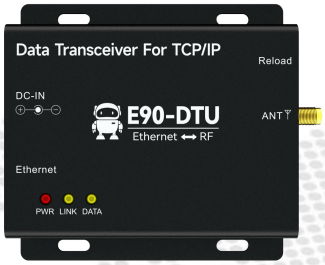
Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



E90-DTU(433L30E)-V8
Ethernet Gateway User Manual

Contents

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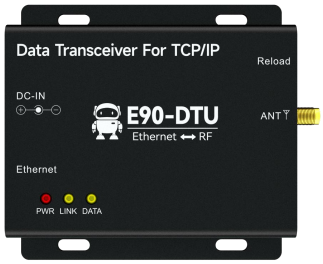
1. Product Overview

1.1. Product introduction



E90-DTU(433L30E)-V8 supports adaptive network rate (up to 100M full-duplex), provides six working modes of TCP Server, TCP Client, UDP Server, UDP Client, HTTP Client, and MQTT Client. Mode supports six-way client connection;
It supports a variety of Modbus gateways, which can perform simple interconversion between Modbus TCP data and Modbus RTU data, record and send the read commands, and actively upload to the server through pre-stored commands;

1.2. Features

- Support high-speed continuous transmission and uninterrupted transmission, no data packetization, unlimited data packet length, adapt to Modbus protocol;
- The industrial-grade design can work in the environment of -40℃～+85℃, and the wide voltage input (DC 8～28V) supports reverse polarity protection;
- All aluminum alloy shell, compact size, easy installation, good heat dissipation;
- Perfect shielding design, good electromagnetic compatibility, strong anti-interference ability;
- RJ45 adaptive 10/100M Ethernet interface;
- Support hardware reset to factory settings;
- Support multiple working modes (TCPS, TCPC, UDPS, UDPC, HTTPC, MQTTC);
- Support three configuration methods: configuration tool, web page and AT command;
- Server mode supports up to 6 socket connections;
- Support DHCP function;
- Support DNS (domain name resolution), and custom domain name resolution server;
- Support multiple Modbus gateways (simple protocol conversion, multi-host mode, storage gateway, configurable gateway, etc.);
- Supports quick access to Alibaba Cloud, Baidu Cloud, OneNET, Huawei Cloud, and standard MQTT servers of version 3.1;
- Support HTTP protocol (GET/POST request);
- Support timeout restart function and disconnection reconnection, and the number of times can be customized;
- Support short connection function, the short connection interval can be customized;
- Supports sending a variety of heartbeat packets and registration packets;
- Support serial port cache cleaning function;
- Support access to the external network, local area network, and virtual serial port tools;

- Support online upgrade function.

2. Quick Start

2.1. Hardware preparation before use

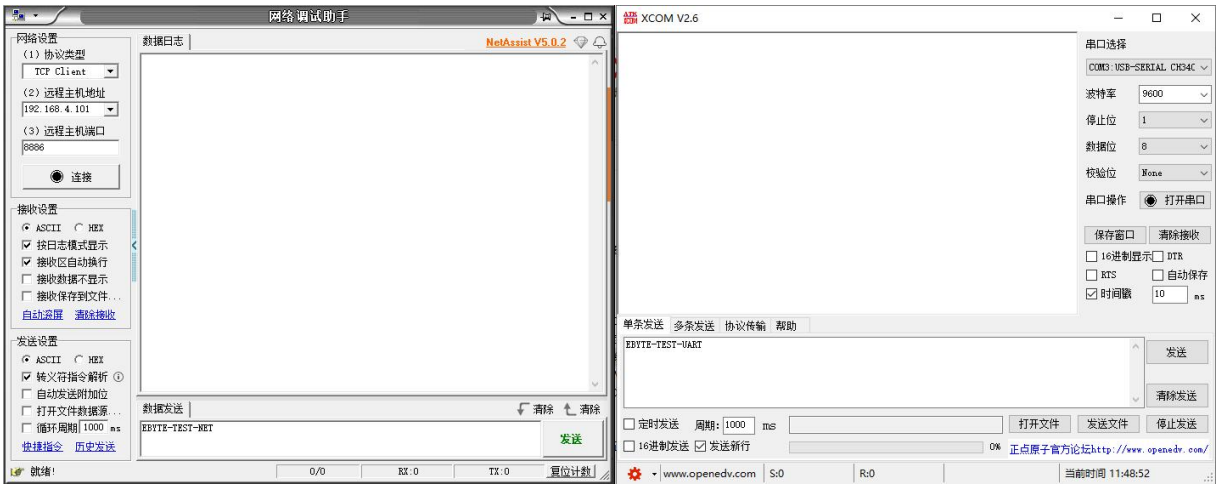
Take the transparent transmission between E90-DTU(433L30E)-V8 and E90-DTU(433L30)-V8 as an example.
In order to test E90-DTU(433L30E)-V8, the following hardware is required:

- One PC with network port;
- One E90-DTU(433L30E)-V8, hereinafter referred to as "gateway radio";
- One E90-DTU (433L30)-V8 digital radio, hereinafter referred to as "serial radio" (for example, if necessary, buy it separately);
- TX433-JKD-20P 2 antennas (inner thread, inner needle);
- Two DC12V-1A power adapters;
- One network cable;
- One USB to RS-485 serial cable;

<table>
<tr><td>  </td><td>  </td><td>  </td><td rowspan="2">  </td></tr>
<tr><td>PC</td><td>E90-DTU(433L30E)_V8</td><td>E90-DTU(433L30)-V8</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td rowspan="2"></td></tr>
<tr><td>cable</td><td>DC12V-1A Power Supply*2</td><td>USB To serial port + several cables</td><td>TX433-JKD-20P*2</td></tr>
</table>

2.2. Software Preparation

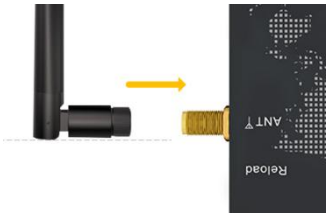
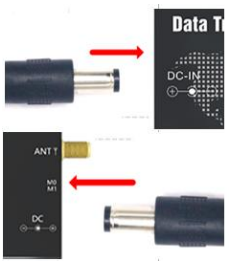
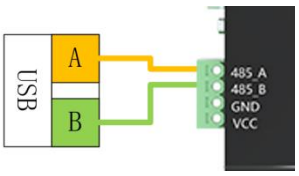
The product details on the Ebyte official website provide the download of the network debugging assistant "NetAssist" and the serial port assistant "XCOM", as shown in the following figure. Official website address: https://www.cdebyte.com.



Download the configuration tool corresponding to the product details, use the "Ebyte Network Configuration Tool" for "Gateway Radio", and use the "RF_Setting_E90.exe" configuration tool for "Serial Radio".

2.3. Hardware connection

Connect the antenna to the E90 radio and connect to the power supply (DC: 8~28V), RS485 connection, network cable connection:

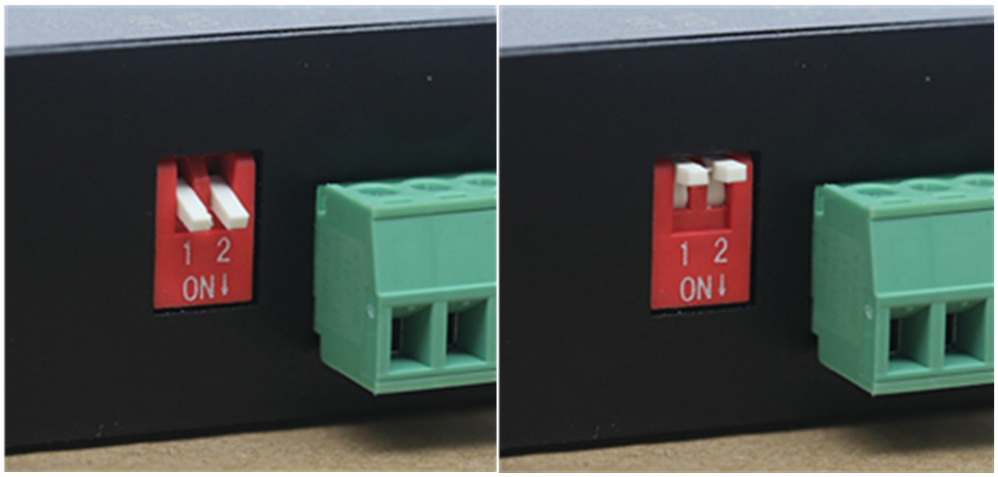
			
Connect the antenna	Above: "Gateway Radio" on Next: "Serial Radio" is connected	Connect RS-485 for "Serial Radio"	Connect the network cable for the "Gateway Radio"

2.4. Wireless parameter configuration

2.4.1. Configure "Serial Modem"

Step 1: Turn on the power and connect the USB to RS-485 serial cable (serial cable A is connected to the radio 485_A, serial cable B is connected to the radio 485_B);

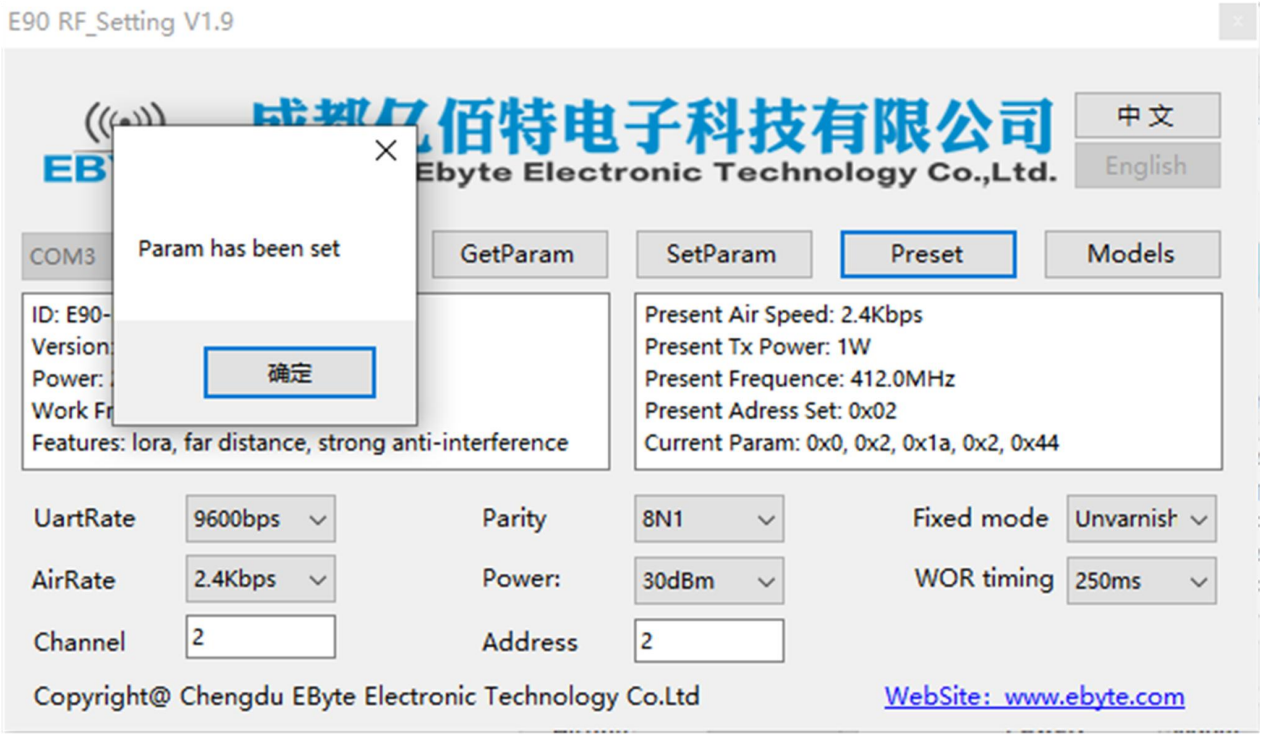
Step 2: Check whether the radio is working in configuration mode, if not in configuration mode, configure the DIP switch to enter configuration mode according to the figure below;



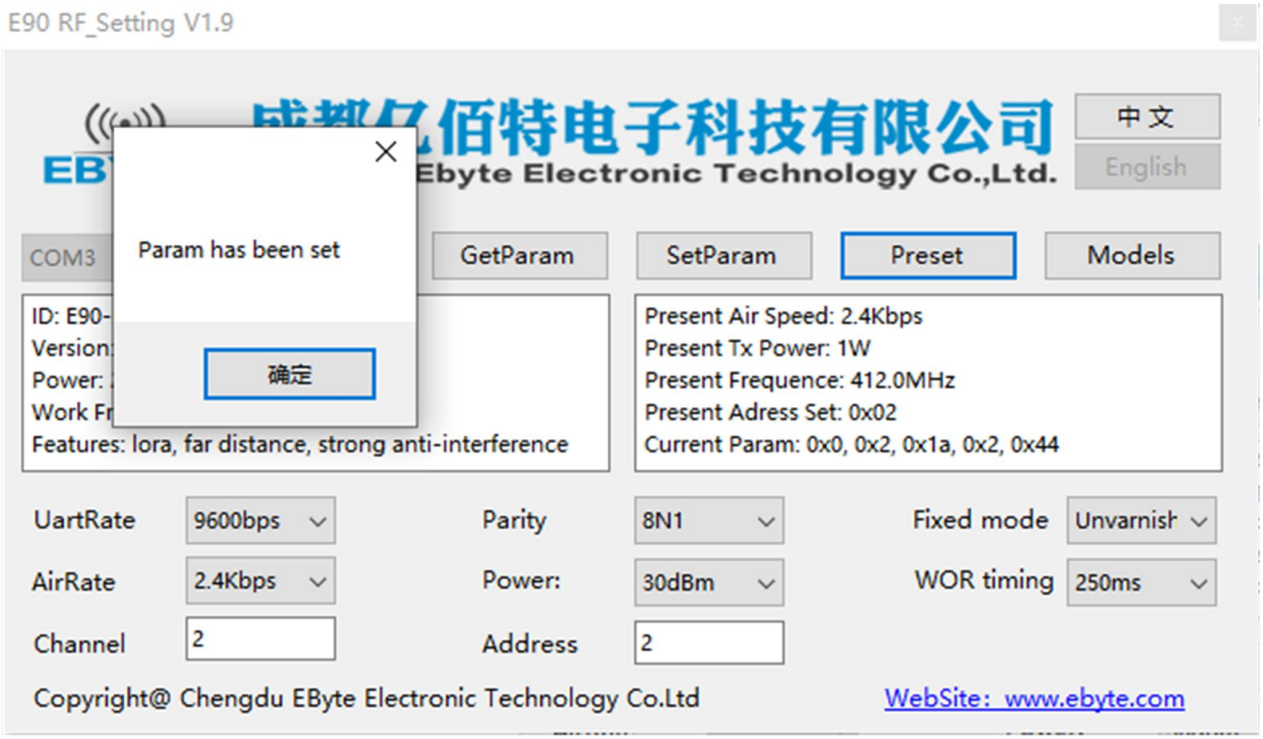
Transfer mode Configuration mode

Step 3: Open the configuration host computer "RF_Setting_E90.exe" and select the corresponding serial port;

Step 4: "Open Serial Port" and click "Read Parameters", then click "Restore Factory Settings";



