EBYTE

Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



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Chapter 1 Product Overview

1.1 Product Introduction

E18-DTU (Z27-ETH) is a high-power ZigBee gateway, he has a complete supporting ZigBee node device, supports adaptive network speed (up to 10M full duplex), provides TCP Server, TCP Client, UDP Server, UDP Client, HTTP Client, MQTT Client six working modes, users can configure through WEB web pages. There are 3 types of logical devices in ZigBee networks: coordinators, routers, and end devices. A ZigBee network consists of a coordinator and multiple routers or terminals.



Ethernet features

- RJ45 supports 10M Ethernet interface；
- Support multiple working modes (TCP Server, TCP Client, UDP Server, UDP Client, HTTPC, MQTTC)；
- Supports three configuration modes: configuration tool, web page, and AT command；
- Server mode supports multiple socket connections；
- Supports multiple baud rates；
- Support DHCP function, after enabling DHCP, the IP address of the device will be assigned by the router, which may cause the IP address to be unable to be determined, resulting in inaccessibility, it is generally recommended to use a static IP；
- Support DNS (Domain Name Resolution), you can customize the domain name resolution server；
- Supports multiple Modbus gateways (simple protocol conversion, multi-master mode, storage-based gateways, configurable gateways)；
- Supports fast access to Alibaba Cloud, Baidu Cloud, OneNET, HUAWEI CLOUD, and standard MQTT servers version 3.1；
- Support HTTP protocol (GET/POST request)；
- Support virtual serial port；
- Support timeout restart function, you can customize the restart time；
- Support short connection function, you can customize short connection interval；
- Support heartbeat package and registration package functions；
- Support serial port cache cleaning function；
- Support access to the Internet and LAN；
- Hardware factory reset is supported；
- Support online upgrade function。

ZigBee features

- Centralized network management: ZIGBEE 3.0 security standard centralized network access mechanism, data security and reliability；
- Interoperability: Zigbee 3.0 standard network mechanism, compatible with ZCL network protocol；
- Large capacity: 256K capacity flash, 8K capacity RAM, the maximum number of network nodes can be expanded to 32；
- Role switching: Users can switch devices arbitrarily in the three types of coordinators, routers, and terminals through serial port commands；
- Support multiple network topologies: point-to-point, star, mesh；
- Network self-healing: If a network intermediate node is lost, a new mesh topology is automatically formed, and the lost node is automatically retrieved after it is restarted；
- Automatic routing: The module supports the network routing function；
- Open and closed network networking: The coordinator controls the opening or closing of the network, and devices that meet the ZigBee 3.0 standard can join the network during the open network period. If the coordinator does not turn off after opening the network, it will automatically shut down after 180 seconds。
- One-click network addition: The node does not need to set PANID and channel, but only needs to trigger the network addition during the window time of the coordinator to open the network。
- Automatic channel and PANID: The coordinator automatically creates a network on the optimal channel and automatically assigns a PANID to avoid duplication with other coordinators。
- Automatic MAC address: The coordinator can obtain the MAC address and short address of the node at the moment of node networking, without the need for processing on the device side。
- Address search: Users can find the corresponding short address according to the MAC address (unique, fixed) of the node that has joined

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the network, 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 secure communication standard, the network contains multi-level security keys;
- Serial port configuration: The module has built-in serial port commands, and users can configure (view) the parameters and functions of the module through serial port commands;
- Module reset: Users can reset the module through serial port commands。
- Over-the-air configuration: Users can remotely configure other devices in the network using over-the-air configuration commands。
- Multiple command formats: Users can use 16-format commands and AT commands to configure and control the module to realize networking, setting transparent transmission, lighting control and other operations。
- With national invention patent certificate, invention name: a wireless transparent transmission module interconnection method based on ZigBee3.0 Patent number: ZL 2019 1 1122430.X



Hardware features

★ All core components are imported originally, compared with the current similar imported digital transmission stations, the most advanced functions, the smallest volume and the best price。

★ Transmit power is available in a variety of options。

★ Operating temperature range: -40°C~+85°C, adapt to a variety of harsh working environment, real industrial grade products。

★ All aluminum alloy shell, compact size, easy installation, good heat dissipation; Perfect shielding design, good electromagnetic compatibility and strong anti-interference ability。

★ Multiple protection functions such as power reverse connection protection, over-connection protection, and antenna surge protection greatly increase the reliability of the station。

★ Powerful software functions where all parameters can be set programmatically: e.g. power, address ID, etc。

★ With a built-in watchdog and precise time layout, the module will automatically restart in the event of an exception and continue to work according to the previous parameter settings。

Application scenarios

- Smart home and industrial sensors, etc;
- Security system;
- Wireless game remote;
- Healthcare products;
- Advanced meter reading architecture(AMI);
- Automotive applications;
- Building automation solutions;
- Automation applications for agricultural greenhouses。

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Chapter 2 Specification Parameters

2. 1 Main specifications

project	illustrate
Operating voltage	8~28V DC, 12V or 24V power supply is recommended
interface	Network port (RJ45), 10Mbps
Working mode	TCP Server（default）、TCP Client、UDP Server、UDP Client、HTTP Client、MQTT Client
Socket connection	The TCP server supports 6-way client connections
Network protocols	TCP/UDP、MQTT、HTTP、IPv4、DHCP、DNS
How to obtain an IP	Static IP (default)、DHCP
DNS domain name resolution	Support
Domain name resolution server	114.114.114.114（Customizable）
Configuration mode	Web page, parameter configuration tool, AT command
IP address	192.168.3.7（Customizable）
User name	admin（Customizable）
password	admin（Customizable）
Local port	8887（Customizable）
Subnet mask	255.255.255.0（Customizable）
gateway	192.168.3.1（Customizable）
Serial port cache	1024 Byte
Packaging mechanism	512 Byte
Serial port baud rate	1200 ～ 230400 bps（Default 115200） Note: It is recommended to use the default parameters, but it is not recommended to modify them
Data bits	5、6、7、8（default） Note: It is recommended to use the default parameters, but it is not recommended to modify them
Stop bit	1（default）、2 Note: It is recommended to use the default parameters, but it is not recommended to modify them
Check digit	None（default）、 Odd、Even Note: It is recommended to use the default parameters, but it is not recommended to modify them
Flow control	Not supported
Product size	84×82×25mm
Product weight	118g ± 2g
Operating temperature and humidity	-40 ～ +85℃、5% ～ 95%RH（No condensation）
Storage temperature and humidity	-40 ～ +105℃、5% ～ 95%RH（No condensation）

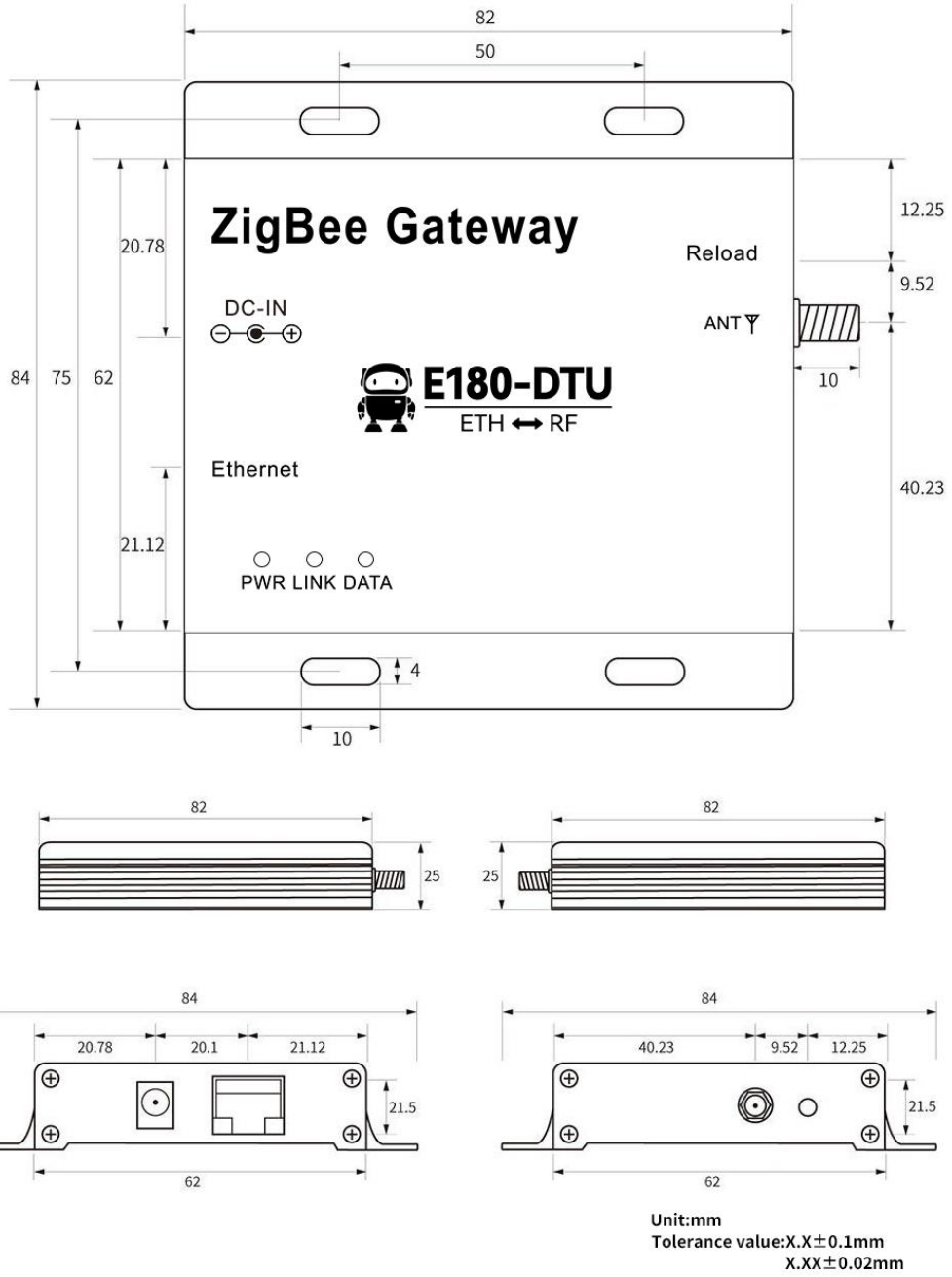
2. 2 Current parameter

Model	Voltage	Emission current
E18-DTU(Z27-ETH)	12V	210mA

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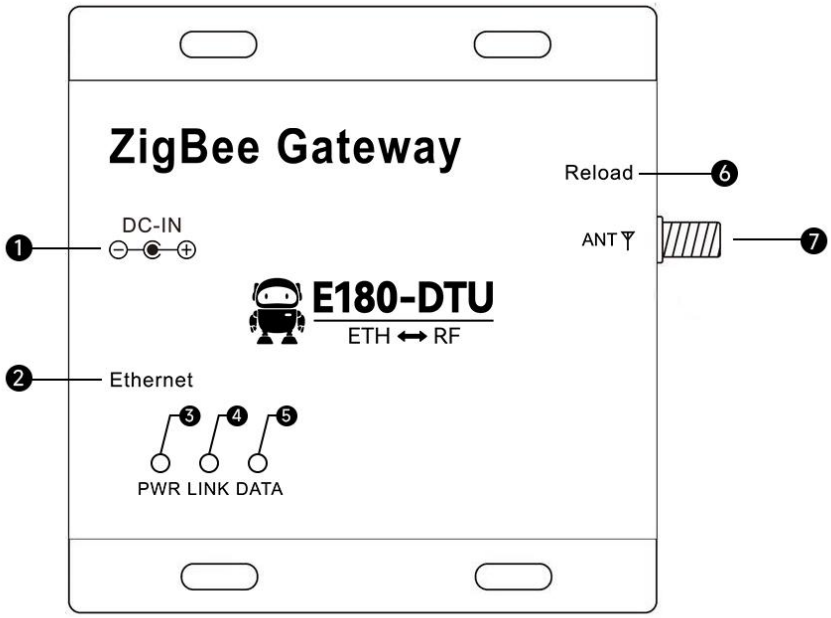
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2. 3 Mechanical dimensional drawings and pin definitions



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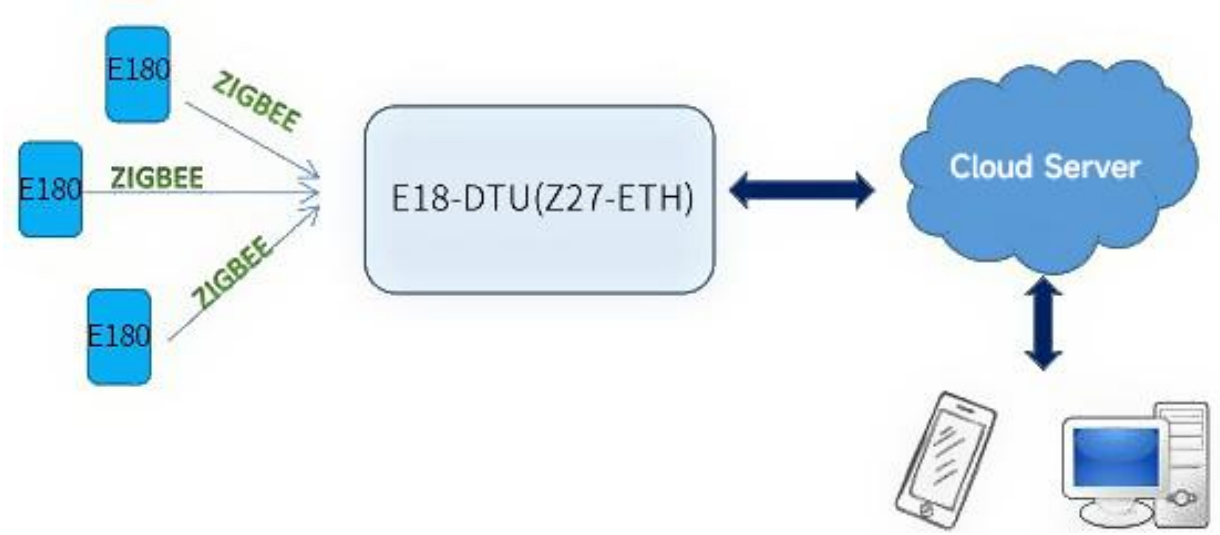
serial number	Identity name	Identity name
1	DC_IN	Power interface, support 8-28V DC power supply, 12V/24V recommended
2	ETHERNET	Ethernet interface, standard RJ45 interface, connection to devices or PCs
3	PWR	Power LED
4	LINK	The connection establishment indicator (green) flashes at 4Hz frequency for 3 seconds after power-up; Network not connected: Off; Network connected: Solid on。
5	DATA	Serial port transceiver indicator (blue and green two-color indicator), 3 seconds after power-on flashing at 4Hz frequency; The blue indicator flashes when there is data entry; The green LED flashes when there is data output;
6	Reload	Long press 5-10S to restore to factory settings (only some Ethernet parameters are restored)
7	ANT	SMA antenna interface

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Chapter 3 Introduction to Product Functions

3. 1 Typical application model



3. 2 ZigBee Basic functionality

ZigBee parameters are configured through the ZigBee 3.0 host computer!!

3.2.1 ZigBee networking introduction

There are three types of logical devices in ZigBee networks: coordinators, routers, and end-devices. A ZigBee network consists of a coordinator and multiple routers and End_Device。

3.2.1.1 **Coordinator**

It has the role of establishing and managing the network, controlling whether to allow other nodes to join the network, storing network information, and having all the functions of routing devices, its main task is to manage the network, record child node information, forward messages, and at the same time, the coordinator needs to identify the terminal authority that requests to enter the network. In the case of no need to add new nodes, the network will not crash after the coordinator is powered off, and routers and terminals will work normally in the current network。

3.2.1.2 **router**

The router allows other nodes to connect with the routing device to expand the coverage of the network, and its main task is to forward packets, play the role of relay routing, and have all the functions of the terminal device. If there are multiple paths from one node to another node, when one of the paths fails, the network will automatically adjust to the other optimal path for transmission to ensure that the data arrives. The router can set up its own network or join someone else's, the router is always active, so it must be powered by the mains power supply。

3.2.1.3 **terminal**

The main task of the terminal device is to send and receive messages, and does not allow other end nodes to connect to the end device. The terminal is always working and can receive and send data at any time。

3.2.2 **How the data is sent**

E18-DTU (Z27-ETH) data transmission methods include unicast, broadcast, multicast and other three ways。

ZigBee packet length: 1~128bytes, maximum 75 bytes in broadcast and multicast modes, and maximum 128 bytes in unicast mode.

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3.2.2.1Broadcast mode

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

3.2.2.2Multicast mode

In multicast mode, the group number (group) is first set for the devices in the network, and the sending device must specify the target group number (which group to send the data to), 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。

3.2.2.3Unicast mode

In unicast mode, the devices in the network communicate point-to-point through the network address, and the sending device sends the received data to the destination address device, and the destination address device can reply an ACK to the sending device after receiving the data to indicate that the data has been received。

3.2.3 How the data is received

The receive data output mode refers to the way the network outputs data when the E18-DTU (Z27-ETH) receives the wireless data；

3.2.3.1Transparent output

If the output mode of the configuration device is transparent output, the module will output the original data through the network port after receiving the wireless data；

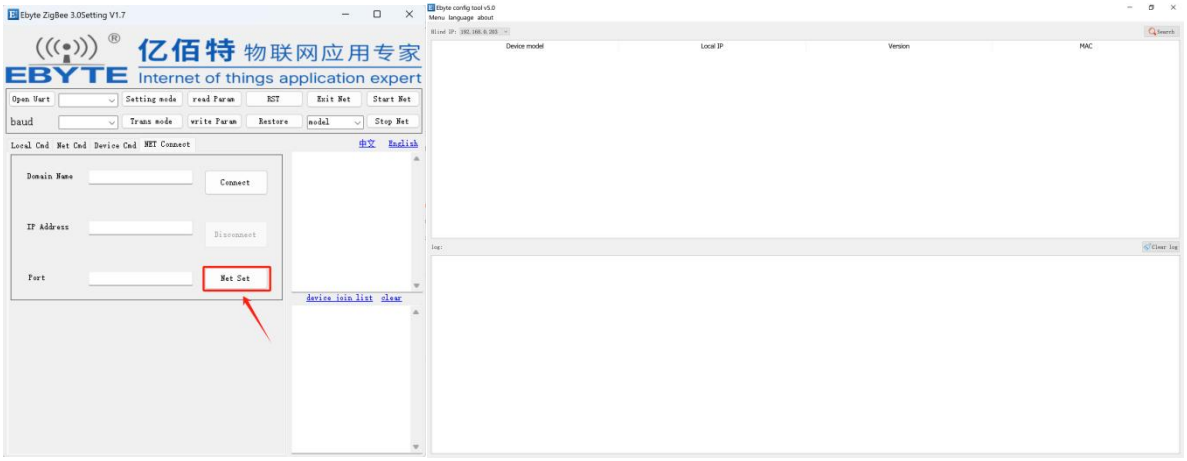
3.2.3.2 HEX instruction format output

When the output mode of the device is HEX command mode, the output data will be output with the ZCL instruction in the HEX instruction, which identifies the source of sending the data and the cluster ID to which the data belongs, and the signal strength of the data；

3.3 Network parameters

Network parameters can be configured via the EBYTE Network Configuration Tool and webpage!!

The EBYTE network configuration tool can be opened by clicking the network configuration button in the ZigBee 3.0 host computer: open the ZigBee 3.0 host computer, click Ethernet connection, click Network configuration, and enter the EBYTE network configuration tool。



ZigBee 3.0 upper computer EBYTE Network Configuration Tool

3.3.1 IP address type

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The IP address is the identification of the module in the LAN and is unique in the LAN. Therefore, it cannot be duplicated with other devices on the same LAN. The IP address of the module can be obtained in two ways: static IP and DHCP.

Static IP: Static IP needs to be set manually, pay attention to write the IP, subnet mask and gateway at the same time during the setting process, static IP is suitable for scenarios that need to count IP and device and correspond one-to-one.

Advantages: Devices that cannot be assigned IP addresses can be searched through the broadcast mode of the entire network segment, which is convenient for unified management;

Disadvantages: Different LAN network segments are different, resulting in normal TCP/UDP communication。

Dynamic DHCP :D HCP mainly uses IP address, gateway address, DNS server address and other information dynamically obtained from the gateway host, thereby eliminating the cumbersome step of setting IP address. It is suitable for scenarios where there are no requirements for IP and it is not mandatory for IP to correspond to the module one-to-one.

Advantages: Devices with DHCP servers, such as access routers, can communicate directly, reducing the trouble of setting IP address gateways and subnet masks。

Disadvantages: Access to a network without DHCP Server, such as direct connection to a 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, our commonly used class C subnet mask: 255.255.255.0, the network number is the first 24 bits, the host number is the last 8 bits, the number of subnets is 255, and the module IP is in the range of 255, then the module IP is considered to be in this subnet。

The gateway refers to the network number of the network where the module's current IP address is located. If a device such as a router is connected to the Internet, the gateway is the route。

3.3.2 **Domain name resolution**（DNS）

Domain name resolution translates domain names into network-recognized IP addresses through domain name resolution (DNS) servers. The domain name resolution (DNS) server address of the serial device server supports user customization, and can realize domain name resolution through the custom domain name resolution server in the case of abnormal domain name server, and the device will report a resolution request to the custom domain name resolution (DNS) server during domain name resolution, and return the device connection parameters (usually IP address) after the resolution is completed。

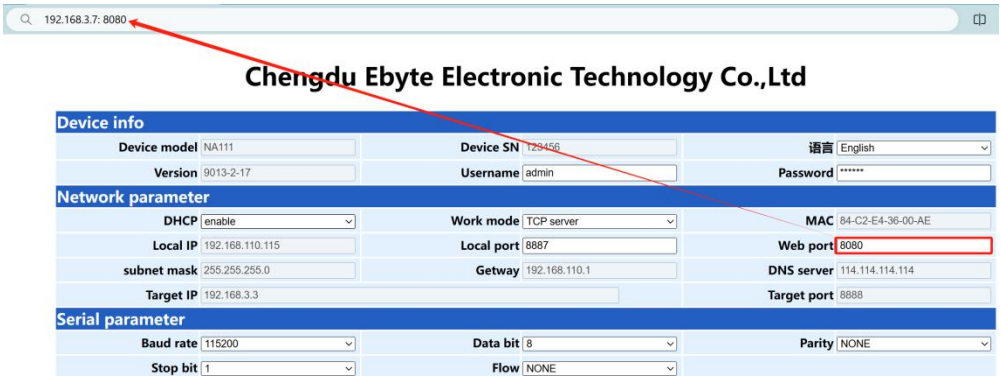
In DHCP mode, the domain name resolution (DNS) server address is automatically obtained (synchronous router domain name resolution address) and cannot be modified。

In static IP mode, the default address of the DNS server is 114.114.114.114。

3.3.3 **Intranet access port**

The private network access port defaults to 80.

