Chengdu Ebyte Electronic Technology Co.,Ltd.

Catalogue

1. Product Introduction

EBT3002 is an Ethernet serial port server chip that converts 8-way serial port (TTL) data to Ethernet data; It has multiple Modbus gateway modes and TCP/DUP/MQTT/HTTP IoT gateway modes, which can meet the networking functions of various serial port devices/PLCs. The chip adopts LQFP100 packaging, which is convenient for user integration.

Functional characteristics

- Support 10M Ethernet interface;
- Adopting LQFP100 standard packaging
- Supports two configuration methods: configuration tools and AT commands;
- The server mode supports multiple socket connections;
- The baud rate supports 2400-115200bps and multiple verification methods;
- Support configurable Domain Name System service, namely DNS;
- Support timeout restart function, with customizable time;
- Support short connection function, with customized short connection intervals;
- Support serial port cache cleaning function;
- Support hardware restoration to factory settings;
- Support online upgrades for convenient customization of user functions;
- Support multiple registration packets and heartbeat packet sending, such as connecting to send MAC, connecting to send custom data, etc;
- Support DHCP to dynamically obtain IP, subnet mask, default gateway and DNS server address;
- Support multiple working modes: TCP client, TCP server, UDP client, UDP server, MQTT client, HTTP client;
- Supports 8-way simultaneous server startup, supports dynamic allocation of 16 clients, and a single server supports access to 9 clients;
- Supports multiple Modbus gateways, enables active reporting of RTU devices, supports mutual conversion between Modbus TCP and Modbus RTU protocols, can be configured as a storage mode for automatic data collection of devices, or can use a one question one answer multi host mode;
- Support MQTT gateway function, quickly connect to Alibaba Cloud and standard MQTT3.1.1 servers (OneNET, Baidu Cloud, Huawei Cloud, etc.);
- Support active reporting of Modbus data to TCP transparent transmission servers, MQTT servers,

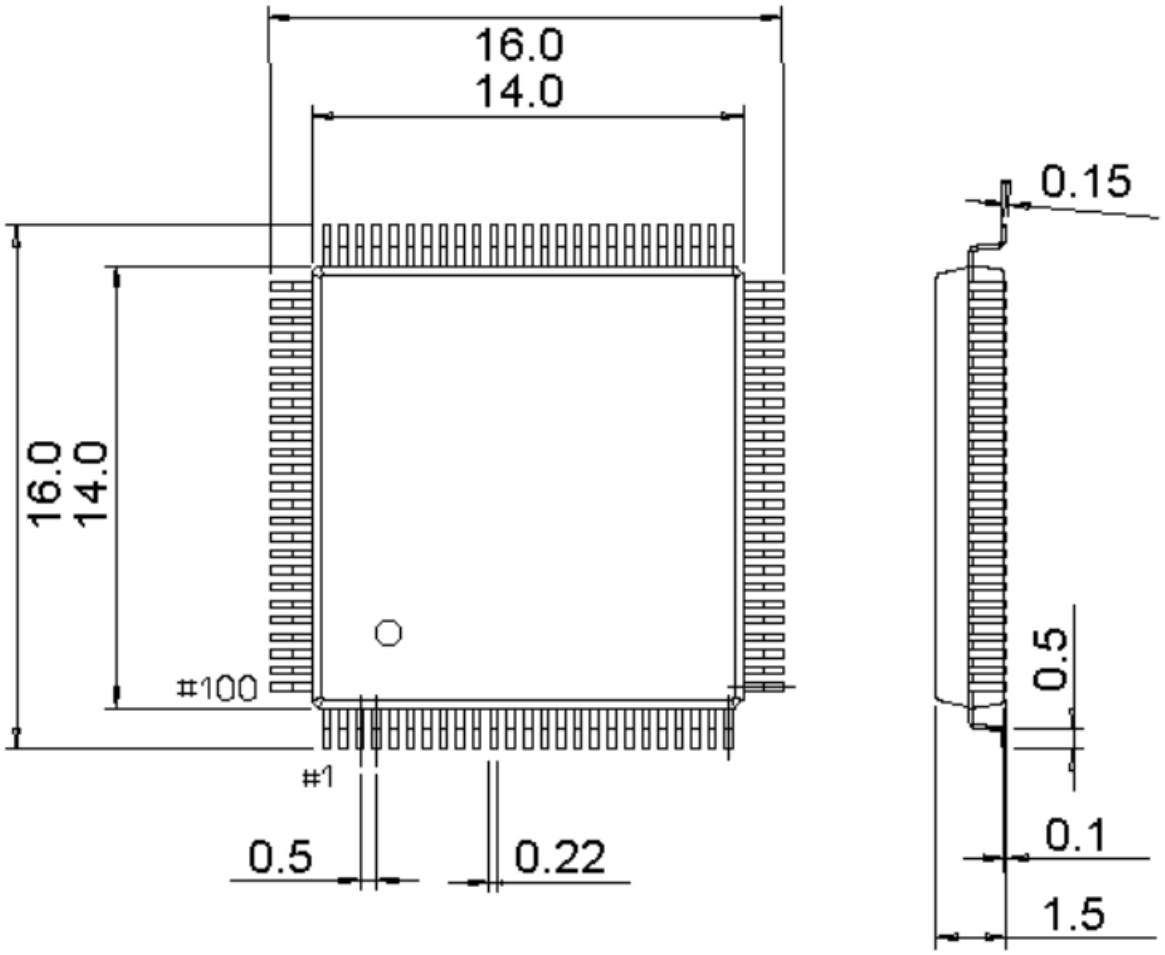
etc;

- Supports HTTP client mode, uses HTTP/1.1 protocol, and can be configured with two request methods: GET and POST;
- TCP/IP can be used for direct communication or through a "virtual serial port" connection for communication.

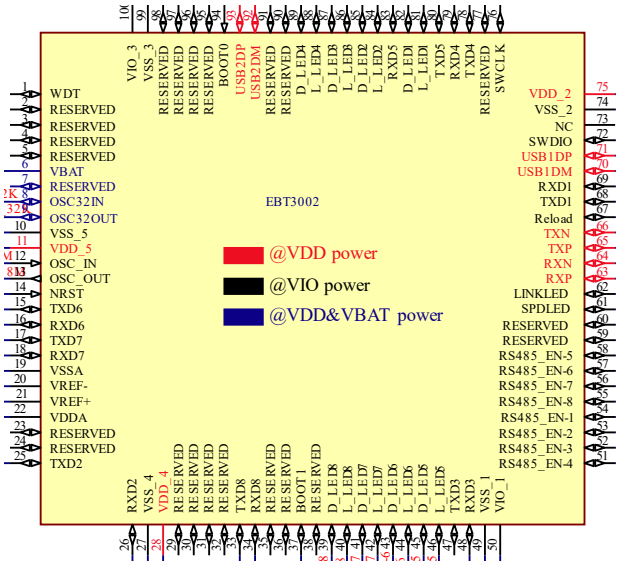
2. Package size and pin definition

2.1 Package size

This chip adopts standard LQFP100 packaging (LQFP100-14 * 14)



