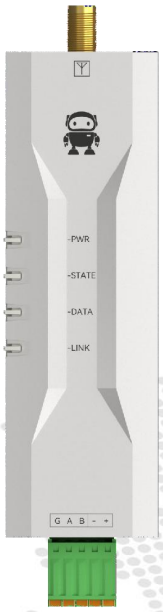
Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



E840-DTU(EC05-485)E

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Chapter 1 Product Overview

1.1. 1Product introduction

E840-DTU (EC05-485)E is a small-sized 4G DTU developed by Chengdu Ebyte Electronic Technology Co., Ltd. using 4G CAT1 technology, available for Asia-Pacific region, Australia, New Zealand and other regions. It has small size, high speed and low latency, low cost and easy to use. By simple configuration, it can realize the serial port device networking function (two-way transparent transmission between the serial port device and the network server). The product uses 2.54 spring crimp terminals and supports installation on guide rails and positioning holes. It can also realize the serial port networking process, which is very convenient to integrate into Internet of Things projects.

The device with a small guide rail installation type is compact and easy to install. Through simple configuration, this device can be easily used to realize transparent two-way data transmission from the serial port to the network.

The device supports two links and MQTT protocol , making it easy to implement IoT applications.

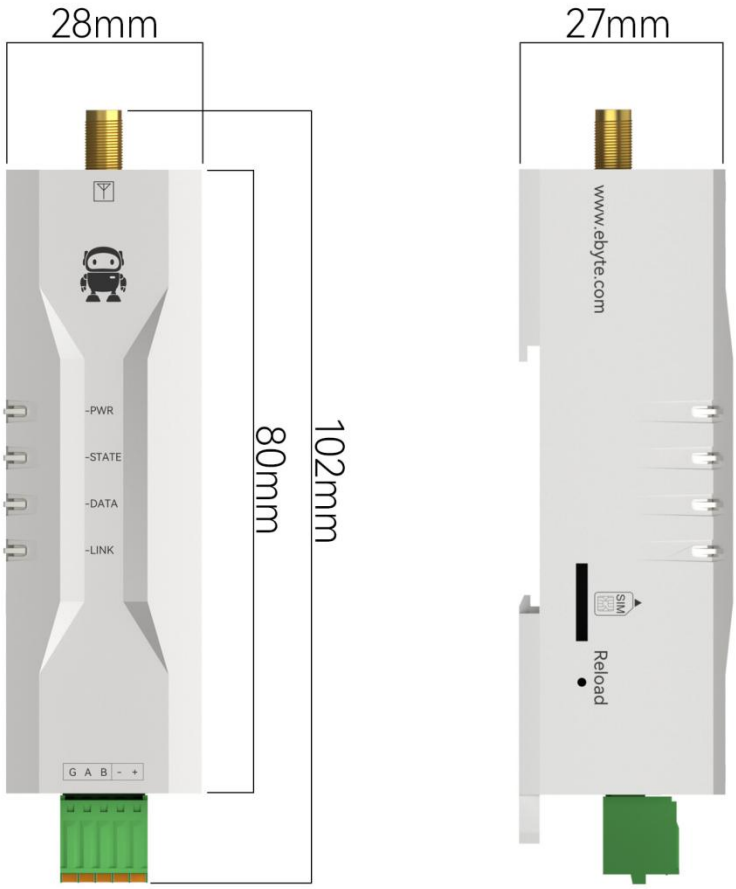
1.2. Features

- Adopts 4G CAT1 solution with millisecond-level latency to meet various data transmission application scenarios ;
- Support 4G full network;
- Support transparent data transmission;
- Support TCP, UDP, MQTT, HTTP network protocols;
- Support connection to standard MQTT3.1.1 servers;
- Support heartbeat package and registration package;
- It can transmit and receive from two Socket links simultaneously, each Socket available for master and backup connection information settings;
- Support automatic switch between Modbus RTU and Modbus TCP;
- Support fast AT commands;
- Available for network, serial port, and SMS AT command configuration;
- Support configuration of security mechanisms, and password can be set by user self;
- Computer-side parameter configuration software is convenient and flexible;
- Support network and SMS data transparent transmission, and support phone number filtering;
- The device supports restart without data and reconnection after disconnection;
- Support APN;
- Support 8-28V wide voltage power supply, suitable for various application scenarios;
- Small size, supports guide rail + positioning hole installation;
- Adopt V0 grade flame retardant plastic shell.

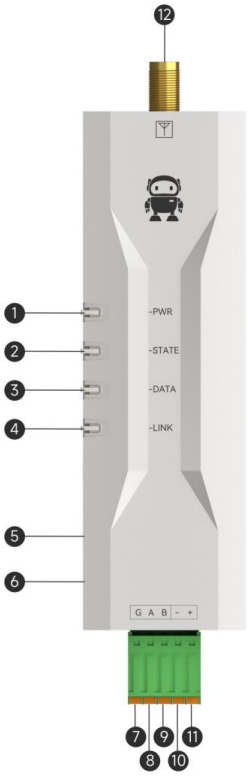
1.3. System parameters

Parameter	Value	Description
Characteristic parameters	Support frequency band	LTE-FDD: B1/B3/B5/B7/B8/B20/B28
	Network protocol features	Support TCP/UDP/ MQTT/HTTP/DNS protocols
	RF interface	SMA -K (external thread internal hole)
Hardware features	Data interface	RS485 (2.54 spring terminal)
	Baud rate	1200-230400 , default 115200 bps
	Data bits	8 (default)
	Stop bit	1 (default), 2
	Check Digit	None (default), Odd, Even
	Operating Voltage	DC 8V - 28V _
	Operating temperature	-40～+85℃
	Dimensions	80*28*27mm
	Product weight	40g
Indicator light	PWR (blue)	Lights up when power is on
	STATE (orange)	Off: The device is powered on and searching for a SIM card; Flashing: The device has detected correct SIM card and is attaching to the network; Normally on: The device is successfully attached to the network;
	DATA (green)	Flashes when sending/receiving data
	LINK (orange)	Normally on: The device is connected to the server successfully; Off: The device failed to connect to the server successfully;

1.4. Product Size



1.5. Pin definition

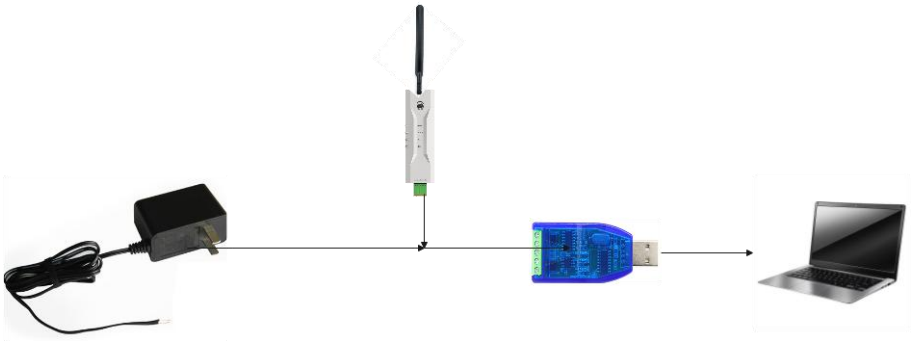


Serial number	Name	Function	Description
1	PWR	Power Indicator	Lights up when power is on
2	STATE	Network access status indicator light	Off: The device is powered on and searching for a SIM card; Flashing: The device has detected correct SIM card and is attaching to the network; Normally on: The device is successfully attached to the network;
3	DATA	Data transceiver indicator light	Flashes when sending/receiving data
4	LINK	Link indicator	Normally on: Any Socket is successfully connected to the server; Off: The device failed to connect to the server successfully;
5	SIM card holder	SIM card holder	NanoSIM card holder, chip upward, notch inward
6	Reload	button	Long press for 5-6 seconds to restore factory. All indicators light up to indicate success. Press and hold the button to power on and enter the upgrade mode, all indicators will flash.
7	GND	RS485 communication port	Connect to converter shielded wire or signal ground wire
8	RS485-A		2.54mm spring terminal, connected to converter A
9	RS485-B		2.54mm spring terminal, connected to converter B
10	V-	Power interface	DC 8-28V power input port, 2.54mm spring terminal
11	V+		
12	ANT	Antenna interface	SMA-K, external thread inner hole, characteristic impedance 50Ω

Chapter 2 Quick start

2.1Hardware preparation

The hardware devices required for this test are as follows:



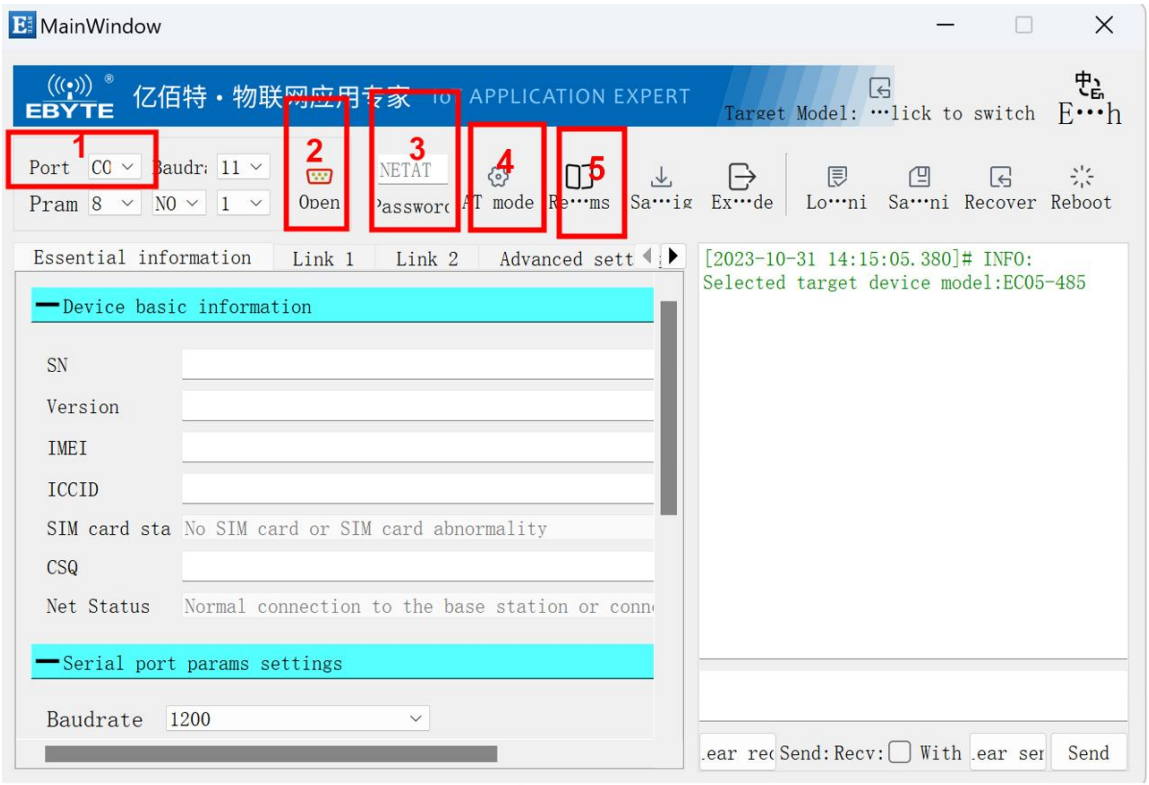
Before testing, connect the power supply, antenna, SIM card, serial cable and other hardware.

1. Insert the SIM card into the device. Note that it is a Nano SIM card (small card), with the notch facing outward and the chip facing upward;
2 Connect the antenna SMA interface to the device;
3 Connect the USB to RS485 to the device, take any appropriate length of wire, connect the A interface of the USB to RS485 to the device A, connect the B interface of the USB to RS485 to the device B, and connect the GND of the USB to RS485 to the device GND (at a short distance, you can Not connected, it is recommended to connect for long-distance communication and use twisted pair shielded wire);
4 Connect the USB to RS485 to the computer and check whether there is a corresponding port through the device manager (if not, please check whether the corresponding driver is installed);
5 Connect the power supply to the device (power supply VCC is connected to the device VCC, and power supply GND is connected to the device GND). If it is a DC terminal adapter, the inner side is + and the outer side is -.

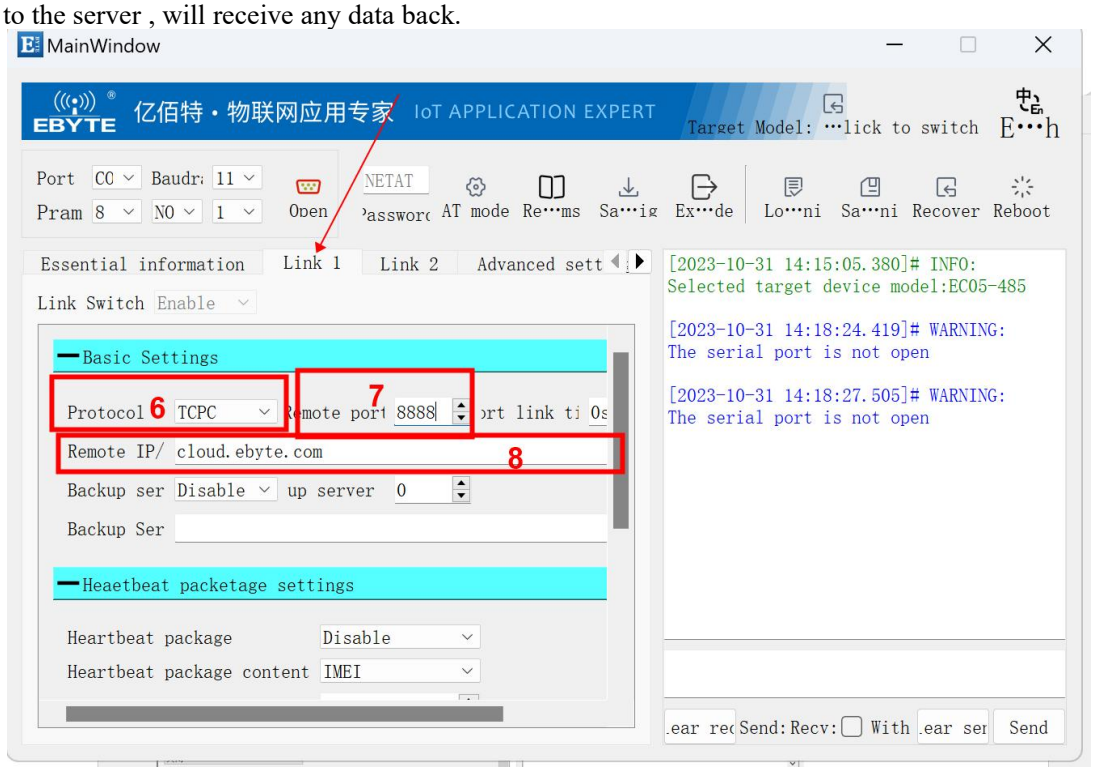
2.2 Parameter configuration

To modify the radio 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.

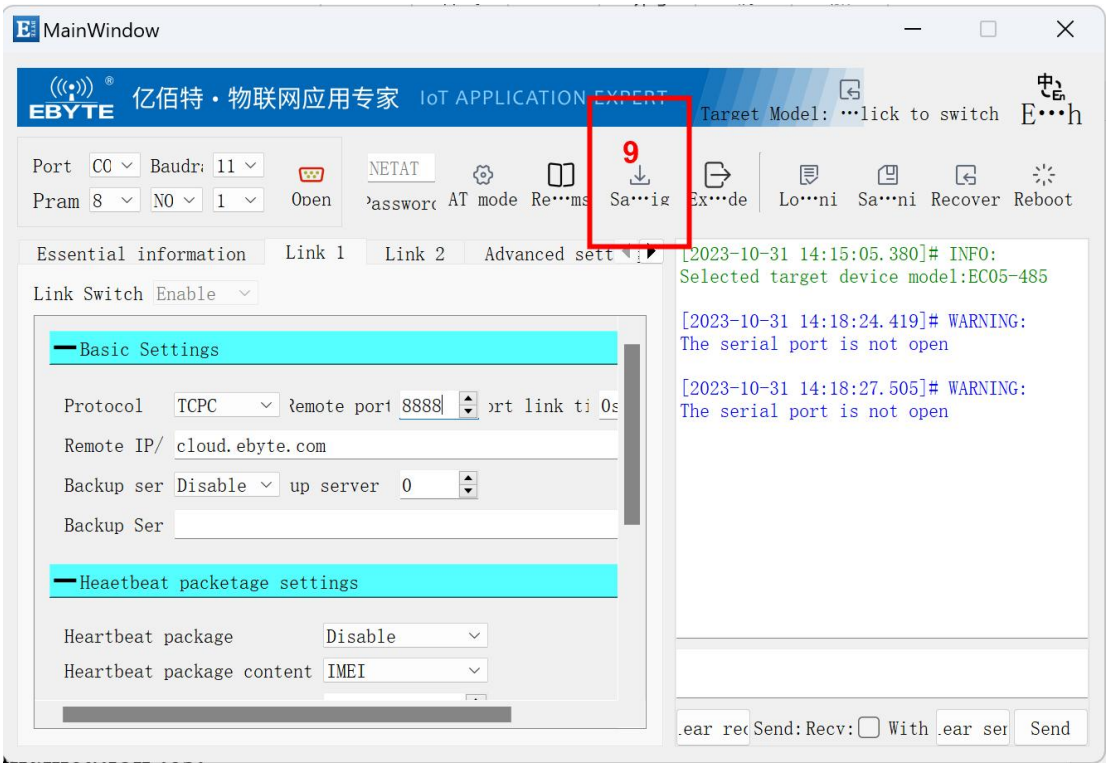
1. Select the COM port corresponding to the adapter (if not found, please go to the serial port adapter website to download and install the driver), select the corresponding baud rate, data bits, stop bits, and check bits (the default is 115200,8,N1);
2. Click "Open Serial Port" and it will display as "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 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";

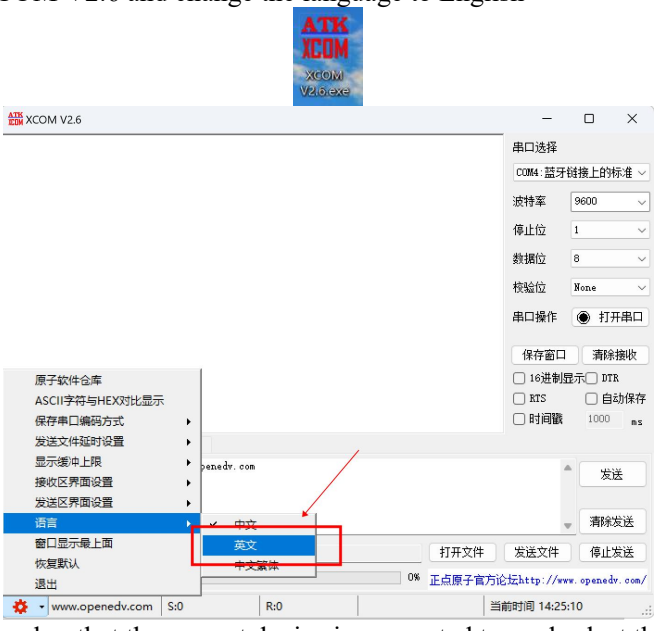


10. Click "Restart Device" and the parameters will take effect after restarting.
11. Click "Close Serial Port"

2.3Communication 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 device, and the device will forward it to the server, and then the server will use the original data. The link returns the data to the device serial port, realizing two-way transmission of data between the device and the server.