Note: If the port number is modified, the port number should be added to the address input field, for example, if you change the web access port to 8080, you need to enter 192.168.3.7:8080 in the address bar to connect to the web page configuration。



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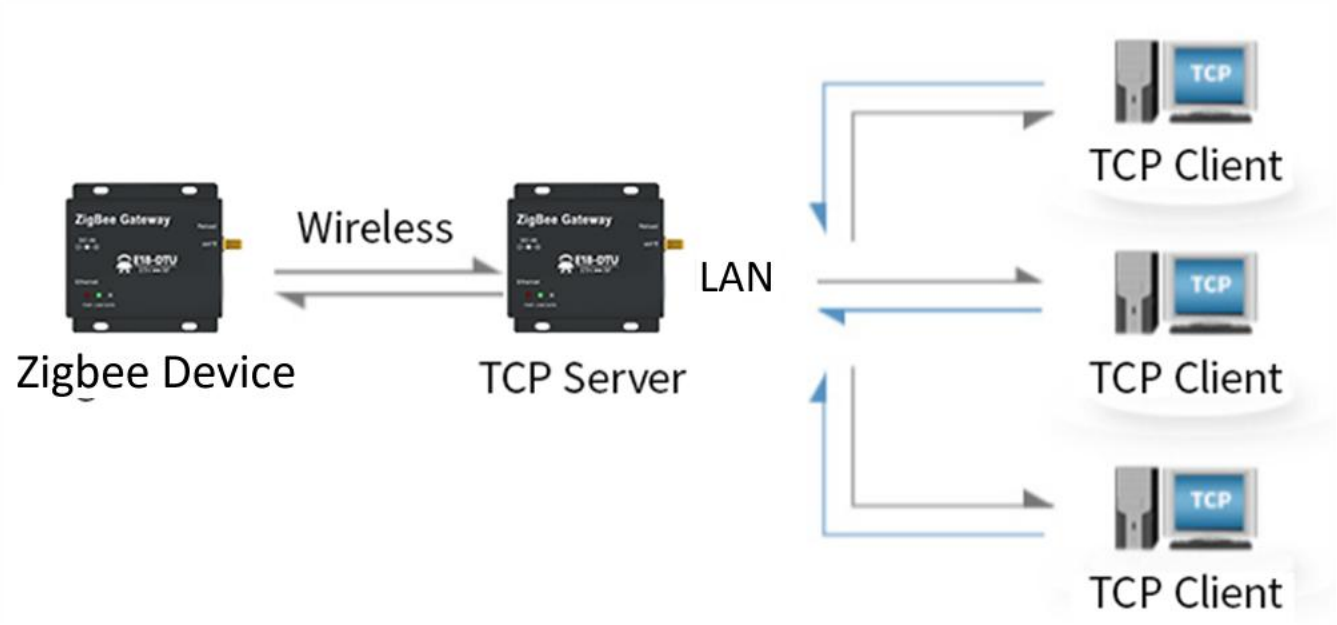
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3.4 Network mode of operation

3.4.1 **TCP server mode**

TCP Server is a TCP server. In TCP Server mode, the device listens on native ports, accepts connection requests from clients, and establishes connections for data communication, typically for communication with TCP clients within a local area network。

When the Modbus gateway function is turned off, the device sends the data received by the serial port to all client devices that establish connections with the device, and supports up to 6 clients to connect。



3.4.2 **TCP client mode**

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

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



3.4.3 **UDP server mode**

UDP Server means that the device does not verify the source IP address of the data when communicating with the UDP protocol, and after each UDP packet is received, the source IP address and source port of the packet are saved, and they are set as the destination IP and port, so the data sent by the device only sends packets to the source IP address and port where the last time the device received data。

This mode is usually used in scenarios where multiple network devices communicate with this device at a high frequency and TCP Server

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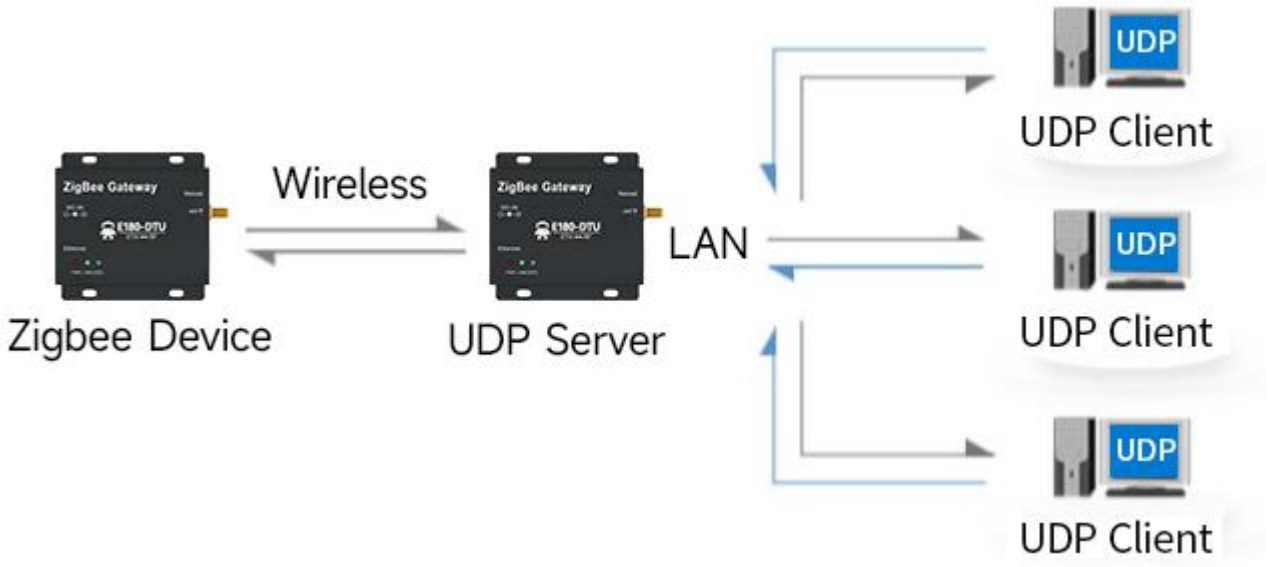
cannot meet the conditions。

Using UDP Server requires the remote UDP device to send data first, otherwise it cannot send data normally。

Note: In UDP mode, the network should send data to devices less than 512 bits per packet, otherwise data loss will result。

3.4.4 **UDP client mode**

UDP Client A connectionless transport protocol that provides simple, transaction-oriented unreliable messaging services, with no connection established and disconnected, and only the destination IP and destination port need to be configured to send data to each other. It is usually used in data transmission scenarios where there is no requirement for packet loss, packets are small and sent frequently, and data is to be transmitted to a specified IP.



In UDP client mode, the device communicates only with the configured remote UDP device (destination IP and destination port).

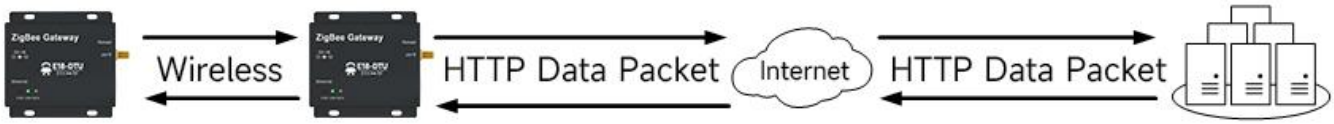
In this mode, the destination address is set to 255.255.255.255, and the transmitted data will be broadcast in the entire network segment, but the transceiver device needs to ensure that the port is consistent and the device can also receive the broadcast data.

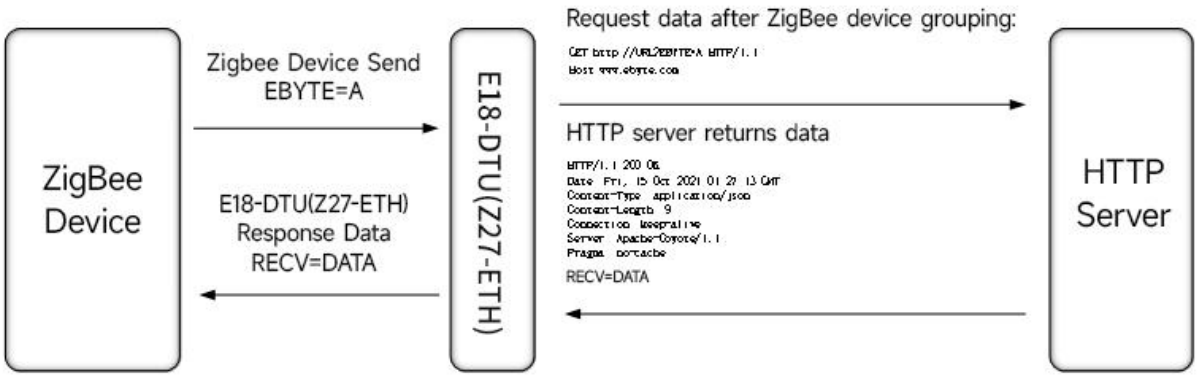
3.4.5 **HTTP client mode**

This mode can realize the HTTP packaging function, providing GET and POST two modes, customers can configure URL, header and other parameters, by the device (serial device server) for packet sending, to achieve fast communication between serial device and HTTP server, using HTTP client mode It is recommended to use random ports and open short connections to save HTTP server resources.

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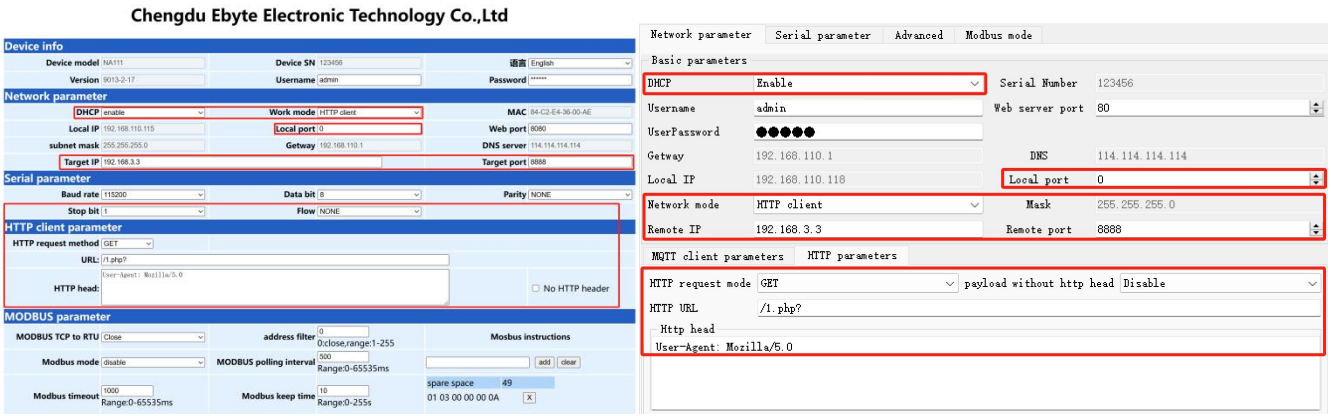




1. GET

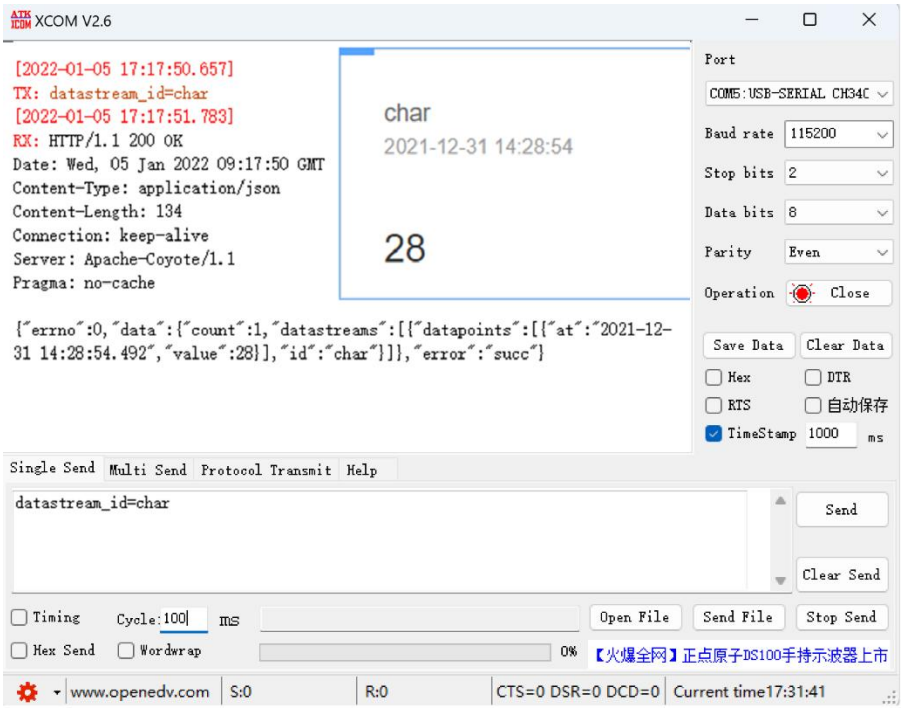
Test the HTTP-GET request of the device in the HTTP mode of OneNET multi-protocol access, as shown in the following figure.

(1) Returns the data configuration with a header：

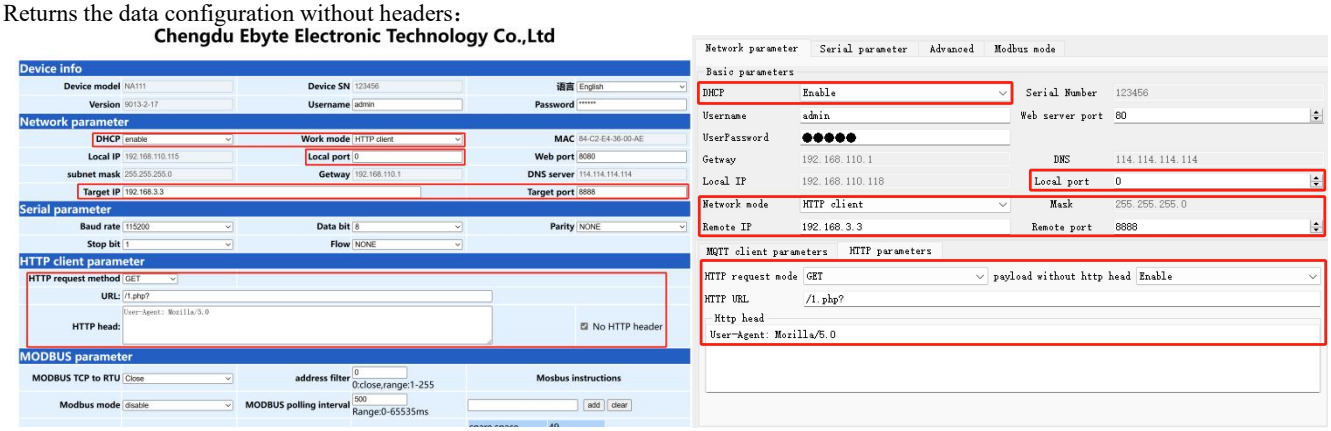


Data return test：

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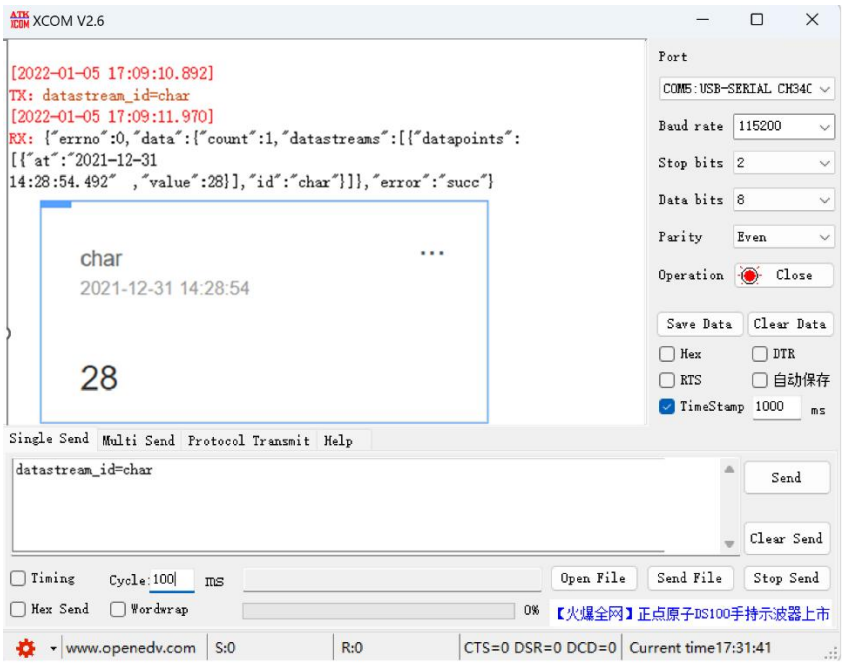


(2) Returns the data configuration without headers：



Data return test：

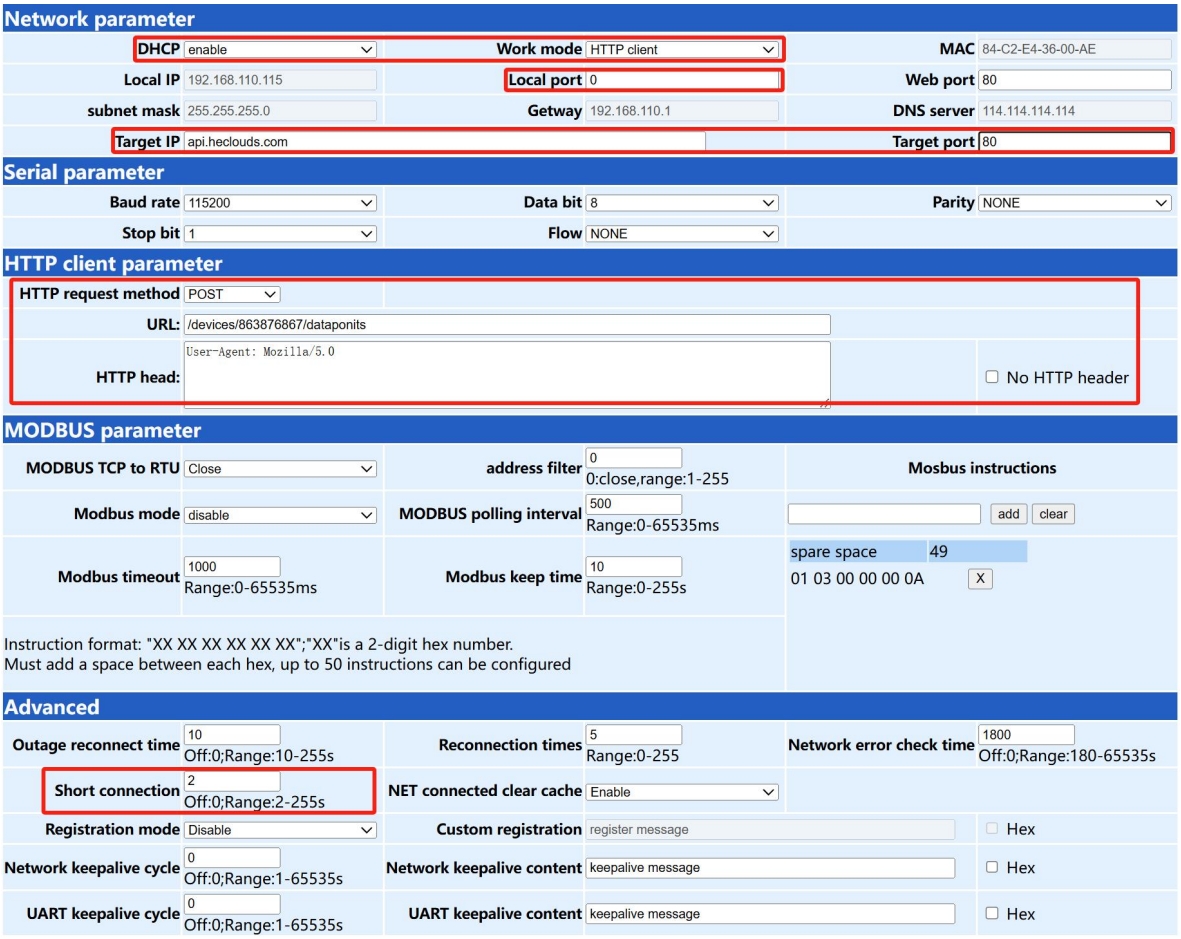
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2. POST

Test the HTTP-POST request of the device in the HTTP mode of OneNET multi-protocol access, as shown in the following figure.

(1) Returns the data configuration with a header:

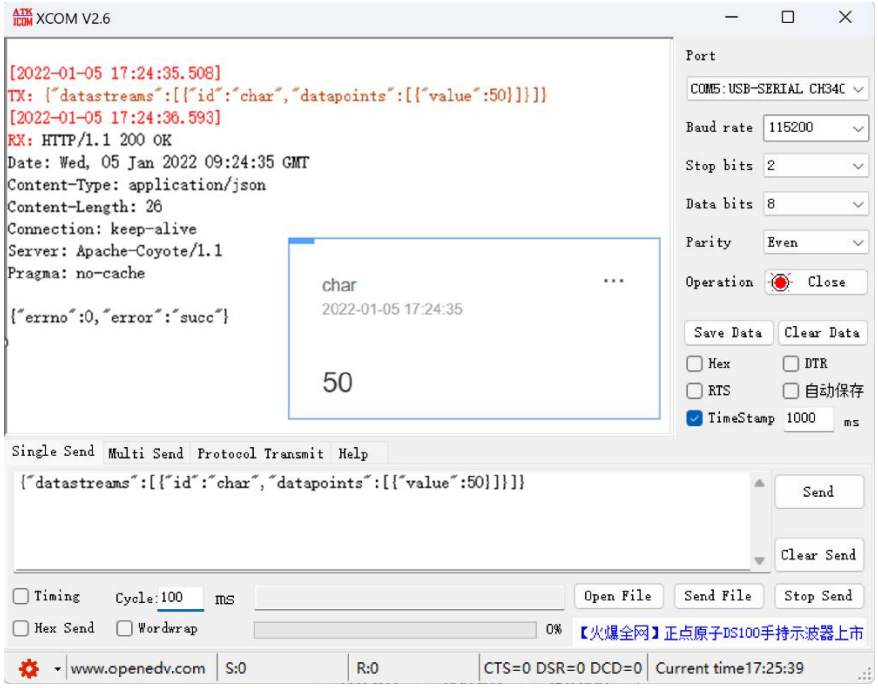


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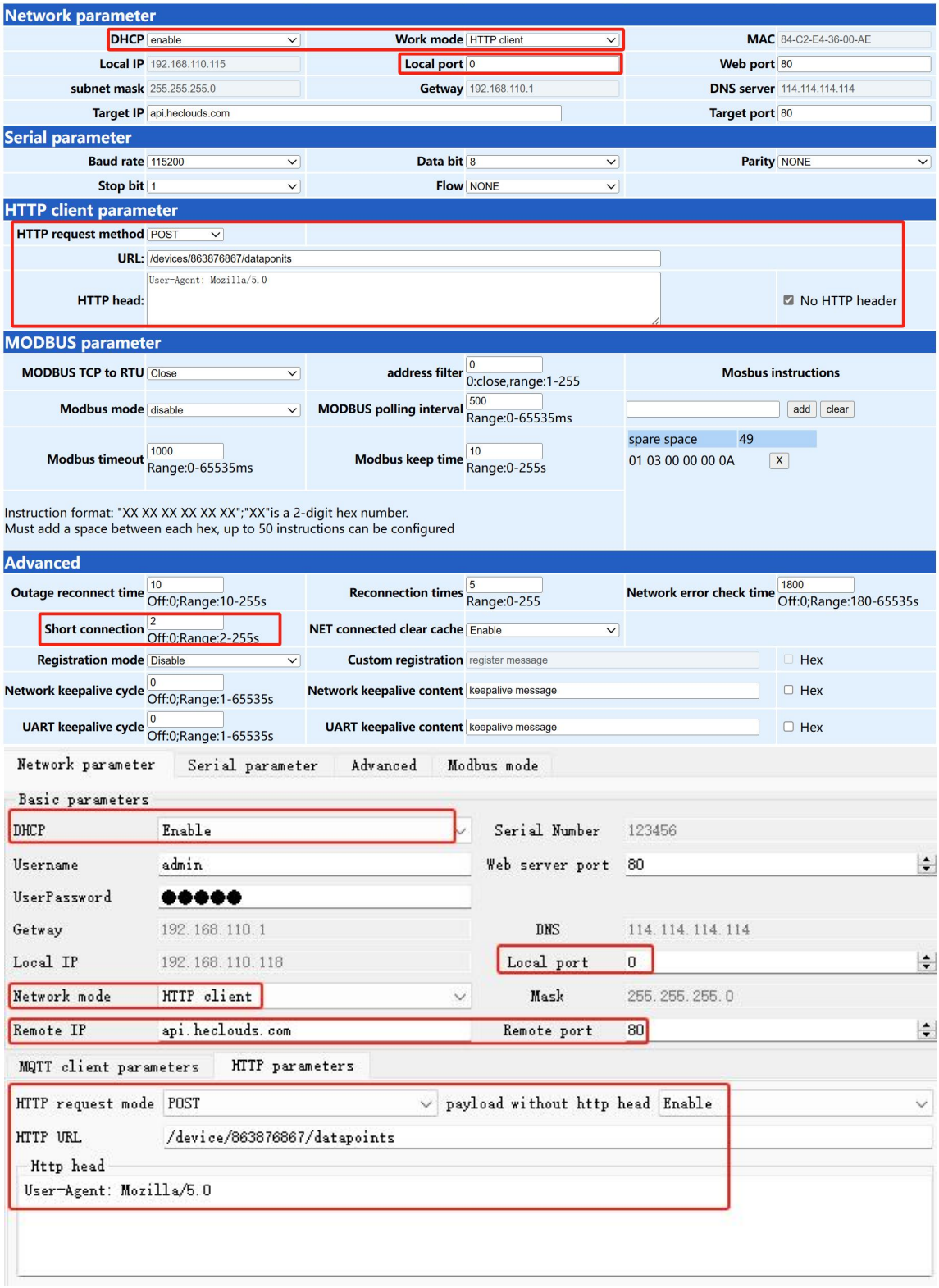
Data return test：