Step 5: Set baud rate to 9600, check to 8N1, "continuous transmission" mode, as shown in the picture below, click "Write Parameter";

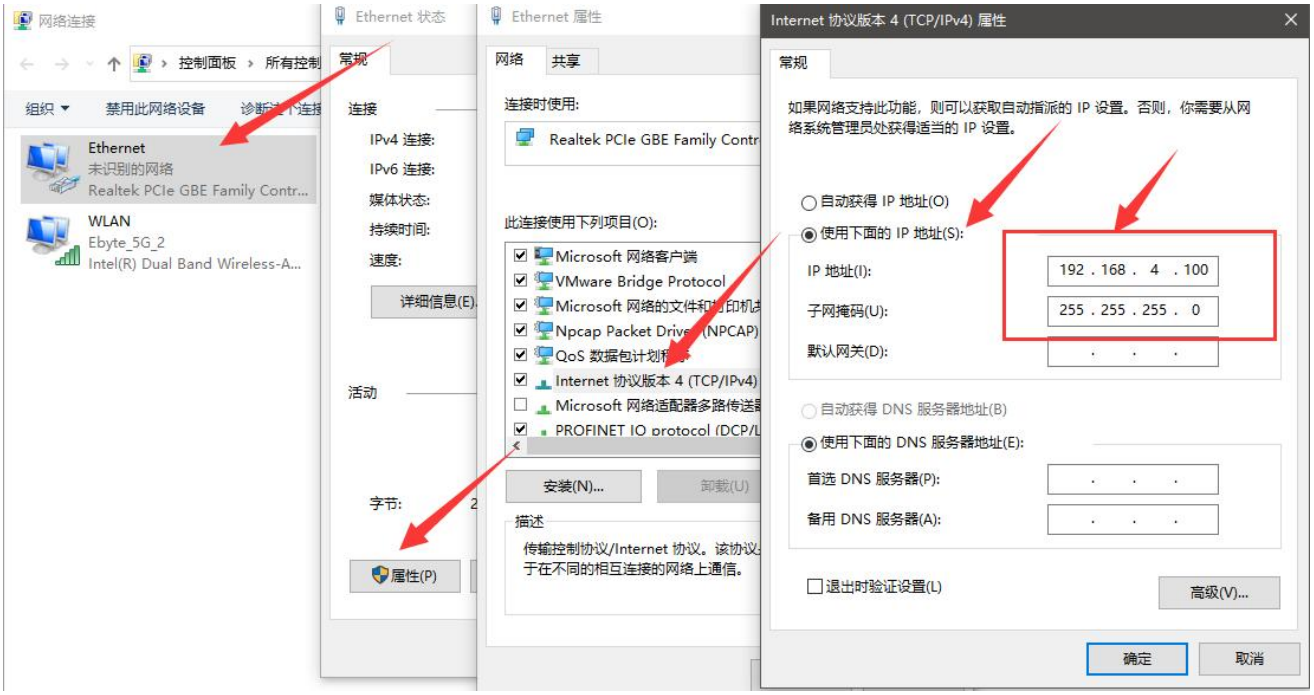


2.4.2. Configuring "Gateway Modem"

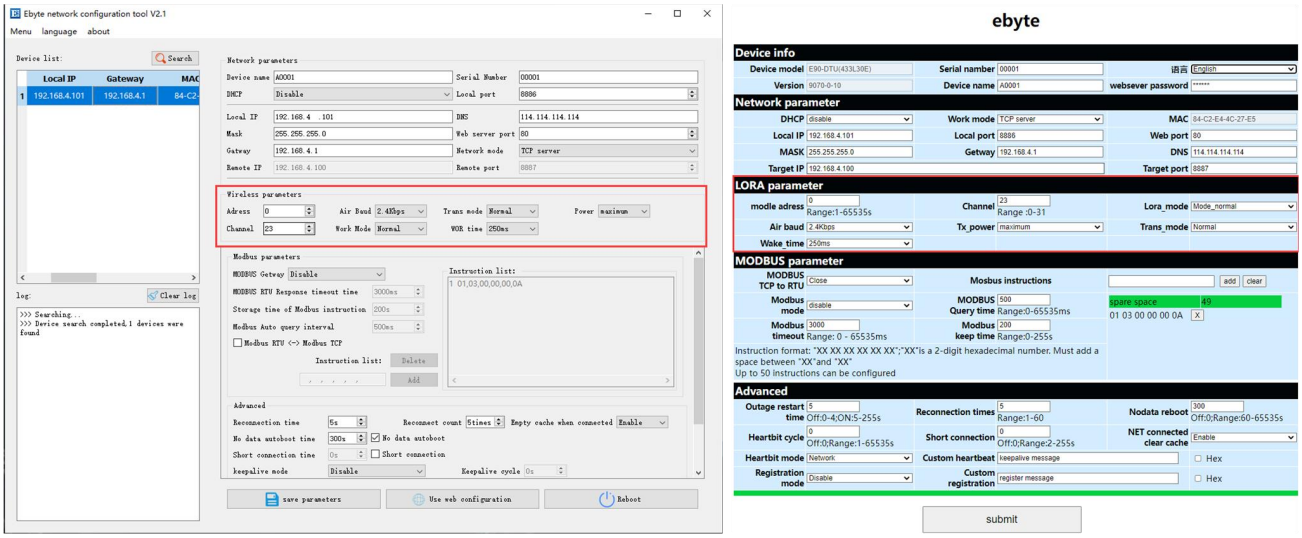
Step 1: Turn on the power and connect the PC and the "Gateway Radio" with a network cable;

Step 1: Perform factory configuration on the "Gateway Radio", press and hold the Reload button until the indicator lights are all on;

Step 2: Modify the IPv4 configuration of the PC, use a static IP, and ensure that the "gateway radio" and the PC are in the same network segment. The factory default IP is 192.168.4.101, so configure the static IP of the PC as 192.168.4.100 as shown in the following figure:



Step 3: Use "Ebyte Network Configuration Tool" or web page configuration;



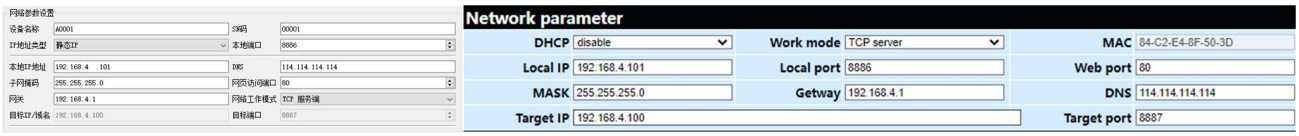
Step 4: Configure the wireless parameters as shown in the figure above, the host computer clicks "Save Configuration" and then clicks "Restart Device", click Submit for the web page configuration, enter the configuration key: 123456, and wait for the configuration to complete;

【Note】

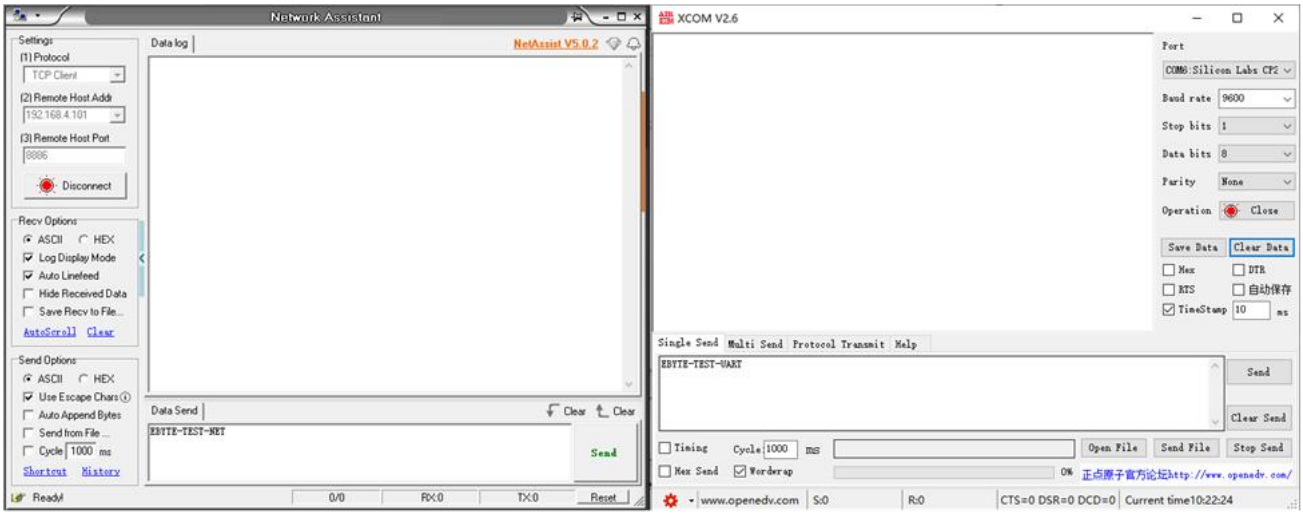
- For browsers that do not support IE kernel, you can use Firefox, GOOGLE, the latest Edge and other browsers;
- If the host computer fails to search for the device, first check whether the network cable is connected normally, and check whether the host computer is turned on for many times in the local area network. If it still cannot be used normally, you can close the firewall and restart the host computer;
- Do not enter the web page in communication mode, otherwise the device will enter the configuration mode, and you can only exit the configuration mode by submitting data or restarting the device.

2.5. TCP server usage

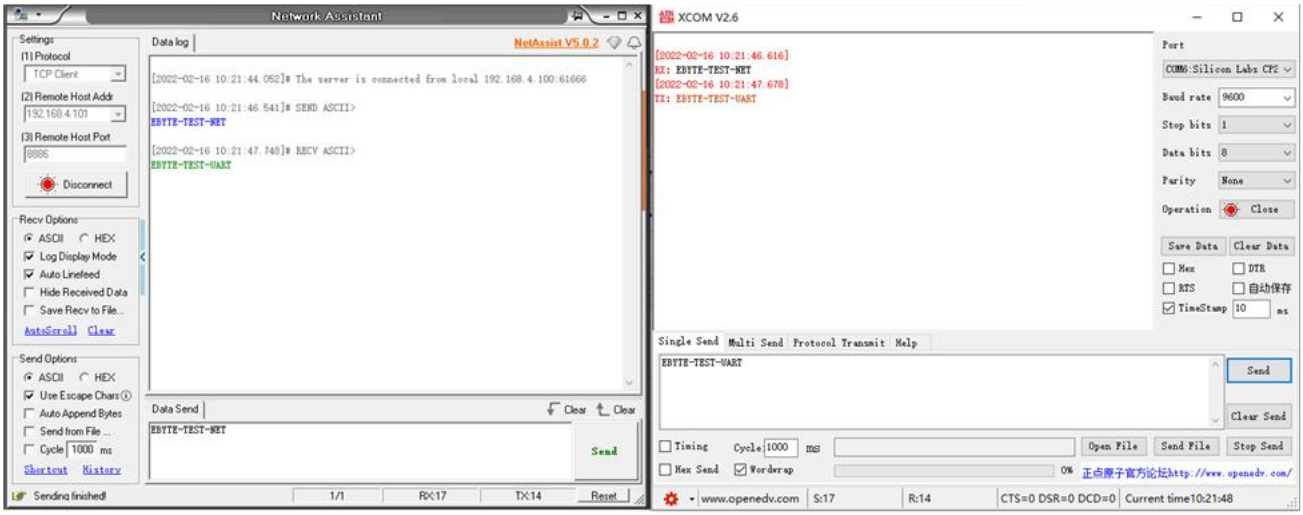
Configure the Ethernet parameters of the "gateway radio", the host computer and web page are configured as follows:



The network assistant (NetAssist) is connected to the "gateway radio" as shown in the figure below (the LINK indicator of the device is always on after the connection is successful, if it can be connected but the indicator is not on, the device is in configuration mode, which can be released by restarting the device), XCOM is connected to the "serial gateway" ":

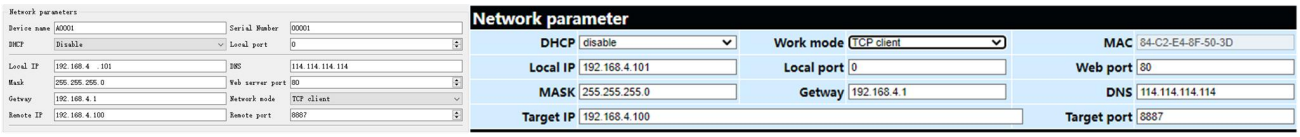


Data sending and receiving test:

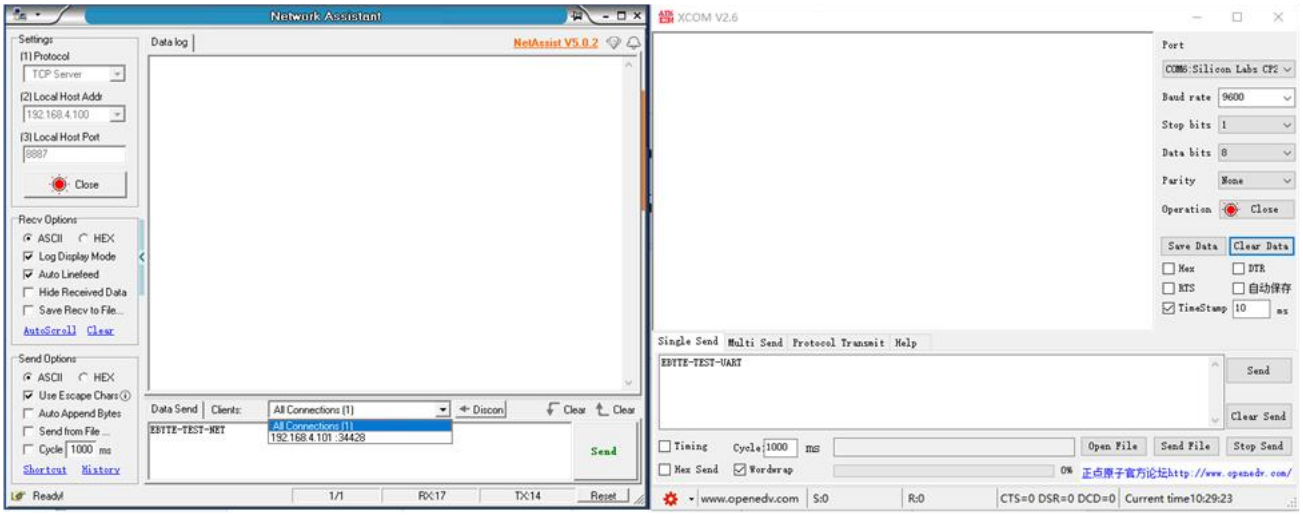


2.6. TCP client usage

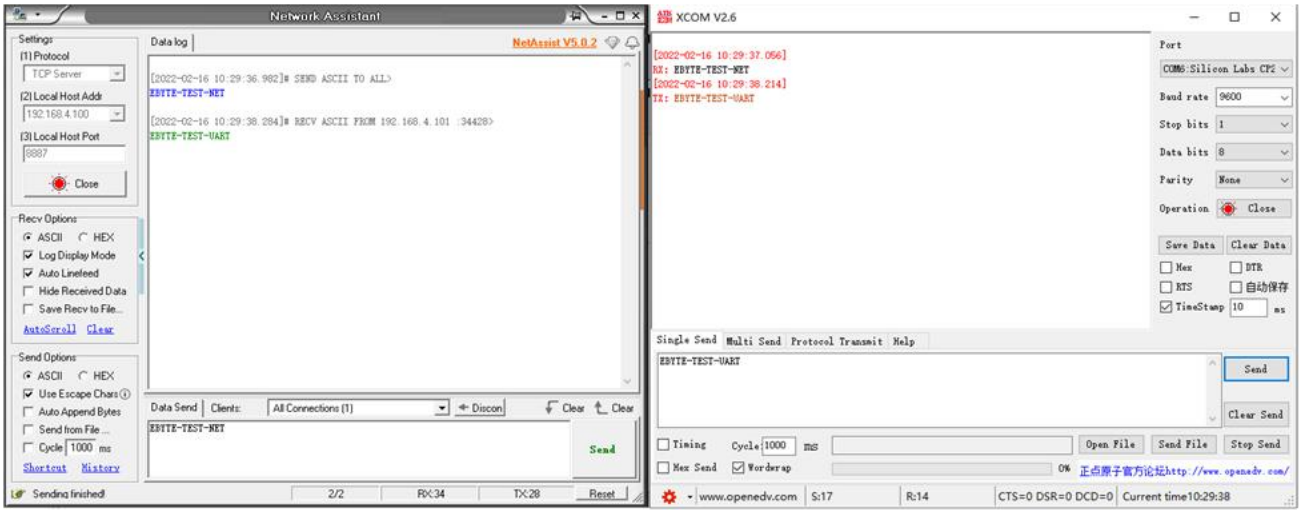
Configure the Ethernet parameters of the "Gateway Radio", the host computer and web page are configured as follows:



The network assistant (NetAssist) is connected to the "gateway radio" as shown in the figure below (the LINK indicator of the device is always on after the connection is successful), and the XCOM is connected to the "serial gateway":

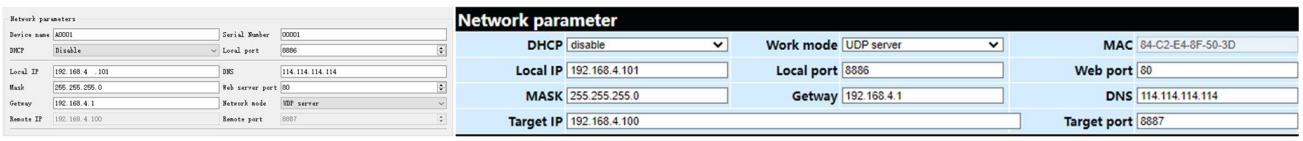


Data sending and receiving test:

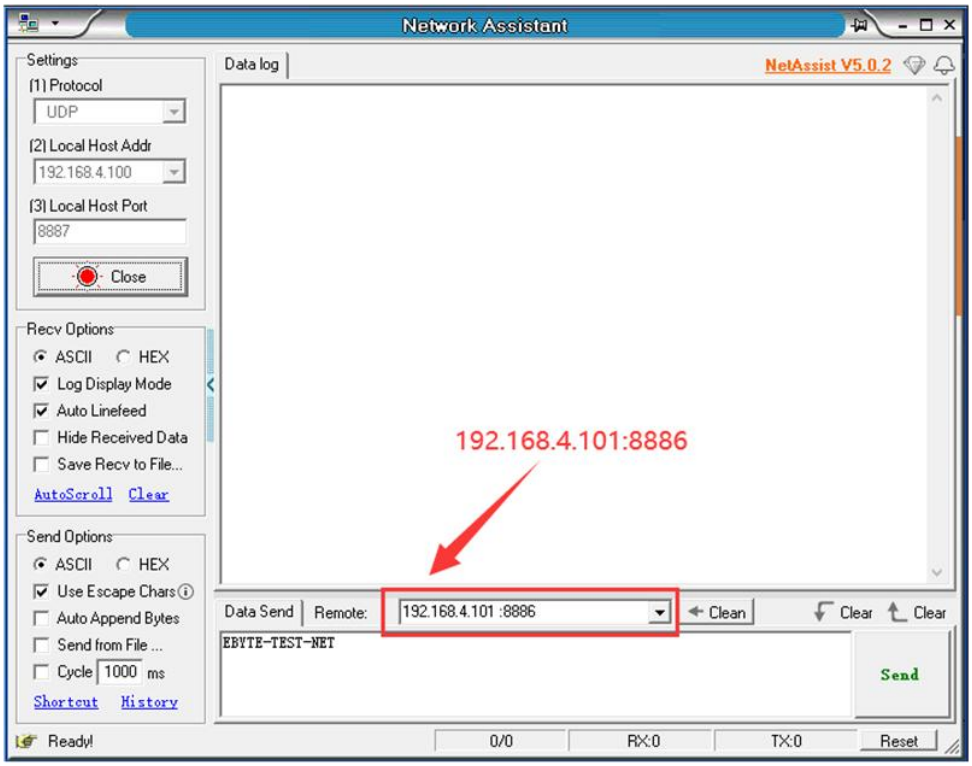


2.7. UDP server usage

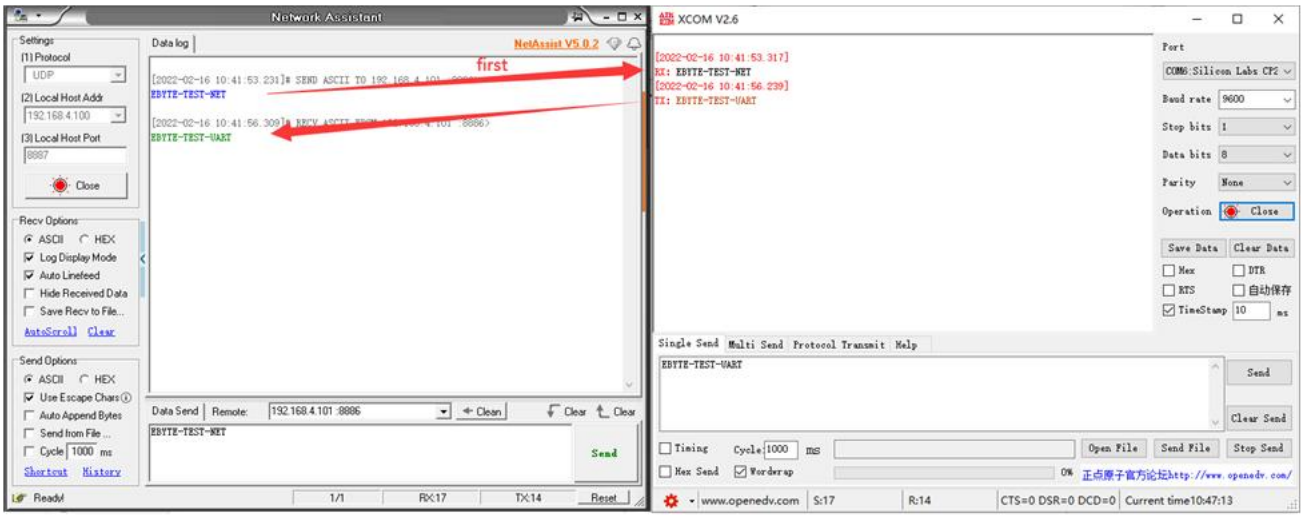
Configure the Ethernet parameters of the "Gateway Radio", the host computer and web page are configured as follows:



After the configuration is completed, the LINK indicator of the device is always on, and the NetAssist is connected to the "gateway radio" as shown in the figure below:

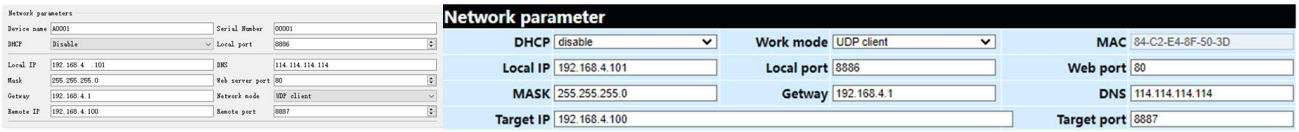


Data sending and receiving test (in UDP server mode, data must be sent by PC first, then UDP can dynamically adjust the destination address, and the data sent by serial port can only be received by the UDP of the last communication):

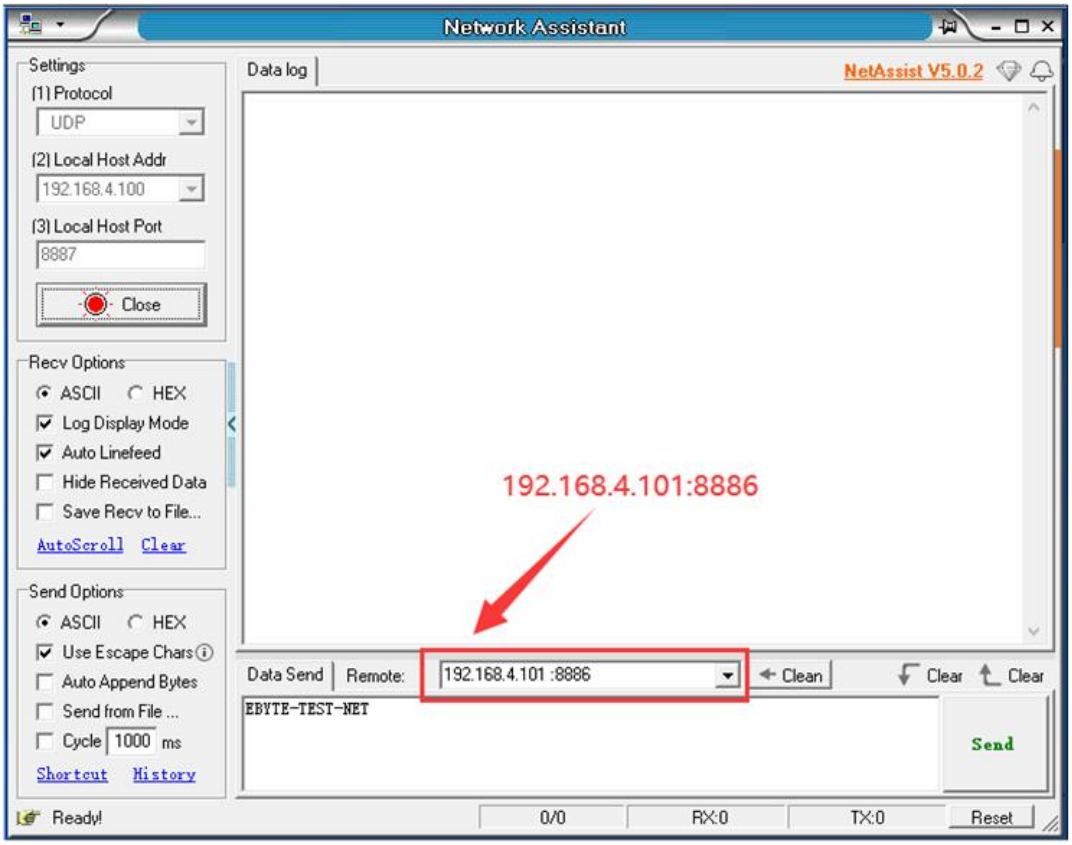


2.8. UDP client usage

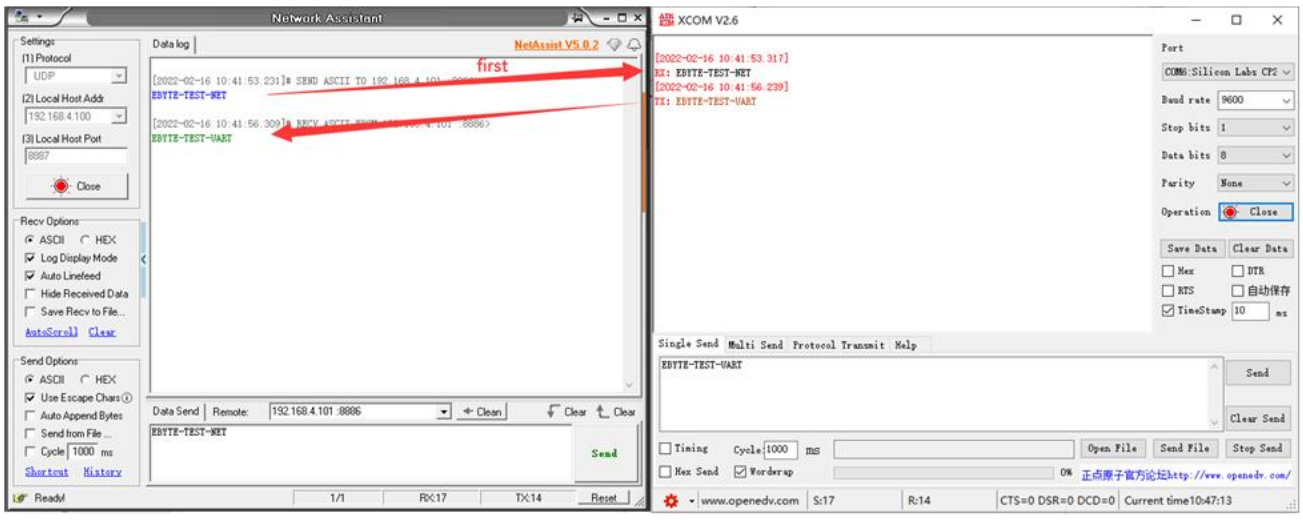
Configure the Ethernet parameters of the "Gateway Radio", the host computer and web page are configured as follows:



After the configuration is completed, the LINK indicator of the device is always on, and the NetAssist is connected to the "gateway radio" as shown in the figure below:



Data sending and receiving test The data sent by the serial port will only be received by UDP (192.168.4.100:8887):



3. Technical Specifications

3.1. General Specifications

No.	Program	Specification
1	voltage	8V~28V DC
2	Network port specifications	Standard RJ45, support 10/100Mbps
3	Network protocol	ARP、ICMP、IPv4、TCP/UDP、MQTT、HTTP
4	Socket model	TCP Server、TCP Client、 UDP Server、UDP Client、 HTTP Client、MQTT Client
5	TCP Server connect	Supports up to 6 TCP connections
6	IP method of obtaining	Static IP, DHCP
7	DNS	support
8	domain name server	Customizable, default 114.114.114.114
9	User configuration	Web configuration, host computer, AT commands
10	Antenna interface	SMA (external thread inner hole)
11	Size	84mm*82mm*25mm
12	Average weight	123 ± 5g
13	Operating temperature	-40 ~ +85℃，Industrial grade
14	Storage temperature	-40～+125℃，Industrial grade
15	Working humidity	10% ~ 90%，Relative humidity, non-condensing

