network transparent transmission mode, users can choose the module to send network heartbeat packets. The main purpose of sending to the network is to maintain activity with the server and allow idle modules (which will not send data to the server for a long time) to maintain connections with the server.

When data is uploaded to the serial port, the content of the heartbeat packet will no longer be sent, and the timing will start from the idle time. When the heartbeat time is up, the heartbeat data will be sent to the server.

The data of the heartbeat packet can be ICCID code, IMEI code , SN or custom registration data (HEX and ASCII are supported to configure custom heartbeat packets, ASCII can be configured with a maximum of 64 bytes , and HEX can be configured with a maximum of 32 bytes).

The heartbeat packet function only takes effect in TCPC, MQTTC, and HTTPC modes, and does not take effect in short connection mode.

PC software configuration steps:

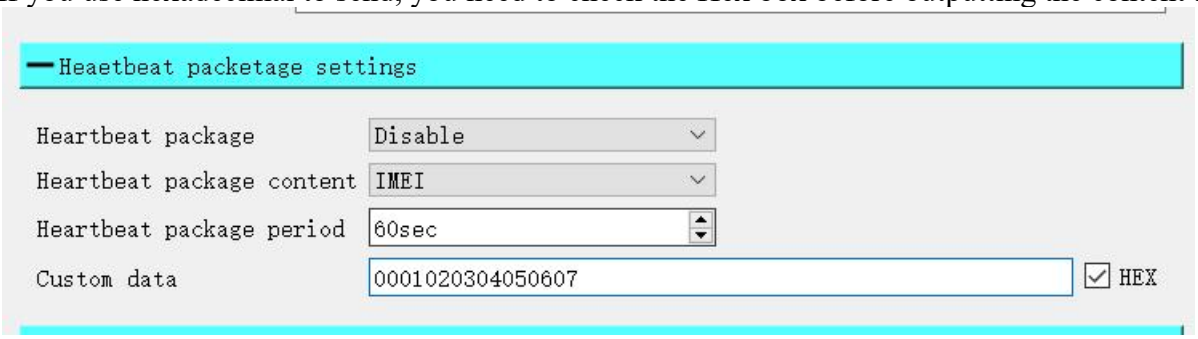
1、Select the heartbeat packet switch to turn on.

2、Select heartbeat packet content .

3、Customizing the heartbeat package requires writing the content of the heartbeat package (if there is none, omit it. After selecting IMEI and ICCID, the custom data will not take effect) .

4、Set the heartbeat packet time (unit: seconds)

5、If you use hexadecimal to send, you need to check the Hex box before outputting the content .



Serial heartbeat packet

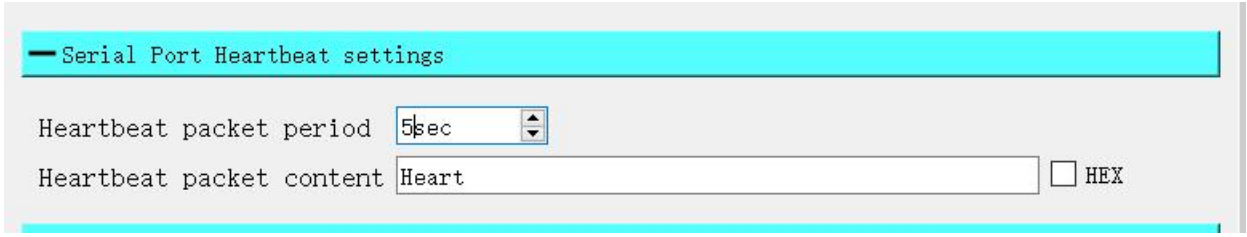
Users can set the serial port heartbeat packet to poll the serial port data, and can customize the heartbeat data.

PC software configuration steps:

1、Set the heartbeat packet time (unit: seconds , time 5-300 seconds)

2、Set heartbeat packet data

3、If you use hexadecimal to send, check the Hex check box (ASCII can be configured up to 64 bytes , HEX can be configured up to 32 bytes) .



3.1.2 Registration package

In network transparent transmission mode (TCPC/UDPC), users can choose to have the module send a registration package to the server. The registration package is to allow the server to identify the source of the data, or as a password to obtain server function authorization. The registration packet can be sent when the module establishes a connection with the server, or the registration packet data can be spliced at the front end of each data packet as the header of a data packet. The data of the registration package can be ICCID, IMEI or customized registration data (customized registration package can be configured in HEX and ASCII, ASCII can be configured with a maximum of 64 bytes , and HEX can be configured with a maximum of 32 bytes).

PC software configuration steps:

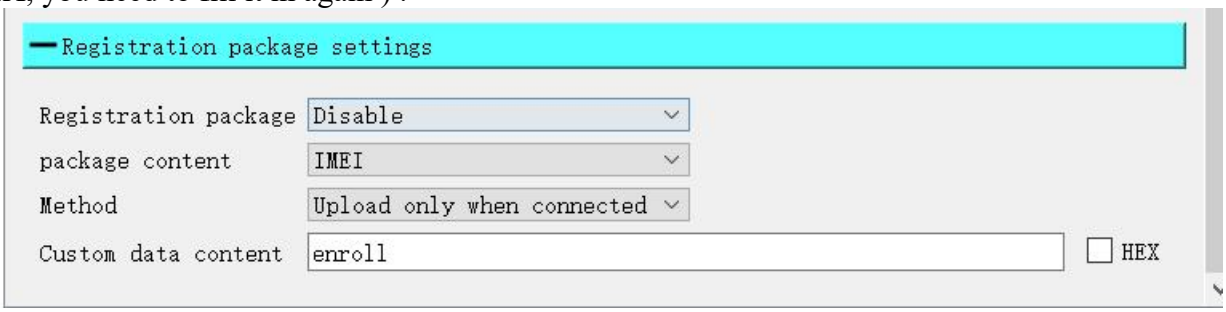
1、Select the registration package switch to turn it on.

2、Select the registration package content (ICCID, IMEI or custom registration data) .

3、Set the registration packet sending method (sent as a data header or connection).

4、If sending in hexadecimal, check the Hex check box .

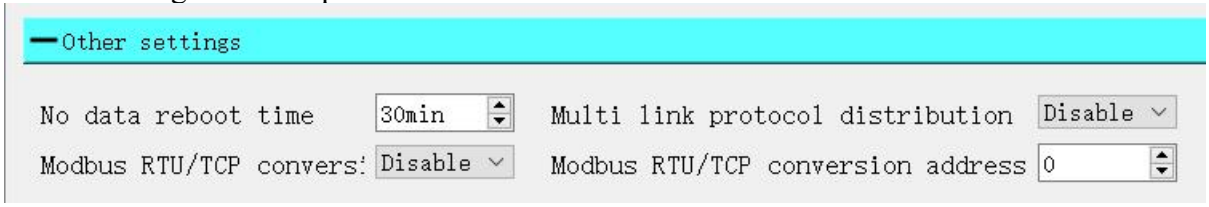
5、Customize the registration package and write the registration package content (if you choose HEX, you need to fill it in again) .



