



Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



Serial ⇌ Ethernet

Serial server

NA111-A

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1. Introduction to the product

NA111-A is a serial server that converts serial data \rightleftharpoons Ethernet data. The appliance comes with an RJ45 interface and rail mount. Available in a variety of Modbus gateway modes to meet the networking capabilities of a wide range of serial devices/PLC.



Features

- RJ45 Adaptive Ethernet interface;
- Supports multiple modes of operation(TCPServer,TCP Client,UDP Server,UDP Client);
- Support web settings, configuration tool settings,AT instruction settings parameters;
- Support for multiple Socket connections;
- Serial port rate supports 1200to230400(default 115200);
- Supports multiple checks(None,Odd,Even,Mark,Space);
- Support for DHCP functionality;
- Support for DNS functionality, domain name resolution;
- DNS server address customization;
- Supports a variety of Modbus gateways (simple protocol conversion, multi-host mode, storage gateway, configurable gateway);
- Support for virtual serial port;
- Supports time-out restart function, re-start time customization;
- Supports short connection function, short connection interval customization;
- Support heartbeat package, registration package function;
- Support cache cleanup function;
- Support access to the extranet, local area network;
- Supports hardware recovery factory settings;
- Support for online upgrades.

2. Get started quickly

If there is a problem during use, click on the official website link:

<https://www.ebyte.com/product-class.aspx>

2.1 Use preparation

Before using serial servers ("devices"), you need to prepare network cables, computers, USB serial converters and other related accessories. Here's how:

Table 2 - 1 Material sheet

serial number	Device tools	quantity
1	equipment	1
2	Cable	1
3	Computer	1
5	USB serial converter	1

2.2 The device is wired

Test serial-to-network data communication and connect the RS485 pin of the device to the PC side via a USB serial converter.

Use a network cable to connect the device's gateway(RJ45)to the PC's gate.

The connection diagram looks like this:



Figure 2- 1 PC connection diagram

2.3 Software settings

2.3.1 The network test environment

Avoid server search failures (pings don't work) and problems with customers not being able to open web pages during real-world applications. Check the computer for the relevant settings first.

- (1) Turn off your computer's fire walls and antivirus software.
- (2) Configure the network card that is connected to the device.
- (3) For PC direct-to-serial servers, you need to set up a static computer that remains the same segment as the device.

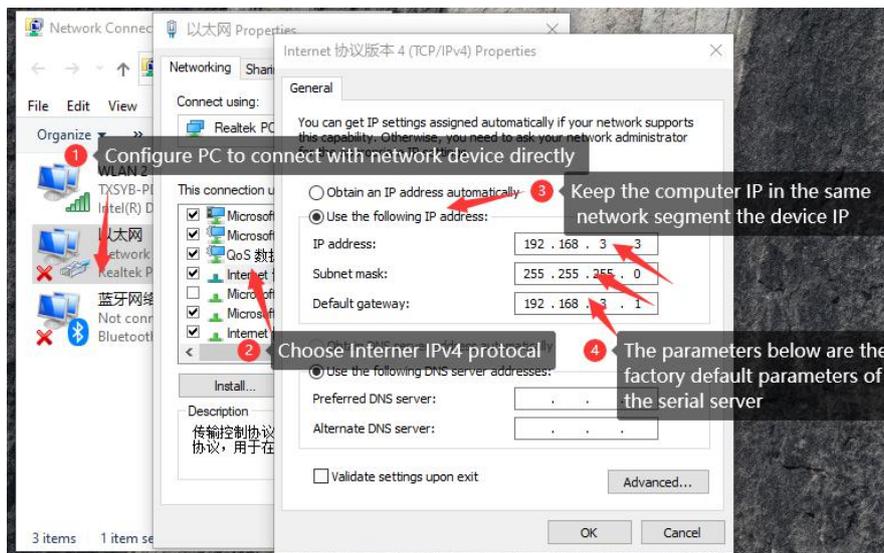


Figure 2- 2 PC local connection settings

2.3.2 The default parameter

Table 2 - 2 default parameters

project	The default parameter
IP address	192.168.3.7
The default local port	8887
Subnet mask	255.255.255.0
The default gateway	192.168.3.1
The default mode of operation	TCP Server

The default target IP	192.168.3.3
The default destination port	8888
Serial port rate	115200
Serial parameters	None / 8 / 1

2.3.3 Data transfer test

After the above steps, follow the device factory default parameters, do the following, to achieve data transmission testing.

Here's how:

- (1) Open the test TCP/IP debug assistant software.
- (2) The network setup selects the TCP client mode, which corresponds to the server IP address (module default target IP: 192.168.3.3). The server port number corresponds to the module setting port 8887(module default port: 8887),clickCreate .
- (3) Wait for the computer to connect to the serial server, and the M0 (green LED lights up)of the serial server when the connection iscomplete.

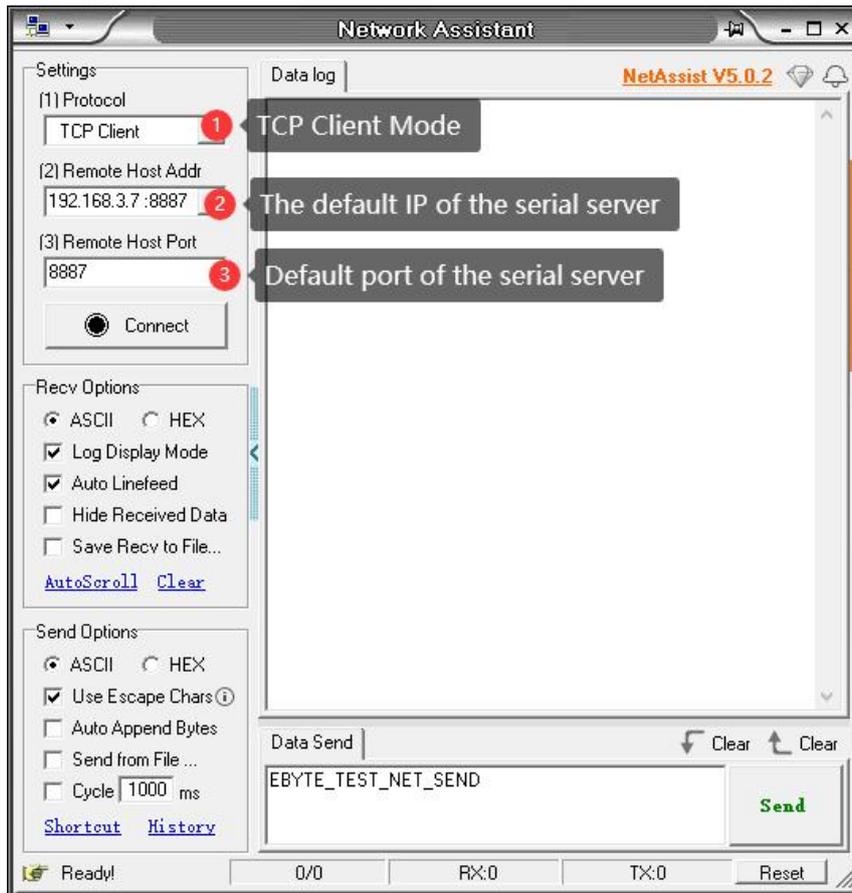


Figure 2- 3 Gate parameter configuration

(4) Open the serial assistant, serial port rate is set to 115200, serial parameter is set to None/8/1,click on open, open serial port.

