16CH-RS232/485/422-ETH

User Manual

V.1.1.0

Figure 1 16CH-RS232/485/422-ETH

1. Overview

16CH-RS232/485/422-ETH is a standard 1U rack-mount converter for 16 RS232/485/422 and TCP/IP protocols. It supports 16 RS232 serial ports/16 RS485/RS422 serial ports (RS422 requires ordering before ship), and RS232 supports flow control. Connecting to the 16CH-RS232/485/422-ETH via a single network cable enables all 16 serial ports to operate simultaneously in full-duplex mode. Each serial port can function as a TCP server, TCP client, UDP, or UDP multicast. It also supports 4 network ports with switch functionality.

16CH-RS232/485/422-ETH uses one IP address for each of the eight serial ports (ports). Different ports are distinguished by their ports. It also supports eight IP addresses for eight serial ports. Ports are the same and can be distinguished by IP addresses. Two IP addresses are required for 16 channels. It has the functions of Modbus TCP to Modbus RTU and serial port to Telnet protocol.

The 16CH-RS232/485/422-ETH uses an ARM9 processing chip to support high-speed data transmission at 921.6Kbps without packet loss.

The serial port of the 16CH-RS232/485/422-ETH is RJ45. When using RS232, RJ45 to DB9 (male) adapter fittings are available. When using RS485, you can use the RJ45 to 2pin terminal. For the line sequence, refer to the hardware section.

DB9 accessory wire for RS232

RS485 transfer terminals

Figure 2

2. Features

2.1 Hardware Features

- 16 serial ports support RS232, RS485, RS422 three serial ports (RS422 needs to order before ship).
- All 16 channels can full-duplex work independently and no-interference each other. Can be configured different baud rate.
- Support network switch function of 4 Ethernet port, and can be used as switch

meanwhile.

- Various indicators. Each serial port has its own TCP connection indicator and data activity indicator.
- Support power supply through cable-POE power supply (customization)
- 220V AC power supply.
- 19-inch standard 1U rack structure design, convenient installation. With rack installation accessories.
- Passed Level 4 EMC test, industrial grade temperature range.

2.2 Software Features

- Support IP "split" technology: Different serial ports can be distinguished by port or IP. Port differentiation: 8 IP addresses can be combined into one IP, and the ports are different, which is suitable for networks lacking IP. IP address: One IP address is changed to 2 to 8 IP addresses, and the ports are the same. It is suitable for applications with fixed port numbers (for example, port 502 of Modbus TCP needs to be fixed).
- Support TCP server, TCP client, UDP mode, UDP multicast.
- The baud rate ranges from 300 to 921600bps, data bits range from 5 to 9, and the parity bits can be none, odd, even, mark, or space. The CTS/RTS hardware flow control and XON/XOFF soft flow control are supported.
- Supports MQTT gateway function.
- Support JSON to Modbus RTU, Modbus TCP and 645 instrument protocols, support HTTP POST, HTTP GET format upload data.
- Supports the function of sending MAC addresses when connected to devices, facilitating device management in the cloud.
- Provide computer side search, configuration device secondary development kit DLL development library.
- DHCP dynamically obtains IP addresses and DNS addresses.
- Supports remote device search and device parameter configuration in the cloud.
- You can remotely view the TCP connection status of the device through software. The virtual serial port supports data monitoring.
- The 16CH-RS232/485/422-ETH supports the Modbus gateway function and transfers from Modbus RTU to Modbus TCP.
- The 16CH-RS232/485/422-ETH supports the Telnet to serial port function and supports embedded Telnet protocols.
- The 16CH-RS232/485/422-ETH supports multiple hosts: In the question-and-answer

query mode, multiple computers can access the same serial port at the same time.

3. Technical Parameters

Table 1 Technical Parameters

Appearance	
Interface:	20 RJ45: 4 Ethernet port, 16 Serial ports.
Power Supply:	220V AC, 10W
Size:	19-inch standard size: L x W x H = 48cm×18cm×4.4cm
Communicate Interface	
Ethernet:	4 10M/100M, switch structure, connect anyone can work
Serial	16 serial ports, each include: RS485/RS232/RS422 (RS422 needs jumper setting)
Serial Port Parameters	
Baud rate:	300~921600bps
Data bit:	5～9
Parity bit	None, Odd check, even check, Mark, Space
Flow control	RTS/CTS，DTR/DCR, NONE
Software	
Protocol:	TCP、UDP、HTTP、MODBUS TCP、MQTT、JSON、DHCP、DNS
configuration method :	VirCom, WEB browser, device management library
Communication method:	Socket, Virtual serial , device management library
Operating Mode	
TCP server, TCP client, UDP, Real Com Driver, Modbus TCP, Telnet	
Environment	
Operating temperature:	-40~85℃
Storage temp:	-65~110℃
Humidity:	5~95%RH

CONTENT

4. Instructions

4.1 Hardware Description

The front view of the 16 CH-RS232/485/422-ETH serial port server is shown in the figure 1. The casing is made of black, radiation-resistant SECC metal.

The size is standard 19 inches 1U chassis of L x W x H = 48cm × 18cm × 4.5cm. Power supply: 220V AC power supply, equipped with power line. There is a grounding point (left side of the power supply) in the shell, and it is not necessary to connect the ground wire if the ground wire of the power supply line is connected.

Figure 3 Front Diagram

Back Diagram

4.2 Indicator lights

Figure 4 Indicator and Ethernet Ports and Serial Ports

Name	Function
power indicators	red. If the switch is not on after power-on, check whether the switch is set to position 1.
4 Ethernet LAN NET1～NET4	It has the same function and can be used as a switch. Network port Green and yellow indicators indicate network data activity.
PORT1~PORT16	1st line is PORT1, PORT3……PORT15，2nd line is PORT2, PORT4……PORT16. The green indicator indicates that the TCP connection corresponding to the serial port is established or is in UDP mode. The yellow indicator indicates that the serial port is active.

4.3 Serial port Line Sequence

Users connect the 16 CH-RS232/485/422-ETH to a switch, hub, or computer network card through NET1 to NET4 network ports. It can also be used for the cascade of 16 CH-RS232/485/422-ETH, expanding to 32 serial servers.