3.2. Wireless Specifications

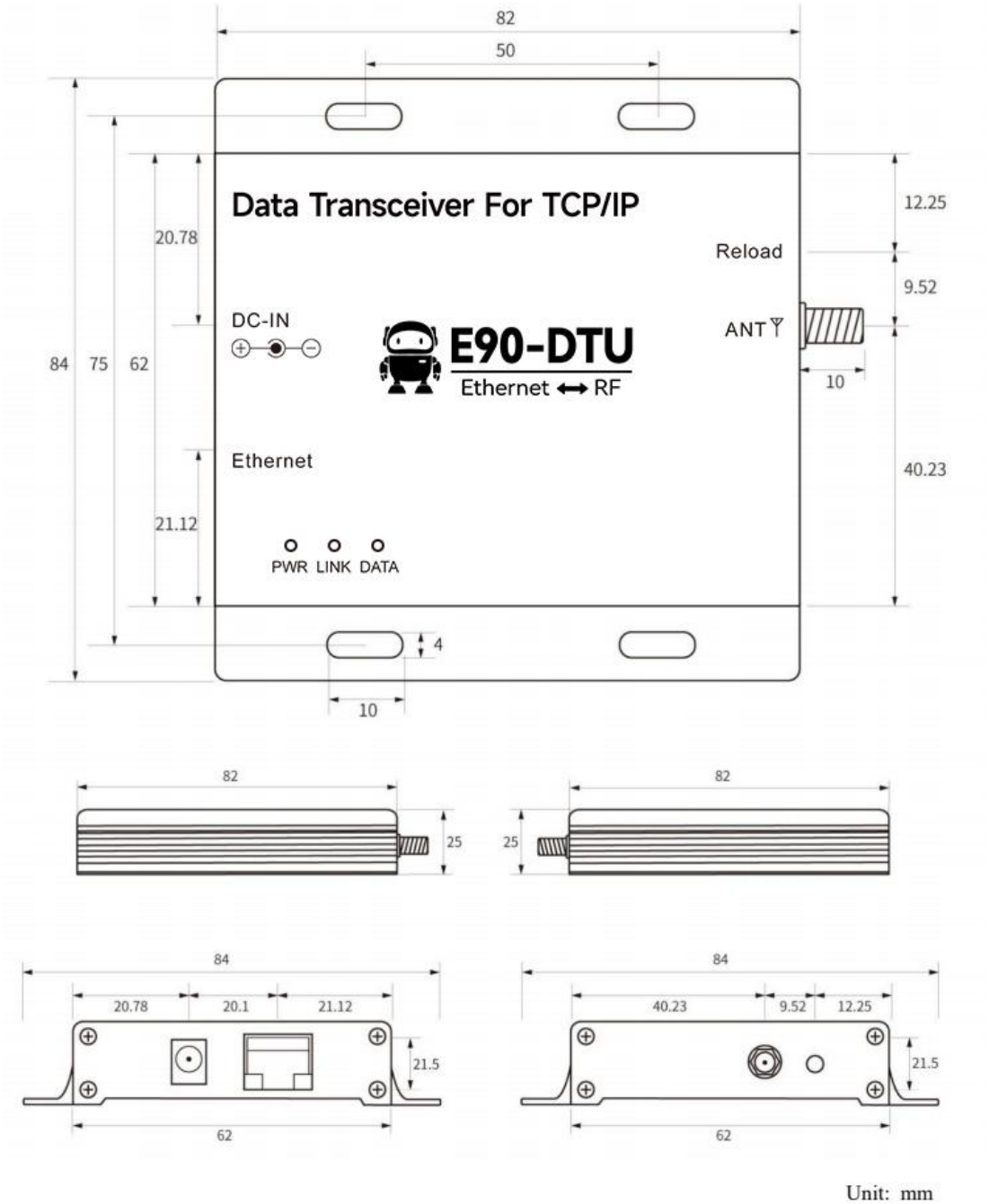
The main parameters		performance			Remark
		minimum	Typical value	maximum value	
blocking power（dBm）		-	-	10	The probability of burning at close range is small
Working frequency（MHz）		410	-	441	Support ISM frequency band, 0～31 Default: 23, Channel Spacing: 1M
Power	Emission		379.0mA @ 12V		Instantaneous power

consumption	current（mA）		257.8mA @ 24V		consumption
	receive current（mA）		16.7mA @ 12V 8.6mA @ 24V		
Maximum transmit power （dBm）		29.5	30.0	30.5	High (30dBm), Medium (27dBm), Low (24dBm), Very low (21dBm) Except for "high", the other transmit power is the reference value, the actual value may be different, and reducing the transmit power will not reduce the power consumption of the device, it is recommended to use the maximum power
air rate （bps）		0.3k	2.4k	19.2k	Airspeed adaptation in continuous transmission mode; Fixed length mode (0.3,1.2,2.4,4.8,9.6,19.2 Kbps)
reference distance		8000m			Clear and open environment, antenna gain 5dBi, antenna height 2.5 meters, air rate 2.4 kbps
Packet length		197Btye			

【Note】

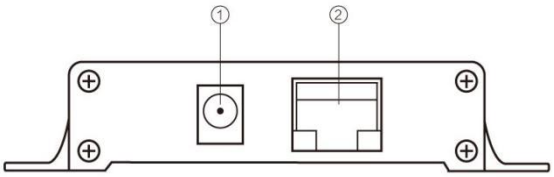
- Use multiple groups of digital radio stations to communicate one-to-one at the same time in the same area. It is recommended that each group of digital radio stations set the channel interval to be more than 2MHz;
- The lower the transmit power, the closer the transmission distance, but the working current will not decrease proportionally. It is recommended to use the maximum transmit power;
- The power adjustment function cannot accurately feedback the actual transmit power of "medium", "low" and "extremely low". The values in the table are for reference only, and other powers can be customized;

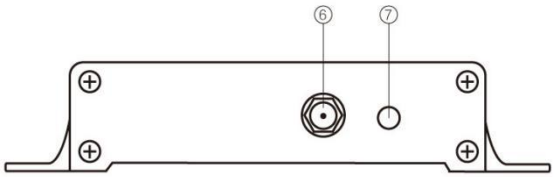
3.3. Mechanical dimension drawing

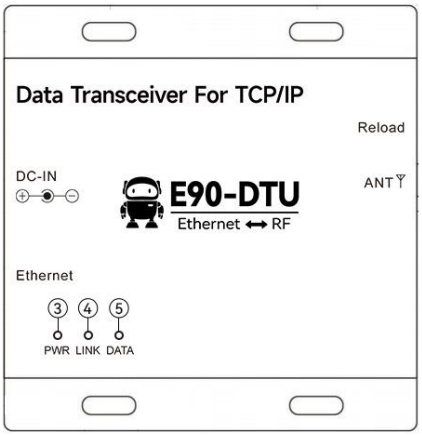


Unit: mm

3.4. Pin Definition







No.	identification name	Function Description
1	DC_IN	Power interface, 8～28V DC female socket (inner needle diameter 2.0mm, hole diameter 6.4mm)
2	ETHERNET	Ethernet interface, standard RJ45 interface
3	PWR	Power Indicator
4	LINK	connection established indicator
5	DATA	Data transceiver indicator
6	ANT	SMA antenna interface, male screw female
7	Reload	Reset to factory settings button

4. Basic Functions of the Product

4.1. Default parameters

category	item	value
Wireless parameters	Module address	0
	channel	23
	transfer mode	continuous transmission
	Work mode	normal
	transmit power	High
Network parameters	IP method of obtaining	static
	native port	8886
	Native IP	192.168.4.101
	subnet mask	255.255.255.0
	gateway	192.168.4.1
	DNS server	114.114.114.114
	web access port	80
	network working mode	TCP server

4.2. Wireless part

4.2.1. Basic Wireless Parameters

Channel: The devices that need to communicate should work on the same channel, and the current working frequency band can be calculated according to the channel value;
Working frequency = lowest frequency band + channel value * channel spacing
Module address: Transparent transmission should ensure that the addresses of the devices that need to be communicated are the same, and the configuration range is 0 to 65535;
Airspeed: Ensure that the airspeeds of the devices that need to communicate are the same, and only take effect in "fixed-length transmission", and "continuous transmission" airspeed adaptation does not require user configuration;

4.2.2. Work mode

General mode:
The radio station receives the user data from the wireless, and can also send the data through the wireless, and the sent data is automatically divided into 58 bytes for transmission.
Wake Mode:
The radio will automatically add a wake-up code before each data packet, and the length of the wake-up code depends on the wake-up time set in the user parameters;

The purpose of the wake-up code is to wake up the digital radio working in the "power saving mode", and the data sent by the "wake-up mode" will also be received in the "normal mode" and "wake-up mode";
[Note] This product does not support the configuration of "power saving mode" as a gateway;

4.2.3. Communication key

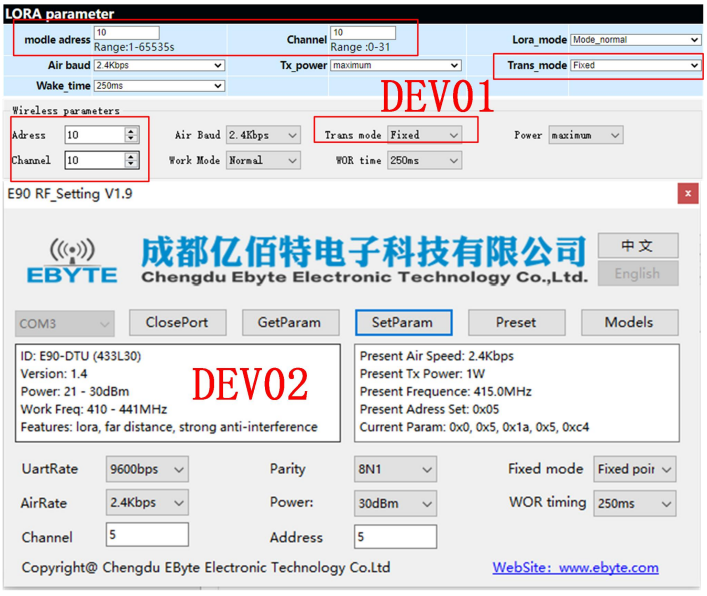
The key can only be configured and cannot be read. The configuration is always displayed as 0 (the configuration range is 0 to 255). The key is used for user encryption to avoid the interception of wireless data in the air by similar modules. The "gateway" will use these two bytes as a calculation factor to transform and encrypt the wireless signal in the air.
Since the key cannot be read, the correct key needs to be entered during configuration, otherwise the device will encrypt the communication data with 0.
To configure the key, you need to enable the "ciphertext function"

4.2.4. Broadcast monitoring

Set the "gateway" wireless address to 0xFFFF: it can monitor the data transmission of all modules on the same channel; the sent data can be received by modules with any address on the same channel, thus playing the role of broadcasting and monitoring

4.2.5. fixed point transmission

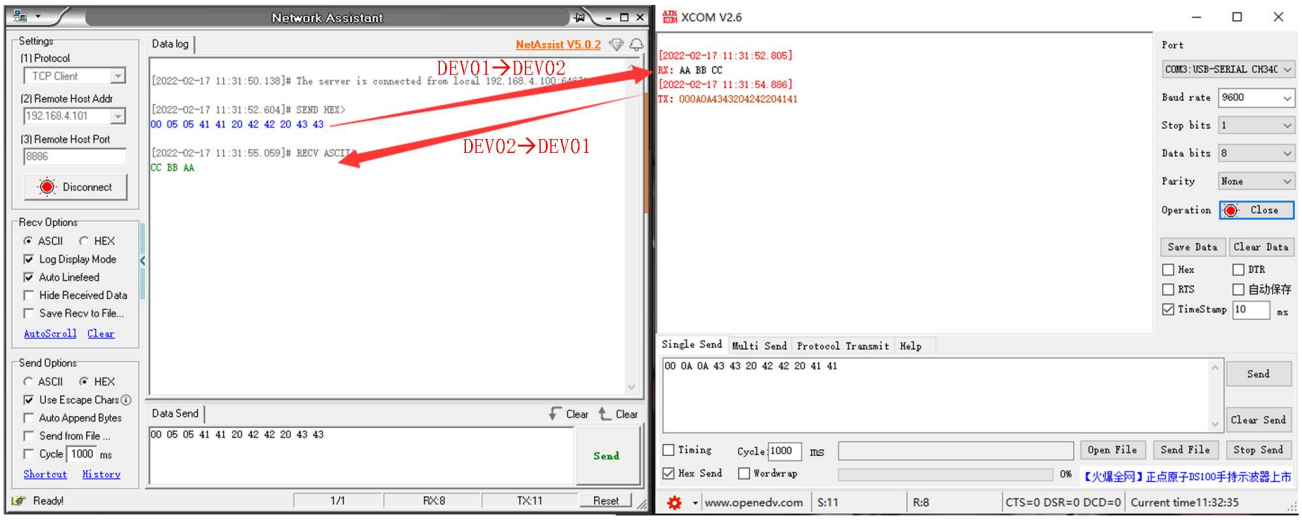
Support address function, the host can transmit data to any address, any channel module, to achieve networking applications: For example: module A (address is 0x00 0A, channel is 0x0A) needs to send data to module B (address is 0x00 05, channel is 0x05) Transmit data AA BB CC (HEX: 41 41 20 42 42 20 43 43), its communication format is: 00 05 05 41 41 20 42 42 20 43 43, where 00 05 is the address of module B, and 05 is the channel of module B, then Module B can receive AA BB CC (other stations do not receive data).
For example, configure the device (DEV01) as the parameters in the figure, connect the PC to the "gateway radio", refer to "Quick Start", (DEV02) is the same series of "serial radio" (sold separately), and also configure the corresponding parameters in the figure.



Fixed-point sending demo:

Sending from DEV01 to DEV02 needs to add 00 05 05 (HEX) before the data;

Sending from DEV02 to DEV01 needs to add 00 0A 0A (HEX) before the data;



4.3. Ethernet part

4.3.1. IP Acquisition

Dynamic acquisition (DHCP):

The dynamic acquisition device will automatically obtain the IP address and subnet mask from the router and synchronize the router's gateway and DNS server. Therefore, in the dynamic acquisition mode, only the working mode and target parameters of the device can be configured.

Static configuration (STATIC):

You need to manually configure the device's IP (factory default: 192.168.3.7), subnet mask (factory default: 255.255.255.0), gateway (factory default: 192.168.3.1), DNS server (factory default: 114.114.114.114) and other parameters , the configuration is to ensure that the communication devices are located in the same network segment and to avoid IP conflicts, otherwise the device cannot pass through and configure the web page normally.

4.3.2. Device Port

random port:

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

Using a random port connection can quickly re-establish the connection when the device disconnects from the server unexpectedly, preventing the server from rejecting the connection due to four waves of incompleteness. It is recommended to use a random port in client mode.

When the device configures the TCP client, HTTP client, and MQTT client mode on the web page, it will automatically configure a random port, which can be customized to cancel.

Static port:

Device fixed port (factory default: 8886), TCP server mode device listens to the configured port, accepts client connection requests and establishes a connection for data communication, TCP client mode device fixed port initiates connection requests.

4.3.3. Subnet Mask and Gateway Configuration

The subnet mask is mainly used to determine the network number and host number of the IP address, to indicate the number of subnets, and to 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 within this subnet, the module IP is considered to be in this subnet.
Gateway refers to the network number of the network where the current IP address of the module is located. If a device such as a router is connected to the external network, the gateway is the router.

4.3.4. 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 this product supports user-defined, and can realize domain name resolution through a custom domain name resolution server in the event of an abnormal domain name server. The device will report the resolution to the custom domain name resolution (DNS) server during domain name resolution. Request, return the device connection parameters (usually the IP address) after the parsing is completed.
In DHCP mode, the domain name resolution (DNS) server address is automatically obtained (synchronized with the router's domain name resolution address) and cannot be customized.
In static IP mode, the factory default address of the domain name resolution (DNS) server is 114.114.114.114, which can be customized by the user.