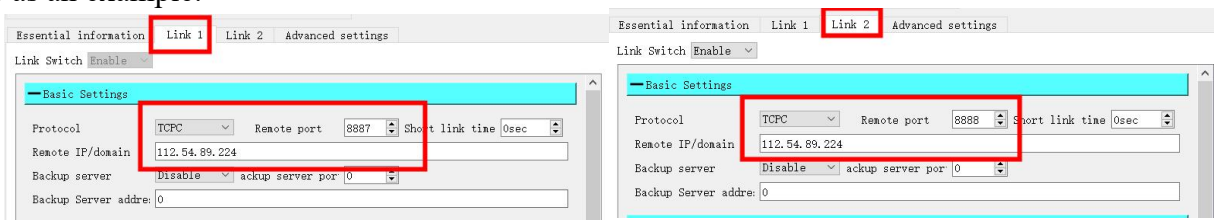
3.1.3 Multi-link protocol distribution

Supports socket distribution protocol. Data can be sent to different Sockets through specific protocols, and data received by different Sockets can also be distinguished by adding headers and tails.

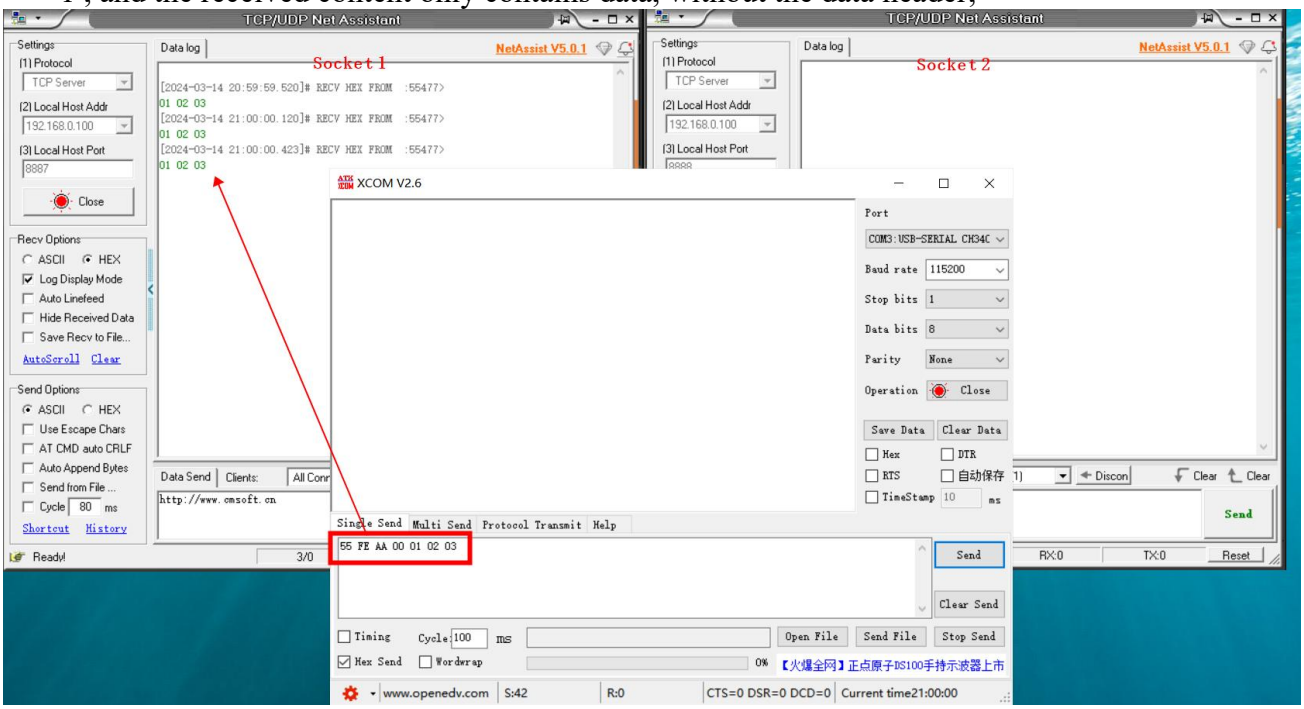
PC software configuration steps:



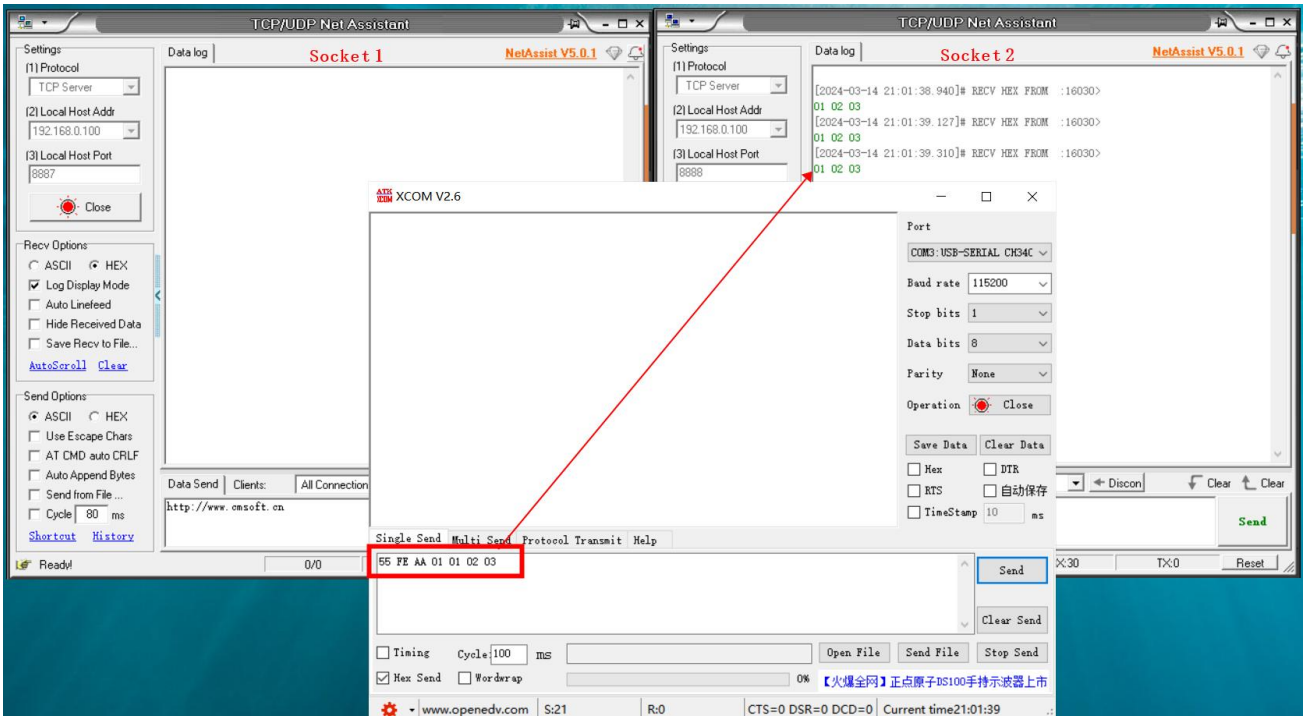
After turning on the multi-link protocol distribution mode, there are the following possibilities. Here we take Socke t1 connected to the server port 8887 and Socke t2 connected to the server port 8888 as an example:



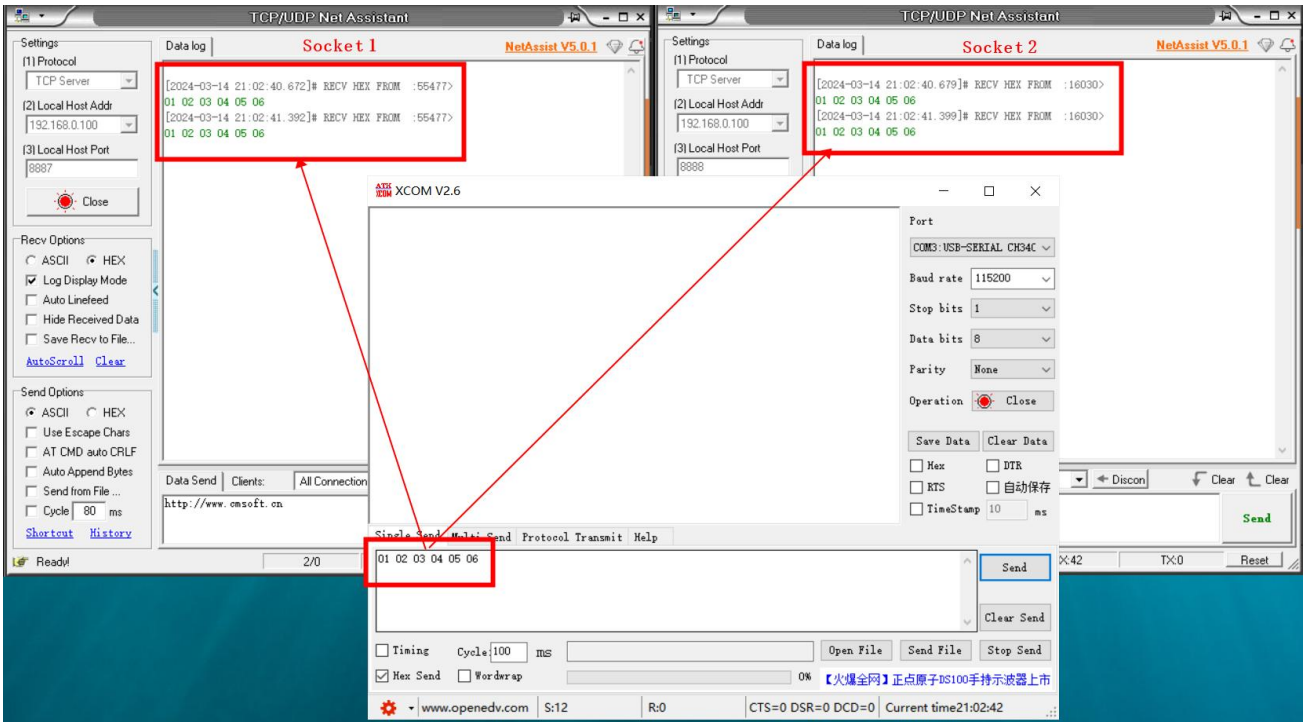
1. The serial port sends data if the data header is 55 FE AA 00, which means it meets the requirements, that is, 55 FE AA 00 + data, then the data will only be transmitted to Socket 1 , and the received content only contains data, without the data header;



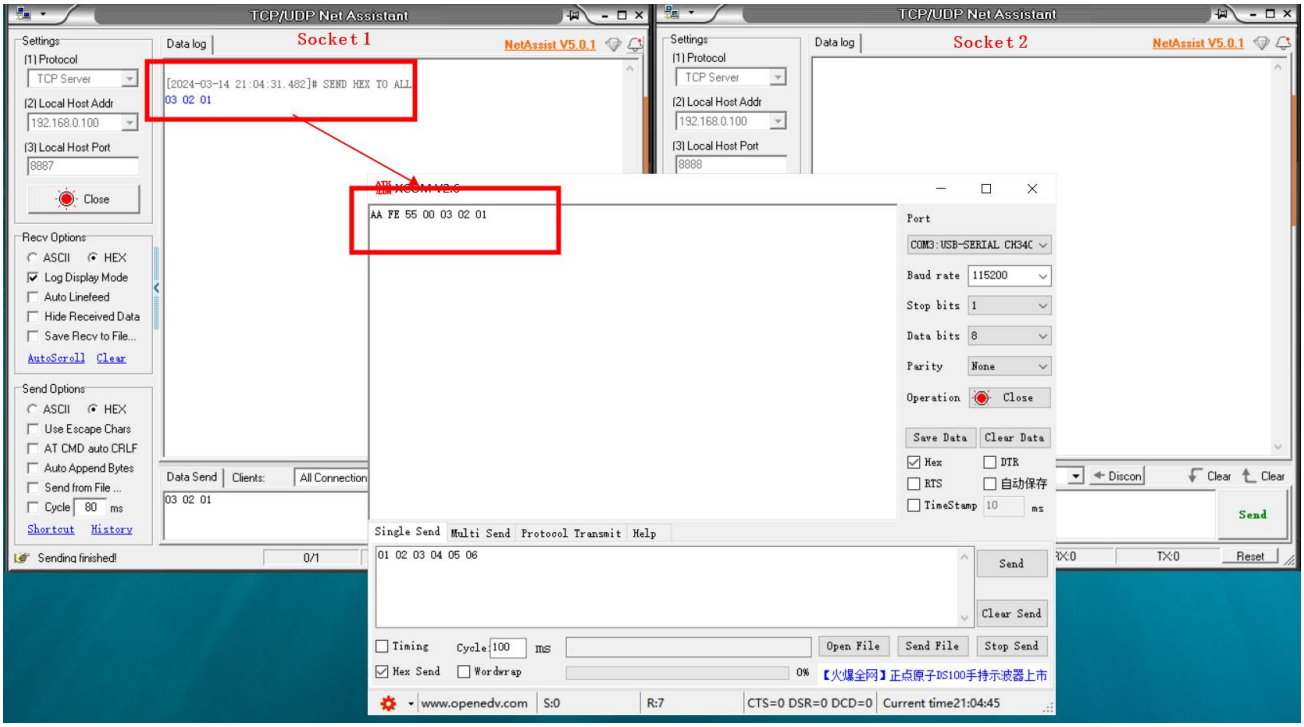
2. The serial port sends data if the data header is 55 FE AA 01, which means it meets the requirements, that is, 55 FE AA 01+data, then the data will only be transmitted to Socket 2 , and the received content only contains data, without the data header;



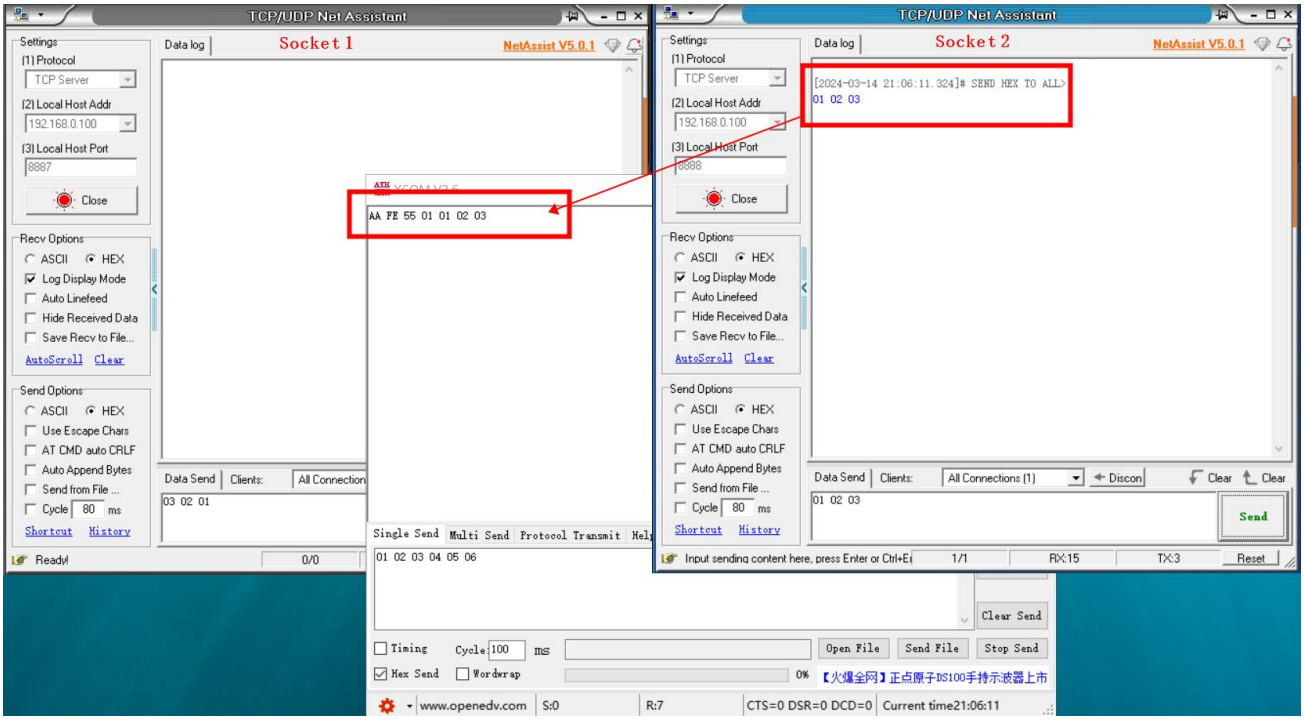
3. The data sent by the serial port is arbitrary data, and the data will be transmitted to two Sockets.