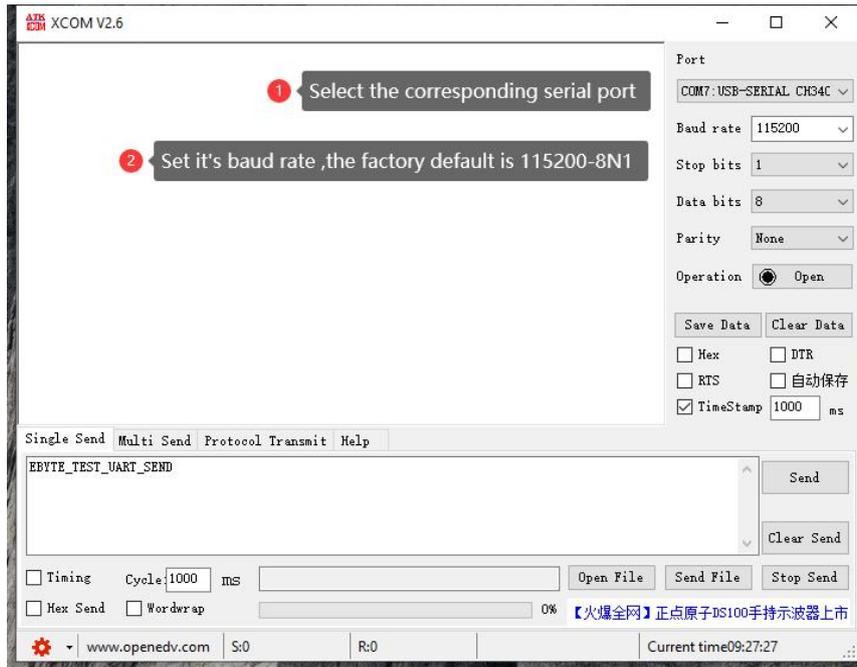


Figure 2- 4 Serial parameter configuration

(5) Data transmission testing, serial assistant (serial port side) to send test data, network debugging assistant (network side) received test data. The network debugging assistant (network side) sends test data, and the serial assistant (serial port side) receives the test data. Duplex communication (i.e., local to network two-way data transceivers).

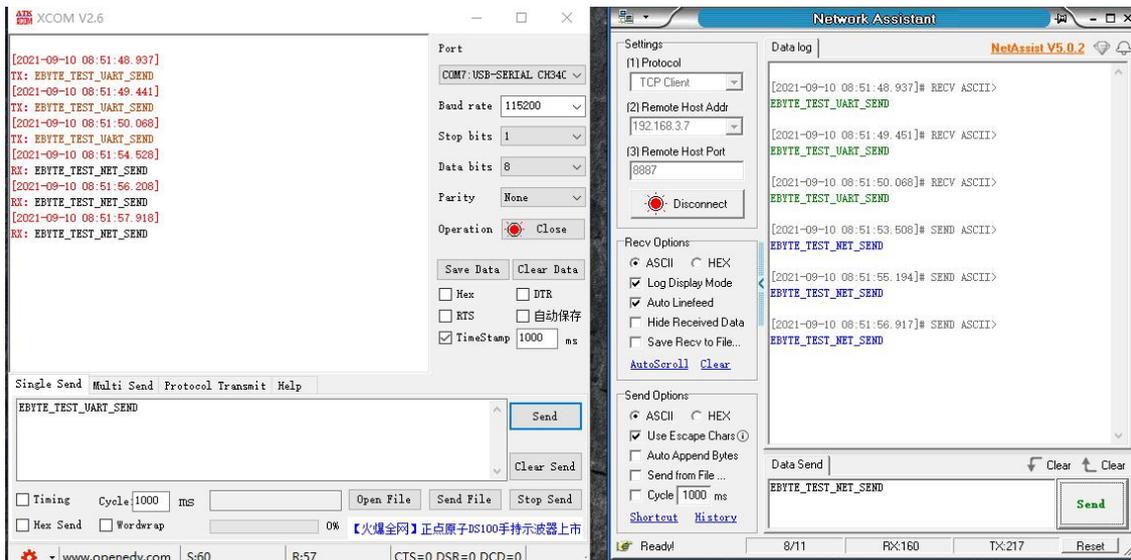


Figure 2- 5 Send tests

3. Product overview

3.1 Product specifications

Table 3 - 1 Specification Table

Product model	The type of product	Socket The number of connections	The working mode	Operating voltage	Product size (mm)
NS1	Patch module	6 way	TCP Sever TCP Client UDP Sever UDP Client	3.0~5.5V(DC)	17 * 19 * 4
NT1	Plug in the module directly	6 way		3.0~5.5V(DC)	35 * 22 * 30
NT1-B	Plug in the module directly	6 way		3.0~5.5V(DC)	35 * 22 * 20
NA111	DTU	6 way		8~28V(DC)	92 * 66 * 30
NA111-A				85~265V(AC)	

3.2 Technical parameters

Table 3 - 2 Device parameters

project	illustrate
Operating voltage	AC 85to265V
interface	Serial(RS485),mesh (RJ45).
The working mode	TCP Server、TCP Client、UDP Server、UDP Client (默认 TCP Server)
Socket connection	Supports 6 paths
Network protocols	IP、TCP/UDP、IPv4
How IP is obtained	DHCP,static IP(default static IP).
Domain name resolution	backing
How it is configured	Web,configuration tools,AT instructions
IP address	Customizable (default 192.168.3.7).
The local port	Customizable (default 8887).
Subnet mask	255.255.255.0
gateway	Customizable (default 192.168.3.1).
Target IP	Customizable (default 192.168.3.3).
The destination port	Customizable (default 8888).
Network cache	512 Byte
Serial cache	512 Byte
The packaging mechanism	512 Byte
Serial port rate	1200 to 230400 bps(default 115200).
The data bit	5, 6,7,8(default 8).
Stop bit	1,2(default 1).
Check bits	None、Odd、Even、Mark、Space (默认 None)
Flow control	RTS/CTS、DSR/DTR、XON/XOFF、NONE (default NONE).
Product size	92 mm*66 mm*30 mm (长*宽*高)
The weight of the product	93g ± 5g
Operating temperature and humidity	-40 to .85degrees C,5% to 95%RH(no condensation).
Store temperature and humidity	-40 to .105degrees C,5% to 95% RH(no condensation).

