Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

E180-DTU(Z20-ETH)



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1. Introduction

1.1 Brief Introduction



E180-DTU(Z20-ETH) is a high-power ZigBee gateway, he has a perfect supporting ZigBee node equipment, support for adaptive network rate (up to 10M full-duplex), provide TCP Server, TCP Client, UDP Server, UDP Client, HTTP Client, MQTT Client six working modes. It provides six working modes: TCP Server, TCP Client, UDP Server, UDP Client, HTTP Client and MQTT Client. There are 3 logical device types in a ZigBee network: coordinators, routers, and terminals, and a ZigBee network consists of a coordinator and multiple routers or terminals.

Ethernet features

- RJ 45 supports 10M Ethernet interface;
- Supports multiple working modes (TCP Server, TCP Client, UDP Server, UDP Client, H TTPC, M QTTC);
- Support configuration tools, web page, AT instruction three configuration ways;
- Server mode supports multichannel Socket connections;
- Support for multiple baud rates;
- Support DHCP function, after opening DHCP, the IP address of the device will be allocated by the router, which may cause the inability to determine the IP address is inaccessible, generally recommended to use static IP;
- Support DNS (domain name resolution), can customize the domain name resolution server;
- Support a variety of Modbus gateways (simple protocol conversion, multi-host mode, storage gateway, configurable gateway);
- Support fast access to Ali Cloud, Baidu Cloud, OneNET, Huawei Cloud, 3 versions of the standard M QTT server;.1
- Support the H TTP protocol (GET / POST request);
- Support for virtual serial port;
- Support the timeout restart function, you can customize the restart time;
- Support the short connection function, can customize the short connection interval;
- Support the heartbeat package, registration package function;
- Support the serial port cache and cleaning function;
- Support access to external network and LAN;
- Support the hardware to restore the factory setting;
- Support for the online upgrade function.

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ZigBee features

- Centralized network management: ZIGBEE 3.0 security standard centralized network access mechanism, data security and reliability;
- Interchange: conforms to zigbee 3.0 standard network mechanism, compatible with ZCL network protocol;
- Large capacity: 256K capacity flash, 32K capacity RAM, the maximum number of network nodes can be expanded to 80;
- Role switching: Users can make the device switch between the three types of coordinator, router and terminal through serial port instructions;
- Support a variety of network topologies: point-to-point, star network, MESH network;
- Network self-healing: when the middle nodes of the network are lost, a new Mesh topology is automatically formed, and the lost nodes are automatically recovered after restart;
- Automatic routing: the module supports the network routing function;
- Open and close network networking: the coordinator controls the opening or closing of the network. During the time period of the open network, the devices meeting the ZigBee3.0 standard can join the network, and any device cannot join after closing the network. If the coordinator is not closed after opening the network, it will be automatically closed after 180 seconds.
- One-click network addition: the node does not need to set the PANID and channel, but only need to trigger the network addition within the window time of the coordinator open network.
- Automatic channel and PANID: The coordinator automatically creates a network in the optimal channel and automatically assigns the PANID, avoiding duplication with other coordinators.
- Automatic MAC address: the coordinator can obtain the node MAC address and short address in the node network instant, without the need to do processing at the device end.
- Address search: the user can find out the corresponding short address according to the MAC address (unique, fixed) of the added network node, and can also find the corresponding long address of each node in the network according to the short address of the node;
- Data security: integrated ZIGBEE 3.0 security communication standards, the network contains multi-level security keys;
- Serial port configuration: the module has built-in serial port instructions, and users can configure (view) the parameters and functions of the module through the serial port instruction;
- Module reset: The user can reset the module through the serial port command.
- Aerial configuration: Users can remotely configure other devices in the network using the Aerial configuration instructions.
- Multiple command formats: users can use 16 decimal format commands and AT commands to configure and control the module to realize networking, set transparent transmission, control light and other operations.
- National invention patent certificate, invention name: a wireless transmission module interconnection method based on ZigBee3.0 Patent number: ZL 2019 1 1122430.X



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Hardware features

- All the core components are imported in original packaging. Compared with the current similar imported digital radio stations, they have the most advanced function, the smallest volume and the best price.
- The emission power is widely optional.
- Working temperature range: -40℃ ~ + 85℃, adapt to a variety of harsh working environment, real industrial-grade products.
- All-aluminum alloy shell, compact volume, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility, strong anti-interference ability.
- Power reverse connection protection, adoptive protection, antenna surge protection and other multiple protection functions, greatly increase the reliability of the station.
- Powerful software functions, all parameters can be programmed through the setting: such as power, address ID, etc.
- Built-in watchdog, and precise time layout, in the event of abnormalities, the module will automatically restart, and can continue to work according to the previous parameter settings.

Applications

- Smart home and industrial sensors;
- Security system;
- Wireless game remote control;
- Health care products;
- Advanced meter reading architecture (AMI);
- Automotive industry applications;
- Building automation solutions;
- Automatic application of agricultural greenhouses.

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2. Specification and parameters

2.1 Main parameters

Main parameter	Performance
Working voltage	8~28V DC, recommended to use 12V or 24V power supply
Joggle	Network port (RJ 45), 10Mbps
Work pattern	TCP Server (Default), TCP Client, UDP Server, UDP Client, H TTP Client, M QTT Client
Socket linkage	The TCP server supports the 6-way client connections
Networking protocol	TCP/UDP、M QTT 、H TTP 、IPv4、DHCP、DNS
IP acquisition method	Static IP (default), DHCP
DNS domain name resolution	support
Domain name resolution server	114.114.114.114 (Customizable)
Configuration method	Web page, parameter configuration tool, and AT instruction
IP address	192.168.3.7 (Customizable)
User name	The admin (customizable)
Password	The admin (customizable)
Local port	8887 (Customizable)
Subnet mask	255.255.255.0 (Customizable)
Gateway	192.168.3.1 (Customizable)
Serial cache	1024 Byte
Packaging mechanism	512 Byte
Serial port port rate	1200 ~ 230400 bps (default 115200) Note: default parameters, modification is not recommended
Data bit	5,6,7,8 (default) Note: The default parameters are recommended, and modifications are not recommended
Stop bit	1 (default), 2 Note: default parameters, modification is not recommended
Check bit	None (default), Odd, Even Note: The default parameters are

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	recommended and modifications are not recommended
Fluid control	nonsupport
Product size	84×82×25mm
Product weight	117g ± 2g
Working temperature and humidity	-40 ~ + 85℃, 5% ~ 95% RH (no condensation)
Store temperature and humidity	-40 ~ + 105℃, 5% ~ 95% RH (no condensation)

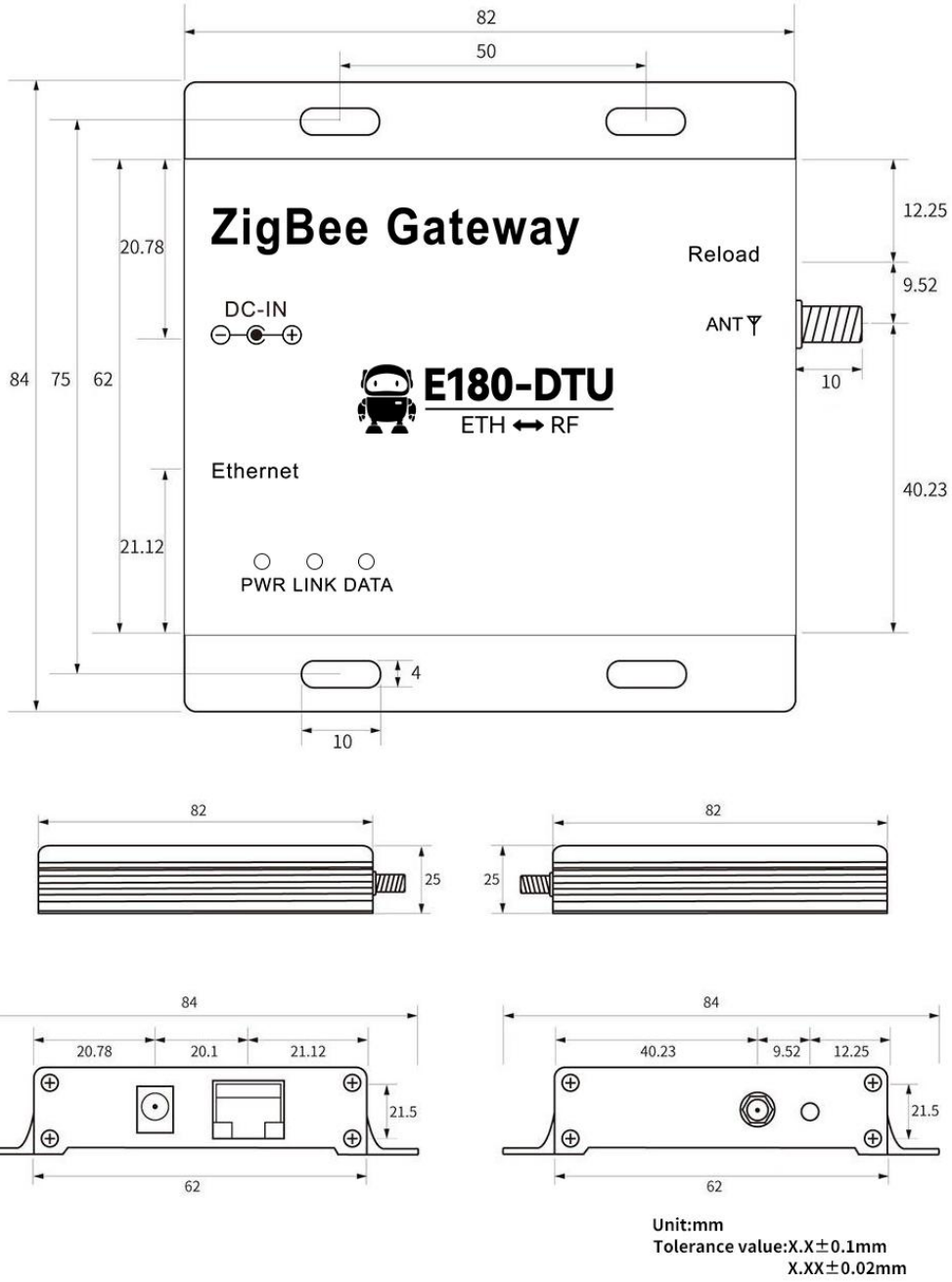
2.2 Current parameter

Model	Voltage	Emission current
E180-DTU(Z20-ETH)	12V	60mA

2.3 Size and pin definition

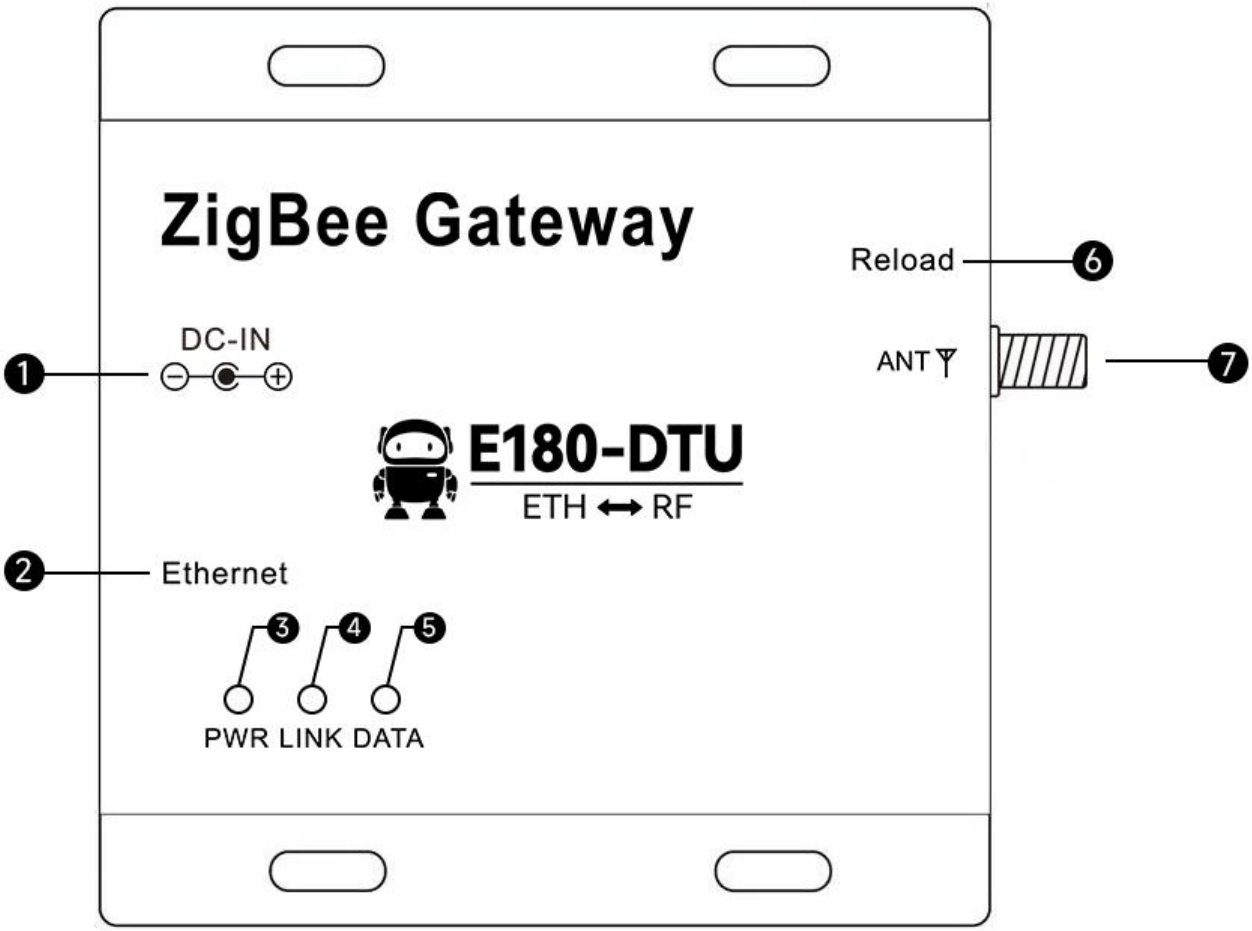
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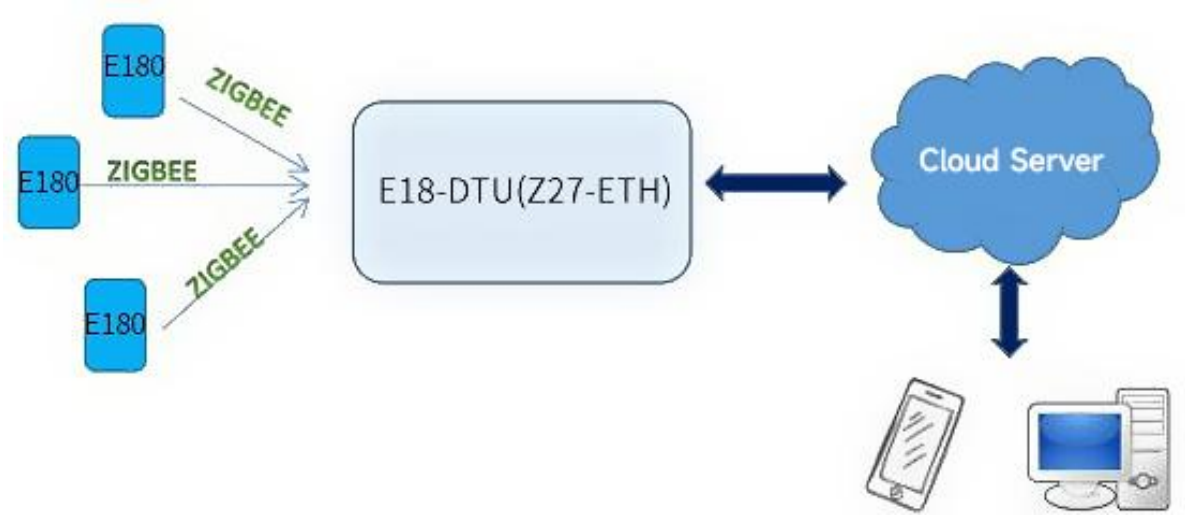
Pin No.	Item	Description
1	DC_IN	Power interface, support 8-28V DC power supply, recommended 12V / 24V
2	ETHERNET	The Ethernet interface, the standard RJ 45 interface, is connected to the device or the PC
3	PWR	power light
4	LINK	Establish connection indicator (green), and on for 3 seconds at 4 hz; Network is not connected: go off; Network connected: Chang liang.
5	DATA	Serial signal indicator (blue and green indicator), flashing at 4 hz for 3 seconds; The blue indicator light flashes when there is data input; The green indicator light flashes when there is a data output;
6	Reload	Long press 5-10S to return to factory settings (only restore Ethernet parameters)
7	ANT	The SMA antenna interface

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3. Introduction of functions

3.1 Typical application model



3.2 ZigBee Basic functions

ZigBee The parameters are configured through the billion-tech ZigBee3.0 upper machine!!!

3.2.1 ZigBee Network introduction

There are 3 logical device types in the ZigBee network: Coordinator (coordinator), Router (router), and End-Device (terminal). The ZigBee network consists of one Coordinator along with multiple Router and multiple End_Device.

3.2.1.1 Coordinator

It has the function of establishing and managing the network, controlling whether other nodes are allowed to join the network, store the network information, and has all the functions of the routing equipment. Its main tasks are to manage the network, record the information of child nodes, and forward messages. In the meantime, the coordinator needs to identify the terminal permission to request the network access. Without the need of new nodes, the network will not crash after the coordinator is powered off, and the router and terminal will work normally in the current network.

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3.2.1.2 Router

The router allows other nodes to be connected to the routing device to expand the coverage of the network. Its main task is to forward messages, relay routing, and have all the functions of the terminal equipment. If there are multiple paths from one node to another node, when one of the paths fails, the network automatically adjusts to the other optimal path for transmission to ensure that the data arrives. The router can build its own network or join someone else's network. The router is always active, so it must be powered by the main power source.

3.2.1.3 Terminal

The main task of the terminal equipment is to send and receive messages, and it does not allow other terminal nodes to be connected to the terminal equipment. The terminal is always in a working state and can receive and send data at any time.

3.2.2 Data transmission method

E180-DTU (Z20-ETH) sends three kinds of data transmission methods, including unicast, broadcast and multicast.

ZigBee packet length: 1-240 bytes, maximum 75 bytes in broadcast and multicast modes, and maximum 240 bytes in unicast mode.

3.2.2.1 Broadcast mode.1

In the broadcast mode, the transmitting device sends the data received by the serial port to each node in the network (including itself), and all the devices in the network will receive the data.

3.2.2.2 Hoost mode.2

In the multicast mode, the group number is set (grouped) for the devices in the network, the sending device must specify the target group number (which group to send data), and then the sending device sends the data received by the serial port to the network, and the device with the same group number in the network will receive the data.

3.2.2.3 Monocast mode.3

In the unicast mode, the device in the network conducts point-to-point communication through the network address, and the transmitting device sends the received data to the target address device, and the target address device can return an ACK to the transmitting device to indicate that the data has been received.

3.2.3 Output mode of receiving data

The receiving data output mode refers to the mode of the network output data when E180-DTU (Z20-ETH) receives the wireless data;

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3.2.3.1 Transparent output.1

If the output mode of the configured device is transparent output, the module receives the wireless data and outputs the raw data through the network port.

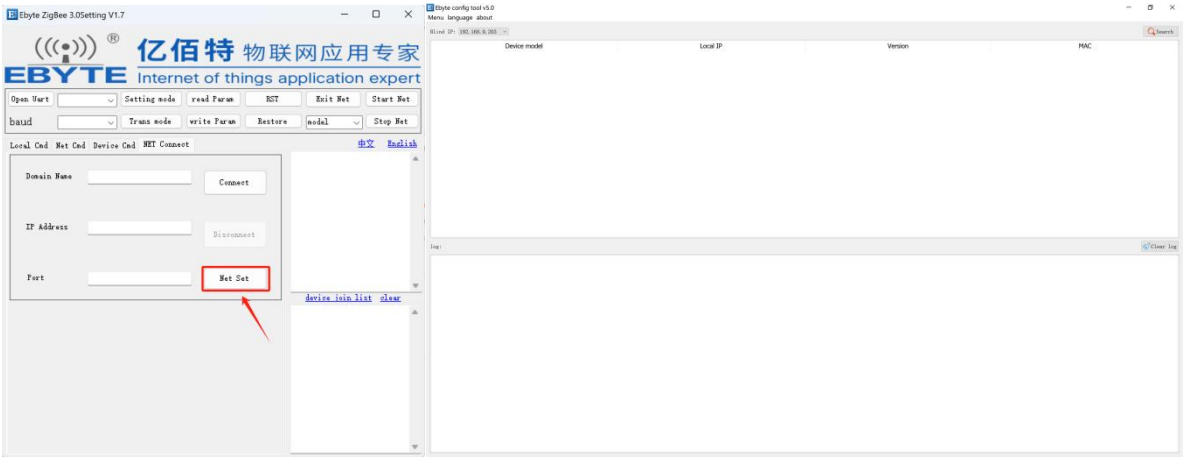
3.2.3.2 HEX instruction format output

When the output mode of the device is in the HEX instruction mode, the output data is output with the ZCL instruction in the HEX instruction, and the HEX instruction identifies the transmission source of the data and the signal strength of the data;

3.3 Network parameters

Network parameters can be configured through the EBYTE network configuration tool and web pages!!!

EBYTE network configuration tool can click the network configuration button in ebai ZigBee 3.0 upper computer: open ZigBee 3.0 upper computer, click Ethernet connection, click network configuration, enter EBYTE network configuration tool.



EBYTE ZigBee 3.0 upper machine EBYTE network configuration tool

3.3.1 IP address type

The IP address is the identity identification of modules in the LAN, and it is unique in the LAN. Therefore, it cannot be repeated with other devices of the same LAN. The IP address of the module has two acquisition methods: static IP and DHCP.

Static IP: Static IP needs to be set manually by the user. In the process of setting, pay attention to write IP, subnet mask and gateway at the same time. Static IP is suitable for scenes that need statistics of IP and devices and correspond to them one to one.

Advantages: Devices that cannot be assigned IP address can be searched through the whole network segment broadcast mode, convenient for unified management;

Disadvantages: different LAN Intranet segments, resulting in no normal TCP / UDP communication.

Dynamic DHCP: The main function of DHCP is to dynamically obtain IP address, gateway address, DNS server address and other information from the gateway host, so as to avoid the cumbersome steps of setting IP address. It is applicable to the scenarios where there are no requirements for IP, and it does not require IP to correspond to modules one by one.

Advantages: Access routers and other devices with DHCP Server can be directly communicated, reducing the trouble of

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setting the IP address gateway and subnet mask.

Disadvantages: Access to no DHCP Serve r network, such as direct connection to the computer, the module will not work properly.

The subnet mask is mainly used to determine the network number and host number of the IP address, indicate the number of subnets, and determine whether the module is in the subnet.

The subnet mask must be set. We commonly used class C subnet mask: 255.255.255.0, network number is the first 24, host number is the bottom 8, the number of subnets is 255, module IP is within 255, so module IP is considered in this subnet.

Gateway is the network number of the network where the current IP address is located. If a device like a router is connected when connected to an external network, the gateway is the route.

3.3.2 Domain name Resolution (DNS)

Domain name resolution transforms a domain name into a network-recognized IP address via the Domain name Resolution (DNS) server. Serial port server domain name resolution (DNS) server address support user customization, in the domain name server exception by custom domain name resolution server implementation domain name resolution, device in the domain name resolution to the custom domain name resolution (DNS) server report resolution request, resolution after returning the device connection parameters (generally IP address).

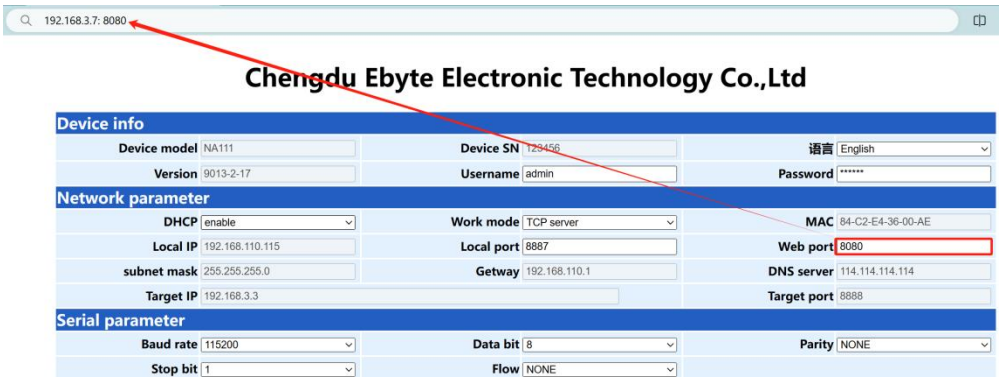
In DHCP mode, the domain name resolution (DNS) server address automatically obtains (synchronize the router domain name resolution address) and cannot be modified.

In the static IP mode, the default address of the Domain Name Resolution (DNS) server is 114.114.114.114.

3.3.3 Intranet access port

The Intranet access port will default to 80.

[Note] If the port number is modified, the port number should be added to the address input bar. For example, modify the web page access port to 8080, and the connection web page configuration needs to enter 192.168.3.7:8080 in the address bar.