(2) Returns the data configuration without headers：

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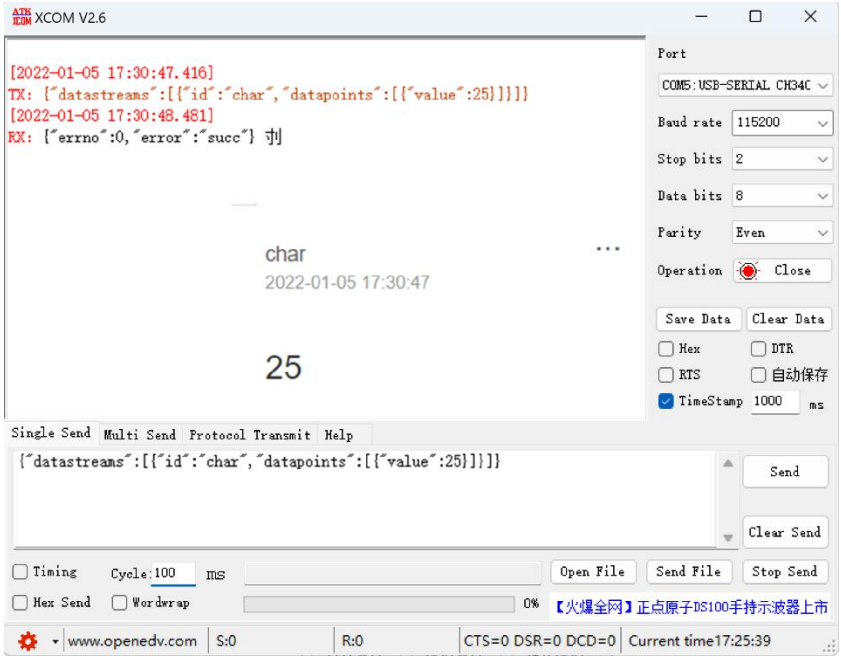
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Data return test：

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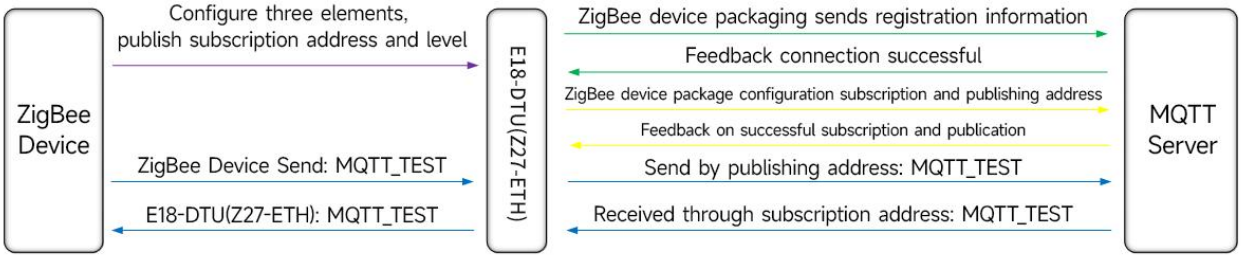
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3.4.6 **MQTT client mode**

The serial device server supports fast access to standard MQTT3.1 protocol servers (OneNET, Baidu Cloud, HUAWEI CLOUD, user-built server types) and Alibaba Cloud servers, supports quality of service 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 addresses support up to 128 character configuration)。





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

1. Standard MQTT3.1.1

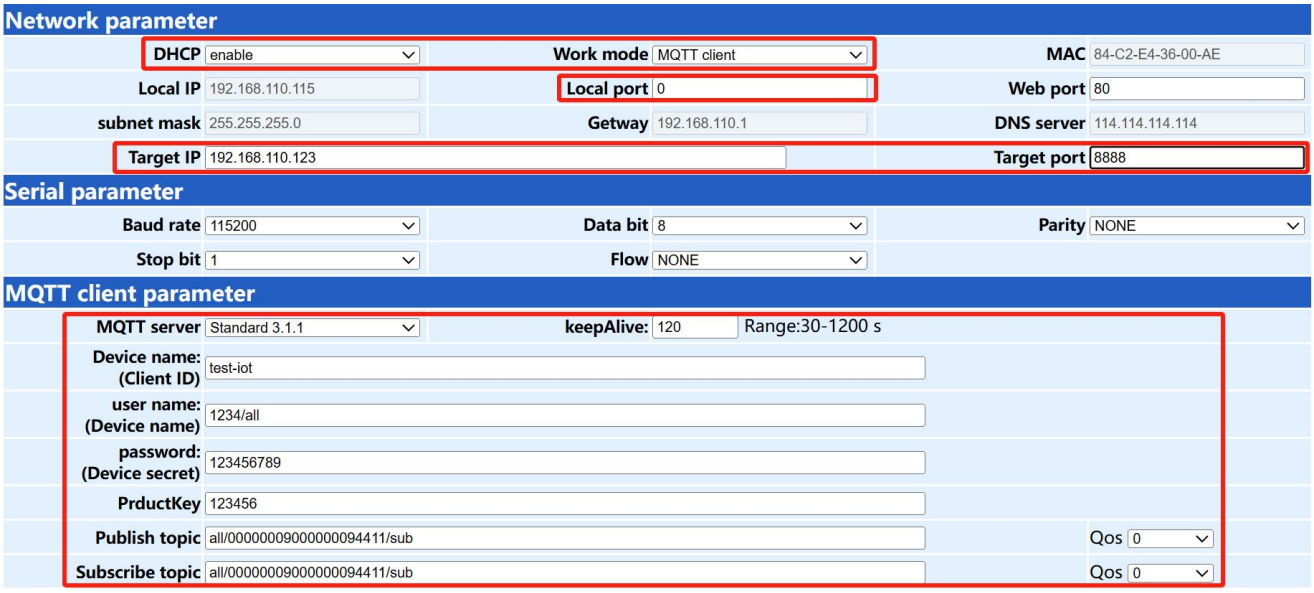
The standard MQTT3.1.1 connection here takes Tencent's standard MQTT3.1.1 server as an example, and the "three elements" described by the standard can be obtained from the Tencent server, as shown in the following figure:

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The following figure describes the parameter configuration (host computer and web page).:



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3.5 Serial port parameters

Note: It is recommended that customers use the default serial port parameters, and it is not recommended that customers modify them!!

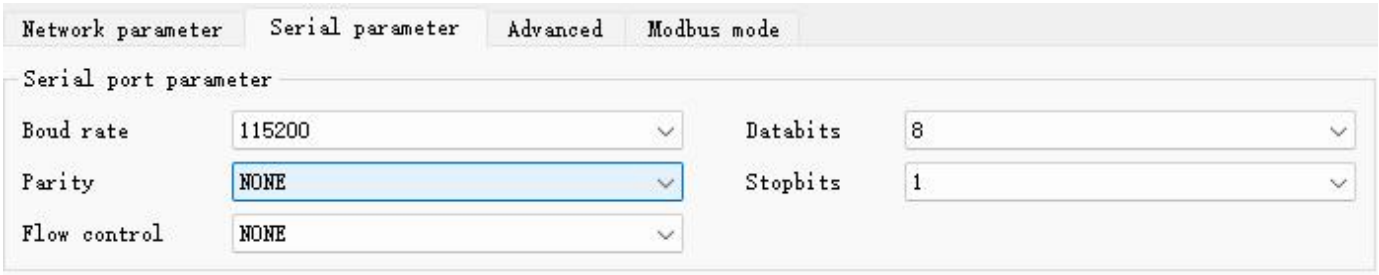
Serial port parameters include: baud rate, data bit, check digit, stop bit.

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

Data bits: The length of data bits, in the range 5, 6, 7, 8.

Check digit: check digit of data communication, support None, Odd, Even three check methods By setting serial port parameters, keeping the serial port parameters consistent with the serial port connection device can ensure the normal operation of the pass.

Stop bit: range 1, 2 can be set.



3.6 Advanced parameters

3.6.1 **Disconnection and reconnection function**

In client mode, the device tries to actively connect to the server at a specified time after the network is disconnected, and if the request times out and the set number of reconnections is reached, the device will perform a restart to prevent the network from being unable to restore the connection after the device is disconnected.

Disconnection and reconnection time: The time interval between each attempt by the device to re-establish the network。

Reconnection times: The number of times the device tries to re-establish the network, the cumulative number of requests reaches the preset value, and if the connection is not successful, the device will automatically restart。

The actual restart time is multiplied by the number of reconnection times for network disconnection, and it is recommended to use the

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factory default parameters without special requirements。

3.6.2 **Timeout restart function**

Support timeout restart function (default: 300 seconds), this function is mainly used to ensure long-term stable operation of the device, if no data is sent and received within the set timeout restart time, the device will restart the operation, so as to avoid abnormal conditions affecting communication。

When the timeout restart feature is enabled, the timeout restart time is set to (60-65535) seconds。

3.6.3 **Configure the tool software settings**

Open the configuration tool software, search for the device, double-click the recognized device, and the parameter query configuration interface will pop up. You can customize and modify the relevant parameters according to your needs, then save the configuration, restart the device, and complete the parameter modification。

【Note】：

Do not use multiple host computers in the same LAN environment, multi-network card industrial computer needs to temporarily disable the use of network cards, otherwise the host computer will be abnormal (the same device is displayed multiple times, the device cannot be searched and other abnormalities occur)

The host computer shields the wireless network card, so it is necessary to connect the network cable to use the host computer, and the wireless network card can be configured through the web page。

3.6.4 **Short connection function**

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

TCP short connection function is applied to TCP client mode, after enabling the short connection function, only request to connect with the server when sending information, after the connection is successful, the serial port does not receive data or the network port does not send and receive data within the set time, and the device will automatically disconnect。

When the short connection function is turned on, the short connection time setting parameter ranges from (2-255) seconds。

3.6.5 **Connect the Empty Cache feature**

The device is in client mode, when the TCP connection is not established, the data received by the serial port will be placed in the buffer, the serial port receiving cache is 1024 bytes, greater than 1024 bytes will overwrite the earliest accepted data, after the network connection is successful, you can choose to clear the serial port cache or send the cache through the network through the configuration.

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

Disable: After the connection is established, the network will receive the data cached by the serial port.

3.6.6 **Heartbeat pack function**

In client mode, users can choose to send heartbeat packets and customize the heartbeat packet time. Heartbeat packet can choose network heartbeat packet, serial port heartbeat packet two modes, support base 16 and ASCII code sending, this heartbeat packet is not MQTT heartbeat, in MQTT client mode needs to be closed, MQTT heartbeat only in "MQTT mode" to configure heartbeat packet cycle time, it is recommended not to configure less than 60s, such as Alibaba Cloud manual recommended to use 120s.

Heartbeat packet sending mode:

The default is to turn off heartbeat packet mode.

Serial port heartbeat pack ->The device sends heartbeat content to the serial port bus according to the set heartbeat interval.

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Netport heartbeat pack ->The device sends heartbeat content to the network port bus according to the set heartbeat interval.

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

Customize the heartbeat packet sending interval, if the value is greater than zero, the heartbeat packet function can be turned on, and the range can be set to (1-65536) seconds when turned on, and 0 when turned off.

3.6.7 **Enrollment package features**

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

Registration packages support the following modes：

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

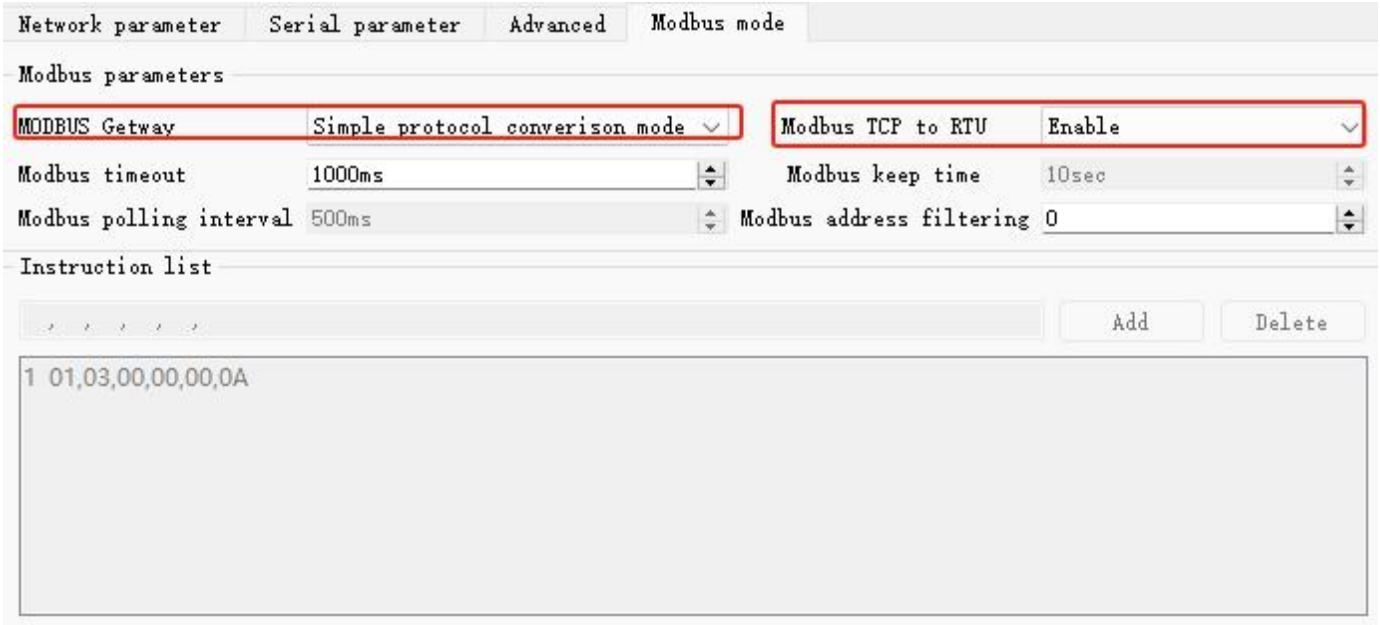
（2） The data for the custom enrollment package is sent when the network establishes a connection to the device

（3） After the network establishes a connection with the device, each packet of data sent by the device to the network is preceded by a MAC address

（4） After the network establishes a connection with the device, each packet of data sent by the device to the network is preceded by a MAC address

3.7 Modbus gateway

3.7.1 **Simple protocol conversion model**



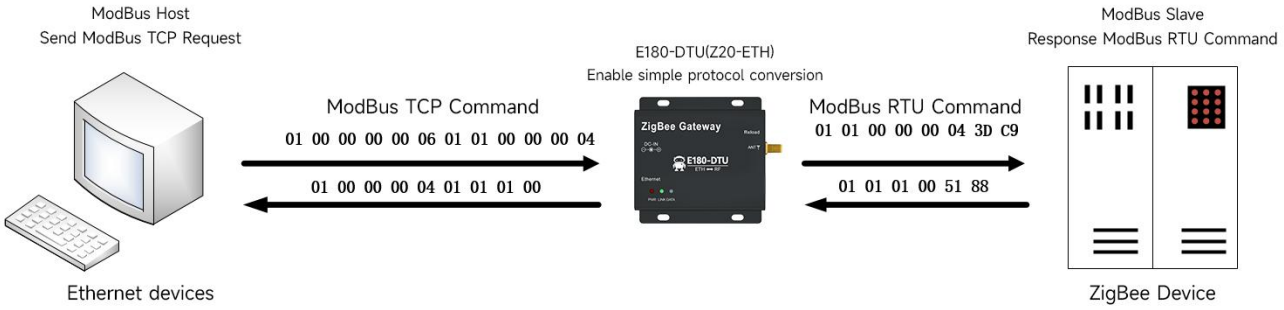
Enable: Convert the Modbus RTU protocol to the Modbus TCP protocol, and discard non-Modbus data (RTU/TCP) without conversion.

Off: Modbus data is validated without protocol conversion, and non-Modbus data (RTU/TCP) is discarded.

Simple protocol conversion can work in any mode (TCP client, TCP server, UDP client, UDP server, MQTT client, HTTP client), no matter what mode it works in, only one Modbus master can exist.

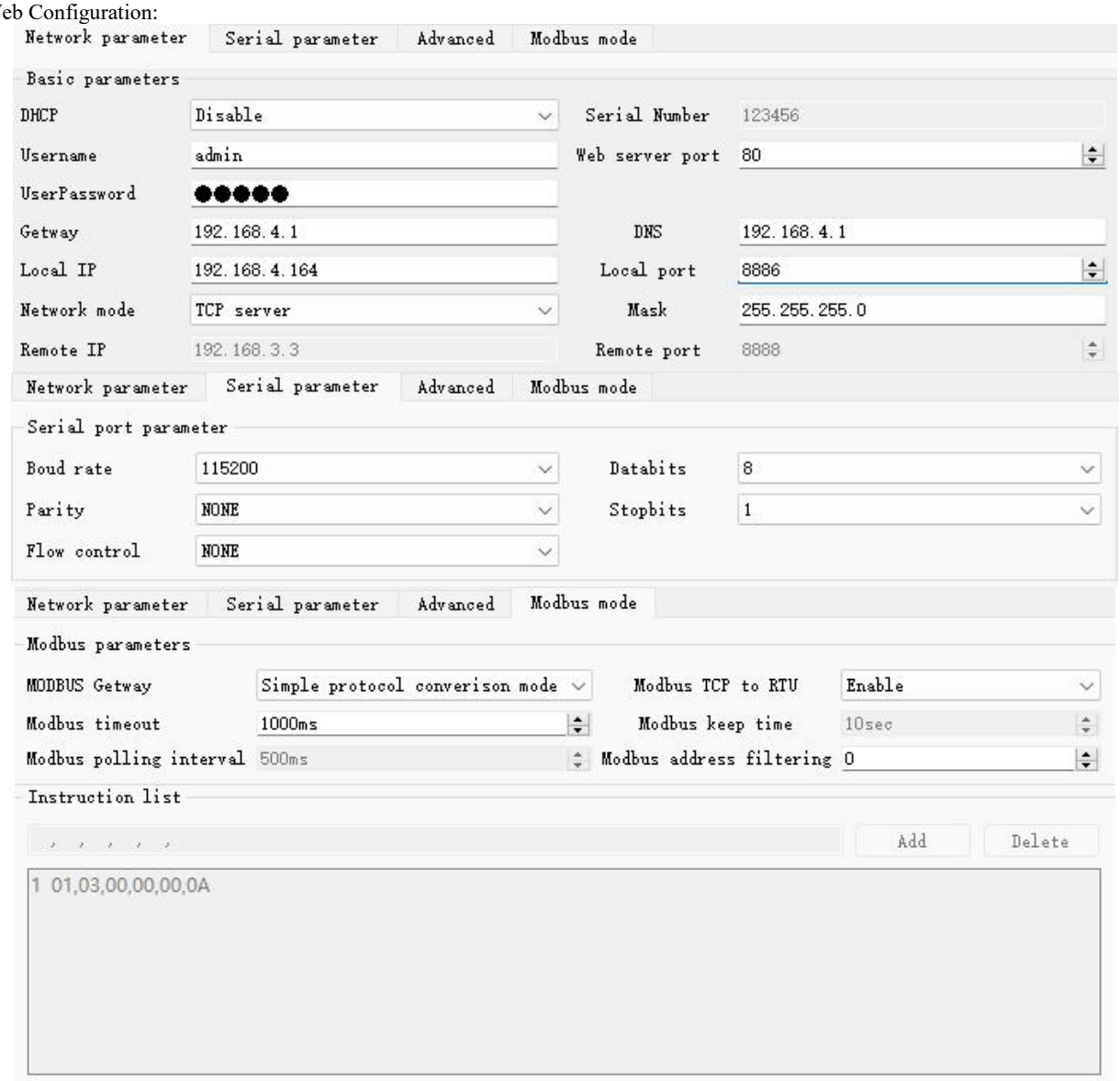
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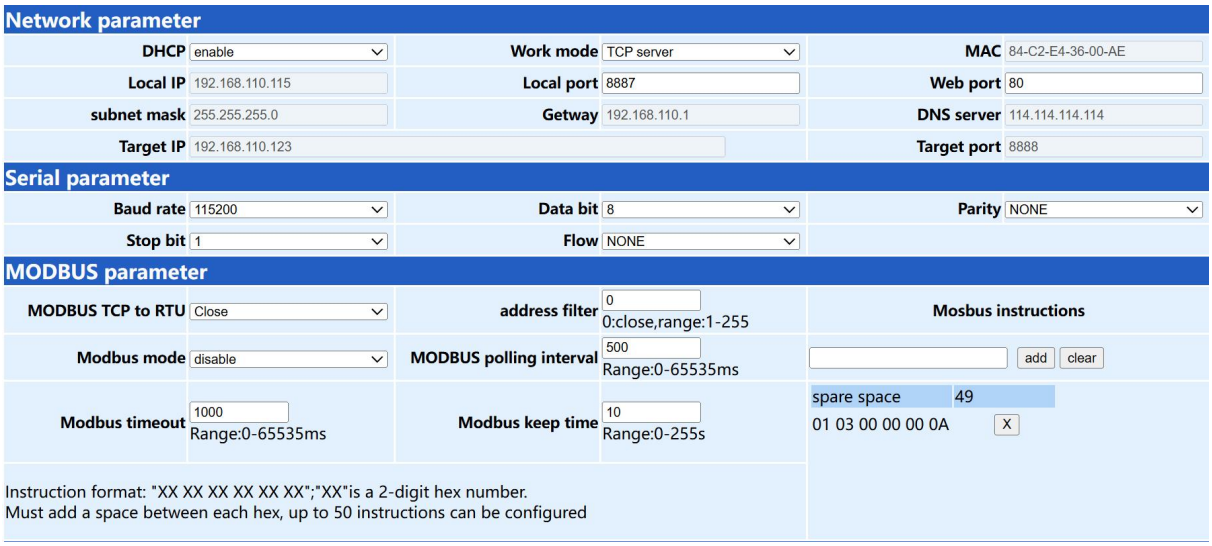
Annotations: Here, the network side is used as the host for explanation. In actual use, the ZigBee gateway side can also be used as a ModBus host

Host/Web Configuration:

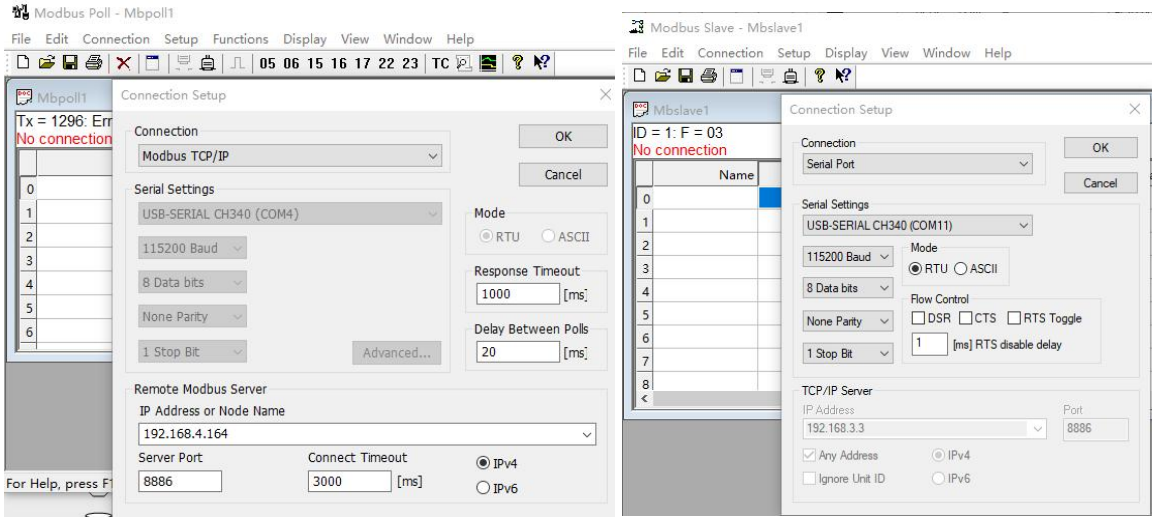


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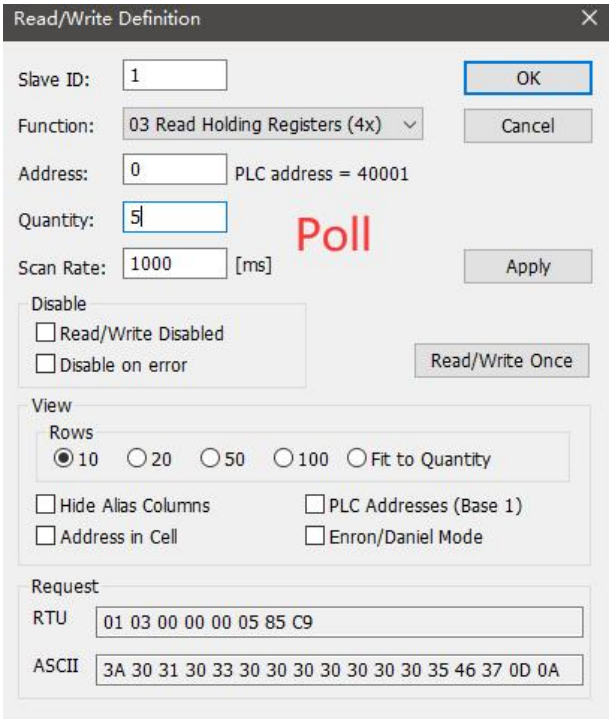
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Modbus Poll and Modbus Slave software debugging:
Software connection settings:



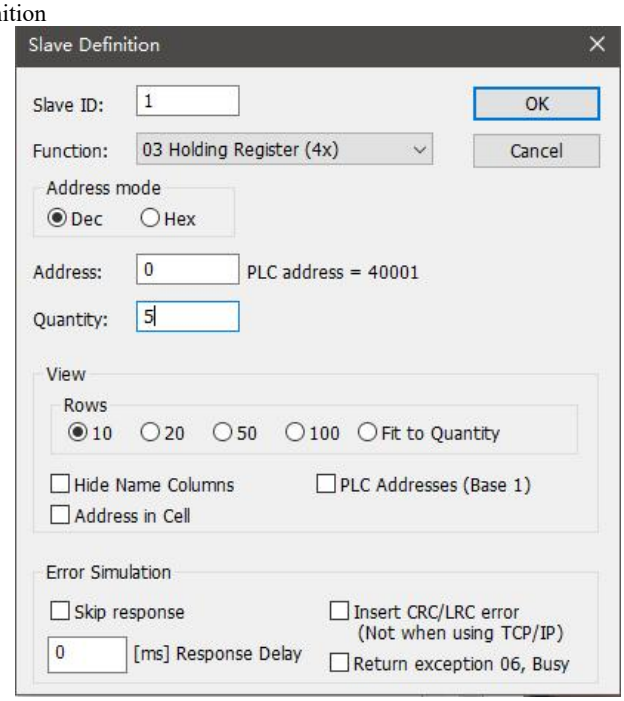
Software register reading and emulation configuration:
Poll menu select Setup→Read/Write Definition



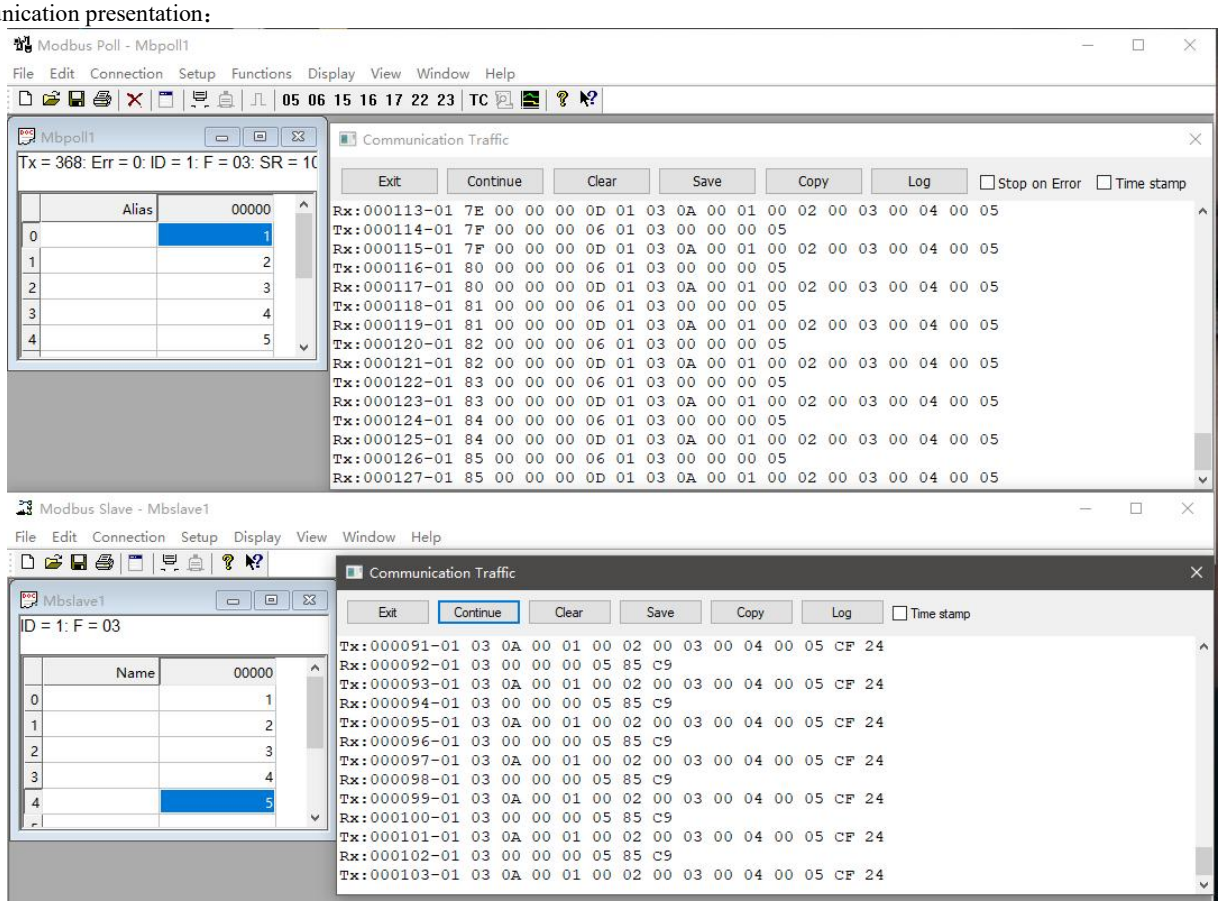
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Slave menu select Setup→Slave Definition



Communication presentation：



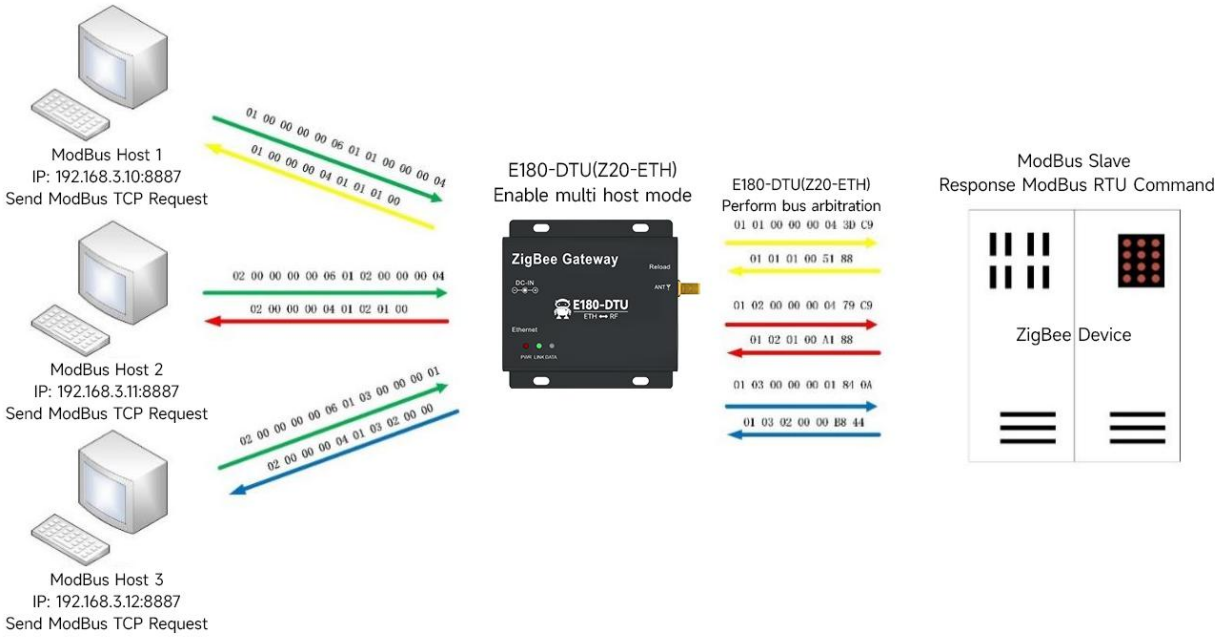
3.7.2 **Multi-host mode**

Multi-master mode can handle up to 6 Modbus TCP hosts, when multiple Modbus hosts access at the same time Modbus gateway will be bus occupation scheduling (RS-485 bus can only process one request at a time, while multi-master mode will be sorted according to TCP requests, other links wait), so as to solve the bus conflict problem (currently only support 6 host connections), only support working in TCP server mode, slaves can only be in serial ports, Otherwise, it will not work.

It is recommended to configure as Simple Protocol Translation when no multiplexed hosts are used.

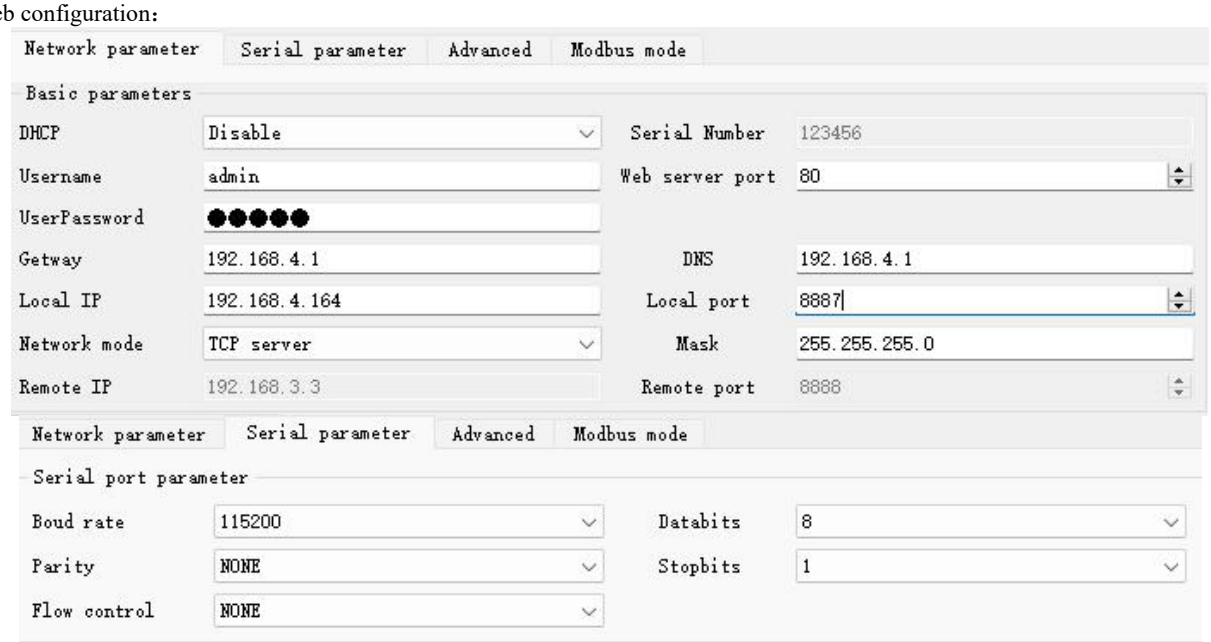
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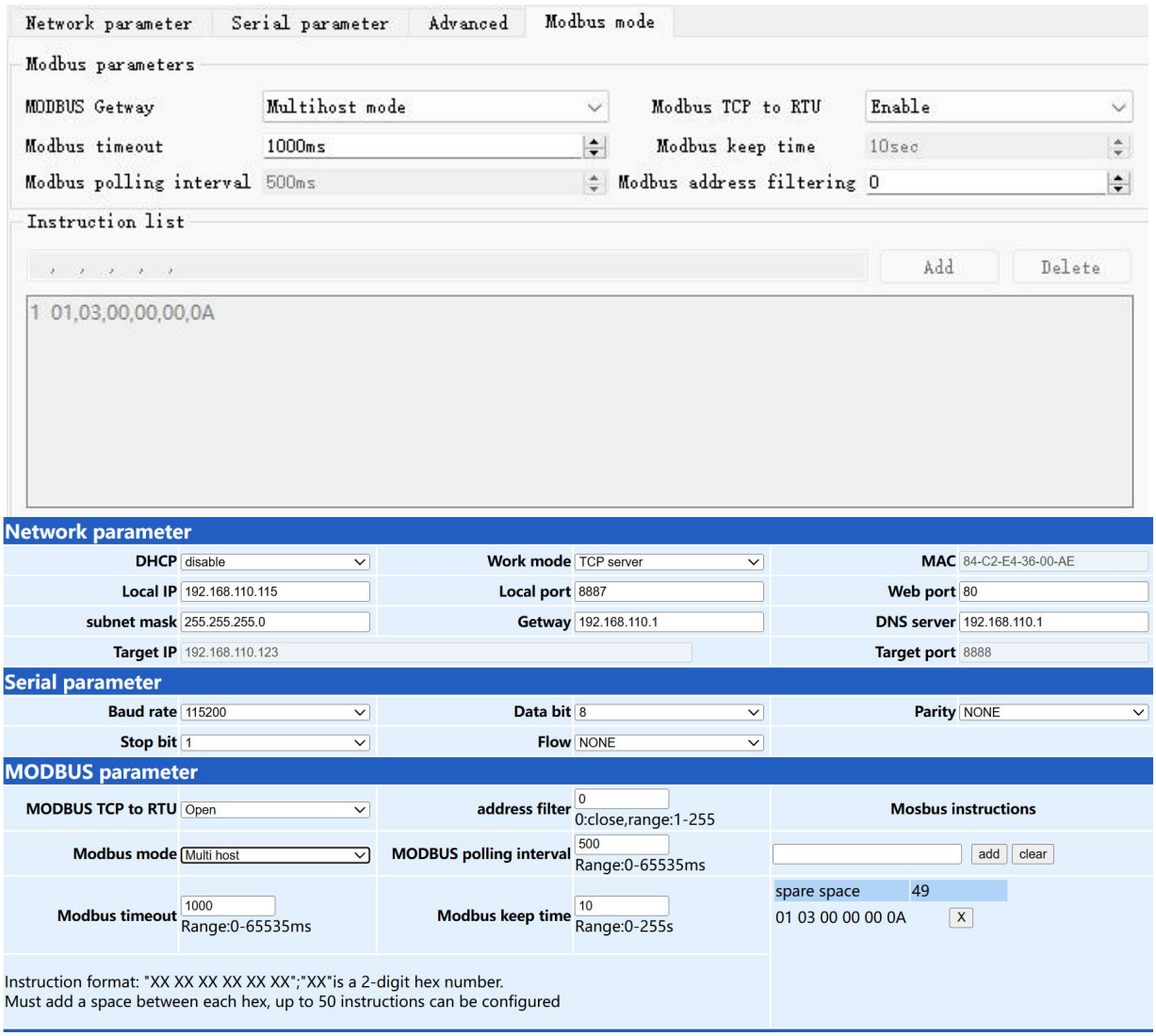
Annotations: Taking three hosts as an example, a maximum of six hosts can be connected during actual use

Host/web configuration：



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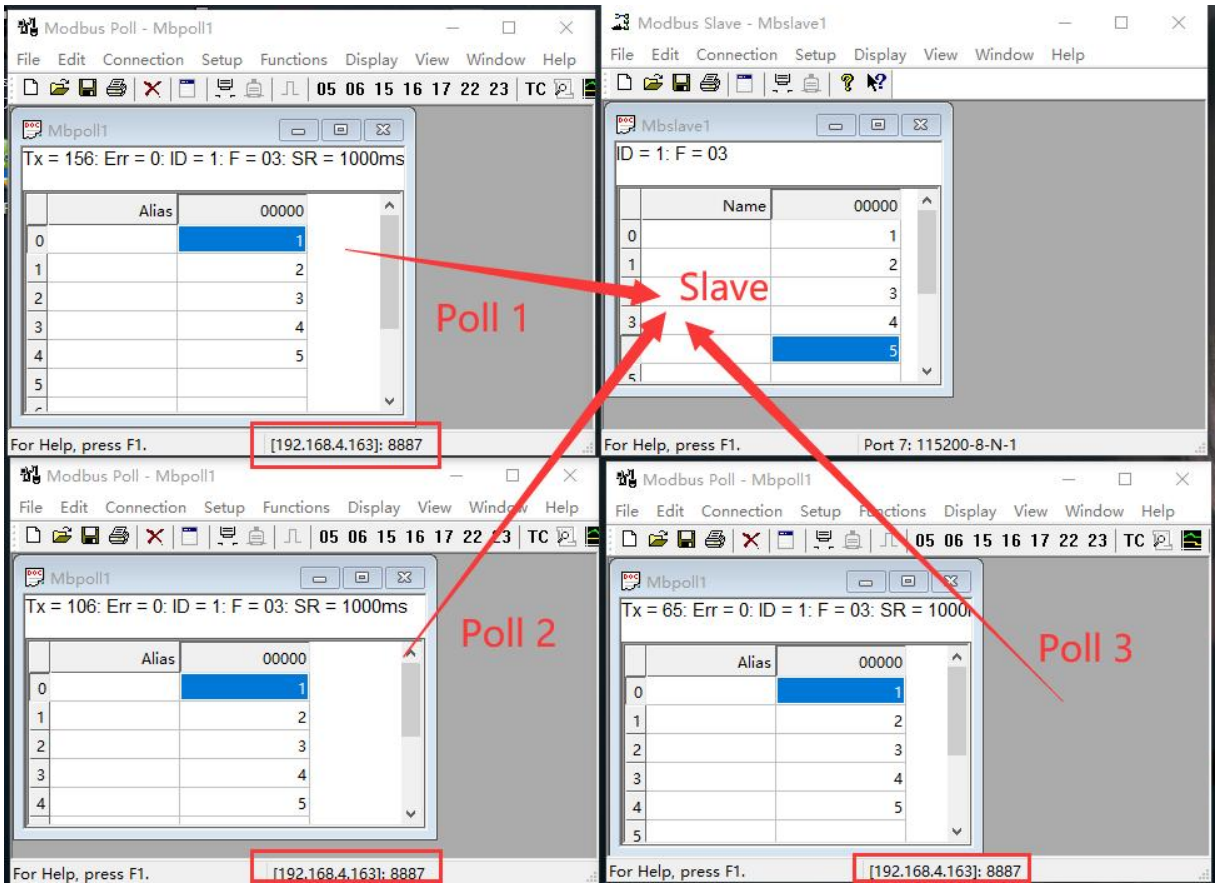


Modbus Poll and Modbus Slave software debugging：

Refer to "Simple Protocol Conversion" for software configuration and register configuration, and enable multiple Modbus Poll software at the same time (3 channels as an example, up to 6 channels can be supported).

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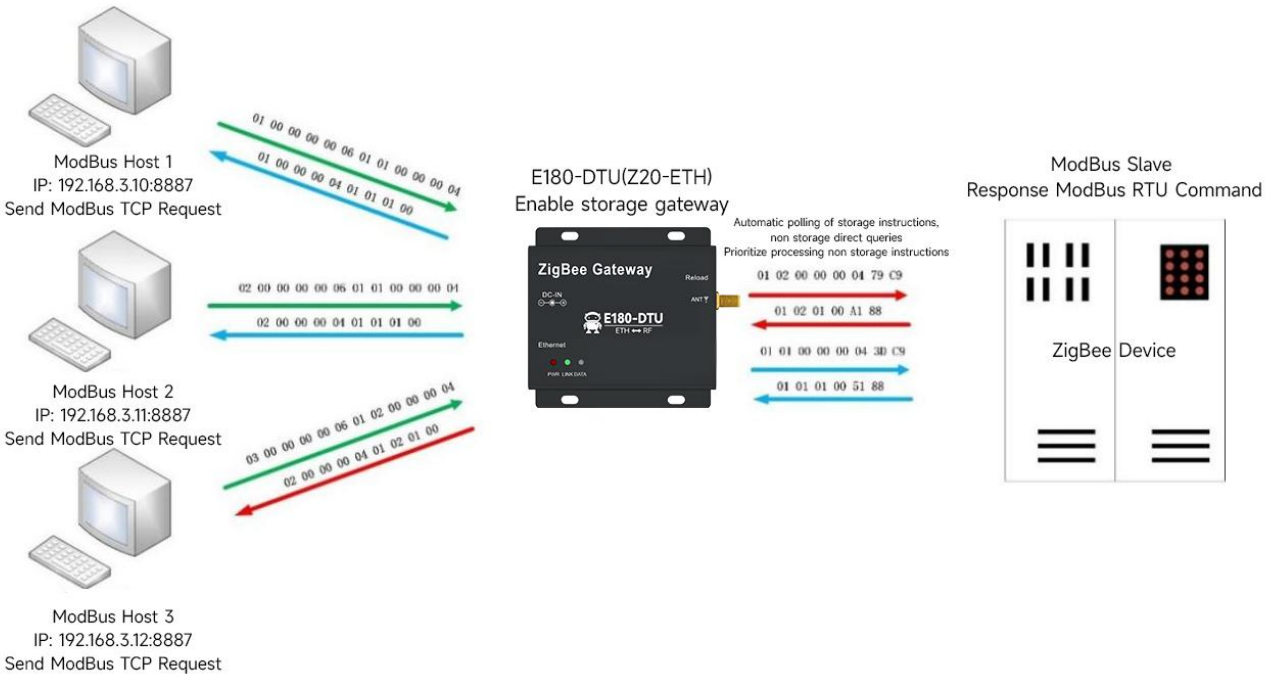


3.7.3 **Storage-based gateways**

When different hosts request the same data, the gateway does not need to ask the RTU device register status many times, but directly returns the cached data in the storage area, which greatly improves the multi-host request processing capability of the gateway, and also shortens the time consumed by the entire request process. Users can customize the store instruction polling interval and instruction storage time according to their needs.

