Serial To Ethernet SMD Module

NS2

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Chapter 1 Product Introduction

NS 2 is a serial to Ethernet server module that realizes serial data and Ethernet data conversion. It provides a variety of Modbus gateway modes and TCP/DUP/MQTT/HTTP IoT gateway modes, which can meet the networking functions of various serial devices/PLCs . The module adopts LCC package, which is convenient for user equipment to be integrated on the PCB board.

The NS 8 -TB test kit comes with a USB-to-TTL circuit that does not require the user to connect an external converter, and leads to reset and factory reset pins for external buttons for easy operation, and also connects the operating status indicator pins to external LEDs for users to observe the status .

Features

- Support 10M Ethernet interface;
- Support two configuration methods: configuration tool and AT command;
- Server mode supports multiple Socket connections ;
- The baud rate supports 2400~115200bps, and supports multiple verification methods;
- Support configurable domain name resolution service, namely DNS;
- Support timeout restart function, the time can be customized;
- Support short connection function, short connection interval time customization;
- Support serial port cache cleaning function ;
- Support hardware reset to factory settings;
- Support online upgrade , convenient user function customization;
- Support sending multiple registration packets and heartbeat packets, such as connecting to send MAC, connecting to send custom data , etc.;
- Support DHCP to dynamically obtain IP, subnet mask, default gateway, DNS server address;
- Support multiple working modes TCP client, TCP server, UDP client, UDP server, MQTT client, HTTP client;
- Support 2 channels to open the server at the same time, support dynamic allocation of 16 clients, and a single server supports 15 client access ;
- Support a variety of Modbus gateways, which can realize the active reporting of RTU devices, support the interconversion of Modbus TCP and Modbus RTU protocols, and can be configured as a storage mode to automatically collect device data, or use a question and answer multi-host mode;
- Support MQTT gateway function, fast access to Alibaba Cloud and standard MQTT3.1.1 servers

(OneNET, Baidu Cloud, Huawei Cloud, etc.);

- Support Modbus data to actively report to TCP transparent transmission server, MQTT server, etc.;
- Support HTTP client mode, using HTTP/1.1 protocol, can be configured as GET, POST two request methods ;
- Support TCP/IP direct communication or connect communication through "virtual serial port" .

Chapter 2 Quick Start

If there is a problem during use, click the official website link: https://www.ebyte.com/product-class.aspx

The quick start is suitable for quickly verifying the functions of the device. This chapter uses the NS8-TB test board as an introduction, hereinafter referred to as the device.

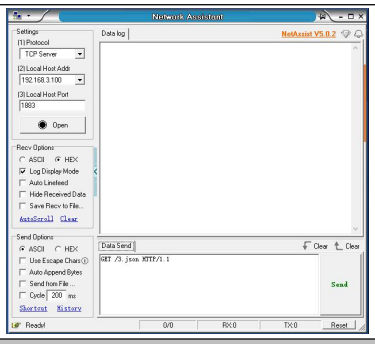
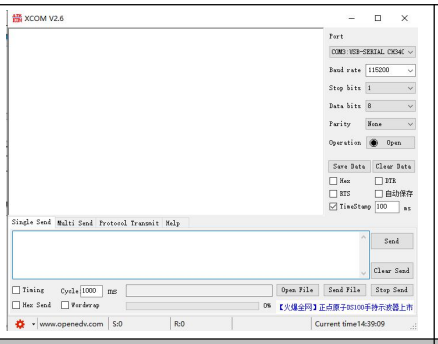
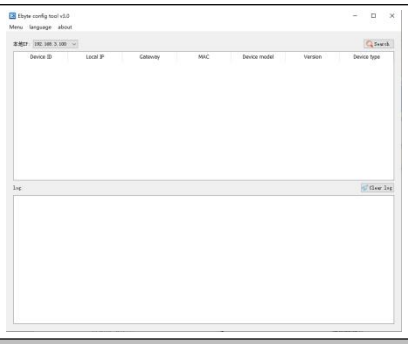
2.1 Hardware preparation

One laptop with RJ45 network port ;
One NS8-TB ;
A network cable ;
The specific preparation of hardware equipment is shown in the following figure:

		
computer	cable	NS8-TB

2.2 Software preparation

Serial port debugging assistant (X COM), network debugging assistant (T CP/IP debugging assistant), Ebyte network configuration tool (configuration host computer), official website address: www .ebyte.com , product details provide a download interface.

		
Network Assistant	X COM	Ebyte network configuration tool

[Note] The version of the host computer shown in the manual may be different from the version of the host computer provided by the official website, and the version of the host computer provided by the official website shall prevail.

2.3 Device default parameter test steps

Different channels use the same IP but different local ports. For example, the factory-configured channel 1 corresponds to port 8 001 and channel 8 corresponds to port 8 00 8 in turn . For details, see the chapter " 4.1 Correspondence between channel and serial port".

2.3.1 Hardware connection

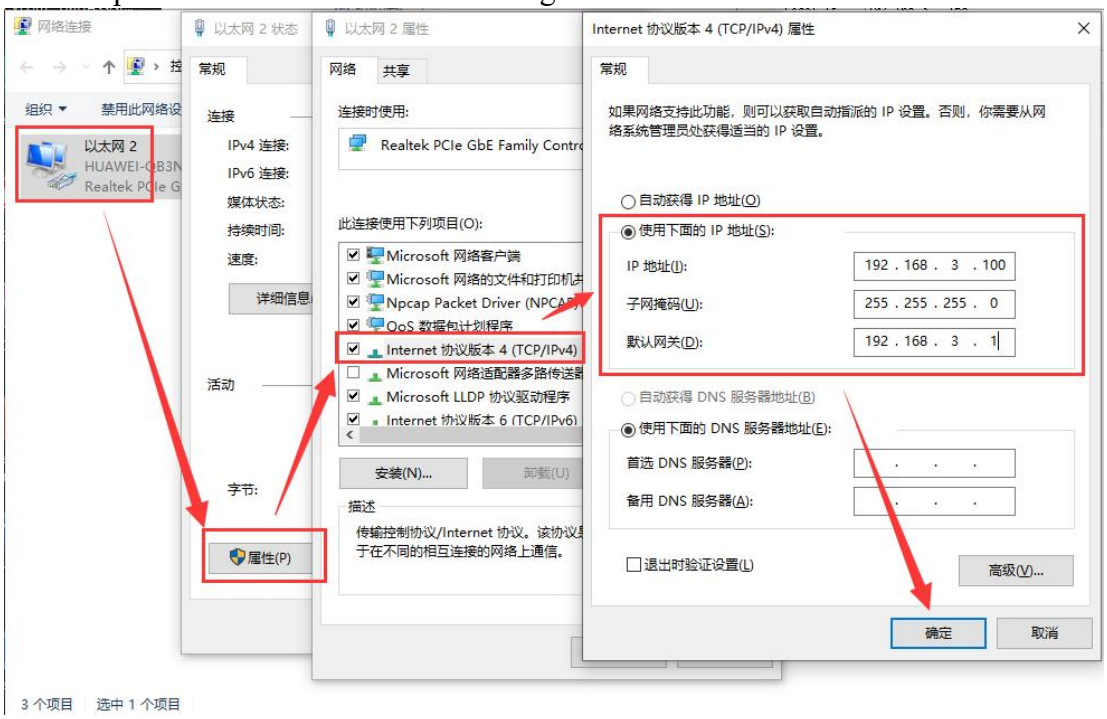
1. Connect the network port of the device and the network port of the computer with a network cable ;
2. Device USB interface _ connect to computer ;
3. After confirming that there is no problem with the status, proceed to the next step of configuration;
Note: The test board is used to test the first serial port by default. If other serial ports need to be verified, jumper caps need to be switched.

2.3.2 Device parameter configuration

In order to enable users to quickly have a simple understanding of the device , we use the default parameters for data transparent transmission test. The default parameters of the NS8 module are shown in the table below.

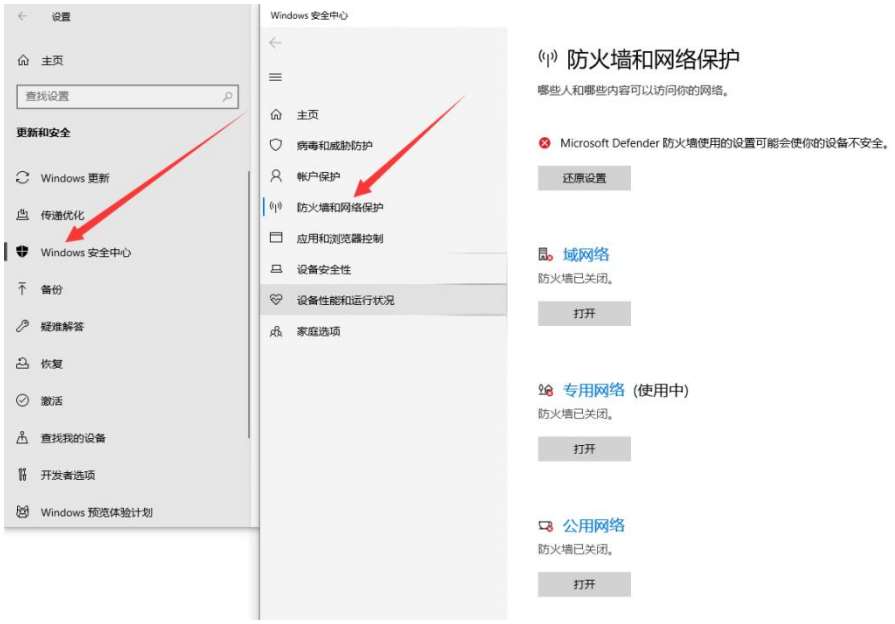
project	default parameters
IP address	192.168.3.7
subnet mask	255.255.255.0
gateway	192.168.3.1
Channel 1 working mode	TCP_SERVER
Local port of channel 1	8 001
Serial baud rate	1 15200
Serial parameters	NONE/8/1/NONE

Make sure that the computer IP and serial server IP are in the same network segment and cannot conflict. The inspection method is shown in the figure below.



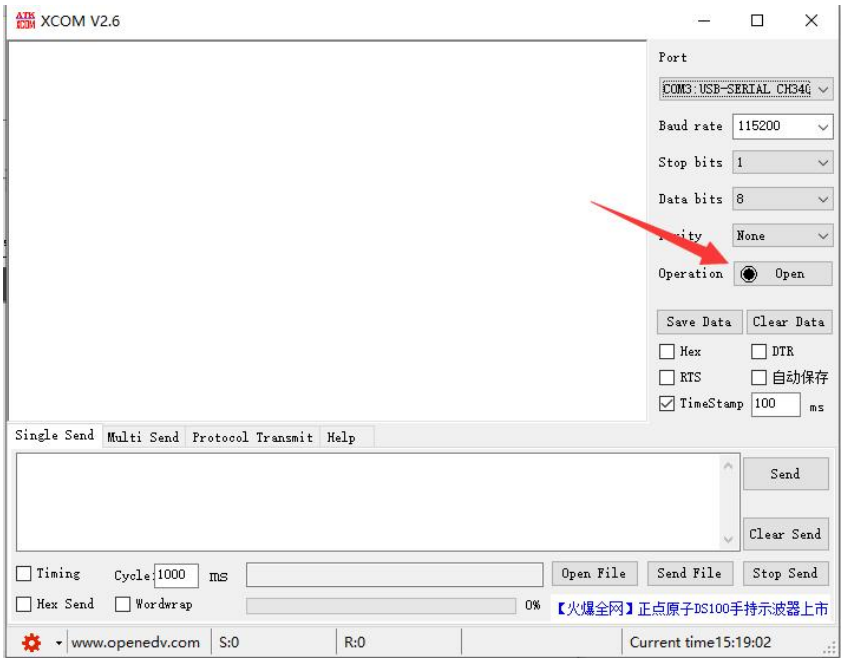
2.3.3 Turn off the computer firewall

If the communication is unsuccessful, the user can try to turn off the firewall on the computer and try again.