3.4 Network working mode

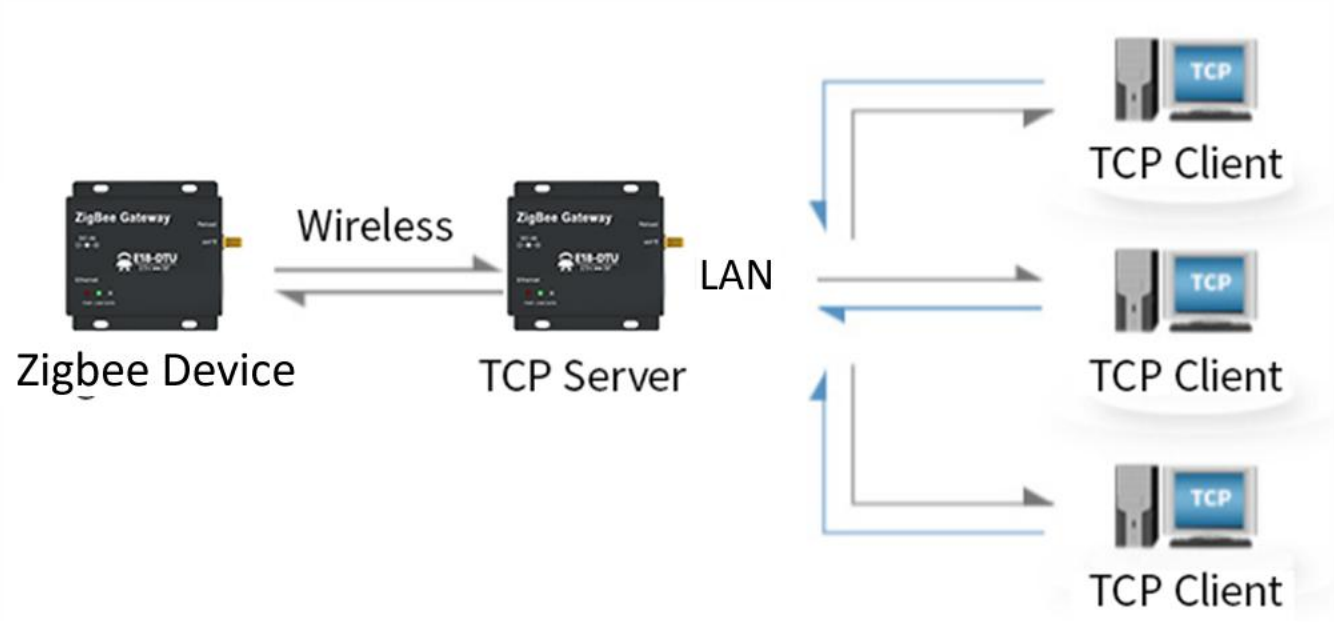
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3.4.1 TCP server mode

TCP Server The TCP server. In TCP Server mode, the device listens to the native port, accepts connection requests from the client and establishes a connection for data communication, usually for the communication with the TCP client within the LAN.

When the Modbus gateway function is turned off, the device will send the data received by the serial port to all client devices connected to the device, supporting up to 6 clients. After the Modbus gateway function is enabled, non-Modbus data will be cleared without forwarding.



3.4.2 TCP client mode

TCP Client 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.

Using the client needs to accurately configure the IP address / domain name, destination port of the target.



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3.4.3 The UDP Server mode

UDP Server Means that the device does not verify the data source IP address when communicating with the UDP protocol. After you receive each UDP packet, save the source IP address and the source port and set it as the target IP and port, so the data sent by the device only sends the packet to the source IP address and port of the last time that the device receives the data.

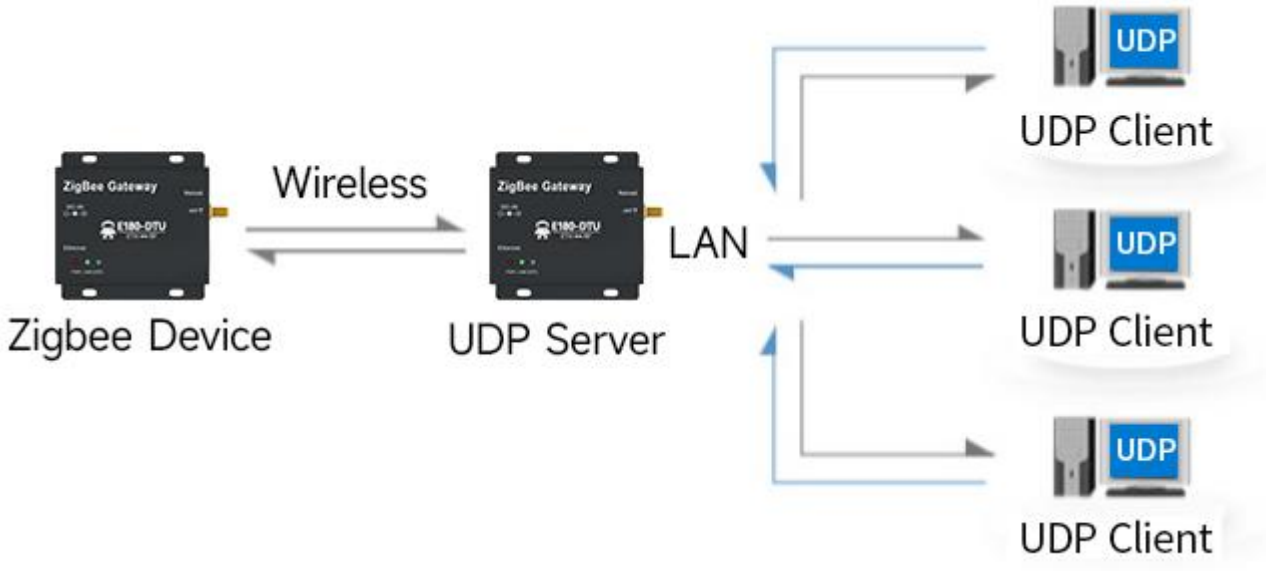
This mode is usually used for scenarios where multiple network devices communicate with the device and the frequency is high and TCP Server cannot meet the conditions.

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

[Note] In UDP mode, the network should send data to the device less than 512 Bit per package, otherwise it will cause data loss.

3.4.4 The UDP client mode

UDP Client A non-connected transmission protocol that provides a simple and unreliable information transmission service oriented to transactions. Without connection establishment and disconnection, it only needs to configure the destination IP and destination port to send the data to the other party. It is usually used for data transfer scenarios with no requirements for packet loss rate, small packets and fast transmission frequency, and data to be transmitted to the specified IP.



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

In this mode, the target address is set to 255.255.255.255, and the sent data will be broadcast in the whole network segment, but the transceiver device should ensure the same port, and the device can also receive the broadcast data.

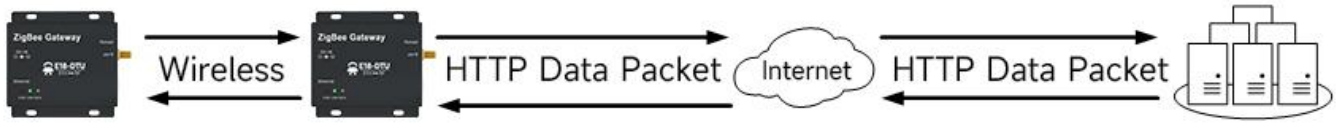
3.4.5 HTTP client mode

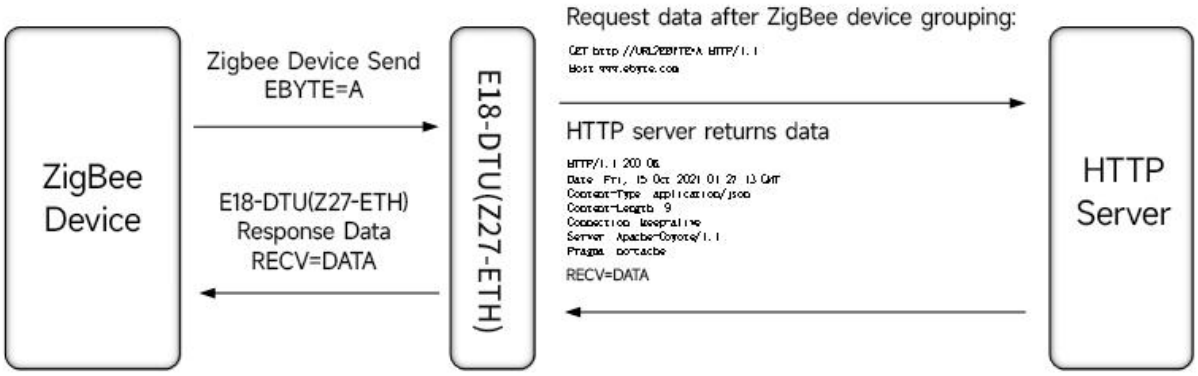
This mode can realize the function of HTTP group package, provides GET and POST mode, customers can configure URL, Header and other parameters, sent by equipment (serial server), realize the rapid communication of serial devices and HTTP

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server, using the HTTP client mode suggest to use random port and open short connection, save HTTP server resources.

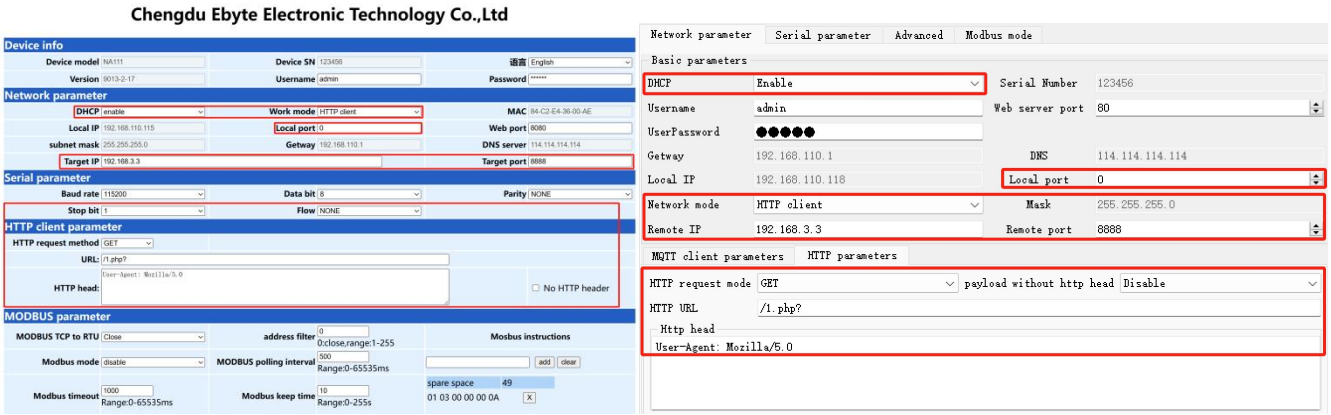




1. GET

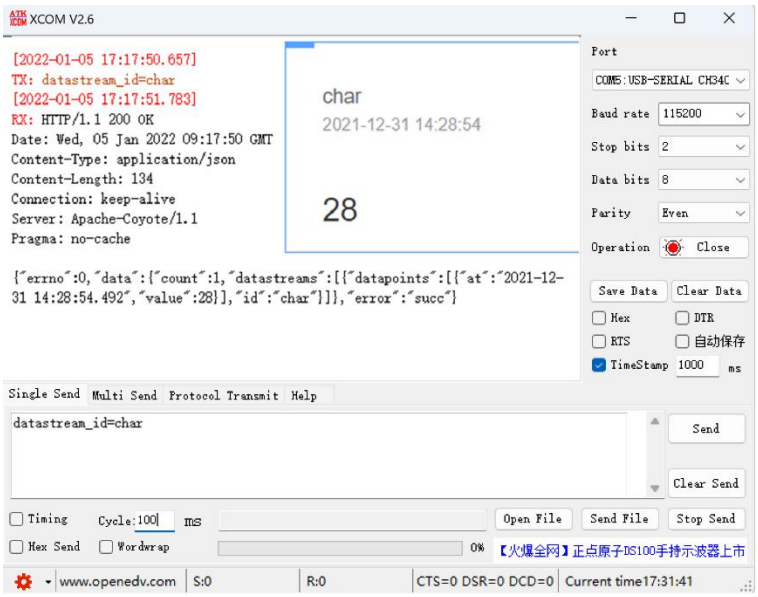
Test the device HTTP-GET request in HTTP mode using OneNET multi-protocol access, as shown in the figure below.

(1) Return data configuration with header header:

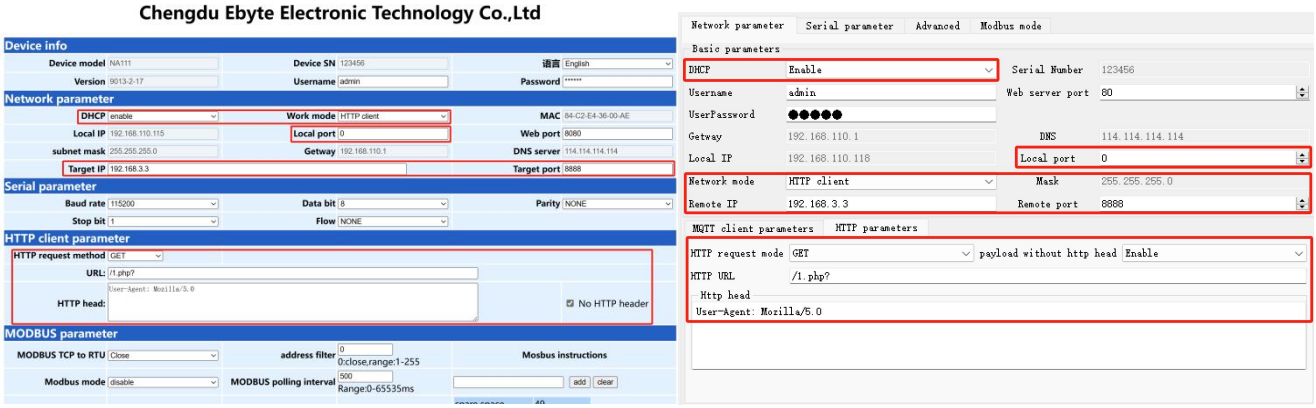


Data return test:

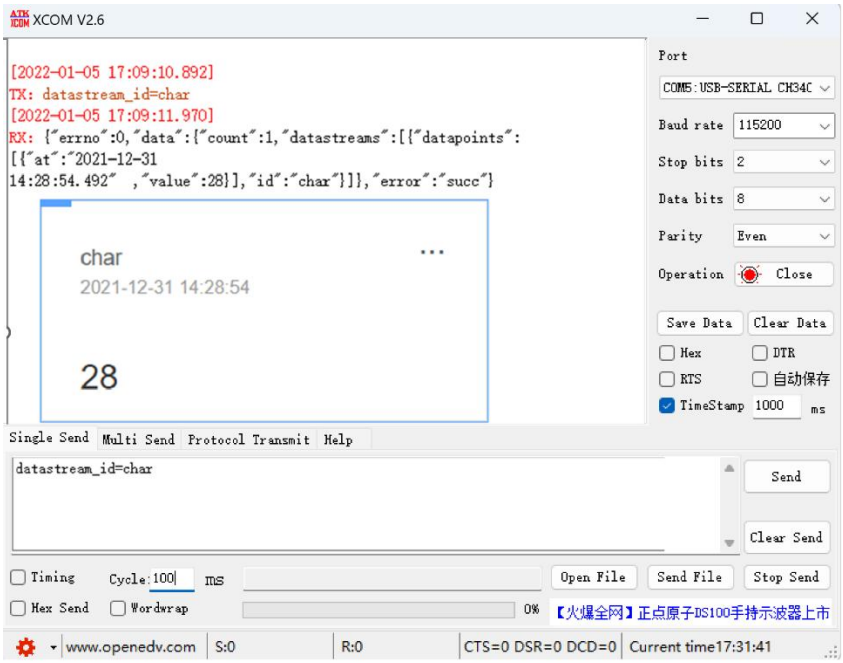
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(2) Return data configuration without headheader:



Data return test:

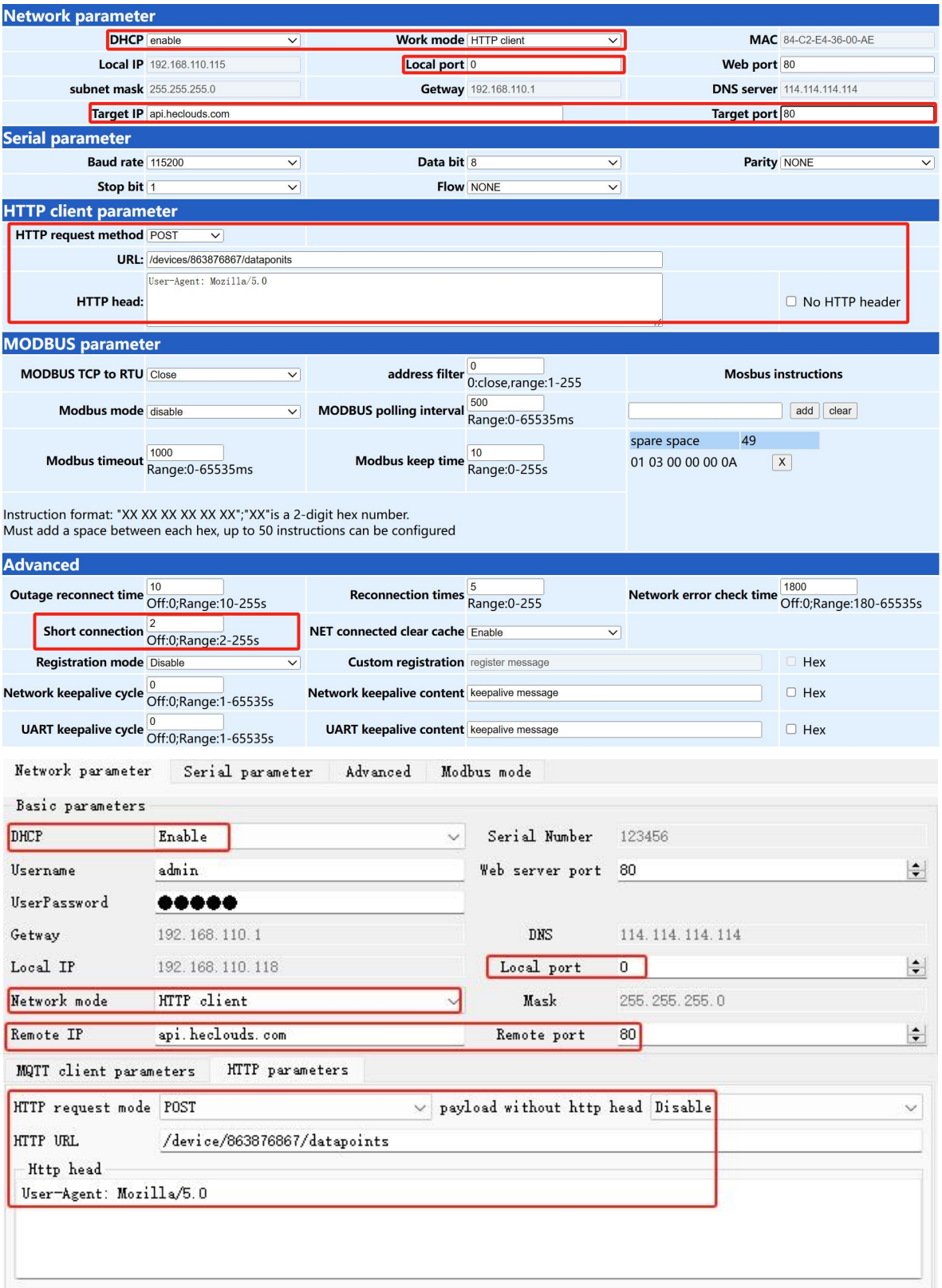


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2. POST

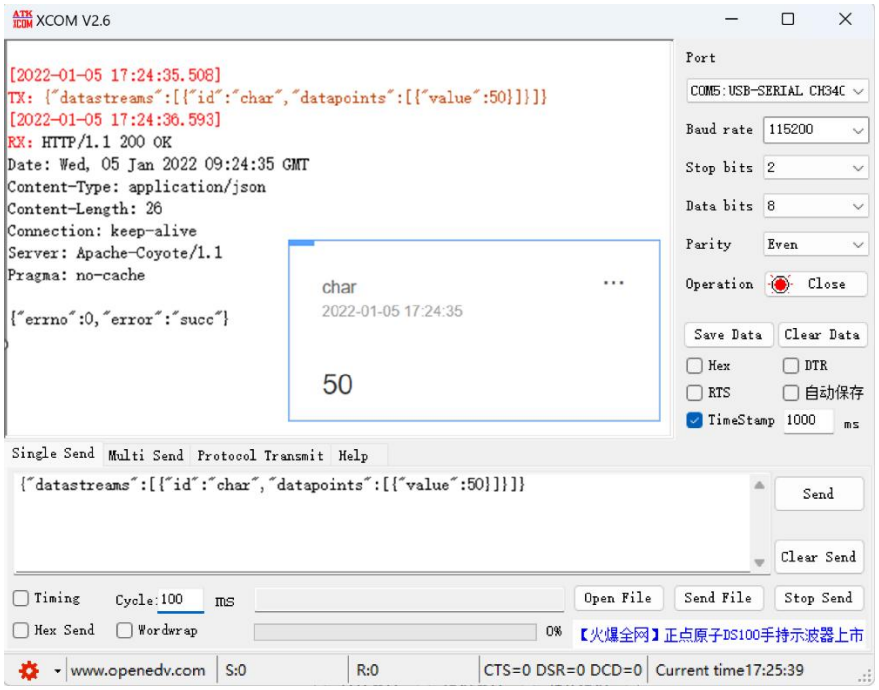
Test the device HTTP-POST request in H TTP mode using One NET multi-protocol access, as shown in the figure below.

(1)Return data configuration with header header:



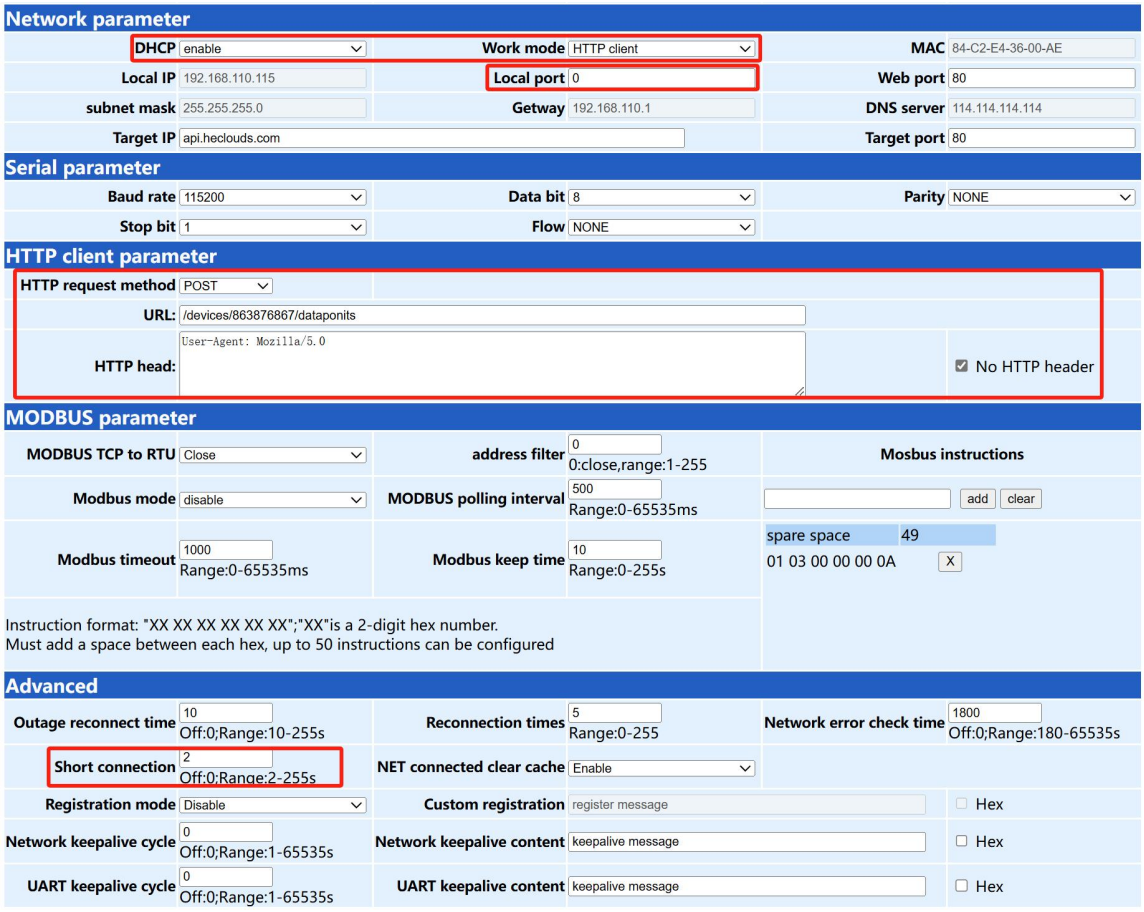
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Data return test:



(2)Return data configuration without headheader:

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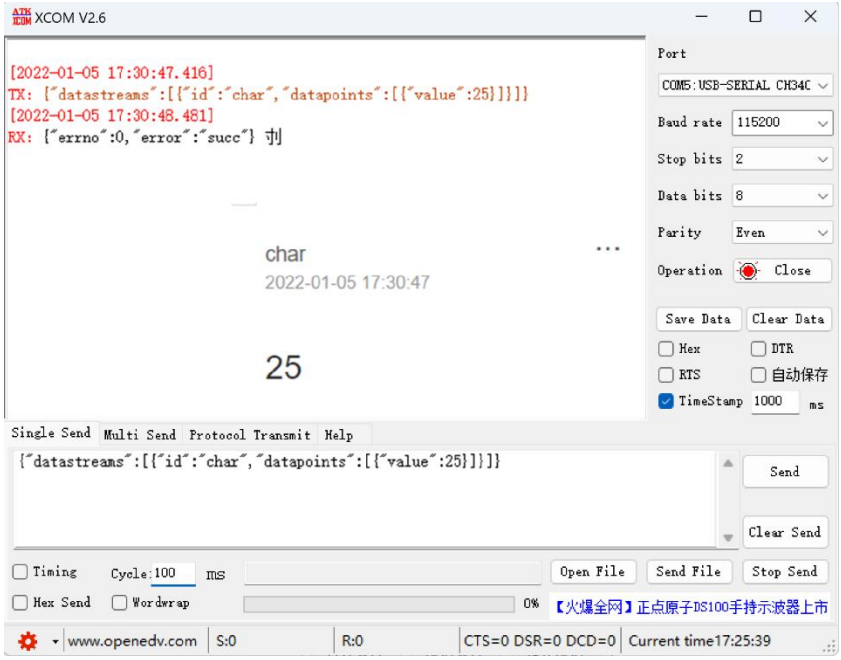




Data return test:

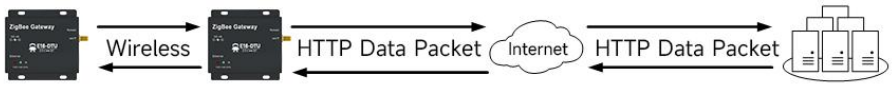
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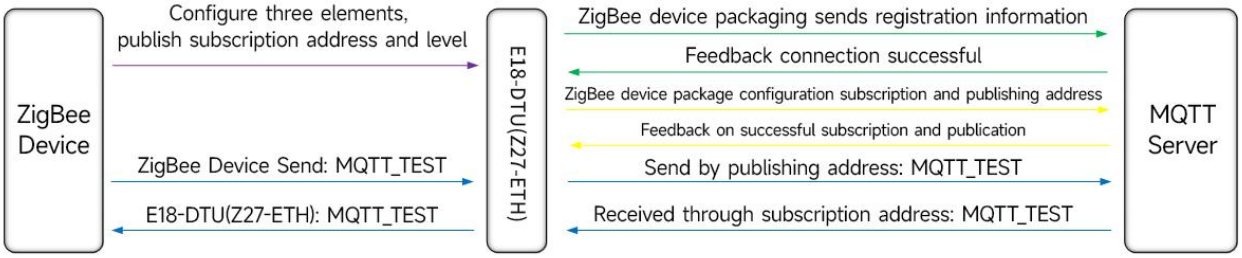
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3.4.6 MQTT client mode

Serial server support fast access standard MQTT3.1 protocol server (One NET, baidu cloud, Huawei Cloud, user self-built server type) and ali cloud server, support service quality level configuration (Qo s 0, Qo s 1), support super long text configuration, convenient better access network service operators (server address, three elements, subscription and release address support up to 128 characters configuration).