3.3 THE LED DESCRIPTION

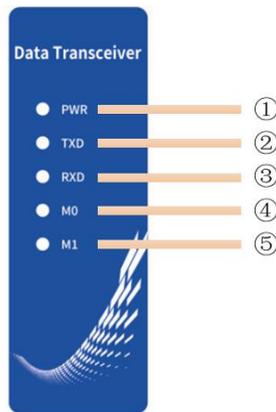


Figure 3- 1 LED

Table 3- 3 LED function table

serial number	name	function	illustrate
1	PWR	Power LED	Power on: The light is always on. Power off: The light goes out.
2	TXD	Serial send light	Data sent: Light on. No data sent: Lights off.
3	RXD	Serial reception indicator	Data sent: Light on. No data sent: Lights off.
4	M0	Link light	TCP mode: network connection, light on. The network is down and the lights are off. UDP mode: The light is always on.
5	M1	STATE indicator	The network cable is connected and the light is always on. The network cable is disconnected and the light goes out.

Note: PWR, TXD, RXD, M0 all light up when the network cable is not connected, M1 goes out.

3.4 Dimensions

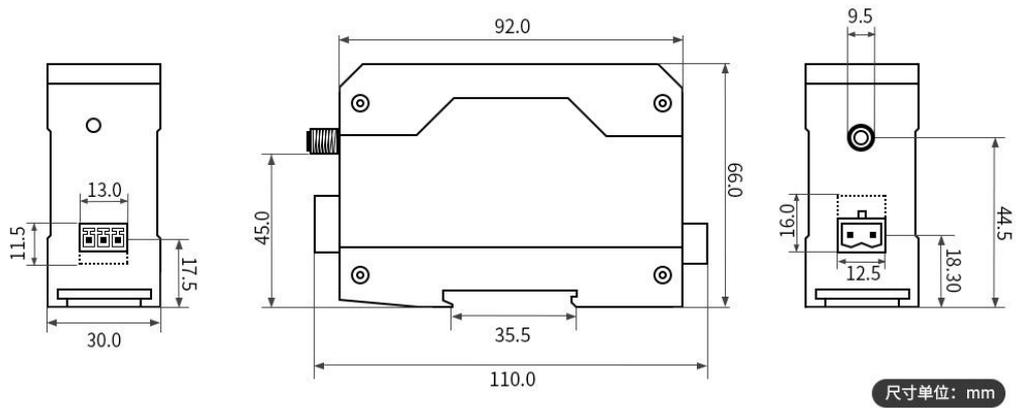


Figure 3 - 2 Dimensions

3.5 How it is installed

The equipment is mounted by rail.

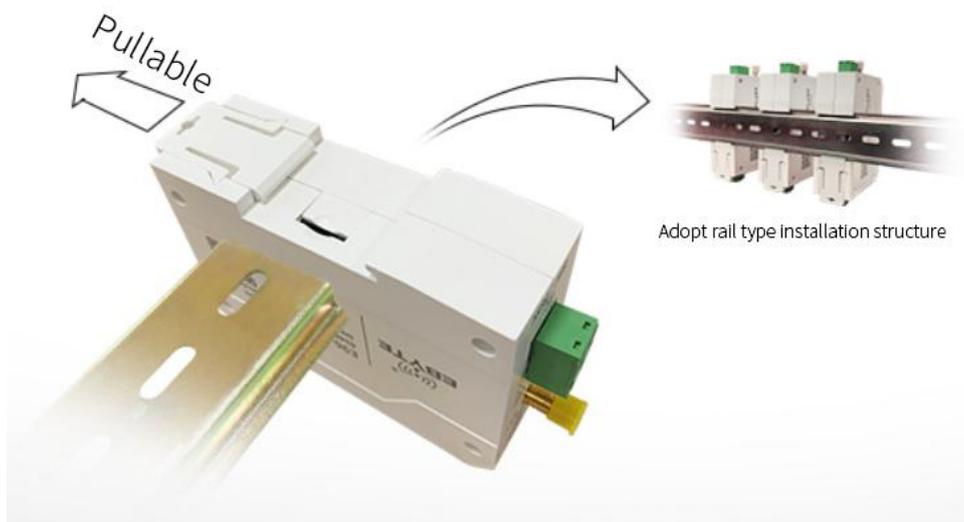


Figure 3- 3 Rail installation



4. Product features

4.1 Introduction to the basic features

4.1.1 Web configuration

The device has a built-in web server that allows users to set and query parameters through web pages.

The port of the Web server is customizable, with a default of 80

How to do this:

- Open the browser, the address bar to enter the IP address of the device, example 192.168.3.7 (IP address and computer need to maintain the same network segment), forget that native IP can be queried through the AT instructions and configuration software.
- The main screen pops up to query the settings.

You can also open it by configuring the open web page configuration button of the software.

Note: If you modify the port number, the address input bar should add the port number, for example, modify the page access port is 8080, the connection page configuration needs to enter 192.168.3.7:8080 in the address bar.

4.1.2 Subnet mask/IP address

The IP address is the identification of the module in the local area network, which is unique in the local area network. Therefore, it cannot be duplicated with other devices on the same LAN. The IP addresses of the modules are static IP and DHCP.

- (1) Static IP: Static IP is a scenario that requires users to set up manually, with attention to writing IP, subnet mask, and gateway at the same time, and static IP for scenarios that need to be counted on IP and devices and that correspond one by one.

Pros: Access devices that cannot assign IP addresses can be searched through the network-wide broadcast mode, making it easy to manage them uniformly

Cons: Different LAN intranet segments are different, resulting in no normal TCP/UDP communication.

- (2) Dynamic DHCP: The main function of DHCP is to obtain information such as IP address, gateway address, DNS server address, etc. dynamically from the gateway host, thus eliminating

the tedious step of setting ip address. Suitable for scenarios where there is no requirement for IP, nor is ip required to correspond to module one by one.

Pros: Devices with DHCP Server, such as access routers, can communicate directly, reducing the hassle of setting up IP address gateways and subnet masks.

Cons: Accessing a network without DHCP Serve, such as directly connected to a computer, the module will not work properly.

Subnet masks are mainly used to determine the network number and host number of IP addresses, indicating the number of subnets and determining whether the module is a flag within the subnet.

Subnet masks must be set, our commonly used Class C subnet mask:255.255.255.0,network number is thefirst 24 bits, host number is the last 8 bits, the number of subnets is 255, module IP in the range of 255, the module IP is considered in this subnet.

A gateway is the network number of the network on which the module's current IP address is located. If you connect to a device such as a router when you connect to an external network, the gateway is the route.

4.1.3 DNS server address

DNS servers are primarily used to convert domain names into network-recognized IP addresses. DNS server addresses are customizable and enable domain name resolution in cases where the local domain name server is abnormal. Devices report resolution requests to custom DNS servers when domain names are resolved, making them easy and efficient to use.