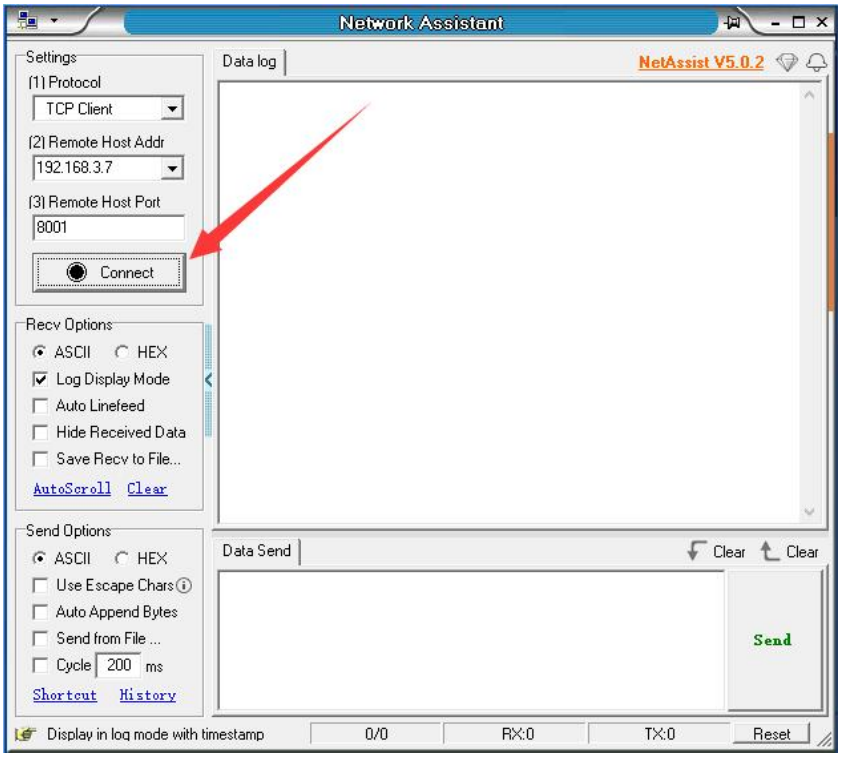
2.3.4 Turn on "Serial Port Assistant"

Select the correct serial port number, configure the correct serial port parameters (115200-8N1), and open the serial port, as shown in the figure below:



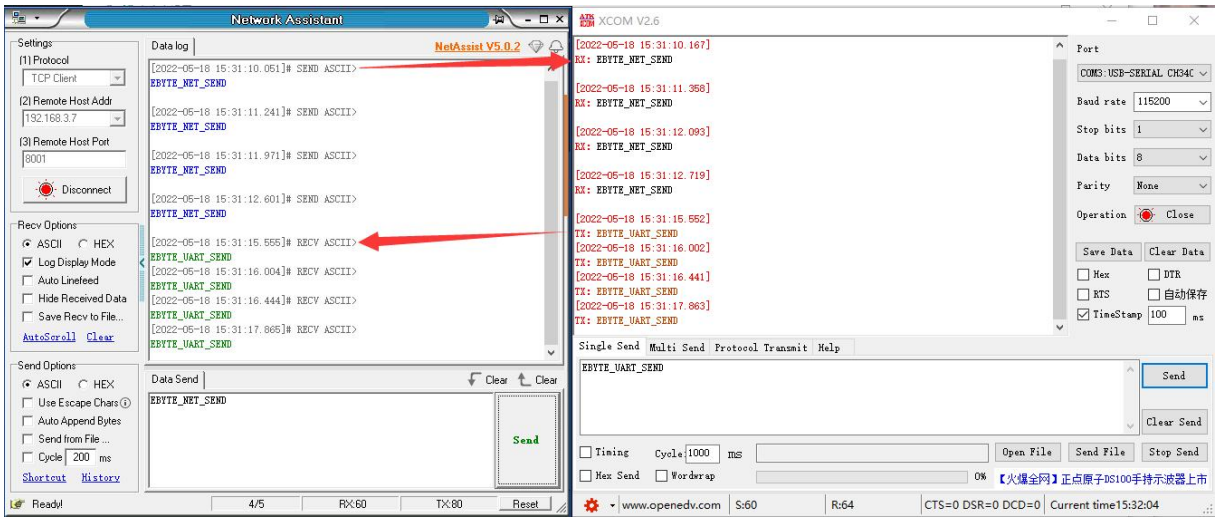
2.3.5 Turn on network assistant

Select the "TCP client " mode, configure the remote IP as "1 92.168.3.7 ", and configure the remote port as "8 001 ", as shown in the figure below:



2.3.6 Data sending and receiving test

Click the [Send] button on the " Network Debug Assistant " and " Serial Port Debug Assistant " respectively to realize the transparent transmission of network and serial port data, as shown in the figure below.



Chapter 3 Product overview

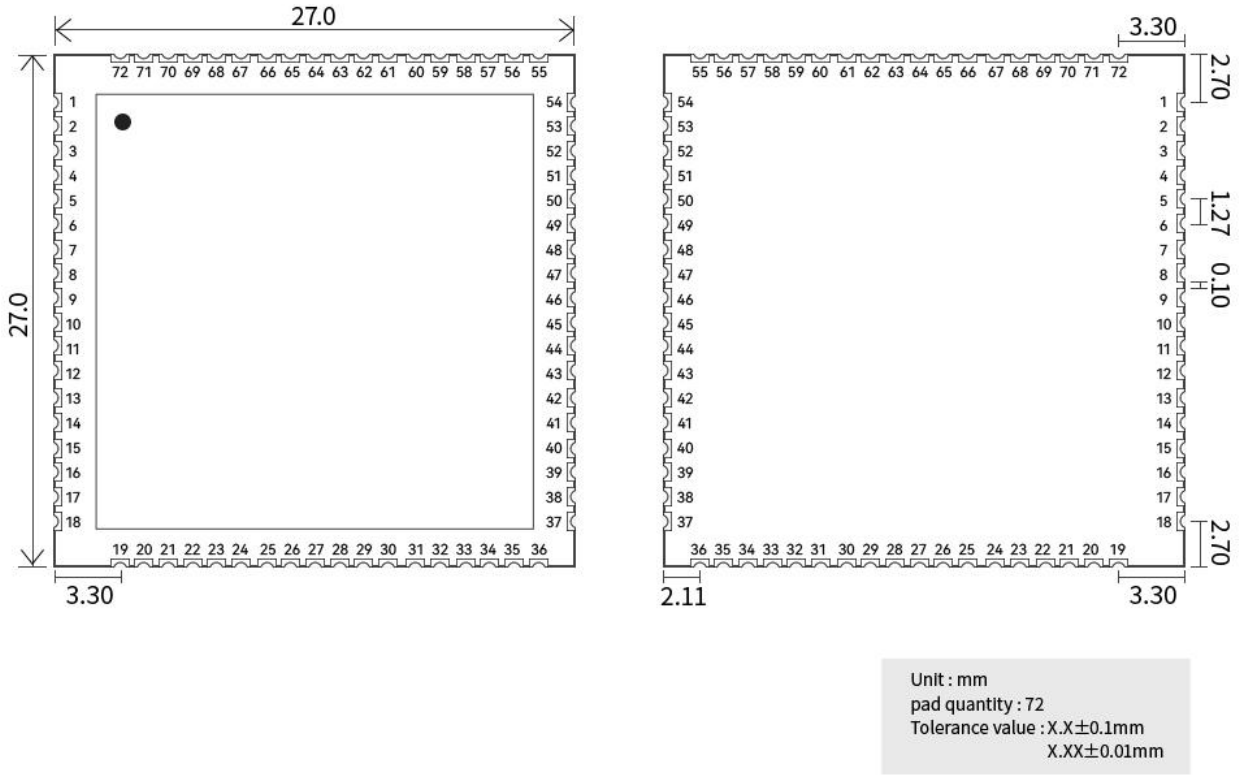
3.1 Product specifications

Product number	product type	Socket Connections	Operating mode	Working voltage (V)	Product Size (mm)
EBT3001	Single serial port chip	6 way	TCP Server _ TCP Client UDP Server _ UDP Client M QTT Client H TTP Client _	DC 2.1～3.6	5 x 5
EBT3002	Eight serial port chip	1 6 way		DC 2.4～3.6	10 x 10
NS1	Single serial port patch	6 way		DC 3.0～5.5	17×19
NS2	Dual serial port patch	1 6 way		DC 3.0～5.5	27 × 27
NS4	Four serial port SMD	1 6 way		DC 3.0～5.5	27 × 27
NS8	Eight serial port patch	1 6 way		DC 3.0～5.5	27 × 27
NS1 -TB	Test base	6 way		DC 3.0～5.5	71 × 27
NS8-TB	Test base	1 6 way		DC 3.0～5.5	103 × 49
NT1	single serial pin	6 way		DC 3.0～5.5	35 x 22 x 20
NT1-B	single serial pin	6 way		DC 3.0～5.5	35 x 22 x 20
NA111	Single serial port rail	6 way		DC 8～28	110 ×66×30
NA111-A				AC 85～265	
N B114	Single serial port positioning hole	6 way		DC 8～28	1 02 × 84 × 25
NB124	Dual serial port positioning hole	6 way		DC 8～28	173 × 95 × 26.5
NB144	Four serial port positioning holes	1 6 way		DC 8～28	198 × 109 × 26.5
NB183	Eight serial port positioning holes	1 6 way		DC 8～28	198 × 109 × 26.5

3.2 Technical Parameters

Item	Explanation
Operating Voltage	3.0 ～ 5.5V (D C)
Working current	Peak: 200mA @ 5V Standby: 30mA@5V Peak: 250mA @ 3.3V Standby: 50mA@3.3V
Serial port level	TTL level (3.3V)
Operating mode	TCP Server (default), TCP Client, UDP Server, UDP Client, HTTP Client , M QTT Client
Socket connection	TCP server supports up to 16 client connections
Network protocol	IP, TCP/UDP, IPv4, I CMP , APR , D HCP , D NS , HTTP , M QTT
IP address	Customizable (default, 192.168.3.7)
DNS	support
DNS domain name resolution server	Customizable (default 1 14.114.114.114)
Configuration method	Configuration tools, AT commands
Local port	Can be customized (default, channel 1~channel 2 : 8 001-800 2)
Subnet mask	255.255.255.0 (default, customizable)
Gateway	192.168.3.1 (default, customizable)
Serial cache	512 Bytes
packaging mechanism	512 Bytes
Serial baud rate	2400 ~ 115200 bps (default 115200)
Data bit	8
Stop bit	1 (default), 2
Check Digit	None (default), Odd, Even
Product Size	27 × 27 × 2.8 mm (L × W × H)
Product weight	3.5g _
Working temperature and humidity	-40 ～ +85℃, 5% ～ 95%RH (no condensation)
Storage temperature and humidity	-40 ～ +105℃, 5% ～ 95%RH (no condensation)

3.3 Pin Description

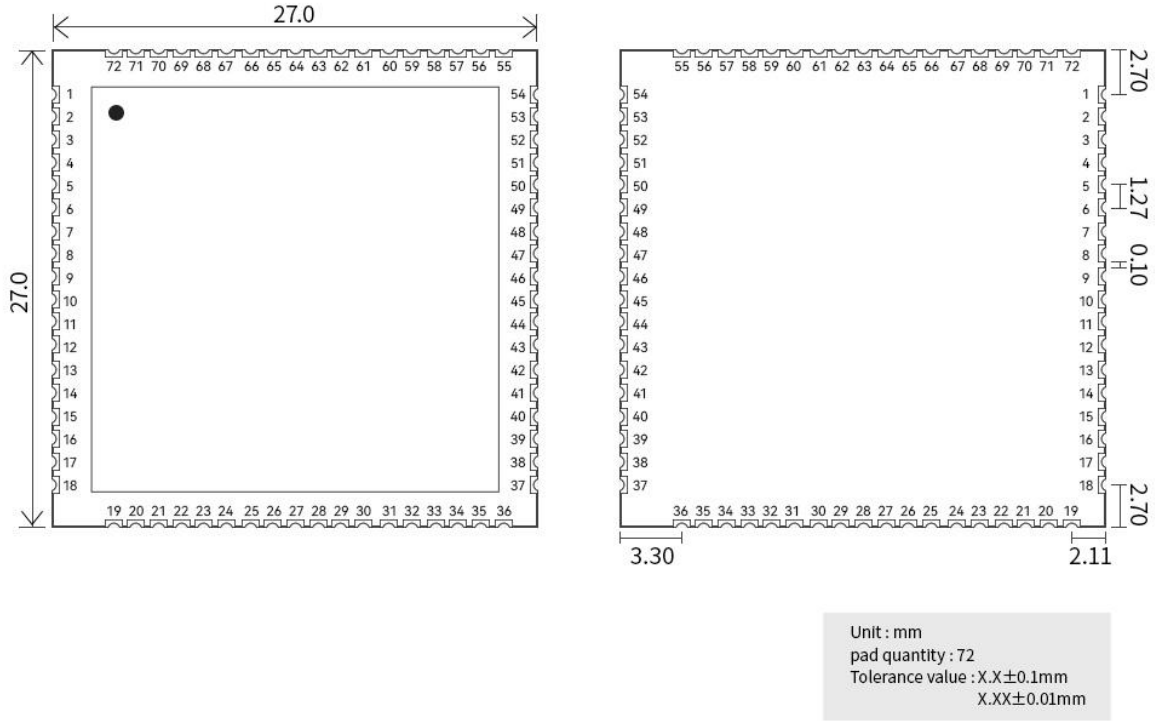


Serial No.	pin	Functional description
1	GND	Common ground terminal, power supply negative terminal input;
2	NC	Default suspending;
3	NC	Default suspending;
4	NC	Default suspending;
5	NC	Default suspending;
6	NC	Default suspending;
7	GND	Common ground terminal, power supply negative terminal input;
8	GND	Common ground terminal, power supply negative terminal input;
9	GND	Common ground terminal, power supply negative terminal input;
10	GND	Common ground terminal, power supply negative terminal input;
11	NC	Default suspending;