Annotations: Forward data according to the rules engine configured on the platform. Here, taking feedback as an example to illustrate

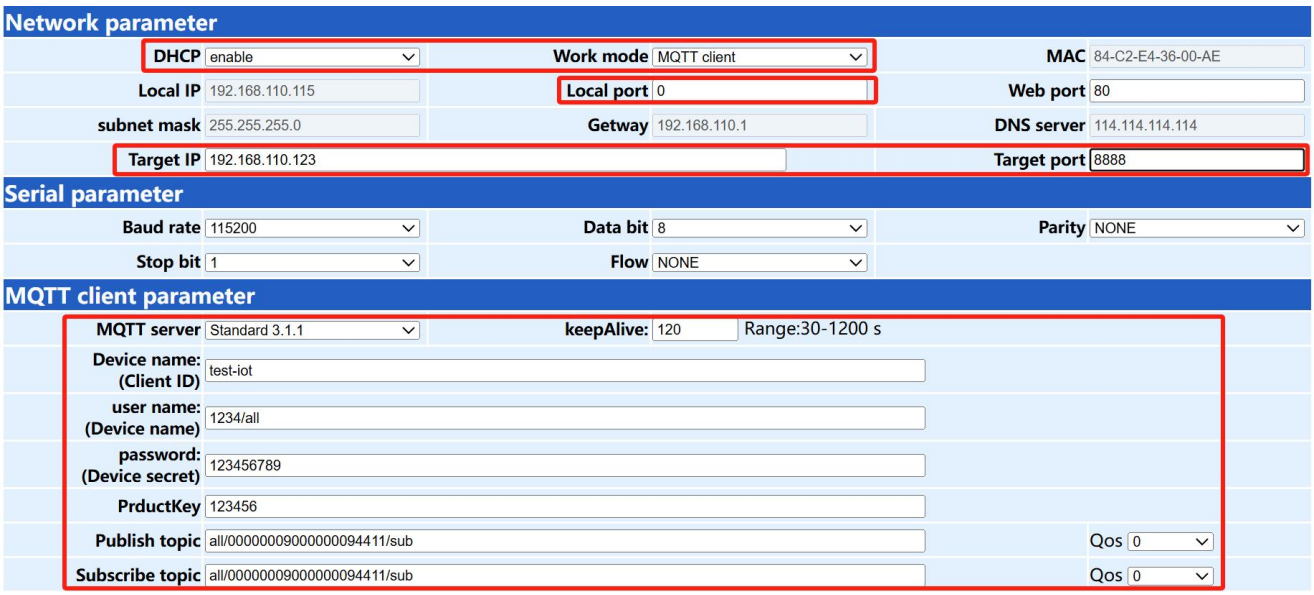
1. Standard for MQTT3.1.1

Here standard MQTT3.1.1 connection Take Tencent's standard M QTT 3 server as an example, the "three elements" described in the standard can be obtained from Tencent server as shown in the figure below:

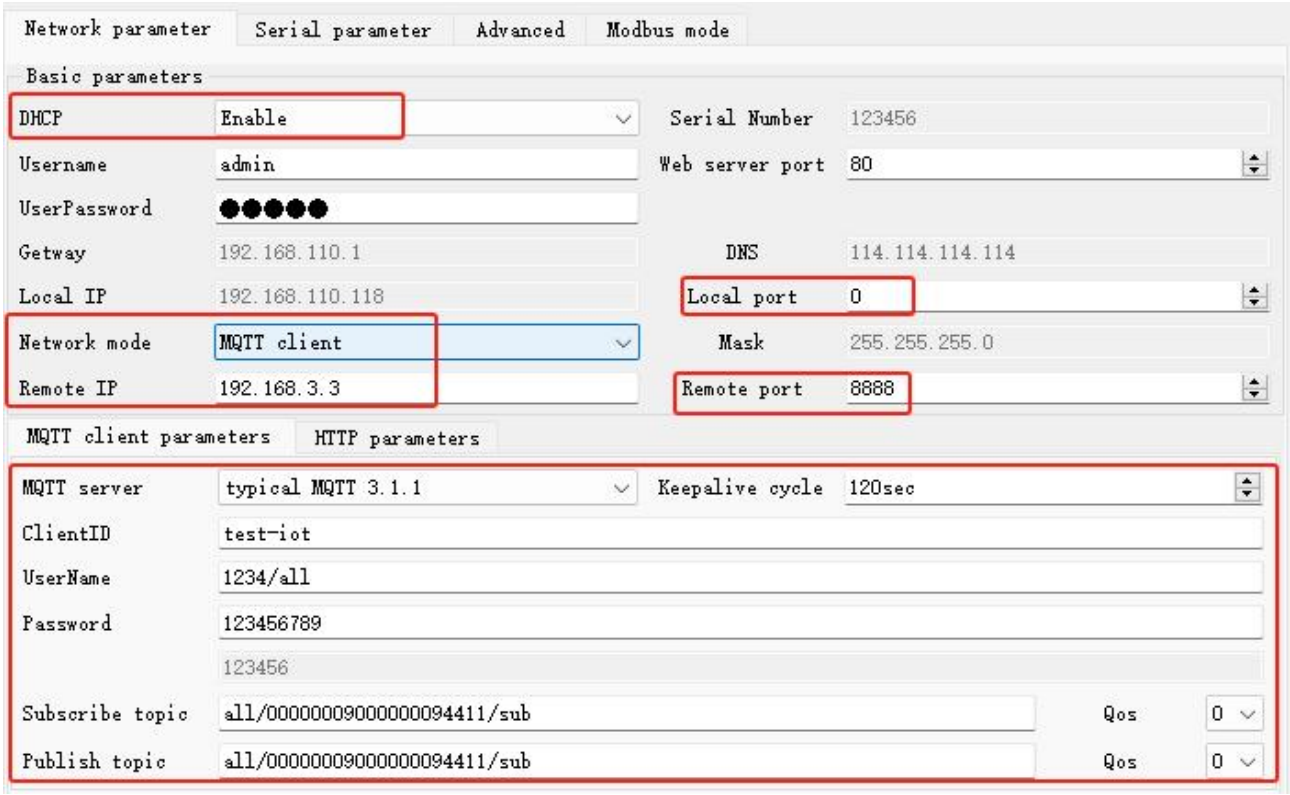
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The parameter configuration (upper computer and webpage) is shown in the figure below:



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3.5 Serial port parameters

Note: Customers are advised to use default serial port parameters, not to modify!!!

Serial port parameters include: port rate, data bit, check bit, and stop bit.

Baud rate: Serial communication rate, configured with 1200,2400,4800,9600,14400,19200,38400,57600,115200 (default), 230400bps.

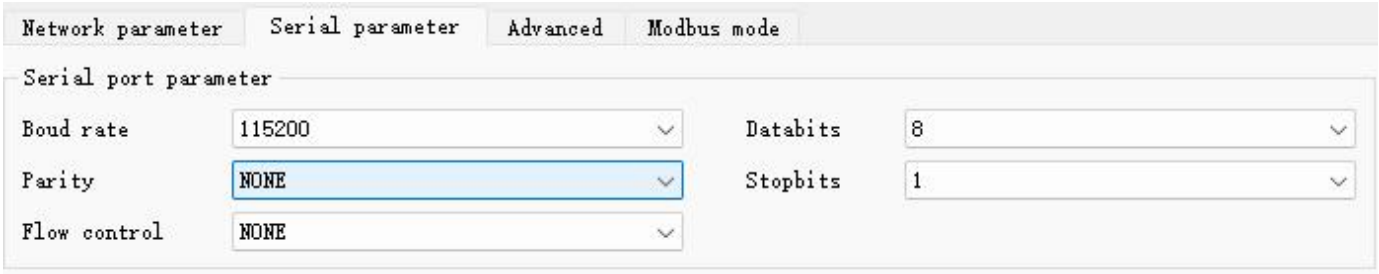
Data bit: length of the data bit, range 5,6,7 and 8.

Check bit: the check bit of data communication, support None, Odd, EN set the serial port parameters, keep the serial port connection device to ensure the normal communication.

Stop bits: Set ranges 1,2.

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3.6 Advanced Parameters

3.6.1 Network disconnection and reconnection function

In the client mode, the device tries to actively connect the server at the specified time after the network connection. If the request times out and the set number of reconnections is not reconnected, the device will restart to prevent the network from resuming the connection after the device is disconnected.

Reconnection time: the time interval between each attempt of the device to re-establish the network.

Number of reconnections: the number of times the device tries to reestablish the network, the cumulative number of requests reaches the preset value, if the connection is not successful, the device will automatically restart.

The actual time of restart is the network reconnection period times the number of reconnections. No special requirements suggest using the factory default parameters.

3.6.2 Timeout restart function

Support the timeout restart function (default: 300 seconds), which is mainly used to ensure the long-term stable operation of the device. If the device does not receive data within the set timeout restart time, the device will restart operation, so as to avoid the impact of abnormal conditions on communication.

When the timeout restart function is turned on, the timeout restart time setting parameter range is (60-65535) seconds.

3.6.3 Configuration tool software settings

Open the configuration tool software, search the device, double-click the identified device, and pop up the parameter query configuration interface. You can customize the relevant parameters according to the requirements, and then save the configuration, restart the device, and complete the parameter modification.

[pour]:

Do not use multiple upper computer in the same LAN environment, multi-network card industrial control machine should be temporarily disabled without using the network card, otherwise the upper computer will be abnormal (the same equipment

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displayed for many times, the equipment can not be found)

The upper computer blocks the wireless network card, so it must be connected to the network cable to use the upper computer. The wireless network card can be configured through the web page.

3.6.4 Short connection function

In client mode, short network connection is supported (this function is turned off by default). TCP short connection is mainly used to save server resource overhead, and is generally applied to multi-point (multi-client) point-to-point (server) scenarios.

The TCP short connection function is applied to TCP Client mode. After the short connection function is enabled, the server only requests the connection when the connection is sent. After the connection is successful, the serial port does not receive the guide data or the network port has no data within the set time, and the device will automatically disconnect.

When the short connection function is on, the short connection time is (2-255) seconds.

3.6.5 Connect the empty cache function

The device is in client mode, and when the TCP connection is not established, the data received by the serial port will be placed in the cache area. If the serial port receiving cache is 1024 bytes, greater than 1024 bytes will cover the earliest accepted data. After the network connection is successful, select the serial port cache or send the cache through the network.

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

Disable: The network will receive serial port cached data after the connection is established.

3.6.6 The function of the heartbeat package

In client mode, the user can choose to send the heartbeat packet and customize the heartbeat packet time. The heartbeat package can choose two modes of network heartbeat packet and serial port heartbeat packet, support 16 decimal and ASCII code sending, this heartbeat package is not MQTT heartbeat, it needs to be closed in MQTT client mode, MQTT heartbeat only needs to configure the heartbeat package cycle time in "MQTT mode", it is recommended not to configure less than 60s, such as Ali Cloud manual suggests using 120s.

Heartbeat packet sending mode:

The default is to close the heartbeat packet mode.

Serial heartbeat package-> The device sends the heartbeat content to the serial bus at a set heartbeat time interval.

Netport heartbeat package-> The device sends the heartbeat content to the netport bus according to the set heartbeat time interval.

Custom heartbeat package content (up to 40 bytes (ASCII) data, 20 bytes (HEX) data).

Customize the heartbeat packet sending time interval, if the setting value is greater than zero, open the heartbeat packet

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function, open can set the range: (1-65536) seconds, close to 0.

3.6.7 Registration package function

In the client mode, the user can choose to send the registration package, customize the package registration time, customize the registration package content (maximum support of 40 bytes (ASCII) data and 20 bytes (HEX) data).

The registration package supports the following modes:

（1） Send the MAC address when the network is connected to the device

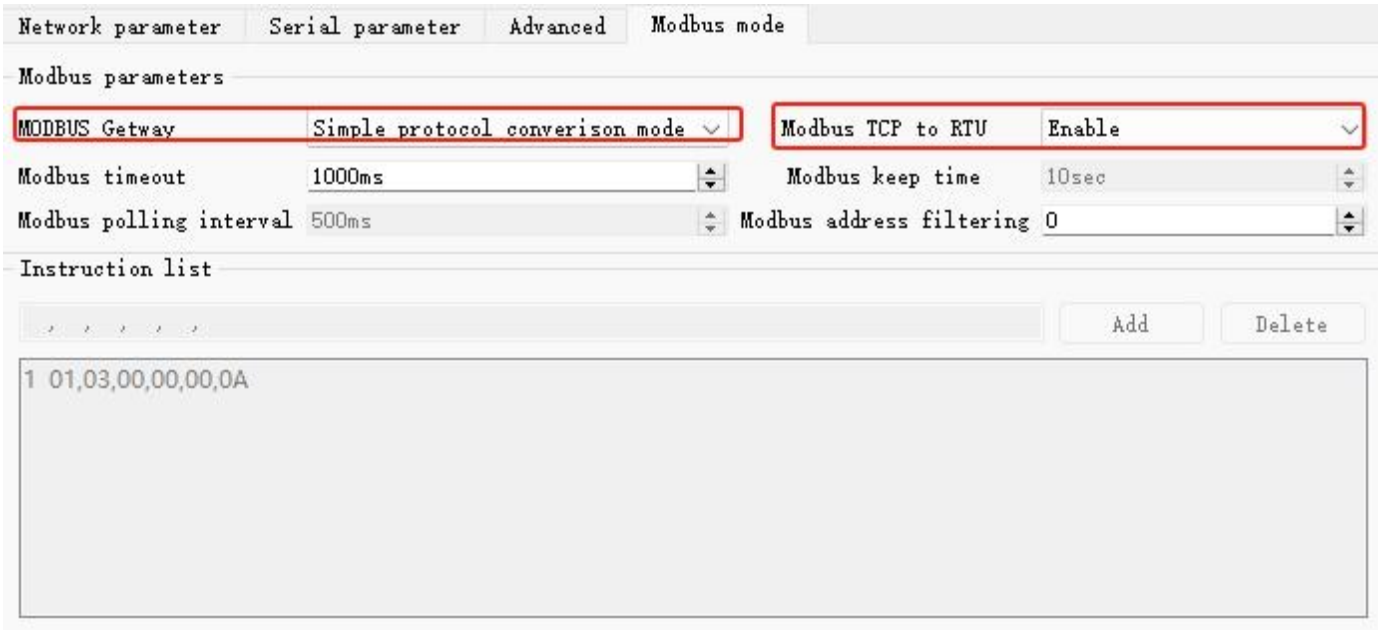
（2） Data for sending a custom registration package when the network establishes a connection to the device

（3） After the network is connected to the device, each packet of data sent by the device to the network is precwith a MAC address

（4） After the connection between the network and the device, each packet of data sent by the device to the network is added with custom registration packet data

3.7 Modbus gateway

3.7.1 Simple protocol transformation mode

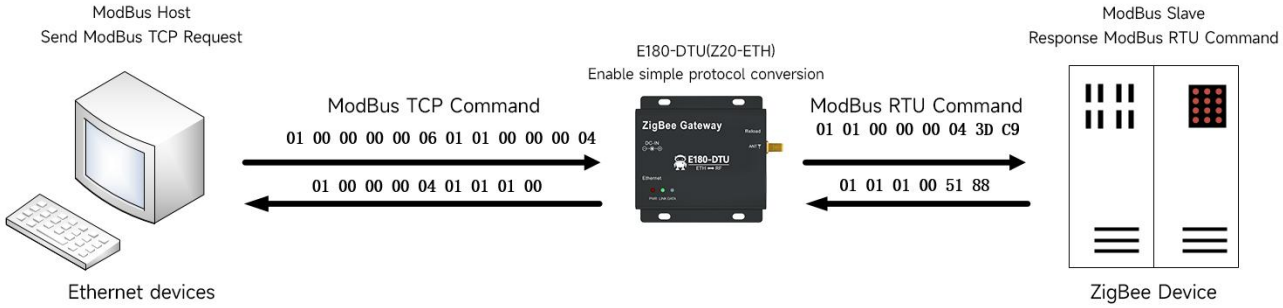


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Open: transfer the Modbus RTU protocol with the Modbus TCP protocol, and discard the non-Modbus data (RTU / TCP) without conversion.

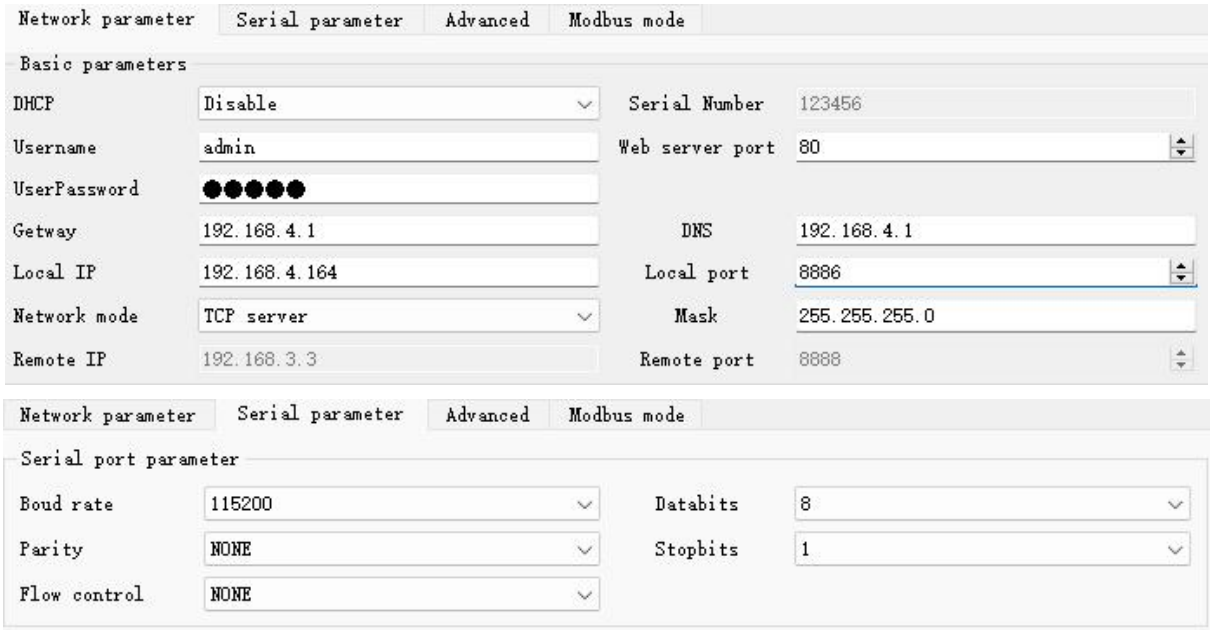
Close: No protocol conversion but verify Modbus data, discard non-Modbus data (RTU / TCP).

Simple protocol conversion can work in any mode (TCP client, TCP server, UDP client, UDP server, MQTT client, HTTP client), whatever mode it works in.