2.2 Pin Definition



Serial number	definition	description
1	WDT	Just hang in the air
2-5,7,23-24,29-32,35-36,38,59-60,77,90-91,95-98	Reserved	Just hang in the air
6	VBAT	External 3.3V
8	PC14/OSC32IN	Low speed external 32.768K crystal oscillator
9	PC15/OSC32OUT	Low speed external 32.768K crystal oscillator
10	VSS_ five	Grounding
11	VDD_ five	External 3.3V
12	OSC_ IN	High speed external 8M crystal oscillator
13	OSC_ OUT	High speed external 8M crystal oscillator
14	NRST	Chip reset pin, effective when pulled down
15	TXD6	Serial port 6 sending pin
16	RXD6	Serial port 6 receiving pin
17	TXD7	Serial port 7 sending pin
18	RXD7	Serial port 7 receiving pin
19	VSSA	Grounding
20	VREF-	Grounding
21	VREF+	External 3.3V
22	VDDA	External 3.3V
25	TXD2	Serial port 2 sending pin
26	RXD2	Serial port 2 receiving pin

27	VSS_ four	Grounding
28	VDD_ four	External 3.3V
33	TXD8	Serial port 8 sending pin
34	RXD8	Serial port 8 receiving pin
37	BOOT1	Default to pull down
39	D-LED-8	Serial port 8 indicates data transmission and reception. When the network cable is not detected after power on, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
40	L-LED8	Serial port 8 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
41	D-LED-7	Serial port 7 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
42	L-LED7	Serial port 7 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
43	D-LED-6	Serial port 6 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
44	L-LED6	Serial port 6, network link status indicator pin, outputs low level when no network cable is detected after power on, high level when network cable is detected, and low level when there is a network connection
45	D-LED-5	Serial port 5 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used

46	L-LED5	Serial port 5 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
47	TXD3	Serial port 3 sending pin
48	RXD3	Serial port 3 receiving pin
49	VSS_ one	Grounding
50	VIO_ one	External 3.3V
51	485-EN-4	Serial port 4 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
52	485-EN-3	Serial port 3 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
53	485-EN-2	Serial port 2 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
54	485-EN-1	Serial port 1 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
55	485-EN-8	Serial port 8 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
56	485-EN-7	Serial port 7 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
57	485-EN-6	Serial port 6 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
58	485-EN-5	Serial port 5 sends instructions (can be used as a 485 send enable pin), pulling up during transmission and pulling down during idle time
61	SPD_ LED	Ethernet interface data transmission indicator light
62	LINK_ LED	Ethernet interface PHY connection status indicator light
63	ETH-RXP	ETH-RXP
64	ETH-RXN	ETH-RXN
65	ETH-TXP	ETH-TXP
66	ETH-TXN	ETH-TXN
67	Reload	1. Default elevation 2. Ground first and then power on, and the module enters boot mode. 3. When the application program is running, press and hold for 5 seconds to restore the factory settings
68	TXD1	Serial port 1 sending pin
69	RXD1	Serial port 2 receiving pin
70	USB1DM	Factory burning for use, suspended if not in use
71	USB1DP	Factory burning for use, suspended if not in use
72	SWDIO	Factory burning for use, suspended if not in use
73	NC	Factory burning for use, suspended if not in use
74	VSS_ two	Grounding
75	VDD_ two	External 3.3V
76	SWCLK	Factory burning for use, suspended if not in use

77	Reserved	System status indication: When the power is turned on and no network cable is detected, a low level pulse is output. When the network cable is detected, a 2s cycle pulse is output. During operation, the network cable is unplugged and the output cycle is 1 second, with a 100ms low level pulse
78	TXD4	Serial port 4 sending pin
79	RXD4	Serial port 4 receiving pin
80	TXD5	Serial port 5 sending pin
81	L-LED1	Serial port 1 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
82	D-LED-1	Serial port 1 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 500ms low-level output pulse is used. When there is no data, a high-level output is used
83	RXD5	Serial port 5 receiving pin
84	L-LED2	Serial port 2 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
85	D-LED-2	Serial port 2 data transmission and reception indication. When no network cable is detected after power on, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
86	D-LED-3	Serial port 3 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
87	L-LED3	Serial port 3 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection

88	D-LED-4	Serial port 4 data transmission and reception indication. After power on, if no network cable is detected, it defaults to being pulled low. When there is data transmission and reception, a 100ms cycle is used, and a 50ms low-level output pulse is used. When there is no data, a high-level output is used
89	L-LED4	Serial port 4 network link status indicator pin, output low level when no network cable is detected after power on, output high level when network cable is detected, and output low level when there is a network connection
92	USB2DM	Factory burning for use, suspended if not in use
93	USB2DP	Factory burning for use, suspended if not in use
94	BOOT0	Upgrade and use, pull down the power to enter BOOT mode, otherwise hang in the air
99	VSS_ three	Grounding
100	VIO_ three	External 3.3V

3. Product Overview

3.1 Product specifications

Product model	product type	Socket Number of connections	Working mode	Working voltage (V)	Product size (mm)	characteristic
EBT3001	Single serial port chip	6	TCP Server TCP Client UDP Server UDP Client MQTT Client HTTP Client	2.1 to 3.6 (DC)	5×5	
EBT3002	Eight serial port chip	16		2.4-3.6 (DC)	14×14	
NS1	Single serial port patch	6		3.0-5.5 (DC)	17×19	
NS2	Dual serial port patch	16		3.0-5.5 (DC)	27×27	
NS4	Four serial port patch	16		3.0-5.5 (DC)	27×27	
NS8	Eight serial port patch	16		3.0-5.5 (DC)	27×27	
NT1	Single serial port pin (network port formal installation)	6		3.0-5.5 (DC)	35×22×30	
NT1-B	Single serial port pin (inverted network port)	6		3.0-5.5 (DC)	35×22×30	
NA111	Single serial port guide rail	6		8-28 (DC)	110×66×30	
NA111-A	Single serial port guide rail	6		85~265 (AC)	110×66×30	
NB114	Single serial port positioning hole	6		8-28 (DC)	102×84×25	Full terminal
NB124	Dual serial port positioning hole	16		8-28 (DC)	173×95×26.5	quarantine
NB124E	Dual serial port positioning hole	16		8-28 (DC)	173×95×26.5	POE isolation
NB124S	Dual serial port positioning hole	16		8-28 (DC)	173×95×26.5	
NB124ES	Dual serial port positioning hole	16		8-28 (DC)	173×95×26.5	POE
NB144	Four serial port positioning holes	16		8-28 (DC)	198×109×26.5	quarantine
NB144E	Four serial port	16		8-28 (DC)	198×109×26.5	POE

	positioning holes					isolation
NB144S	Four serial port positioning holes	16		8-28 (DC)	198×109×26.5	
NB144ES	Four serial port positioning holes	16		8-28 (DC)	198×109×26.5	POE
NB183	Eight serial port positioning holes	16		8-28 (DC)	198×109×26.5	
NB183S	Eight serial port positioning holes	16		8-28 (DC)	198×109×26.5	

3.2 technical parameter

project	explain
working voltage	2.4-3.6V (DC)
Working current	300mA @ 3.6V
Serial port level	TTL level (3.3V)
Working mode	TCP Server (default), TCP Client, UDP Server, UDP Client, HTTP Client, MQTT Client
Socket connection	TCP server supports up to 16 client connections
Network Protocol	IP, TCP/UDP, IPv4, ICMP, APR, DHCP, DNS, HTTP, MQTT
IP address	Customizable (default, 192.168.3.7)
Domain Name System	support
DNS Domain Name System server	Customizable (default 114.114.114.114)
collocation method	Configuration tools, AT instructions
Local Port	Customizable (default, channels 1 to 8: 8001 to 8008)
Subnet mask	255.255.255.0 (default, customizable)
gateway	192.168.3.1 (default, customizable)
Serial port cache	512Byte
Packaging mechanism	512 Byte
Serial Port Baud Rate	2400-115200 bps (default 115200)
Data bits	8
Stop bit	1 (default), 2
Check digit	None (default), Odd, Even
Product size	fourteen × fourteen × 1.5 mm (L × W × H)
Product weight	0.7g
Working temperature and humidity	-40~+85 ℃, 5%~95% RH (without condensation)
Storage temperature and humidity	-40~+105 ℃, 5%~95% RH (without condensation)