4.3.5. Target IP/Domain Name

The target IP parameter can automatically identify whether the configuration parameter is an IP address or a domain name input, and the domain name input supports a maximum of 128 characters for configuration.

4.4. SOCKET function

4.4.1. TCP Server

TCP Server is the TCP server. In TCP Server mode, the device listens to the local port, accepts the client's connection request and establishes a connection for data communication. When the Modbus gateway function is disabled, 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. After the Modbus gateway function is enabled, the non-Modbus data will be cleared and not forwarded.
Typically used for communication with TCP clients within a local area network.
The connection request is no longer accepted after more than 6 clients, and the web page configuration cannot be used when the 6 clients remain connected.

4.4.2. TCP Client

TCP Client is the TCP client. When the device is working, it will actively initiate a connection request to the server and establish a connection to realize the interaction between serial port data and server data.
To use the client, you need to configure the target IP address/domain name and target port accurately.

4.4.3. UDP Server

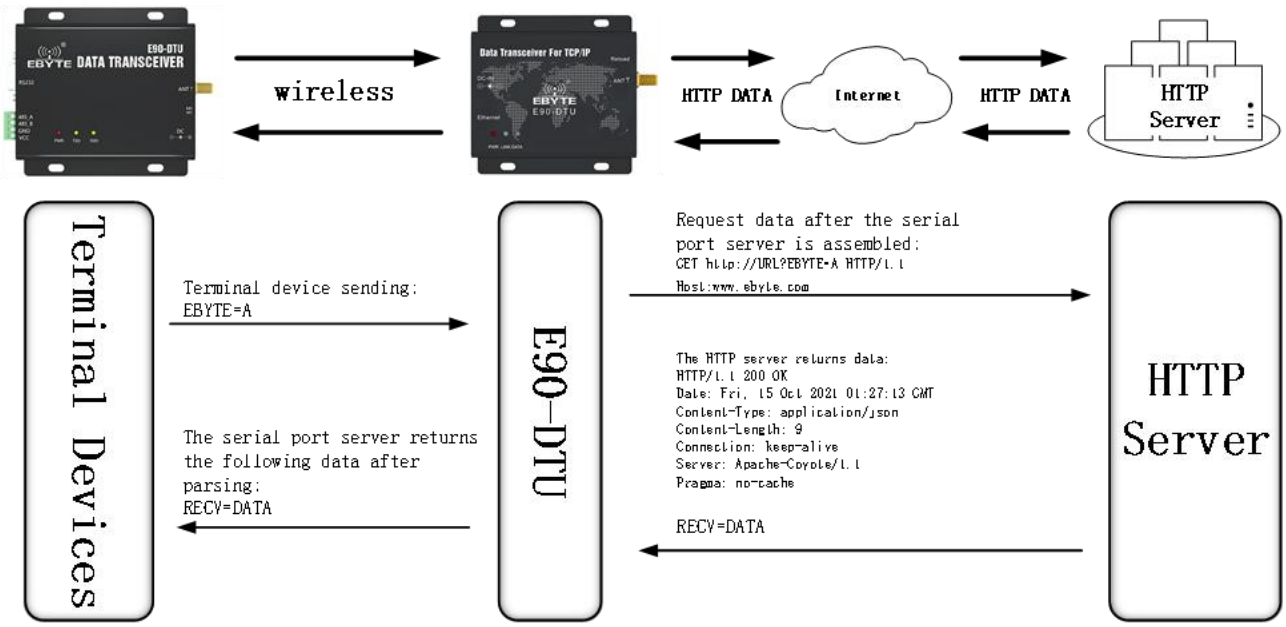
UDP Server means that the device does not verify the IP address of the data source when it communicates using the UDP protocol. After receiving a UDP data packet, it saves the source IP address and source port of the data packet, and sets it as the destination IP and port, so the device sends The data only sends data packets to the source IP address and port where the device received the data last time.
This mode is usually used in scenarios where multiple network devices communicate with this device, and the frequency is high, and the TCP Server cannot meet the conditions.
Using UDP Server requires the remote UDP device to send data first, otherwise the data cannot be sent normally.
[Note] In UDP mode, the data sent by the network to the device should be less than 512Bit per packet, otherwise it will cause data loss.

4.4.4. UDP Client

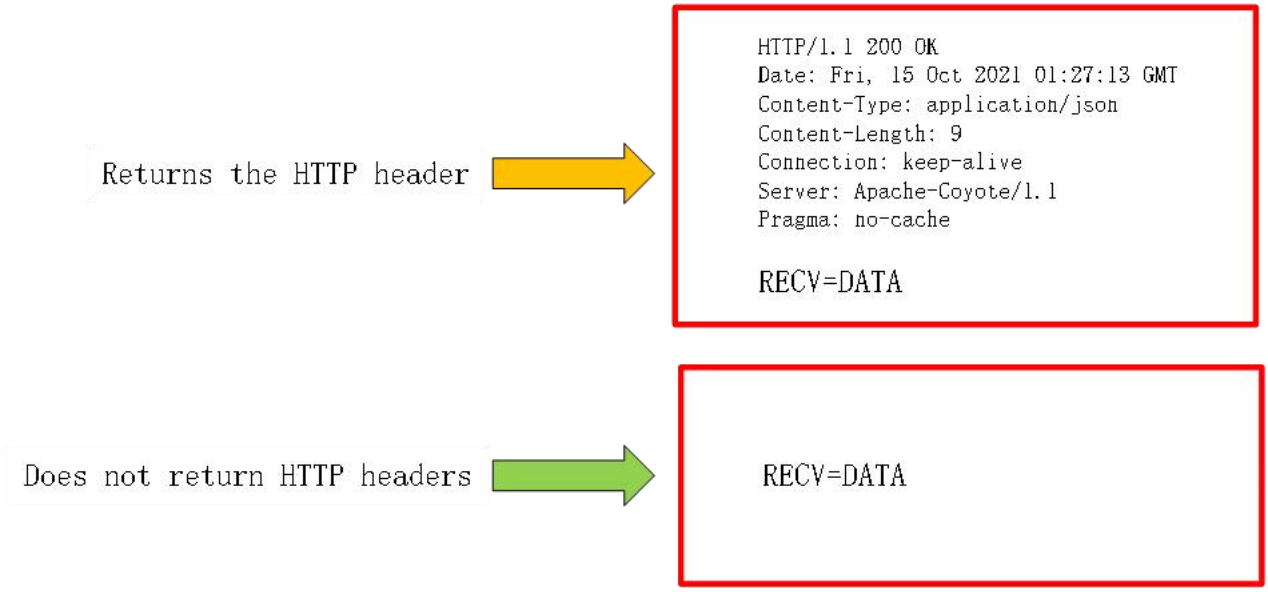
UDP Client is a connectionless transmission protocol that provides transaction-oriented simple and unreliable information transmission services. There is no connection establishment and disconnection, and data can be sent to the other party only by configuring the destination IP and destination port. It is usually used in data transmission scenarios where there is no requirement for the packet loss rate, the data packets are small and the transmission frequency is fast, and the data is to be transmitted to the specified IP.
In UDP Client mode, the device will only communicate with the configured (target IP and target port) remote UDP devices.
In this mode, the target address is set to 255.255.255.255, and the sent data will be broadcast on the entire network segment, but the transceiver device needs to ensure that the ports are consistent, and the device can also receive broadcast data.

4.4.5. HTTP Client

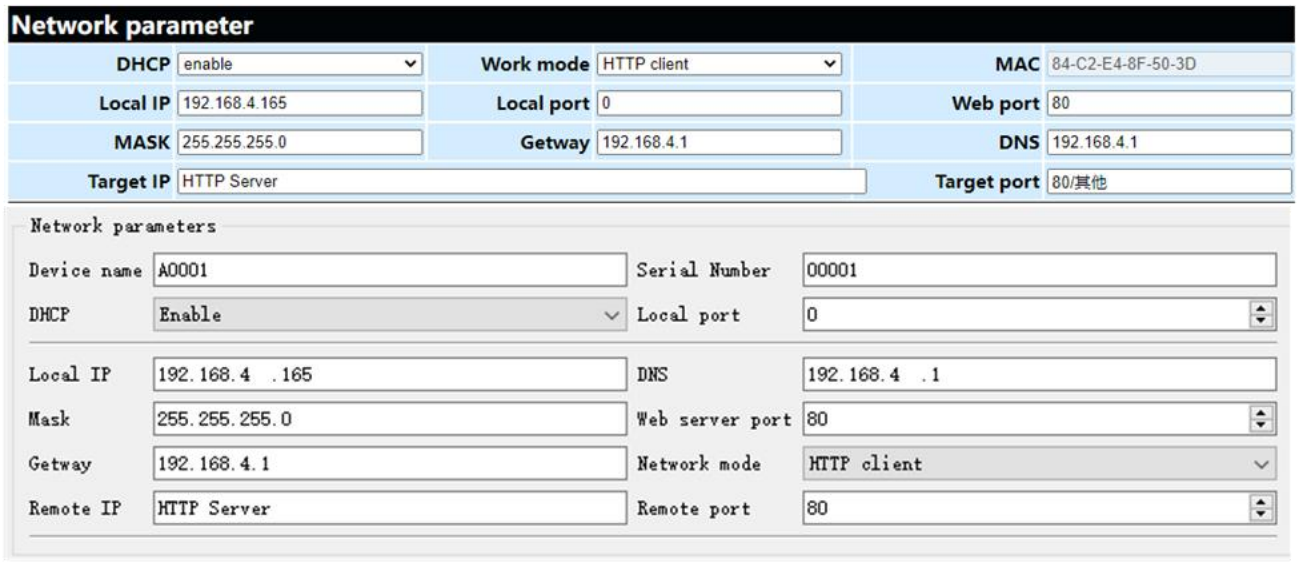
This mode can realize the function of HTTP automatic packet grouping. It provides two modes: GET and POST. Customers can configure URL, Header and other parameters by themselves, and the device will send packets to achieve fast communication between the digital radio station and the HTTP server. Using HTTP client In terminal mode, it is recommended to use random ports and enable short connections to save HTTP server resources. The size of a single request packet is affected by wireless sub-packets.



Supports configuring whether to return HTTP protocol headers. The returned data is shown in the following figure:



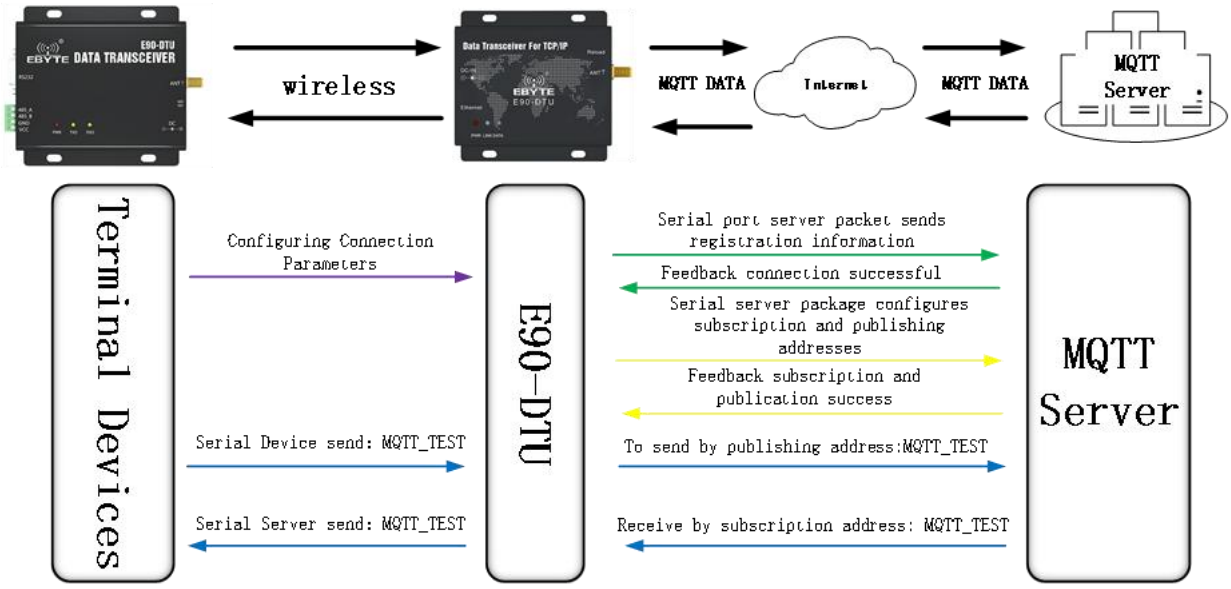
Protocol configuration instructions, enable DHCP to configure the HTTP server address and corresponding port number (the picture below is the host computer, and the picture above is the webpage):



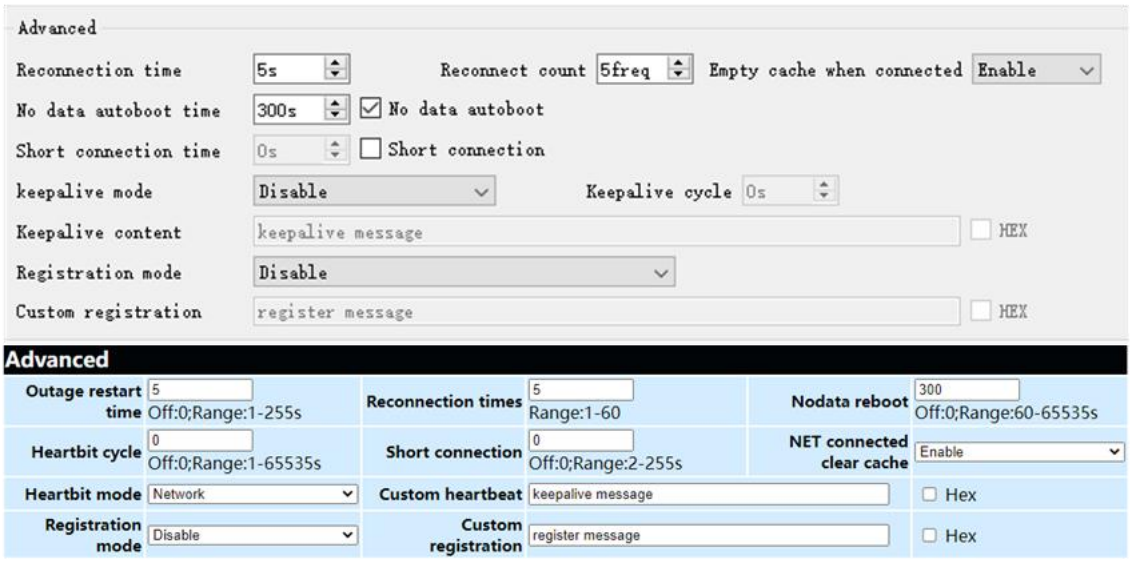
Mode configuration description, take the packet header not returned as an example (the picture on the left is the configuration of the host computer, and the picture on the right is the configuration of the web page):

4.4.6. MQTT Client

Supports quick access to standard MQTT3.1.1 protocol servers (OneNET, Baidu Cloud, Huawei Cloud, user-built and other server types) and Alibaba Cloud servers, supports QoS level configuration (QoS 0, QoS 1), supports super-long text configuration, Convenient and better access to network service operators (server address, three elements, subscription and publishing addresses support up to 128 characters of configuration).