In DHCP mode, dns server addresses are automatically acquired and cannot be modified.

In static IP mode, theDNS server factory address default:114.114.114.114.

4.1.4 Restore factory settings

The restore pin of the device continues to press for about 5 seconds until the device restarts and the device restarts and returns to factory settings.

The following table parameters are modified to factory default parameters after the factory settings are restored.

Table 4- 1 Part Factory Default parameter

project	The default parameter
IP address	192.168.3.7
The default local port	8887

Subnet mask	255.255.255.0
The default gateway	192.168.3.1
The default mode of operation	TCP Server
The default target IP	192.168.3.3
The default destination port	8888
Serial port rate	115200
Serial parameters	None / 8 / 1
Heartbeat pack cycle	0
Time-out restart	300
Short connection	Shut down
The connection emptyes the cache	enable
Register the package	Shut down
Modbus gateway	Shut down

Note: User-defined configurations are formatted, and only some of the parameters are listed in the table above.

4.2 The Socket feature

4.2.1 TCP Server mode

TCP Server is the TCP server. In TCP Server mode, the device listens to the native port, accepts the client's connection request, and establishes a connection for data communication. When the Modbus feature is turned off, when the device serial port receives serial data, the data is sent to all client devices connected to the device at the same time, supporting up to 6 clients.

Typically used for communication with TCP clients within a local area network.

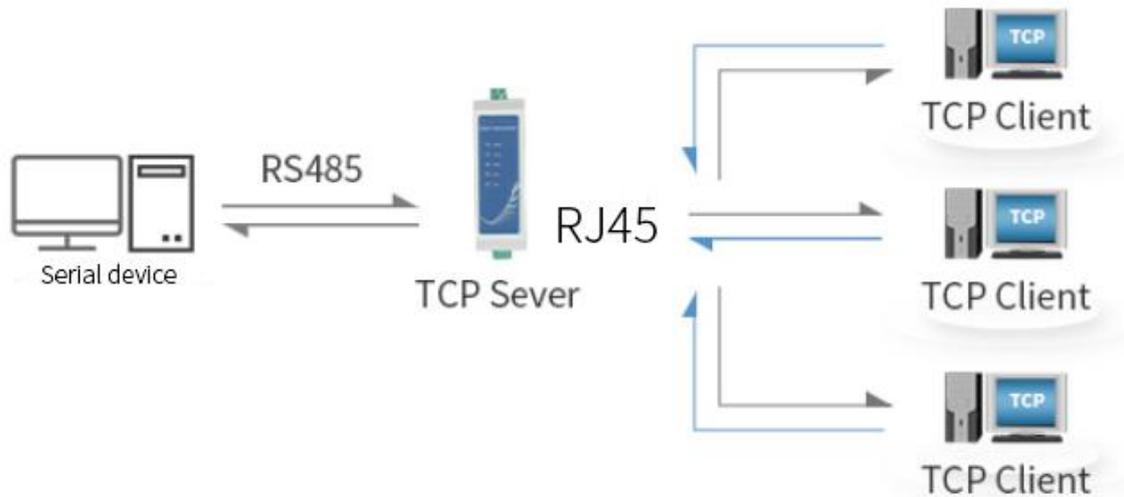


Figure 4-1 Server Mode Schematic

4.2.2 TCP Client mode

TCP Client is the TCP client. When the device is working, it initiates a connection request to the server and establishes a connection for the interaction between serial and server data. According to the TCP Protocol, TCP Client is a connection and disconnected distinction that ensures a reliable exchange of data. Typically used for data interaction between devices and servers, it is the most common form of networked communication.

Setting up service-side mode requires accurate configuration of the target's IP address/domain name, destination port.

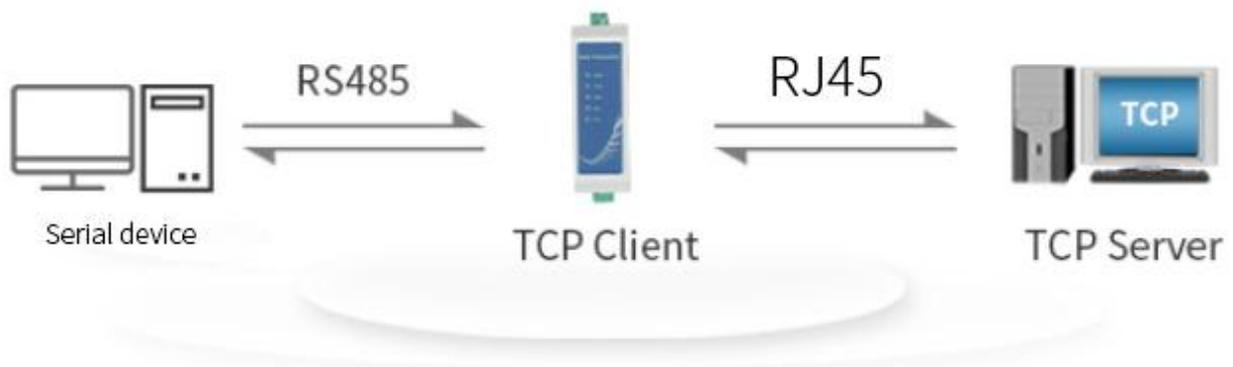


Figure 4- 2 Client Mode Schematic

4.2.3 UDP Server mode

UDP Server is a device that enables a device to communicate with a UDP protocol without verifying the data source IP address, and after each UDP packet is received, the source IP address of the packet and the source port are saved and set to the target IP and port, so the device The data sent by sends packets only to the source IP address and port where the last device received the data.

This mode is typically used for scenarios where multiple network devices communicate with this device and are more frequent and TCP Server cannot meet the criteria.

Note: InUDP mode, the network should send data to the device less than 512Bit per pack, otherwise data loss will result.

4.2.4 UDP Client mode

UDP Client is a connectionless transport protocol that provides a simple, unreliable information delivery service for transactions, with no connection established and disconnected, and only IP and ports need to be developed to send data to each other. Typically used for data transfer scenarios where packet drop rates are not required, packets are small and send more frequently, and data is passed to the specified IP.

In UDP Client mode, the device will only communicate with the target port of the target IP, and data sent by other IPs will not be received by the device.

In this mode, the destination address is set to 255.255.255.255, and the sending data is broadcast throughout the network segment, but the transceiver device needs to ensure that the ports are consistent and that the device can also receive broadcast data.

4.3 Serial function

4.3.1 Serial basic parameters

The basic parameters of serial port include: baud rate, data bit, stop bit, check bit.

Baud Rate: Serial communication rate, configurable for 1200,2400,4800,9600,14400,19200,38400,57600,115200 、 230400bps。

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

Stop bit: You can set ranges 1,2.

Check bit: the check bit of data communication, support None,Odd,Even,Mark,Space five verification methods by setting serial parameters, to maintain consistent with serial connection

equipment serial parameters can ensure that the general allowed normal.