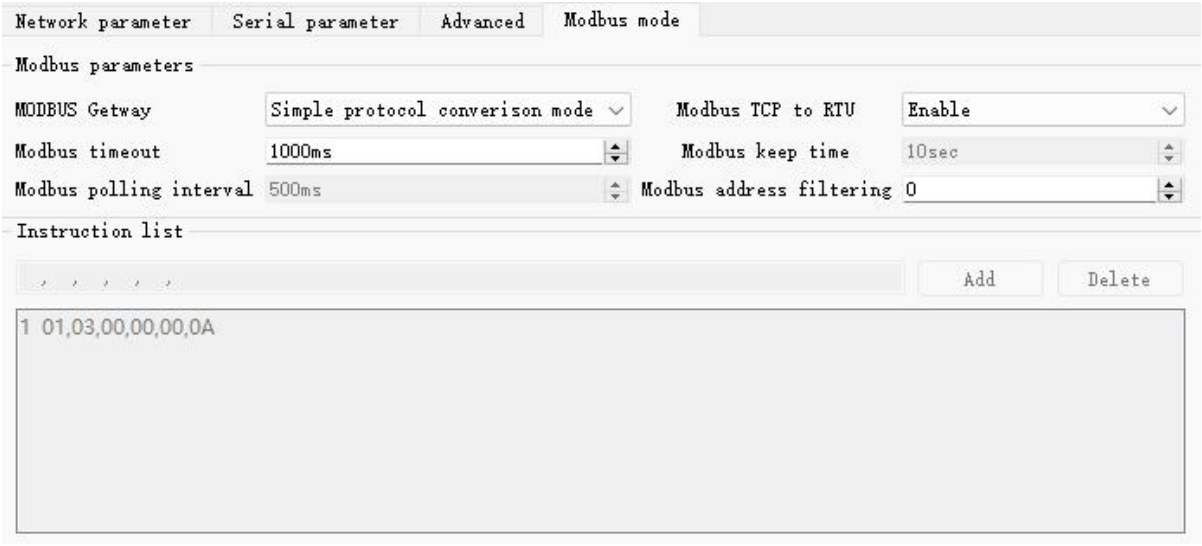


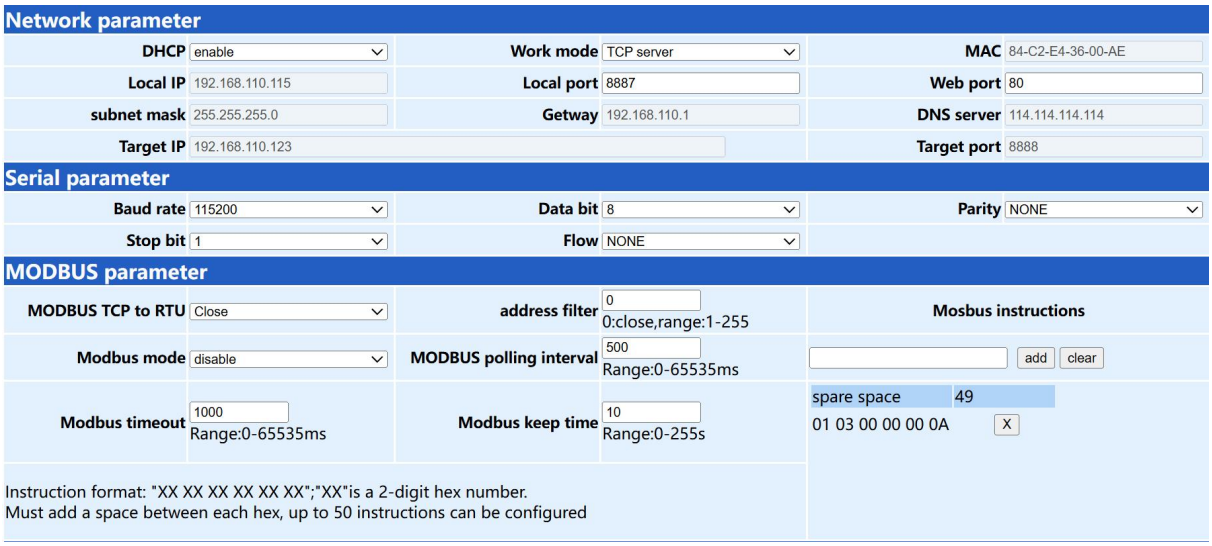
Annotations: Here, the network side is used as the host for explanation. In actual use, the ZigBee gateway side can also be used as a ModBus host

Upper computer computer / web page configuration:



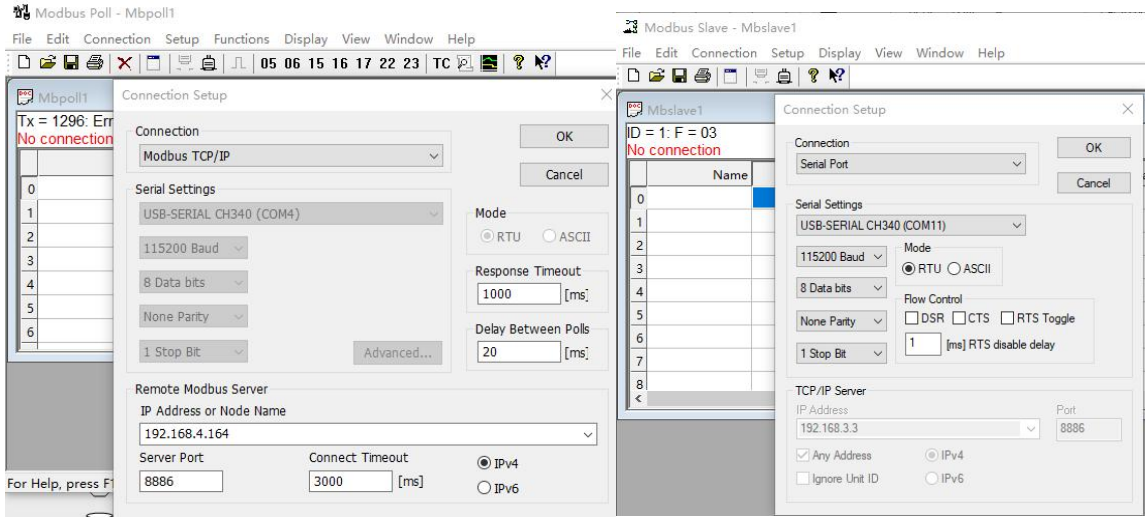
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Modbus Poll and Modbus Slave software debugging:

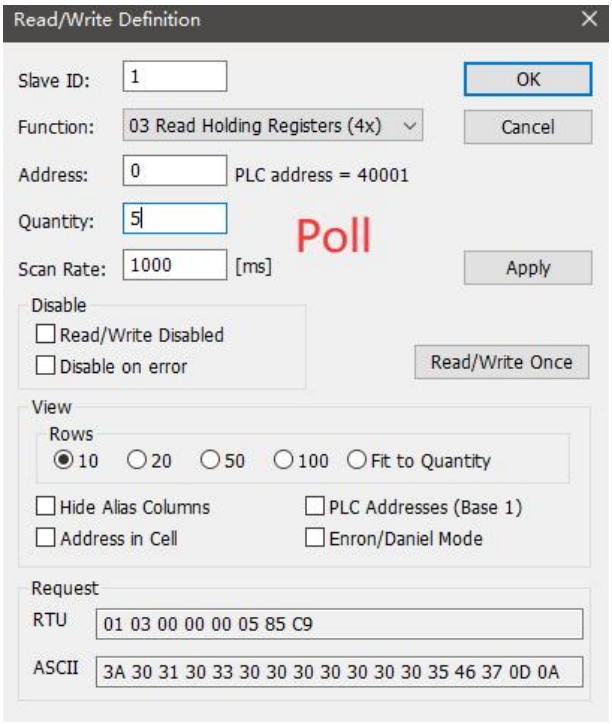
The Software Connection Settings:



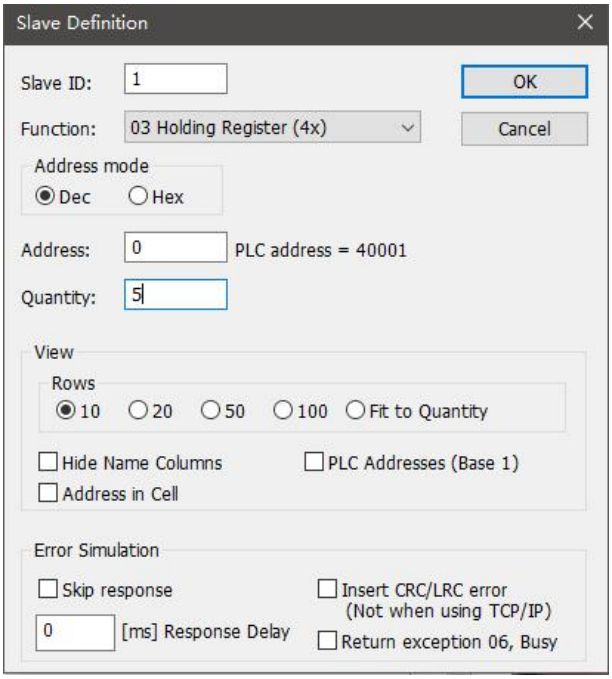
Software register read and simulation configuration:

→The Poll menu selects Setup Read / Write Definition

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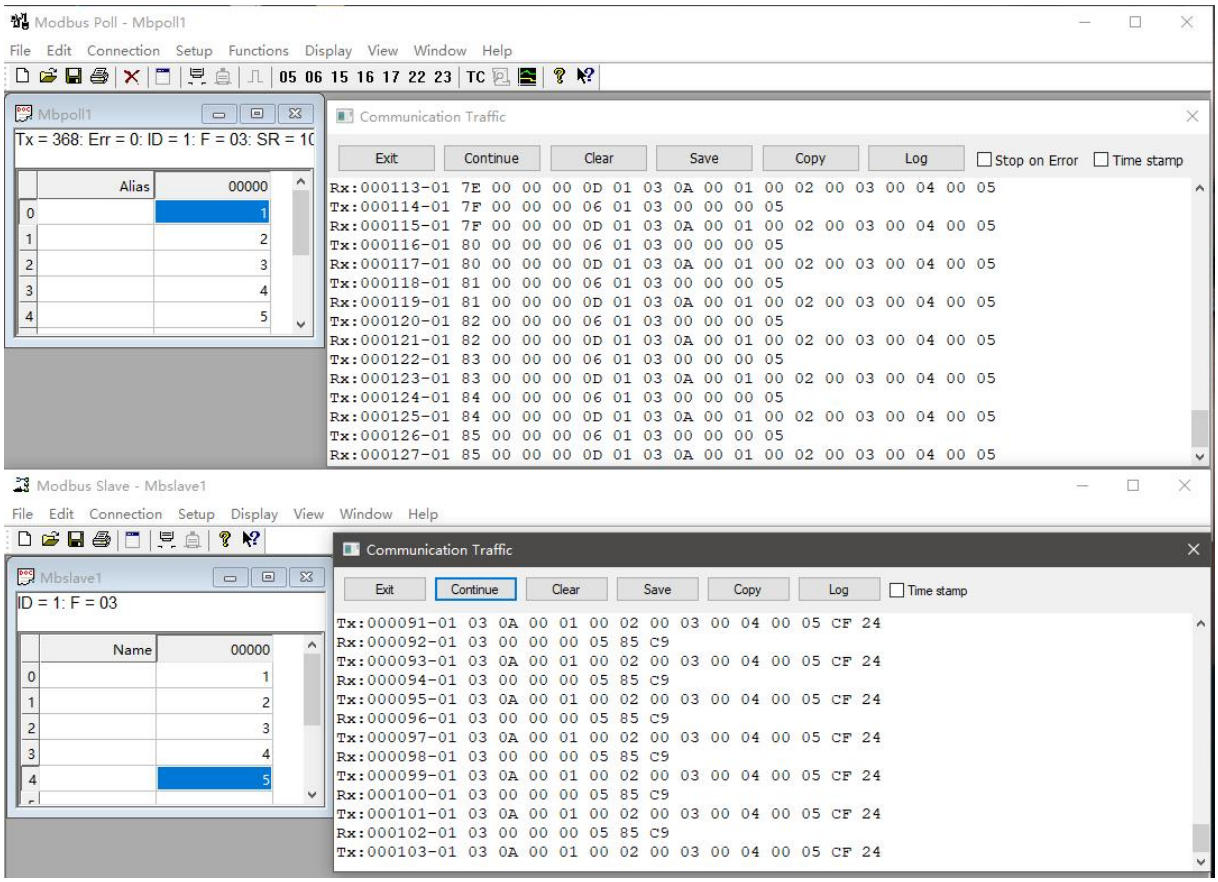
→Slave The menu selects the Se tup Slave Definition



Communication presentation:

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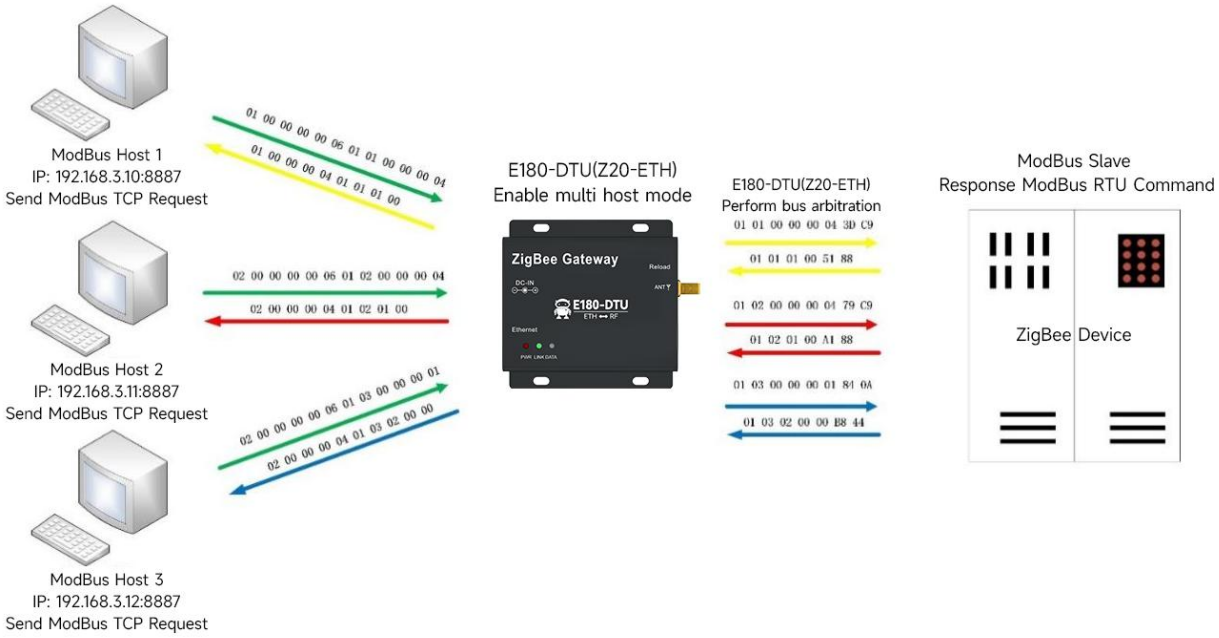
3.7.2 Multihost mode

Multiple host mode can handle up to 6 Modbus TCP hosts. When multiple Modbus hosts are accessed at the same time, the Modbus gateway will occupy bus scheduling (RS-485 bus can only process one request at a time, while multiple host mode will sort according to TCP request, and other links wait), so as to solve the problem of bus clashes (currently only support 6 host connections), only supports working in TCP server mode, slave only in the serial port, otherwise it cannot work normally.

It is recommended to configure Simple Protocol Conversion when there is no multiple host in use.

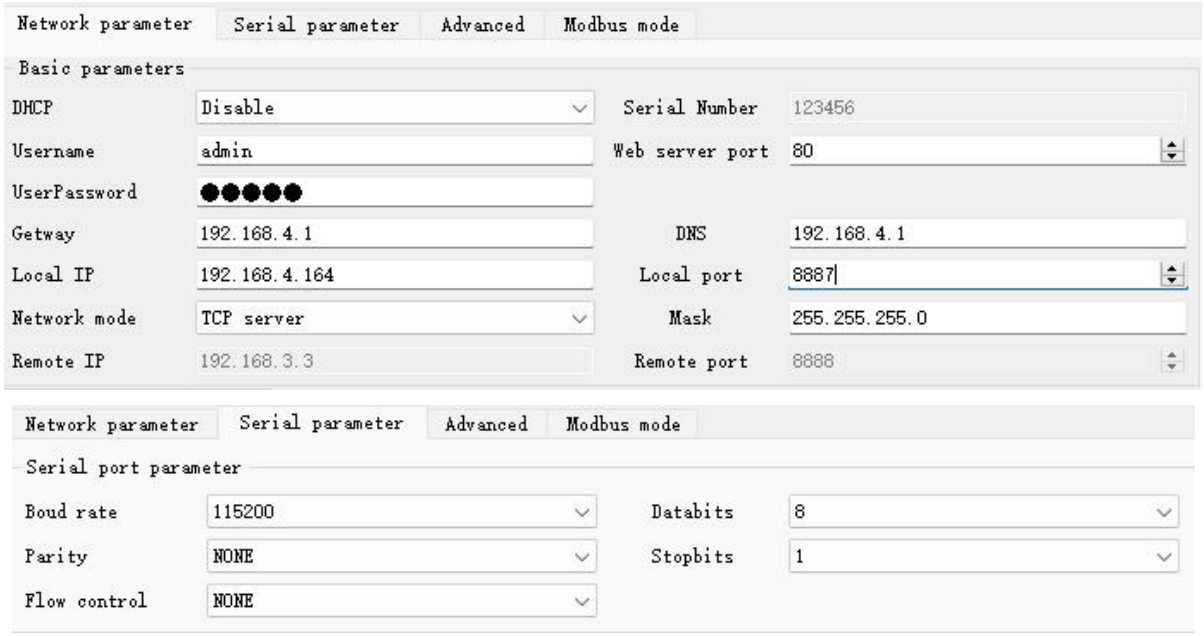
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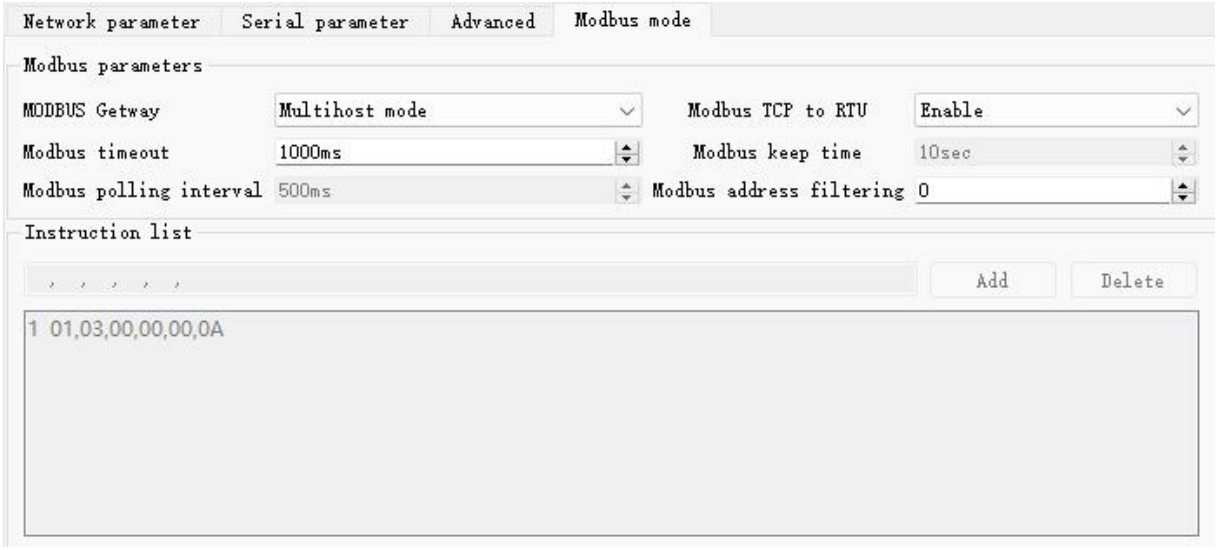
Annotations: Taking three hosts as an example, a maximum of six hosts can be connected during actual use

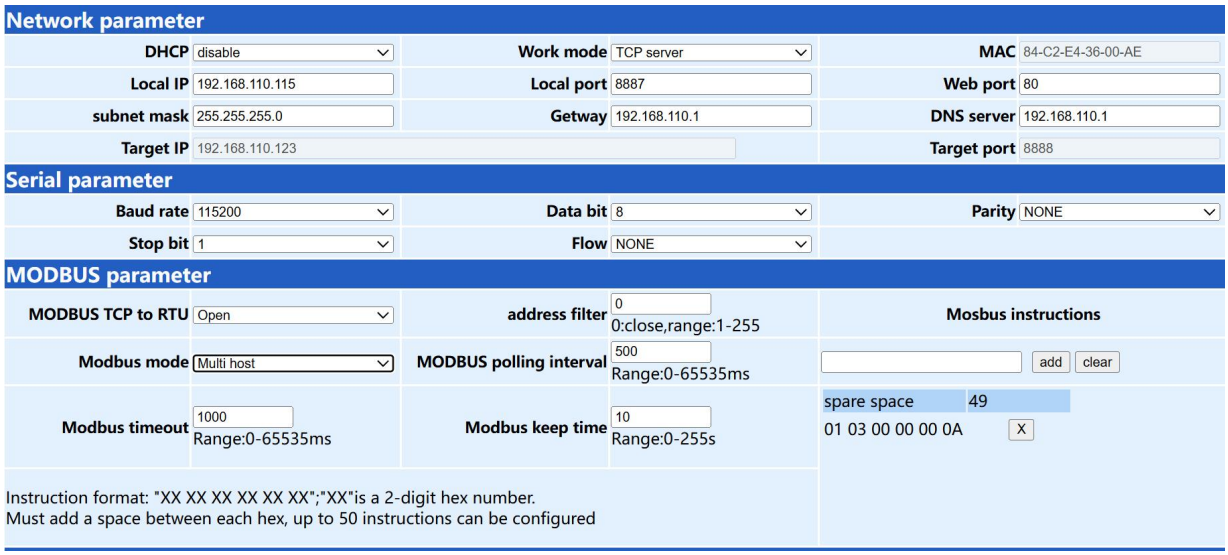
Upper computer computer / web page configuration:



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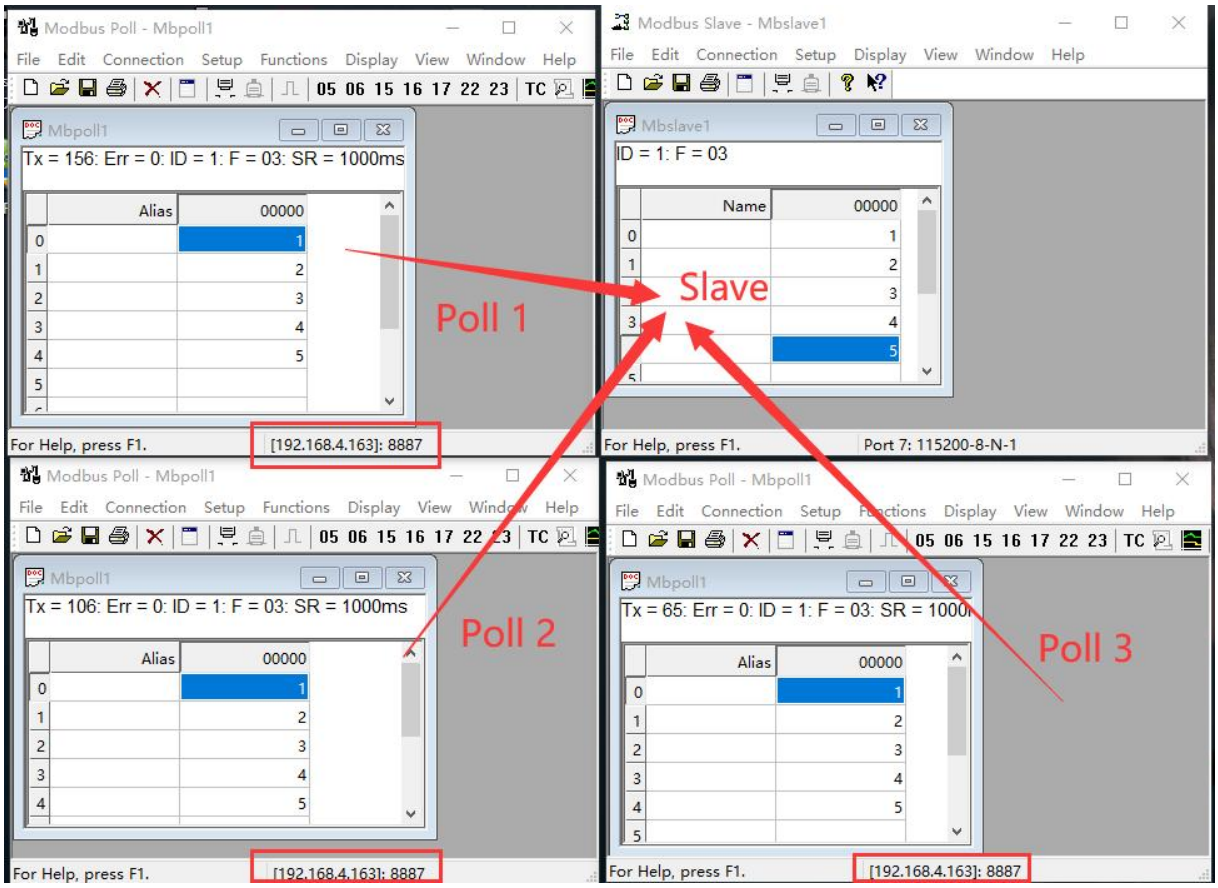


Modbus Poll and Modbus Slave software debugging:

Software configuration and register configuration refer to "simple protocol conversion", and open multiple Modbus Poll software simultaneously (3 channels, for example, up to 6 channels).

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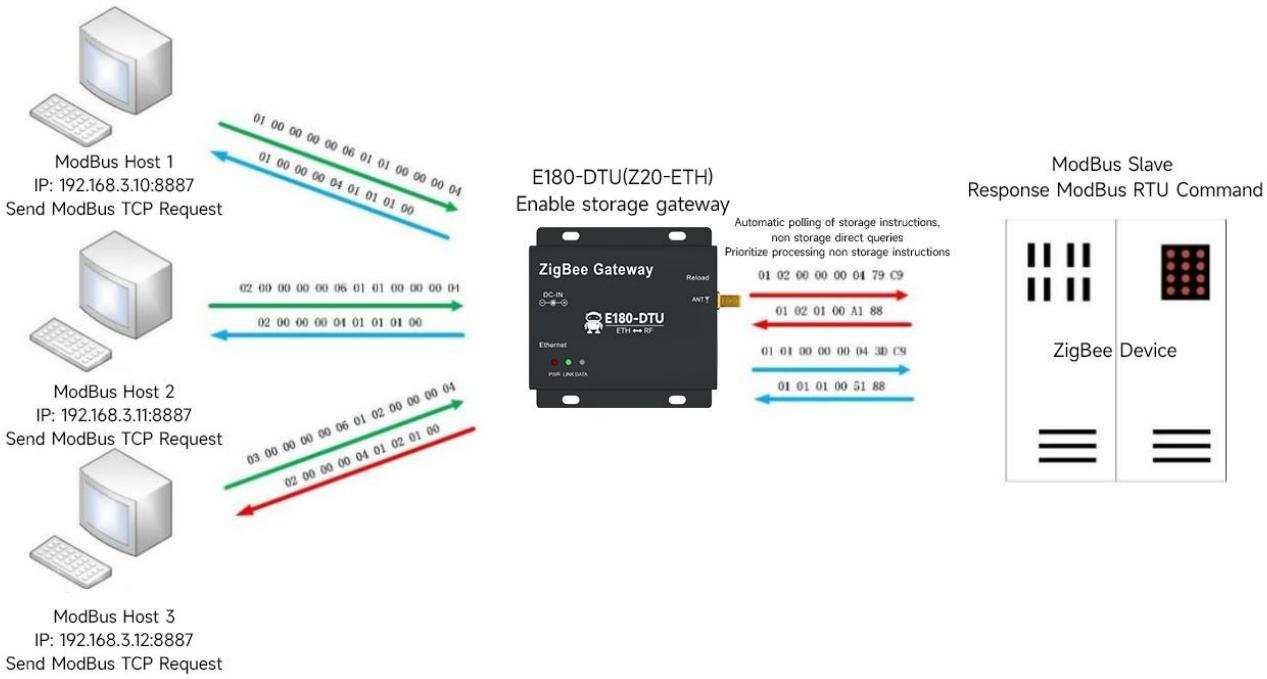


3.7.3 The storage-type gateway

Storage gateway not only to the bus data arbitration will also store for repeated read instructions, when different host request the same data without the RTU device register status, and directly return to storage area cache data, greatly improve the gateway more host request processing capacity, but also shorten the time consumed by the entire request process. The user can customize the storage area instruction polling interval and the instruction storage time according to the requirements.