4. Socket 1 sends any data. After the serial port receives it, it will add the data header AA FE 55 00 before the data.



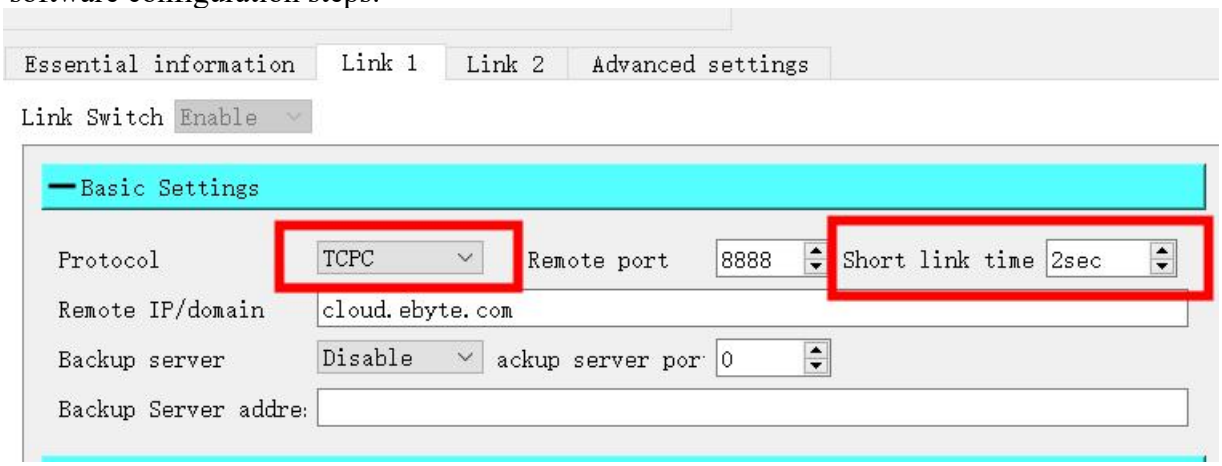
5. Socket 2 sends arbitrary data. After the serial port receives it, it will add the data header AA FE 55 01 before the data.



3.1.4 Short connection

When set to a short link, a connection will be established with the server only when data is sent. When there is no data transmission, the timer will start. After the set time is exceeded, the connection with the server will be disconnected. The short connection time can be configured up to 6 5535 s . This setting only takes effect in TCPC mode .

PC software configuration steps:

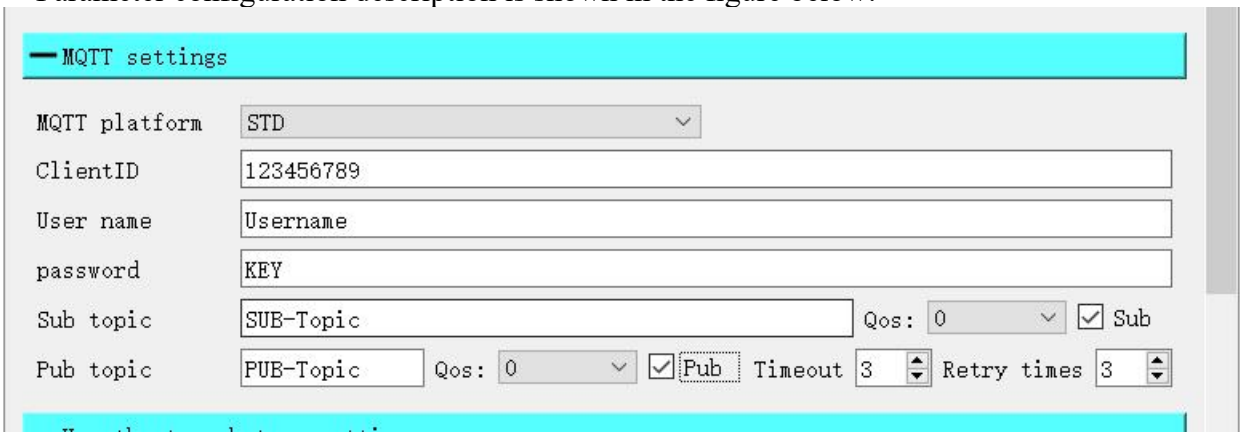


3.2 MQTT mode

3.2.1 Standard MQTT3.1.1 connection

The standard M QTT3.1.1 connection here takes Tencent's standard M QTT 3.1.1 server as an example. The "three elements" of the standard description can be obtained from the Tencent server as shown in the figure below:

Parameter configuration description is shown in the figure below:



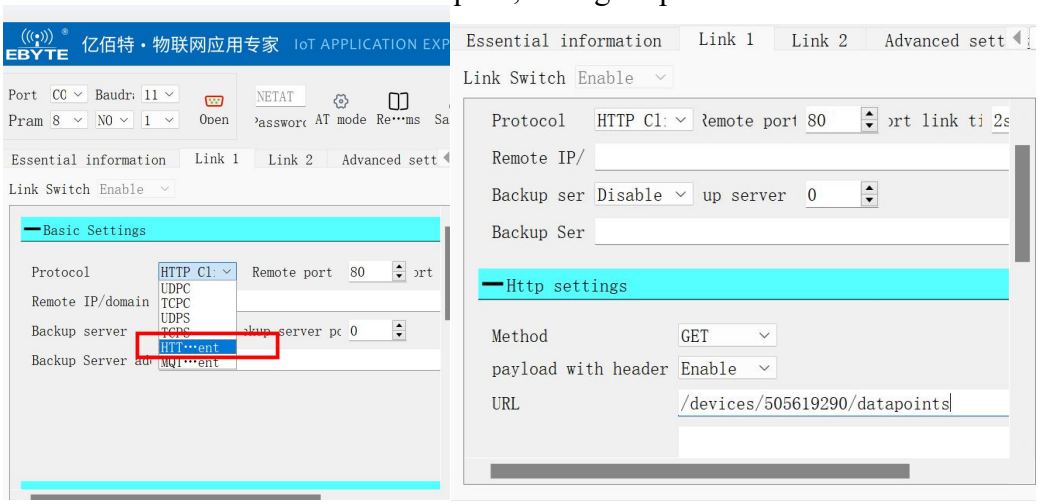
Configure the corresponding subscription publishing address, and use the platform online debugging to send data for communication testing:

3.3 HTTP mode

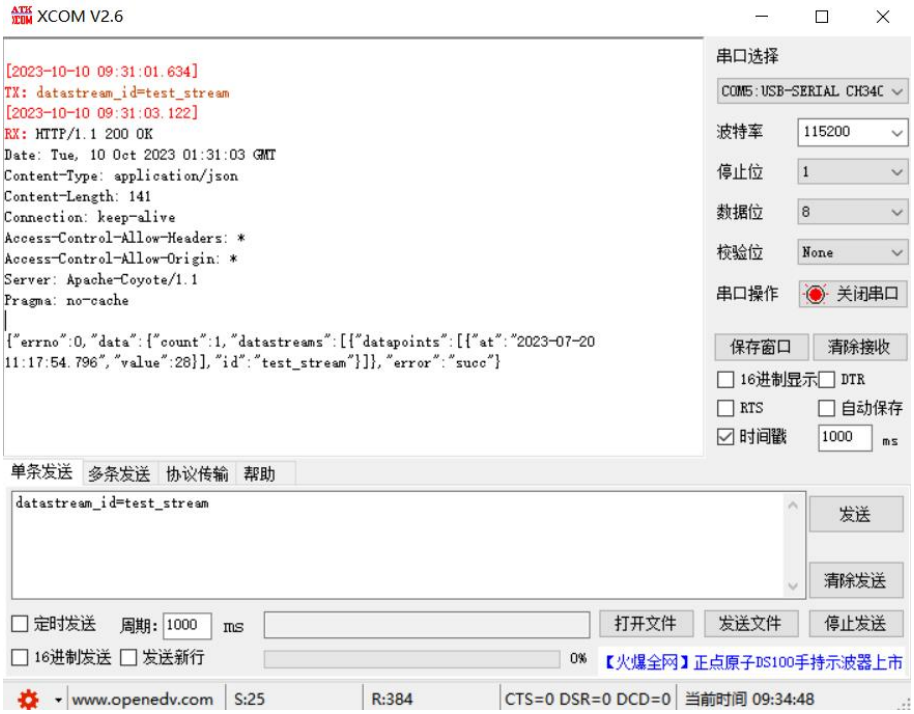
The module supports access to the HTTP server as an HTTP client, and supports data interaction in the form of POST and GET.

3.3.1 GET request

Use HTTP server to test HTTP -GET request, configure parameters as shown below.

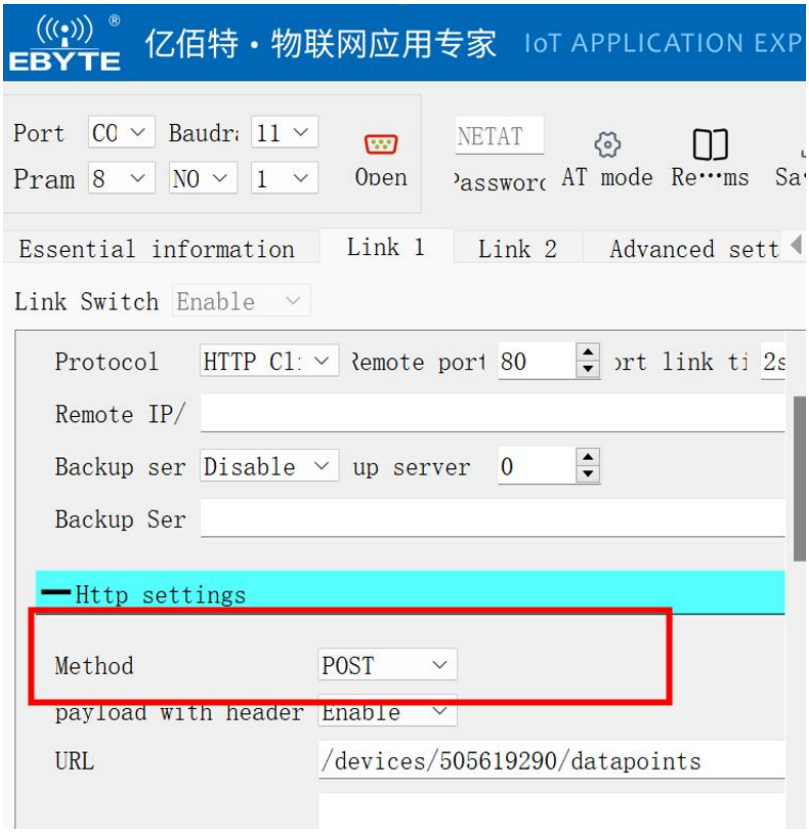


Return parameters after sending request via serial port

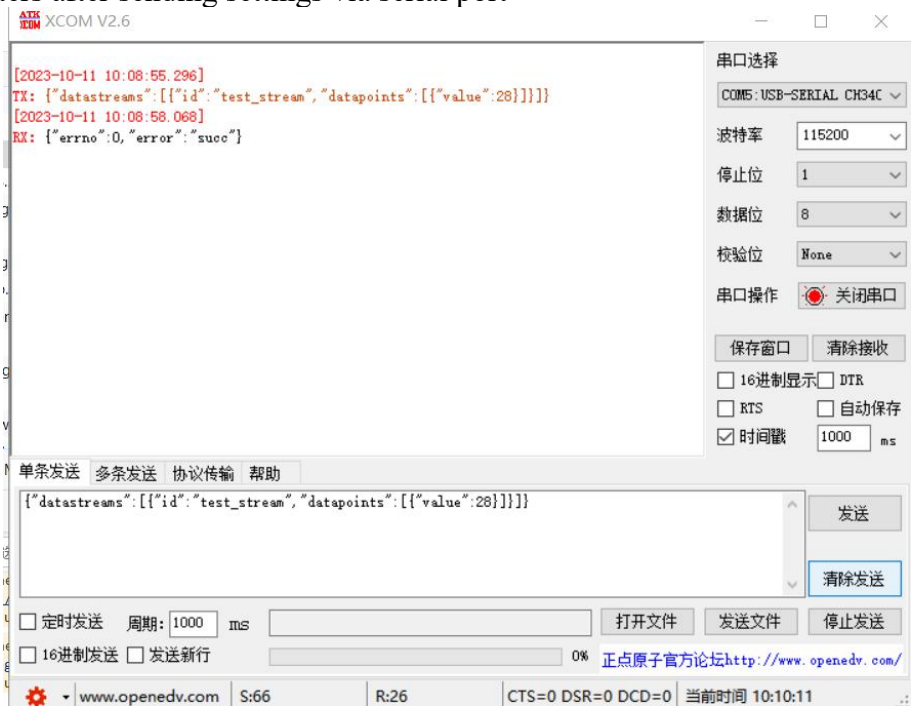


3.3.2 POST request

Use HTTP server to test HTTP - POST request, configure parameters as shown below.