12	NC	Default suspending;
13	NC	Default suspending;
14	NC	Default suspending;
15	TXD2	The serial port sends data, only supports 3.3V T TL , if it is connected to 5 V , level conversion is required;
16	RXD2	The serial port receives data, only supports 3.3V T TL , if it is connected to 5 V , level conversion is required;
17	NC	Default suspending;
18	NC	Default suspending;
19	GND	Common ground terminal, power supply negative terminal input;
20	GND	Common ground terminal, power supply negative terminal input;
twenty one	VCC	Positive power input, supports 3-5.5V input , can be used with pin 22 at the same time;
twenty two	VCC	Positive power input, support 3-5.5V input; can be used with pin 21 at the same time;
twenty three	NC	Default suspending;
twenty four	NC	Default suspending;
25	NC	Default suspending;
26	NC	Default suspending;
27	NC	Default suspending;
28	NC	Default suspending;
29	NC	Default suspending;
30	NC	Default suspending;
31	NC	Default suspending;
32	NC	Default suspending;
33	485EN-2	Serial port 2 R S48 5 enable pin, normally low, pull high when sending data
34	NC	Default suspending;
35	NC	Default suspending;
36	485EN-1	Serial port 1 R S48 5 enable pin, normally low, pull high when sending data
37	NC	Default suspending;
38	NC	Default suspending;
39	NC	Default suspending;
40	NC	Default suspending;
41	SPDLED	Network port data indicator
42	LINKLED	Network port connection indicator
43	RX+	Ethernet receives RX+ signal ;

44	RX-	Ethernet receives RX- signal ;
45	TX+	Ethernet sends TX+ signal ;
46	TX-	Ethernet sends TX- signal ;
47	RESTORE	Reset pin, pull it down for more than 5 seconds to take effect
48	TXD1	The serial port sends data, only supports 3.3V T TL , if it is connected to 5 V , level conversion is required;
49	RXD1	The serial port receives data, only supports 3.3V T TL , if it is connected to 5 V , level conversion is required;
50	NC	Default suspending;
51	NC	Default suspending;
52	NC	Default suspending;
53	3.3V	Can output voltage 3.3V ;
54	GND	Common ground terminal, power supply negative terminal input;
55	NC	Default suspending;
56	NC	Default suspending;
57	NC	Default suspending;
58	NC	Default suspending;
59	NRST	Module reset, pull down for more than 1ms to take effect
60	NET	Network connection indicator light, output 2S square wave if the connection is successful If the connection is unsuccessful, output a 1S rectangular wave, pull it high at 0.9S, and pull it low at 0.1S
61	NC	Default suspending;
62	NC	Default suspending;
63	NC	Default suspending;
64	NC	Default suspending;
65	LINK1	Serial port 1 data link indicator, U DP mode output low level ; In other modes, if the connection is successful , the output will be low level, and if there is no connection, the output will be high level ;
66	DATA1	Serial port 1 data indicator pin, output 50ms square wave when there is data interaction;
67	LINK2	Serial port 2 data link indicator, U DP mode output low level ; In other modes, if the connection is successful , the output will be low level, and if there is no connection, the output will be high level ;
68	DATA2	Serial port 2 data indicator pin, output 50ms square wave when there is data interaction;
69	NC	Default suspending;
70	NC	Default suspending;
71	NC	Default suspending;
72	NC	Default suspending;

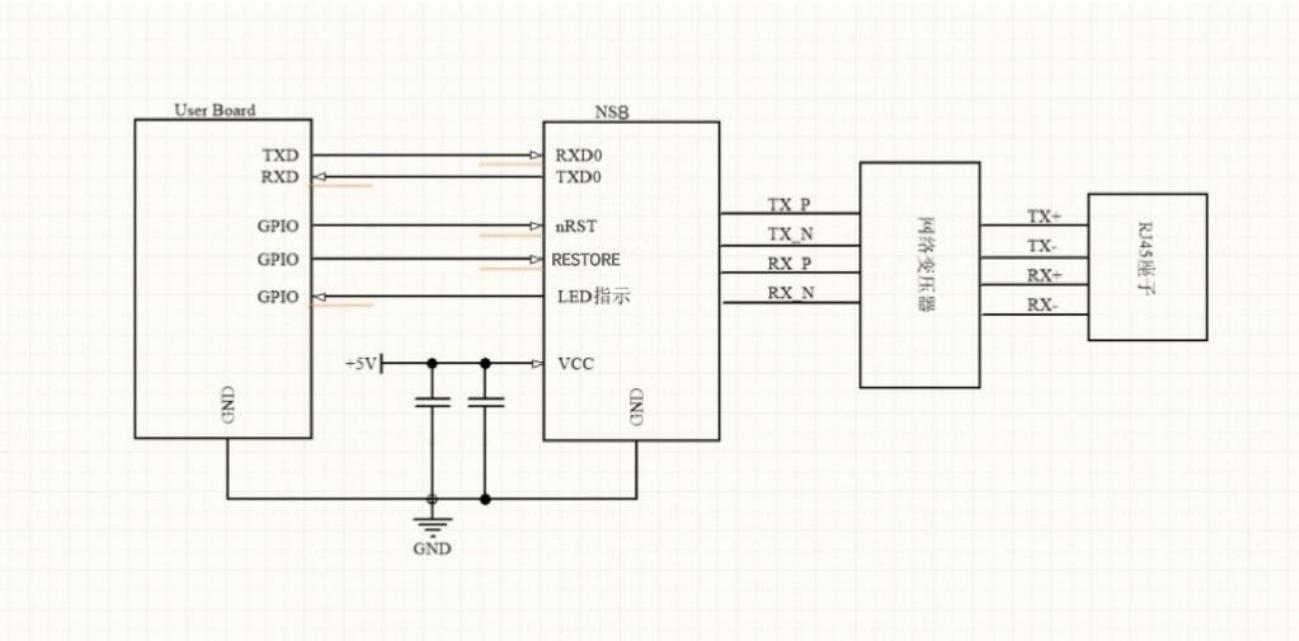
3.4 Dimensions



Unit : mm
pad quantity : 72
Tolerance value : X.X±0.1mm
X.XX±0.01mm

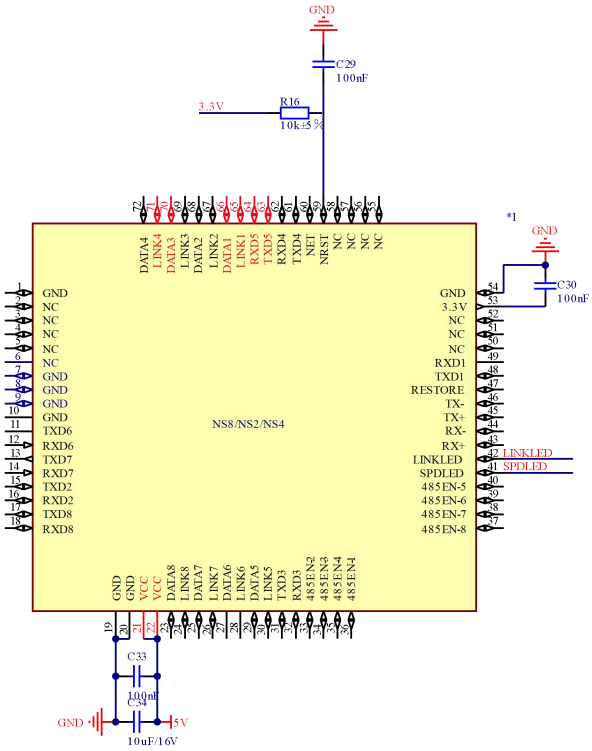
3.5 Hardware Reference Design

3.5.1 Typical application hardware connection



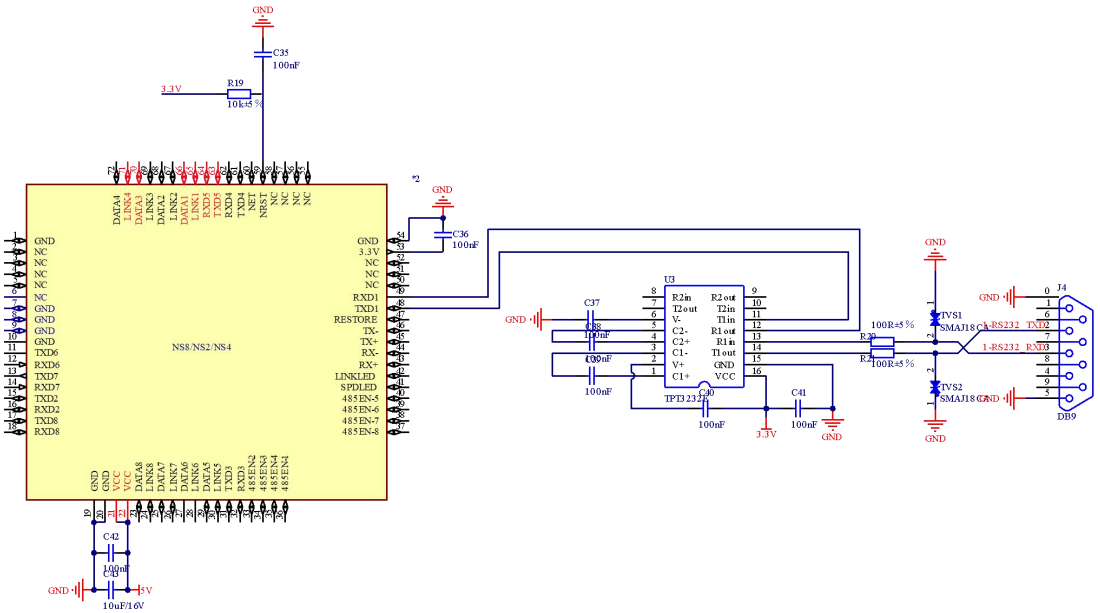
3.5.2 power interface

NS 2 uses DC typically 5 V. The voltage range of V CC is 3.0~ 5.5 V, the normal working current is 200 mA @5V , and the peak current is about 300 mA @5V . It should be noted that if the power supply is less than 3.3V , the 3.3V output of pin 53 will vary according to the input. V CC can be connected to 10UF/ 16V /10% and 100nF/50V/10% bypass chip capacitors to stabilize the module , and the NRST reset pin needs to be pulled up . As shown below.



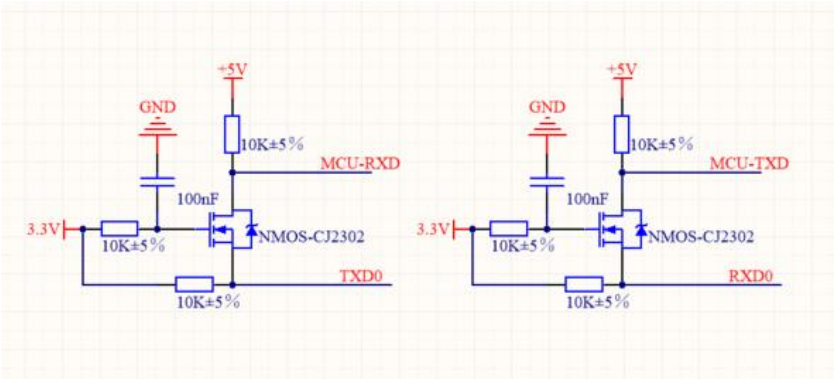
3.5.3 UART interface

UART is a serial data interface and only supports TTL-3.3V communication level. It can connect RS-232 chip to RS-232 level and connect with external equipment. The UART interface of this module includes TXD/RXD signal lines. Taking the RS-232 level as an example, the reference circuit is as follows:



If it is to communicate directly with MCU (3.3V level), just add the TXD of the module to the RXD of the MCU, and connect the RXD of the module to the TXD of the MCU. If the MCU is at 5V

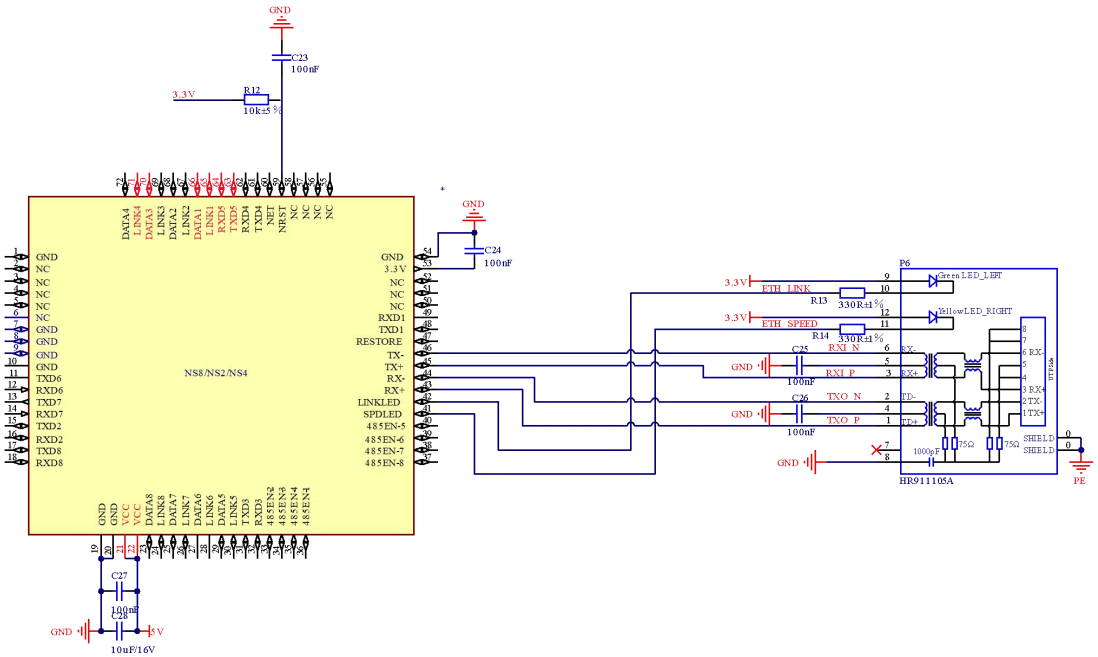
level, a conversion circuit needs to be added in the middle, as shown in the figure below:



3.5.4 Application of External Network Transformer for 10 M Ethernet Interface

The NS 2 module can be connected to an external 10 M Ethernet physical interface, and supports the design method of interconnecting RJ45 connectors and network transformers.