The following figure shows the sequence of network ports：

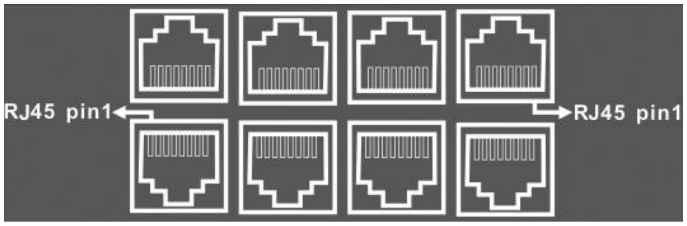


Figure 5 Cable line sequence

RJ45 PIN	1	2	3	4	5	6	7	8
Name	RTS	RXD	TXD	CTS(422-)	GND	485+	485-	422+

1) When as RS232, the required pins are shown below：

RJ45 PIN	Name	Specifications	Corresponding RJ45 to DB9 accessory sequence
2	RXD	The receiving pins of serial device server	2
3	TXD	The sending pins of serial device server	3
5	GND	Grounding	5
1	RTS	After the flow control is enabled, when the pin is 0, the serial device server can accept the data of the serial device.	6, 8

4	CTS	After the flow control is enabled, when the pin is 0, the serial device server can send the data of the serial device.	4, 7

Users can make their own crystal head to connect the RS232 device, or equipped with RJ45 to DB9 line (male), the corresponding line sequence refer to the above table. The equipped DB9 line can be directly connected to RS232 DB9 female device.

When used as RS485, only need to connect pin6 (485A) and pin7 (485B). It is recommended that the user make the crystal head by own and connect it to the RS458 device via Category 5 shielded cable.

When used as RS422, you need to jumper inside the device, change the pin4 from flow control CTS of the RS232 to receive R- of RS422 to. Please contact our engineers for specific practices.

Item	422 line of 16CH-RS232/485/422	The corresponding connection line to User RS422
6	T/R+（485A）	R+
7	T/R-（485B）	R-
8	R+	T+
4	R-	T-

16CH-RS232/485/422 meet the RS485 standard, each 16CH-RS232/485/422 can be with 32 terminal 485 devices. The maximum communication distance is 1200 meter, the resistance of 485 terminal is 120 ohms, usually must use terminal resistance when wiring over 300m. Pay attention to the wiring, 485+ and 485- must be a twisted-pair, in order to reduce signal interference.

5. Software Installation

Connect the provided power cord to the device's 220V power interface. After powering on, turn on the switch on the back.

If the power indicator light on the front illuminates, the device is powered normally. Connect to the network using any of the four network ports.

Configure the device parameters using Vircom. Please refer to the instructions below for specific configuration methods. After configuration, connect the software to the corresponding PORT's TCP/UDP port to enable data forwarding between the device and the corresponding serial port.

Vircom can be used to configure the device IP and other parameters, also can create virtual serial port. If no need the virtual serial port function, you can download the free-installation version.

Table 2 Software Version

Software	Description
VirCom_en	English version configuration software
Virtual-serial-port	Virtual serial port control software

5.1 Parameter Configuration

After installing Vircom, the hardware also connecting, run Vircom software and click "Device Manage" as figure 6. Use Vircom can search and configure the device parameter in different segment, which is very convenient as long as the device and computer of running Vircom are under the same switch.