Return parameters after sending settings via serial port



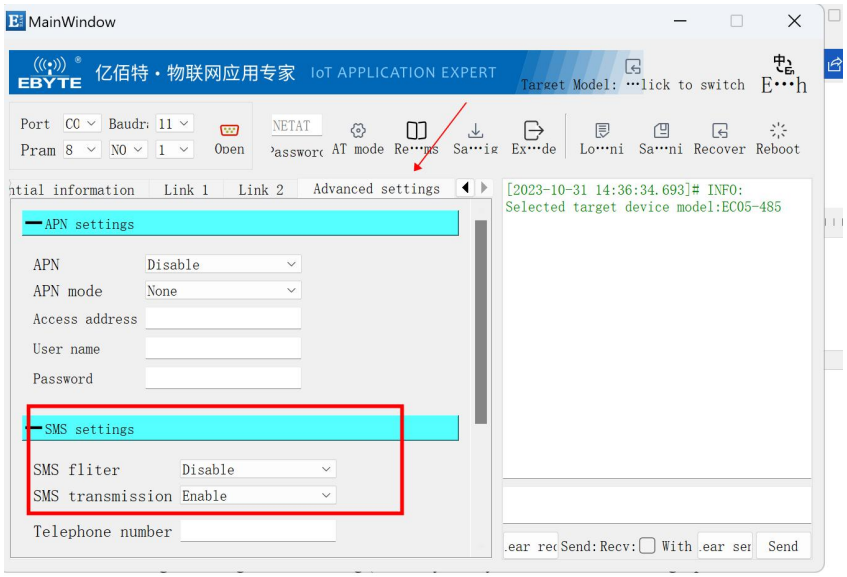
3.4 SMS transparent transmission mode

In this mode, the data received by the serial port will be sent to the target phone number through SMS, and the content of the SMS sent to the module phone number will be transparently transmitted to the serial port output.

PC software configuration steps:

1、Check the box to enable SMS transparent transmission .

2、Set the SMS target phone number (if you only want to receive SMS messages, no need to set it) .
3、Check the message receiving number filtering (check if you only receive data from the target phone number) .

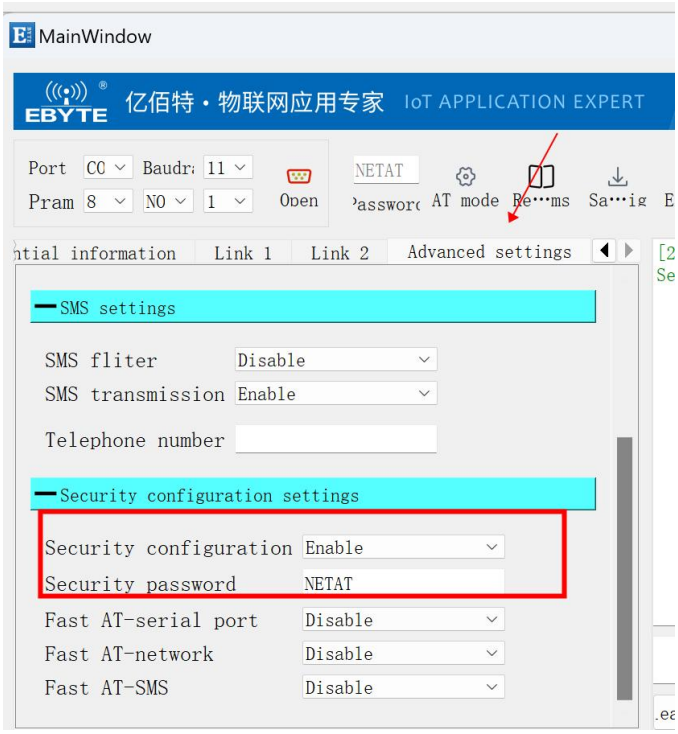


3.5 Security configuration

Users can set a secure configuration password to enter the configuration or read parameter state. Users are required to perform password verification operations. Only after the passwords match successfully can parameter configuration be performed. If the login password is not sent within 30 seconds or the wrong password is sent, the module will automatically exit the configuration state.

PC software configuration steps:

1、Check the command mode security verification .
2、Set a secure password (0-32 bytes)
3、Save configuration
4、Reboot the device



When entering the configuration, send +++, then send AT+PASSWORDSET=NETAT . After returning OK, you can continue to send other instructions.

3.6 Quick AT command

The fast AT command allows users to modify the device configuration through a single piece of data information through the serial port, network, and SMS, without the need to switch to command mode through "+++", which is convenient and fast.

PC software configuration steps:

1、Turn on the fast AT command enablement, and you can choose to turn on fast serial port AT, fast network AT, and fast SMS AT .

2、Save configuration

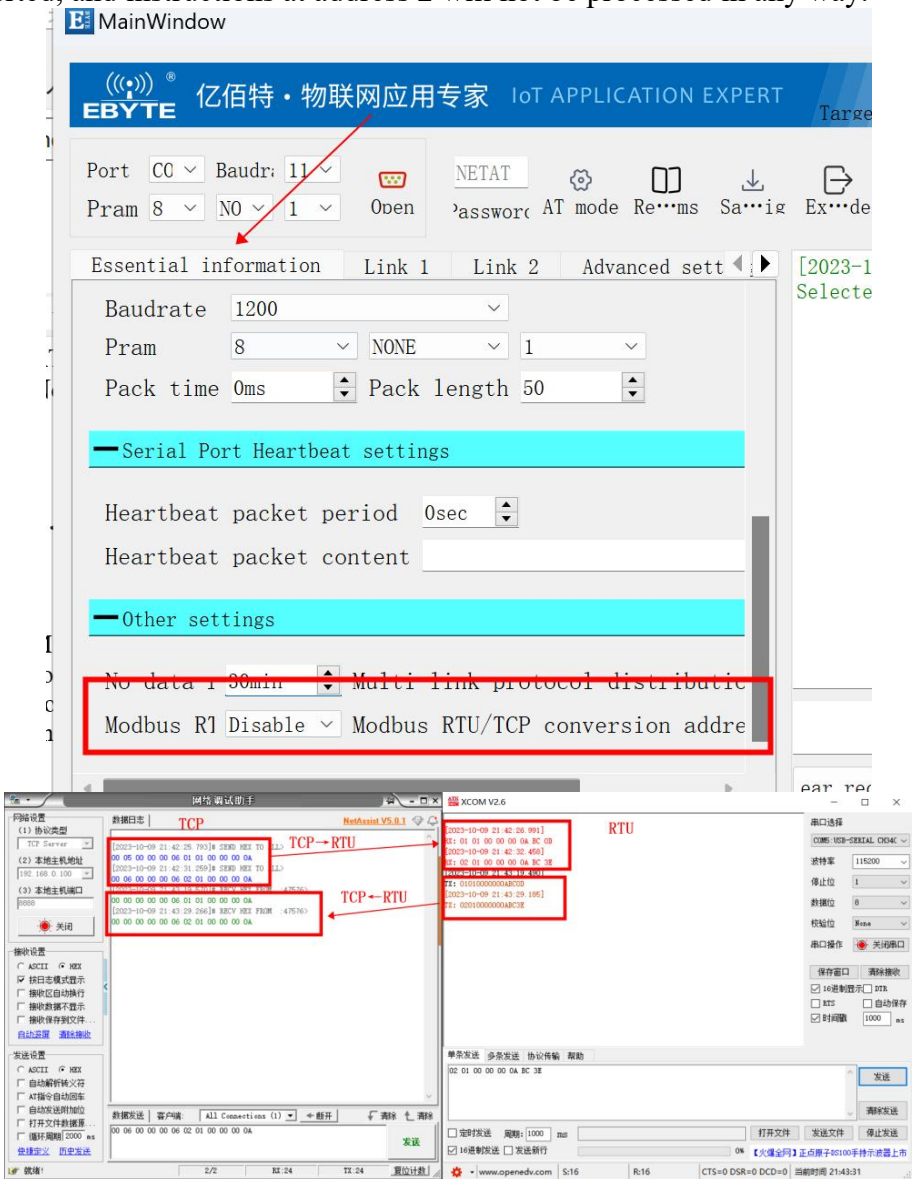
3、Reboot the device

4、To send AT commands through the serial port, network, or SMS, you need to add the security password and keywords before the AT command (for example, the security password is "NETAT*",