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Annotations: Taking two hosts as an example, a maximum of six hosts can be connected during actual use

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

characteristic:

（1） The gateway has a 5K cache for storing instructions and return results (reading 10 holding registers, for example, can store 189 instructions and return results);

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

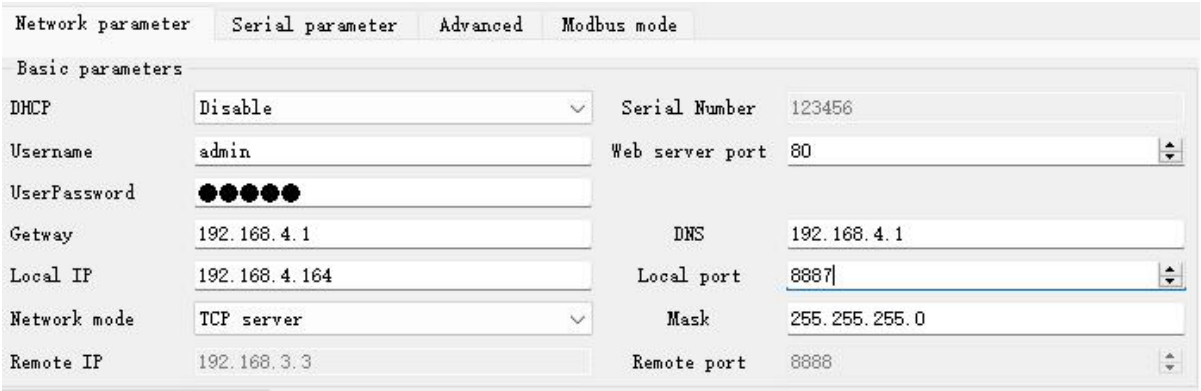
（3） Query interval can be customized, 0-65535ms;

（4） The gateway will poll the RTU device according to the instruction storage time used for the configuration, the MODBUS host does not query the command again during the storage time, and the gateway automatically removes the storage instruction to release the cache;

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

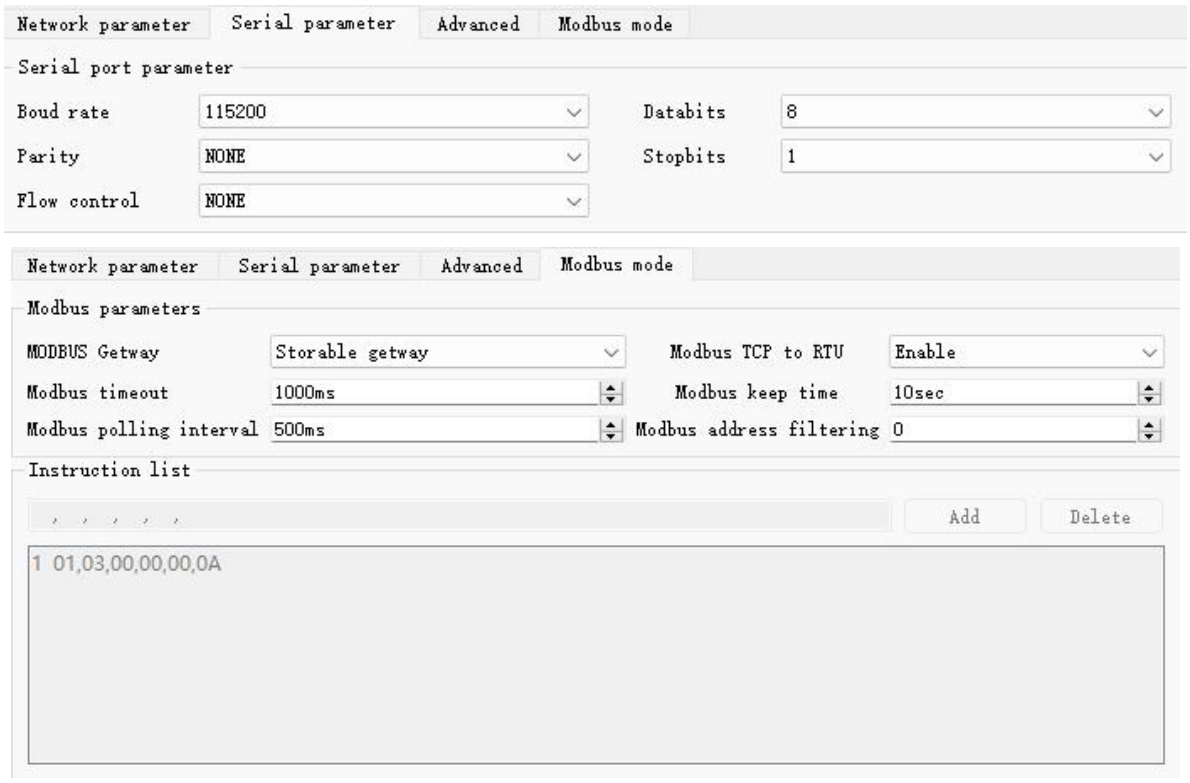
（6） Only support 01,02,03,04M od bus function code query results storage;

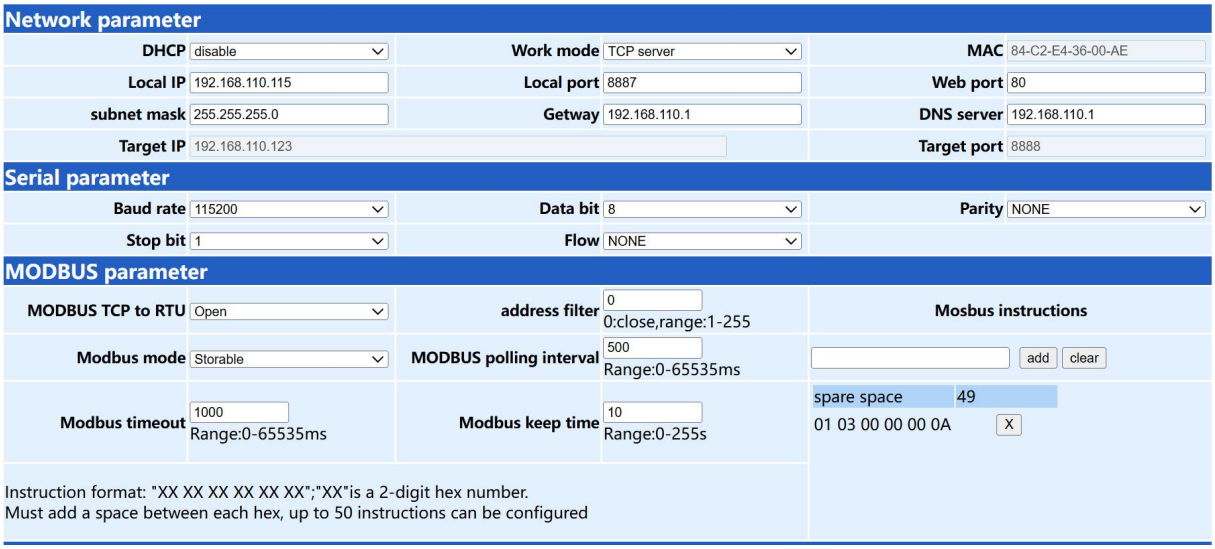
Storage gateway upper computer and web page configuration:



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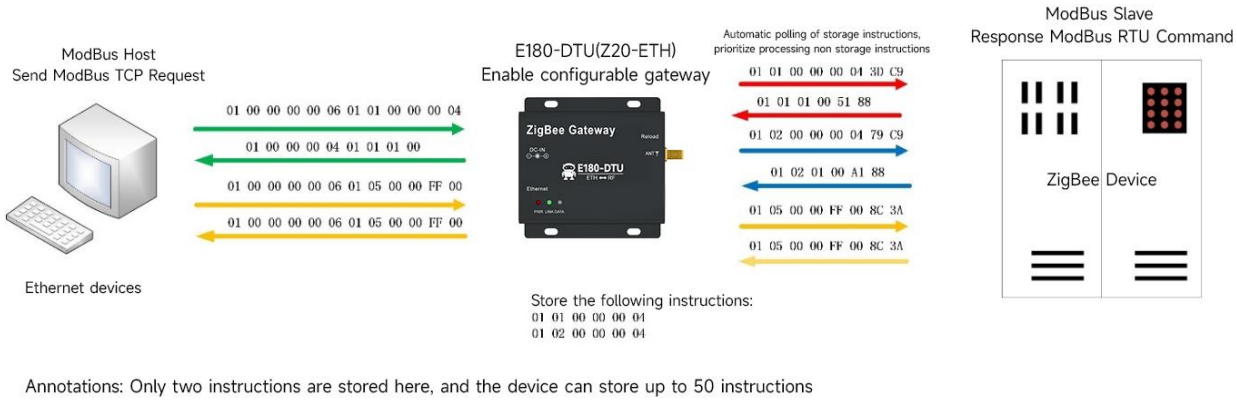


3.7.4 Configurable gateway

The gateway, based on the pre-configured M ODBUS instructions, automatically polls the RTU device register (only supports the configuration of M ODBUS reading instructions), and the non-storage instructions will directly operate the RTU device. Often read instructions can be stored in the gateway in advance, shortening the response time (query configured instructions). Due to the above features, the wireless transmission side of the configurable gateway can only connect to the Modbus slave station.

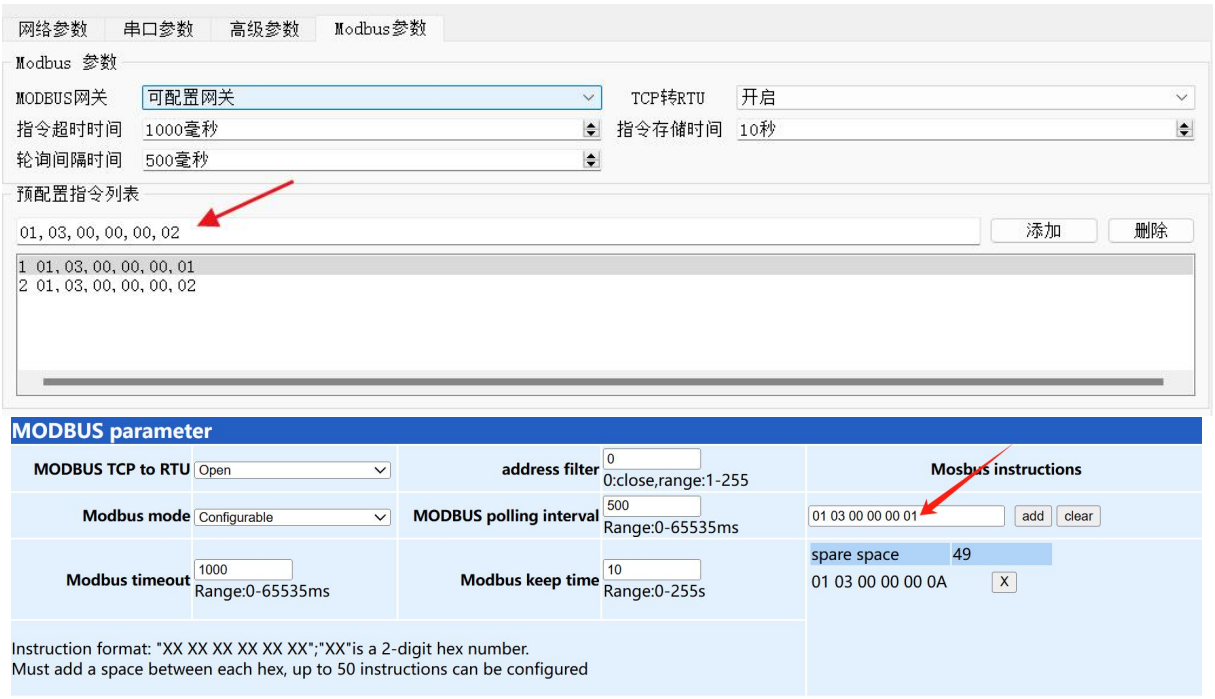
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Annotations: Only two instructions are stored here, and the device can store up to 50 instructions

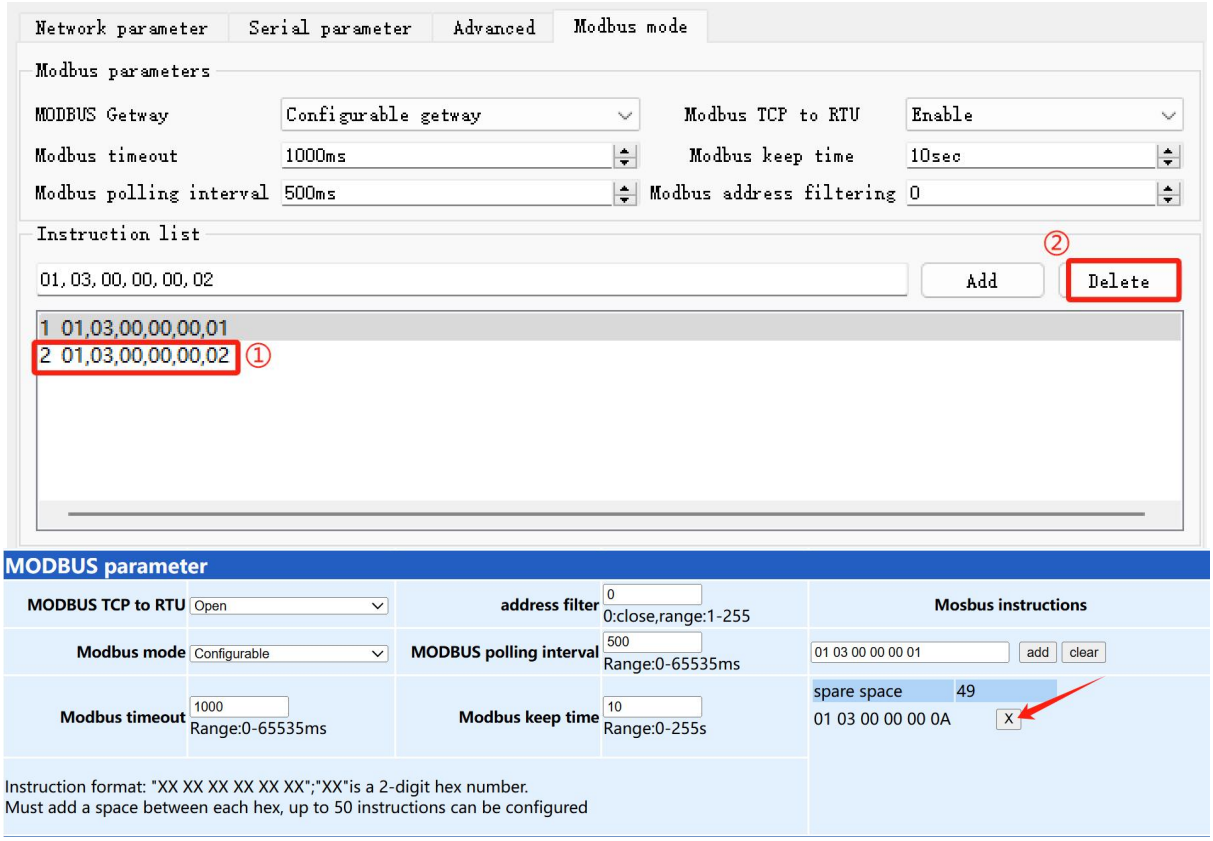
Instructions store instructions (add, instruction error and format error cannot be added):



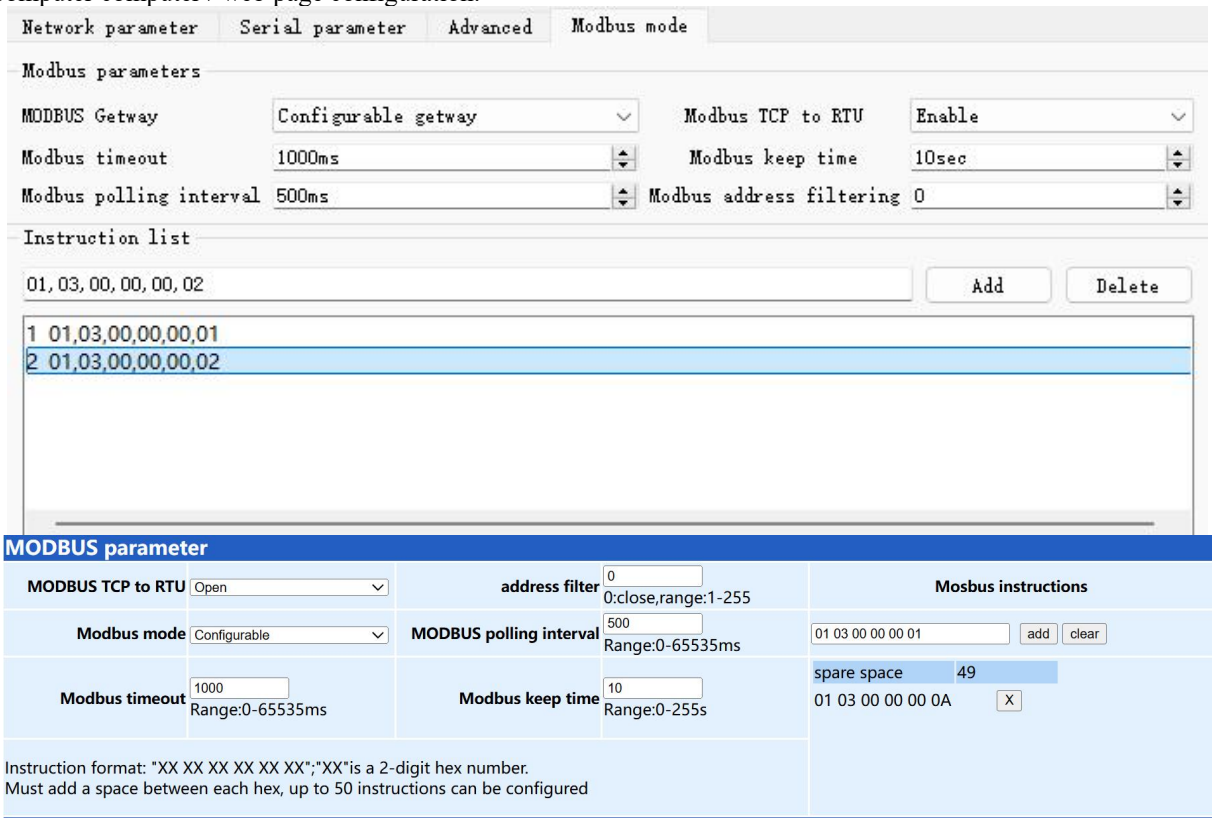
Instructions struction instruction instructions (delete):

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Upper computer computer / web page configuration:



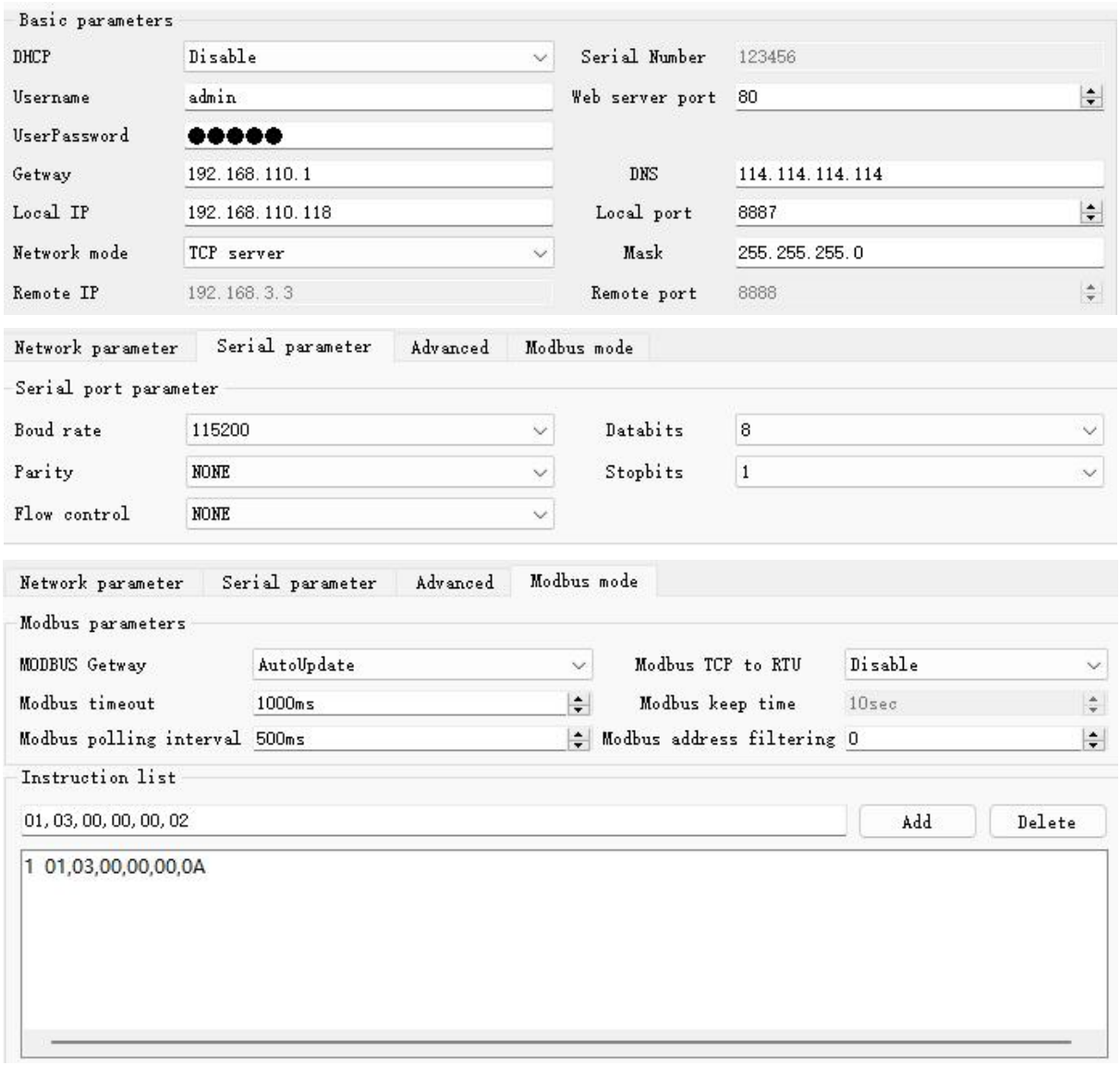
3.7.5 Automatic upload

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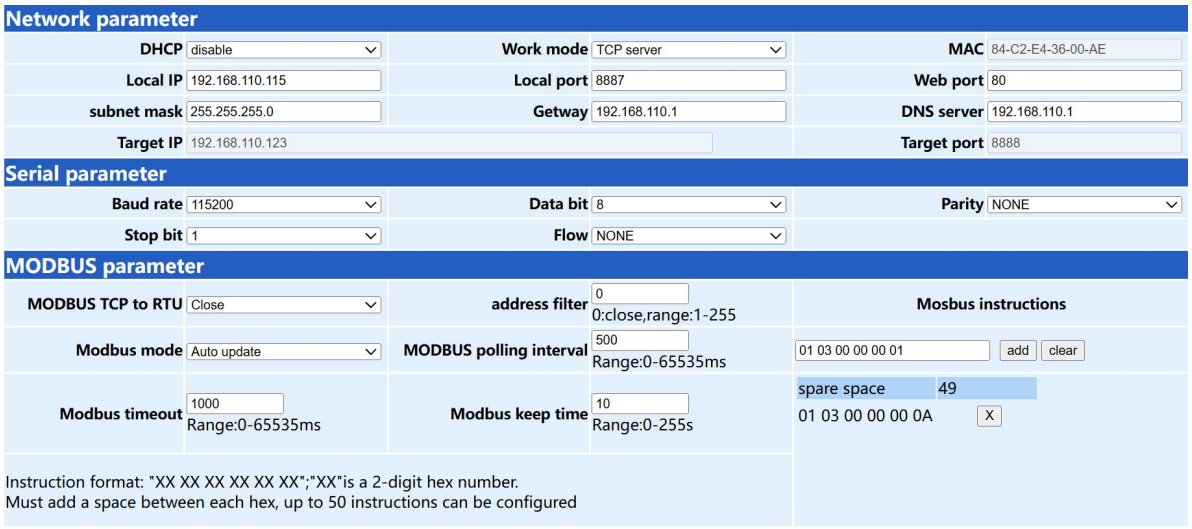
In client mode (TCP client, UDP client, M QTT client, H TTP client), the gateway will automatically poll the instructions in the storage list and upload them to the server. You can select the feedback format (Modbus RTU format or Modbus TCP format) and the instruction polling interval (0-65535ms) according to the requirements.