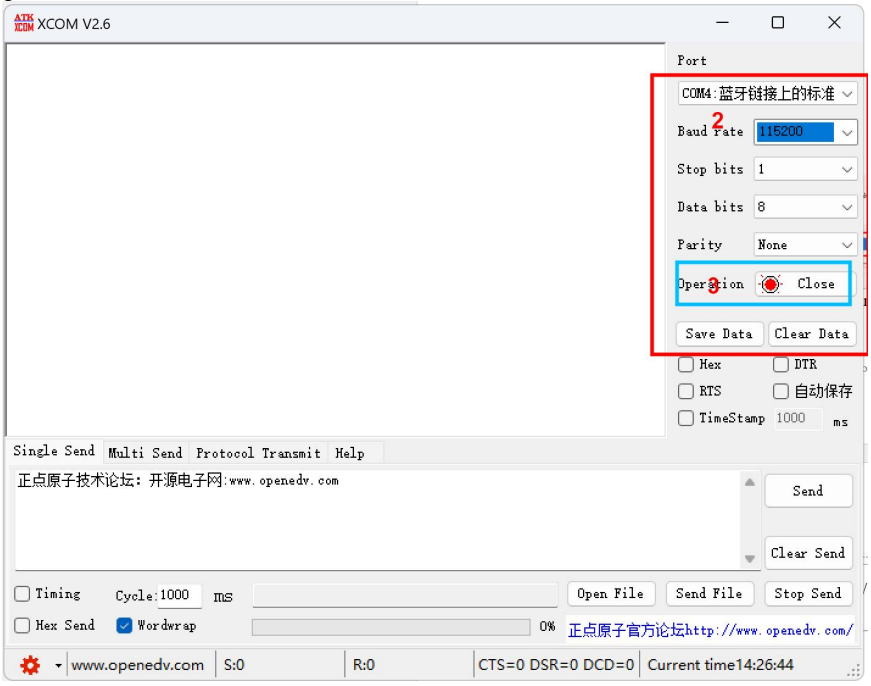
1. Double-click to run XCOM V2.6 and change the language to English



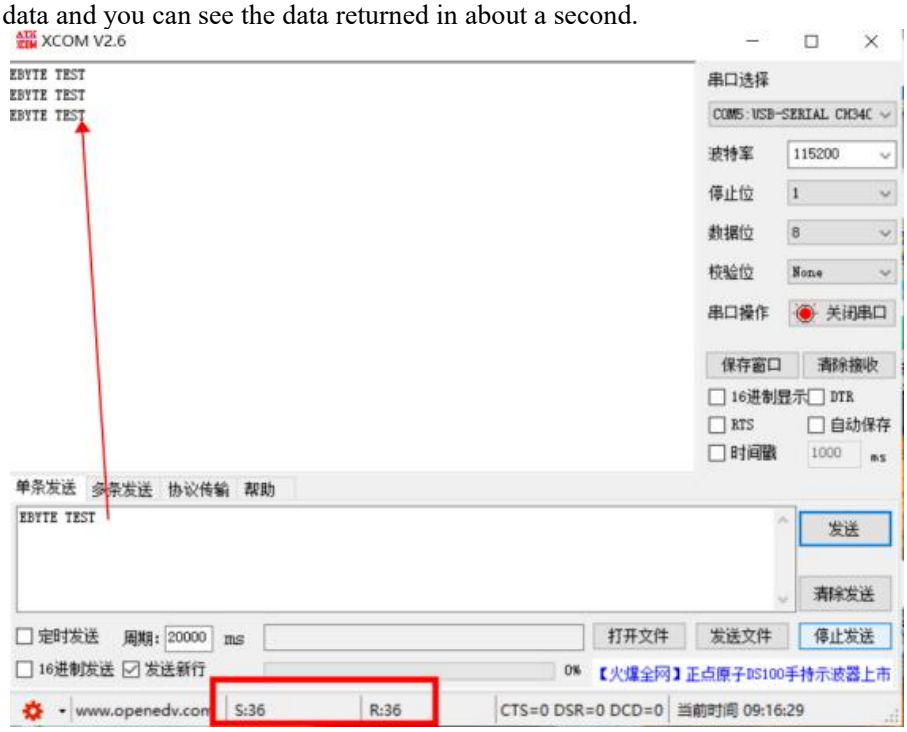
2. Select the serial port number that the current device is connected to, and select the correct baud rate, stop

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

Chapter 3 Product Features

This chapter mainly introduces the product functions. The following figure is the overall functional block diagram of the product, which can give you a general understanding.

3.1Data transparent transmission mode

In this mode, the user's serial port device can send data to the designated server on the network through this device. The device 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

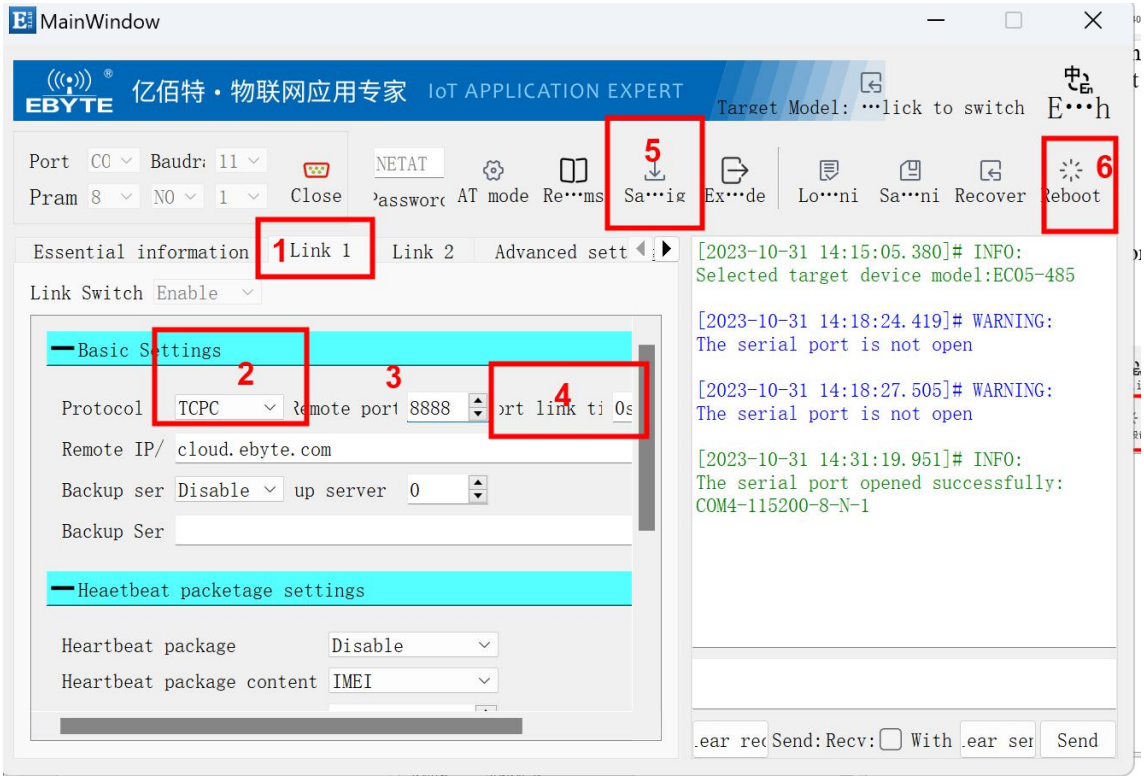
2、Configure connection type

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



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

3.1.1Heartbeat bag

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 devices (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 heartbeat packet content will no longer be sent, and the timing will start from the idle time, and the heartbeat data will be sent to the server after the heartbeat time is up.

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:

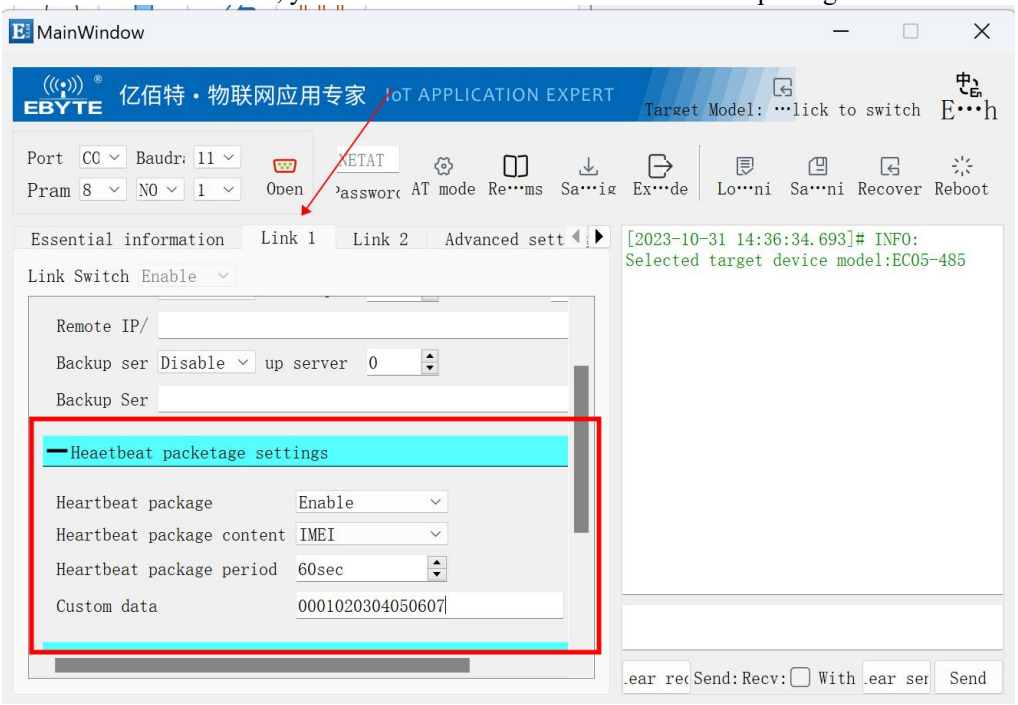
1、Select the heartbeat packet switch to turn on.