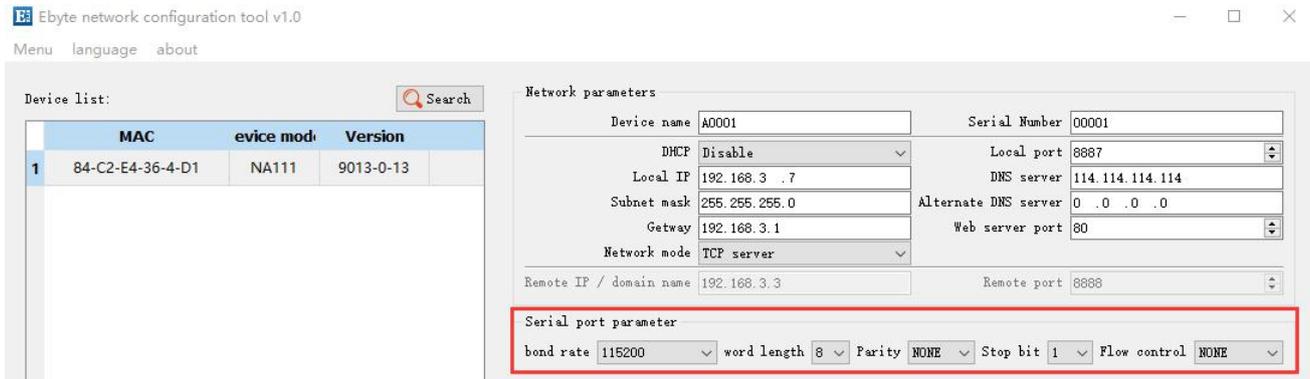


Figure 4- 2 Upper machine serial port parameter configuration

4.3.2 Serial data is sent and received

The serial assistant (serial port side) sends test data, and the network debugging assistant (network side) receives the test data. The network debugging assistant (network side) sends test data, and the serial assistant (serial port side) receives the test data. The 485 interface enables half-duplex communication (i.e. data can be transmitted in both directions of a signal carrier, but not simultaneously).

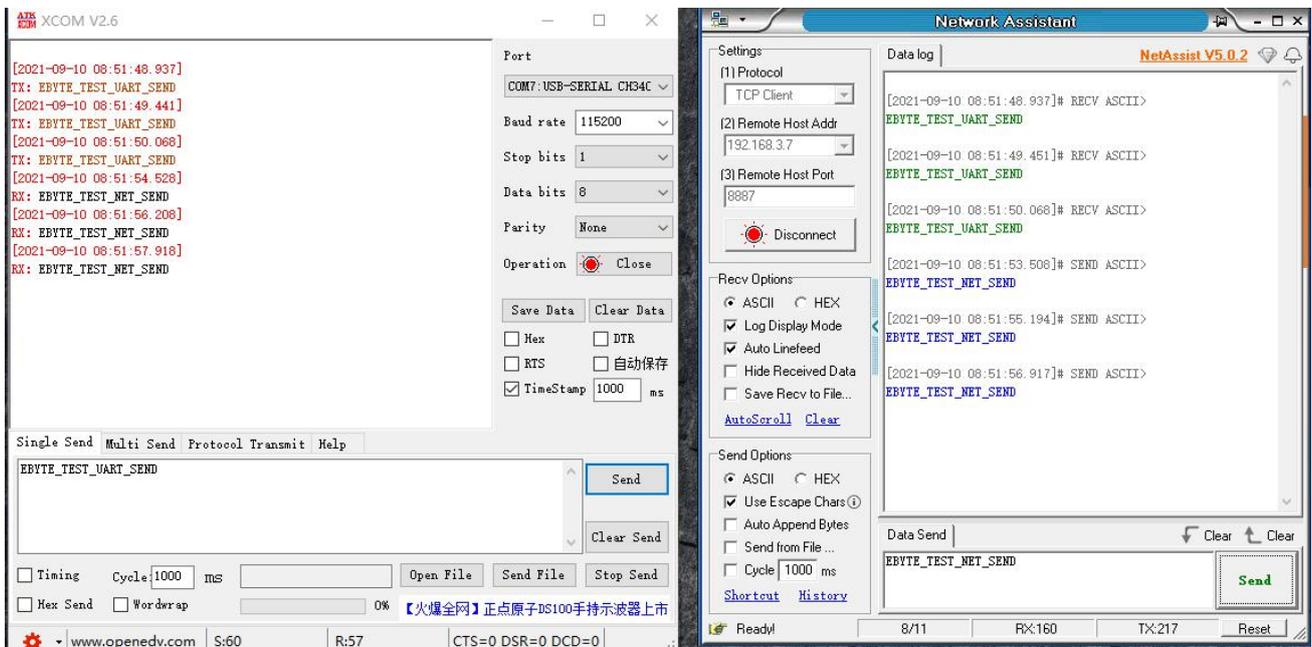


Figure 4- 3 Data send and receive diagrams

4.4 Advanced features

4.4.1 Heartbeat package function

In network transmission mode, users can choose to send a heartbeat package and customize the heartbeat time. Heartbeat Package supports network heartbeat package, serial heartbeat package.

Heartbeat package sending mode:

- (1) The default is to turn off heartbeat mode.
- (2) Serial mode -> Device Sends heartbeat content to the serial bus at a set heartbeat interval.
- (3) Gate Mode -> Device Send heartbeat content to the gate bus at a set heartbeat interval.

Custom heartbeat content (up to 38 bytes (ASCII) data, 19 bytes (HEX)data).

Custom heartbeat package send time interval, set to 0 to turn off the heartbeat function, set the value greater than zero to turn on the heartbeat function, open can set the range:(1-65536)seconds, the default value is 0.

4.4.2 Register the package feature

In network transmission mode, users can choose to send the registration package and customize the registration package time.

The registration package supports the following modes:

- (1) Send a MAC address(OLMAC)when the network establishes a connection tothe device
- (2) Send custom enrollment package data(OLCSTM)when the network establishes a connection tothe device
- (3) When the network is connected to the device, each packet of data that the device sends to the network is preceded by a MAC address (EMBMAC).
- (4) Once the network is connected to the device, each package of data that the device sends to the network is preceded by custom enrollment package data(EMBCSTM).

Custom registration package content (up to 38 bytes (ASCII) data,18 bytes (H EX)data).

Note: Web page configuration does not work properly using connections to send MAC and connections to send custom registration package modes.

4.4.3 Short connection

Supports short network connections (which are turned off by default), and TCP short connections are primarily used to save server resources overhead and are typically used in multipoint (multi-client)-to-one (server) scenarios.

TCP short connection function is applied to TCP Client mode, after turning on the short connection function, only when sending information request to connect to the server, after the connection is successful, in the set time serial port did not receive the guide data or the network port no data send and receive, the device will automatically disconnect. It is important to note that in the case of disconnection, the first packet of data sent activates the short connection mechanism and the first frame of data is lost.