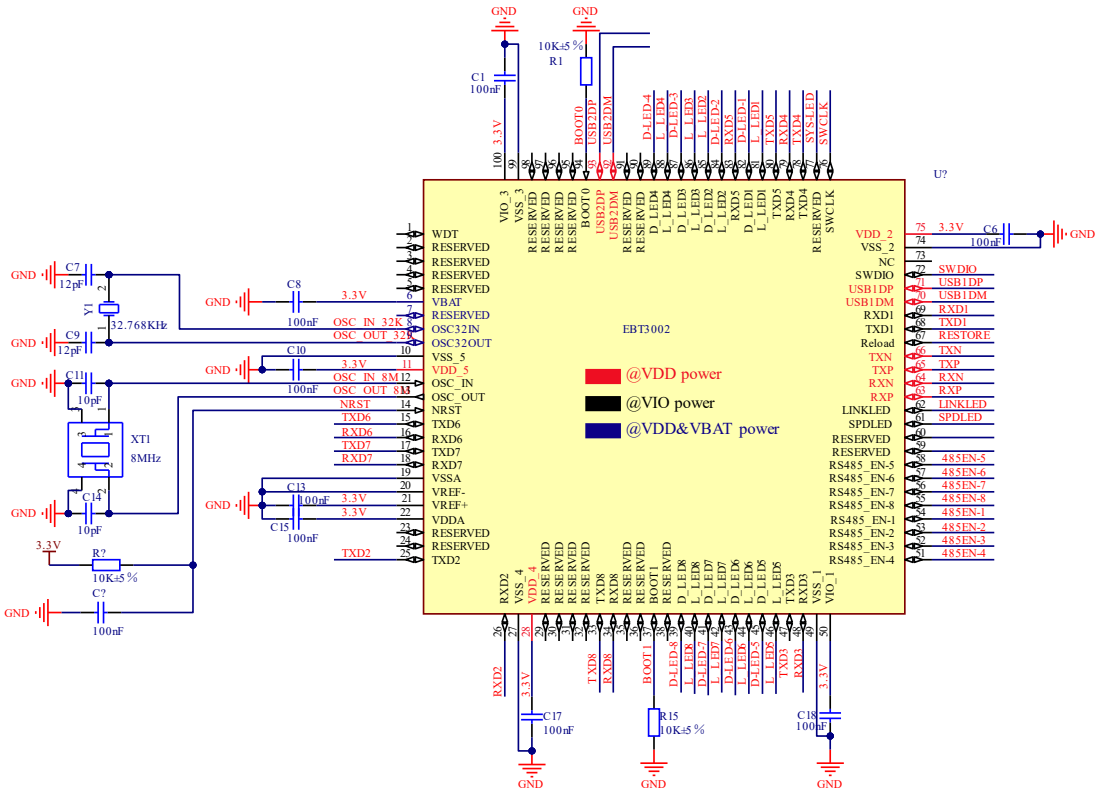
3.3 Default parameters

project	Default parameters
IP address	192.168.3.7
Default Local Port	8001-8008
Subnet mask	255.255.255.0

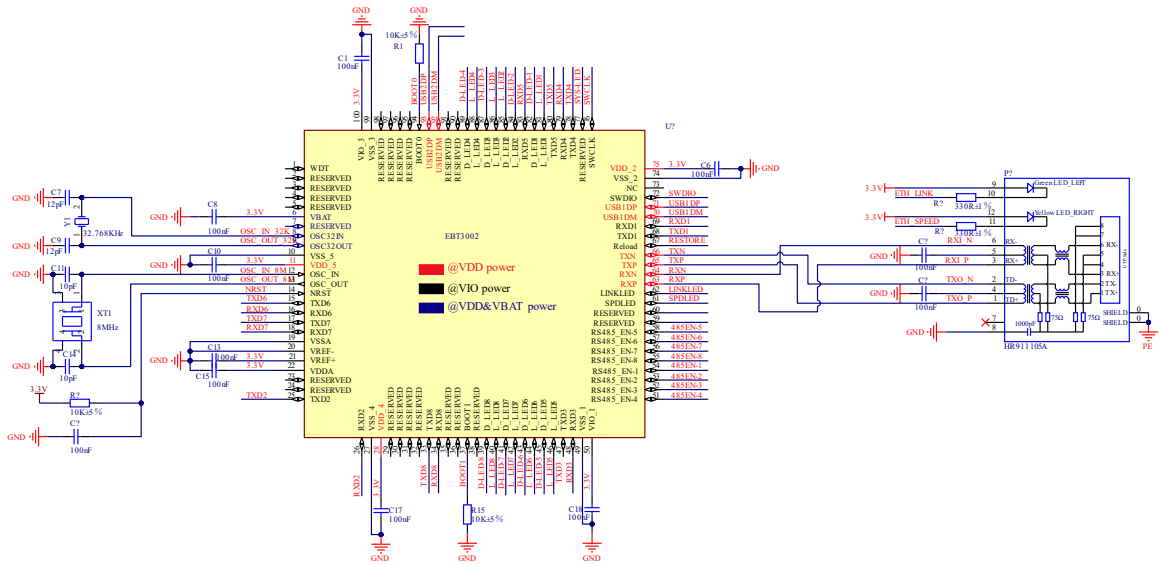
Default gateway	192.168.3.1
Default working mode	TCP Server
Default Destination IP	192.168.3.100
Default target port	502
Serial Port Baud Rate	115200
Serial port parameters	None/8/1

3.4 Hardware reference design

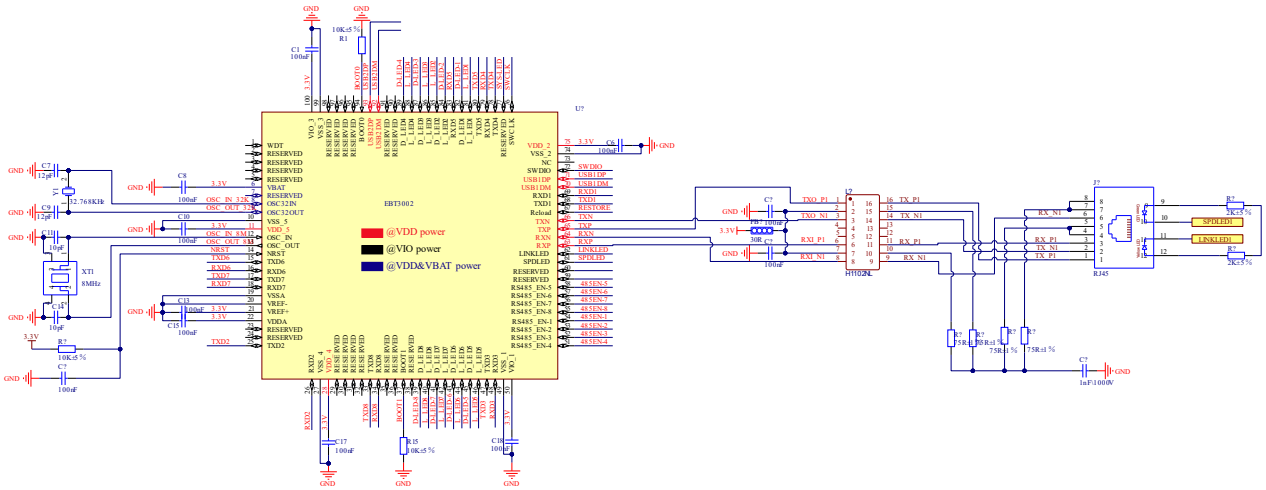
3.4.1 Typical application hardware connection