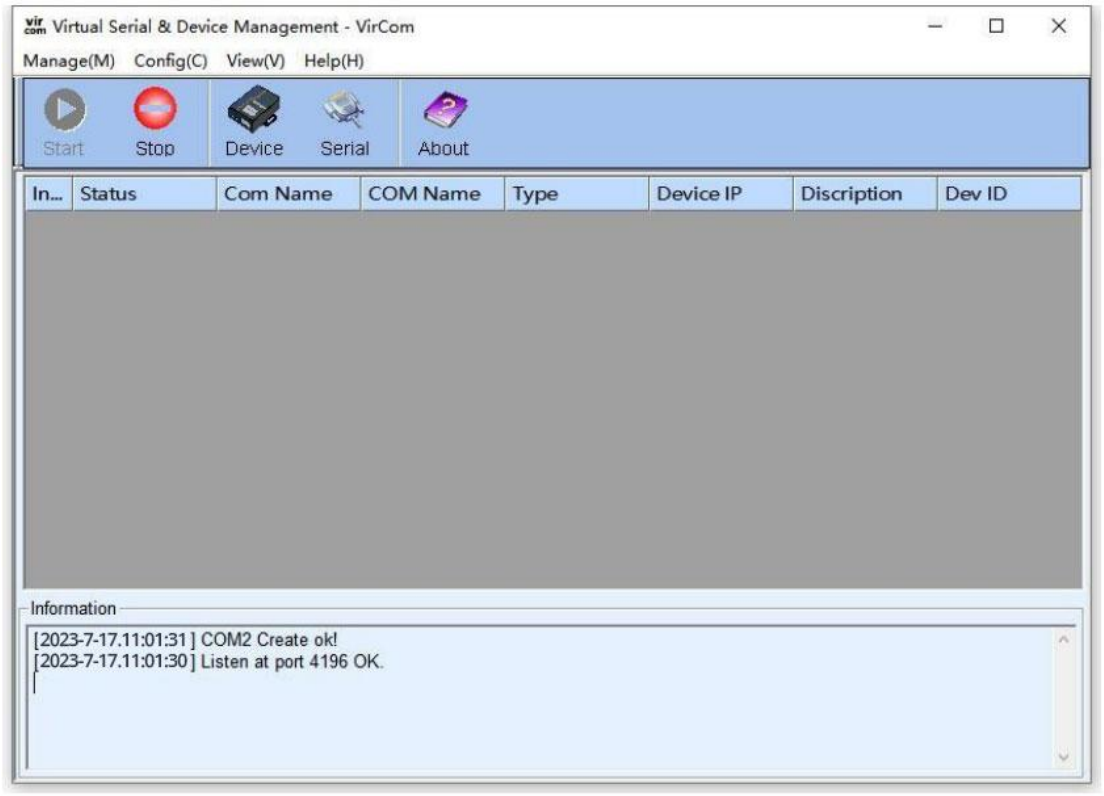


Figure 6 Vircom Main Interface

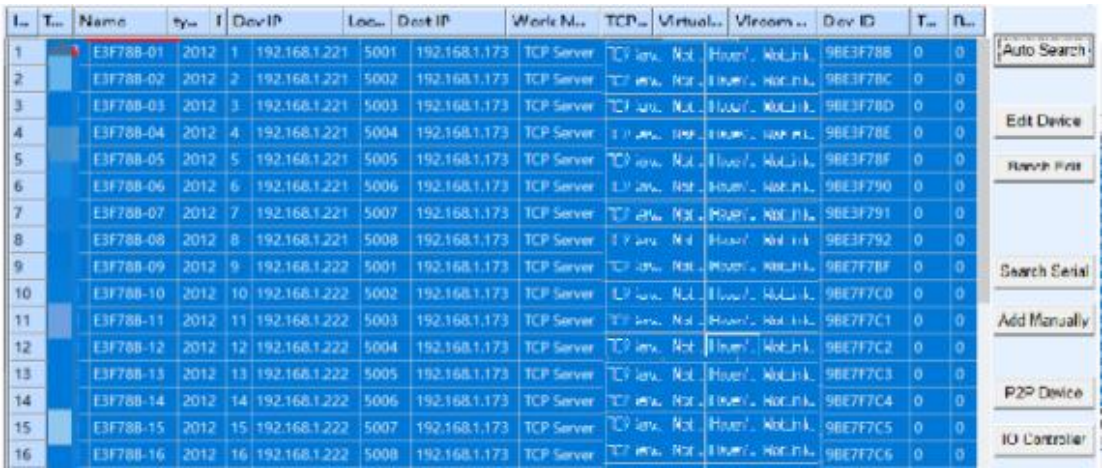


Figure 7 Device List

After sorting, the 16 ports of the device are arranged consecutively. In this case, start from the first device E3F78B-01 and drag the mouse down until the devices with all 16 ports are selected. Then click "Batch Edit". Batch Edit will allow 16 ports to be modified at once, with the correct IP and PORT.

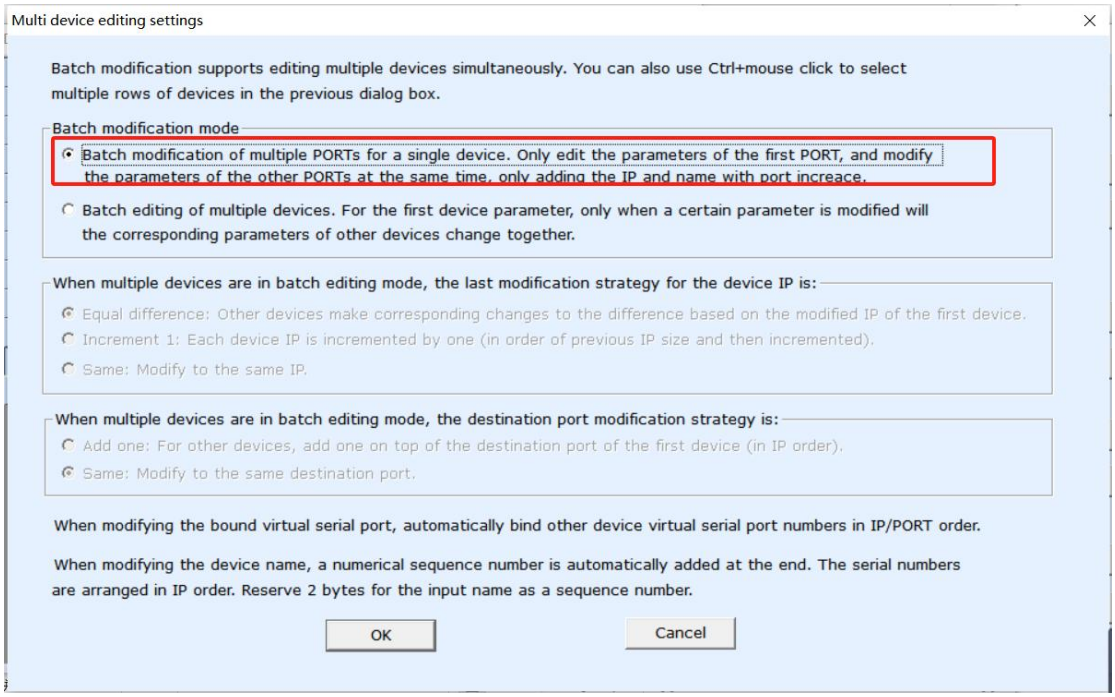


Figure 8 Batch setup options

Because all ports of channels 1 to 16 are selected, the software recognizes all PORT changes to a device at one time, as shown in the figure above. When selecting the batch modification method of 8 ports of a single module, you do not need to modify the content of the parameter dialog box, and you can directly click "Modify Settings" to modify it. In this case, although the PORT1 device parameters are not modified, the other 2 to 8 ports selected will be modified into the device parameters of PORT1.