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

Peculiarity:

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

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

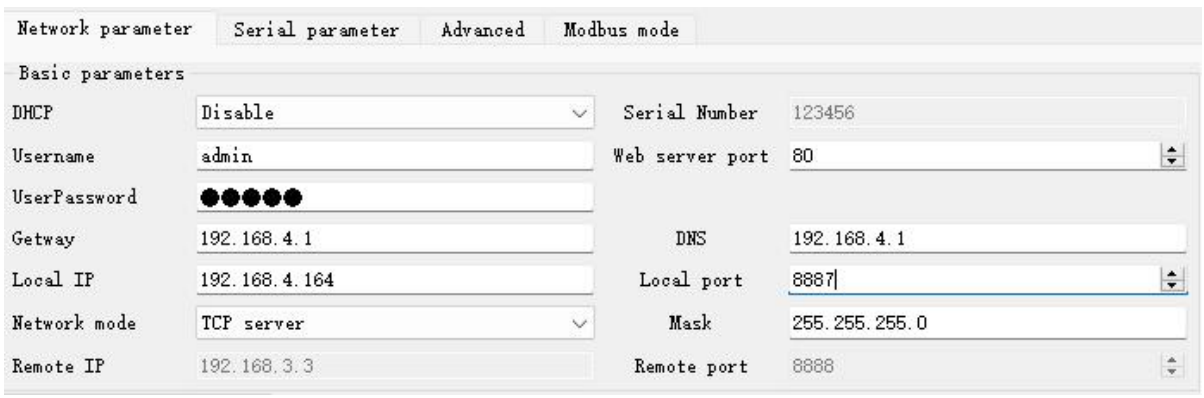
（3） The polling interval can be customized, 0-65535ms；

（4） The gateway polls the RTU device according to the storage time of the configured instruction, and the MODBUS host does not query the instruction again during the storage time, and the gateway automatically deletes the storage instruction to release the cache；

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

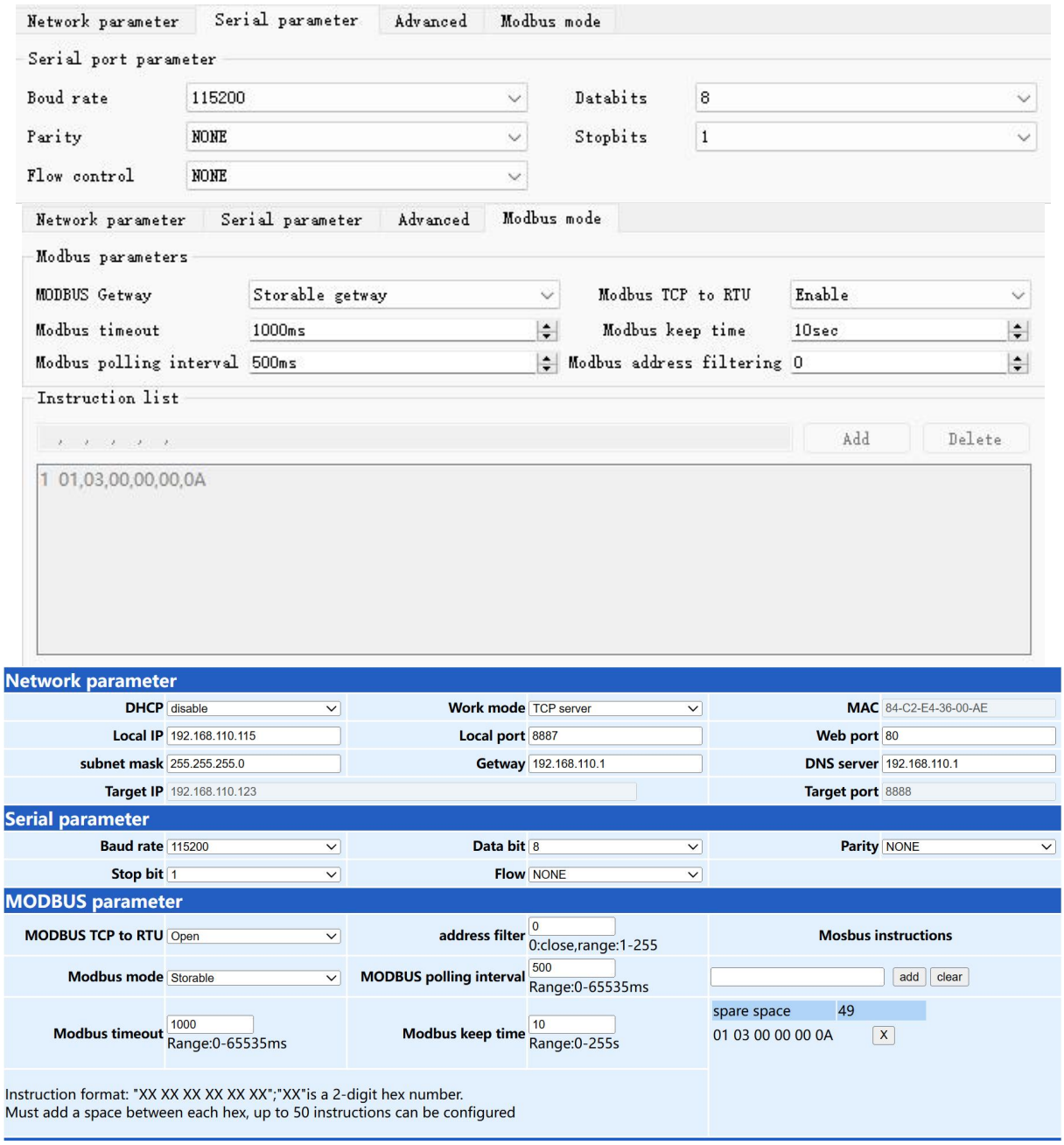
（6） Only 01, 02, 03, and 04Modbus function code query result storage is supported；

Storage gateway host computer and web page configuration：



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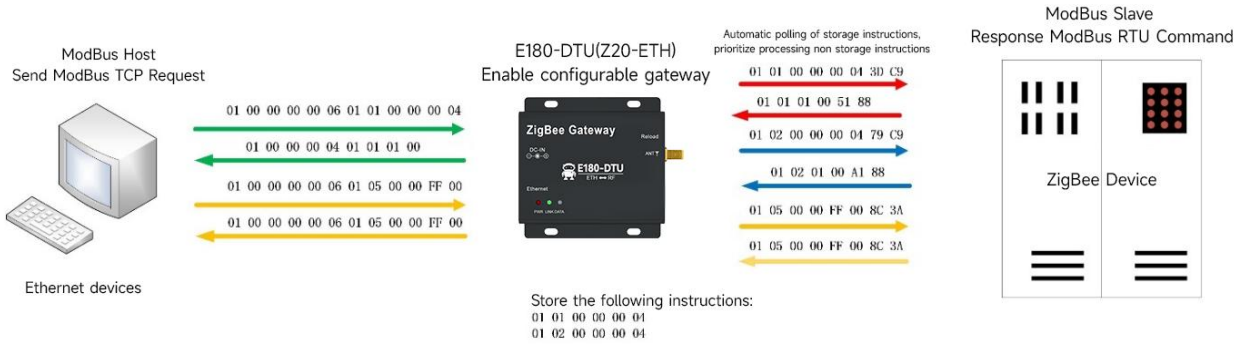


3.7.4 **Configurable gateway**

The gateway automatically polls the RTU device registers according to the preconfigured MODBUS instructions (only the configuration of MODBUS read instructions is supported), and the non-storage table instructions directly operate the RTU device. Frequently read instructions can be stored in the gateway in advance, which can improve response time (query configured instructions). Due to the above features, only Modbus slaves can be connected to the wireless transmission side of the configurable gateway.

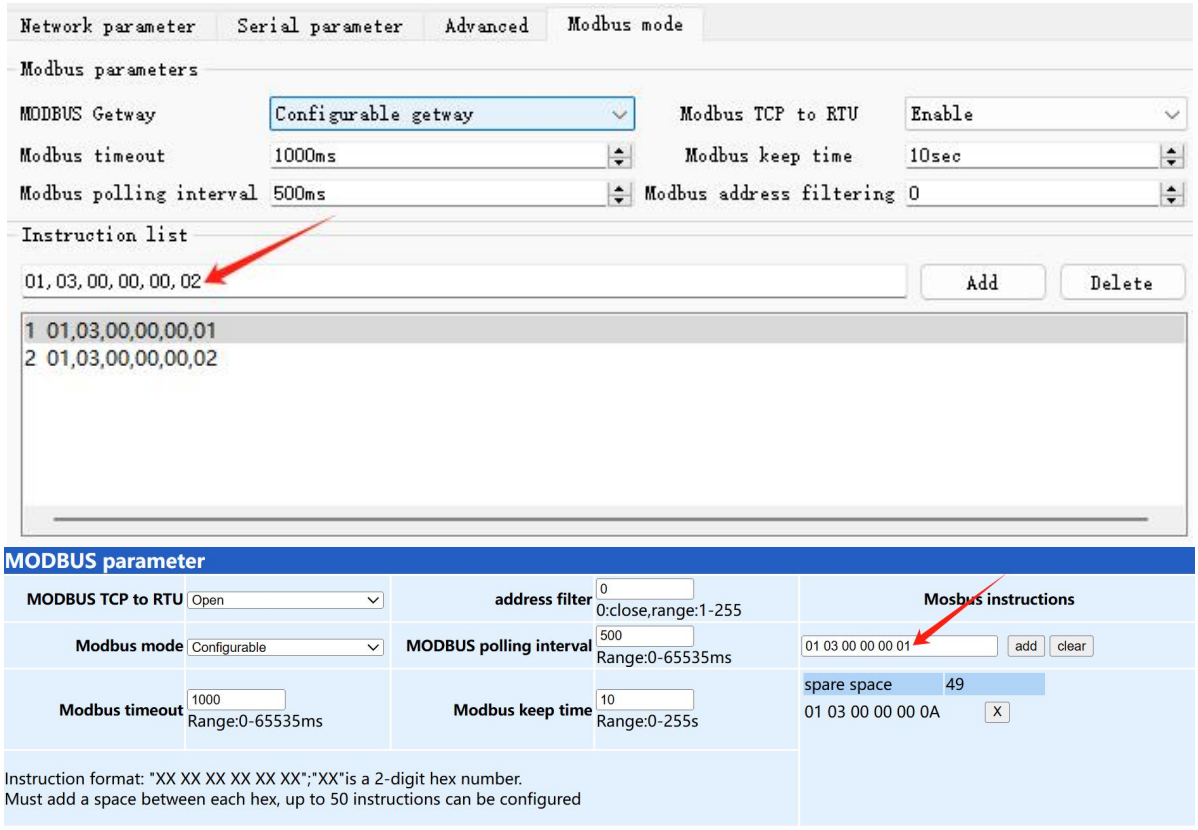
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Annotations: Only two instructions are stored here, and the device can store up to 50 instructions

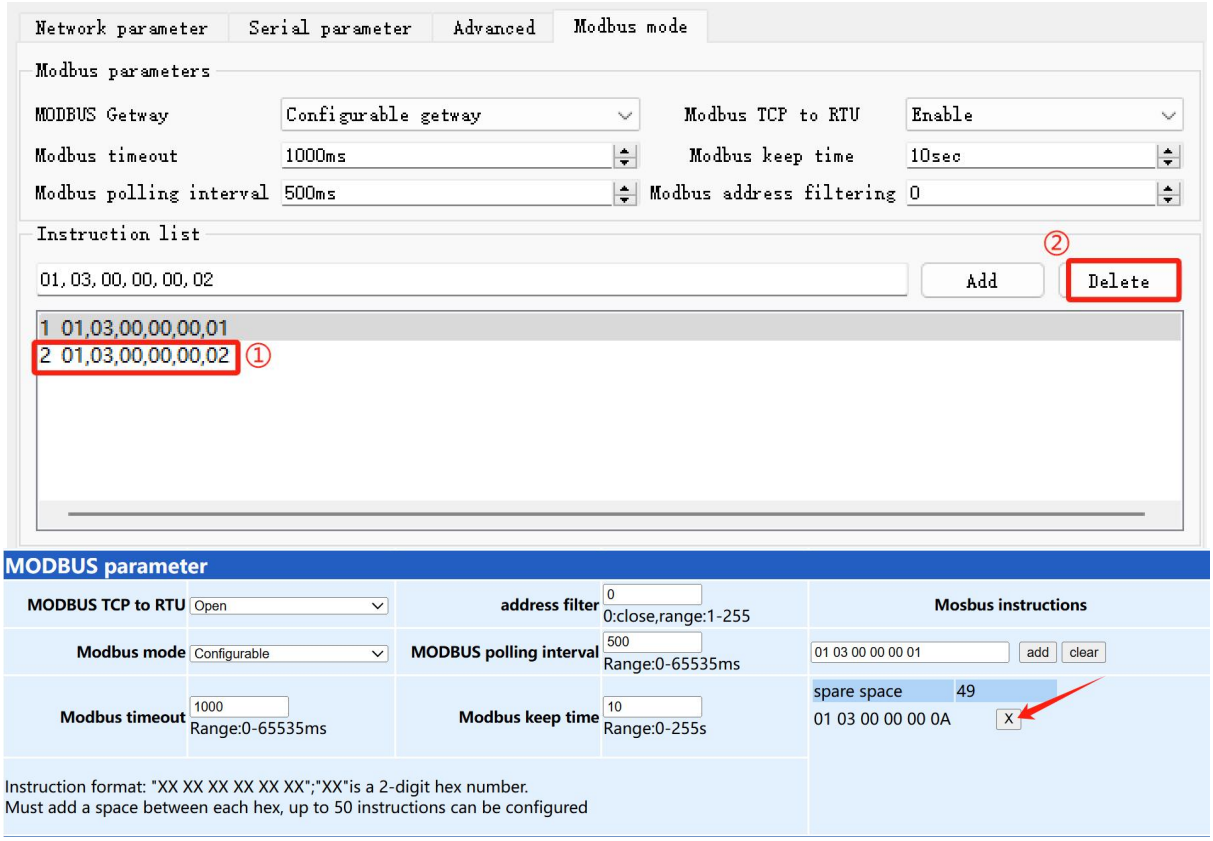
Instruction storage description (add, instruction errors and format errors cannot be added)：



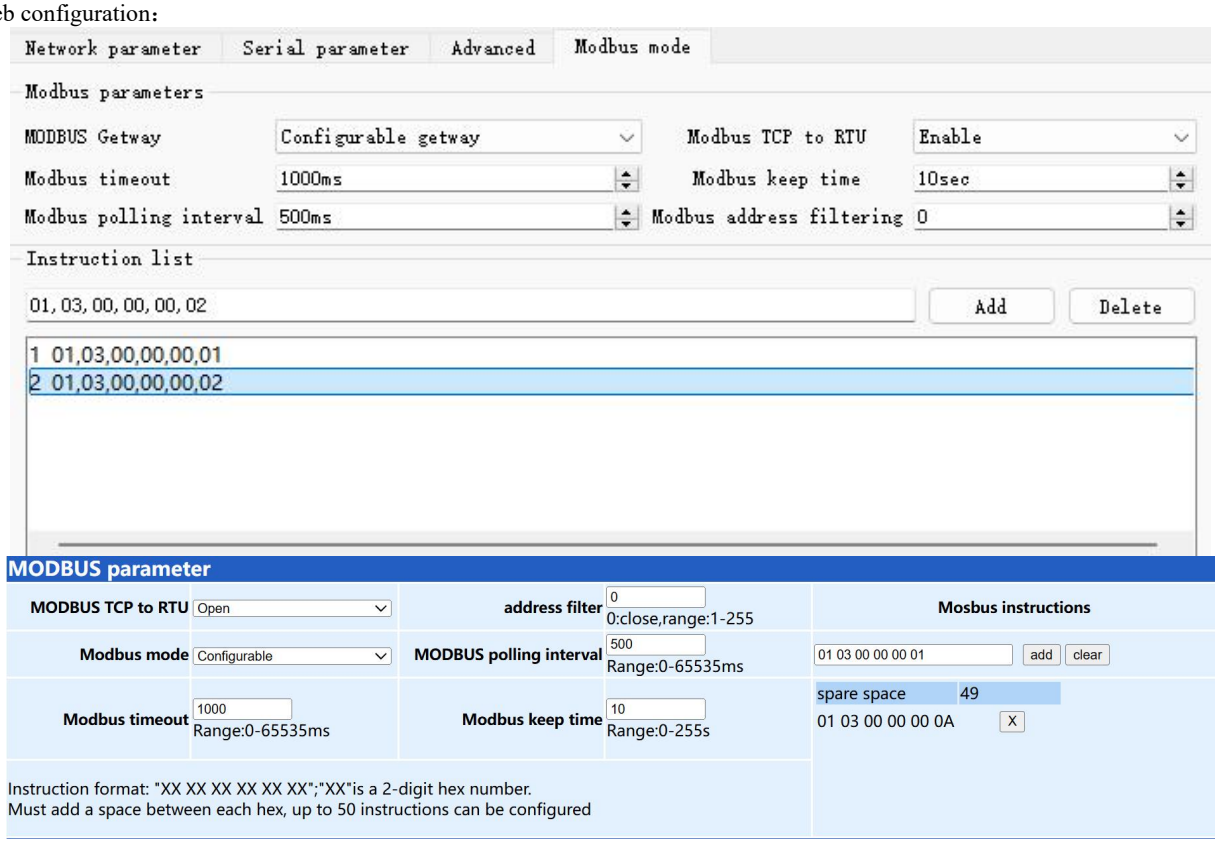
Instruction Storage Description (Delete)：

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Host/web configuration：



3.7.5 **Automatic upload**

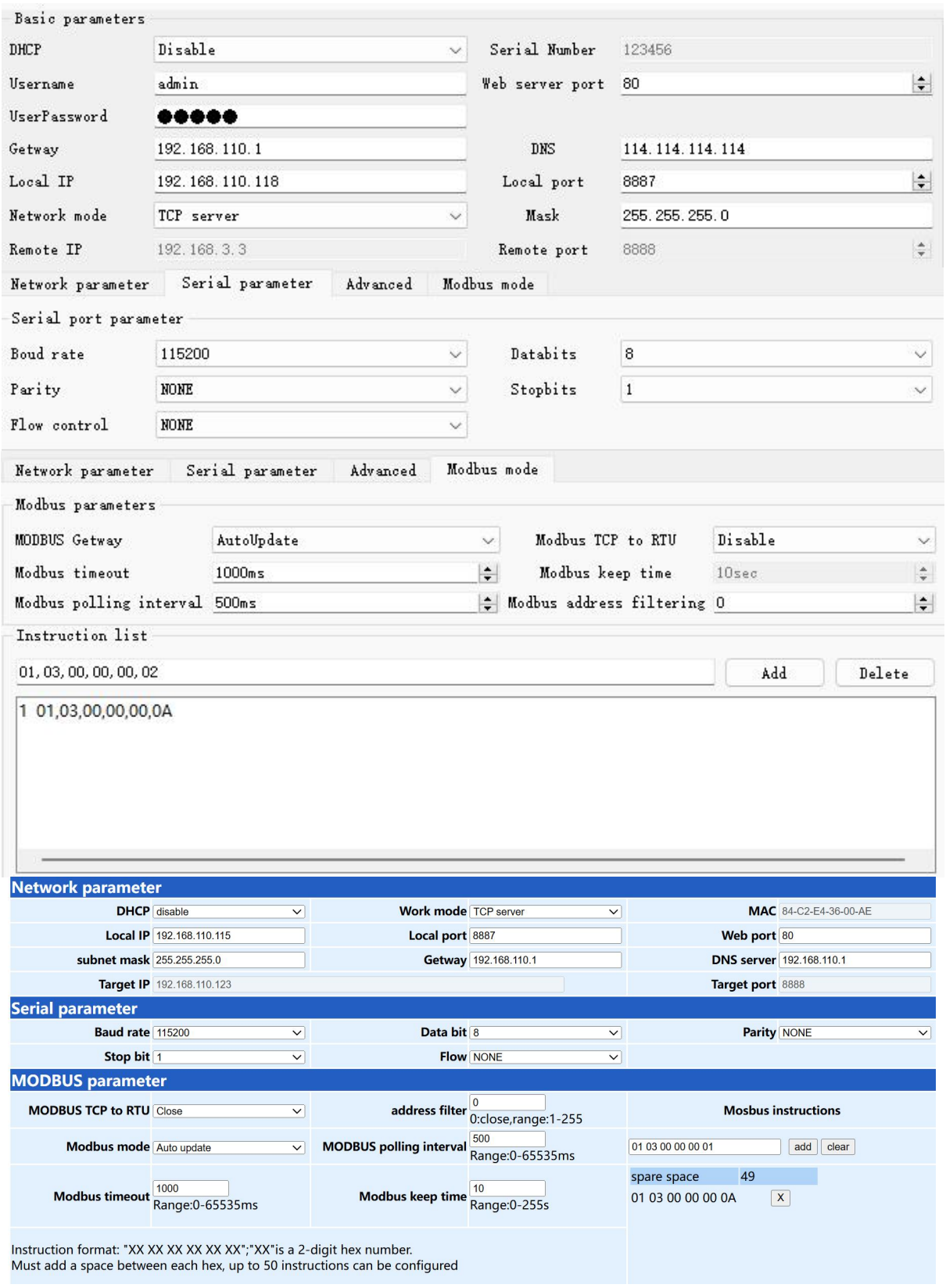
In the client mode (TCP client, UDP client, MQTT client, HTTP client), the gateway will automatically poll the instructions in the stored instruction table and upload them to the server, and can choose the feedback format (Modbus RTU format or Modbus TCP format) and the

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instruction polling interval (0-65535ms) according to your needs。

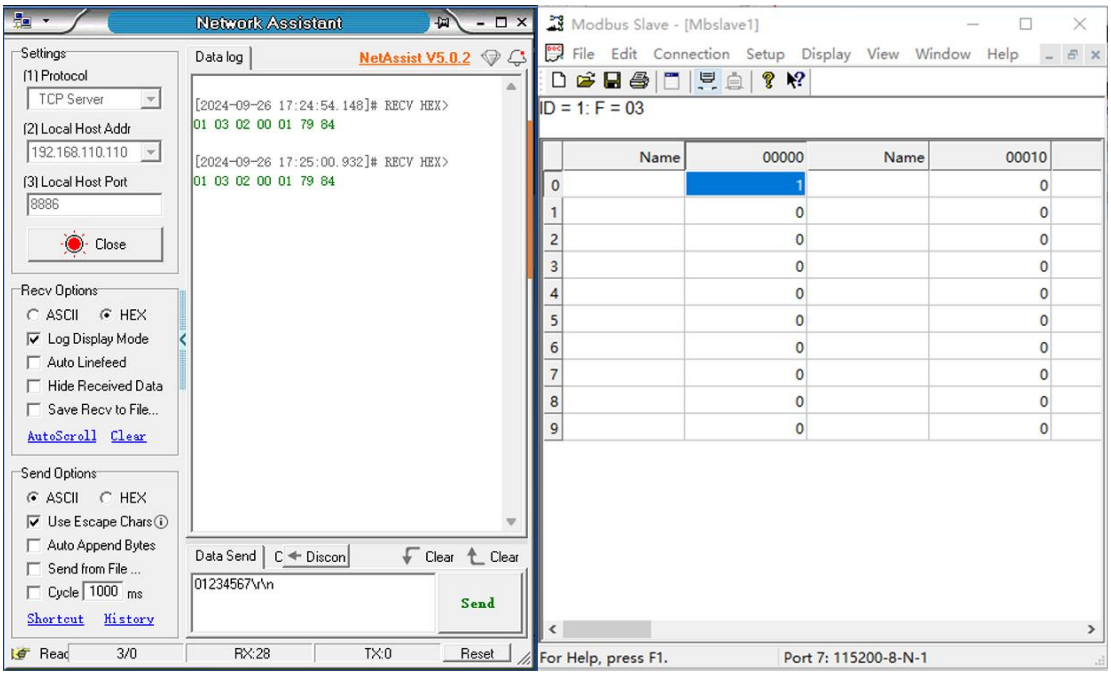
Refer to "Configurable Gateway-Instruction Storage Instructions" for instruction pre-storage, and automatically upload the configuration of the host computer/web page:



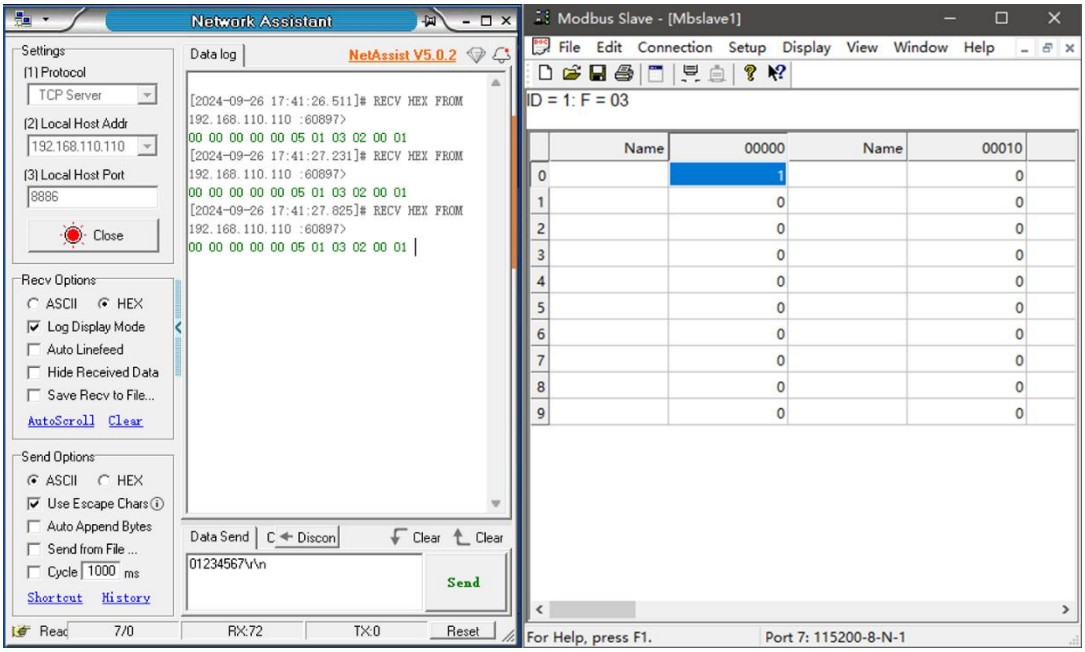
TCP client demo (Modbus RTU format):

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TCP client demo (Modbus TCP format):



3.8 Introduction to basic functions

3.8.1 **Web page configuration**

The device has a built-in web server, which is convenient for users to set and query parameters through web pages.