Short Link Hold Time turns off the short connection feature when set to 0. When you set the range to (2-255)seconds, the short connection function is turned on and the default hold time is 0 seconds.

Note: Short connections only work in client mode, and server mode does not take effect.

4.4.4 Time-out restart function

Supports time-out restart (default:300 seconds), which is primarily used to ensure long-term stable operation of the device, no data transceiver within the set time-out restart time, and the device will restart to avoid the impact of unusual conditions on communication.

Time-out re-start time The parameter range(60-65535)is configured to 0 to indicate a shutdown time-out restart. The default is 300 seconds.

4.4.5 Cache cleanup

When a TCP connection is not established, the data received by the serial port is placed in the cache, which is 512 bytes, and when the network connection is successful, you can choose to empty the serial cache or send the cache over the network.

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

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

4.4.6 Disconnect restart function

After the device is disconnected, it attempts to actively connect to the server or waits for the client to connect at a specified time, and if the time-out and no reconnection succeeds, the device automatically restarts to prevent the network from regaining connectivity after the device is dropped.

Disconnect re-connection time: The interval between devices each time they try to re-establish the network.

Reconnections: The number of times the device attempts to re-establish the network, the cumulative number of re-connects reaches the preset value, and if the connection is not successful, the device will automatically restart.

The actual re-start determination time is the disconnected rejoining time multiplied by the number of reconations.

The recommended network restart time is configured as 5S,and the number of disconnected restarts is 5.

4.4.7 Remote upgrade

In order to facilitate late maintenance and upgrade functions and replace different firmware,NA,NS,NT supports online upgrades, and upgrade firmware users provided by our company can upgrade or replace the current firmware via the upper computer.

Firmware upgrade procedure:

Step 1: Turn on the computer, select the device that needs to be upgraded, open the device upgrade assistant in the menu bar;

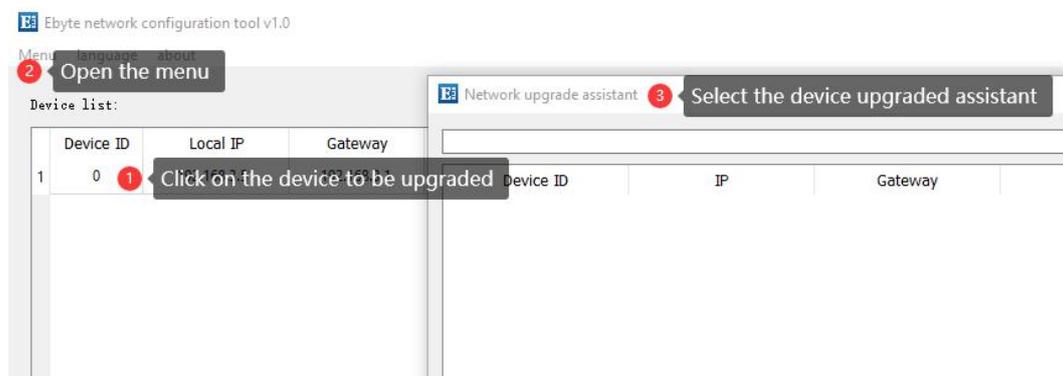


Figure 4- 4 Upgrade The first step is to explain

Step 2: Click to select the firmware, open the corresponding firmware;

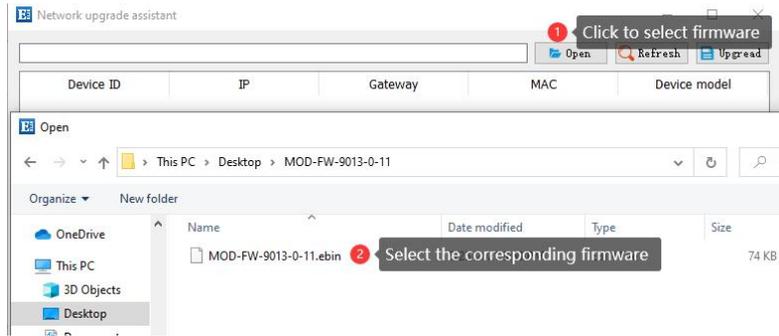


Figure 4- 5 Upgrade The second step is to explain

Step 3: Refresh the device and select the device that needs to be upgraded;

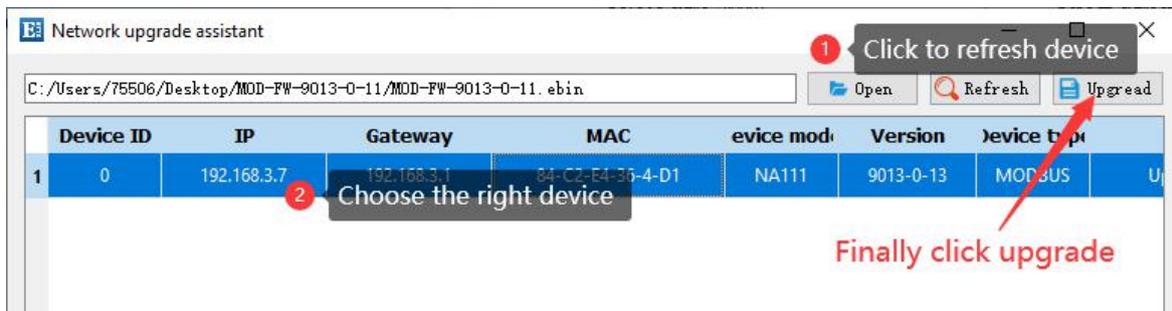


Figure 4-6 Upgrade the third step

Step 4: Wait for the device upgrade to complete and restart the device.

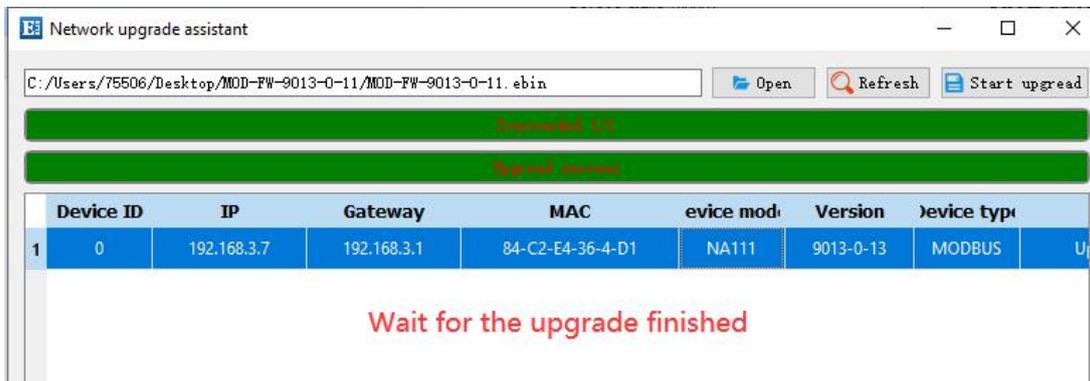


Figure 4- 7 Upgrade the fourth step

4.5 Modbus gateway features

Supports 4 MODBUDS gateway features:

- Simple protocol conversion mode
- Multi-host mode (Modbus firmware only supported).