3.4.2 Network port with transformer reference circuit



3.4.3 Network port without transformer reference circuit



4. basic function

4.1 Channel and Port Correspondence

Baud rate: 2400, 4800, 9600, 14400, 19200, 38400, 57600, 76800, 115200bps;
Data bits: Only 8 bits are supported;
Check bit: supports non parity (NONE), odd parity (ODD), and even parity (EVEN);
Hardware flow control: not supported;

passageway	Default working mode	Default Port
Channel 1	TCPS	8001
Channel 2	TCPS	8002
Channel 3	TCPS	8003
Channel 4	TCPS	8004
Channel 5	TCPS	8005
Channel 6	TCPS	8006
Channel 7	TCPS	8007
Channel 8	TCPS	8008

4.2 Local network parameters

4.2.1 Local IP

STATIC (static IP): users can define the configuration IP, subnet mask, default gateway, and Domain Name System server (DNS server);

DHCP (dynamic IP acquisition): the device login server automatically obtains the IP address, subnet mask, gateway address, DNS server address parameters assigned by the server and configures them for use;

4.2.2 DNS (Domain Name System)

When the user enters the domain name, it will automatically query the DNS server, 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 System server to resolve private domain name server data.

In the dynamic IP mode, the device will automatically follow the Domain Name System server configured by the routing device. The user only needs to modify the DNS server of the routing device, and does not need to configure this device.

4.2.3 Network disconnection and reconnection cycle

When the device detects a disconnection from the server, it periodically initiates a reconnection request. Therefore, the "disconnection reconnection time" does not affect the normal connection establishment time. Users can customize the request period, which is 5 seconds by default.

4.2.4 Timed out restart (no data restart)

The device monitors the data transmission and reception status. If the device does not receive and receive data for a long time, the device will automatically restart to ensure the stability of long-term operation.

The default activation cycle of this feature is 5 minutes. Users can customize the activation or deactivation of timeout restart, as well as customize the dataless restart cycle.

4.3 Hardware recovery factory

The RESTORE pin is continuously pulled down for 5 seconds before being set high, and the device is restored to the factory.

4.4 Equipment working mode

4.4.1 TCP Server

TCP Server refers to a TCP server. In TCP Server mode, devices listen to local ports, accept connection requests from clients, and establish connections for data communication. When disabling the Modbus gateway function, the device sends the data received by the serial port to all client devices that establish connections with the device.

The server can dynamically adjust the number of clients that can be accessed. Firstly, it ensures that each of the eight channels can establish a complete communication link. In addition, the device also has an 8-channel dynamic access communication link. For example, if the device is in the eight

channel server mode, each server can access 2 client devices, or if the device is in the one channel server mode, the server can access 9 client devices. If the number of client devices exceeds the access limit, The device will perform a connection rejection.

4.4.2 TCP Client

TCP Client refers to the TCP client. When the device is working, it will actively initiate connection requests to the server and establish a connection, which is used to achieve the interaction between serial port data and server data.

To use the client, it is necessary to configure the IP address/domain name and target port of the target accurately.

Eight channels can independently open eight TCP clients.

4.4.3 UDP Server

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

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

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

[Note] In UDP mode, the data sent by the network to the device should be less than 512Bit per packet, otherwise it may cause data loss.

4.4.4 UDP Client

UDP Client is a connectionless transmission protocol that provides simple and unreliable information transmission services for transactions. There is no connection establishment or disconnection, and data can be sent to the other party by configuring the destination IP and

destination port. Usually used in data transmission scenarios where there is no requirement for packet loss rate, the data packet is small and the transmission frequency is fast, and the data needs 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 devices.

In this mode, the target address is set to 255.255.255.255, and the transmitted data will be broadcasted throughout the entire network segment. However, the transmitting and receiving devices need to ensure that the ports are consistent, and the devices can also receive broadcast data.

[Note] In UDP mode, the data sent by the network to the device should be less than 512Bit per packet, otherwise it may cause data loss.

4.4.5 HTTP client

This mode can achieve HTTP automatic packet grouping function, providing two methods: GET and POST. Customers can configure parameters such as URL and Header on their own, and the device can group and send packets, achieving fast communication between serial data and HTTP servers. The URL and Header can support up to 128 bytes of data, and eight channels can independently enable HTTP client mode without affecting each other.

The HTTP request data should be smaller than the packaging length (512 bytes), otherwise the device will divide the request data into multiple packets for requests, resulting in abnormal requests.

Support configuring whether to return HTTP protocol headers.

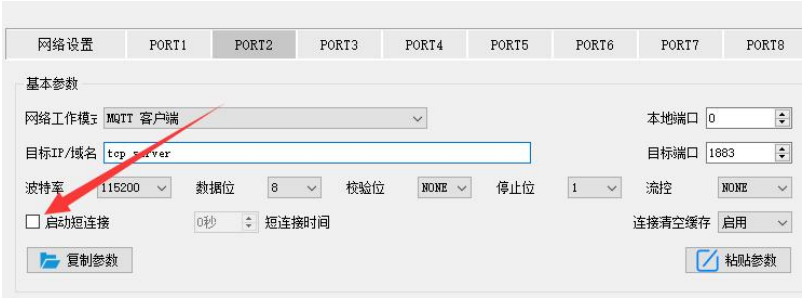
Configuration instructions: Open the upper computer, search for devices, and enter the device configuration interface. First, configure the "network parameters". It is recommended to use the DHCP function to avoid device IP anomalies (network segment errors, IP conflicts, etc.) caused by incorrect configuration. When configuring channels that require the use of HTTP function, support the simultaneous configuration of HTTP client mode for eight channels, Here is an example of using GET to request the "Baidu" webpage (URL: blank, HEADER: Host: www.baidu.com, target domain name: www.baidu.com, target port: 80, and it is recommended to use a random port for the local port).

POST description: The header data configured as a POST request method does not require a separate configuration of data length (such as Content length: 2729). The device automatically calculates the data length and sends it as a package. Other header data needs to be manually configured, and supports a maximum of 128 bytes of data configuration.

4.4.6 MQTT client

Supports fast access to standard MQTT3.1.1 protocol servers (such as OneNET, Baidu Cloud, Huawei Cloud, and user built server types) and Alibaba Cloud servers, supports service quality level configuration (Qos 0, Qos 1), supports ultra long text configuration, and facilitates better access to network service operators (server address, three elements, subscription and publishing address support up to 128 characters configuration, Alibaba Cloud product key 64 characters).