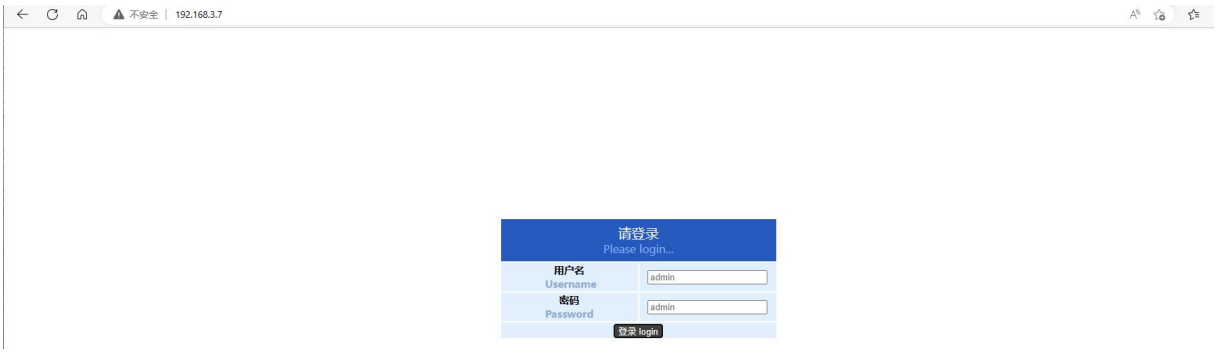
The port of the web server can be customized (2-65535), default: 80.

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):

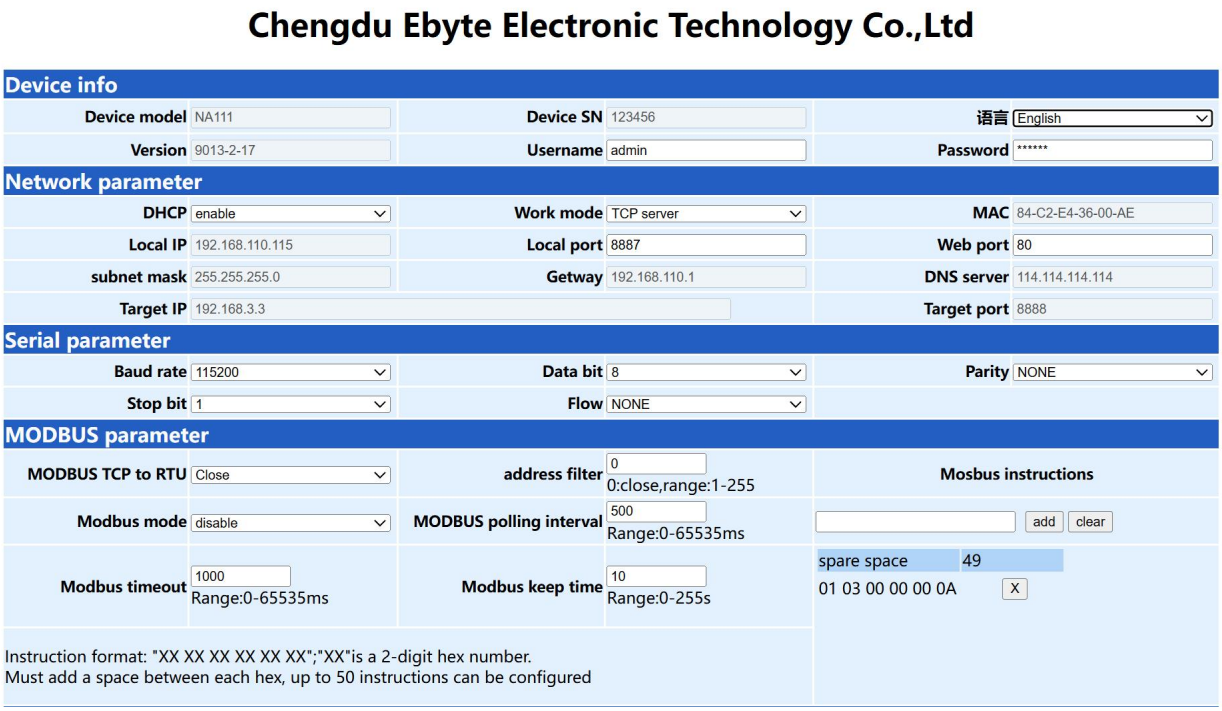
- Open the browser, enter the IP address of the device in the address bar, the default is 192.168.3.7 (the IP address and the computer need to keep the same network segment), forget that the local IP can be queried through AT command and configuration software;

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



- The main interface pops up on the webpage, and you can query and set relevant parameters;
- Click Submit to save the configuration parameters;
- The progress bar prompts the configuration progress, please do not refresh the web page again after the configuration is completed (refresh the web page to enter the configuration mode again, you can enter the communication mode by restarting the device or submitting it again)。



3.8.2 **Factory reset**

Press and hold the device's Reload button until all LEDs are fully lit to release the button。

3.8.3 **AT command configuration**

Ethernet parameter AT command configuration: The relevant parameter query and modification of the device can be completed through

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the AT command configuration. For specific AT commands, please refer to "NA11x&NB114&NS1&NT1-AT Command Set"。

3.8.4 **Random native port**

TCP clients, UDP clients, HTTP clients, and MQTT clients can configure the native port to 0 (use random native ports), and the server mode cannot use random ports, otherwise the client cannot establish a connection correctly。

Using a random port connection allows you to quickly re-establish the connection if the device unexpectedly disconnects the server, preventing the server from rejecting the connection due to four incomplete waves, it is recommended to use random ports in client mode。

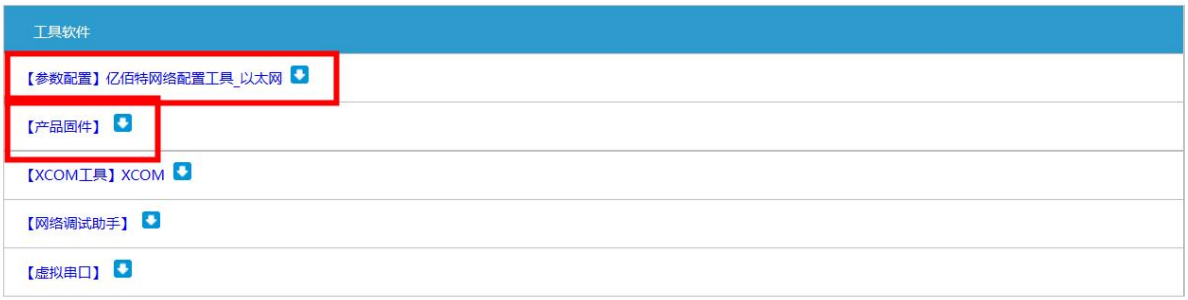
When you configure TCP client, HTTP client, and MQTT client modes, the device automatically enables random ports。

3.8.5 **Remote upgrade**

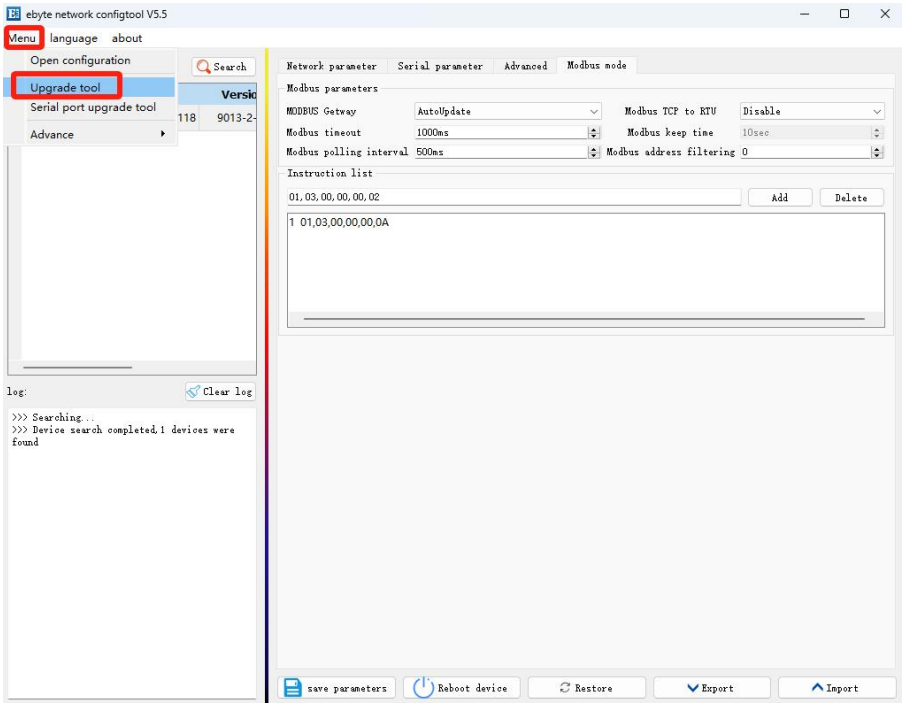
In order to facilitate the later maintenance and upgrade functions and replace different firmware, the Ethernet part (NA11x series, NB114, NS1, NT1, etc.) supports online upgrade, and users can upgrade or replace the current firmware through the host computer through the upgraded firmware provided by our company。

Network upgrade firmware procedure：

Step 1: Go to the corresponding location on the official website to download the host computer and "product firmware"；



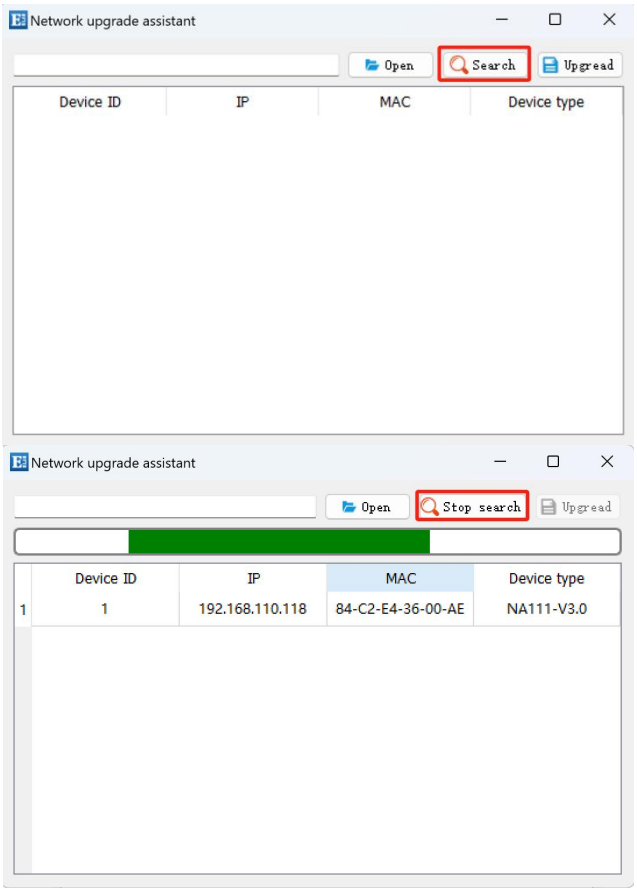
Step 2: Open the host computer, click "Menu", and select "Device Upgrade Assistant"；



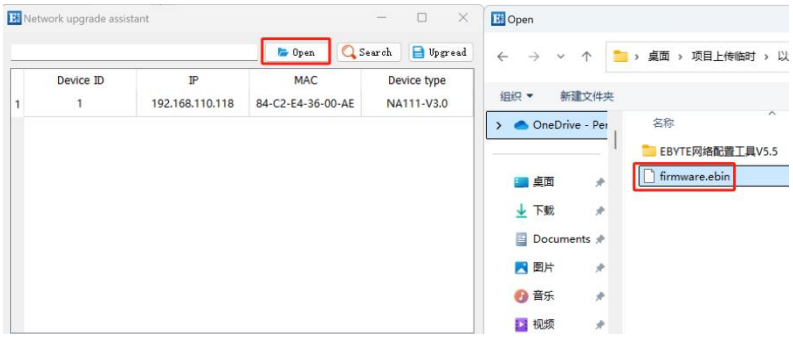
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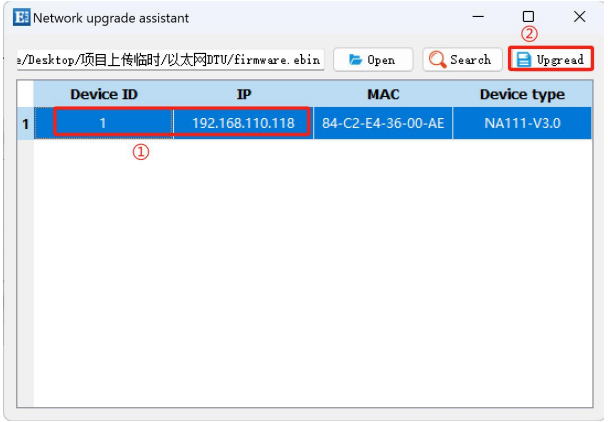
Step 3: In the pop-up "Device Network Upgrade Assistant" dialog box, click "Search Device" (the computer and the device should be in the same network segment), and click "Stop Search" after searching for the device；



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

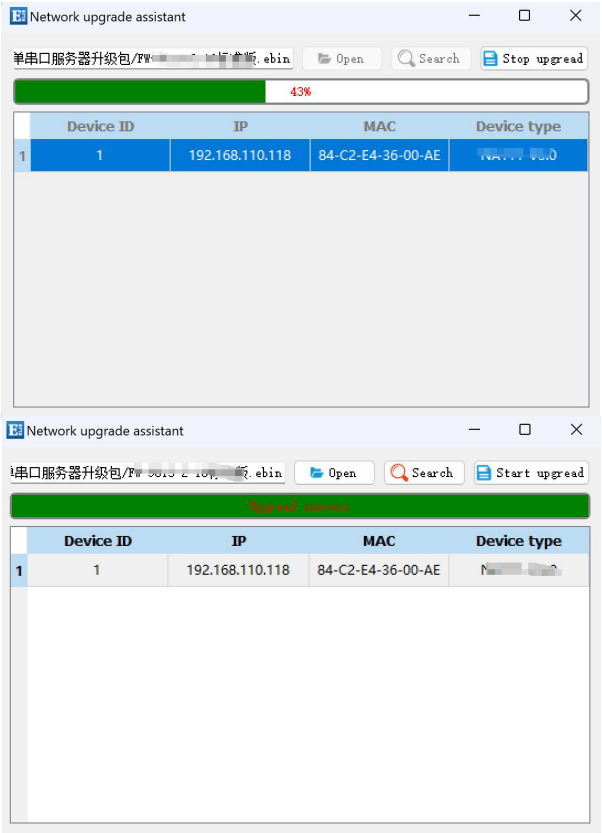


Step 5: Select the device to be upgraded, click "Upgrade", the progress bar will start to change, wait for the upgrade to complete.



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Chapter 4 Quick Start

1.1 Use preparation

E18-DTU (Z27-ETH) (hereinafter referred to as "equipment") Before use, prepare network cable, computer and other related auxiliary materials. The details are as follows：

		
E18-DTU(Z27-ETH)	parvicostellae	Computer
		
DC 12V Power supply adapter	antenna	

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1.2 Device wiring

Connect the E18-DTU (Z27-ETH) device to the antenna, power supply, and network cable to the computer。

1.3 Ethernet settings

4.3.1 Network test environment

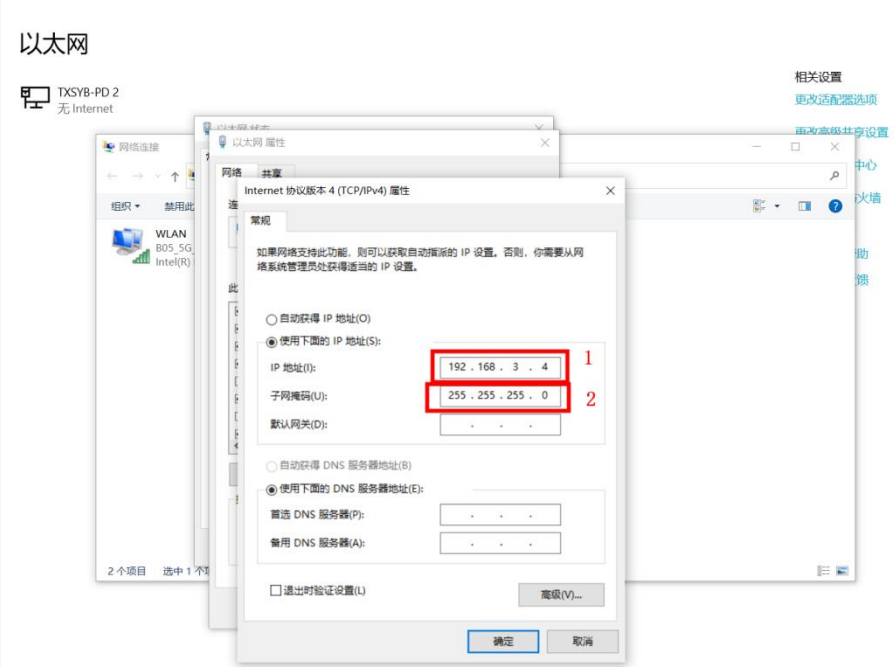
In order to avoid problems such as server search failure and inability to open web pages in the actual application process, it is recommended to check the relevant settings of the computer first.

（1） Turn off your computer's firewall and anti-virus software；

（2） Configure the NIC to which the device is connected；

（3） This case is for the device directly connected to the computer test, you need to configure the computer as a static IP (the computer is directly connected to the device, there is no router to assign, the computer cannot obtain the IP address), and the use of switches or routers needs to ensure that the device and the computer are in the same network segment (for example: 192.168.3.xxx)；

（4） In this case, the static IP address of the computer is 192.168.3.4 (the same CIDR block as the device), the subnet mask is 255.255.255.0, and the default gateway is 192.168.3.1。



4.3.2 Radio Ethernet default parameters

project	Default parameters
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 baud rate	115200（Modification is not recommended）
Serial port parameters	8 / None / 1（Modification is not recommended）

4.3.3 Network connectivity test

After the above operation steps, follow the factory default parameters of the device and perform the following operations to achieve network connection。

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The procedure is as follows：

（1）Open the Test TCP/IP Debugging Assistant software；

（2）In the "Network Settings" area, select TCP Client Mode, the remote host address corresponds to (the default local IP of the device: 192.168.3.7), and the remote host port corresponds to the factory port 8887 of the device, click Connect；

（3）Wait for the computer to connect to the device, after the connection is completed, the device's LINK light is always on, indicating that the station is connected to the network；

1.4 ZigBee quickly builds the network

In order to allow users to quickly familiarize themselves with the station, this section will guide users to build a ZigBee network with simple configuration in combination with the host computer, including node type configuration, PANID settings, channel settings, and transmit power settings。

When using the ZigBee 3.0 host computer, our radio must be in TCP server (TCP Server) mode, otherwise the radio cannot connect to the host computer!!