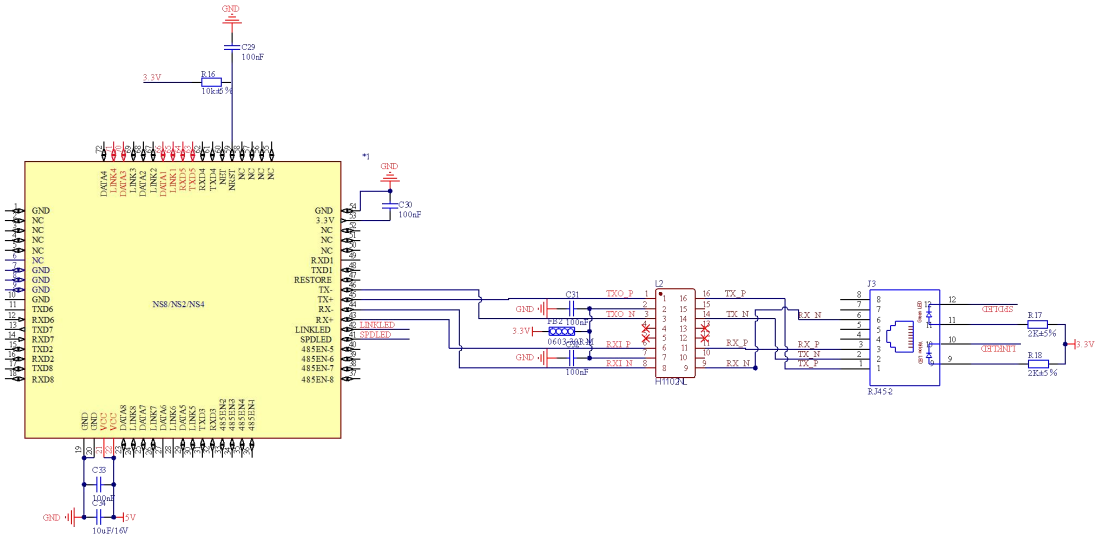
The network transformer and RJ45 connector are combined into a standard 10M Ethernet physical interface, and then connected to the NS1 module. RX+ and RX- are differential lines, 100 ohm differential impedance matching, TX+ and TX- are differential lines, 100 ohm differential impedance matching. The hardware design reference circuit diagram is as follows:



3.5.5 Application of 10M Ethernet interface built-in network transformer

RJ45 built-in 2KV electromagnetic isolation network transformer. The corresponding network data receiving pin of the NS1 module is directly AC-coupled with the data receiving pin of the

Ethernet physical interface, and is used as a data transmission channel in the system. RX+ and RX- take differential lines, 100 ohm differential impedance matching, TX+ and TX- take differential lines, 100 ohm differential impedance matching. The hardware design reference circuit diagram is as follows.



3.5.6 Reference package

In order to facilitate the customer's hardware layout, Ebyte has made a corresponding PCB package library. Please download the specific documents from the official website

https://www.ebyte.com/product-class-all.html

Chapter 4 Basic functions

4.1 Correspondence between channel and serial ports

Baud rate: 2 400 , 4 800 , 9 600 , 1 4400 , 1 9200 , 3 8400 , 5 7600 , 7 6800 , 1 15200bps ;
Data bits: only 8 bits are supported;
Parity bit: support no parity (N ONE), odd parity (O DD), even parity (E VEN);
Hardware flow control: not supported;

aisle	default working mode	default port
channel 1	T CPS	8001
channel 2	T CPS	8002

4.1 Local network parameters

4.1.1 Local IP

S TATIC (static IP) : users can define configuration IP , subnet mask, default gateway, domain name resolution server (D NS server);

D HCP (dynamic IP acquisition): The device logs in to the server to automatically obtain the IP address , subnet mask, gateway address, and DNS server address parameters assigned by the server and configure them for use;

4.1.2 D NS (domain name resolution)

the domain name, the DNS server will be automatically queried, and the DNS server will retrieve the database to obtain the corresponding IP address. In the static IP mode , the user can customize the domain name resolution server to resolve private domain name server data. In this mode, the device automatically follows the domain name resolution server configured by the routing device, and the user only needs to modify the DNS server of the routing device without configuring the device.

4.1.3 Network disconnection reconnection cycle

When the device detects that it is disconnected from the server, it periodically initiates a reconnection request, so the "disconnection reconnection time" will not affect the connection establishment time under normal circumstances. Users can customize the configuration request cycle, and the default is 5s.

4.1.4 Timeout restart (no data restart)

The device monitors data sending and receiving. If the device does not send and receive data for a long time, the device will automatically restart to ensure the stability of long-term work.

The default cycle of this function is 5 minutes, and the user can customize the cycle of restarting with timeout or no data.

4.2 Hardware factory reset

RESTORE pin of the device is kept low for 5s, and the factory reset of the device is completed.

4.3 Device working mode

4.3.1 TCP Server

TCP Server is the TCP server. In TCP Server mode, the device listens to the local port, accepts the connection request from the client and establishes a connection for data communication. When the Modbus gateway function is turned off , the device sends the data received by the serial port to all client devices connected to the device.

The number of clients that can be accessed by the server is dynamically adjusted. First, ensure that each channel of the 2 channels can establish a complete communication link. In addition, the device also has 14 dynamic access communication links. For example, if the device turns on the 2-channel server mode, each The server can access 8 client devices, or if the device opens 1 server, the server can connect to 15 client devices. If the number of client devices exceeds the access number, the device will refuse to connect.

4.3.2 TCP Client

TCP Client is the TCP client. When the device is working, it will actively initiate a connection request to the server and establish a connection to realize the interaction between serial port data and server data.

To use the client, you need to configure the IP address /domain name and target port of the target accurately .

2 channels can independently open 2 -way TCP client .

4.3.3 UDP Server

UDP Server means that the device does not verify the source IP address of the data when using the UDP protocol to communicate. After receiving a UDP data packet, it saves the source IP address and source port of the data packet, and sets it as the target IP and port . , so the data sent by the device only sends data packets to the source IP address and port where the device received data last time.

This mode is usually used in scenarios where multiple network devices communicate with this device, and the frequency is high, and the TCP Server cannot meet the conditions.

Using UDP Server requires the remote UDP device to send data first, otherwise the data cannot be sent normally.

[Note] In UDP mode , the data sent by the network to the device should be less than 5 12B it per packet, otherwise it will cause data loss .

4.3.4 UDP Client

UDP Client is a connectionless transmission protocol that provides transaction-oriented simple and unreliable information transmission services. There is no connection establishment and disconnection, and data can be sent to the other party only by configuring the destination IP and destination port. It is usually used in the data transmission scenario where there is no requirement for the packet loss rate, the data packet is small and the sending frequency is fast, and the data is to be transmitted to the specified IP.

In UDP Client mode, the device will only communicate with the configured (target IP and target port) remote UDP device .

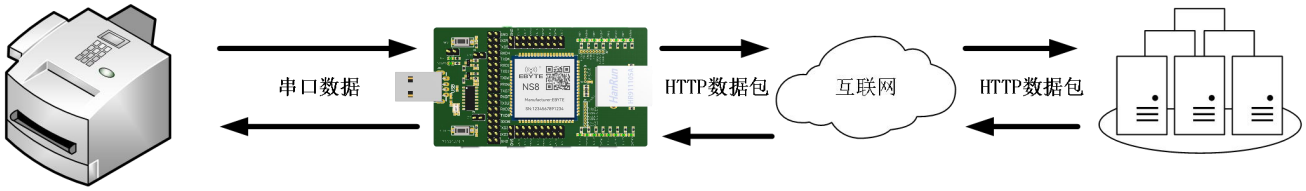
In this mode, the destination address is set to 255.255.255.255, and the sending data will be broadcast on the entire network segment, but the sending and receiving devices need to ensure that the ports are consistent, and the device can also receive broadcast data .

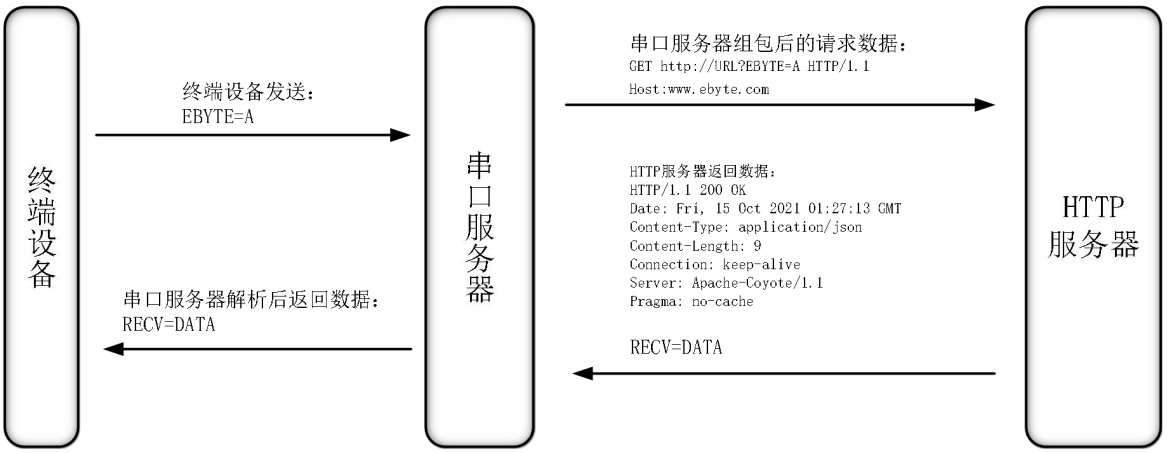
[Note] In UDP mode, the data sent by the network to the device should be less than 5 12B it per packet, otherwise it will cause data loss.

4.3.5 HTTP client

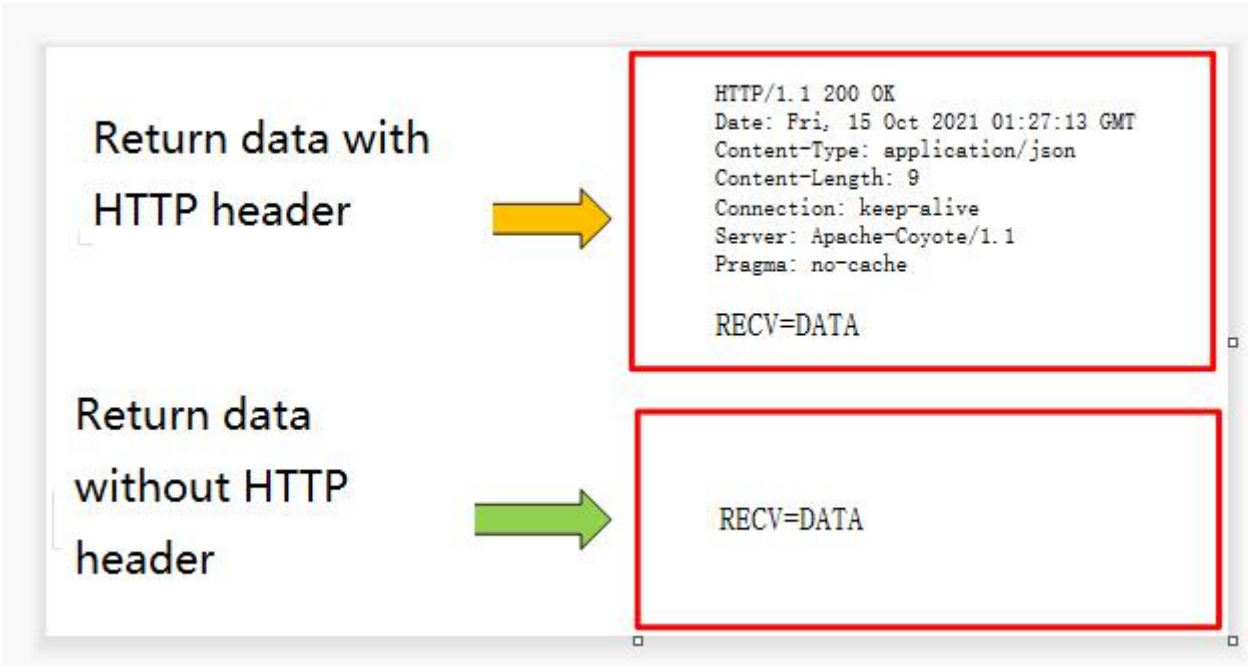
This mode can realize HTTP automatic package function, and provides two methods of GET and POST. Customers can configure URL, Header and other parameters by themselves, and the device will send the package to realize fast communication between serial port data and HTTP server. URL and Header It supports up to 128 bytes of data, and the two channels can independently open the HTTP client mode without affecting each other.

The HTTP request data should be smaller than the packet length (5 to 12 bytes), otherwise the device will divide the request data into multiple packets for request, resulting in abnormal request.