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 .



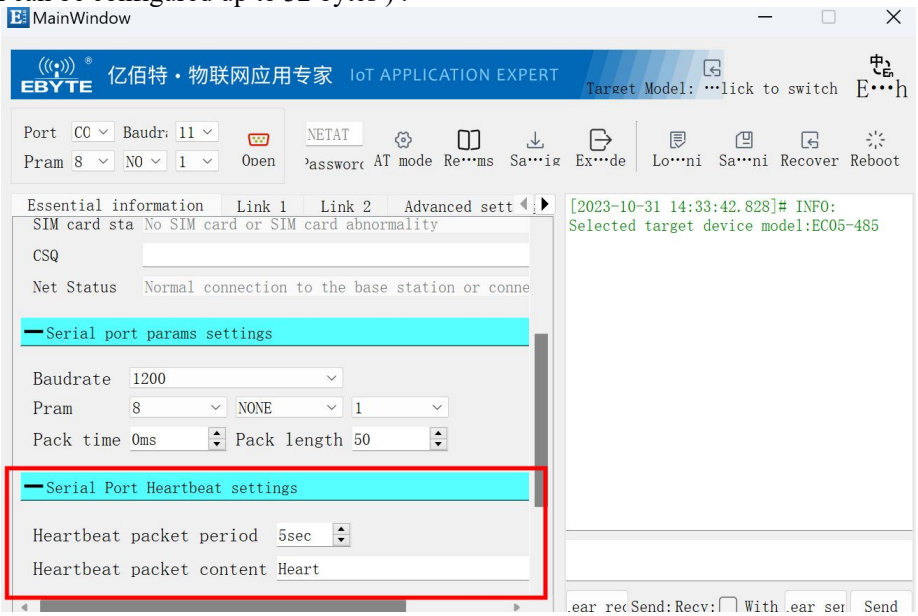
Serial heartbeat packet

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) .

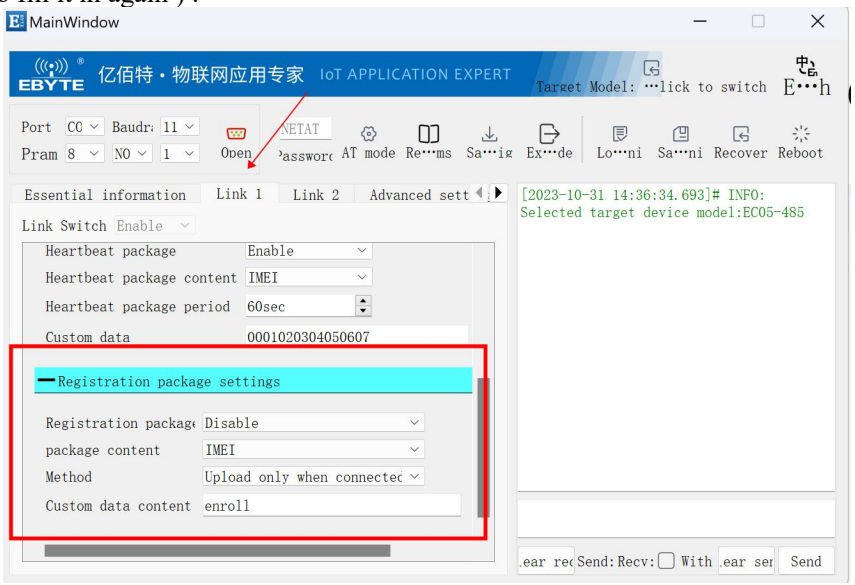


3.1.2Registration package

In network transparent transmission mode (TCPC/UDPC), users can choose to have the device 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 device establishes a connection with the server, or the registration packet data can be spliced at the front 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:

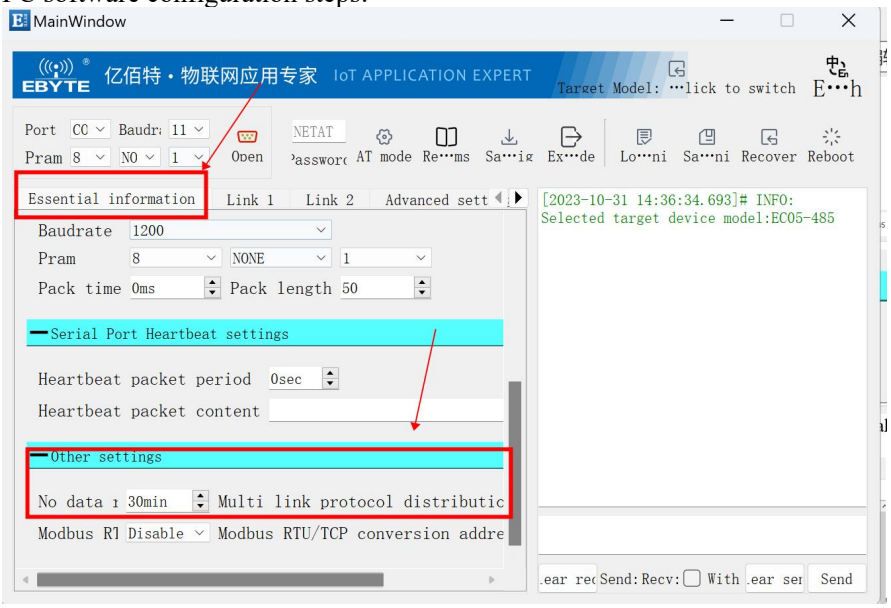
1. Select the registration package switch to turn it on.
2. Select the registration package content (ICCID, IMEI or custom registration data) .
3. Set the registration packet sending method (sent as a data header or connection).
4. If sending in hexadecimal, check the Hex check box .
5. Customize the registration package and write the registration package content (if you choose HEX, you need to fill it in again) .



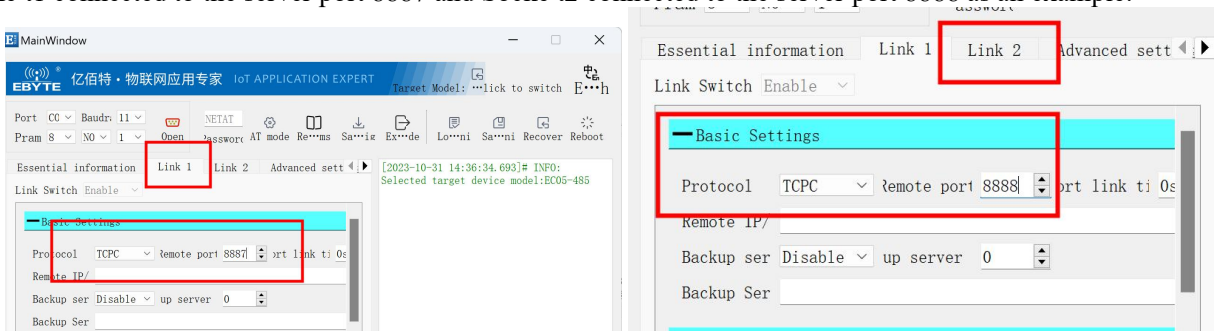
3.1.3Multi-link protocol distribution

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.

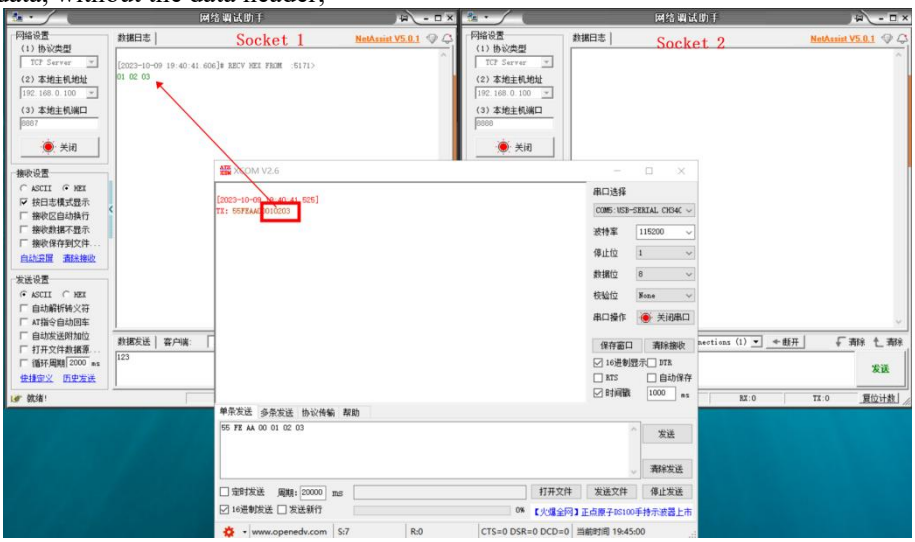
PC software configuration steps:



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

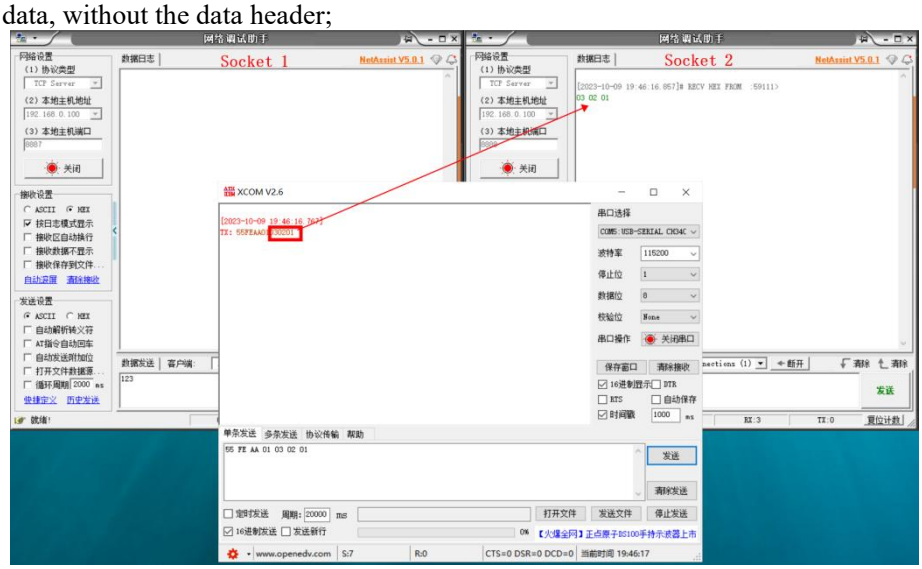


1. The serial port sends data if the data header is 55 FE AA 00, which means it meets the requirements, that is, 55 FE AA 00 + data, then the data will only be transmitted to Socket 1 , and the received content only contains data, without the data header;

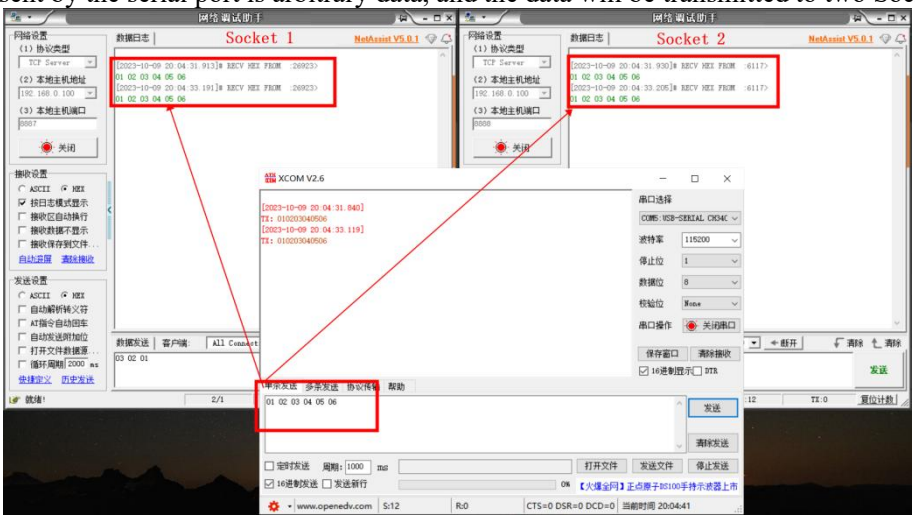


2. The serial port sends data if the data header is 55 FE AA 01, which means it meets the requirements, that

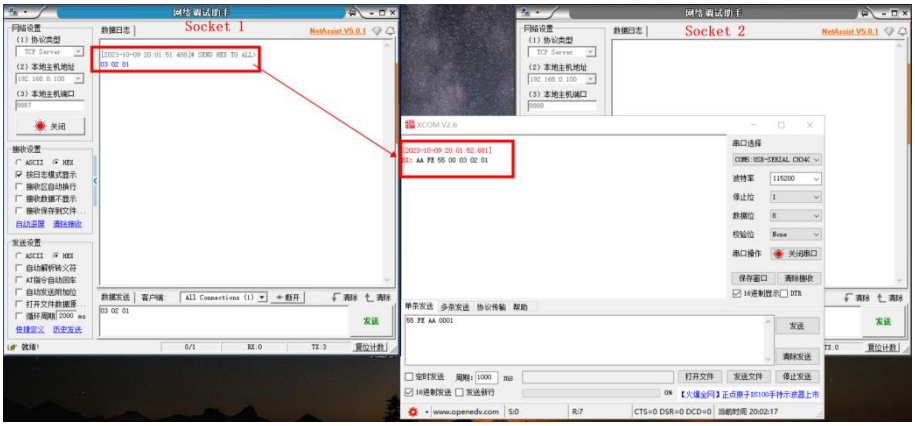
is, 55 FE AA 01+data, then the data will only be transmitted to Socket 2 , and the received content only contains data, without the data header;



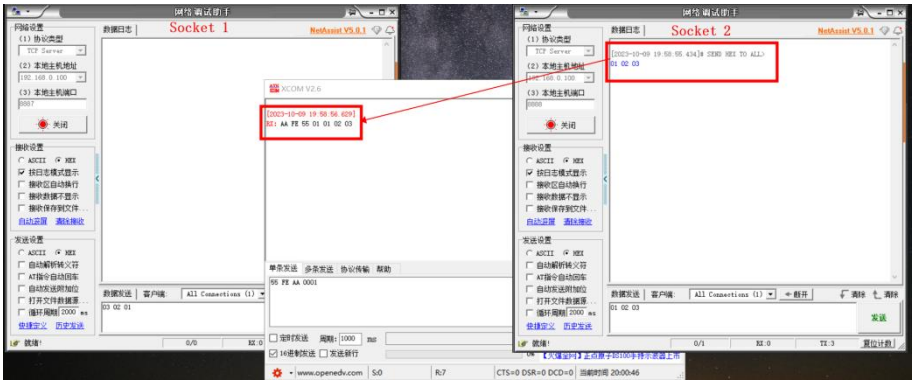
3. The data sent by the serial port is arbitrary data, and the data will be transmitted to two Sockets.



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 .

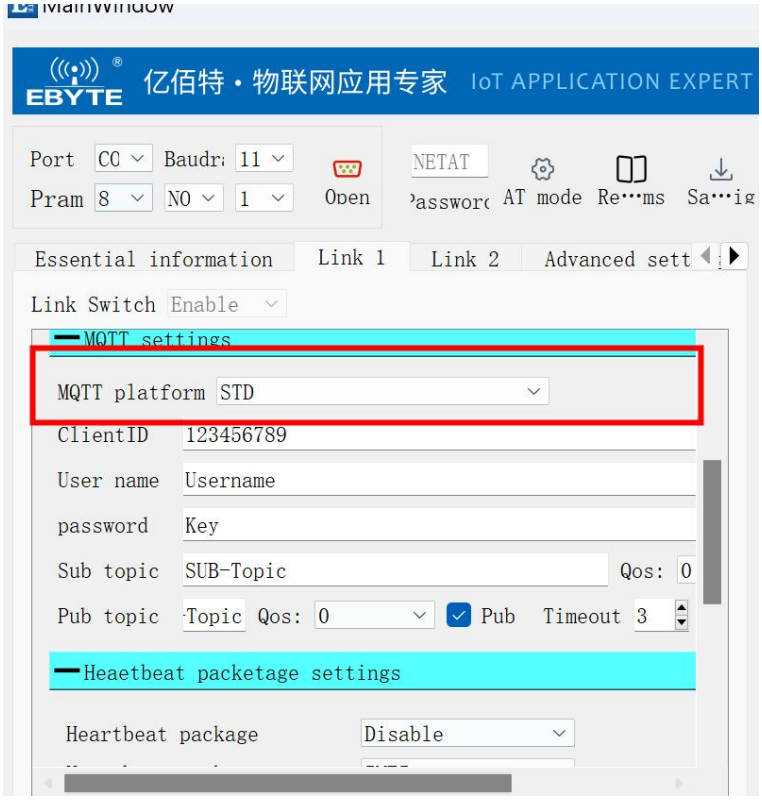
PC software configuration steps:

3.2 MQTT mode

3.2.1Standard 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:



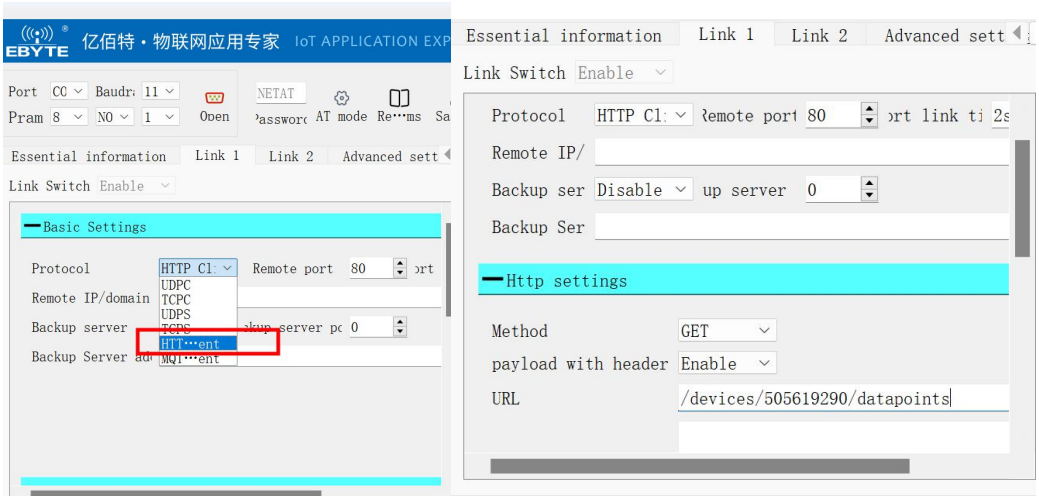
Configure the corresponding subscription publishing address, and use the platform online debugging to send data for communication testing:

3.3 HTTP mode

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

3.3.1GET request

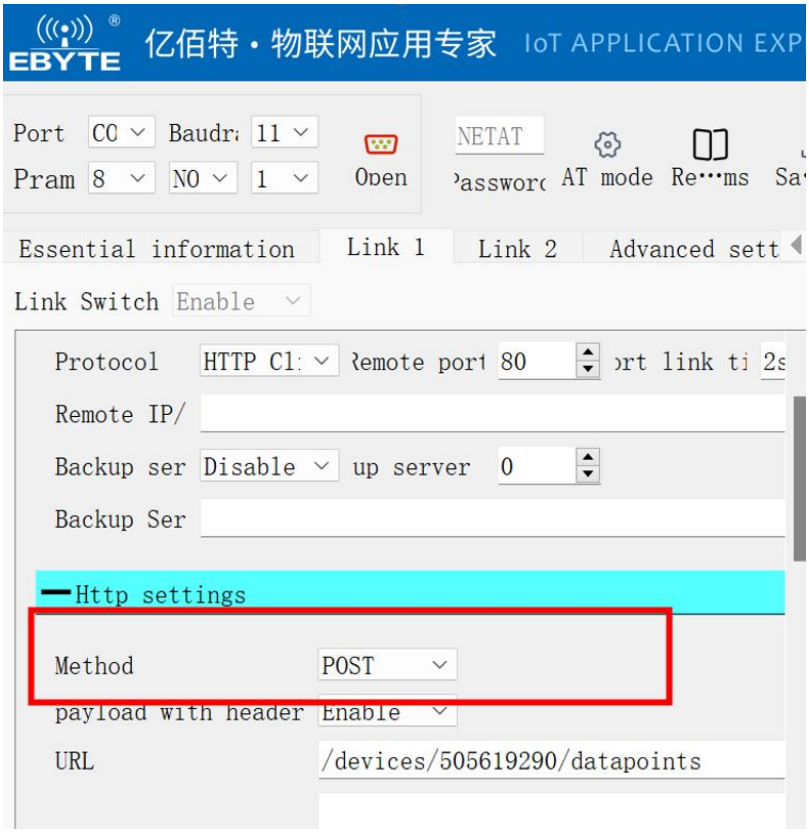
Use HTTP server to test HTTP -GET request, configure parameters as shown below.



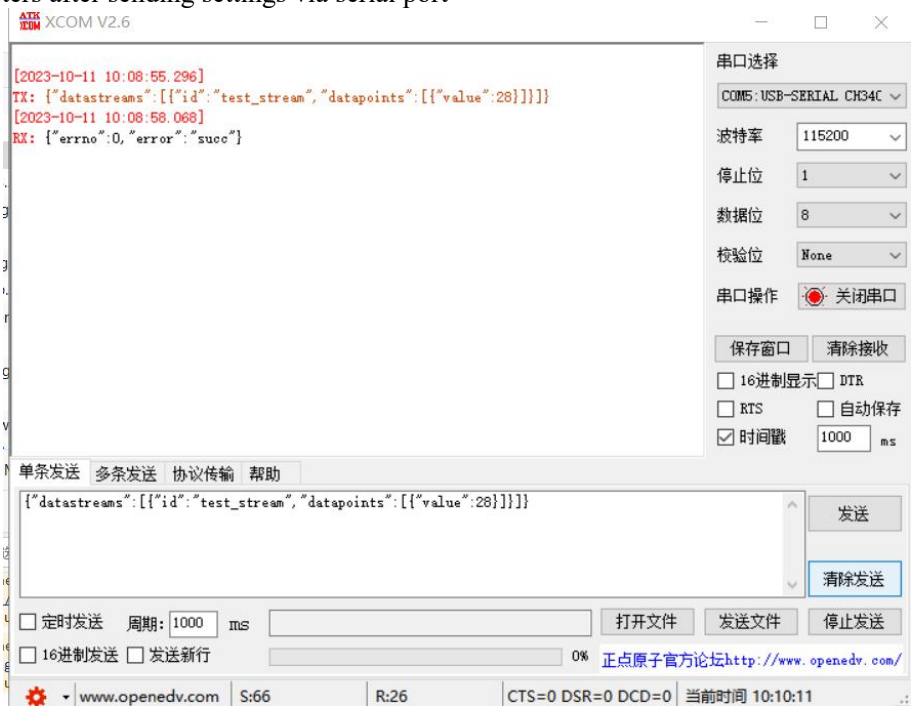
Return parameters after sending request via serial port

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

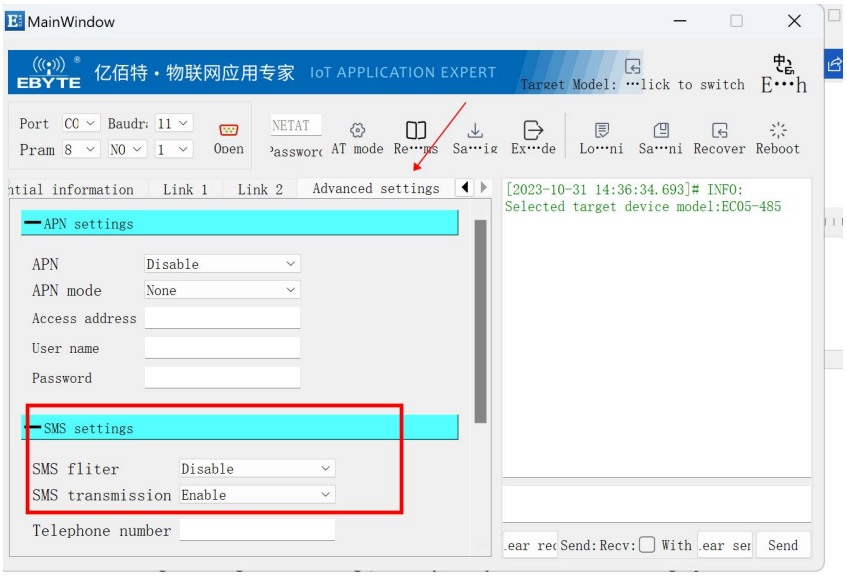
In this mode, the data received by the serial port will be sent to the target phone number through SMS, and the content of the SMS sent to the device phone number will be transparently transmitted to the serial port output.

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 device will automatically exit the configuration state.

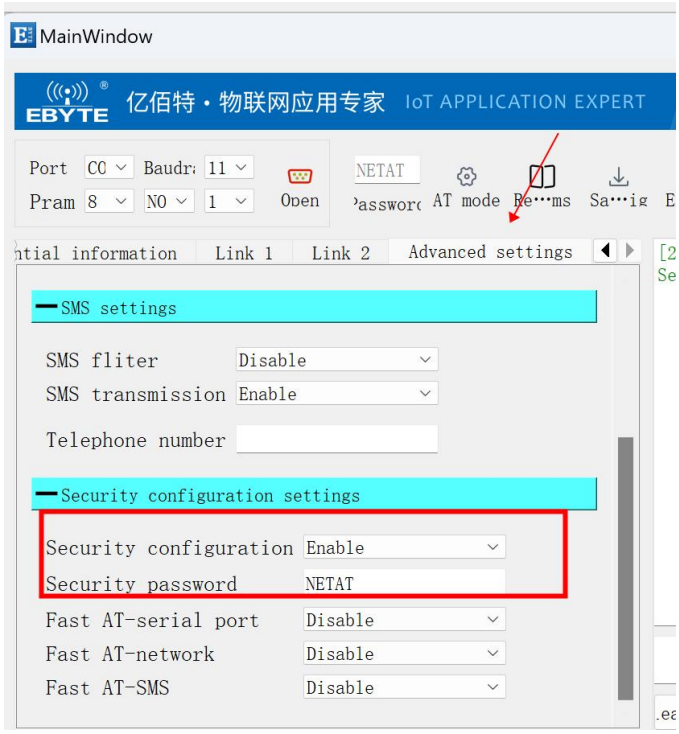
PC software configuration steps:

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 commands.

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 .