When using the MQTT function, short links should be turned off, otherwise the device will repeatedly connect to the server. It is recommended to use a random port, as shown in the following figure:



（1）、 You can refer to the following table to fill in the parameters for selecting standard MQTT3.1.1, Baidu Cloud, OneNET, and Huawei Cloud configurations:

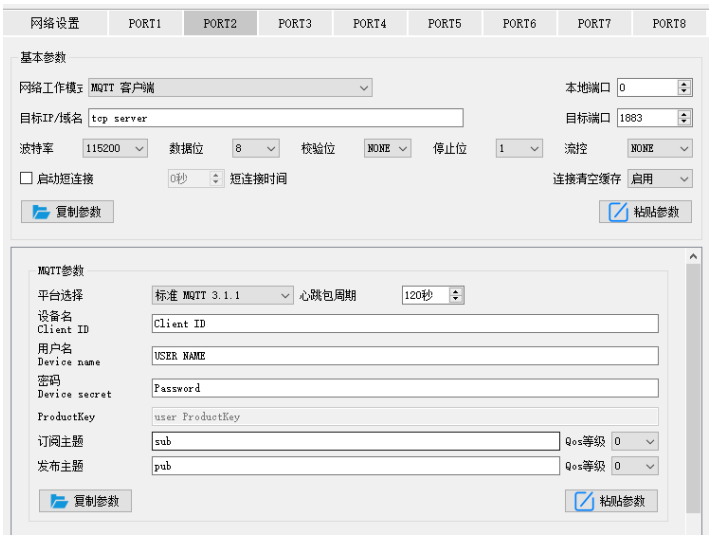
parameter	Standard MQTT3.3.1	Baidu Cloud	OneNET
Device Name (Client ID)	Client ID	DeviceKey	Device ID
user name (Device name)	User Name	IoTCoreId/Device Key	Product ID
password (Device secret)	Password	DeviceSecret	Device Name/User Password
PrductKey	Alibaba Cloud parameters, optional		
Publish Theme	MQTT publishing topic address (dynamically generated by OneNET)		
Subscription Theme	MQTT subscription topic address (dynamically generated by OneNET)		

[Note]

- Dynamically generating topic addresses can use the same parameters to achieve the effect of data retrieval. For example, if OneNET publishes and subscribes to the same topic address: 123456, data retrieval can be achieved;
- Due to adjustments on the MQTT platform (Baidu Cloud, Huawei Cloud, OneNET), it is not possible to connect after filling in the parameters. The platform rules shall prevail;

Taking the standard MQTT3.1.1 parameter filling as an example, as shown in the following

figure:



（2）、 Alibaba Cloud

Support the use of Alibaba Cloud's "three elements" to directly connect to the server and obtain the "three elements" required 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 testing:

Configuration topic description:

Select the corresponding product, select "Custom Topic" in the Topic class list (please refer to Alibaba Cloud documentation for detailed instructions), click "Define Topic Class", configure the name as 1234, and grant publish and subscribe permissions (for data retrieval).

Configure the device connection parameters as shown in the following figure (the left image shows the upper computer, and the right image shows the webpage configuration):

{

ProductKey: a1GlhuTU1yN,

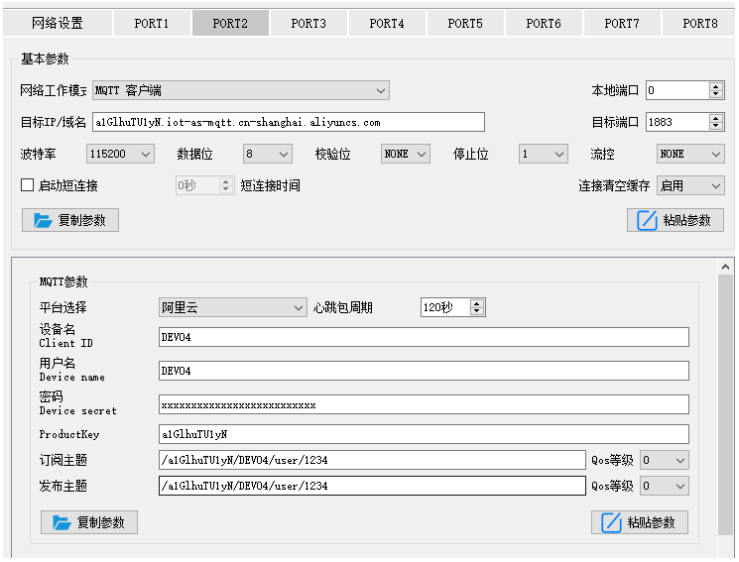
DeviceName: DEV04,

DeviceSecret ":" xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx "

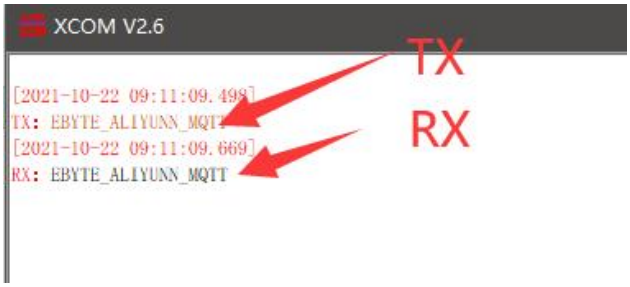
}

Alibaba Cloud server address: ProductKey. iot as mqtt. cn shanghai. aliyuncs. com: 1883

Topic for subscription and publication:/a1GlhuTU1yN/DEV04/user/1234



Alibaba Cloud MQTT platform communication testing:



4.5 Channel Port

Random port:

TCP clients, UDP clients, HTTP clients, and MQTT clients can configure the local port to 0 (using random local ports). The server mode cannot use random ports, otherwise the client cannot establish a connection correctly (the device is not listening to the port correctly).

Using a random port connection can quickly reestablish the connection when the device accidentally disconnects the server, preventing the server from rejecting the connection due to four incomplete waves. It is recommended to use a random port in client mode.

The device will automatically configure random ports when configuring TCP client, HTTP client, and MQTT client modes at AT, which can be customized and cancelled.

Static port:

Fixed port of the device (factory default: 8001-8008), TCP server mode device listens to the configured port, accepts connection requests from clients and establishes connections for data communication. TCP client mode device fixed port initiates connection requests.

5. Advanced features

5.1 Heartbeat package and registration package

5.1.1 Heartbeat

In client mode, users can choose to send heartbeat packets and customize the heartbeat packet time. Heartbeat packets can be selected from two modes: network heartbeat packets and serial heartbeat packets. It supports sending in hexadecimal and ASCII codes. This heartbeat packet is not an MQTT heartbeat and needs to be turned off when using the MQTT client mode. MQTT heartbeat can only be configured under the "MQTT parameter configuration" column for "heartbeat cycle". The MQTT heartbeat packet content is constrained by the protocol and is not open for configuration. It is recommended not to configure it for less than 60 seconds, for example, in Alibaba Cloud manuals, it is recommended to use 120 seconds.

Heartbeat packet sending mode:

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

Custom heartbeat packet content (supports up to 40 bytes of ASCII data and 20 bytes of HEX data)

Customize the heartbeat packet sending interval. When set to 0, turn off the heartbeat packet function. When set to a value greater than 0, turn on the heartbeat packet function. When turned on, the range can be set to (1-65536) seconds, with a default value of 0.

5.1.2 Registration Package

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

The registration package supports the following modes:

1. Send MAC address (OLMAC) when establishing a connection between the network and the

device.

2. Send custom registration package data (OLCSTM) when establishing a connection between the network and the device.
3. After establishing a connection between the network and the device, each packet of data sent by the device to the network is prefixed with a MAC address (EMBMAC).
4. After establishing a connection between the network and the device, each packet of data sent by the device to the network is preceded by a custom registration packet data (EMBCSTM).