When using the MQTT function, the advanced settings such as short links should be closed as shown in the following figure (the upper picture is the host computer, and the following picture is the web page configuration):



, select the standard MQTT3.1.1, Baidu Cloud, OneNET, Huawei Cloud configuration can refer to the following table to fill in the parameters:

parameter	standard MQTT3.3.1	Baidu cloud	OneNET
Equipment name （Client ID）	Client ID	DeviceKey	equipment ID
username （Device name）	User Name	IoTCoreId/DeviceKey	product ID

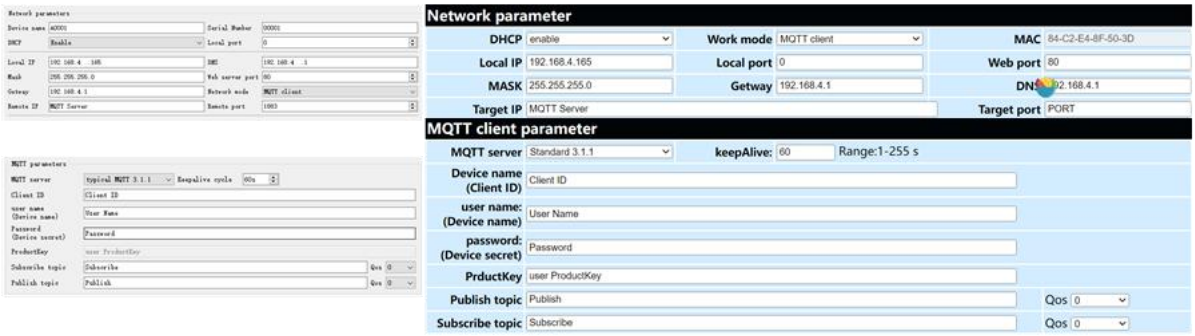
password （Device secret）	Password	DeviceSecret	Equipment name /User Password
PrductKey	Alibaba Cloud parameters, optional		
Post topic	MQTT Publish topic address (dynamically generated by OneNET）		
Subscribe to topics	MQTT Subscription topic address (dynamically generated by OneNET)		

【Note】

Dynamically generated topic addresses can use the same parameters to achieve the effect of data return, for example: OneNET publishes and subscribes to the same topic address: 123456, which can achieve data return;

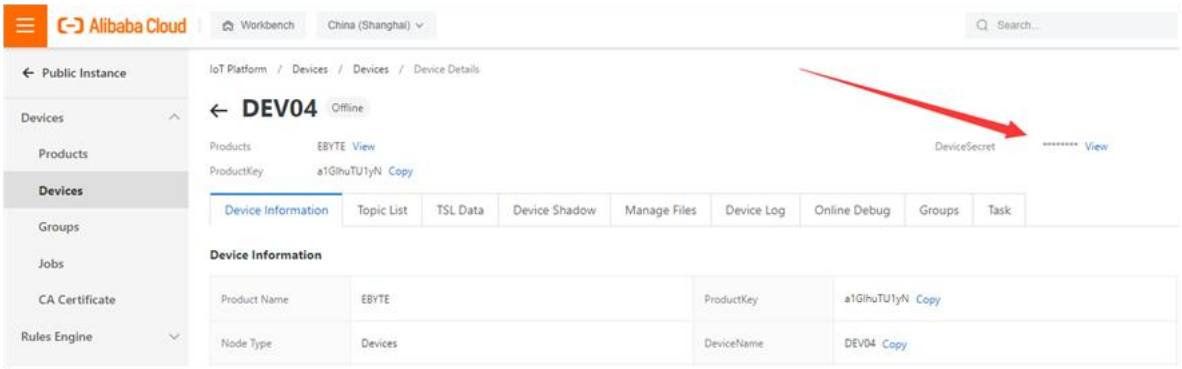
Due to the adjustment of the MQTT platform (Baidu Cloud, Huawei Cloud, OneNET), the connection cannot be made after filling in the parameters, and the platform rules shall prevail;

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



(2)Alibaba Cloud

Supports the use of Alibaba Cloud's "Three Elements" to directly connect to the server, and obtains the "Three Elements" required to connect to Alibaba Cloud, as shown in the figure (only for demonstration cases, users need to use self-built parameters to connect):



To configure a topic for communication testing:

Configuration theme description:

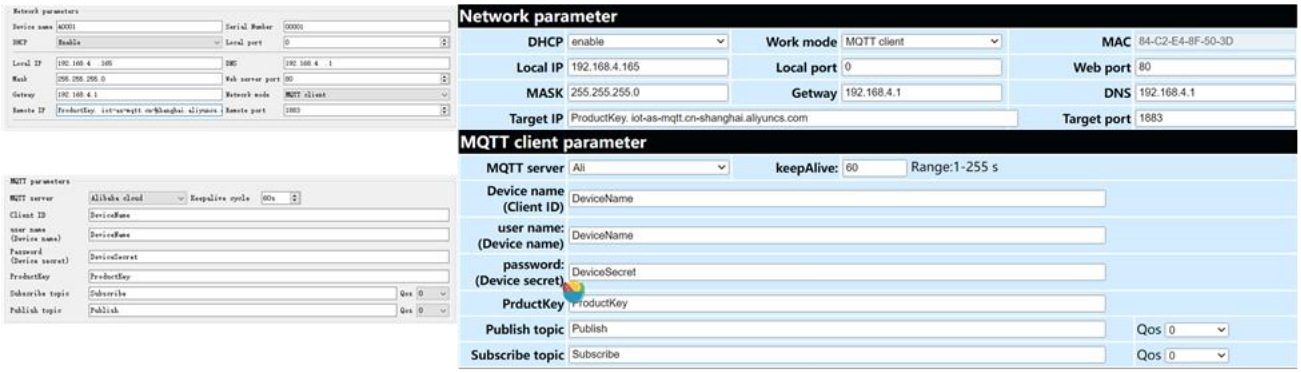
Select the corresponding product, go to "Custom Topic" under the Topic class list (for details, please refer to the Alibaba Cloud documentation), click "Define Topic Class", set the name to 1234 and grant publish and subscribe permissions (for data return pass).

Configure the device connection parameters, as shown in the following figure (the picture on the left is the host computer, and the picture on the right is the web page configuration):

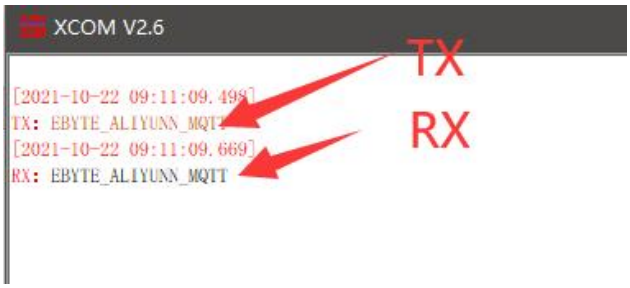
```
{
   "ProductKey": "a1GlhuTU1yN",
   "DeviceName": "DEV04",
   "DeviceSecret": "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
}
```

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

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



Alibaba Cloud MQTT platform communication test:

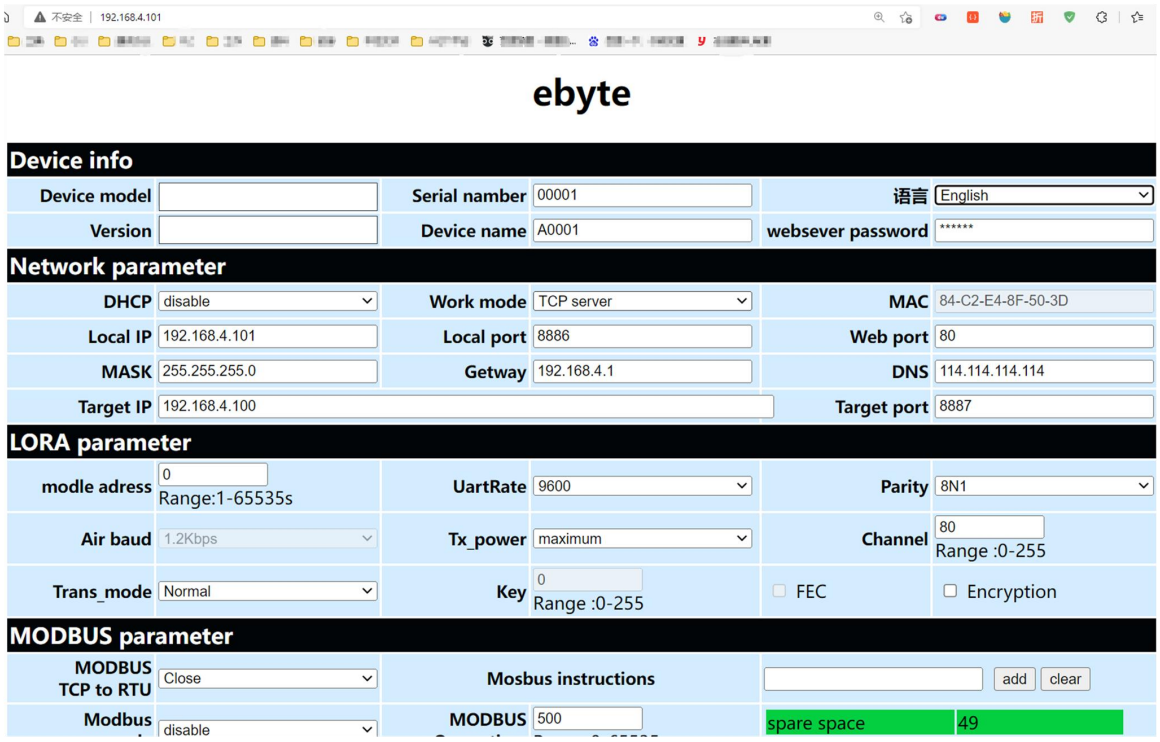


4.5. Web page configuration

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

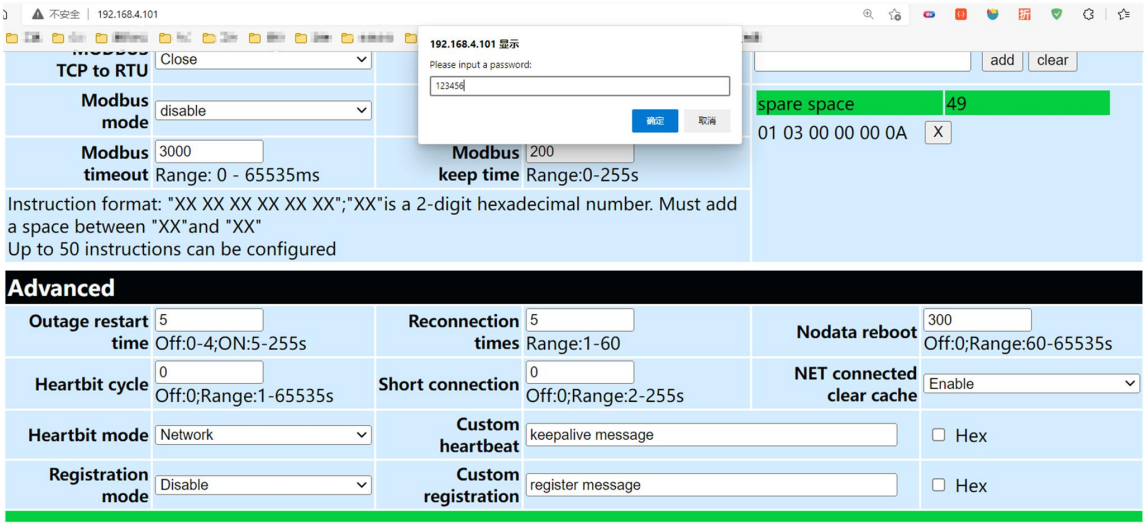
Operation method (Microsoft Edge version 94.0.992.50 as an example, does not support IE kernel browser):

Open the browser, enter the IP address of the device in the address bar, for example 192.168.4.101 (the IP address and the computer need to be kept on the same network segment, if the firewall cannot be used and try again), if you forget the local IP, you can use AT commands and configuration software inquiry;

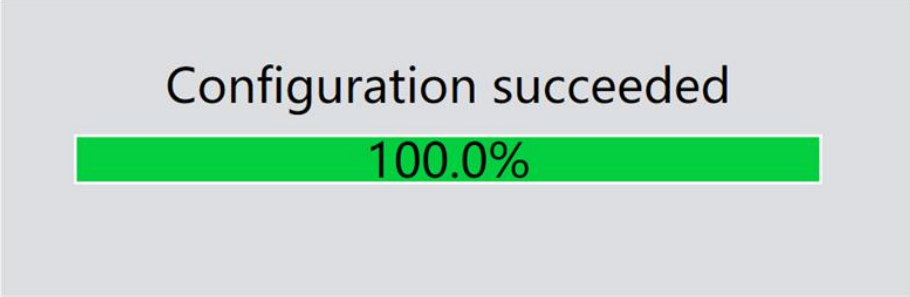


(2) The web page pops up the main interface, and you can query and set relevant parameters;

(3) Click Submit to save the configuration parameters after entering the correct key. The factory default key is: 123456;

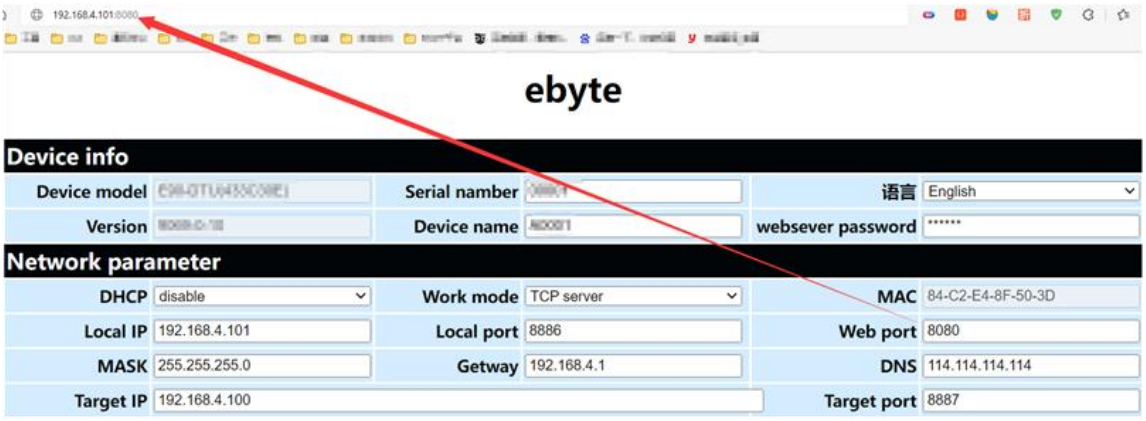


The progress bar indicates the configuration progress. Do not refresh the web page again after the configuration is completed (refresh the web page to enter the configuration mode again, you can enter the communication mode by restarting the device or submitting again);



It can also be opened through the Open Web Configuration button of the configuration software.

[Note] If the port number is modified, the port number should be added to the address input field. For example, if the web page access port is modified to 8080, the connection web page configuration needs to enter 192.168.4.101:8080 in the address bar.



4.6. Hardware reset to factory

To restore the keys to the factory, you need to effectively connect the network cable and power supply. Keep pressing the Reload pin of the device until the LED indicators are all on to release the keys.