- Storage gateway (Modbus firmware only).
- Configurable gateway (Modbus firmware support only).

4.5.1 Simple protocol conversion mode

Simple protocol transformation: Convert Modbus RTU data to Modbus TCP data, or Modbus TCP data into Modbus RTU data, enabling Ethernet Modbus data to interoperate with serial Modbus data.

Simple protocol transformations can work in TCP server mode or in TCP client mode, whether working on TCP servers or TCP clients can only have one Modbus master.

The gateway works in TCP server mode:

- When the Ethernet side is the Main Station of TheModbus, only Theocket (prevents data conflicts) can be connected all the way;
- When the serial port side is the main station of Modbus, up to6 Modbus TCP from the station can be connected;

The gateway works in TCP client mode:

- The Ethernet side acts as the Modebus master, and the serial side theoretically supports up to 128 RTU from the station;

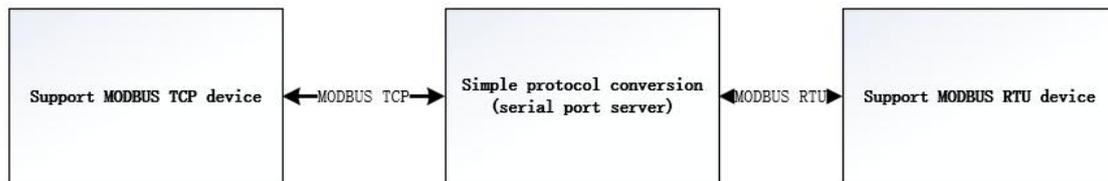


Figure 4-8 Simple Protocol Conversion

Simple protocol conversion parameter configuration:

- (1) Mode configuration: AT is configured as MOD1, and the web page, the desktop selects a simple protocol conversion.
- (2) Modbus Answer TimeOut Configuration: Range: 0-65535ms, Default: 500ms.

4.5.2 Multi-host mode

For simple concoding conversions, there can only be one Modbus master, and functional upgrades are performed, and bus occupancy scheduling occurs when multiple hosts access the

Modbus gateway at the same time, thus resolving bus conflicts (currently only 6 host connections are supported), and only support working in TCP server mode.

Because of the bus conflict detection mechanism, each additional Modbus master has an impact on the timeliness of the data response.

For example, multiple computers turn on the configuration king to collect data (up to six, too many MODBUS hosts can cause a stable variation).

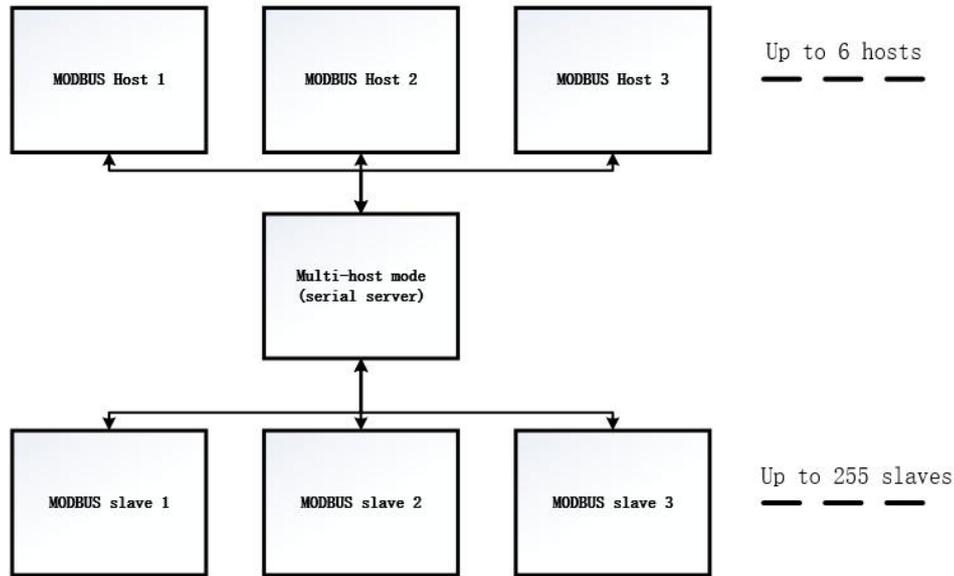


Figure 4- 9 Multi-Host Mode

Multi-host mode parameter configuration:

- (1) Mode configuration: AT is configured as MOD2, and the web page and the host select the multi-host mode.
- (2) Modbus answer timeout time configuration: Range: 0-65535ms, default: 500ms.

4.5.3 Storage gateway

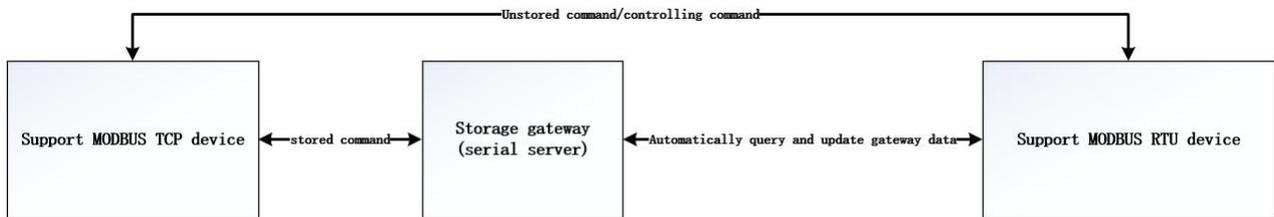
A gateway based on multi-master development that optimizes the speed of read on the network side, a read instruction issued by the storage network side, and when a stored instruction is read on the network side, the gateway responds quickly to the MODBUS TCP instruction instead of the RTU device, and the serial side automatically polls the RTU device register during the instruction storage time to update the data.