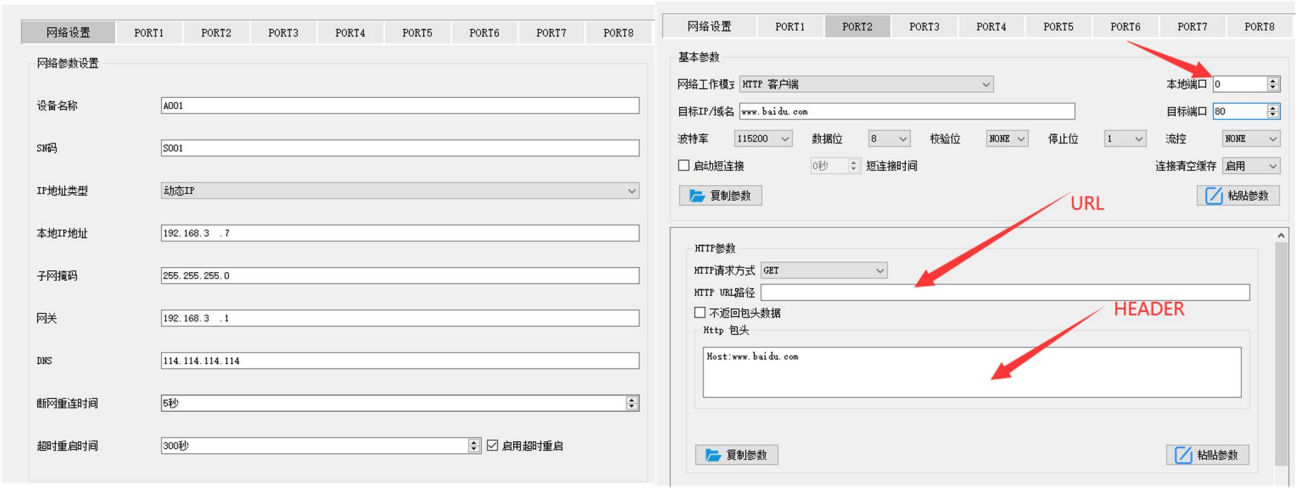




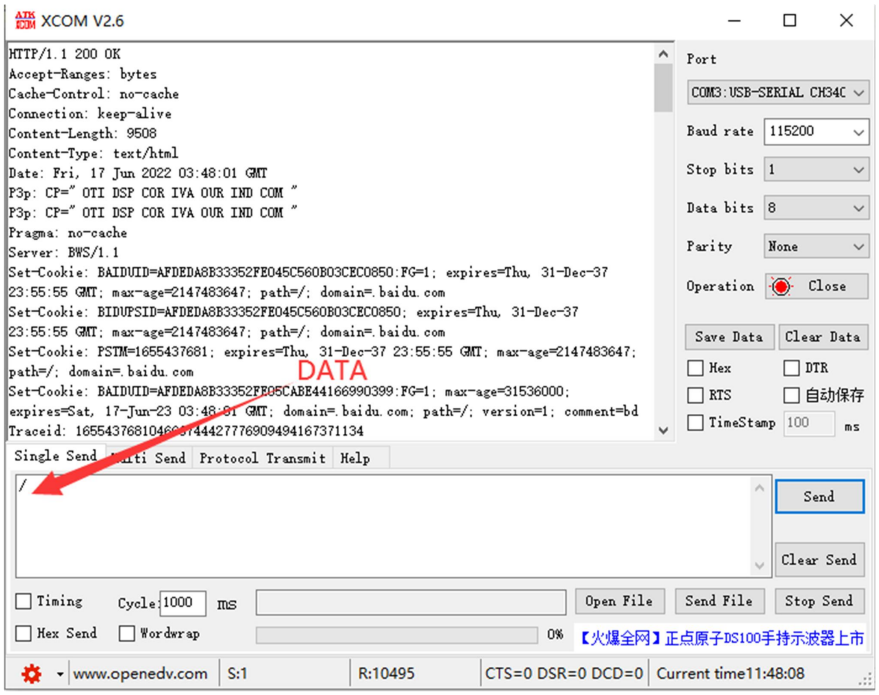
It supports configuring whether to return the HTTP protocol header, and the returned data is shown in the figure below:



Configuration instructions, turn on the host computer, search for the device and enter the device configuration interface, configure the "network parameters" first, it is recommended to use the DHCP function , to avoid the device IP abnormality caused by wrong configuration (network segment error, IP conflict, etc.), it needs to be used in the configuration The channel with HTTP function supports 2 channels to configure the HTTP client mode at the same time. Here is an example of requesting the "Baidu" webpage through GET (URL : empty , H EADER : Host : www.baidu.com , target domain name : www .baidu.com , target port: 8 0 , it is recommended to use a random port for the local port), the specific configuration is shown in the figure below:



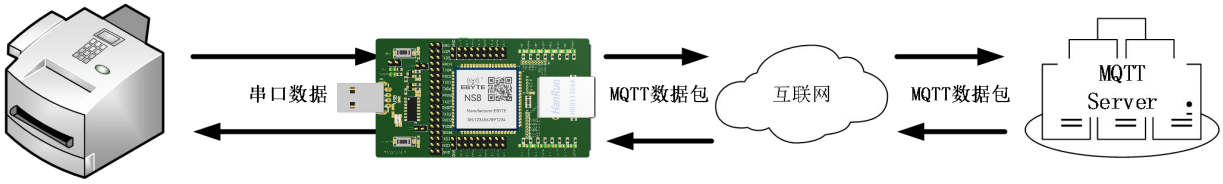
The request data is "/", use the serial port assistant to get the web page:

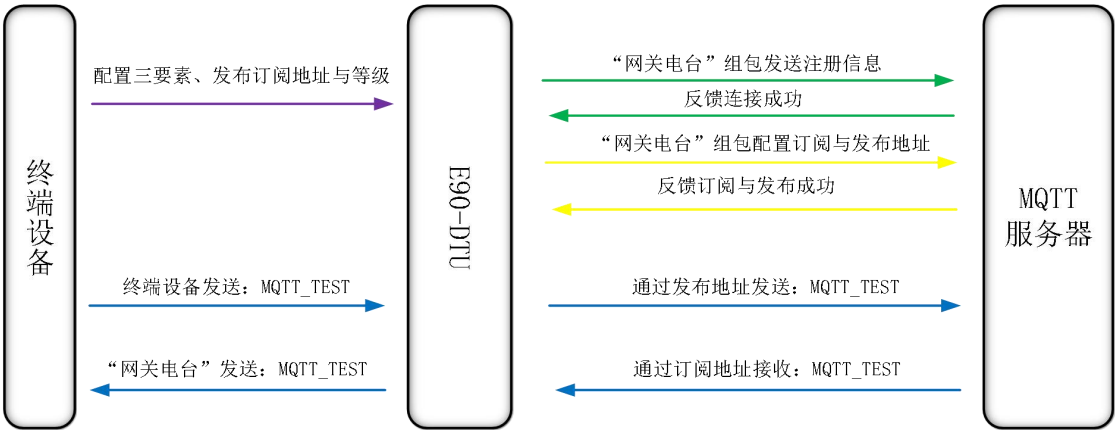


POST description, the header data configured as POST request method does not need to configure the header data with a separate data length (for example: Content -length: 2729) , the device will automatically calculate the data length and group the packet to send, other header data needs to be manually configured, at most Support 1 28 bytes data configuration.

4.3.6 MQTT client

Supports fast access to standard MQTT3.1.1 protocol servers (OneNET, Baidu Cloud, Huawei Cloud, user-built server types, etc.) and Alibaba Cloud servers, supports quality of service configuration (Qos 0, Qos 1), and supports ultra-long text Configuration, convenient and better access to network service operators (server address, three elements, subscription and publishing address support up to 128 characters configuration, Alibaba Cloud product key 6 4 characters).





When using the M QTT function, you should close the short link, otherwise the device will repeatedly connect to the server. It is recommended to use a random port, as shown in the figure below:

1. To select the standard MQTT3.1.1, Baidu Cloud, OneNET, and Huawei Cloud configurations, you can refer to the following table to fill in the parameters:

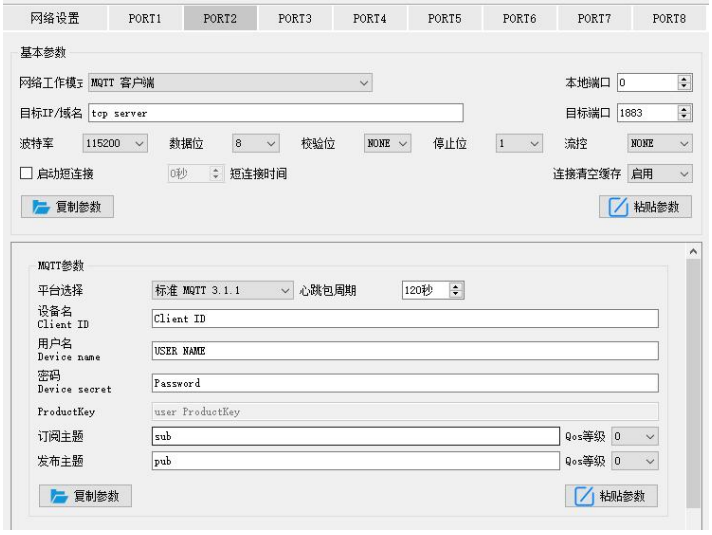
parameter	Standard M QTT3.3.1	Baidu cloud	One NET
Equipment name (Client ID)	Client ID	DeviceKey	device ID
username (Device name)	User Name	IoTCoreId/Device Key	Product ID
password (Device secret)	Password _	DeviceSecret	Device Name/ User Password
PrductKey _	Alibaba Cloud parameters, can be left blank		
post topic	M QTT release topic address (dynamically generated by		

	One NET)
subscribe topic	M QTT subscription topic address (dynamically generated by One NET)

【Note】

- Dynamically generating topic addresses can use the same parameters to achieve the effect of data return, for example: OneNET publishes and subscribes to the same topic address: 1 23456 to achieve data return;
- the adjustment of the M QTT platform (Baidu Cloud, Huawei Cloud, OneNET), the connection cannot be made after filling in the parameters, and the platform rules shall prevail;

Take the standard MQTT3.1.1 parameter filling as an example, as shown in the figure below:



2. Ali Cloud

It supports the use of Alibaba Cloud's "three elements" to directly connect to the server to obtain the "three elements" needed to connect to Alibaba Cloud, as shown in the figure (only for demonstration cases, users need to use self-built parameters to connect):

Configure Topic for communication test:

Configuration theme description:

Select the corresponding product, click "Customize To pic " under the Topic class list (please refer to the Alibaba Cloud documentation for details), click "Define To pic class", configure the name as 1 234 and grant publish and subscribe permissions (use for data return).

Configure the device connection parameters, as shown in the figure below (the left picture is the upper computer, and the right picture is the webpage configuration) :

{

"ProductKey": "a1GlhuTU1yN",

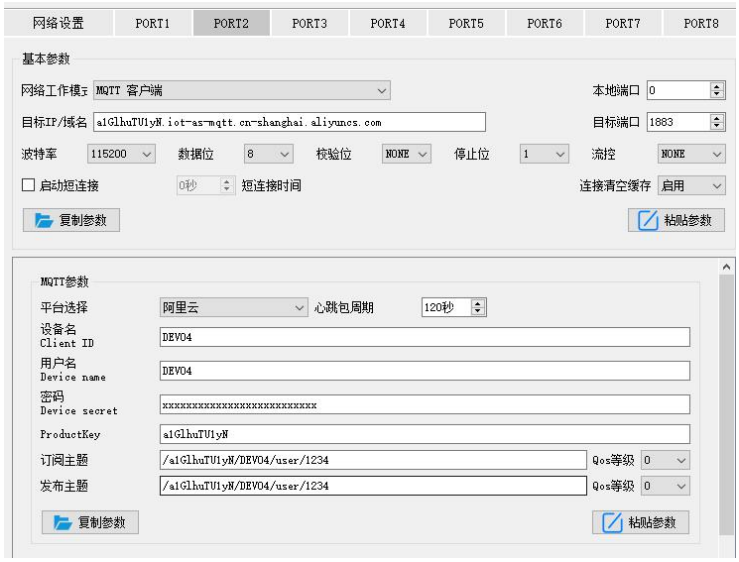
"DeviceName": "DEV04",

"DeviceSecret": "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"

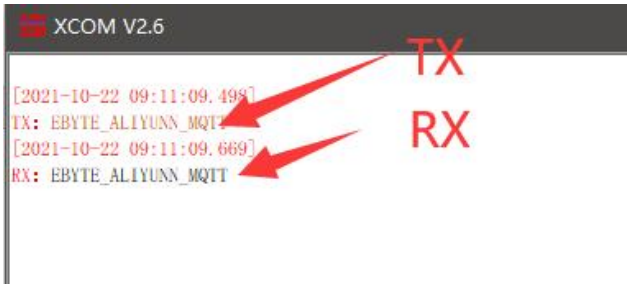
}

Aliyun server address: ProductKey . iot-as-mqtt.cn-shanghai.aliyuncs.com:1883

pic for subscription and publishing : /a1GlhuTU1yN/DEV04/user/1234



Alibaba Cloud M QTT platform communication test:



4.4 Channel port

Random port:

TCP client, UDP client, HTTP client, MQTT client can configure the local port as 0 (use random local port), server mode cannot use random port, otherwise the client cannot establish the connection correctly (device is not correctly configured) port listening).

Using a random port connection can quickly re-establish the connection when the device is accidentally disconnected from the server, preventing the server from rejecting the connection due to four waved incomplete. It is recommended to use a random port in client mode.

the device configures the TCP client, HTTP client, and MQTT client mode at AT , it will automatically configure a random port, which can be canceled by customization.