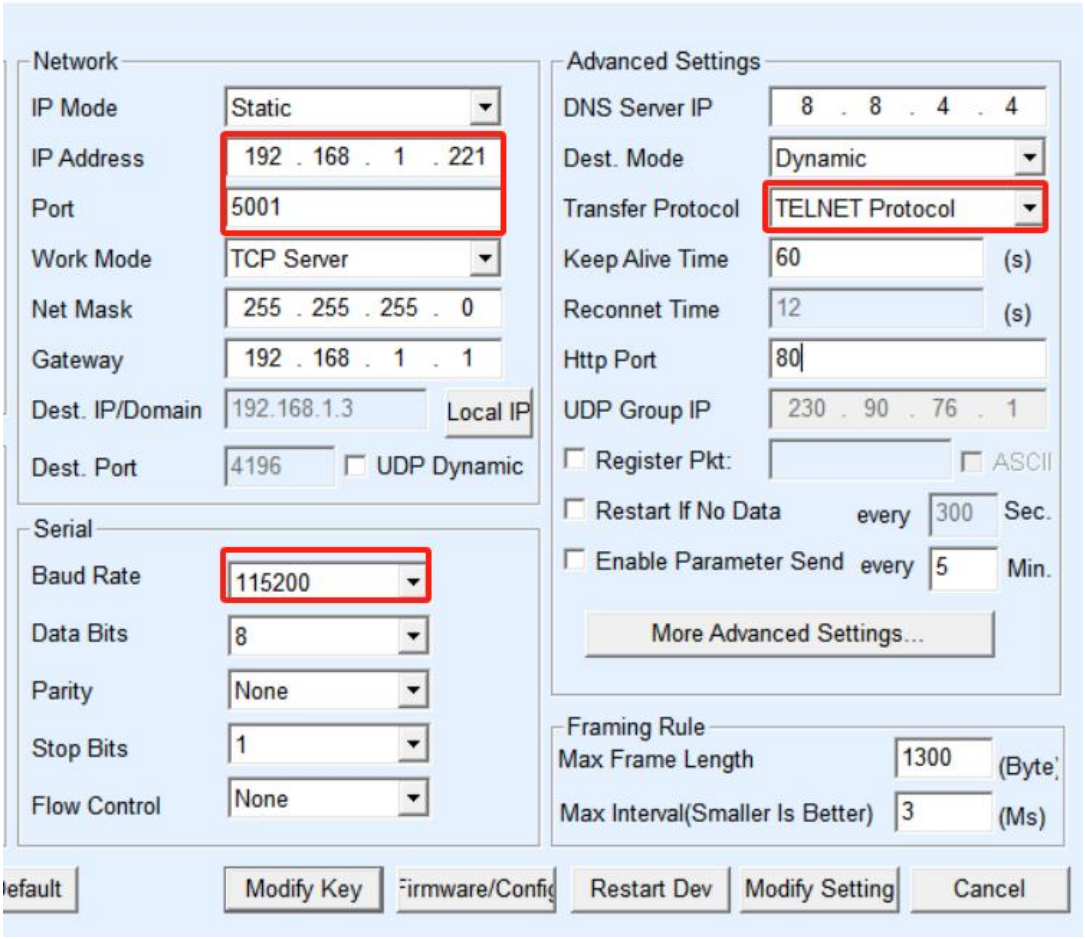


Figure 9 parameter diagram

In the parameter dialog box, you can modify the baud rate and other parameters. If you want to switch from telnet to serial port, select TELNET. E3F78B-01 is automatically filled in by the software based on the PORT ID. IP address 192.168.1.221 is the first IP address, and PORT 5001 is the number of the first port. Then click the "Modify Settings" button. The software can modify 16 ports in batches at once.

The 16 channels have two independent modules. Channels 1 to 8 belong to module 1. Channels 9 to 16 belong to module 2. The new IP address and PORT are shown in the following table：

PORT No	IP	Interface	Inner module	Name
1~8	192.168.1.221	5001~5008	Module 1	E3F78B-01~ E3F78B-08
9~16	192.168.1.222 （Add 1 to the previous IP）	5001~5008	Module 2	E3F78B-09~ E3F78B-16

If the software needs to connect to PORT14, it first knows that the IP is 192.168.1.222 (8 ports one IP, 14 belongs to module 2), and then the PORT number is the sixth in this module (14MOD 8 =6), so the port is 5006. Therefore, the connected IP address is 192.168.1.222 and port 5006.

Modules 1 and 2 cannot be set to the same IP address; otherwise, communication fails. If the IP address is set to the same IP address by mistake, you need to change it to a different IP address, which will not cause adverse results. Different ports of the same module can also be set to different IP addresses. However, if you do not need to change the IP addresses of fixed ports, you are advised not to use multiple IP addresses. Here's how to change to one PORT, multiple ips.

First, select the PORT number you want to modify, and then click "Batch Edit".

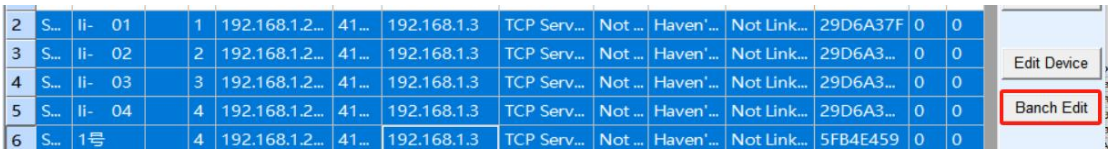


Figure 10 Modifying multiple IP addresses

In batch configuration modification, you can change the Multiple Ports for a single device mode to Batch Edit for multiple devices mode, which does not intelligently identify IP addresses and ports.

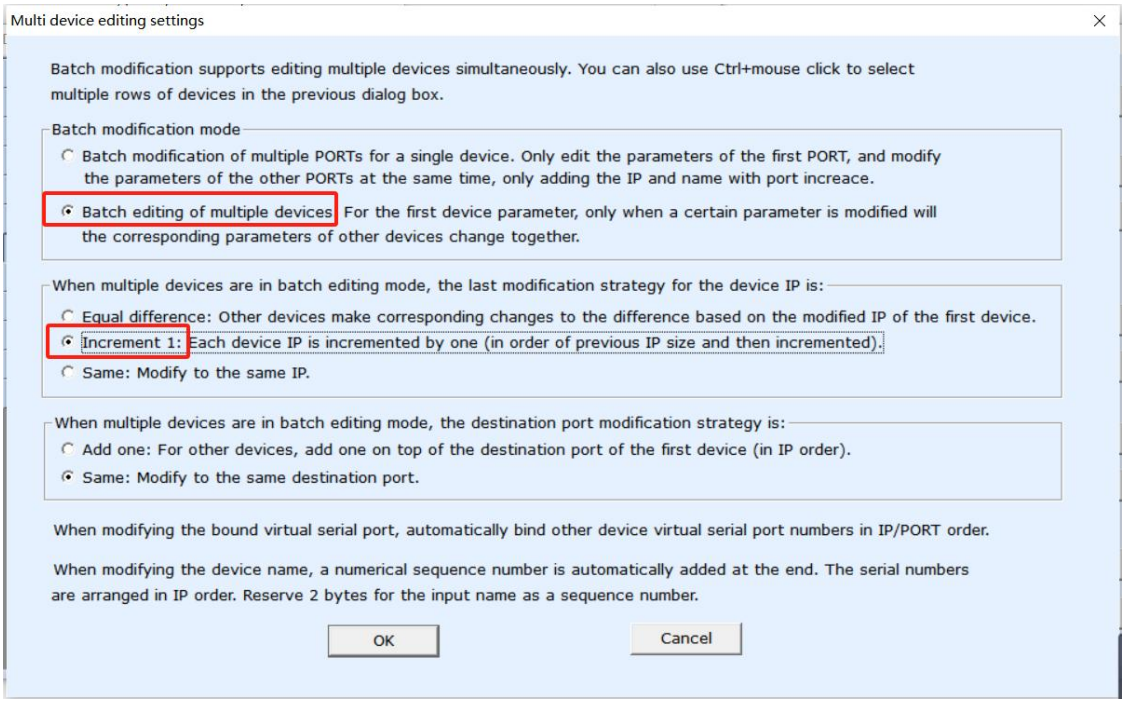


Figure 11 Modifying multiple IP addresses Step 2

In IP mode, select Add One. That is, the IP addresses that follow the first IP address are automatically added by one.