Instruction pre-storage refer to "configurable gateway-instruction storage instructions", automatic upload upper computer / webpage configuration:

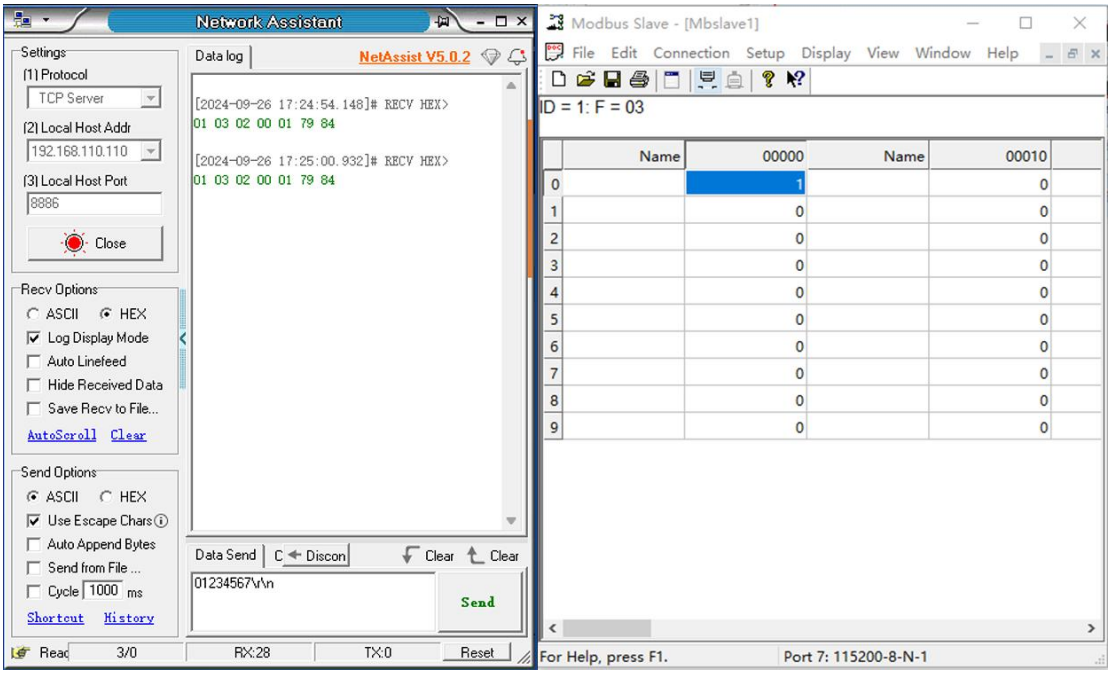


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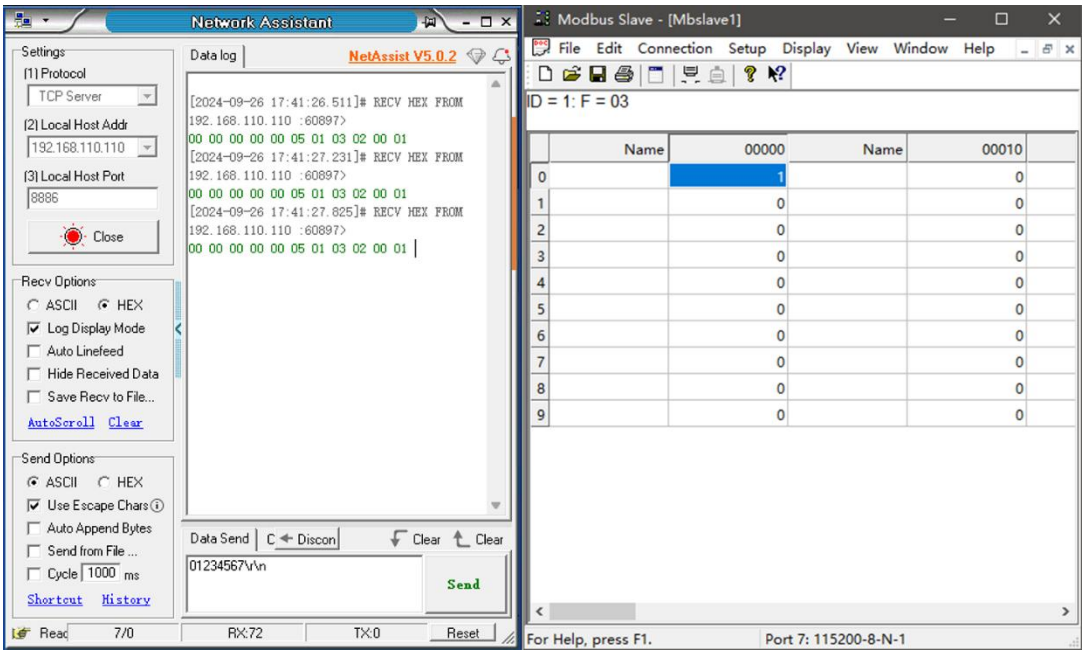
TCP Client Presentation (in Modbus RTU format):



TCP Client Presentation (in Modbus TCP format):

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3.8 Introduction of basic functions

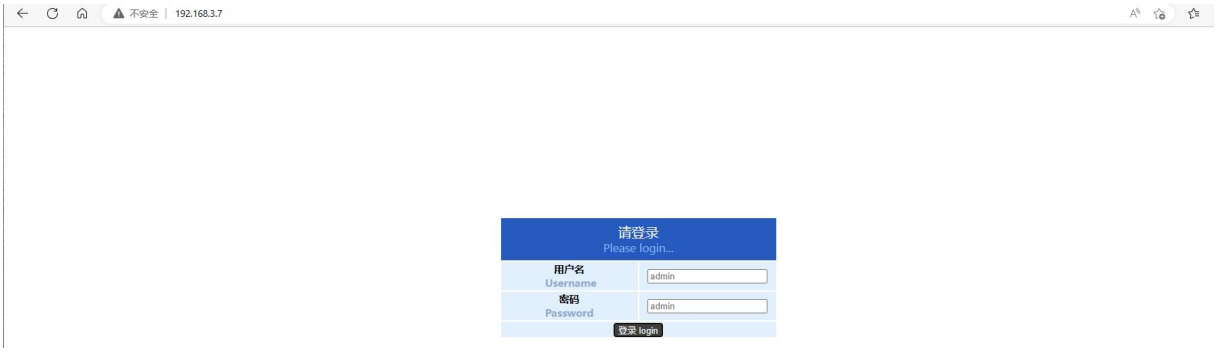
3.8.1 Web page configuration

The built-in web server is convenient for users to set and query parameters through the web page.

The ports of the Web server can be customized (2-65535), the default: 80.

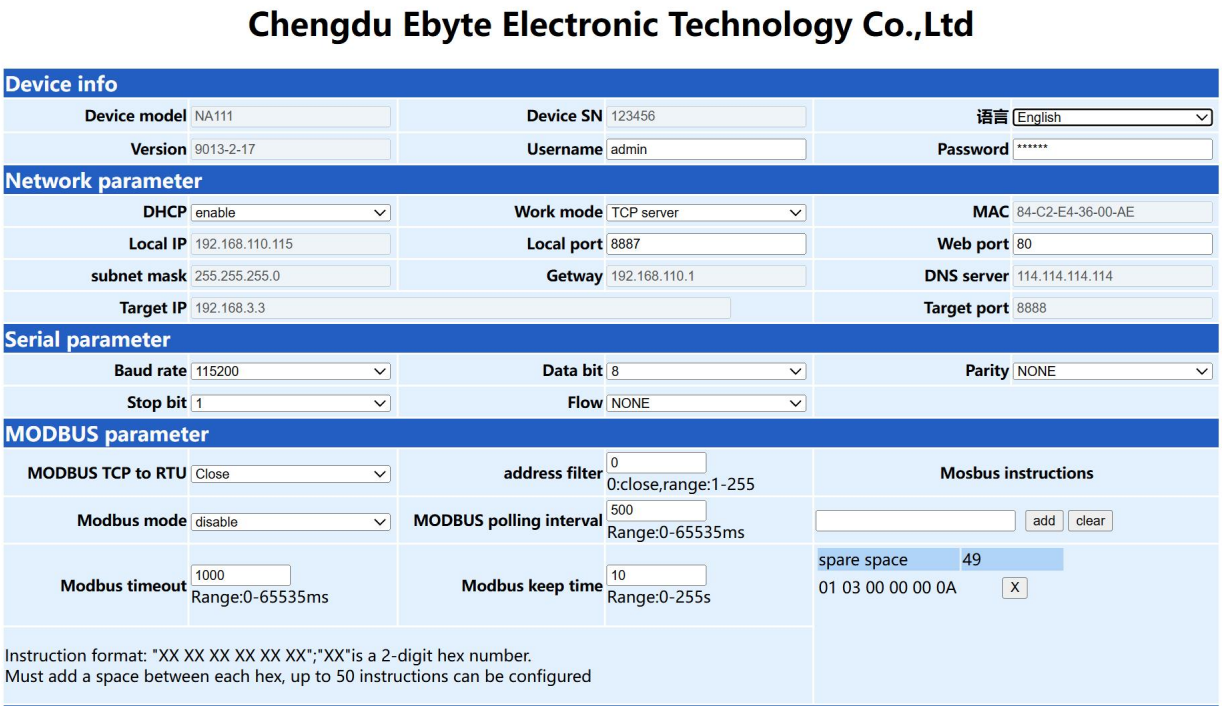
Operation mode (Microsoft Edge version 94.0.992.50 as an example, it is recommended to use Google kernel browser, IE kernel browser is not supported):

- Open the browser, address bar input the device IP address, default 192.168.3.7 (IP address and computer need to maintain the same network segment), forget the local IP can be through AT instructions and configuration software query;



- Click log in, default account admin, default password admin (entered, you can directly click log in);

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- Web page pop up the main interface, you can query and set the relevant parameters;
- Click Submit to save the configuration parameters;
- The progress bar indicates the configuration schedule, do not refresh the page again after the configuration is completed (refresh the page and enter the configuration mode again, you can enter the communication mode by restart the device or submit again).



3.8.2 Restore the factory Settings

Long press the R e load button of the device until all LED lights are on to release the button.

3.8.3 AT instruction configuration

Ethernet parameter AT instruction configuration: device related parameter query modification, can be completed through AT instruction configuration. For specific AT instructions, please refer to the "NA11x & NB 114 & NS1 & NT1-AT instruction set".

ZigBee AT Instruction configuration: related parameter query modification of equipment, can be completed through AT instruction configuration. For specific AT instructions, please refer to the "E180-ZG120A-AT instruction set". AT instruction

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mode is a special mode in transmission mode. If the device in transmission mode has no distribution network, it will enter AT command mode after re-power. The equipment that successfully distributes the network in AT mode will automatically enter the transmission mode after restart.

3.8.4 Random local port

TCP client, UDP client, HTTP client and MQTT client can configure the native port as 0 (using random native port) in server mode, otherwise the client cannot establish the connection correctly.

Using a random port connection to quickly reestablish the connection when the device accidentally breaks the server, prevents the server from rejecting the connection for four incomplete waves, suggesting a random port in client mode.

The device automatically enables random ports when configuring the TCP client, HTTP client, and MQTT client mode.

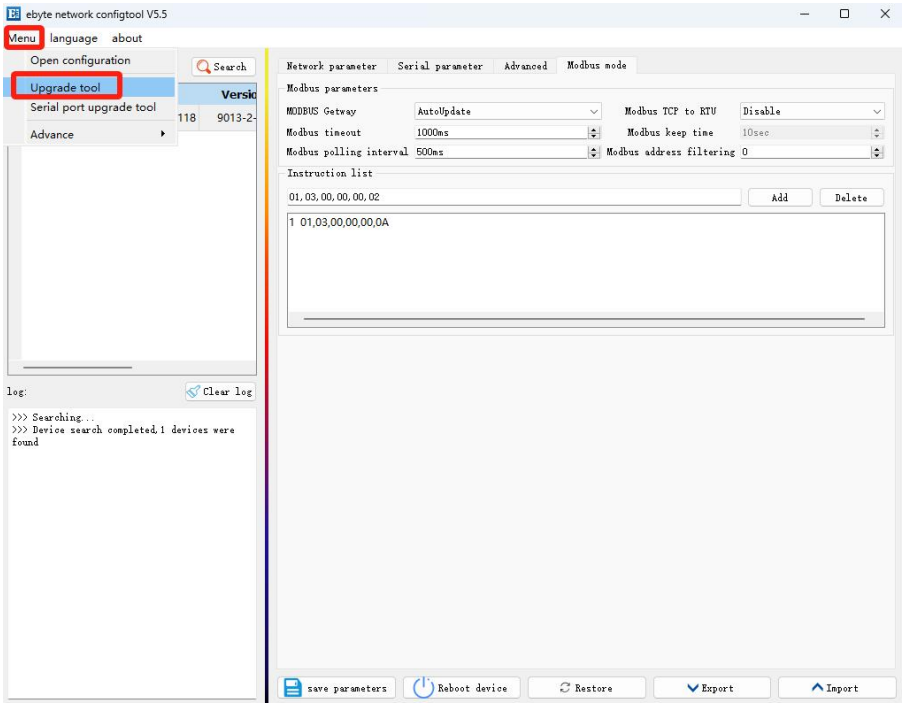
3.8.5 Remote upgrade

In order to facilitate later maintenance and upgrade functions and replacement of different firmware, the Ethernet part (NA11x series, NB 114, NS1, NT1, etc.) supports online upgrades, and our users can upgrade or replace the current firmware through the upper machine.

Network upgrade firmware operation steps:

Step 1: download the upper machine and the "product firmware" from the corresponding location on the official website;

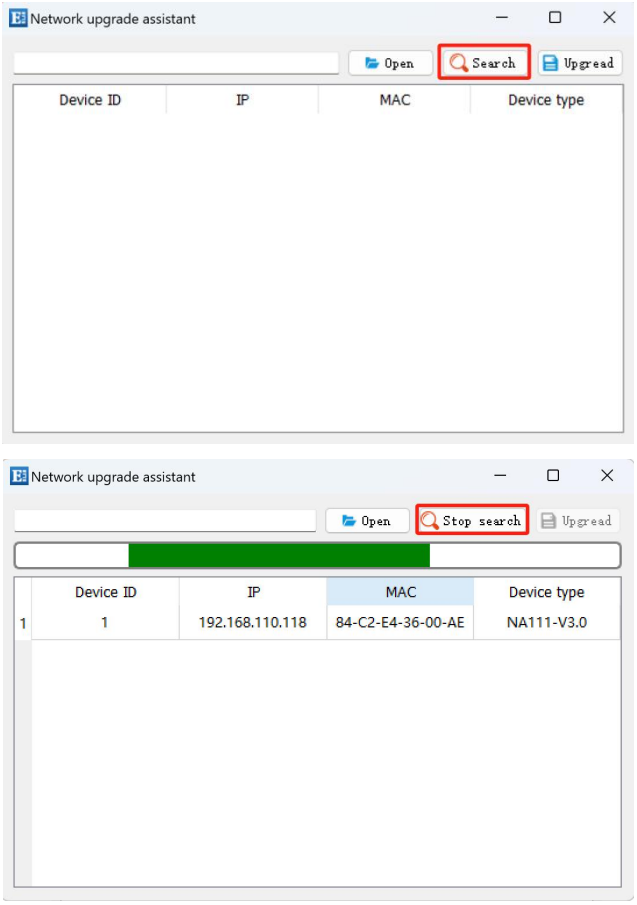
Step 2: Open the upper computer, click "Menu", and select "Device Upgrade Assistant";



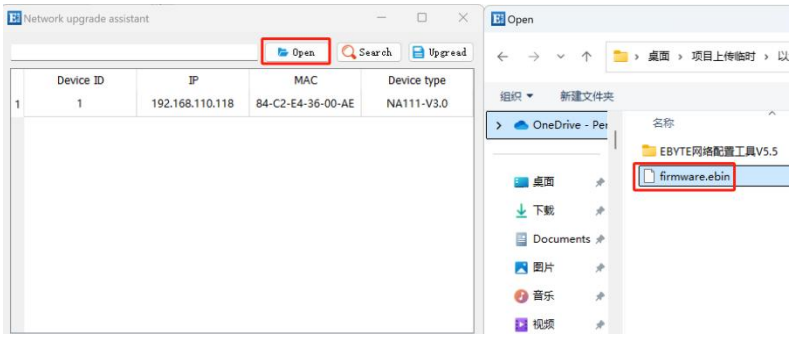
Step 3: In the pop-up "Device Network Upgrade Assistant" dialog box, click "Search device" (the computer and the device should be in the same network segment), search for the device and click "Stop Search";

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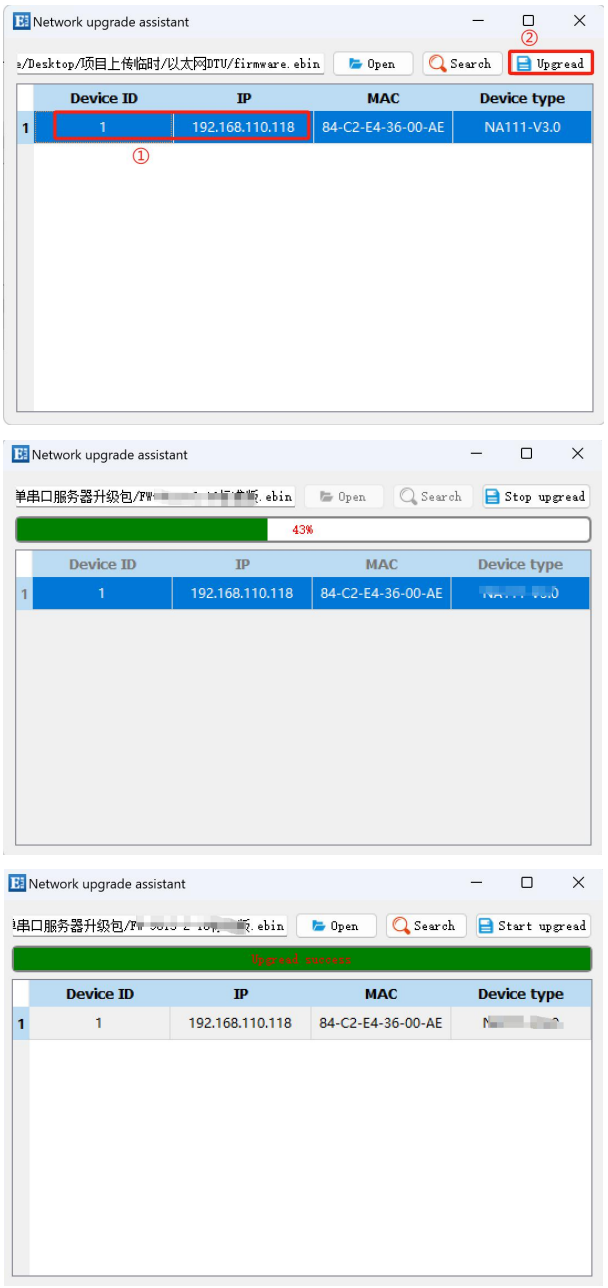
Step 4: Click "Select firmware", select the corresponding firmware, and then click "Open";



Step 5: Select the device to be upgraded, click "Upgrade", and the progress bar starts to change, and wait for the upgrade to complete.

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4.Quick Start

1.1 Use preparation

Before using E180-DTU (Z20-ETH) (hereinafter referred to as "equipment"), network cable, computer and other related auxiliary materials shall be prepared.details are as follows:

		
E180-DTU(Z20-ETH)	parvicostellae	computer
		
DC 12V Power supply adapter	antenna	

1.2 Equipment wiring

Connect the E180-DTU (Z20-ETH) device to the antenna, the power supply, and connect the network cable to the computer simultaneously.

1.3 Ethernet Settings

4.3.1 Network test environment

To avoid the customer in the actual application process of the server search failure, and can not open the web page and other related problems, it is suggested to check the relevant Settings of the computer first.

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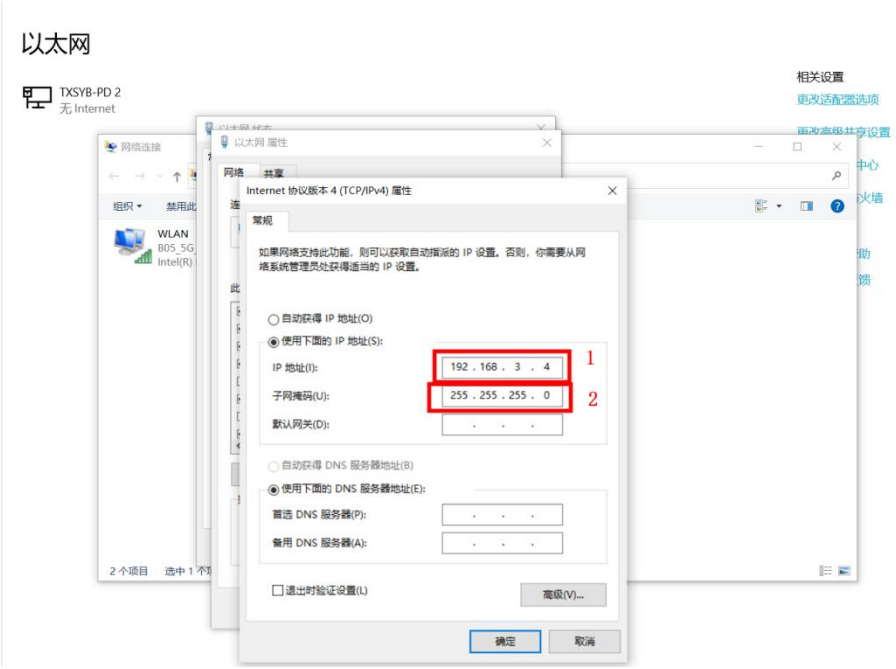
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（1） Turn off the computer firewall, anti-virus software;

（2） Configure the network card connected to the device;

（3） In this case, for the equipment directly connected to the computer test, the computer needs to configure the computer as static IP (the computer directly connected to the device, no router to allocate, the computer can not get the IP address), using the switch or router needs to ensure that the device and the computer are in the same network segment (such as: 192.168.3.xxx);

（4） The static IP of the configured computer is 192.168.3.4 (the same network segment as the device), the configured subnet mask is 255.255.255.0, and the configured default gateway is 192.168.3.1.



4.3.2 Default parameters of Radio Ethernet

project	Default parameter
IP address	192.168.3.7
Default local port	8887
subnet mask	255.255.255.0
default gateway	192.168.3.1
Default working mode	TCP Server
Serial port port rate	115200 (modifications not recommended)
Serial port parameters	8 / None / 1 (modifications not recommended)

4.3.3 Network connection test

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After the above operation steps, the network connection can be realized by following the factory default parameters and performing the following operations.

The operation steps are performed as follows:

(1) Open the test TCP / IP debugging assistant software;

(2) "Network Settings" area, select TCP client mode (TCP Client), the remote host address corresponding (the device default local IP: 192.168.3.7), the remote host port corresponding to the device factory local port 8887, click connect;

(3) Wait for the computer to connect the device. After the connection, the LINK light of the device is always on, indicating that the radio station has been connected to the network;



1.4 ZigBee Build a network quickly

In order to enable users to quickly familiarize themselves with radio stations, this section will guide users to build a ZigBee network, including node type configuration, PANID setting, channel setting, and transmission power setting.

When using the ZigBee3.0 host, our station must be in TCP server (TCP Server) mode, otherwise the station cannot connect to the host!!!

4.4.1 Preparation of the work

Before establishing the ZigBee network, we need to configure the network parameters of the radio station. We prepare 2~3 sets of equipment, here choose 3 E180-DTU (Z20-ETH) radio stations, users can also choose to use 1 E180-DTU (Z20-ETH) radio station, the rest choose our E18 series, E180 series modules for testing.

We used the three sets of E180-DTU (Z20-ETH) as the coordinator, router and terminal respectively.

- **Coordinator device network parameter configuration**

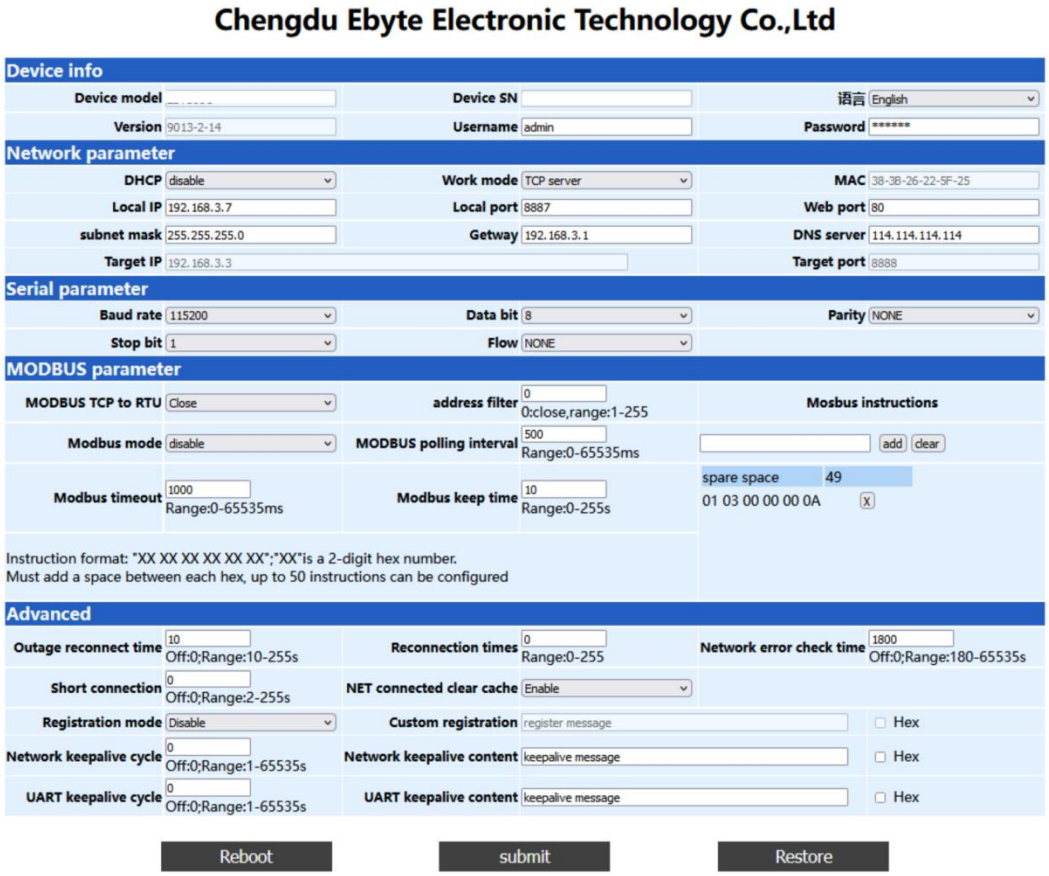
（1） Configure the coordinator device network, connect our device to the computer, open the browser, type 192.168.3.7 in

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the website input box, click Enter, come to the login page, enter the user name: admin, password: admin, and click login.