Static port:

Device fixed port (factory default use: 8 001-800 2), TCP server mode device listens to the configuration port, accepts the connection request from the client and establishes a connection for data communication, and TCP client mode device fixed port initiates a connection request.

5 Advanced Features

5.1 Heartbeat package and registration package

5.1.1 heartbeat packet

In client mode, users can choose to send heartbeat packets and customize the heartbeat packet time. The heartbeat packet can choose network heartbeat packet and serial port heartbeat packet. It supports hexadecimal and ASCII code sending. This heartbeat packet is not MQTT heartbeat. It needs to be closed when using MQTT client mode. MQTT heartbeat can only be set in the "MQTT parameter configuration" column. Configure "Heartbeat Period" in the next step. The content of the MQTT heartbeat packet is restricted by the protocol and cannot be configured. It is recommended not to configure it for less than 60s. For example, the Alibaba Cloud manual recommends using 120s.

Heartbeat packet sending mode:

1. The default is to turn off the heartbeat packet mode.
2. Serial mode -> The device sends heartbeat content to the serial bus according to the set heartbeat time interval.
3. Network port mode -> The device sends heartbeat content to the network port bus according to the set heartbeat time interval.

Customize the content of the heartbeat packet (support up to 40 bytes (ASCII) data, 20 bytes (HEX) data)

Customize the heartbeat packet sending time interval. When it is set to 0, the heartbeat packet function is turned off. When the value is greater than 0, the heartbeat packet function is turned on. When it is turned on, the range can be set: (1-65536) seconds, and the default value is 0.

5.1.2 Registration package

In the client mode, the user can choose to send the registration package and customize the registration package time.

The registration package supports the following modes:

1. The MAC address (OLMAC) is sent when the network establishes a connection with the device.

2. The data of the custom registration package (OLCSTM) is sent when the network establishes a connection with the device.
3. After the connection between the network and the device is established, the MAC address (EMBMAC) is added in front of each packet of data sent by the device to the network.
4. After the connection between the network and the device is established, each packet of data sent by the device to the network will be prepended with custom registration packet data (EMBCSTM).

Customize the content of the registration package (support up to 40 bytes (ASCII) data, 20 bytes (HEX) data)

[Note] When configuring the registration package, it is recommended not to use special characters (such as "," "\", "/", etc.), if you want to use it, it is recommended to use hexadecimal configuration .

5.2 Short connection

In client mode, short network connections are supported (this function is disabled by default). TCP short connections are mainly used to save server resource overhead, and are generally used in multi-point (multi-client) to one-point (server) scenarios.

The TCP short connection function is applied in the TCP Client mode. After the short connection function is turned on, it only requests to connect with the server when sending information. After the connection is successful, the serial port does not receive data or the network port has no data to send and receive within the set time. The device will automatically disconnect.

When the short link hold time is set to 0, the short link function is disabled. When the setting range is (2-255) seconds, the short connection function is enabled, and the default hold time is 0 seconds (short connection is turned off).

5.3 Serial buffer cleaning

When the TCP connection is not established, the data received by the serial port will be placed in the buffer area. The serial port receiving buffer is 512 bytes. After the network connection is successful, you can choose to clear the serial port buffer or send the buffer through the network through configuration.

Enable: The device does not save the data received by the serial port before the connection is established.

Disabled: After the connection is established, the network will receive the data buffered by the serial port .

5.4 Modbus gateway

5.4.1 Protocol conversion

Enable: Verify Modbus data and discard non-Modbus data (R TU/TCP) without transmission, and convert Modbus RTU protocol to Modbus TCP protocol.

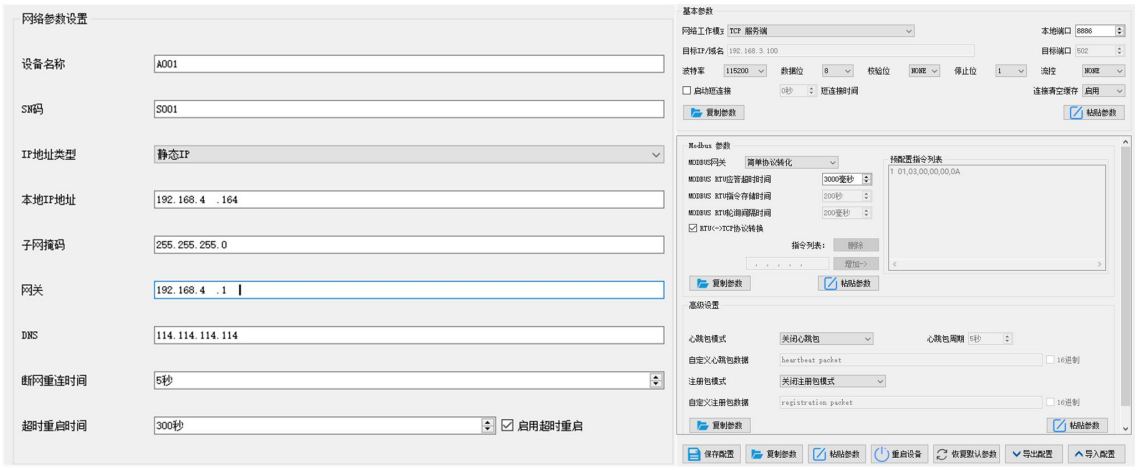
Disabled: Do not perform protocol conversion but check Modbus data, discard non-Modbus data (R TU/TCP) and do not transmit.

5.4.2 Simple Protocol Conversion

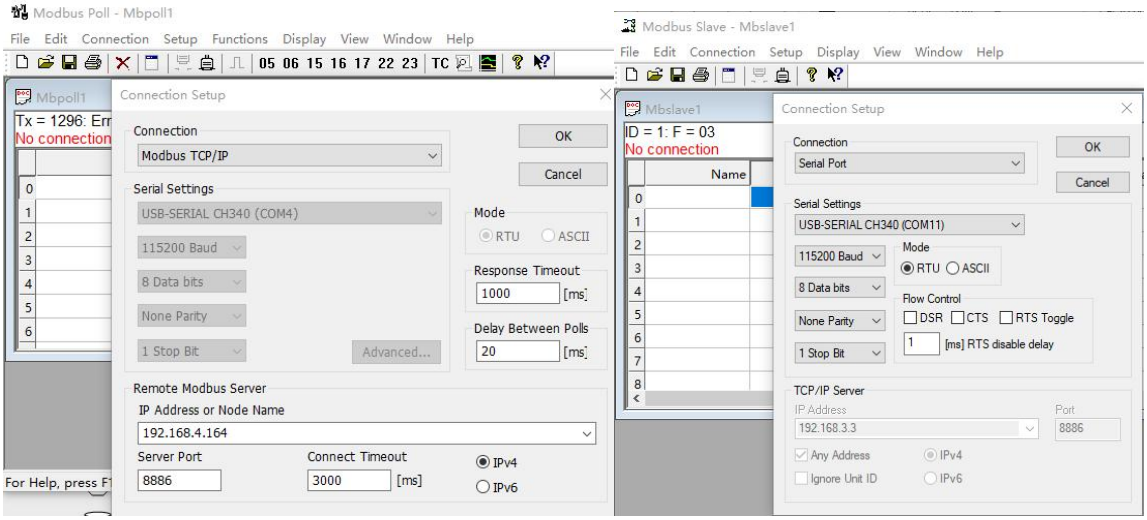
Modbus RTU data to Modbus TCP data, or convert Modbus TCP data to Modbus RTU data, and realize the mutual conversion between Ethernet Modbus data and serial port Modbus data.

Simple protocol conversion can work in any mode (TCP client, TCP server, U DP client, U DP server, M QTT client). This gateway mode does not support multi-host operation. If you need multiple hosts, please use "storage gateway" and "multi-host mode".

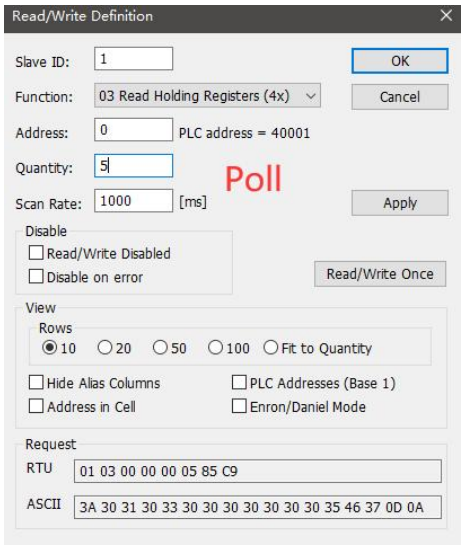
Simple protocol conversion configuration:



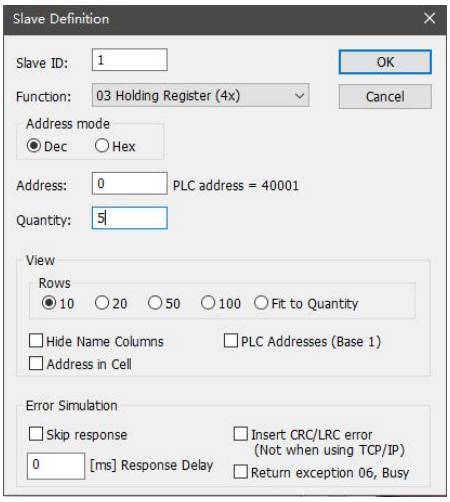
Modbus Poll and Modbus Slave software debugging :
Software connection settings:



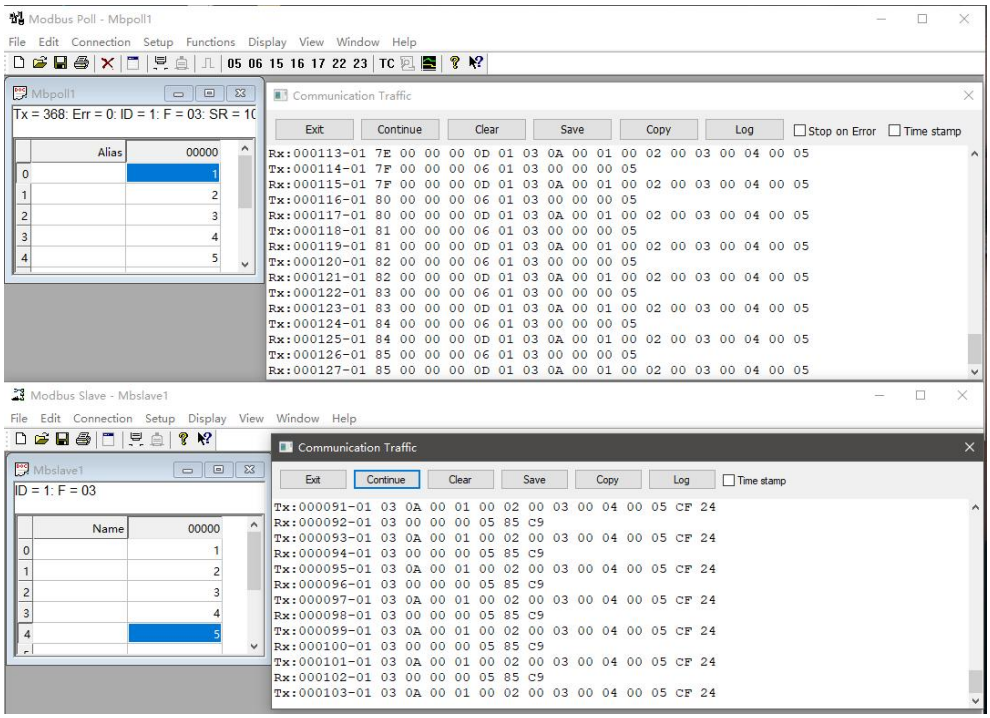
Software register reading and emulation configuration:
Poll menu selection Set up →Read/Write Definition



Slave menu select Set up →Slave Definition



Newsletter Demo:

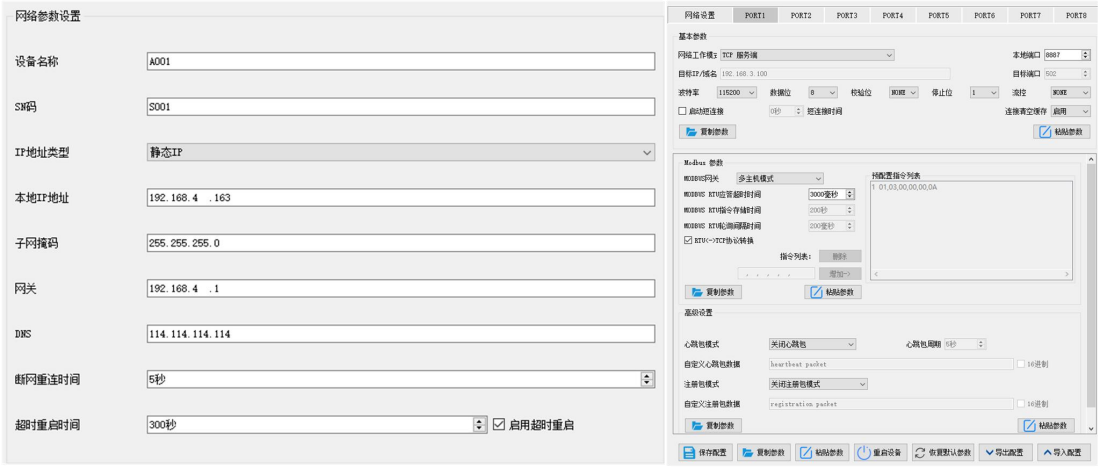


5.4.3 Multi-host mode

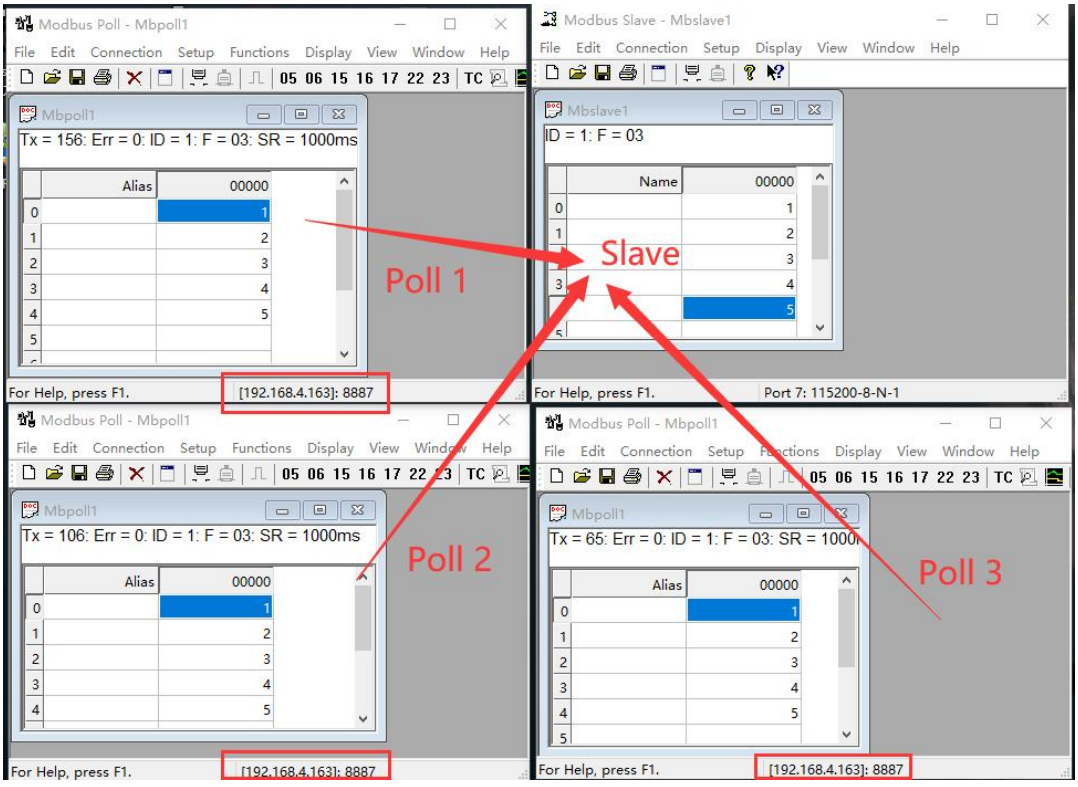
Relatively simple protocol conversion can only have one Modbus master station, while the multi-host mode can simultaneously access multiple Modbus TCP hosts. When multiple Modbus hosts access at the same time, the Modbus gateway will perform bus occupancy scheduling (RS -485 The bus can only process one request at a time, and the multi-host mode will sort and process according to the TCP request , and other links will wait), thus solving the bus conflict problem (currently, it supports up to 15 Modbus channels in single server mode TCP host connection, multi-channel host access at the same time should pay attention to the matching of the request interval and timeout time, otherwise the transmission rate of the serial port is much lower than the transmission rate of the Ethernet, resulting in packet loss. If you need a fast response, it is recommended to use a "storage gateway"), it only supports working in TCP server mode, and the

slave can only be on the serial port, otherwise it cannot work normally.

As the number of hosts increases, the Modbus timeout should be increased accordingly. If multiple hosts need continuous high-speed requests, it is recommended to use "storage gateway", and it is recommended to configure "simple protocol conversion" when there are no multiple hosts.



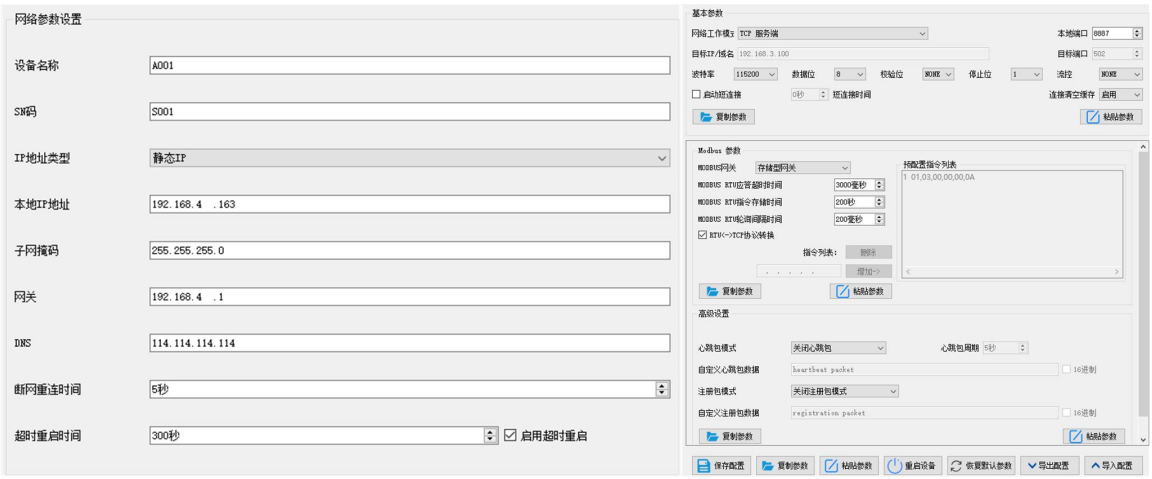
Refer to "Simple Protocol Conversion" for software configuration and register configuration, and open multiple Modbus Poll software at the same time (3 channels as an example, and a single server model can support up to 15 channels).



5.4.4 Storage gateway

The storage gateway not only arbitrates the bus data, but also stores repeated read instructions. When different hosts request the same data, the gateway does not need to ask the RTU device register status multiple times, but directly returns the data cached in the storage area, which is

extremely It greatly improves the multi-host request processing capability of the gateway, and also shortens the time consumed by the entire request process. Users can customize the polling interval of the storage area instructions and the instruction storage time according to their needs.



As an optimization of multi-host request performance, the storage gateway can only work in the TCP server mode, which improves the response speed of the network side.

Features:

（1） The gateway has a 2K cache for storing instructions and returning results (reading 10 holding registers as an example, it can store about 67 instructions and returning results);

（2） The RTU response timeout automatically clears the cache to ensure the real-time and authenticity of the data;

（3） The polling interval can be customized, 0 -65535 ms (default: 200ms) ;

（4） RTU device according to the storage time of the command used for configuration . If the MODBUS host does not query the command again during the storage time, the gateway will automatically delete the storage command to release the cache;

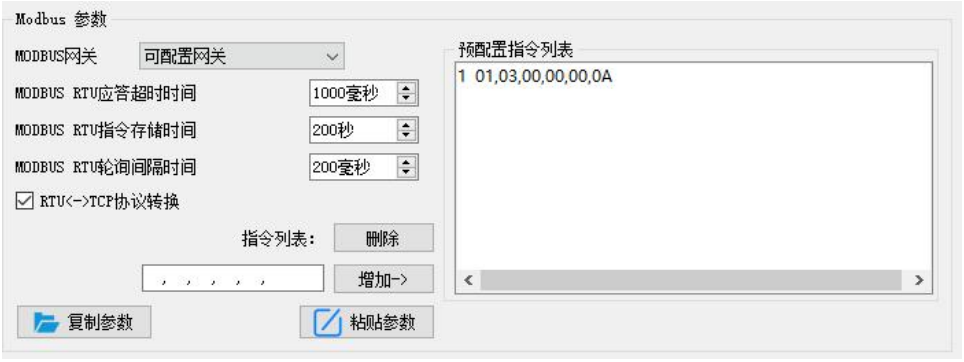
（5） The first instruction and control instruction (05 , 06 , 0F , 10 function code) will directly access the RTU device ;

（6） Only support 0 1 , 0 2 , 0 3 , 0 4M od bus function code query result storage;

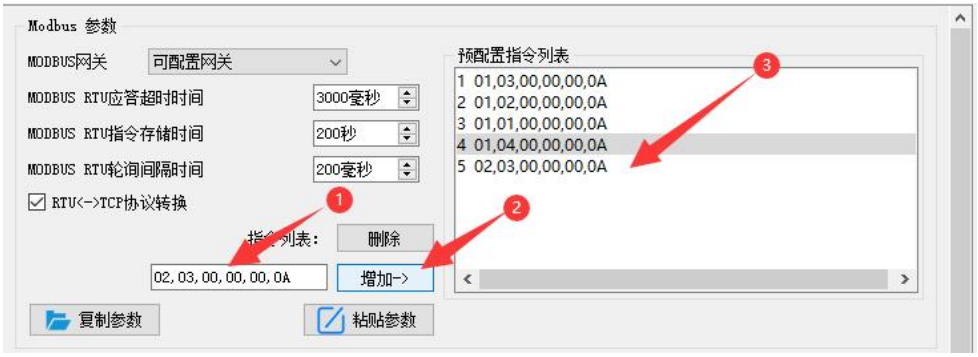
5.4.5 Configurable gateway

The gateway automatically polls the RTU device registers according to the pre-configured MODBUS commands (only supports the configuration of MODBUS read commands), and the commands in the non-storage table will directly operate the RTU device, and the frequently read commands can be stored in the gateway in advance, which can shorten the Response time (command to query configuration), the data will not be sent directly to the server and will only be returned after the request of the Modbus host, which is similar to the use method of "simple protocol conversion". If you need to automatically upload the data to the server, please select "automatic upload". Due to the above characteristics, the serial port side of the configurable gateway can only be connected to

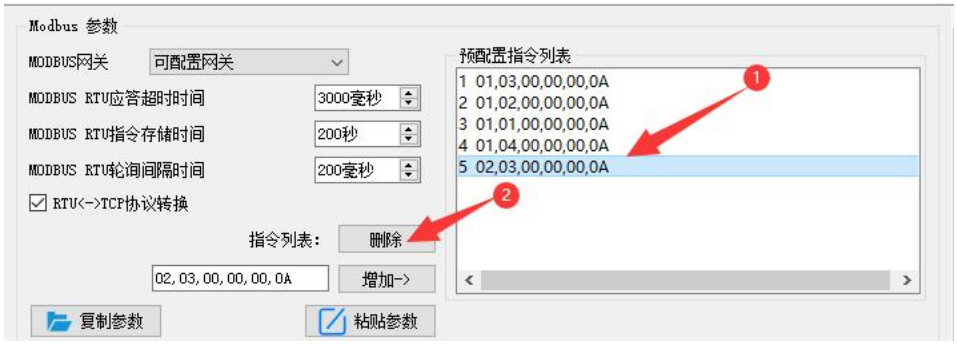
the Modbus slave station.



Instructions storage instructions (increase, instruction errors and format errors cannot be added):



Instruction storage instructions (delete):