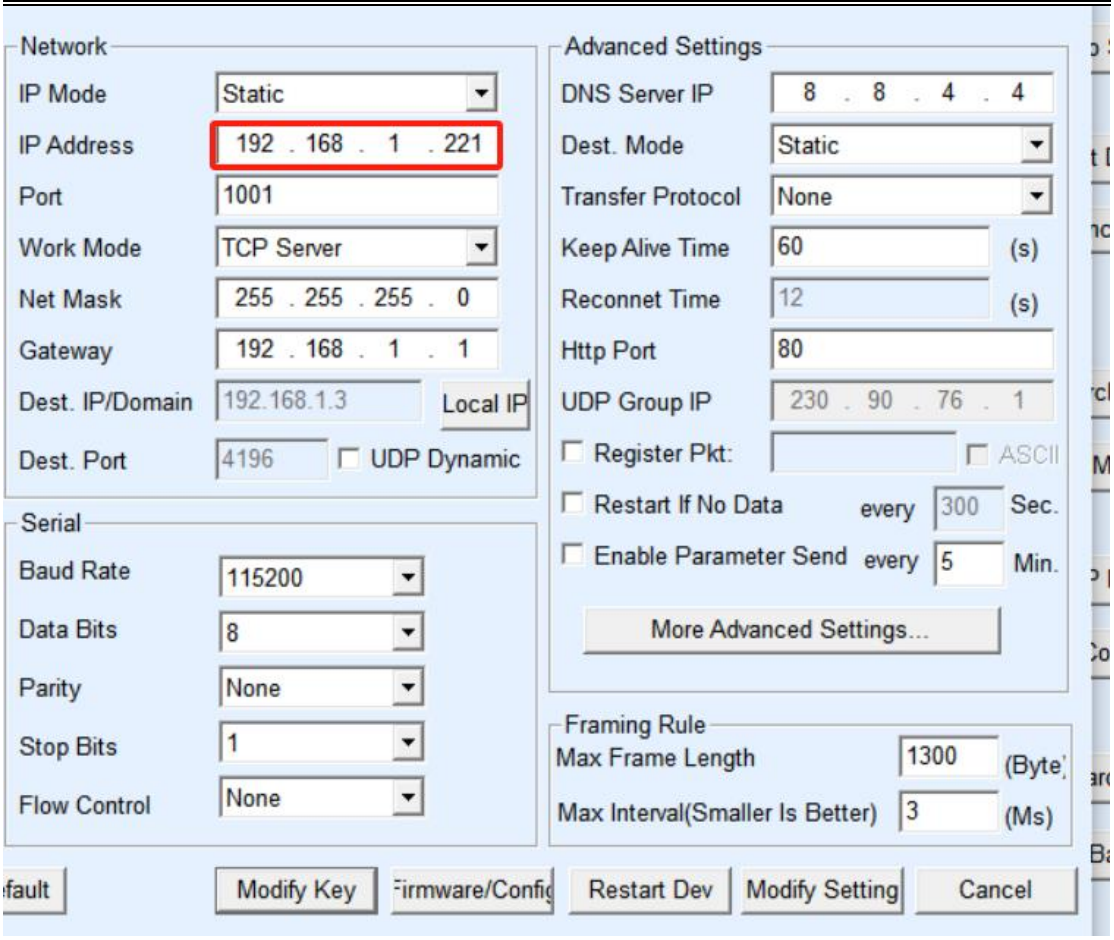
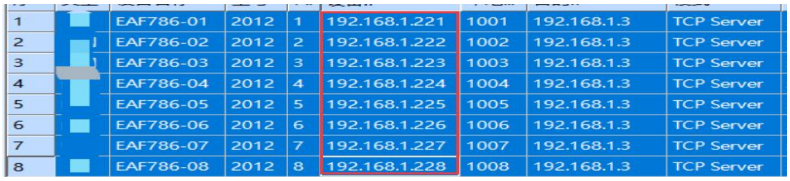


Figure 12 Modifying multiple IP addresses Step 3

In the Modify Parameters dialog box, be sure to change the IP address. If you do not change the IP address, no operation will be performed. Because this mode will only change the change of the parameter down, no change of the parameter will not affect.



1	EAF786-01	2012	1	192.168.1.221	1001	192.168.1.3	TCP Server
2	EAF786-02	2012	2	192.168.1.222	1002	192.168.1.3	TCP Server
3	EAF786-03	2012	3	192.168.1.223	1003	192.168.1.3	TCP Server
4	EAF786-04	2012	4	192.168.1.224	1004	192.168.1.3	TCP Server
5	EAF786-05	2012	5	192.168.1.225	1005	192.168.1.3	TCP Server
6	EAF786-06	2012	6	192.168.1.226	1006	192.168.1.3	TCP Server
7	EAF786-07	2012	7	192.168.1.227	1007	192.168.1.3	TCP Server
8	EAF786-08	2012	8	192.168.1.228	1008	192.168.1.3	TCP Server

Figure 13 Result of modifying multiple IP addresses

According to the modification result, the number of IP addresses is now 8, from 192.168.1.221 to 192.168.1.228.

Because the functions and parameters of each of the 16 serial ports are independent and similar, the following parameters describe the parameters of only one serial port：

Table 3 Parameter Meaning

Parameter Name	Value Range	Meaning
Virtual Serial	Port Unused, created virtual serial port	You can bind the current device to a created virtual serial port. Please add a COM port in "Serial Port Management" on the main interface first.
Device model		Only display the core module model
Device name	Any	You can give the device an easy-to-read name with a maximum length of 9 bytes.
Device ID		Factory unique ID, cannot be modified.
Firmware Version		Core module firmware version
Supporting Function		Refer to Table 4 for the functions supported by the device.
IP Mode	Static, DHCP	Users can choose static or DHCP (dynamic IP)
IP Address		IP address of the serial device server
Port	0～65535	The listening port of the serial port server when it is in TCP Server or UDP mode. When acting as a client, it is best to specify port 0, which is beneficial to improve the connection speed. When using port 0, the system will randomly assign a local port. The difference between this and non-zero ports is: (1) When the local port is 0, a new TCP connection is established with the PC when the module restarts. The old TCP connection may not be closed, and there may be multiple false connections with the device. Generally, the host computer hopes to close the old connection when the module restarts; specifying a non-zero port will close the old connection. (2) When the local port is 0, the TCP re-connection time is faster. When the serial port server is in TCP client mode, it also acts as a TCP server to listen for connections on the port. At the same time, the local port number used by the TCP client to connect to the server is "port + 1".
Working Mode	TCP server mode, TCP client mode, UDP mode, UDP multicast	When set as a TCP server, the serial device server waits for the computer to connect; when set as a TCP client, the serial device server actively initiates a connection to the network server specified by the destination IP.
Sub-net Mask	Eg: 255.255.255.0	Must be the same as the subnet mask of the local area network.
Gateway	Eg: 192.168.1.1	Must be the same as the local LAN gateway.
Destination IP or domain name		In TCP client or UDP mode, data will be sent to the computer indicated by the destination IP or domain name.
Destination Port		In TCP client or UDP mode, data will be sent to the destination port of the destination IP.
Baud Rate	1200、2400、4800、7200、 9600、14400、19200、 28800、38400、57600、 76800、115200、230400、460800、921600	Serial port baud rate