5. Advanced Functions

5.1. Heartbeat Packet

In client mode, users can choose to send heartbeat packets and set the time of heartbeat packets by themselves. The heartbeat packet can be selected in two modes: network heartbeat packet and serial heartbeat packet. It supports hexadecimal and ASCII transmission. This heartbeat packet is not an MQTT heartbeat and needs to be turned off in MQTT client mode. MQTT heartbeat only needs to configure KeepAlive in "MQTT function settings" Time, it is

recommended not to configure less than 60s.
Heartbeat packet sending mode:
(1) The default is to turn off the heartbeat packet mode.
(2), serial port mode -> the device sends heartbeat content to the serial port bus according to the set heartbeat time interval.
(3) Network port mode -> The device sends heartbeat content to the network port bus according to the set heartbeat time interval.
Customize heartbeat packet content (maximum support 40 bytes (ASCII) data, 20 bytes (HEX) data)
Customize the heartbeat packet sending interval. When it is set to 0, the heartbeat packet function is turned off. If the setting value is greater than zero, the heartbeat packet function is turned on.

5.2. Registration Package

In the client mode, the user can choose to send the registration package, and set the registration package time by definition.
The registration package supports the following modes:
(1) The MAC address (OLMAC) is sent when the network establishes a connection with the device
(2) The data of the custom registration package sent when the network establishes a connection with the device (OLCSTM)
(3) After the network and the device are connected, each packet of data sent by the device to the network is preceded by a MAC address (EMBMAC)
(4) After the network and the device are connected, each packet of data sent by the device to the network is prepended with custom registration packet data (EMBCSTM)
Custom registration package content (maximum support 40 bytes (ASCII) data, 20 bytes (HEX) data)
[Note] Please do not use special characters (such as ",", "\", "/", etc.) when configuring the registration package on the web page. The host computer can configure special characters, but it may cause the web page configuration to be inaccessible.

5.3. Short connection

In client mode, short network connection is supported (this function is disabled by default). TCP short connection is mainly used to save server resource overhead, and is generally used in multi-point (multi-client)-to-point (server) scenarios.
The TCP short connection function is applied in the TCP Client mode. After the short connection function is turned on, it only requests to connect with the server when sending information. The device will automatically disconnect.
When the short link hold time is set to 0, the short link function is turned off. When the setting range is (2-255) seconds, the short link function is turned on, and the default hold time is 0 seconds (short link is turned off).

5.4. Network disconnection and reconnection

In client mode, after the device is disconnected from the network, it will try to actively connect to the server at the specified time. If the request times out and the set number of reconnections has not been successfully reconnected,

the device will restart to prevent the device from disconnecting from the network. Unable to restore connection.
Disconnection and 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 re-establish the network, and the cumulative number of requests reaches the preset value. If the connection is not successful, the device will automatically restart.
The actual restart time is the network disconnection reconnection period multiplied by the number of reconnections.
It is recommended to use the factory default parameters without special requirements.

5.5. Restart after timeout

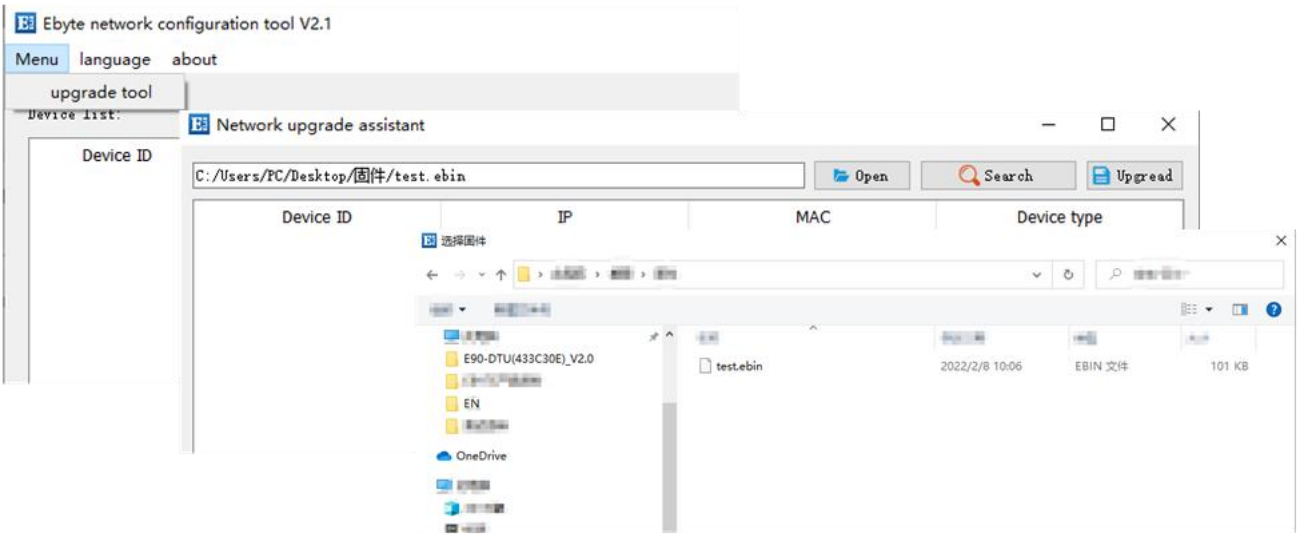
Support timeout restart function (default: 300 seconds), this function is mainly used to ensure long-term stable operation of the device. If data is not sent and received within the set timeout restart time, the device will restart to avoid the impact of abnormal conditions on communication.
The parameter range of timeout restart time is (60-65535) seconds. If it is set to 0, it means shutdown timeout restart. The default is 300 seconds.

5.6. Cache cleaning

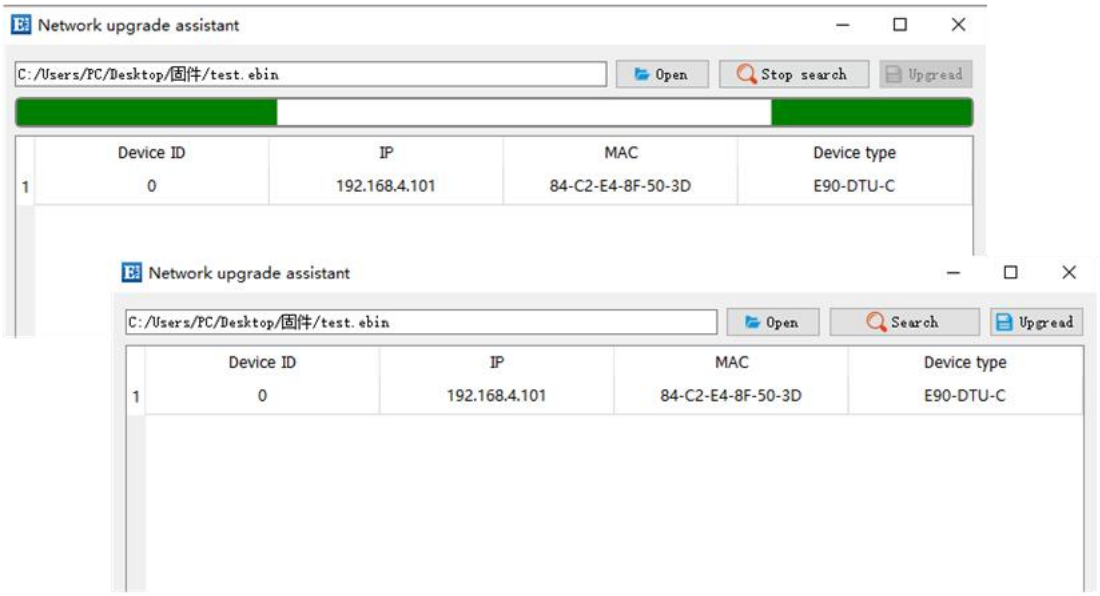
The device is in the client mode. When the TCP connection is not established, the data received by the serial port will be placed in the buffer area. The serial port receiving buffer is 1024 bytes, and the data larger than 1024 bytes will cover the earliest received data. After the network connection is successful, you can Select to clear the serial port cache or send the cache through the network through configuration.
Enable: The device does not save the data received by the serial port before the connection is established.
Disabled: After the connection is established, the network will receive the serial buffered data.

5.7. Remote upgrade

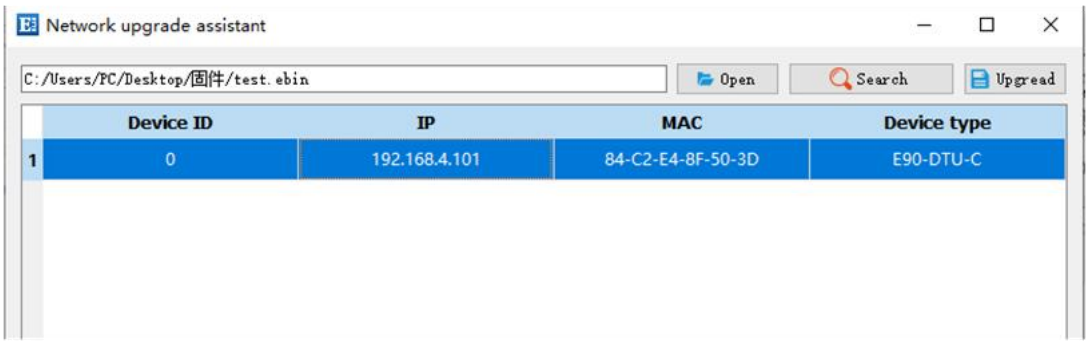
In order to facilitate later maintenance and upgrade functions and to replace different firmware, this product supports online firmware upgrade, users can upgrade or replace the current firmware through the host computer through the upgrade firmware provided by our company (the firmware provided on the official website shall prevail, the official website only provides the latest firmware Firmware, please read the upgrade instructions carefully before upgrading, the firmware number in the picture may be inconsistent with the firmware provided on the official website, but the upgrade method is the same).
Network upgrade firmware operation steps:
Step 1: Open the host computer, open the device upgrade assistant in the menu bar, and select the required firmware (the official website provides download firmware);



Step 2: Click to search for devices, and click to stop searching after finding the device;

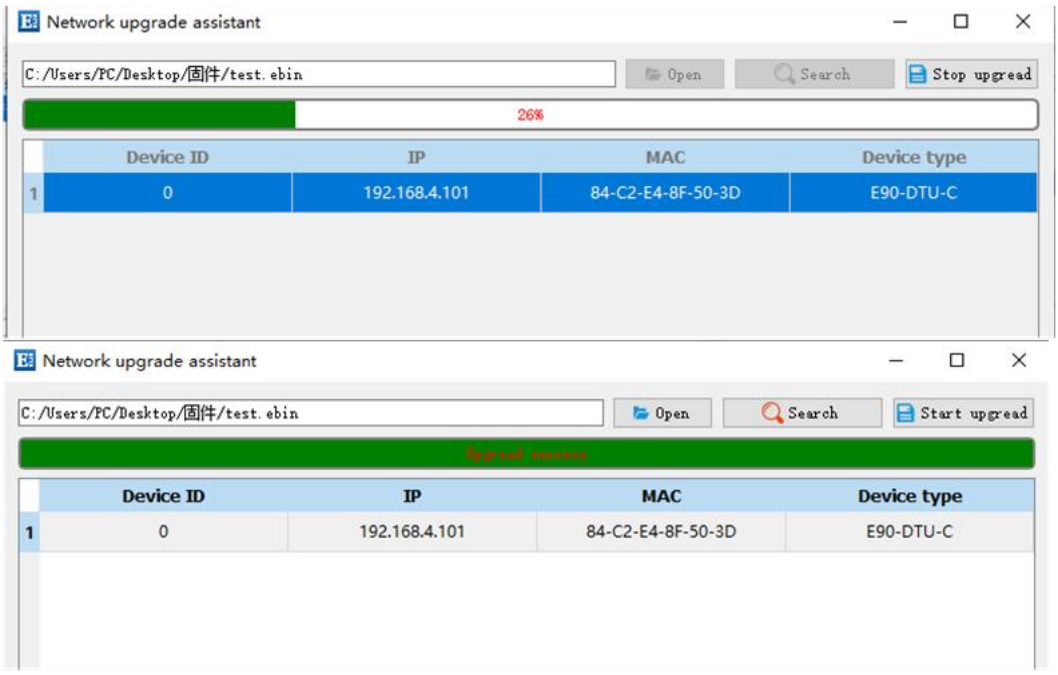


Step 3: Select the corresponding device that needs to be upgraded;



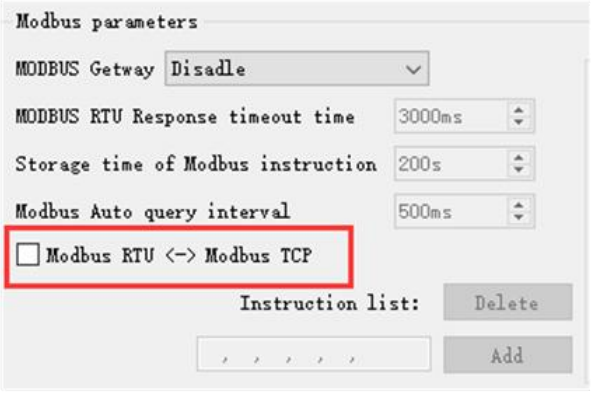
Step 4: Click to start the upgrade, the device indicator flashes, and wait for the upgrade to complete.

[Note] When the device is just powered on, click the "Search Device" of the upgrade assistant, the device will enter the firmware burning state, and it will return to normal mode after power off and restart.



5.8. Modbus Gateway

5.8.1. Protocol Conversion



Enabled: Modbus data is checked and non-Modbus data (RTU/TCP) is discarded and not transmitted, and the Modbus RTU protocol and the Modbus TCP protocol are interconverted.

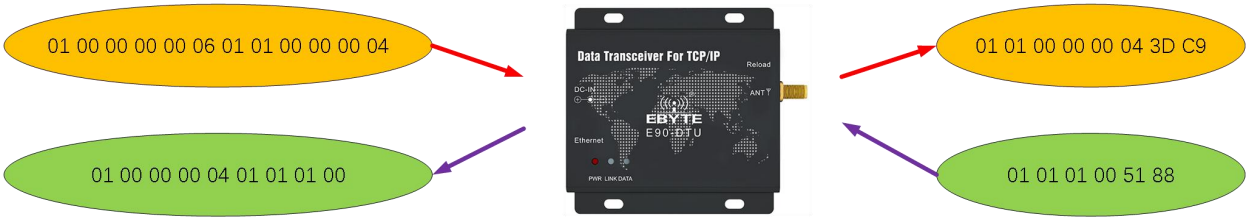
Disabled: Do not perform protocol conversion but verify Modbus data, discard non-Modbus data (RTU/TCP) and not transmit.

[Note] Due to the packetization mechanism of wireless modulation, the maximum size of a single packet is 58 bytes.