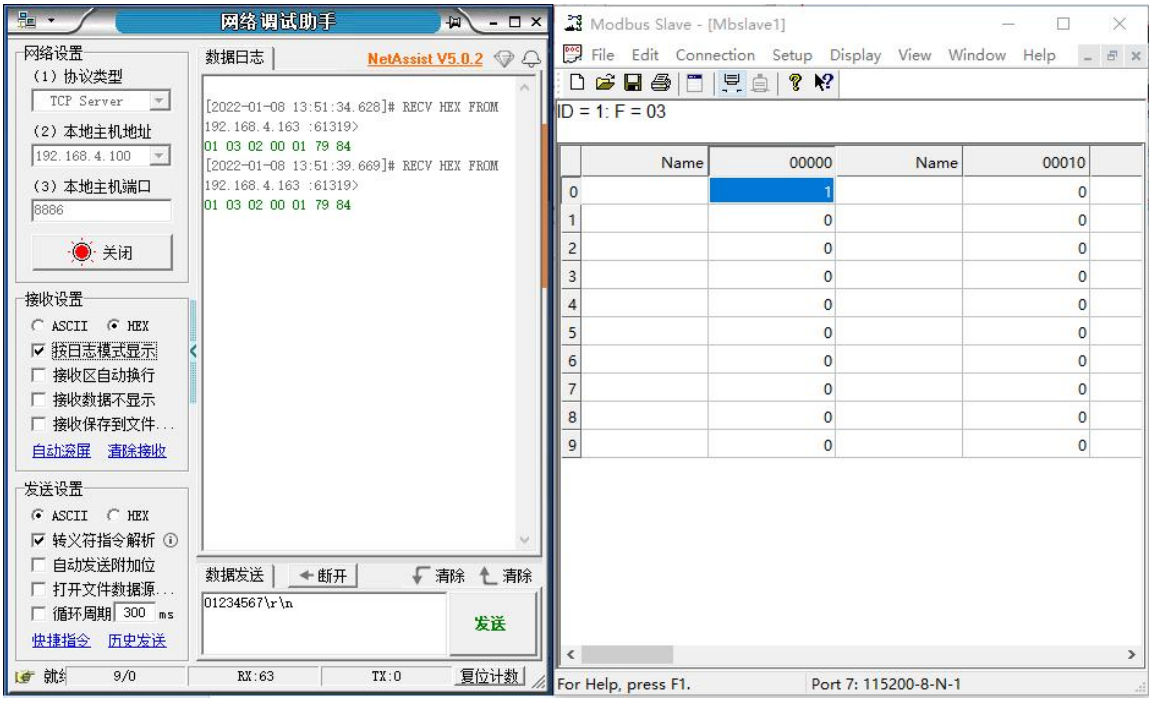


5.4.6 Automatic upload

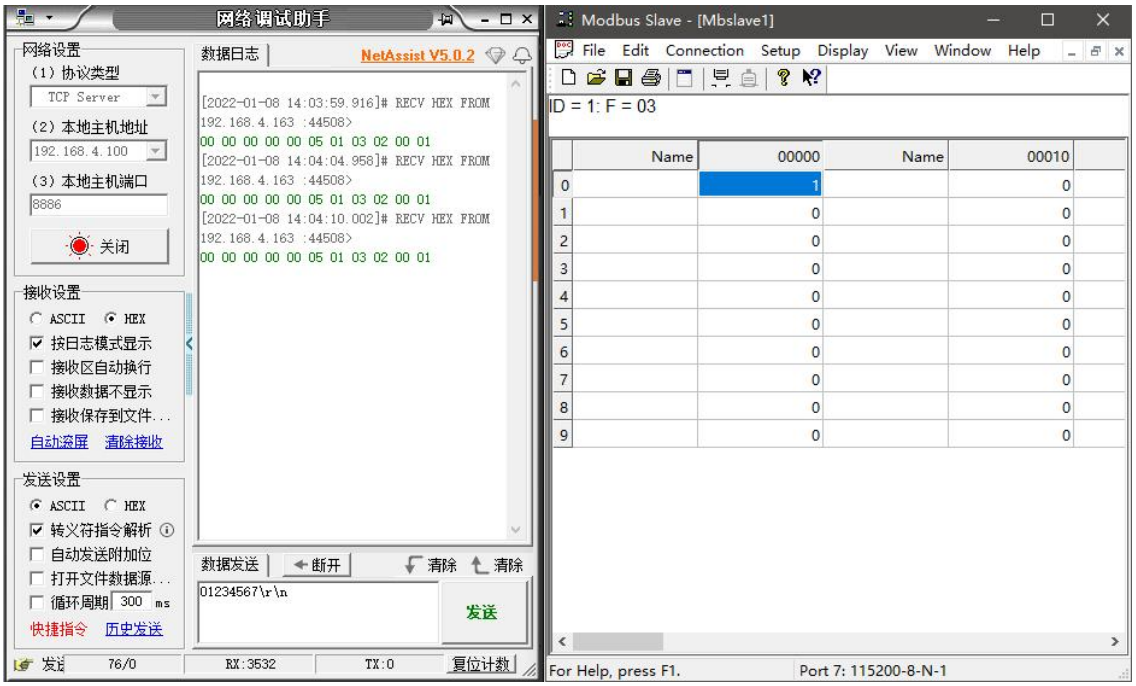
In the client mode (TCP client, UDP client, MQTT client, HTTP client) the gateway will automatically poll the instructions stored in the instruction table and upload them to the server. You can choose the feedback format (Modbus RTU format or Modbus TCP format) according to your needs.) and command polling interval (0-65535ms).

Instruction pre-storage refers to "Configurable Gateway - Instructions for Instruction Storage", and automatically uploads the host computer/webpage configuration:

TCP client demo (Modbus RTU format):



TCP client demo (Modbus TCP format):



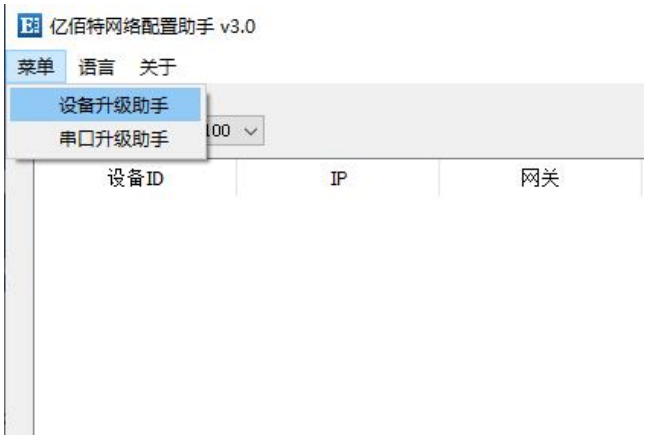
5.5 Firmware upgrade

upgrade the firmware of the device through the "Ebyte Network Configuration Tool" .

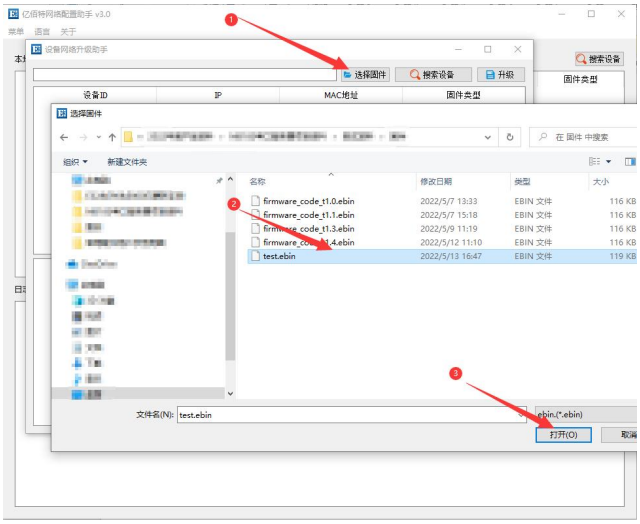
5.5.1 UDP upgrade

Step 1: Open the "Ebyte Network Configuration Tool", and select "Device Upgrade Assistant" under

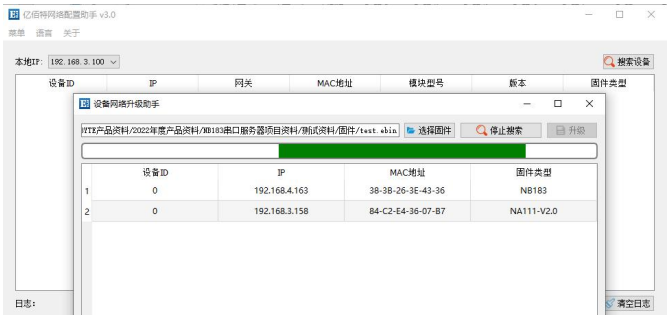
the "Menu" option;



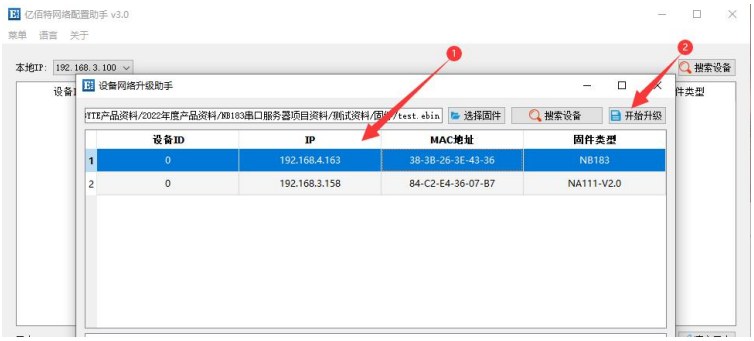
Step 2: Select the firmware to be used, which needs to be obtained from the "Related Downloads" of the corresponding product details on the official website (www.ebyte.com) . The demo firmware is not provided on the official website.

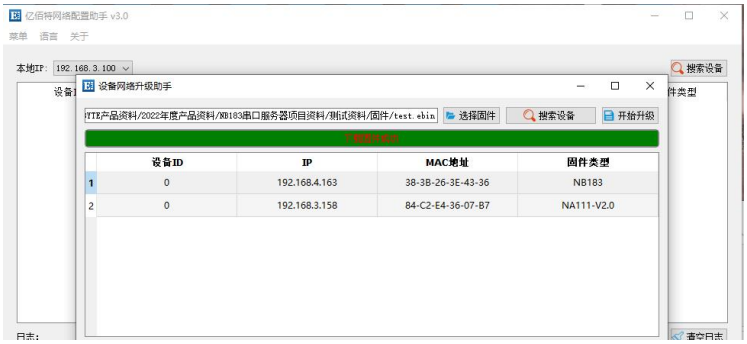


Step 3: Click "Search Device", the device list will display the currently found device, click "Stop Search" again.



After selecting the device to be upgraded, click Start to upgrade, and wait for the host computer to display that the upgrade is complete.





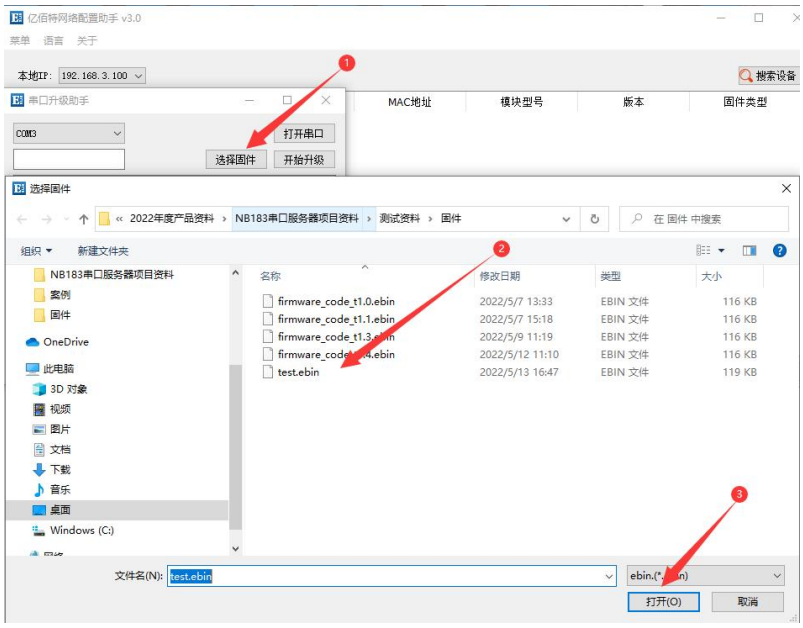
5.5.2 Serial upgrade

Only channel 1 (that is, serial port 1, which can use RS232 interface / RS485 interface) supports the use of serial port for upgrading. When the network upgrade fails or the network environment is complicated, it is recommended to use the serial port for upgrading ;

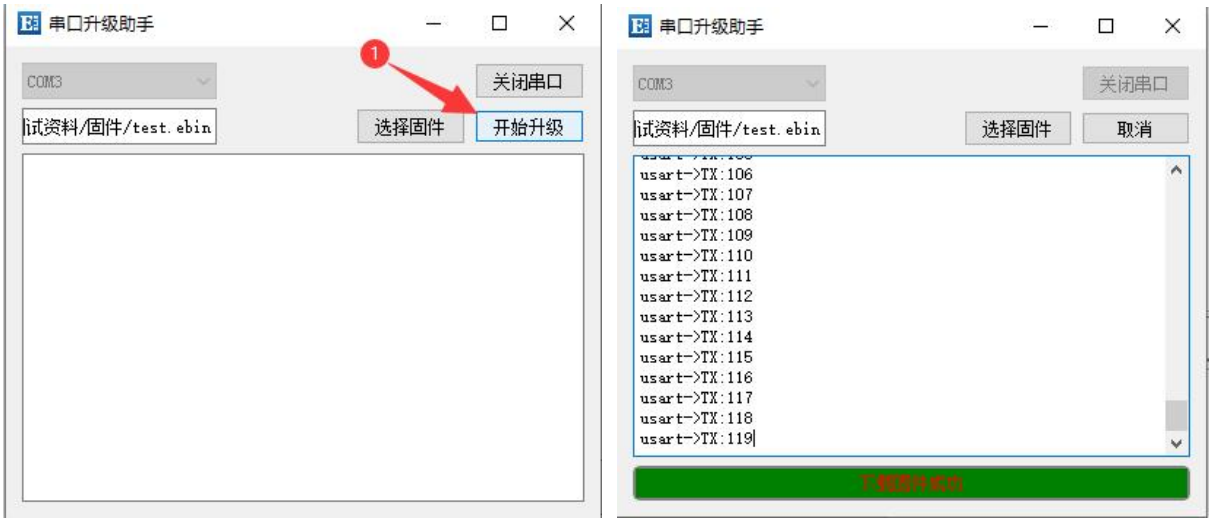
Step 1: Make sure the device is powered off and connect to serial port 1 correctly;

Step 2: Open "Ebyte Network Configuration Tool", select "Serial Port Upgrade Assistant" under the "Menu" option, select the corresponding serial port and click "Open Serial Port";

Step 3: Select the firmware to be used, which needs to be obtained from the "Related Downloads" of the corresponding product details on the official website (www.ebyte.com) . The demo firmware is not provided on the official website;



Step 4: Click "Start Upgrade", pull down the Re load pin of NS2 and then turn on the power of the device, wait for the firmware upgrade to complete, and click "Cancel" to end the serial port upgrade;



The final interpretation right belongs to Chengdu Ebyte Electronic Technology Co., Ltd.

Revision history

Version	revision date	Revision Notes	Maintained by
1.0	2023-03-16	initial version	L L
1.1	2023-12-8	Corrected dimensional drawings	LYL

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