Parameter Name	Value Range	Meaning
Data Bits	5、 6、7、8、 9	
Check digit	None, Even, Odd, Mark, Space	
Stop Bits	1、2	
Flow Control	No flow control, hard flow control CTS/RTS, hard flow control DTR/DCR, soft flow control XON/XOFF	Only valid for RS232 serial port
DNS Server		When the destination IP is described by domain name, you need to fill in the DNS server IP. When the IP mode is DHCP, you do not need to specify the DNS server, it will be automatically obtained from the DHCP server.
Destination mode	Static, Dynamic	In TCP client mode: When using static destination mode, the device will automatically restart after 5 consecutive failures in connecting to the server.
Conversion agreement	NONE、Modbus TCP、Real_COM	NONE means that data forwarding from the serial port to the network is transparent; Modbus TCP will directly convert the Modbus TCP protocol into the RTU (ASCII) protocol to facilitate coordination with the Modbus TCP protocol; RealCOM is designed to be compatible with the old version of the REAL_COM protocol and is a virtual serial port protocol. However, when using a virtual serial port, it is not necessary to select the RealCom protocol.
Keep-alive time	0～255	Heartbeat interval. (1) When set to 1-255, if the device is in TCP client mode, it will automatically send TCP heartbeats every "keep alive time". This can ensure the TCP validity of the link. When set to 0, there will be no TCP heartbeat. (2) When set to 0-254, when the conversion protocol is selected as REAL_COM protocol, every keep alive time, the device will send a data with a length of 1 and content of 0 to implement the heartbeat mechanism in the Realcom protocol. When set to 255, there will be no realcom heartbeat. (3) When set to 0-254, if the device is working in TCP client mode, the device will send device parameters to the destination computer every keep alive time. When set to 255, there will be no parameter sending function, which can realize remote device management.

Parameter Name	Value Range	Meaning
Disconnection re-connection time	0～255	In TCP client mode, when the connection is not successful, each "disconnection re-connection time" will re-initiate a TCP connection to the computer. It can be 0 to 254 seconds. If it is set to 255, it means that it will never reconnect. Note that the first TCP connection (such as hardware power-on, device restart through Vircom software, no data light) will generally be made immediately. Only after the first connection fails will it wait for the "disconnection re-connection time" and try again, so the "disconnection re-connection time" will not affect the connection establishment time under normal circumstances between the network and the server.
Web access port	1～65535	The default is 80
Multicast address		Used for UDP multicast
Enable registration package		When the TCP connection is established, the registration packet is sent to the computer. After enabling the registration packet, the realcom protocol must be selected. Supports TCP server and TCP client modes.
Data packet length	1～1400	One of the serial port framing rules. After receiving data of this length, the serial port server sends the received data as a frame to the network.
Data packet interval	0～255	Serial port framing rule 2: When the data received by the serial port of the serial server pauses and the pause time is greater than this time, the received data will be sent to the network as a frame.

The functions supported by the device are explained as follows:

Table 4 Device Supported Function

Name	Description
Domain name system	The destination IP can be a domain name (such as a server address starting with www).
REAL_COM protocol	A non-transparent serial port server protocol, suitable for multiple serial port servers to bind virtual serial ports through the Internet. Because the protocol contains the device MAC address, it helps the host computer to identify the device. It can be not used in general.
Modbus TCP to RTU	It can realize Modbus TCP to RTU conversion and also supports multi-host function.
Serial port modification parameters	Supports serial port AT commands to configure and read device parameters.
Obtain IP automatically	Support for DHCP client protocol
Storage extension EX function	Subsequent expansion
Multiple TCP connections	Supports more than 1 TCP connection when acting as a TCP server.
IO port control	Supports any custom instructions to control 8 IO outputs.
UDP multicast	UDP multicast
Multi-destination IP	As a TCP client supports simultaneous connection of 7 destination IP.
TELNET function	Connect to the serial port server through Telnet to monitor the serial port of the device.

Modify parameters without restarting the system

PORT1 and PORT8 belong to the same module. If you modify the parameters of one PORT, the whole module restarts. However, in the following cases, only the local PORT will be restarted, and other ports of the module will not be affected.

1. Just click the "Restart Device" button without modifying any parameters.
2. Switch between None and TELNET Protocol.
3. Modify only one or more of the following parameters:
   a) Local port and destination port
   b) Baud rate, data as, check bit, flow control, stop bit

c) Device name, packet interval, packet length

5.2 TCP communication test

Because the functions and parameters of each of the 16 serial ports are independent and similar, the subsequent communication describes the configuration of only one of the serial ports.

After device parameters are configured, you can use the serial port tool or TCP debugging tool to test the TCP connection.

After configuring the device parameters, you can use serial port tools and TCP debugging tools to perform TCP connection communication tests.

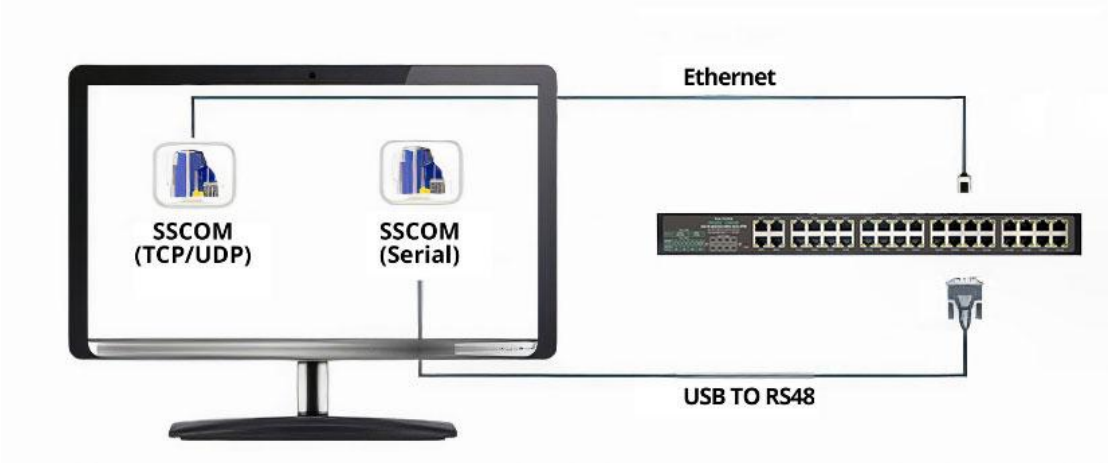


Figure 14 TCP communication diagram

The serial port server's serial port to network port, network port to serial port data transparent forwarding function.