4.4.1 Preparations

Before setting up a ZigBee network, we need to configure the network parameters of the station. We prepare 2~3 sets of equipment, here choose 3 E18-DTU (Z27-ETH) radios, users can also choose to use 1 E18-DTU (Z27-ETH) radio, the rest choose our E18 series, E180 series modules for testing。

We use 3 sets of E18-DTUs (Z27-ETH) as coordinators, routers, and terminals。

- **Coordinator device network parameter configuration**

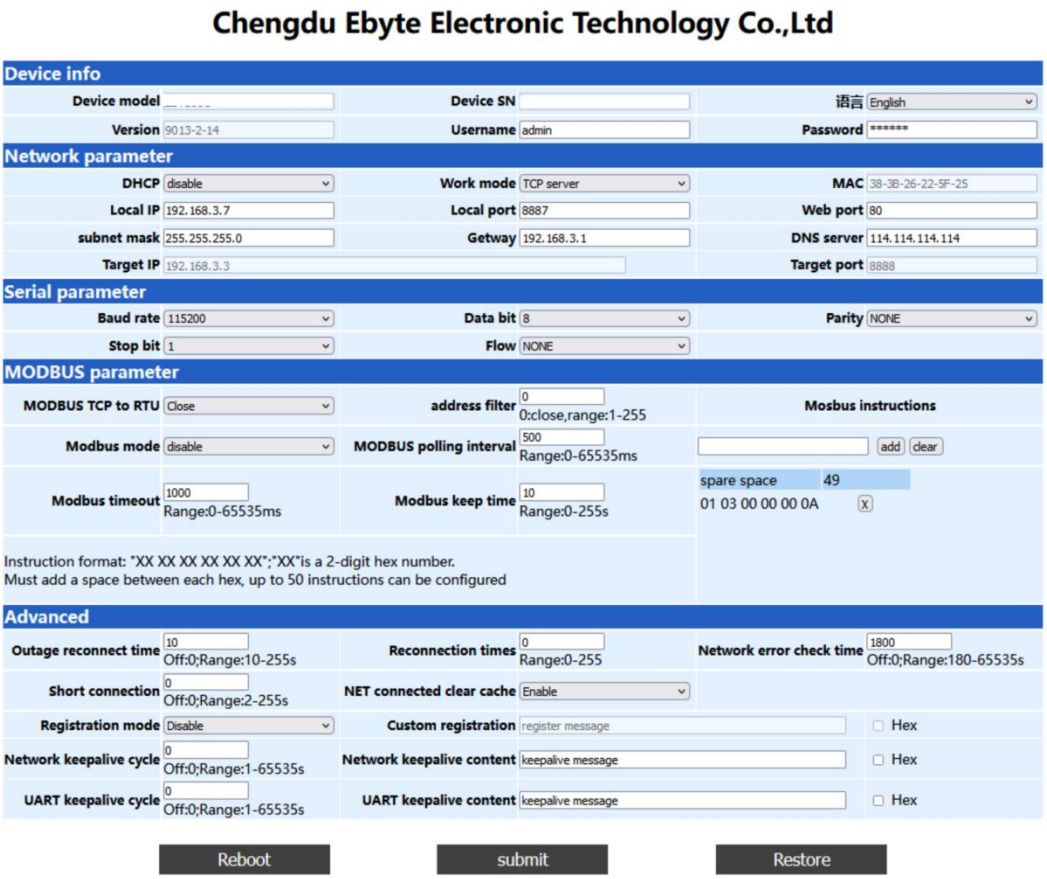
（1）Configure the coordinator device network, connect our device to the computer, open a browser, type 192.168.3.7 in the URL input box, click Enter, come to the login page, enter the username: admin, password: admin, click login。



（2）Enter the configuration page, do not modify, and keep the coordinates radio network parameters as default。

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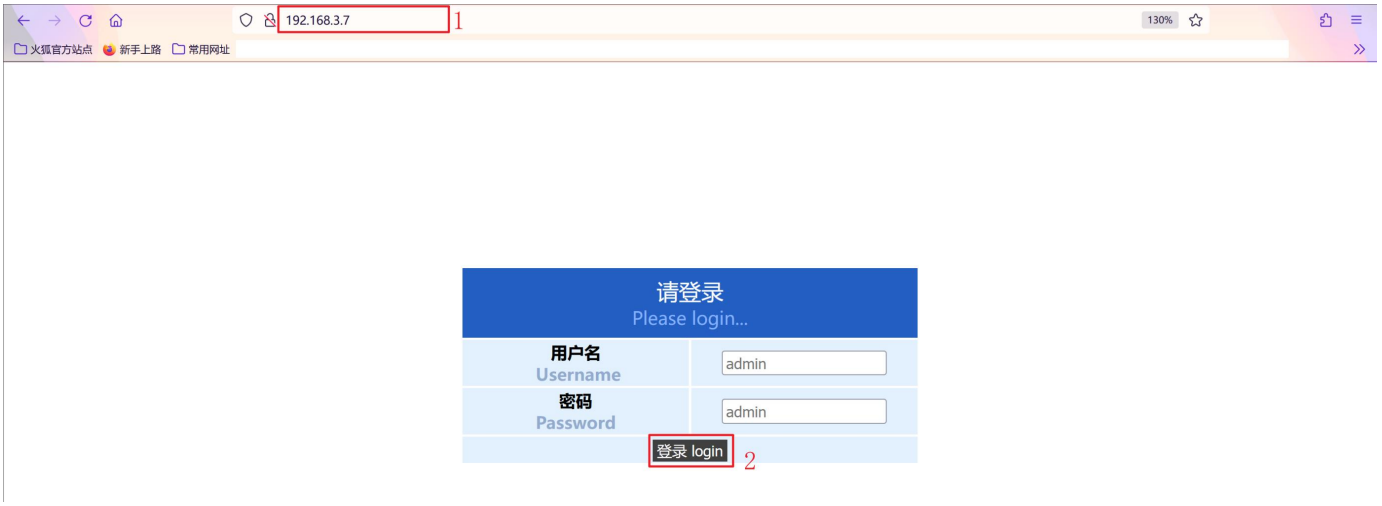


（3）The progress bar is displayed to 100%, indicating that the parameter configuration was submitted successfully。



- **Router device network parameter configuration**

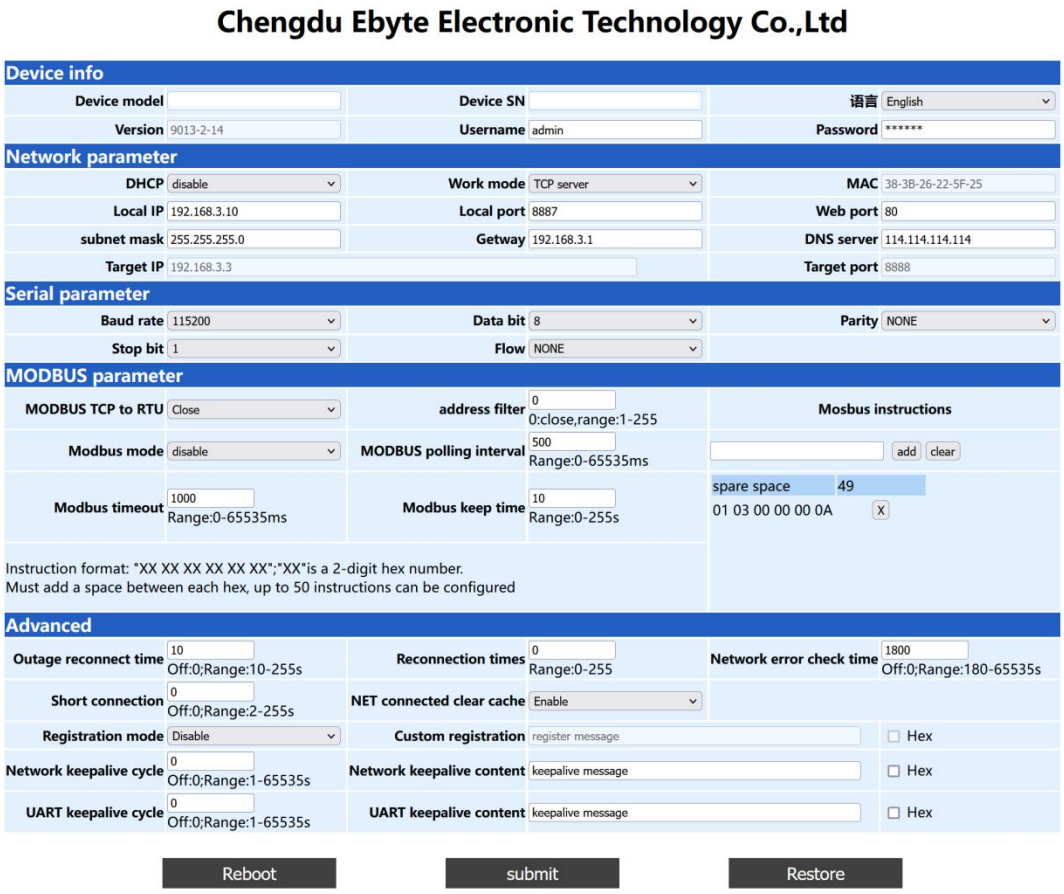
（1）Configure the router device network, connect our device to the computer, open a browser, type 192.168.3.7 in the URL input box, click Enter, come to the login page, enter the user name: admin, password: admin, click login。



（2）Go to the configuration page, modify the device IP address to 192.168.3.10, keep the remaining parameters as default, and click Submit。

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Note: After the device IP is modified, the configuration page entry will change the modified IP address, here is 192.168.3.10, if the device IP is forgotten, we can restore the network parameters through the Reload button.

（3）The progress bar is displayed to 100%, indicating that the parameter configuration was submitted successfully。



- **Configure the network parameters of the terminal device**

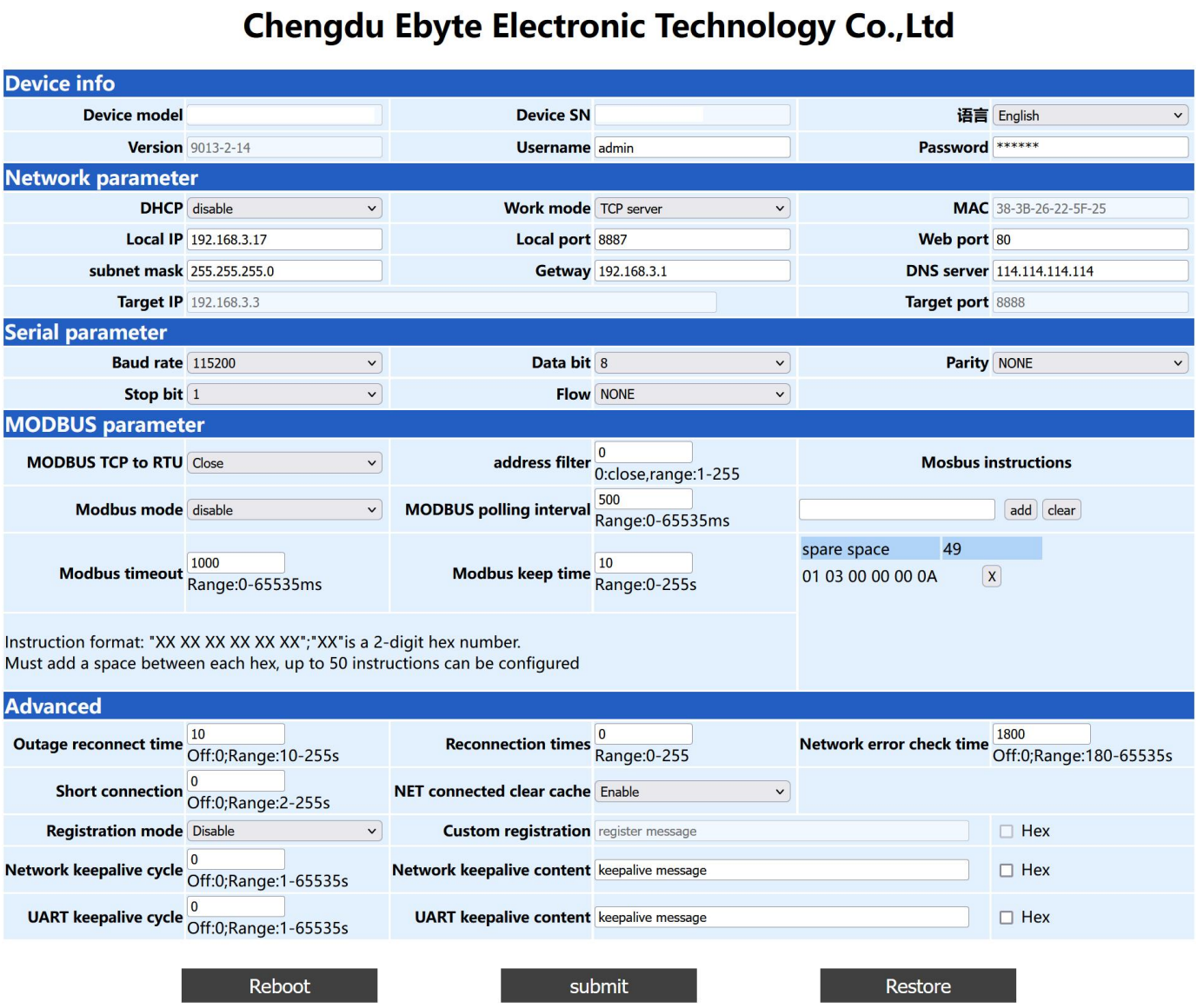
（1）Configure the terminal device network, connect our device to the computer, open a browser, type 192.168.3.7 in the URL input box, click Enter, come to the login page, enter the user name: admin, password: admin, click login。



（2）Go to the configuration page, modify the device IP to 192.168.3.17, keep the remaining parameters as default, and click Submit。

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Note: After the device IP is modified, the configuration page entry will change the modified IP address, here 192.168.3.17, if the device IP is forgotten, we can restore the network parameters through the Reload button。

（3）The progress bar is displayed to 100%, indicating that the parameter configuration was submitted successfully。



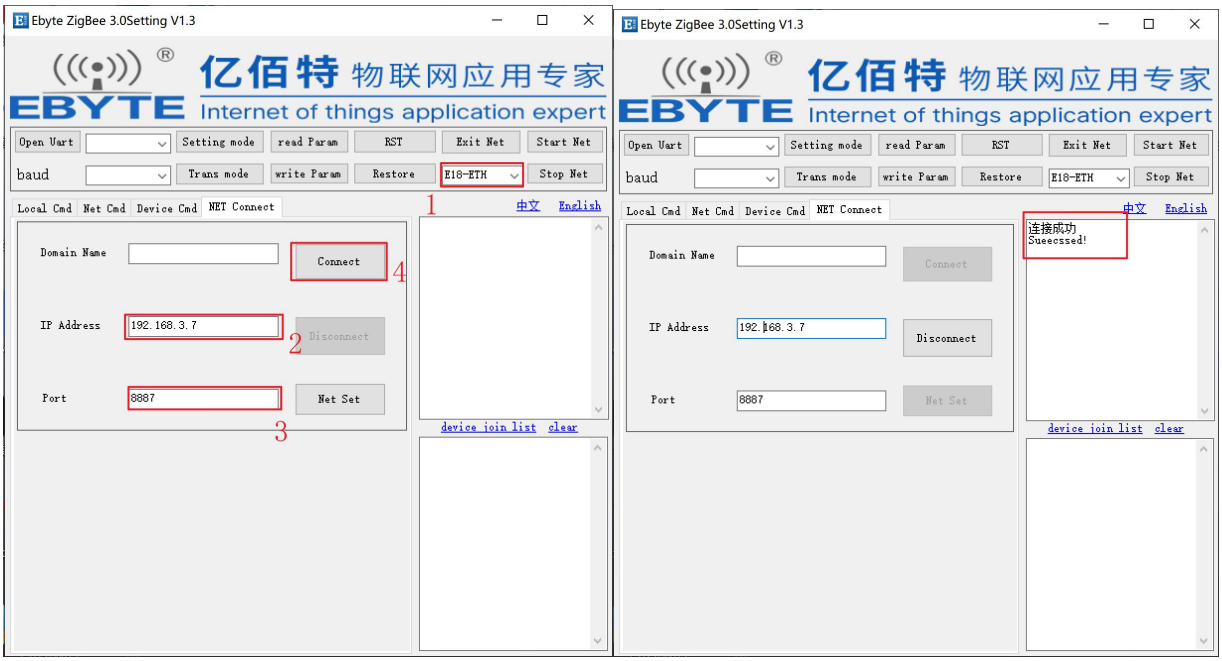
4.4.2 Quickly set up a ZigBee network

Combined with the host computer software to quickly and easily establish a ZigBee network, the specific steps are as follows：

（1）Connect radio station 1 to the computer, open the host computer software "ZigBee 3.0 host computer", select the device type, enter the IP address, enter the port number, click Connect Server, and you can see that the right window shows that the connection is successful。

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（2）The module leaves the factory for HEX command configuration mode, click "Read parameters", the message box prompts "Read parameters successfully", the main network parameters include: long address, the station type defaults to coordinator (if not, please set to coordinator), network status is "not have" (if you do not need to exit the network or restore to the factory). If the read parameters are invalid, it is possible that the module is currently in transmission mode, and you need to click "Enter Configuration Mode", and the message box prompts "Entering the configuration state successfully"。



（3）Click "Start Network Configuration" to coordinate to establish an open network, the coordinator will open the network for 180 seconds after creating a new network, the LINK light flashes 1Hz, and routers and terminals can join the network within this time。

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4.4.3 Quickly join a ZigBee network

（1）Connect radio 2 to the computer, open the host computer software "ZigBee3.0 host computer", select the device type, enter the IP address, enter the port number, click Connect to Server, and you can see that the right window shows that the connection is successful.



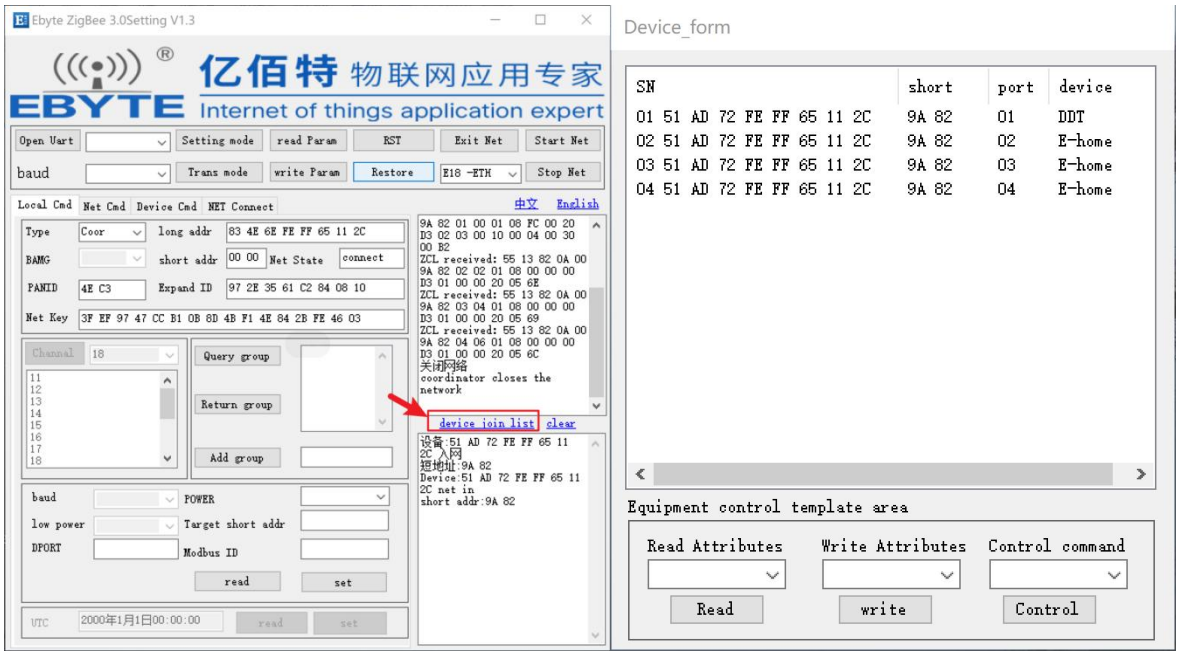
（2）Click "Start Network Configuration", the LINK light of the DTU device flashes rapidly at 10Hz, and it is necessary to ensure that the coordinator device is also in the network configuration state (see Section 5.1). Wait for a while, the LINK light of the DTU turns to solid light or 1Hz flashing (router mode), click "Read Parameters", you can view the network access information of the device, and the network status is "connect". If the LINK lamp turns off and the network status is "not have", the module fails to add the network, check whether the coordinator device is in the network configuration state and whether the distance between the coordinator device and the router/terminal device is within a reasonable range.

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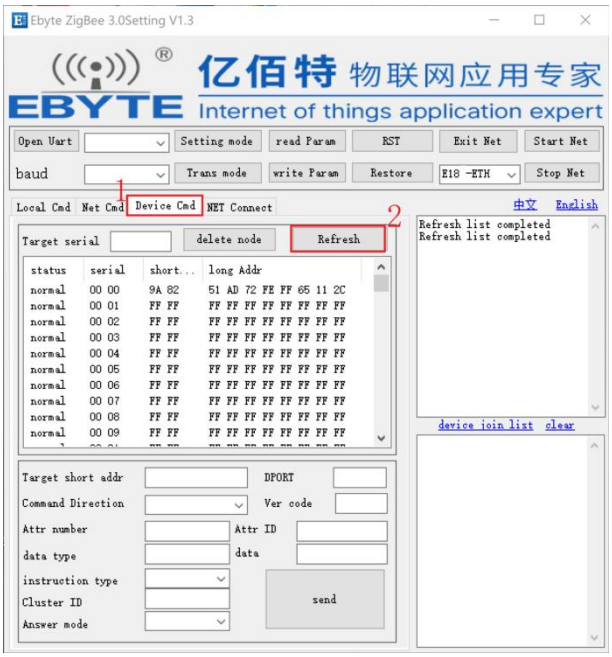
（3）Through the host computer interface of the coordinator device, you can view the information of other routers/terminal devices that have joined the coordinator device network, including MAC addresses and short addresses. Click the "Device Staging List" on the host computer interface of the coordinator device to view the 9-byte SN number of the connected device (Note: a module may have multiple SN numbers, each SN number represents a peripheral or function, the more functions of the module display the more SN number), the SN number can be used for device control and device binding transparent transmission targets.



（4）On the host computer interface of the coordinator device, click "Device Control Command" and click "Refresh Device List" to see the MAC address and short address of the network-connected device.

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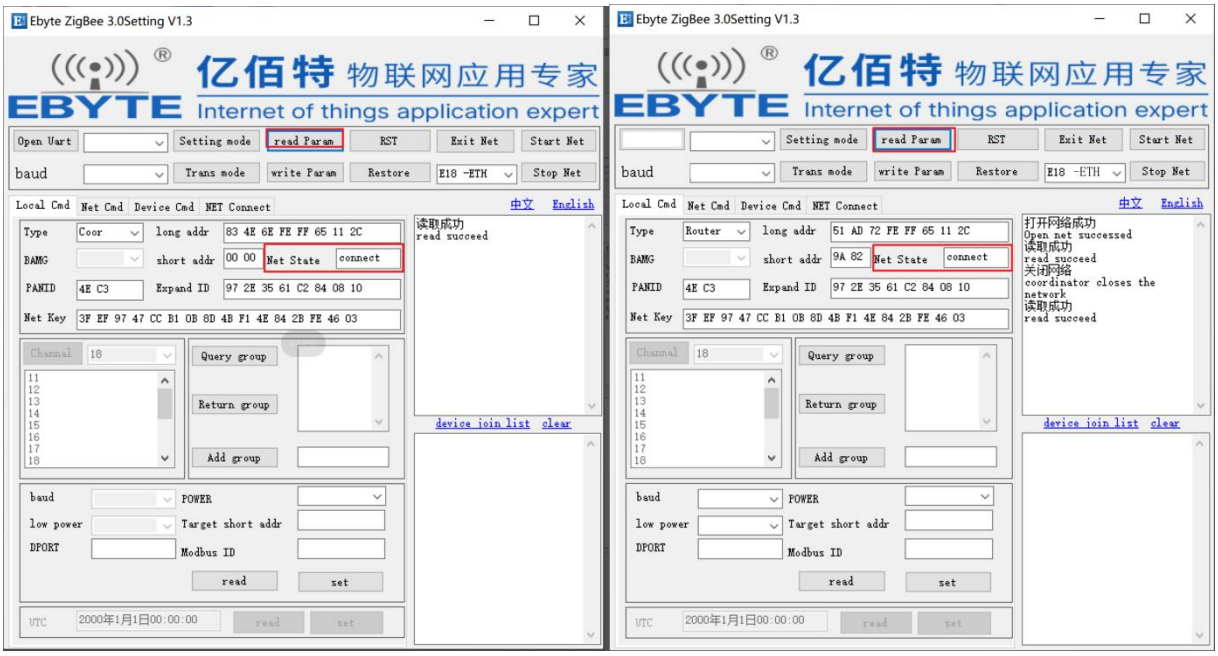
In this way, several routers and endpoints can be joined to a coordinator network。

Notes：

If a router or endpoint that has joined the network needs to switch to the network established by another coordinator, you need to "exit the network" or "restore the factory", and then set it up again according to the process in 4.4.3. Similarly, if the router that has joined the network needs to be changed to an endpoint, or the endpoint that has joined the network needs to be changed to a router, you also need to "exit the network" or "restore the factory"。

4.4.4 Data transmission

（1）Open the host computer software of the coordinator device and the network-connected device, click "Read Parameters", and confirm that the current network status of the device is "connect", indicating that the device is networked。



Coordinator device Router device

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（2）Click "Query" to query the configuration parameters of the device. The destination short address of the transparent transmission is 0xFFFF, and the destination port 0xFF (that is, 255), that is, the device defaults to broadcast in the transparent transmission mode.