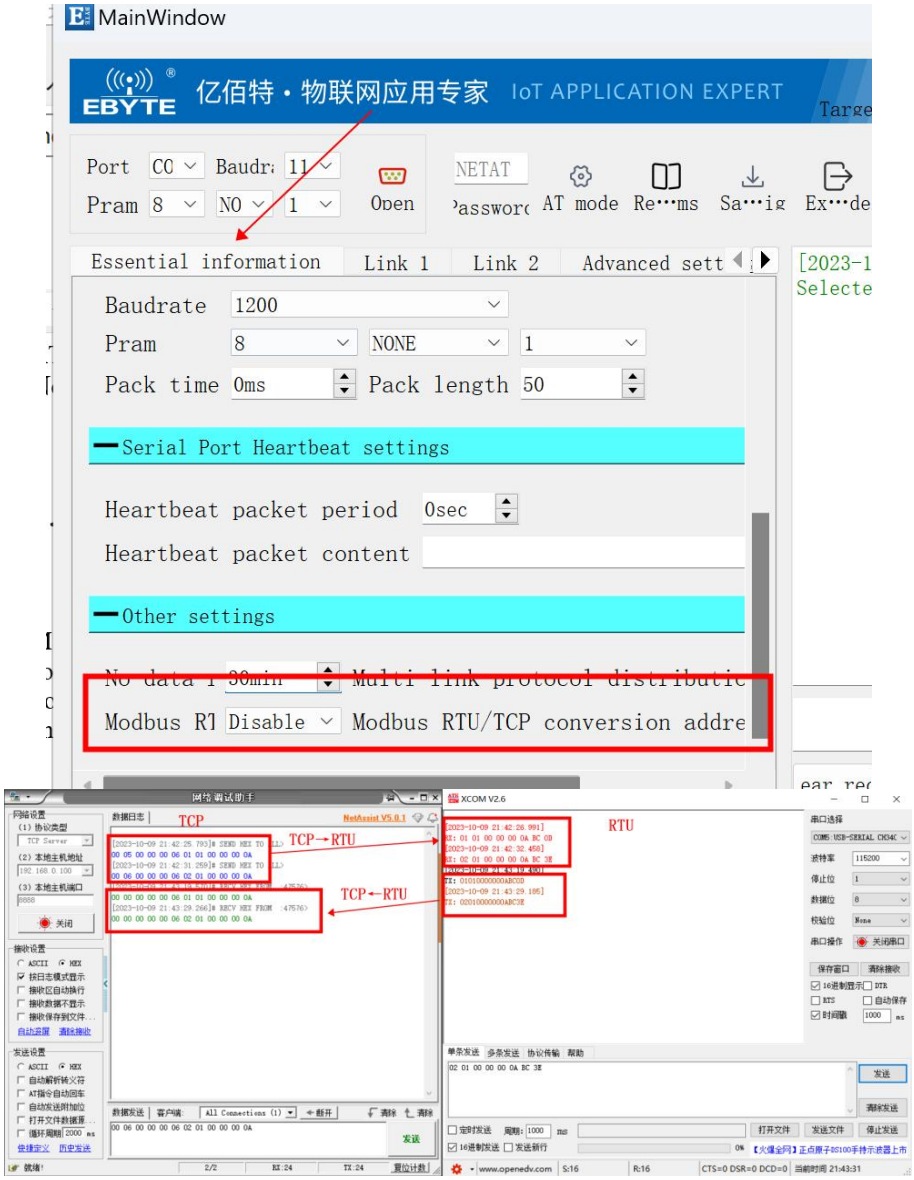
2、Save configuration

3、Reboot the device

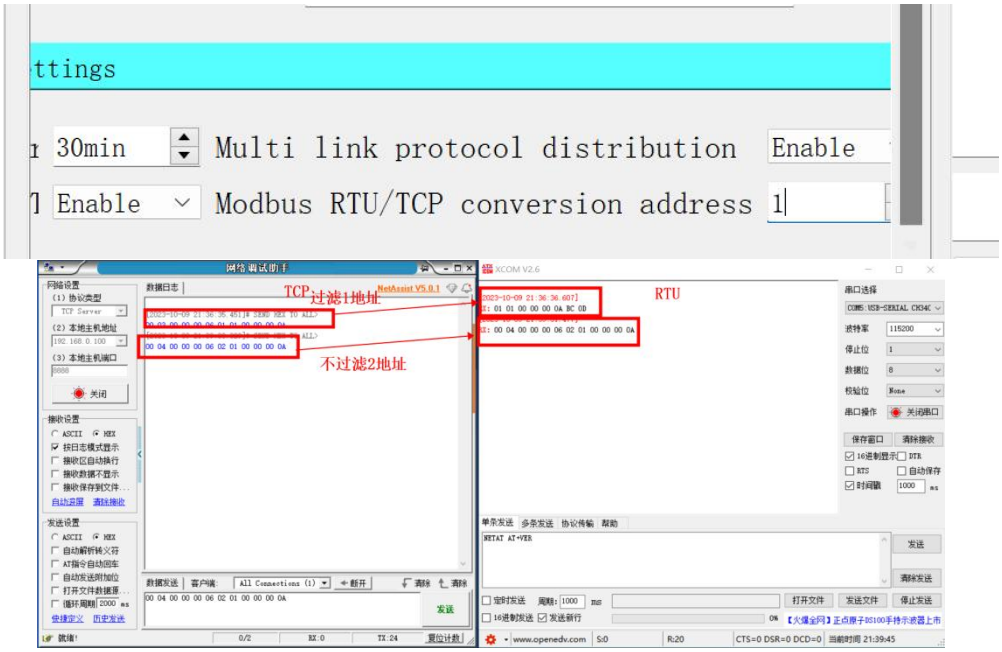
4、To send AT commands through the serial port, network, or SMS, you need to add the security password and keywords before the AT command (for example, the security password is "NETAT*", and when sending the AT+VER command, you need to send NETAT*AT+VER). For details, see AT command manual.
Note: The 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.



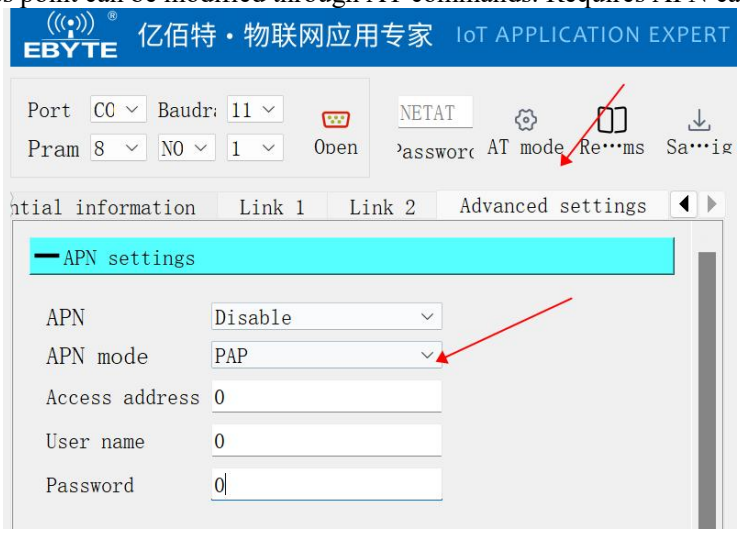
Convert all addresses



Only convert 1 address

3.8 APN access point

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

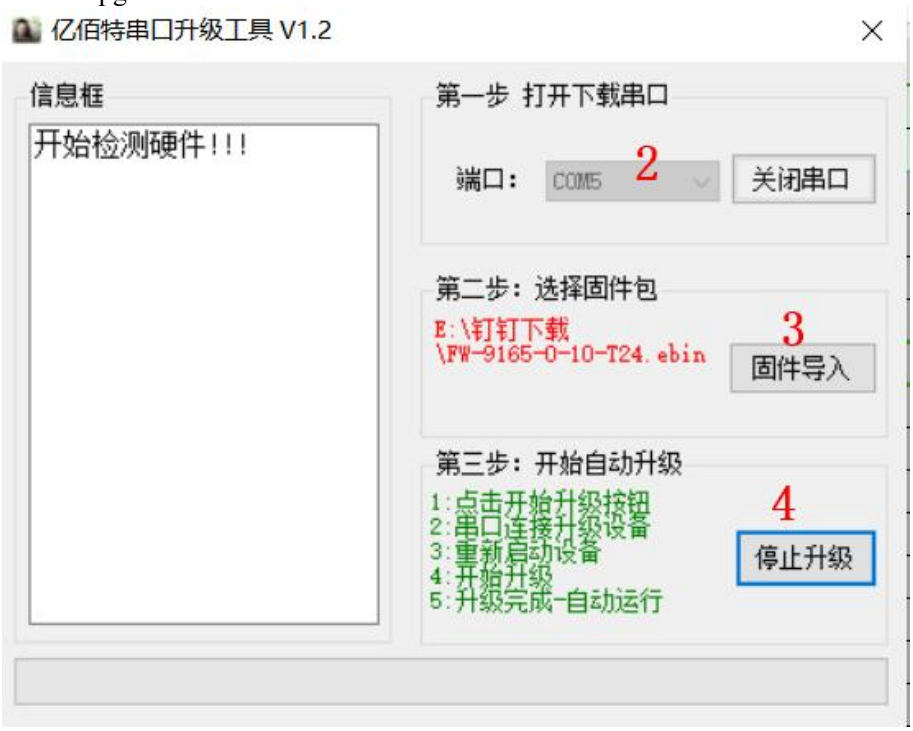


3.9 Serial port upgrade function

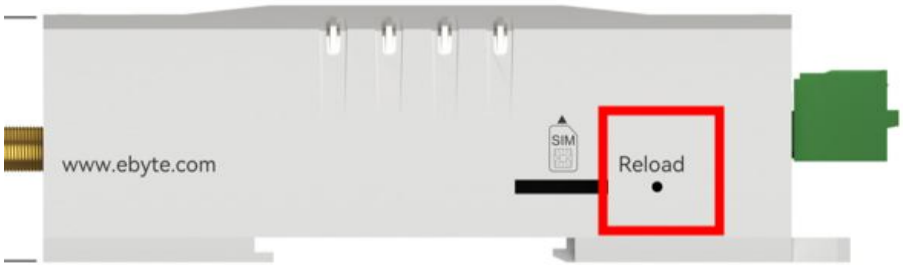
Firmware upgrade is achieved by switching the firmware through the serial port and performing the upgrade . The upgrade steps are as follows:

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

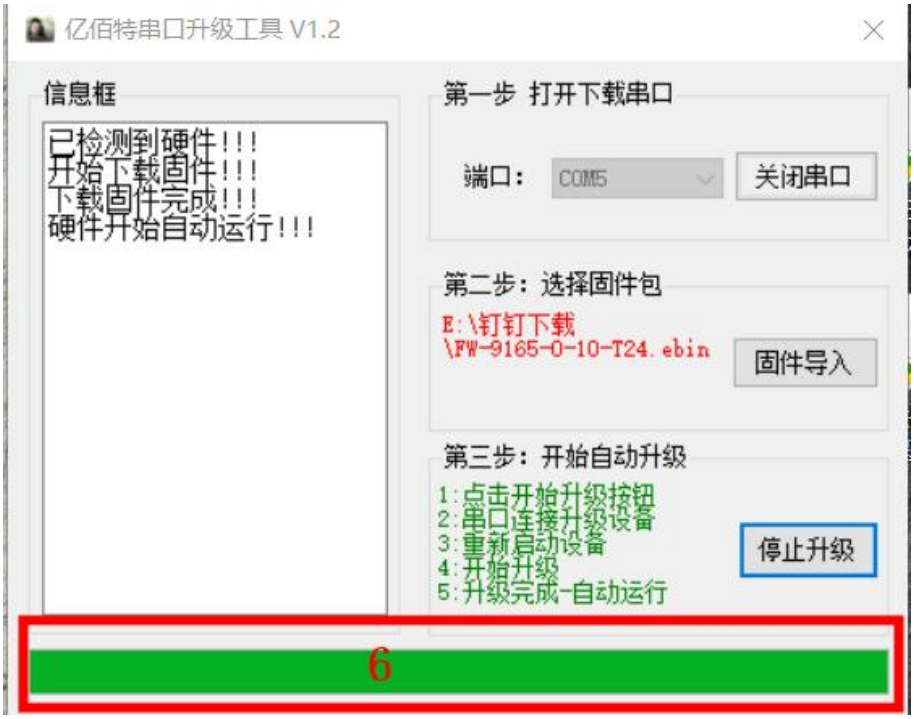
2. Select the download port and open the serial port
3. Import firmware package
4. Click to start the upgrade



5. Power off the device, then press and hold the device Reload button (on the left side of the device) to power on. The other LED lights except PWR will flash to indicate that the upgrade has started.

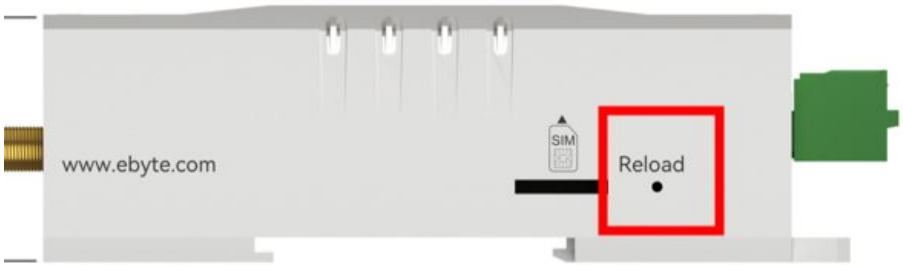


6. 8. Wait until the progress bar below the software is completed and then close the software, indicating that the upgrade is complete.



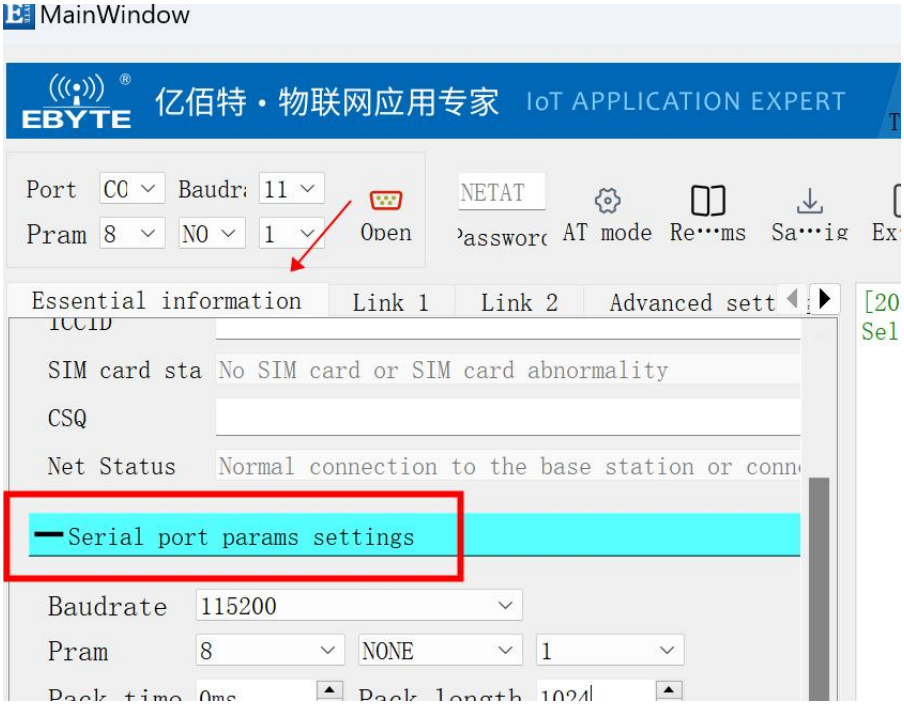
3.10 Hardware factory reset

To restore the factory default parameters, after powering on, press the R e store button for 5 ~ 6 seconds until all LEDs light up, and then release it to restore the device parameters to the factory default parameters, and the device 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 .

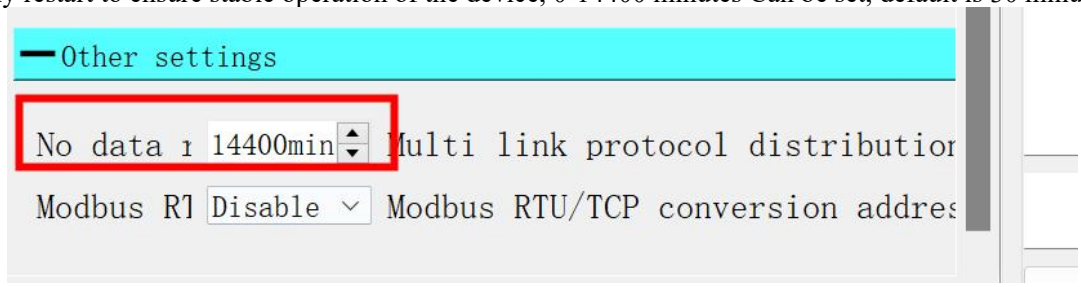
Length-triggered framing: When receiving data from the UART, the length-triggered mode will continuously check the number of bytes received. If the number of bytes received is equal to a certain "length threshold", it is considered that a frame has ended, otherwise it will wait for the end of the packaging 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 device 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

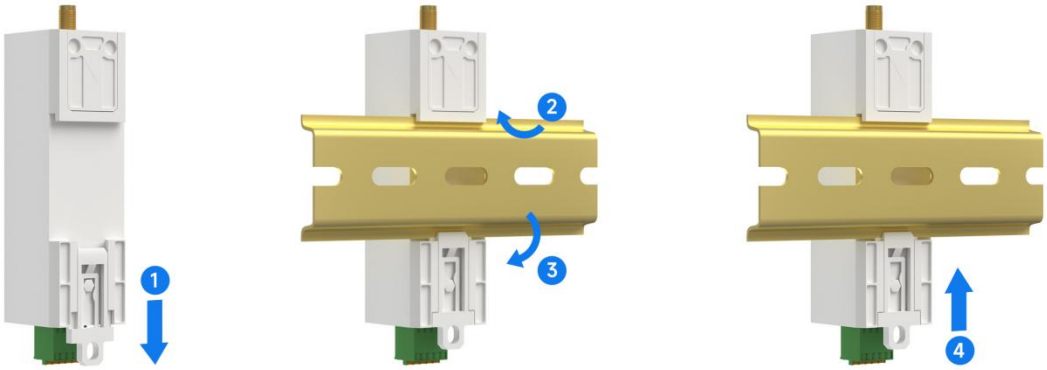
In order to prevent the device from working abnormally for a long time, you can set the no-data restart time. When the device does not receive the server downlink data, when the no-data restart time is reached, the device will automatically restart to ensure stable operation of the device, 0-14400 minutes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



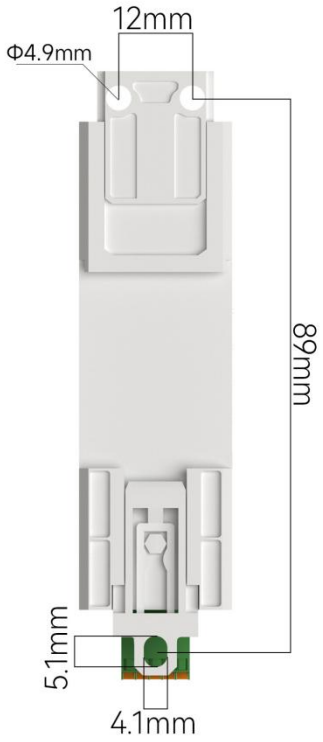
Chapter 4 Installation dimensions

4.1Rail installation

Using standard DIN35 guide rail buckle (35mm).



4.2Positioning hole installation



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	Issued by
1.00	2023-10-13	initial version	LYL

About Us

Technical support: support@cdebyte.com
Documents and RF Setting download link: https://www.cdebyte.com
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Official hotline:028-61399028
Web: https://www.cdebyte.com
Address: Building B5, Mould Industrial Park, 199# Xiqu Ave, High-tech Zone, Chengdu, 611731, Sichuan, China

成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.