Custom registration package content (supports up to 40 bytes of ASCII data and 20 bytes of HEX data)

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

5.2 Short connection

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

The TCP short connection function is applied in the TCP Client mode. After enabling the short connection function, only a request is made to connect to the server when sending information. After the connection is successful, if the serial port does not receive or receive data or the network port does not receive or receive data within the set time, the device will automatically disconnect.

Turn off the short link function when the short link retention time is set to 0. When the setting range is (2-255) seconds, the short connection function is turned on, and the default hold time is 0 seconds (close short links).

5.3 Serial cache cleaning

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

5.4 Modbus gateway

5.4.1 protocol conversion

Enable: Verify Modbus data, discard non Modbus data (RTU/TCP) for transmission, and convert Modbus RTU protocol to Modbus TCP protocol.

Disabled: Modbus data is verified without protocol conversion, and non Modbus data (RTU/TCP) is discarded and not transmitted.

5.4.2 Simple Protocol Conversion

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

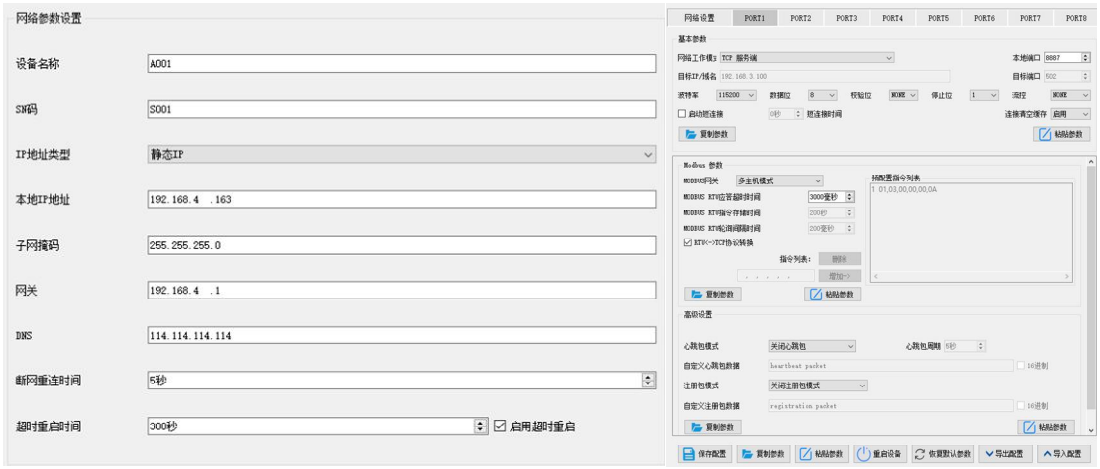
Simple protocol conversion can work in any mode (TCP client, TCP server, UDP client, UDP server, MQTT client), and this gateway mode does not support multi host operation. If multiple hosts are required, please use "storage gateway" and "multi host mode".

5.4.3 Multi host mode

Relatively simple protocol conversion can only exist with one Modbus master station, while multi host mode can simultaneously access multiple Modbus TCP hosts. When multiple Modbus hosts access at the same time, the Modbus gateway will schedule bus occupancy (RS-485 bus can only process one request at a time, while multi host mode will sort and process TCP requests based on their order, while other links will wait), In order to solve the bus conflict problem (currently, in single server mode, up to 9 Modbus TCP host connections are supported. When multiple hosts are connected simultaneously, attention should be paid to matching the request interval and timeout time,

otherwise it may be due to the serial port transmission rate being much lower than the Ethernet transmission rate causing packet loss. If quick response is needed, it is recommended to use a "storage gateway"). It only supports working in TCP server mode, and the slave can only work on the serial port, Otherwise, it will not work properly.

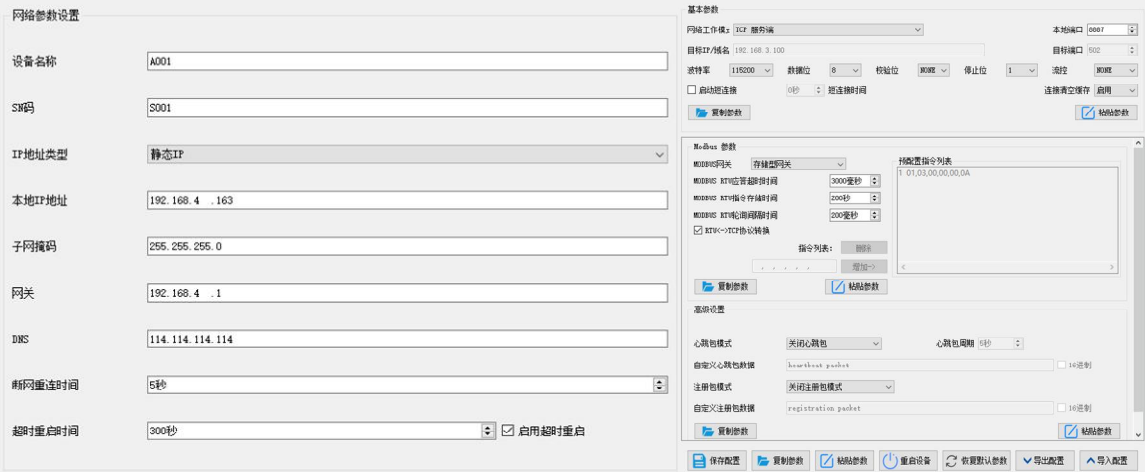
As the number of hosts increases, the Modbus timeout should be increased accordingly. If multiple hosts need to continuously request high-speed requests, it is recommended to use a "storage gateway". It is recommended to configure it as "simple protocol conversion" when there are no multiple hosts used.



Refer to "Simple Protocol Conversion" for software configuration and register configuration, and enable multiple Modbus Poll software simultaneously (for example, 3-channel model can support up to 9 channels).

5.4.4 Storage gateway

A storage gateway not only arbitrates bus data but also stores duplicate read instructions. When different hosts request the same data, the gateway does not need to inquire about the register status of the RTU device multiple times, but directly returns the cached data in the storage area, greatly improving the multi host request processing ability of the gateway and shortening the time consumed in the entire request process. Users can customize the storage area instruction polling interval and instruction storage time according to their needs.



As an optimization for multi host request performance, storage based gateways can only work in TCP server mode, improving the response speed on the network side.