Assuming that the COM port (USB TO RS232/485) of the PC is connected to the serial port of the serial server, then open the serial debugging assistant window and open the corresponding COM port, as shown in the figure below:

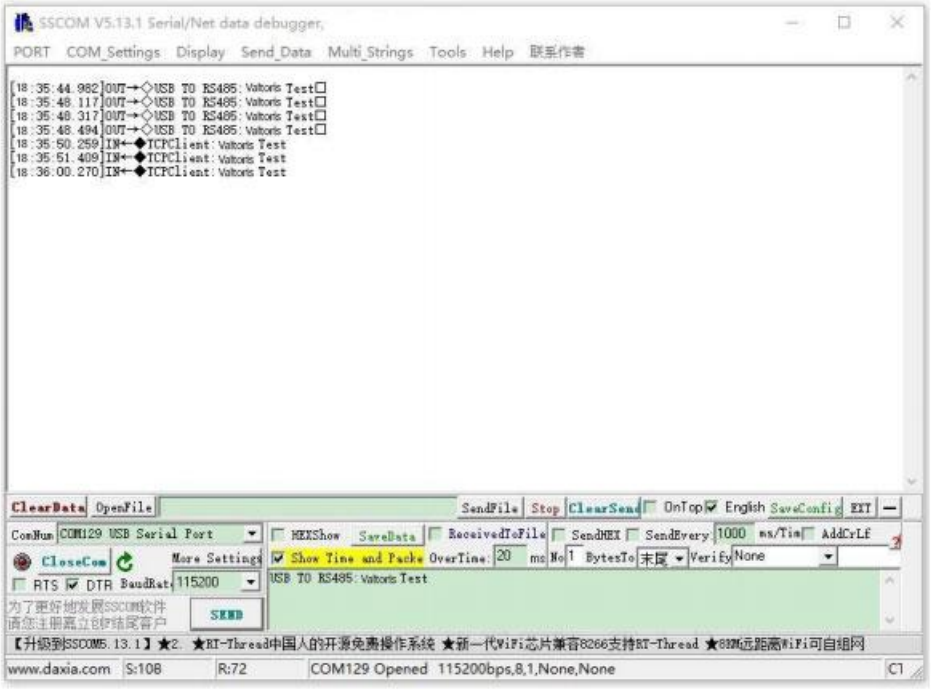


Figure 15 SSCOM1: USB to RS485 transceiver interface

In addition, open one more serial port debugging assistant window and use it as a TCP client mode. Fill in the destination IP as the IP of the serial server (currently 192.168.1.200) and the destination port as 4196, and then click the "Open" button, as shown in the figure below:

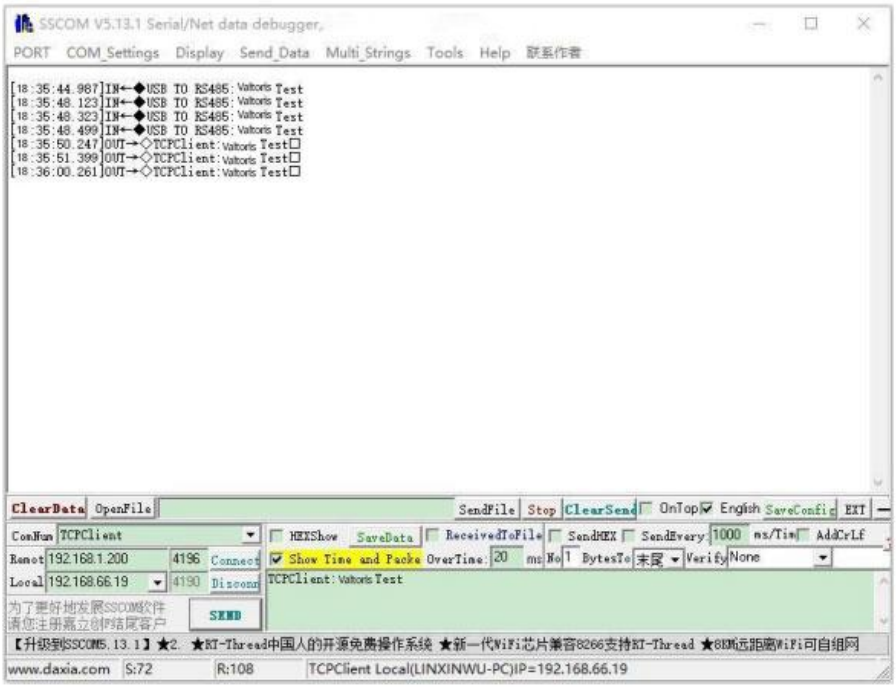


Figure 16 SSCOM2: TCP Client transceiver interface

Enter "TCP Client: “Valtoris Test" in the serial debugging assistant SSCOM2 set as

TCPClient and click to send, the data will be transferred to the RS485 interface through the serial server network port, next it will be sent to the USB TO RS485, and finally be displayed in the serial debugging assistant SSCOM. In turn, input "USB TO RS485: Valtoris Test" in SSCOM1, and click to send to SSCOM2 and display it.