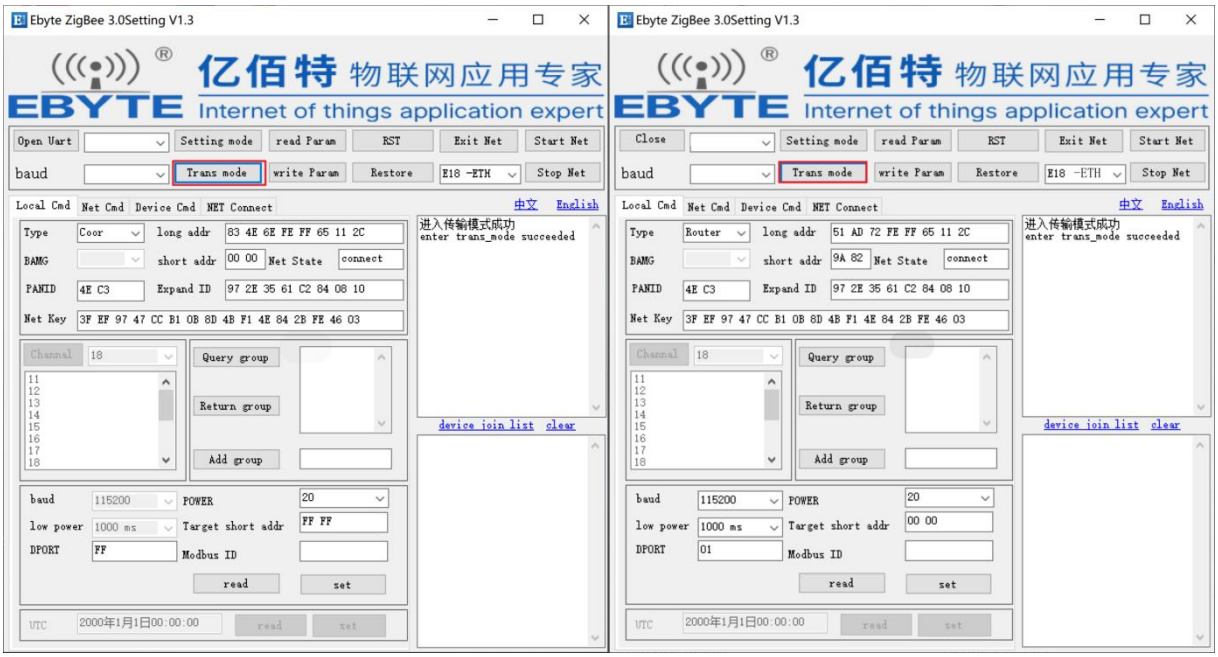
（3）Then, the router device is set to transmit data to the coordinator device in the form of on-demand, and the coordinator device uses broadcast mode to transmit data. In the host computer interface of the router device, set the destination short address to 00 00 (that is, 0x0000) and the destination port to 01 (that is, 0x01 or 1), and then click "Settings". After the setting is complete, you can click "Query" again to confirm whether the setting is successful。



（4）Enter the transparent transmission mode, and click "Enter transmission mode" on the host computer interface of the coordinator device and the router device respectively, both of which can enter the transparent transmission mode. One serial port inputs any data, and the other serial port can completely output the same data。

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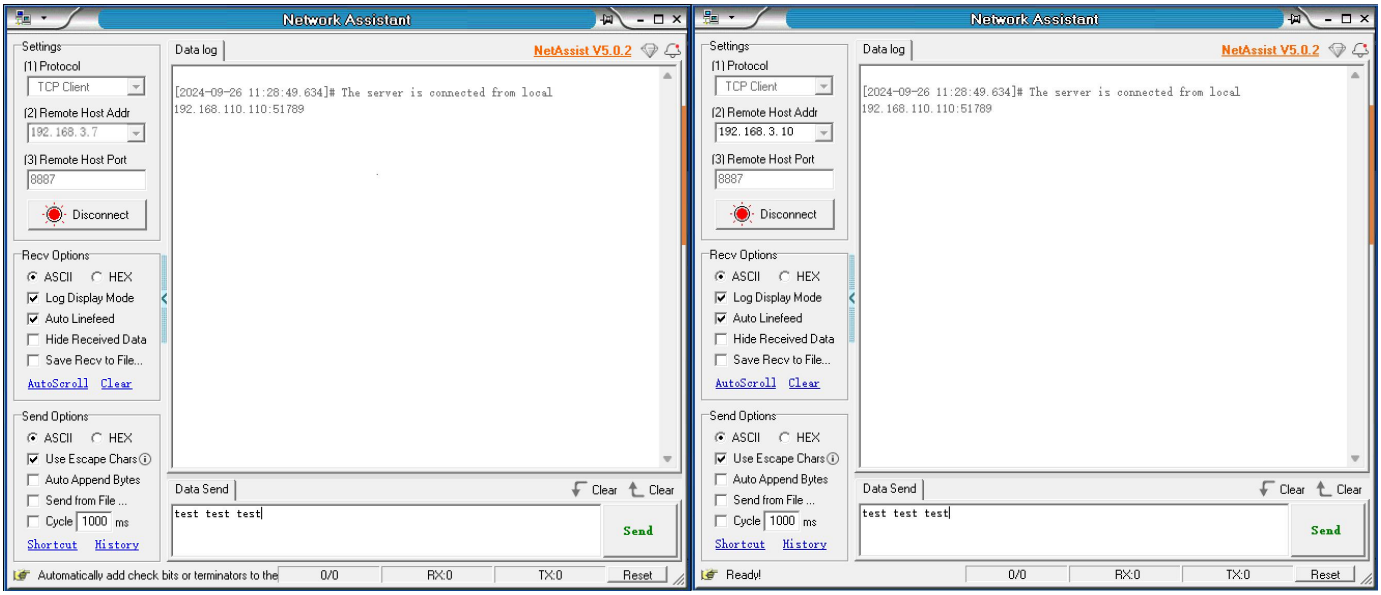
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Coordinator device Router device

After entering the transparent transmission mode, close the host computer configuration software and open the serial port assistant. Enter any data on either side, and the other will output the same data. The party sending data returns "OK" to indicate successful sending, and "FAIL" or "ERRO" to indicate that the sending failed。

（5）Open the Network Debugging Assistant, select TCP Client as the protocol type, enter the IP address, enter the remote host port, and click Connect。

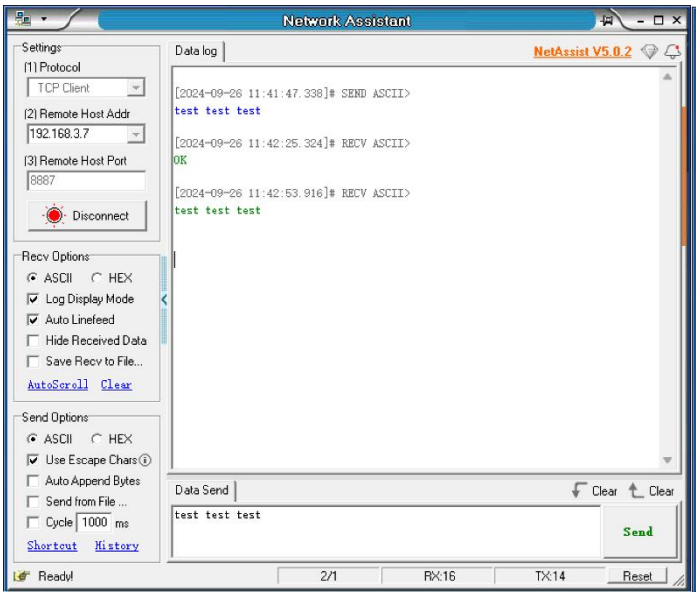


Coordinator device Router device

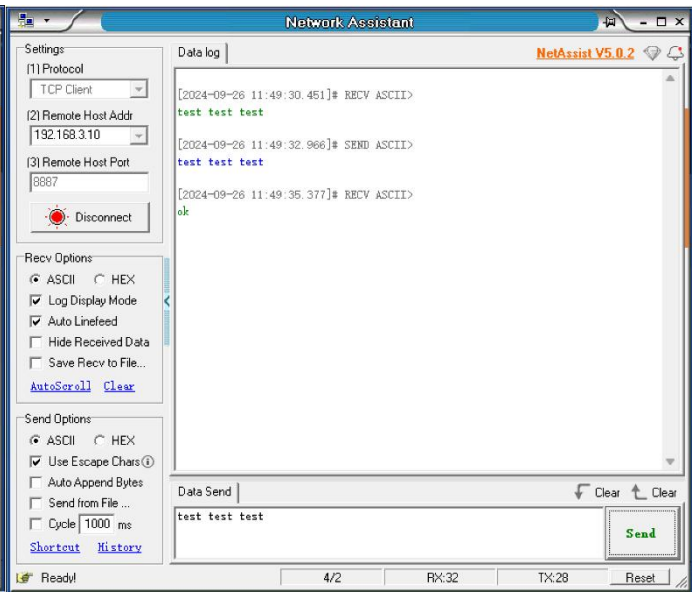
（6）Enter "Test Test Test" in the data sending window of the Network Debugging Assistant and click Send to see the data transmission and reception of the two devices。

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Coordinator device



Router device

4.4.5 Data transmission between incoming nodes

The coordinator of the ZigBee 3.0 data transmission module needs to take on the network management function, and if it works in transparent mode, it may miss important messages related to network changes. Therefore, we recommend that the coordinator work in HEX command configuration mode when the number of nodes entering the network is large, and assign the connecting nodes to transfer data to each other。

（1）Click "Enter Parameter Configuration" in the host computer interface, and the coordinator device and router device return to the configuration mode. After the coordinator returns to the configuration mode, it receives a heartbeat packet reported by the network connection device cycle。



Coordinator device



Router device

（2）The coordinator adds several more incoming nodes, sets a new device as "endpoint", and clicks "Write Parameters" → "Restart" to join

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the endpoint device network (see Section 4.4.3)。



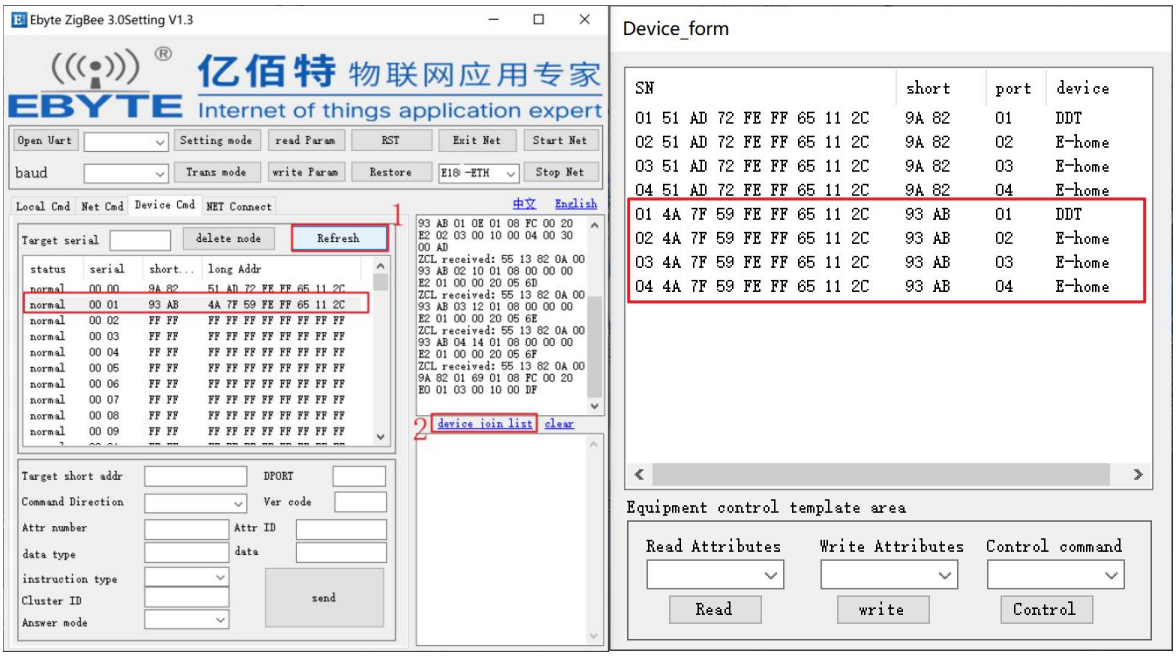
（3）If the new node device is configured to join the network, click Read Parameters and view the network status to connect, indicating that the endpoint device has joined the coordinator device network。



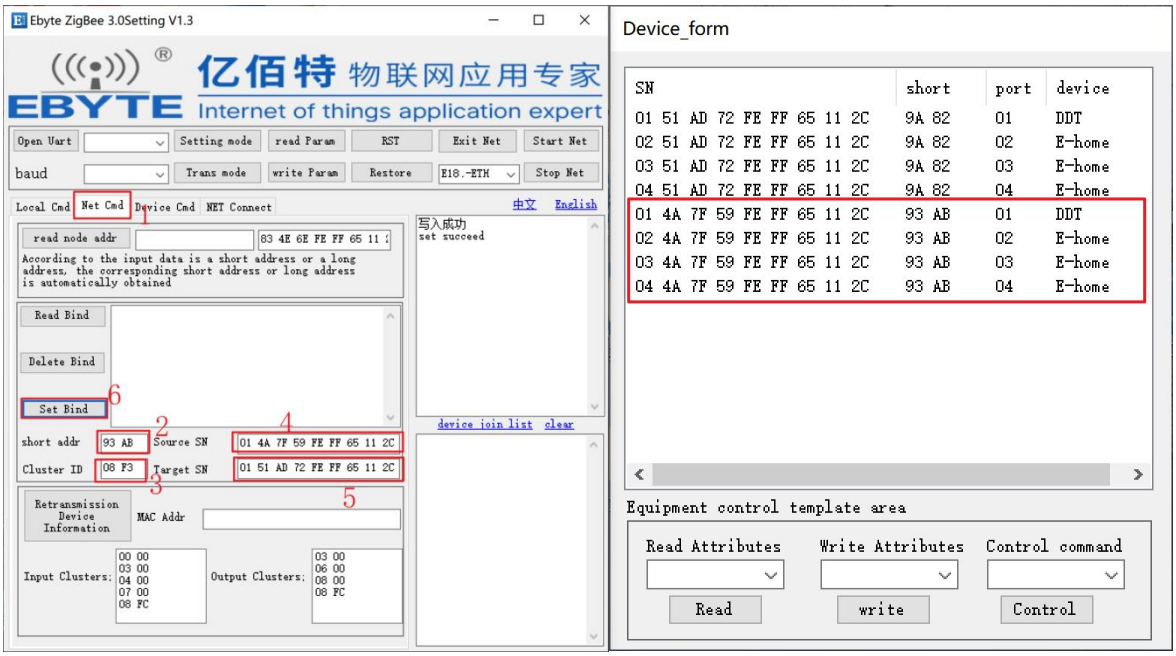
（4）On the host computer interface of the coordinator device, click "Refresh Device List" to see the new device entering the network, click "Device Staging Table", and there is also new device information。

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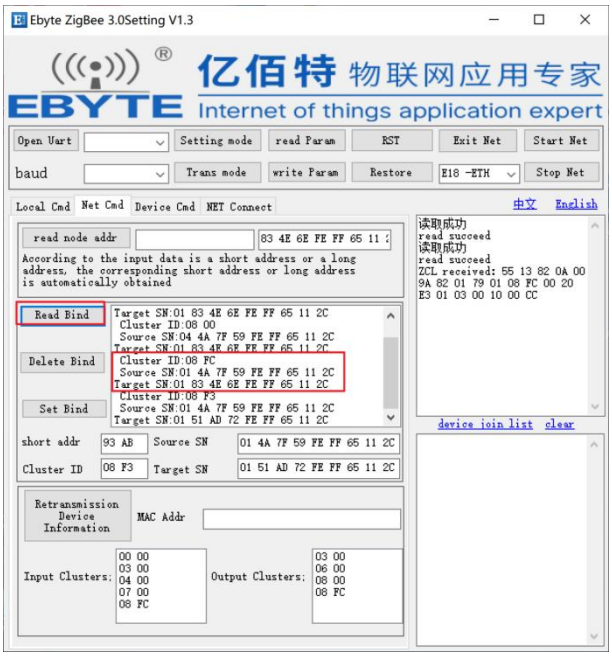
（5）On the interface of the host computer of the coordinator, set the endpoint device to bind the router device so that the end node device can transmit data transparency to the router device. On the host computer interface of the coordinator device, click the "Network Command" menu, fill in the short address of the terminal device in the "Device Staging List" into the "Destination Short Address", fill in the SN number of the terminal device into the "Source Destination SN", fill in the SN of the router device with the "Destination Virtual SN", and fill in the cluster ID with 08 FC (Ebaite follows the ZigBee Alliance's official "ZigBee Cluster Library" specification to customize the data transmission cluster, see the " ZigBee 3.0 Module HEX Command Standard Specification), and then click "Set Constant Connection"。



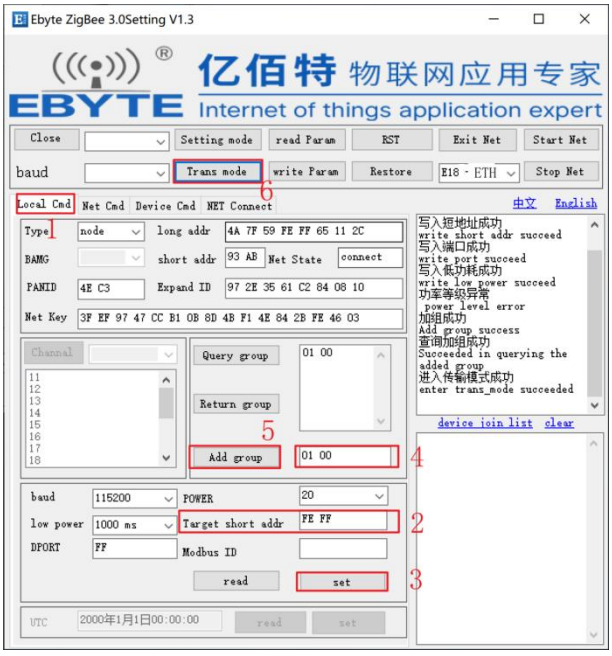
To ensure that the binding settings are valid, you can click View Frequent Connections to confirm whether the binding is successful. As shown in the figure, there is a cluster ID 08 FC on the module, Source SN is the terminal device, and Target SN is the binding record of the router device, indicating that the binding setting is successful。

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（6）On the host computer interface of the terminal device, set the "target short address" to "FE FF" (0xFFFE is an invalid short address, after setting the target short address to an invalid short address, the device will automatically default the transparent transmission target to the bound address), and click "Settings". Then enter "01 00" in "Module Plus Group", click "Module Plus Group", add the terminal device to the 0x0001 group, and then click "Enter Transfer Mode"。



（7）On the host computer interface of the router device, set the destination port to "00" (destination port setting 0x00 that is, multicast mode), and then set the destination short address to "01 00" (the destination short address in multicast mode is the multicast address, here multicast to the 0x0001 group), click Settings, and the router sends transparent transmission packets to the group 0x0001 multicast. Then tap "Enter Transfer Mode".

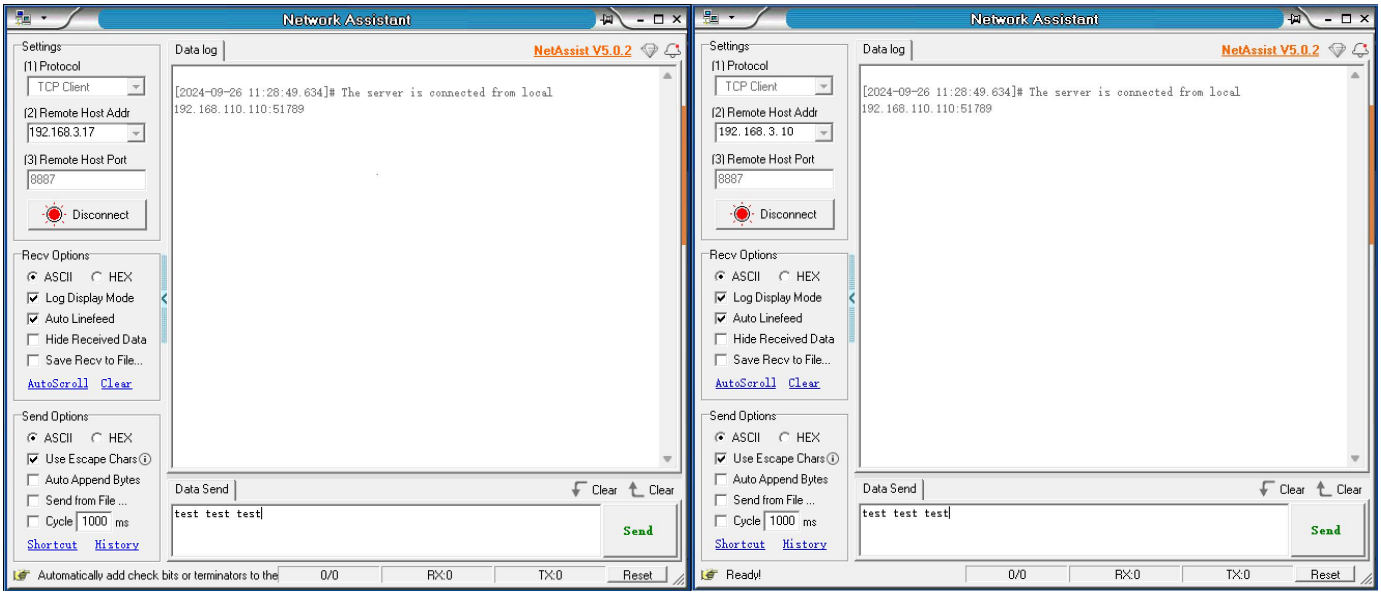
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With the above configuration, data can be transferred between router devices and end devices, and the coordinator no longer receives the data they transmit. The coordinator can add more devices, setting them up to communicate with each other.

（8）Open the Network Debugging Assistant, select TCP Client as the protocol type, enter the IP address, enter the remote host port, and click Connect.

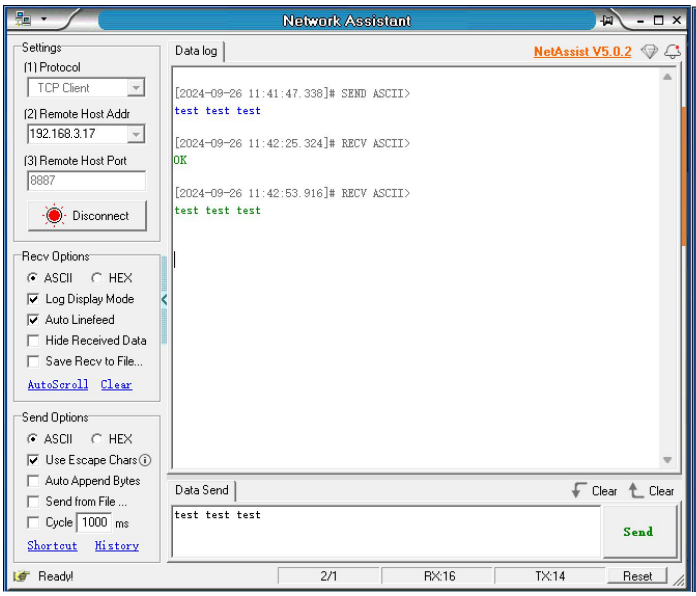


Terminal Router device

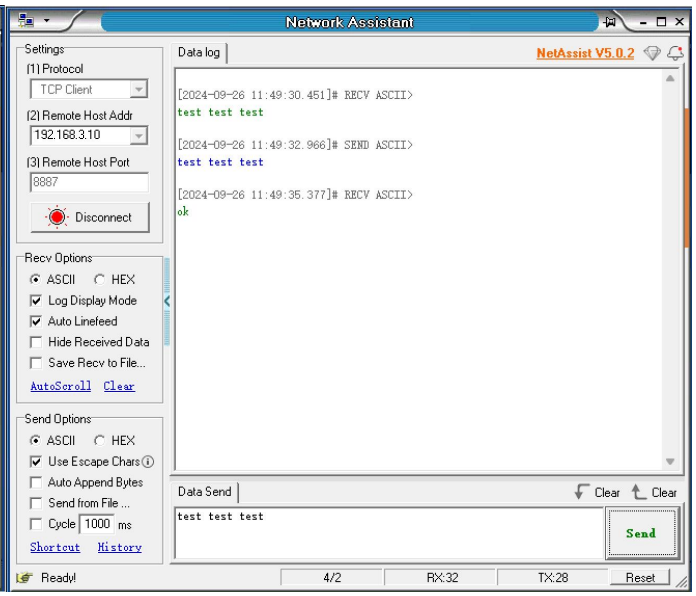
（9）Enter "Test Test Test" in the data sending window of the Network Debugging Assistant and click Send to see the data transmission and reception of the two devices.

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Terminal



Router device

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Revision history

version	Revision date	Revision Instructions	Maintainers
1.0	2023-5-30	Initial version	Bin
1.1	2024-5-11	Content revision	Bin
1.2	2024-10-30	Content revision	Bin

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