（2） Enter the configuration page, do not modify, the coordinator radio network parameters remain by default.



（3）The progress bar displays to 100%, indicating a successful parameter configuration submission.



- **Router device network parameter configuration**

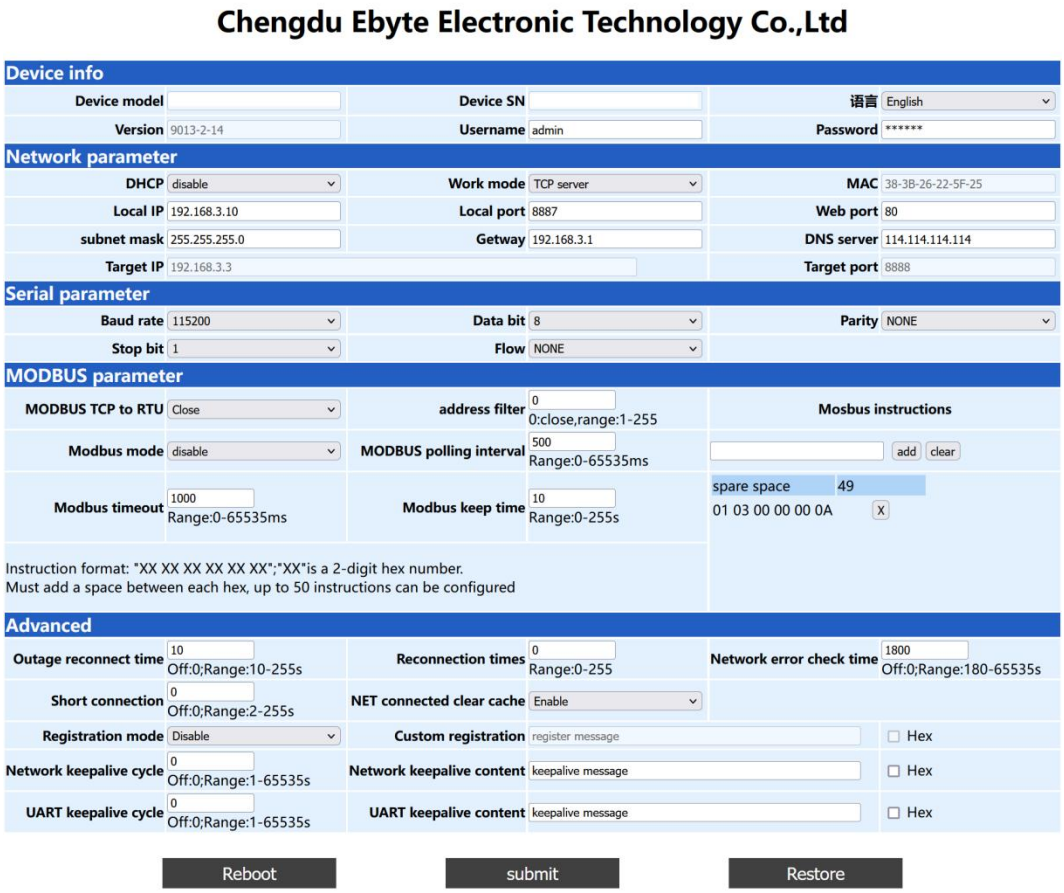
（1） Configure the router device network, connect our device to the computer, open the browser, type 192.168.3.7 in the website input box, click Enter, come to the login page, enter the user name: admin, password: admin, click log in.

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（2） Go to the configuration page, change the device IP to 192.168.3.10, keep the remaining parameters by default, click Submit.



Note: After the device IP is modified, the configuration page entrance will change the modified IP address, which is 192.168.3.10. If the device IP is forgotten, we can restore the factory setting of network parameters through the Reload button.

（3）The progress bar displays to 100%, indicating a successful parameter configuration submission.



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- **Network parameter configuration of the terminal equipment**

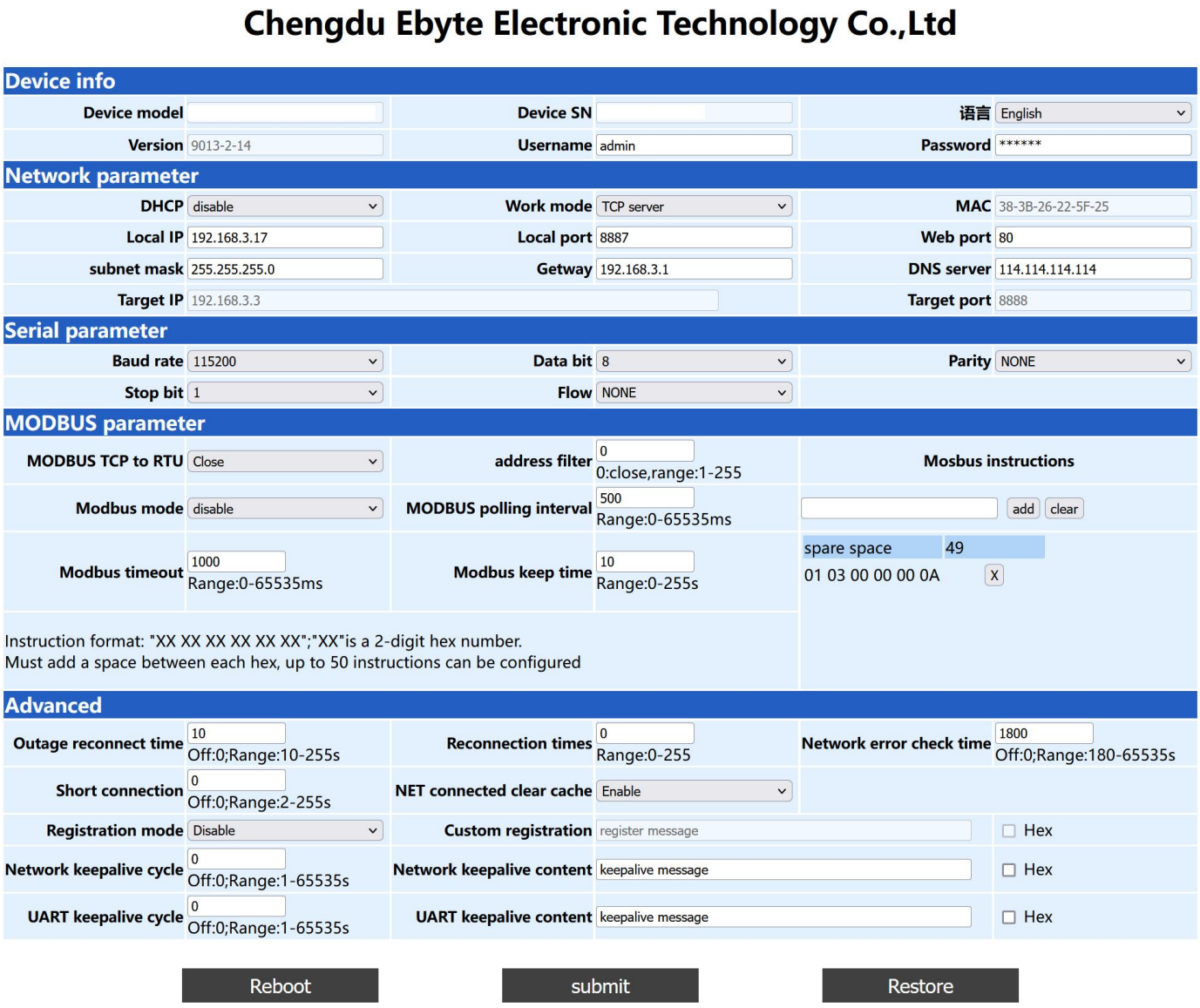
（1） Configure the terminal device network, connect our device to the computer, open the browser, type 192.168.3.7 in the website input box, click Enter, come to the login page, enter the user name: admin, password: admin, and click log in.



（2） Go to the configuration page, change the device IP to 192.168.3.17, keep the remaining parameters by default, click Submit.

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Note: After the device IP is modified, the configuration page entrance will change the modified IP address, which is 192.168.3.17. If the device IP is forgotten, we can restore the factory setting of network parameters through the Reload button.

（3）The progress bar displays to 100%, indicating a successful parameter configuration submission.



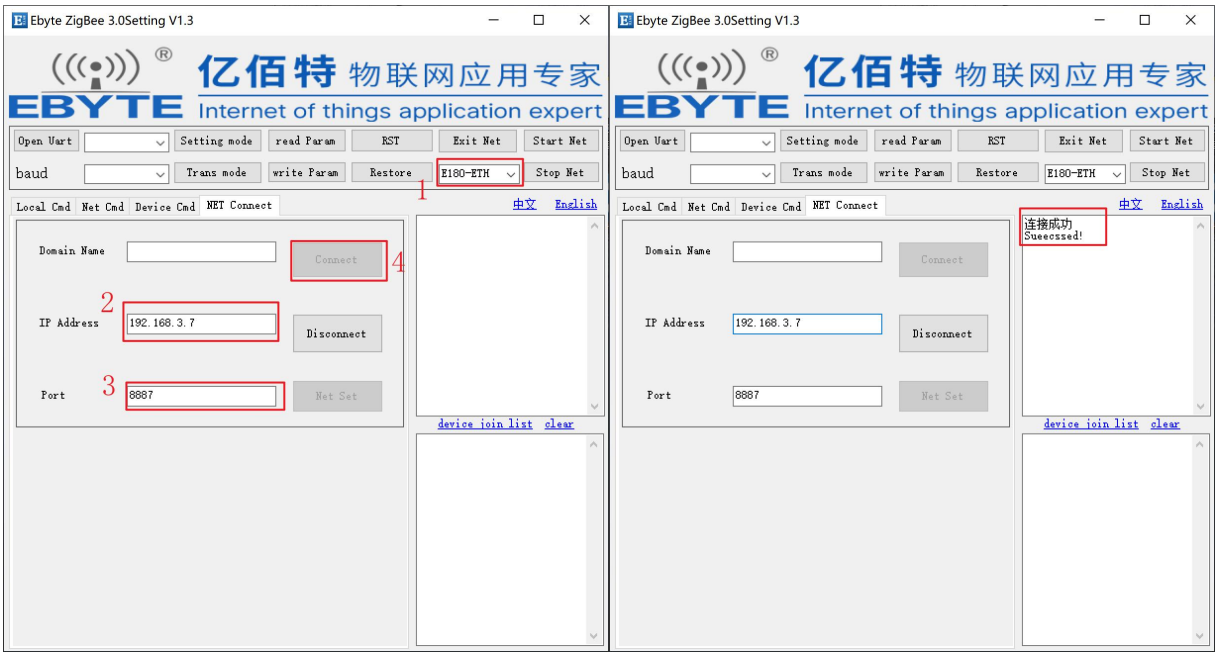
4.4.2 Quickly build a ZigBee network

Combined with the upper computer software to quickly and simply build a ZigBee network, the specific steps are as follows:

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(1) Connect radio 1 to the computer, open the upper computer software "ZigBee3.0 upper computer", select the device type, input the IP address, input the port number, click the connect server, and see the right window.



(2) the module factory is HEX instruction configuration mode, E180-DTU if in AT command mode, need to switch to HEX instruction mode, click "read parameter", message box prompt "read parameter success", the main network parameters include: long address, station type default coordinator (if not please set to coordinator), network status is "not have" (if it is not necessary to exit the network or restore the factory). If the read parameter is invalid, it is possible that the module is currently in transmission mode and needs to click "Enter the Configuration Mode", and the message box prompts "Enter the configuration state successfully".



（3）Click "Start distribution network" to coordinate and establish an open network. The coordinator will open a new network

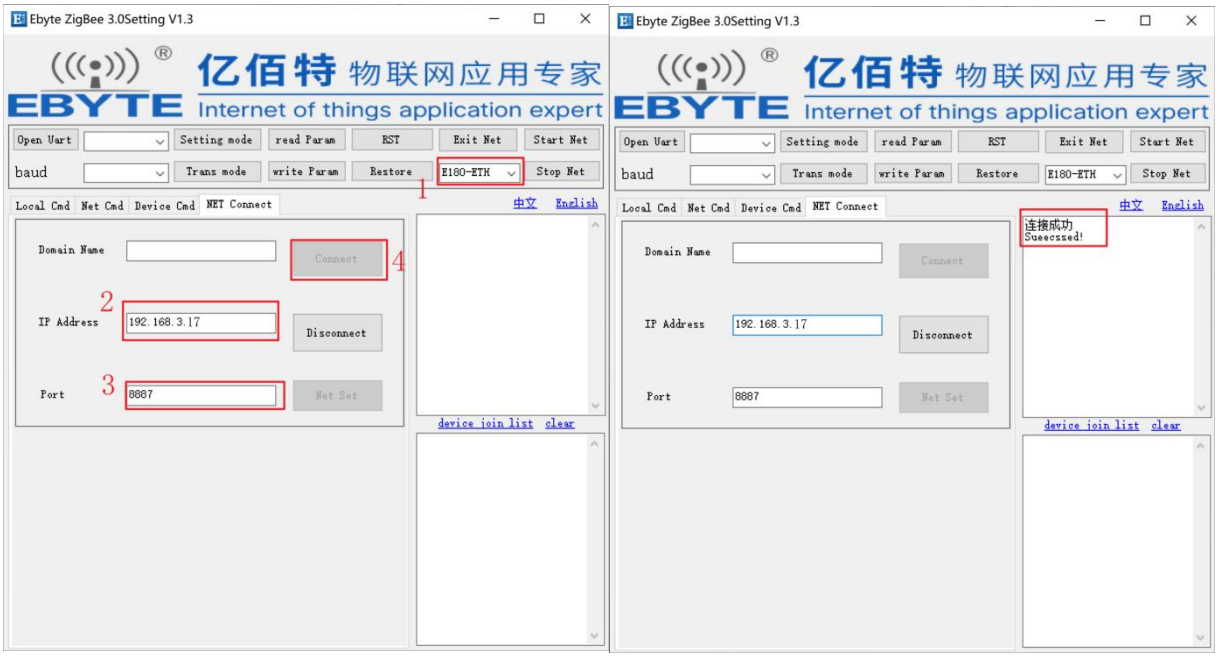
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for 180 seconds, LINK lights flicker at 1Hz, and the router and terminal can join the network within this time.



4.4.3 Quick addition to a ZigBee network

(1) Connect radio 2 to the computer, open the upper computer software "Yibai ZigBee3.0 upper computer", select the device type, input the IP address, input the port number, click the connection server, you can see the right window shows the successful connection.



(2) Click "Start distribution network", and the LINK light of DTU equipment flashes quickly at 10Hz. At this time, ensure that the coordinator equipment is also in the distribution network state (see Section 5.1). Wait for a while, the LINK light of DTU

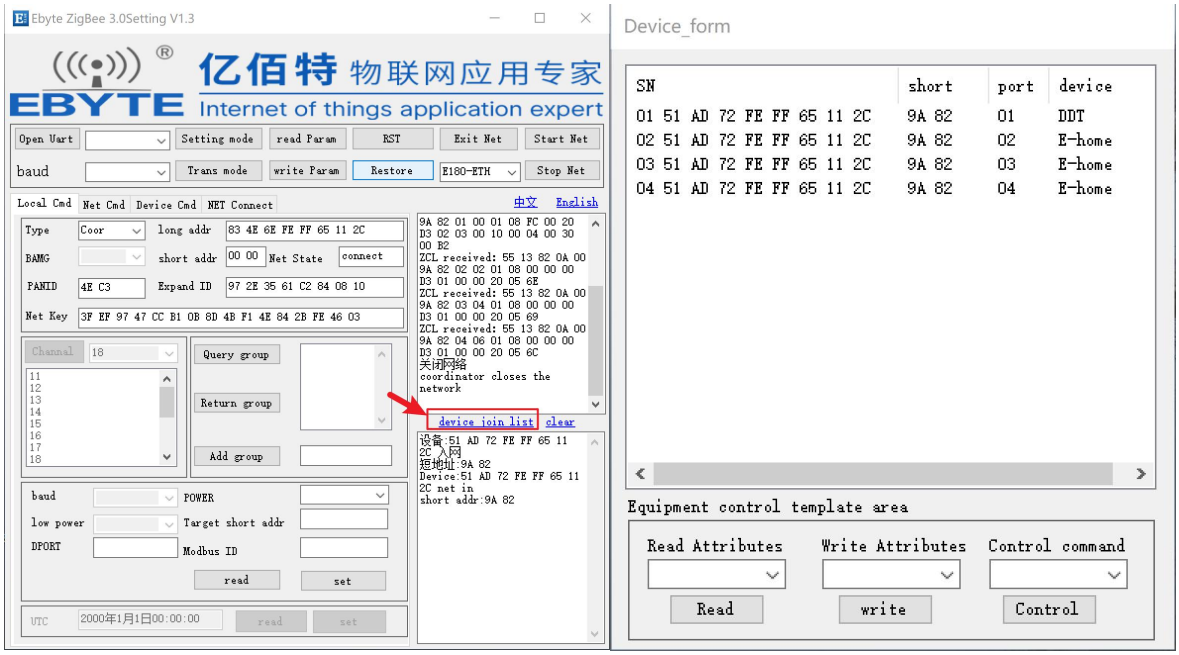
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becomes long light or 1Hz flashing (router mode). Click "Read parameters" to view the network access information of the device. At this time, the network status is "connect". If the LINK light is out and the network state is "not have", the module network fails, check whether the coordinator device is in the distribution state and the distance between the coordinator device and the router / terminal device is within a reasonable range.



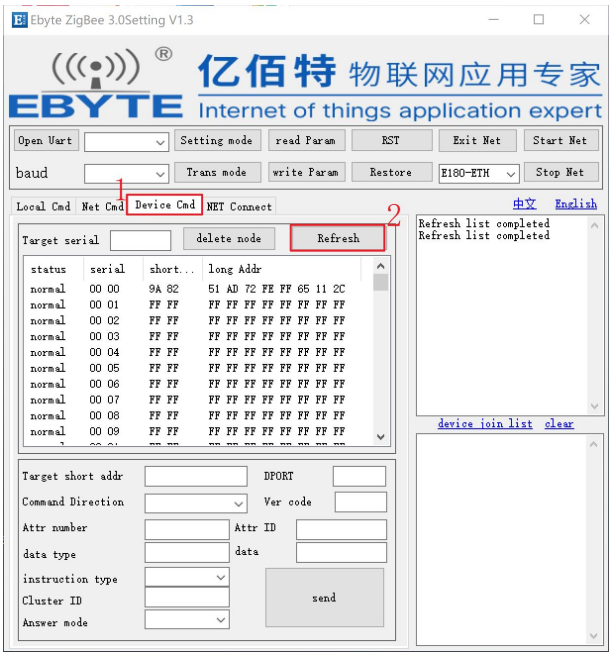
(3) View the router / terminal device information, including the MAC address and the short address. Click the "Device staging list" on the computer interface of the coordinator device to view the 9 byte SN number of the access device (Note: there may be multiple SN numbers in a module, each SN number represents one peripheral or function, the more the module function, the more SN number), SN number can be used to control the device and the device binding transtransmission target.



(4) On the upper computer interface of the coordinator device, click "Device Control Instruction" and click "Refresh the device list", to see the MAC address and short address of the network access device.

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By this method, several routers and terminal nodes can be added in a coordinator network.

matters need attention:

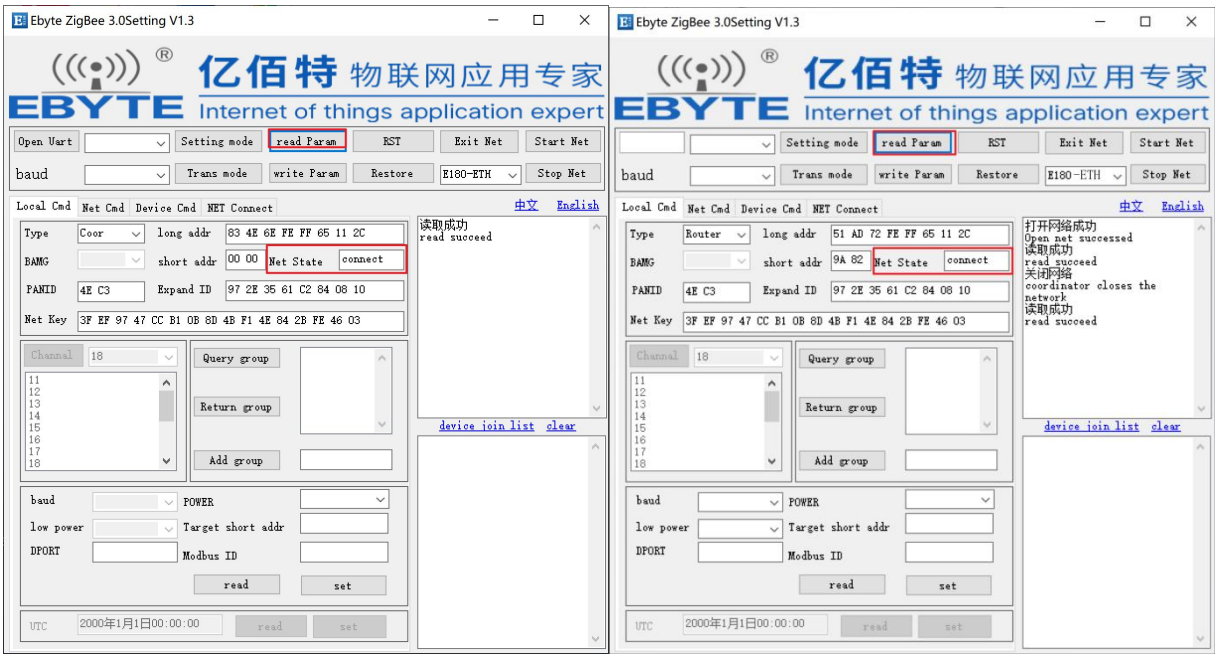
If the router or terminal node that has already been added to the network needs to switch to the network established by the other coordinator, it needs to carry out the "exit the network" or "restore the factory" operation, and then set it up again according to the process of 4.4.3. Similarly, if the router that has joined the network needs to be changed to a terminal node, or the terminal node that has joined the network is changed to a router, the "exit the network" or "restore the factory" operation is also required.

4.4.4 Data transmission

(1) Open the host computer software of the coordinator device and the network access device, and click "Read parameters" to confirm that the current network status of the device is "connect", indicating that the device has been networked.

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Coordinator equipment, and the router equipment

(2) Click "Query" to query the configuration parameters of the equipment. The short address of the transmission target is 0xFFFF, and the target port 0 xFF (i. e. 255) means that the device is broadcast by default in the transmission mode.



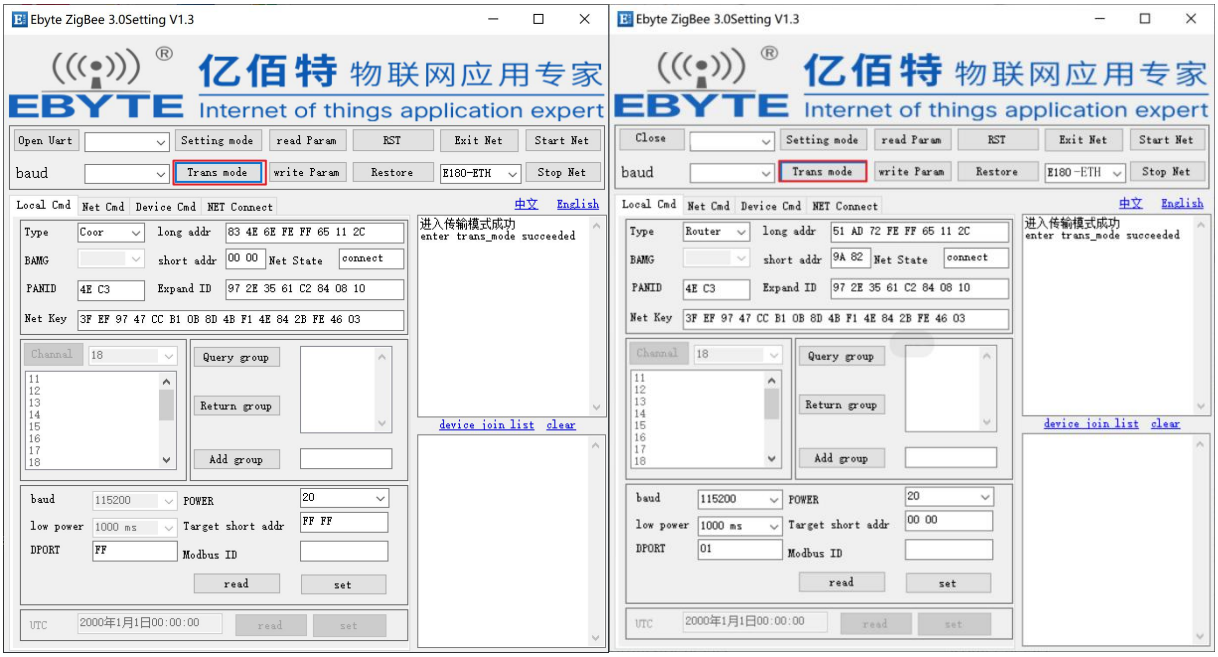
(3) Then the router equipment is set to transmit the data to the coordinator equipment in the form of on-demand, and the coordinator equipment adopts the broadcast mode. In the upper computer interface of the router device, set the target short address to 00 00 (i. e. 0x00 00), the target port is set to 01 (i. e. 0x01 or 1), and then click "Settings". After setting up, you can click "Query" again to confirm whether the setting is successful.