As an upgraded version of the multi-host mode, the storage gateway also works only in TCP

server mode, increasing the responsiveness of the network side.

peculiarity:

- (1) The gateway allocates a total of 5K space for storage of instructions and storage that returns results;
- (2) RTU responds to timeouts by automatically deleting storage instructions to ensure the real-time nature of the data;
- (3) The gateway polls the RTU device based on the instruction storage time used for the configuration, the MODBUS host does not query the instruction again at storage time, and the gateway automatically deletes the storage instruction to free up memory;
- (4) The first instruction is transmitted directly to the RTU device;
- (5) Only 01, 02, 03, 04 MODBUS function code query results storage;



Only support 01, 02, 03, 04 functional code storage

Figure 4- 10 Storage Gateway

Storage gateway parameter configuration:

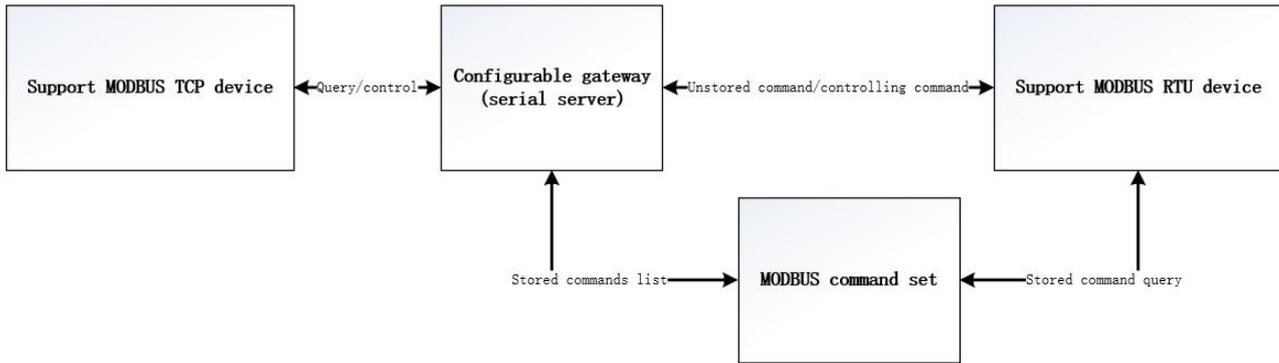
- (1) Mode configuration: AT is configured as MOD3, and the webpage, computer selects the storage gateway.
- (2) Modbus Answer TimeOut Configuration: Range: 0-65535ms, default: 500ms.
- (3) Modbus instruction storage time Settings: Range: 0-254s, for instruction storage time settings, default: 10s.

4.5.4 Configurable gateway

Serial port automatically polls the RTU device register (MODBUS read instructions only are supported) based on the configured MODBUS instructions, and unconfigured instructions and control instructions operate directly on the RTU device. You can store frequently read instructions in advance in the gateway, reducing response times (querying configured instructions). Due to the above features, only Modbus from the serial side of the storage gateway can be connected.

Only 14 storage instructions can be configured using the web page, and 50 storage instructions can be configured for the desktop and AT instructions.

It can improve the response speed of simple protocol transformation but has some effect on stability, and is used in scenarios that have high demands on response real-time.



Need to configure polling command in advance
 Only 01, 02, 03, 04 functional code storage can be configured

Figure 4-11 Configurable gateway

Configurable gateway parameter configuration:

- (1) Mode Configuration: AT is configured as MOD4, and the webpage, the desktop selects the configurable gateway.
- (2) Modbus answer timeout time configuration: range: 0-65535ms, default: 500ms.
- (3) Storage instructions: Web page configuration format (e.g. 01,01,00,00,00,08), the upper computer directly enters MODBUS instructions (e.g. 010100000008).

5. How it is configured

5.1 Web settings

You can customize the settings with the web settings. Open your browser, enter the device IP(default:192.168.3.7)in the addressbar, go to the page, query, set parameters, and finally click on the "Submit" menu to wait for the page to return a success prompt, you can take effect.

Note: The device cannot use web settings if it has been connected to the server as client mode and successfully connected to the client as a server

Note: Web settings cannot be used if domain name resolution is turned on or DHCP is turned on and an IP address is not available.
As shown in the drawings.

5.2 Configure tool software settings

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

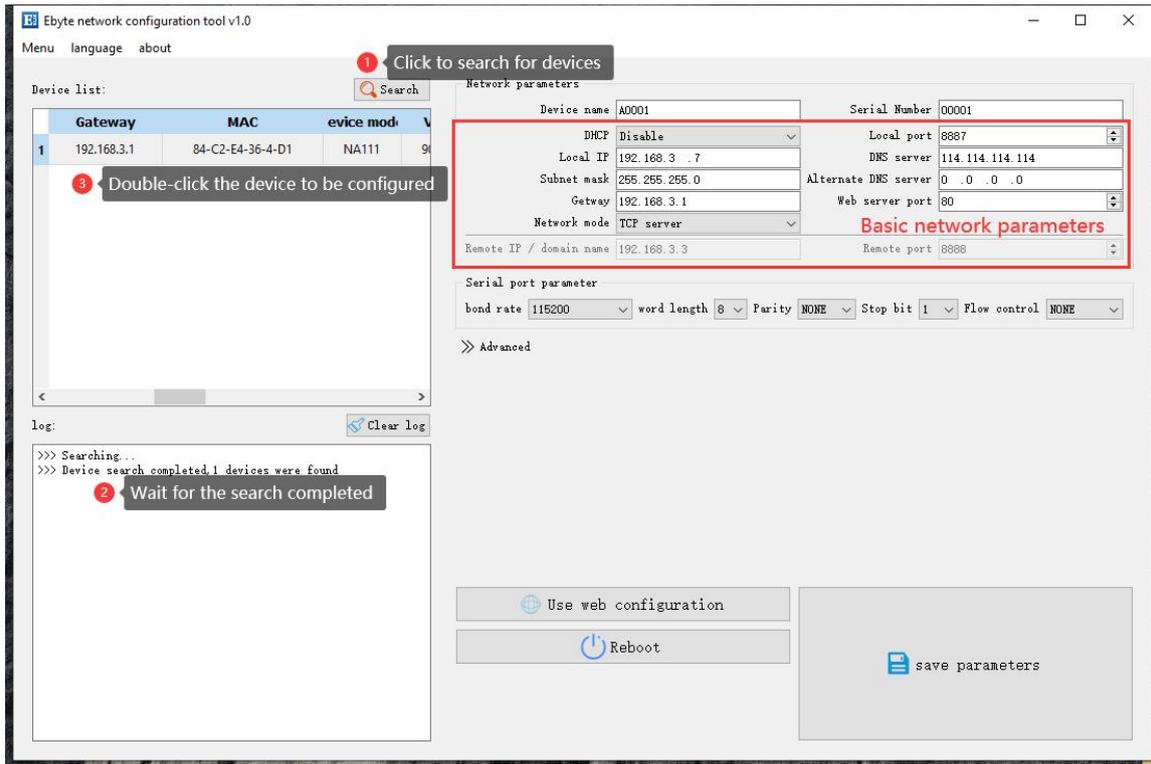


Figure 2- 7 Upper computer configuration

5.3 AT instruction configuration

The relevant parameters of the device are modified and can be done through the AT instruction configuration. For specific AT instructions, refer to the Serial Server AT Instruction Set.

6. Revise history

The final interpretation is owned by Chengdu Eymut Electronics Technology Co., Ltd.

version	The revision date	Revised instructions	Maintainer
1.0	2021-06-28	The initial version	LC
1.1	2021-09-13	Content revision	LZX

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