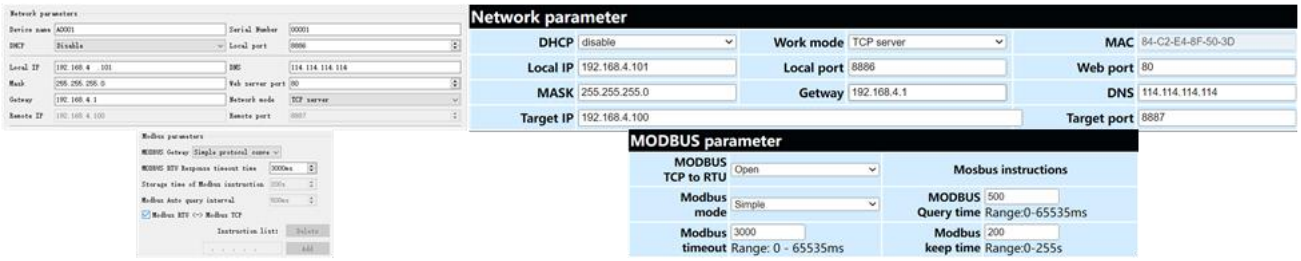
5.8.2. Simple Protocol Conversion

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

Simple protocol conversion can work in any mode (TCP client, TCP server, UDP client, UDP server, MQTT client), no matter what mode it is working in, there can only be one Modbus master.



Simple protocol conversion configuration description (TCP server mode as an example, the left picture is the upper computer, the right picture is the webpage):



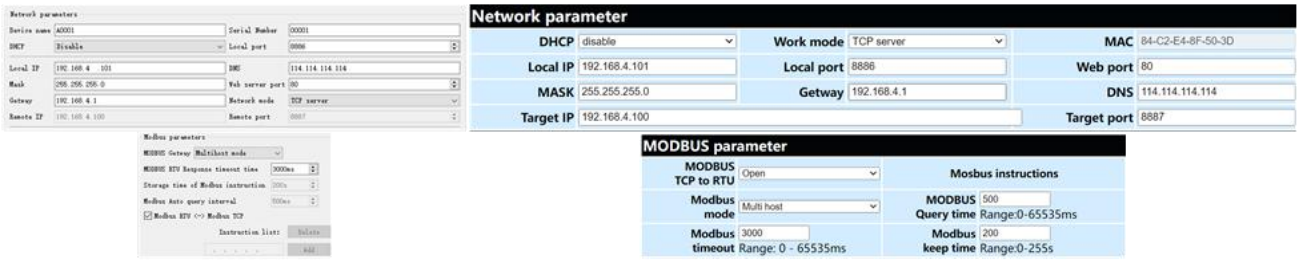
5.8.3. Multi-host mode

There is only one Modbus master station for relatively simple protocol conversion, while the multi-master mode can handle up to 4 Modbus TCP masters. One request is processed at a time, while the multi-host mode will be sorted and processed according to the TCP request, and other links will wait), thereby solving the bus conflict problem (currently only 4 host connections are supported), only supports working in TCP server mode, slave machine Only in the serial port, otherwise it will not work properly.

With the increase of the number of hosts, the Modbus timeout time should be increased accordingly, and the request interval should be increased. If multiple hosts are required to make continuous high-speed requests, it is recommended to use a "storage gateway".

It is recommended to configure "Simple Protocol Conversion" when no multi-channel host is used.

Multi-host mode configuration (the picture on the left is the host computer, and the picture on the right is the webpage):



5.8.4. Storage Gateway

The storage gateway not only arbitrates the bus data but also stores the repeated read commands. When different hosts request the same data, the gateway does not need to query the register status of the RTU device multiple times, but directly returns the data cached in the storage area. To a certain extent, the multi-host request processing capability of the gateway is improved, and the time consumed by the entire request process is also shortened. Users can customize the storage area command polling interval and command storage time according to their needs.

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

Features:

(1) The gateway has a 3K cache for storing instructions and returning results (reading 10 holding registers as an example, about 100 instructions and returning results can be stored);

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

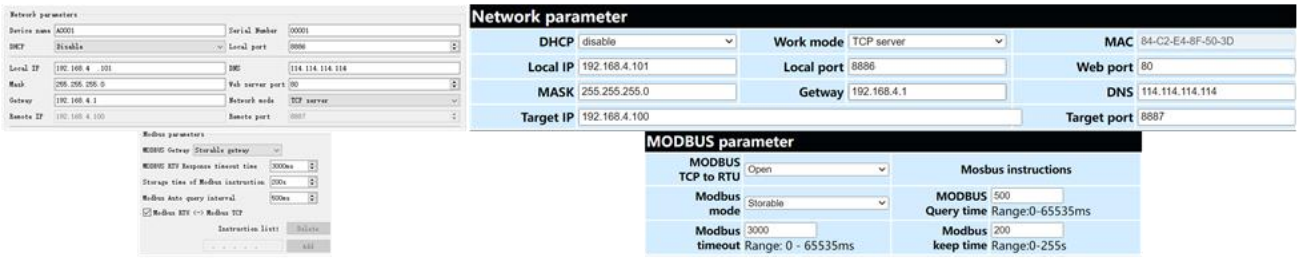
(3) The polling interval can be customized, 0-65535ms (default: 500ms);

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

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

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

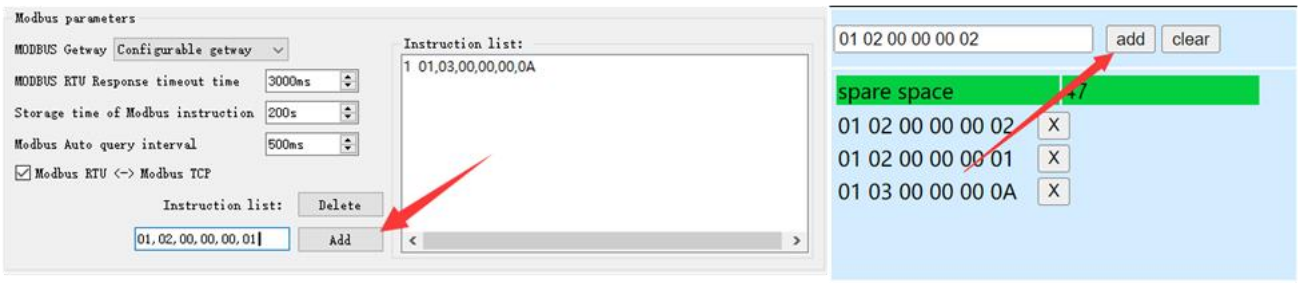
Storage gateway configuration (the picture on the left is the host computer, and the picture on the right is the webpage):



5.8.5. Configurable Gateway

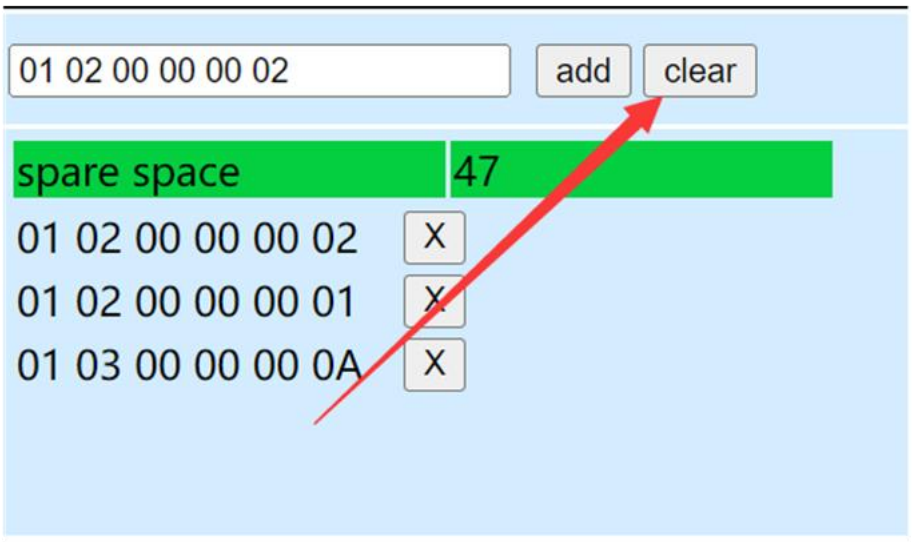
The gateway automatically polls the RTU device register according to the pre-configured MODBUS command (only supports the configuration of the MODBUS read command), and the commands in the non-storage table will directly operate the RTU device. Frequently read commands can be stored in the gateway in advance, which can shorten the response time (query configured commands). Due to the above features, the serial port side of the configurable gateway can only be connected to Modbus slaves.

Instruction storage description (increase, the instruction error and format error cannot be added, the left picture is the host computer, the right picture is the webpage):

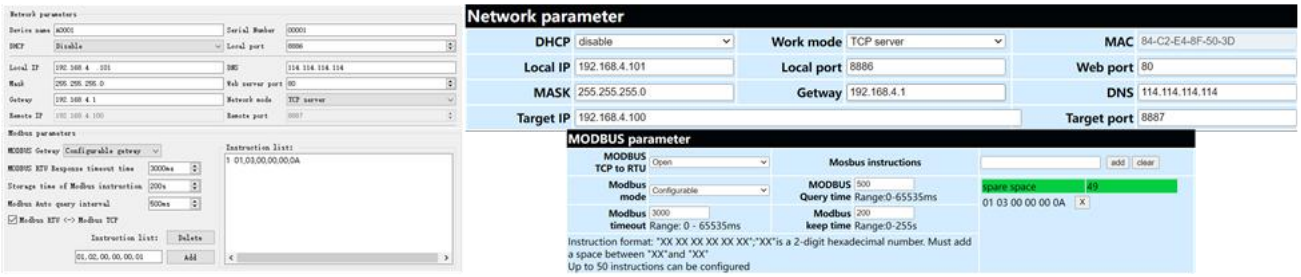


Instruction storage description (delete, the picture on the left is the host computer, and the picture on the right is the webpage):

Instruction storage description (clear, web page and AT command support):



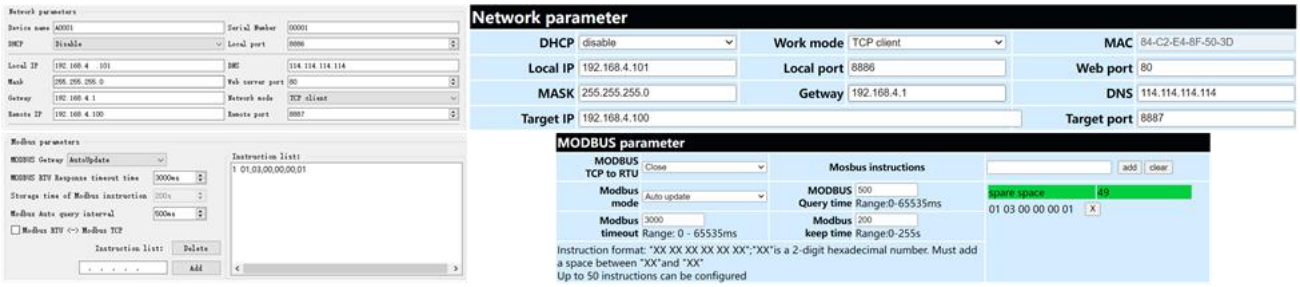
Configurable gateway configuration (the picture on the left is the host computer, and the picture on the right is the webpage):



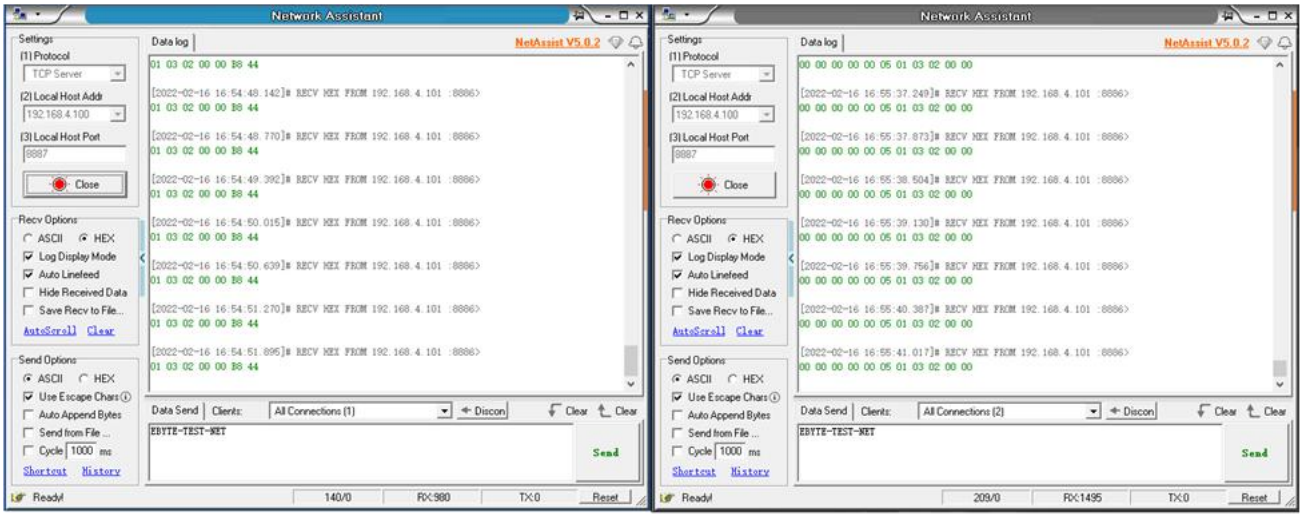
5.8.6. Automatic upload

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

For instruction pre-storage, refer to "Configurable Gateway - Instruction Storage Instructions", and automatically upload the upper computer/web page configuration:



TCP client demonstration (Modbus RTU format on the left, Modbus TCP format on the right):



6. Configuration Mode

6.1. Web configuration

You can customize the relevant parameters through the Web setting method. Open the browser, enter the device IP in the address bar (default: 192.168.4.101), enter the page, you can query and set parameters, and finally click the "Submit" menu to wait for the page to return to the successful prompt, and it will take effect.

Note: Do not enter the web page configuration during normal use, which may cause data loss. If you enter the web page configuration, you need to restart to enter the communication mode.

Web page configuration initialization password: 123456, can be customized configuration, only supports 6-bit

uppercase and lowercase letters and numerical configuration.

The webpage configuration requires browsers with newer kernels to work properly, such as Microsoft Edge (96.0.1054.62), Google chrome (96.0.4664.110), Firefox (95.0.2), etc.

[Note] IE, 360 compatibility mode, QQ browser compatibility mode and other browsers using IE core are not supported to use web page configuration.

6.2. Host computer configuration

Open the configuration tool software, search for devices, double-click the identified device, and the parameter query configuration interface will pop up. You can customize and modify 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 local area network environment. Multi-network card industrial computers need to temporarily disable and do not use network cards, otherwise the host computer will not be able to search for devices normally (the same device is displayed multiple times, no device can be found, etc.)

The host computer shields the wireless network card, so the network cable must be connected to use the host computer, and the wireless network card can be configured through the web page.

6.3. AT command configuration

The query and modification of relevant parameters of the device can be completed through AT command configuration. For specific AT commands, please refer to "E90-DTU(433L30E)-V8 AT Command".

Revise history

Version	Revision date	Revision Notes	Maintenance man
1.0	2022-06-06	initial version	LC
1.1	2022-09-08	Update manual product diagram	XXN

About us

Technical support: support@cdebyte.com
Documents and RF Setting download link:： https://www.cdebyte.com
Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com
---
Official hotline: 028-61399028 ext. 4000-330-990
Web: https://www.cdebyte.com
Address: Building B5, 199 Xiqu Dadao, Chengdu city, Sichuan Province

Chengdu Ebyte Electronic Technology Co.,Ltd.