Features:

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

（2） RTU automatically clears cache when responding to timeout, ensuring real-time and authenticity of data;

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

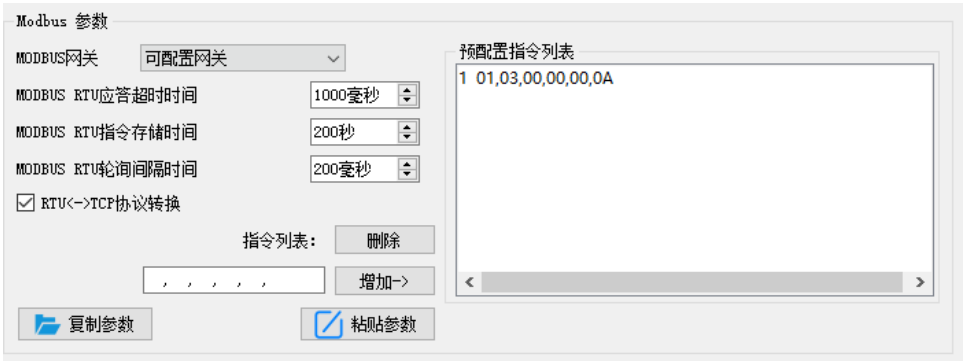
（4） The gateway will poll the RTU device based on the instruction storage time used for configuration. If the MODBUS host does not query the instruction again during the storage time, the gateway will automatically delete the storage instruction and release the cache;

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

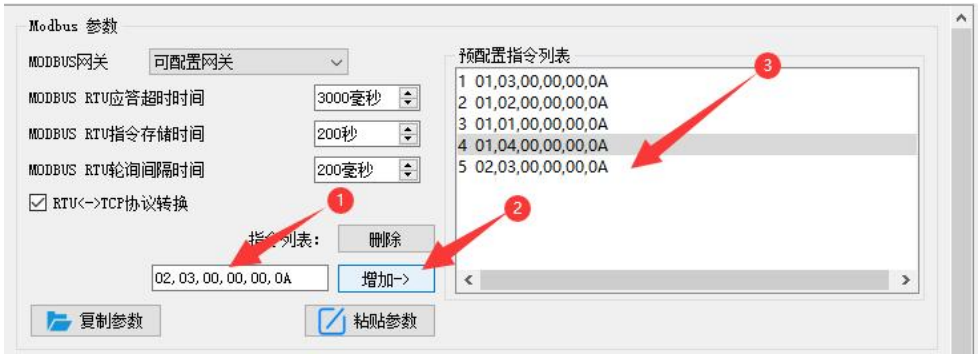
（6） Only support the storage of query results for 01, 02, 03, and 04 Modbus function codes;

5.4.5 Configurable gateway

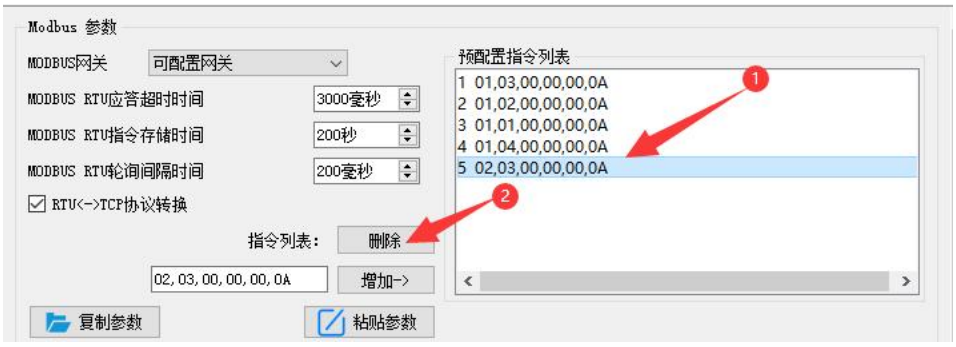
The gateway automatically polls the RTU device registers based on pre configured MODBUS instructions (only supports MODBUS read instruction configurations). Non storage table instructions will directly operate the RTU device, and frequently read instructions can be stored in the gateway in advance, which can shorten response time (query configured instructions). Data will not be directly sent to the server and will only be returned after Modbus host requests, similar to the usage method of "simple protocol conversion", If you need to automatically upload data to the server, please select 'Auto Upload'. Due to the above characteristics, the serial port side of the configurable gateway can only connect to Modbus slave stations.



Instruction storage instructions (added, instruction errors and formatting errors cannot be added):



Instruction storage description (deletion):



5.4.6 Automatic upload

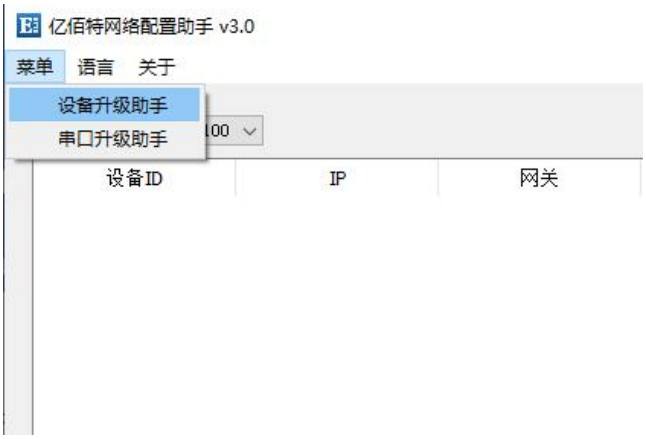
In client mode (TCP client, UDP client, MQTT client, HTTP client), the gateway will automatically poll the stored instructions in the instruction table and upload them to the server. The feedback format (Modbus RTU format or Modbus TCP format) and instruction polling interval (0-65535ms) can be selected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

5.5 Firmware update

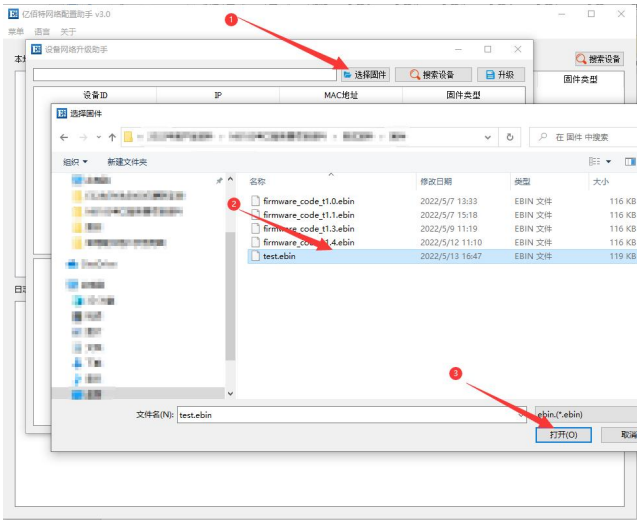
Users can upgrade the firmware of their devices through the "Billiton Network Configuration Tool".

5.5.1 UDP upgrade

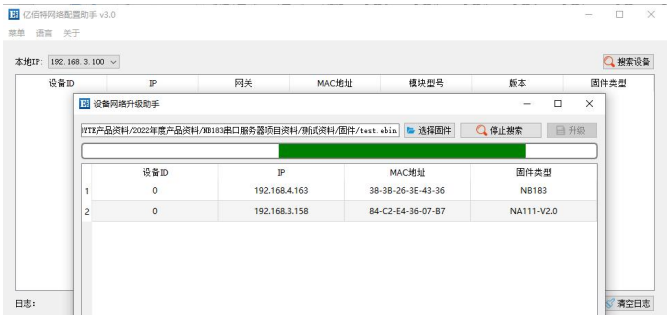
Step 1: Open the "Billiton Network Configuration Tool" and select "Device Upgrade Assistant" under the "Menu" option;



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

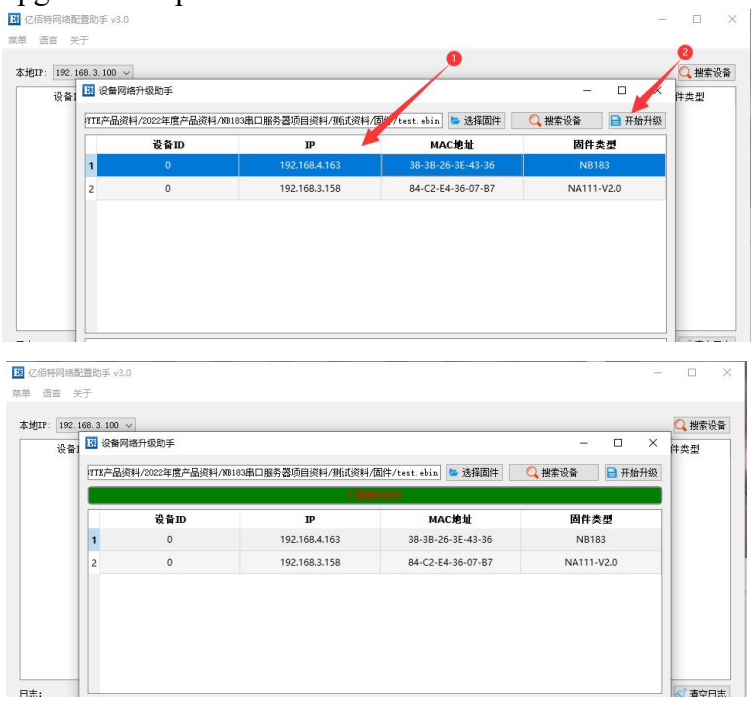


Step 3: Click "Search for Devices" and the device list will display the currently found devices. Click "Stop Search" again.