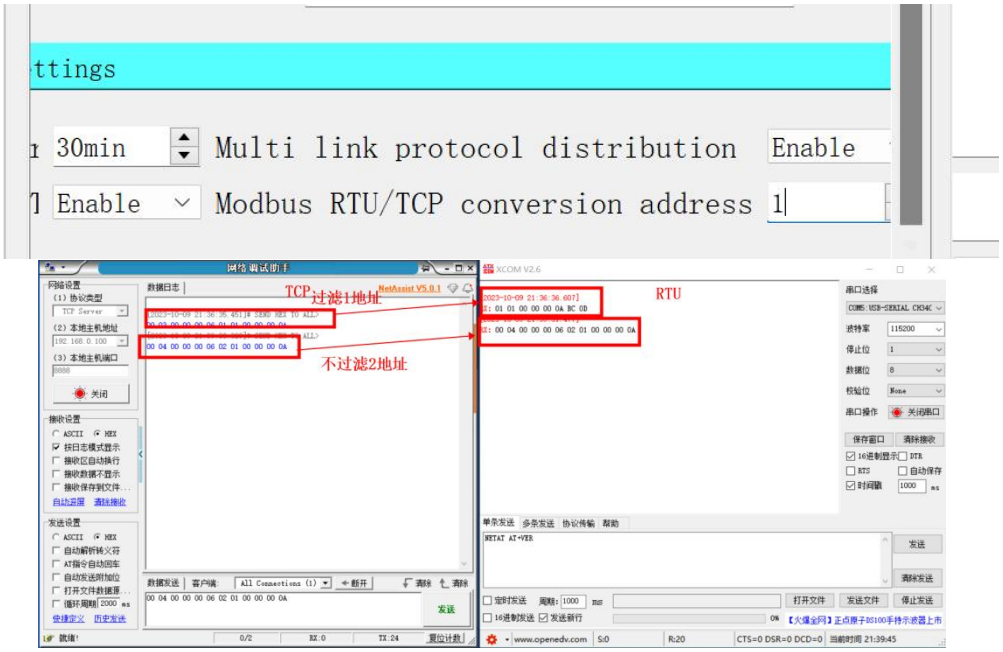
and when sending the AT+VER command, you need to send NETAT*AT+VER). For details, see AT command manual.
Note: The AT command here needs to add a carriage return as the end character .

3.7 ModBus TCP to RTU

This function can be enabled by checking TCP Modbus. This function realizes mutual conversion between Modbus RTU data sent and received by the serial port and Modbus TCP data sent and received by 4G. Setting the conversion address can specify the corresponding device address to be converted. 0 means converting all addresses. For example, if it is set to 1, only address 1 will be converted, and instructions at address 2 will not be processed in any way.



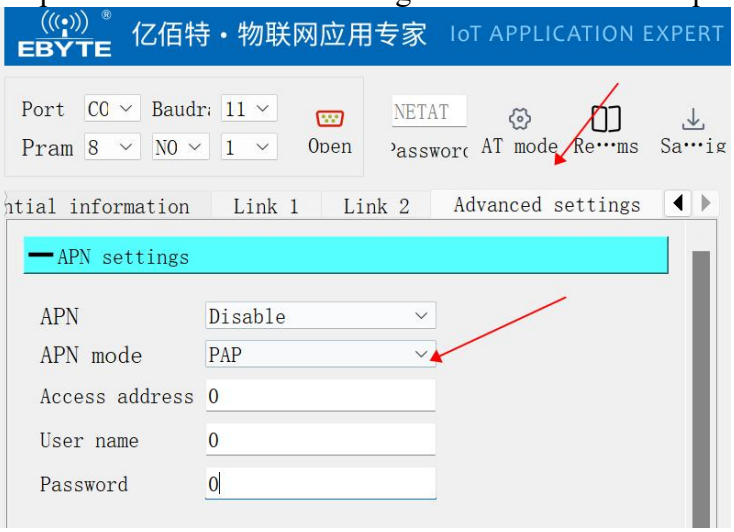
Convert all addresses



Only convert 1 address

3.8 APN access point

The module APN access point can be modified through AT commands . Requires APN card support .



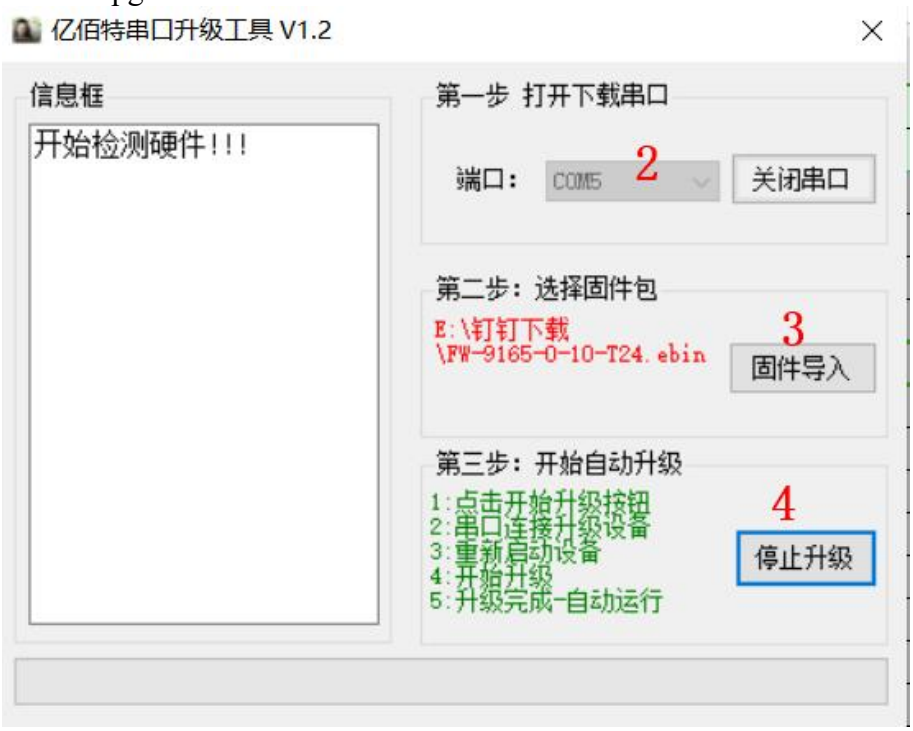
3.9 Serial port upgrade function

Firmware upgrade is achieved by switching the firmware through the serial port and performing the upgrade .