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(4) Enter the transmission mode. After clicking "Enter transmission mode" on the upper computer interface of the coordinator device and the router device respectively, both can enter the transmission mode. One side serial port input any data, the other side serial port can completely output the same data.



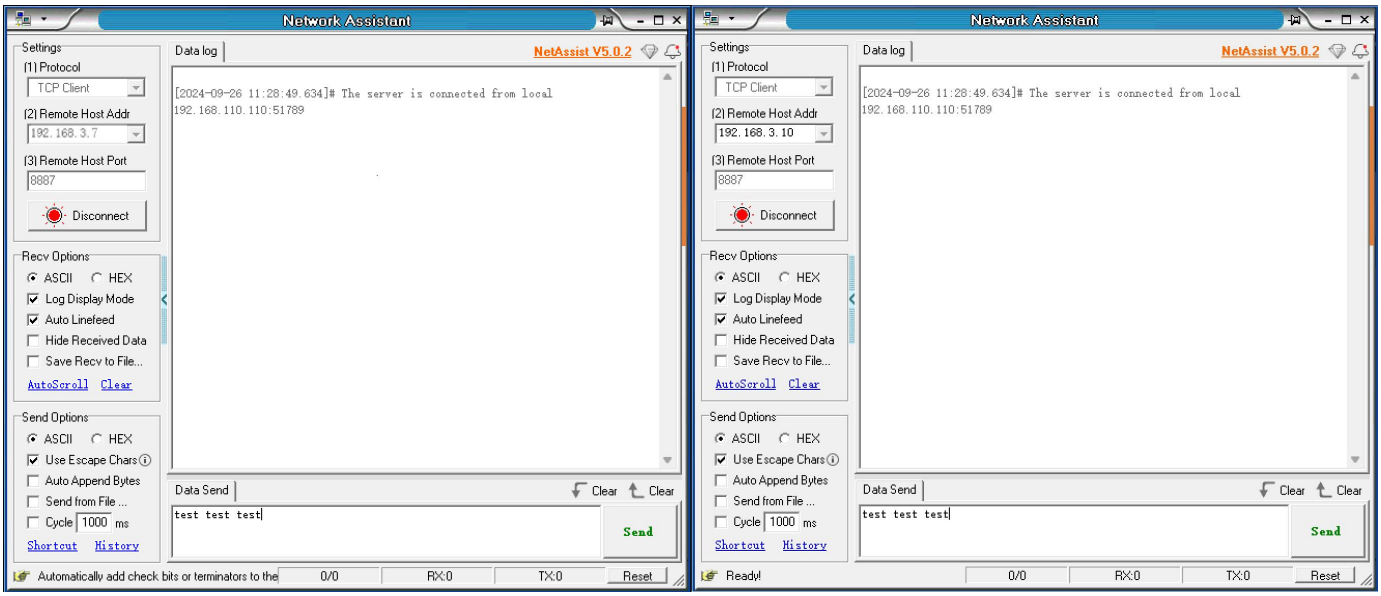
Coordinator equipment, and the router equipment

After entering the transmission mode, close the host computer configuration software and open the serial port assistant. If either party enters any data, the other party will output the same data. The party sending the data returns "OK" for sending success, and "FAIL" or "ERRO" for sending failure.

(5) Open the network debugging assistant, select the protocol type as "TCP Client", enter the IP address, input the remote host port, and click Connect.

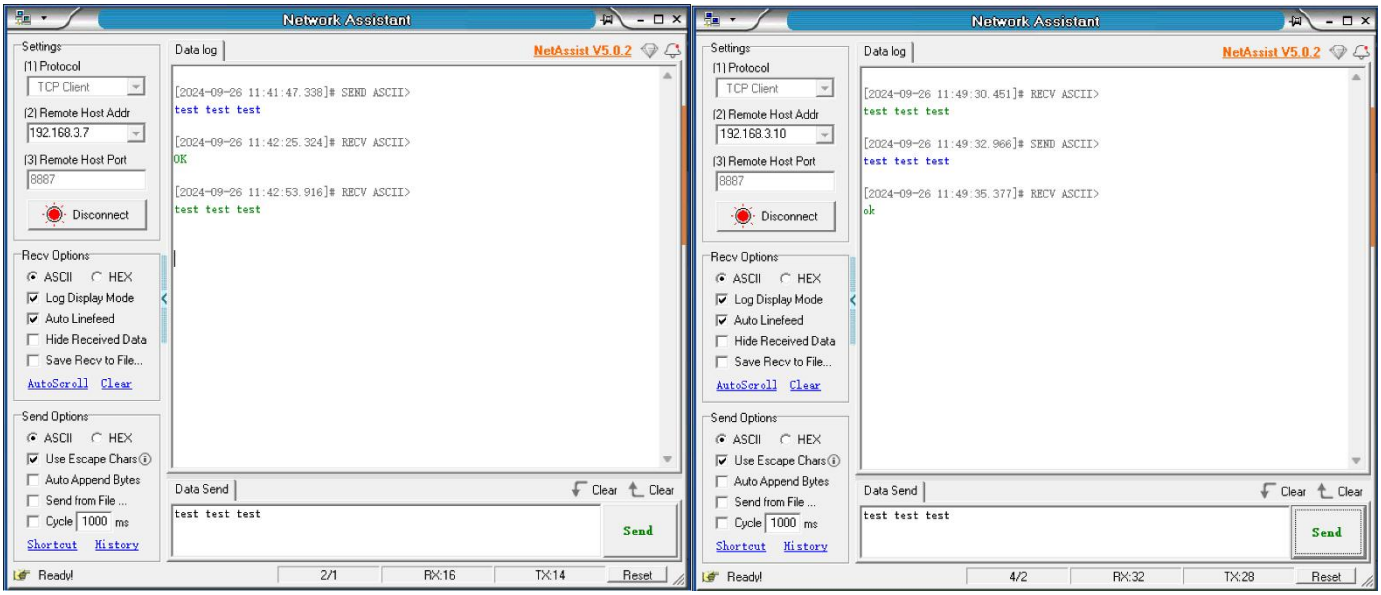
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Coordinator equipment, and the router equipment

(6) Enter "test test test" in the data sending window of the network debugging assistant, and click Send, you can see the data sending and receiving situation of the two devices.



Coordinator equipment, and the router equipment

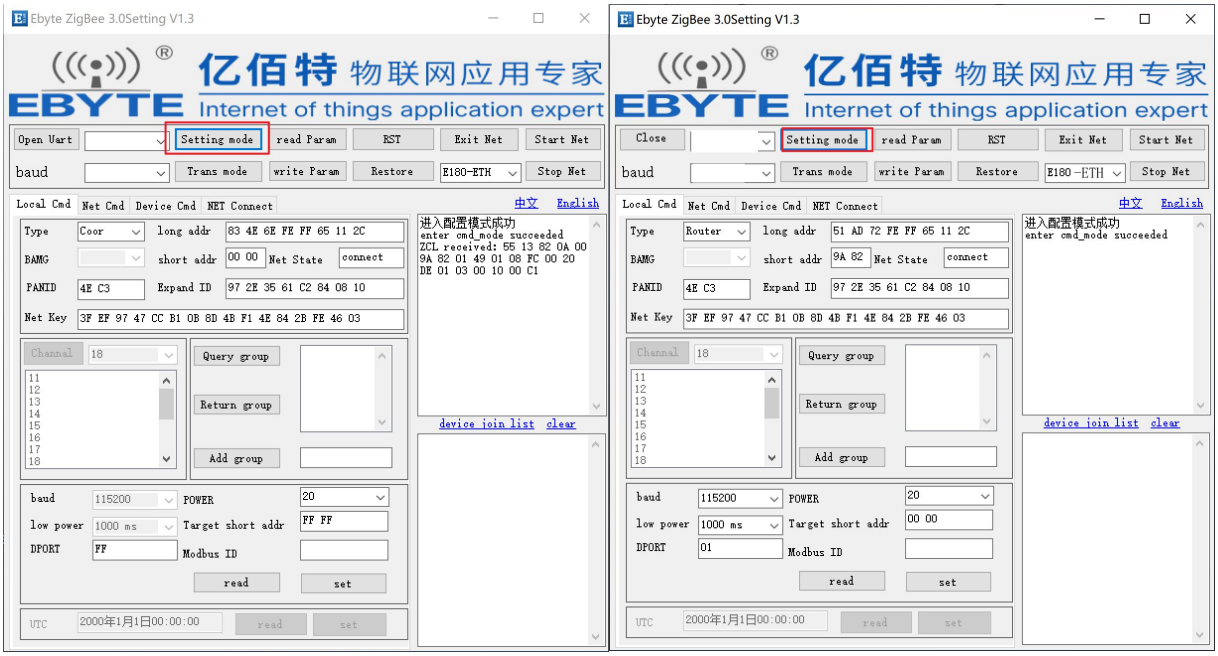
4.4.5 Data transmission between network access nodes

The coordinator of ZigBee 3.0 data transmission module needs to undertake the network management function. If it works in the transmission mode, it may miss the important messages involving network changes. Therefore, we suggest that the coordinator work in the HEX instruction configuration mode with a large number of added network access nodes, and assign the network access nodes to transmit data to each other.

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(1) Click "Enter the Parameter Configuration" in the upper computer interface, and the coordinator devices and router devices will return to the configuration mode. When the coordinator returns to configuration mode.



Coordinator equipment, and the router equipment

(2) The coordinator will add several network access nodes, set a new device as "terminal node", click "write parameters" and "restart", and add the terminal node device to the coordinator device network (see Section 4.4.3).



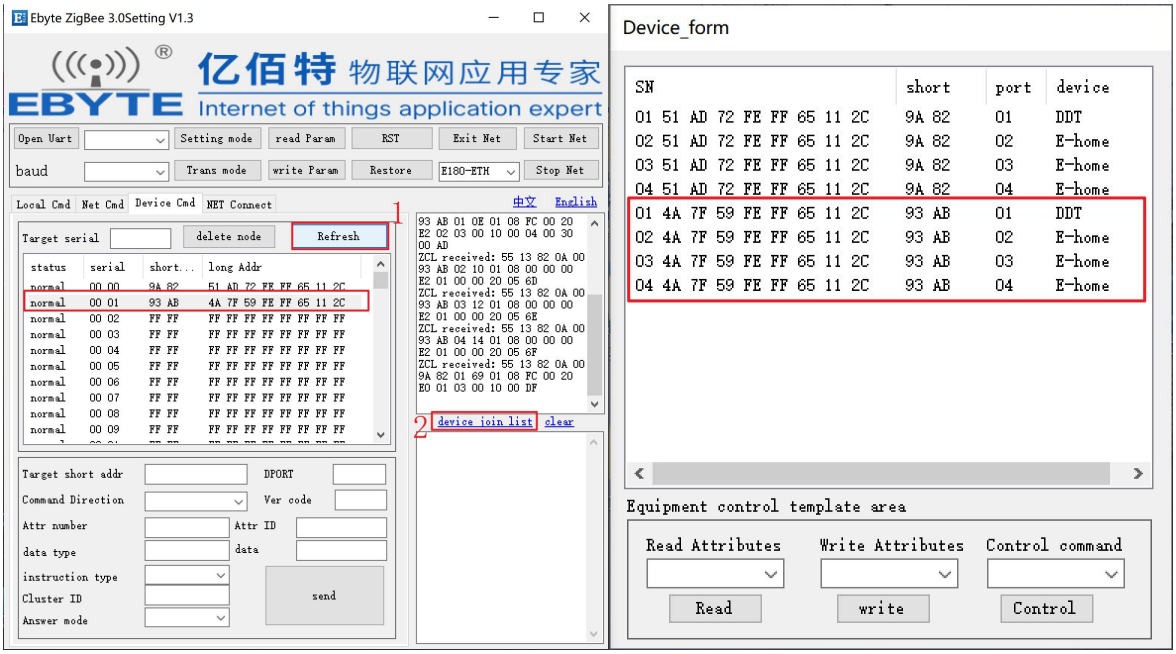
(3) The new node device is successfully configured to enter the network. Click "Read parameters" to check the network status as "connect", indicating that the terminal node device has joined the coordinator device network.

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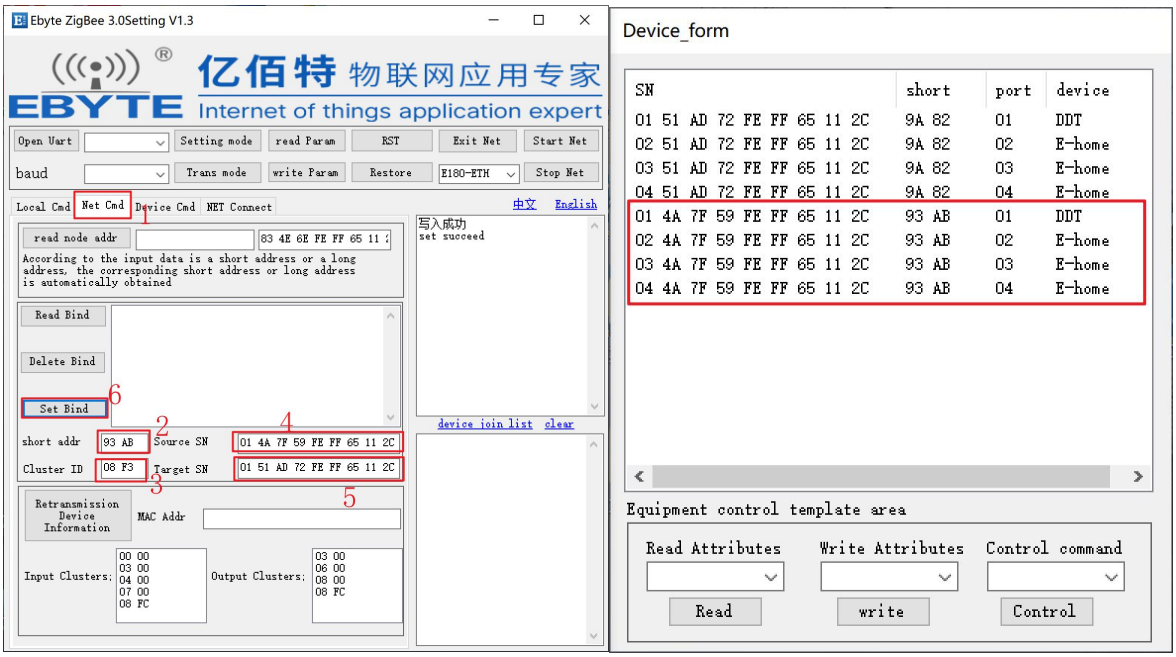
(4) On the upper computer interface of the coordinator equipment, click "Refresh the equipment list" to see the new equipment enter the network, and click "Equipment Temporary Storage Table", which also has the new equipment information.



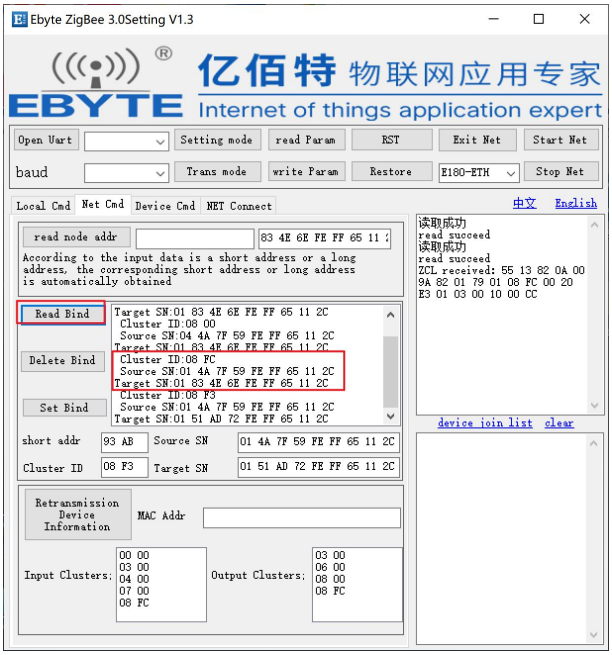
(5) On the coordinator host interface, the terminal node device is set to bind the router device, so that the terminal node device can transmit the data to the router device. In the upper computer interface of the coordinator device, click the "network instruction" menu, fill the short address of the terminal device in the "target short address", fill in "source target SN", router SN "target virtual SN" and cluster ID fill in 08 FC (customized data transmission cluster following the official ZigBee Cluster Library specification of ZigBee alliance, see the ZigBee3.0 module HEX command standard specification), and then click "setting regular connection".

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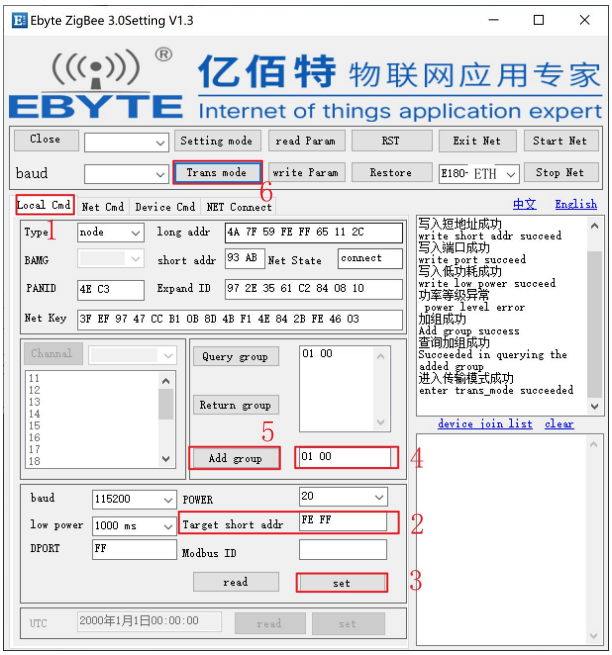
To ensure that the binding setting is valid, you can click "View regular connection" to confirm whether the binding is successful. As shown in the figure, there is a module where cluster ID is 08 FC, Source SN is the terminal device, and Target SN is the binding record of the router device, indicating that the binding setting is successful.



(6) In the upper computer interface of the terminal device, set the "target short address" to "FEFF" (0 xFFFE is invalid short address, set the target short address to invalid short address, the device will automatically default the transmission target to binding address), and click "Settings". Then enter "01 00" in "Module Add", click "Module Add", add the terminal device to 0x0001 group, and then click "Enter transmission mode".

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(7) In the upper computer interface of the router device, set the target port to "00" (the target port to 0x00 is multicast mode), then set the target short address to "01 00" (the target short address is multicast address, here to group 0x0001 group), click Set, and the router sends a transmission message to group 0x0001 multicast. Then click "Enter Transmission Mode".

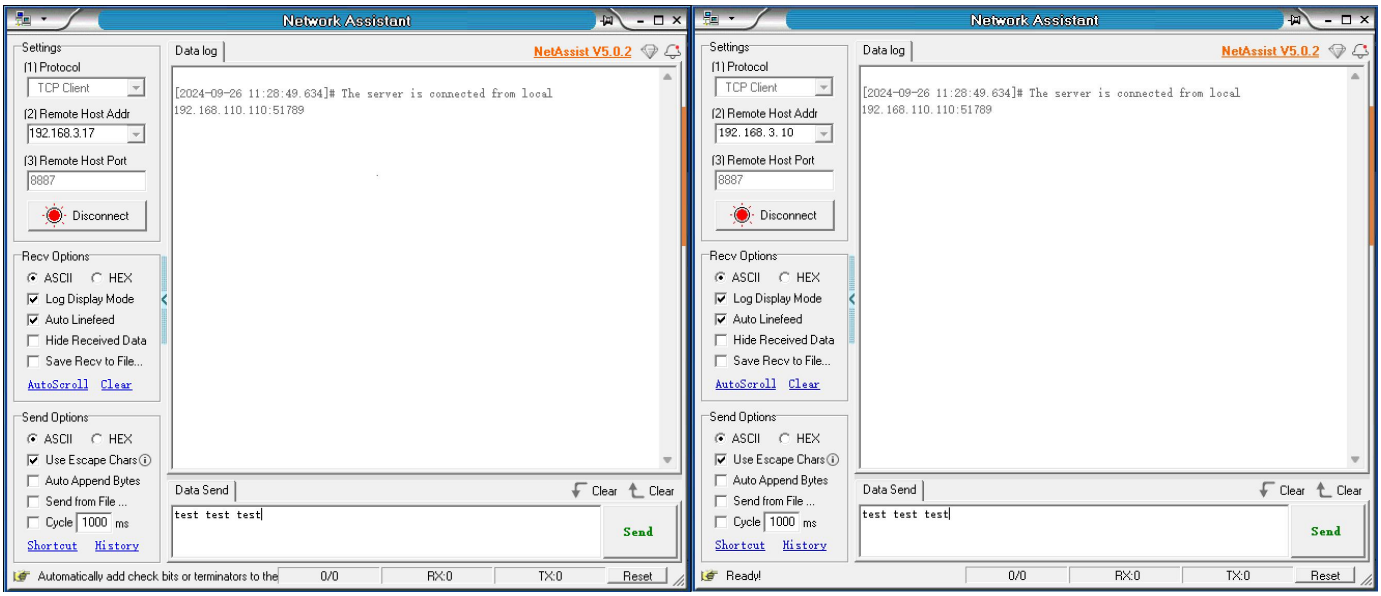


Through the above configuration, the router device and the terminal device can transmit data to each other, and the coordinator no longer receives the data transmitted by them. The coordinator can add more devices and set them up to communicate with each other.

(8) Open the network debugging assistant, select the protocol type as "TCP Client", enter the IP address, enter the remote host port, and click Connect.

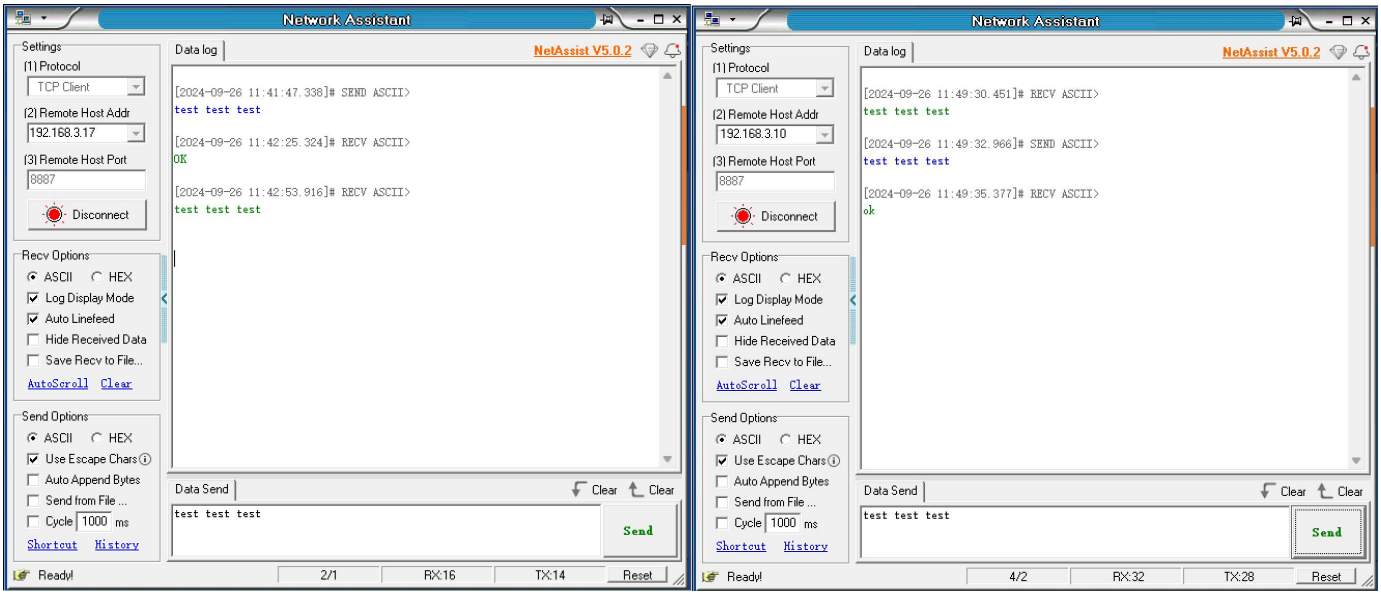
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Terminal equipment, the router equipment

(9) Enter "test test test" in the data sending window of the network debugging assistant, and click Send, you can see the data sending and receiving situation of the two devices.



Terminal equipment, the router equipment

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