After selecting the device that needs to be upgraded, click 'Start Upgrading' and wait for the upper

computer to display 'Upgrade Completed'.

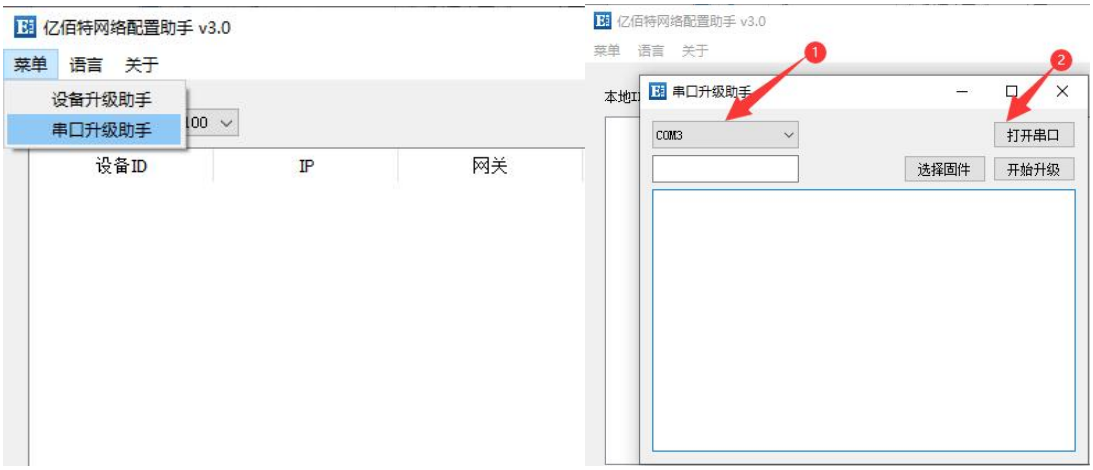


5.5.2 Serial port upgrade

Only channel 1 (i.e. serial port 1, which can use RS232/RS485 interface) supports upgrading using serial port. When network upgrading fails or the network environment is complex, it is recommended to use serial port for upgrading;

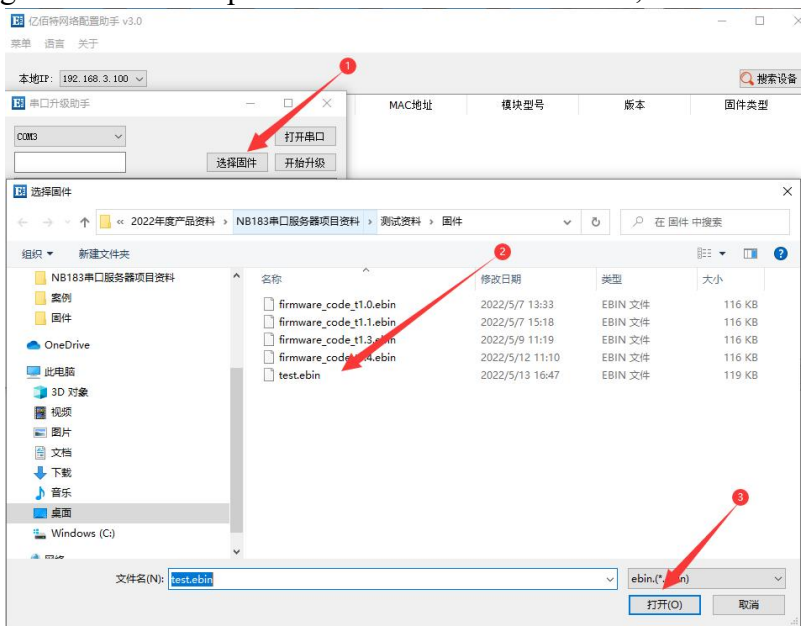
Step 1: Ensure that the device is in a power off state and correctly connect to serial port 1;

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

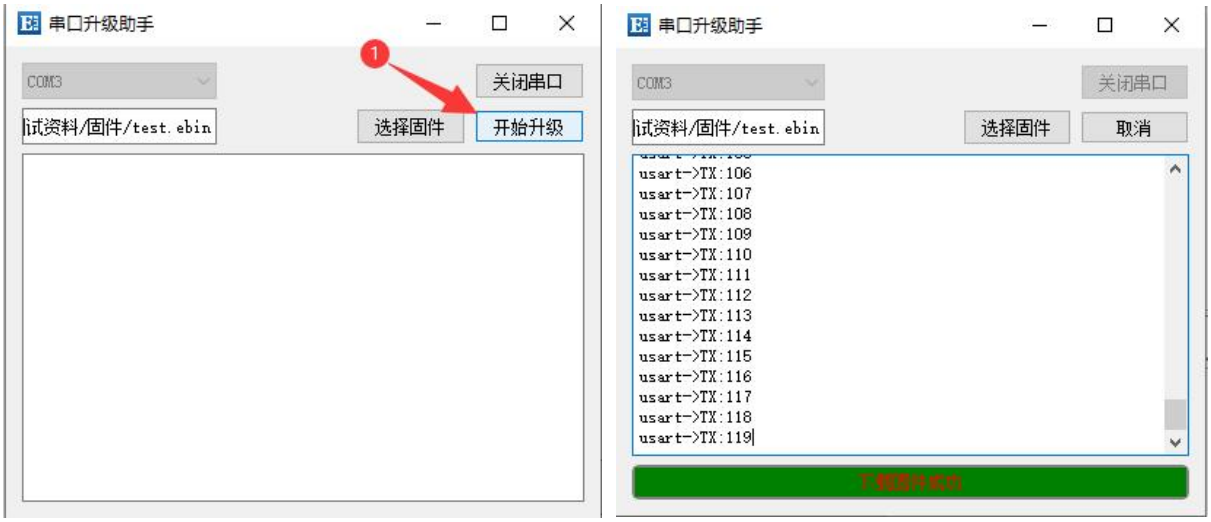


Step 3: Select the firmware that needs to be used, which needs to be obtained from the "Related

Downloads" corresponding to the product details on the official website (www.ebyte. com). The demonstration of using firmware is not provided on the official website;



Step 4: Click "Start Upgrade", press and hold the Reload button on NB183, then turn on the device power, wait for the firmware upgrade to complete, and then 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 Description	Maintainer
1.0	2023-05-29	Initial version	LYL
1.1	2023-11-10	Modify the pin definition	LYL

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