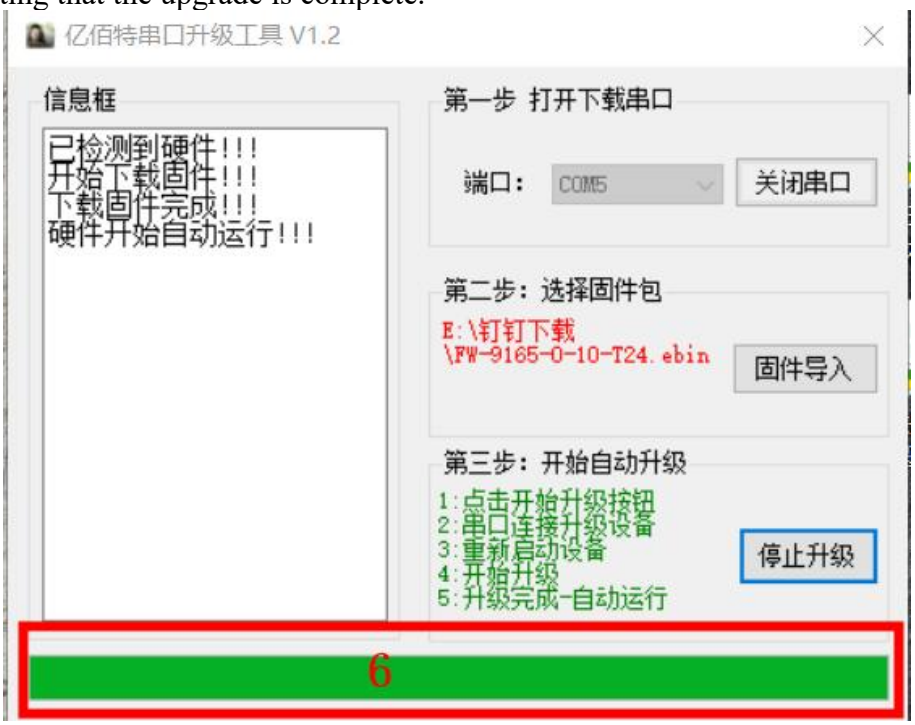
The upgrade steps are as follows:

1. Double-click to run the Ebyte firmware burning tool

2. Select the download serial port and open the serial port
3. Import firmware package
4. Click to start the upgrade



5. Unplug the power jumper cap on the test board to power off the module. Then press and hold the Reload button on the test board (or pull down the module Reload pin) to power on. The other LED lights except PWR flash to indicate that the upgrade has started.
6. When the progress bar below the software is completed, you can close the software, indicating that the upgrade is complete.

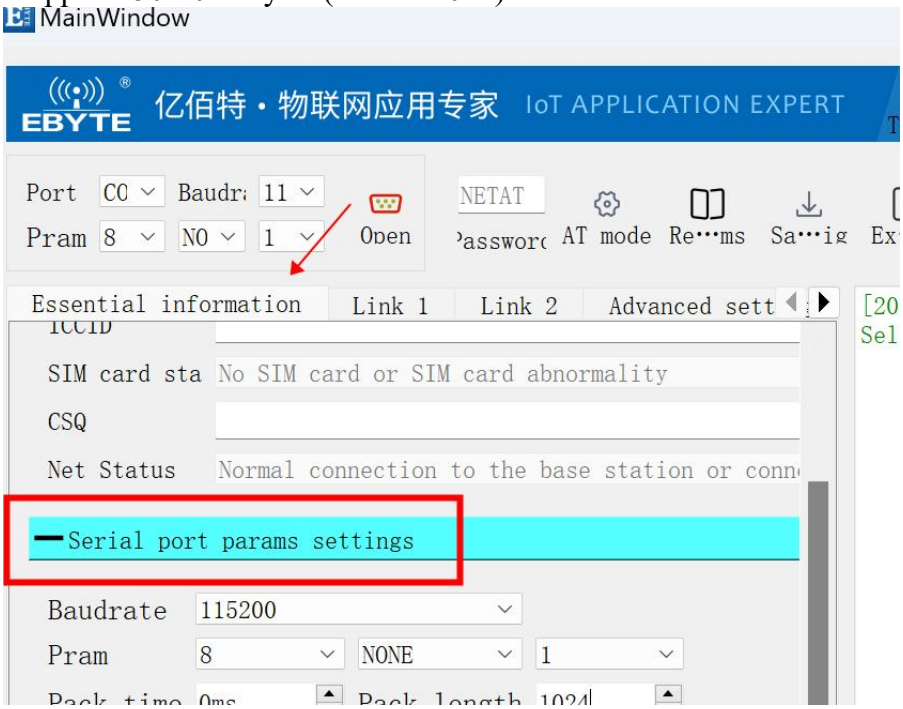


3.10 Hardware factory reset

Restore the factory default parameters. After powering on, press the test board RELOAD key (or pull down the RELOAD pin of the module) for 5 ~ 6 seconds until all LEDs light up, and then release it to restore the module parameters to the factory default parameters, and the module will automatically restart.

3.11 Serial port parameter settings

Serial port baud rate supports 1200/2400/4800/9600/19200/38400/57600/115200/230400
Data bits support 8 bits
Stop bit supports 1/2 bits
Packaging time supports 0-1024 (unit: ms, 0 is automatic)
Packet length supports 50-1024 bytes (default 1024)



There are two situations when the serial port is packaged into frames. The first is time-triggered framing, and the second is length-triggered framing.

Time-triggered framing: When receiving data from UART, the interval between two adjacent bytes will be continuously checked. If the interval time is greater than or equal to a certain "time threshold", it is considered that a frame has ended, otherwise data will be received until it is greater than or equal to the set packaging length bytes. Send this frame of data to the network as a TCP or UDP packet. The "time threshold" here is the packaging interval. The settable range is 0 ms~ 1024 ms. The factory default is 0ms , which is automatic recognition .

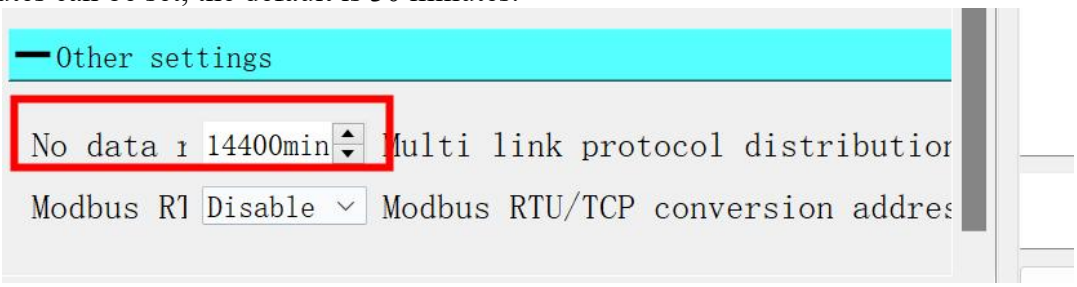
Length-triggered framing: When receiving data from the UART, the length-triggered mode will continuously check the number of bytes received. If the number of bytes received is equal to a certain "length threshold", it is considered that a frame has ended, otherwise it will wait for the end of the packaging time. Send this frame of data to the network as a TCP or UDP packet. The "length threshold" here is the packaging length. The settable range is 5 0 ~ 1024 . Factory default 1024

3.12 NTP time acquisition

The module supports NTP time acquisition, which can be obtained through the host computer or AT command. The acquisition command is AT+NTP. The return value is such as 2022.12.31,12:25:35.

3.13 Restart without data

In order to prevent the module from working abnormally after working for a long time, you can set the no-data restart time. When the module does not receive the server downlink data, when the no-data restart time is reached, the module will automatically restart to ensure stable operation, 0-14400 minutes can be set, the default is 30 minutes.



4. Important statement

- Ebyte reserves the right of final interpretation and modification of all contents in this manual.
- Due to the continuous improvement of product hardware and software, this manual may be changed without prior notice. The latest version of the manual shall prevail.
- Users of this product need to go to the official website to pay attention to product updates so that users can obtain the latest information on this product in a timely manner.

Revise history

Version	Revision date	Revision Notes	Maintenance man
1.00	2023-12-14	initial version	LYL

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