5.3 Virtual serial port test

The SSCOM2 in the figure communicates directly with the serial server via TCP. In order to allow the serial software that has been developed by the user to communicate with the serial server, a virtual serial port needs to be added between the user's program and the serial server. As shown in the figure, Vircom and the user's program run on the same computer, and Vircom virtualizes a COM port, so that this COM port corresponds to the serial server. When the user program opens the COM communication, it can be sent to the user serial device through the Vircom serial server. The following demonstrates this operation step:

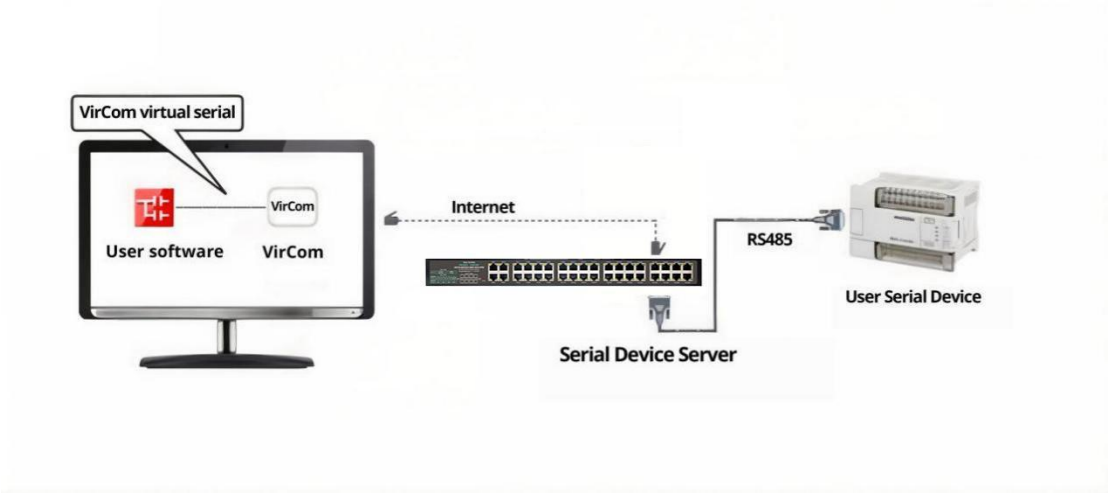


Figure 17 Function of virtual serial port

Click "Serial Port Management" on the Vircom main interface, then click "Add", and select to add COM2, where COM2 is the COM port that does not originally exist on the computer.

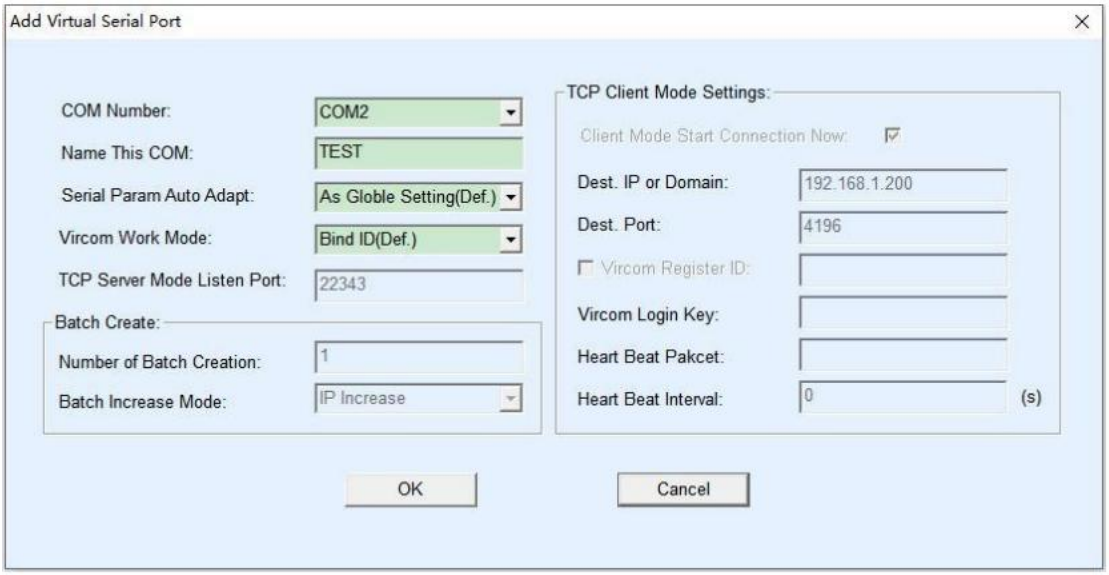
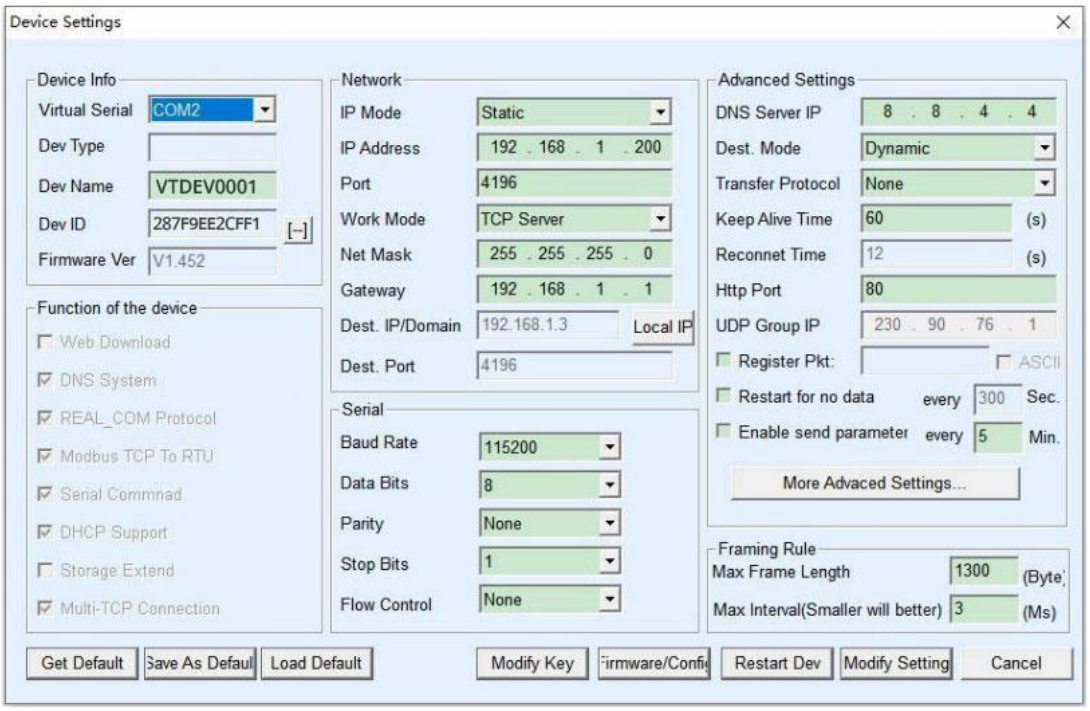


Figure 18 Add Virtual Serial Port

Then enter the “device manage”, and double-click the device that you need to bind to the COM2. As shown in Figure 19, select COM2 from the "virtual serial port" list in the upper left corner. Then click "modify Settings". And return to the main interface of Vircom. You can see that the COM2 has been connected to a device with IP 192.168.1.200. You can use COM2 instead of SSCOM2 to communicate.



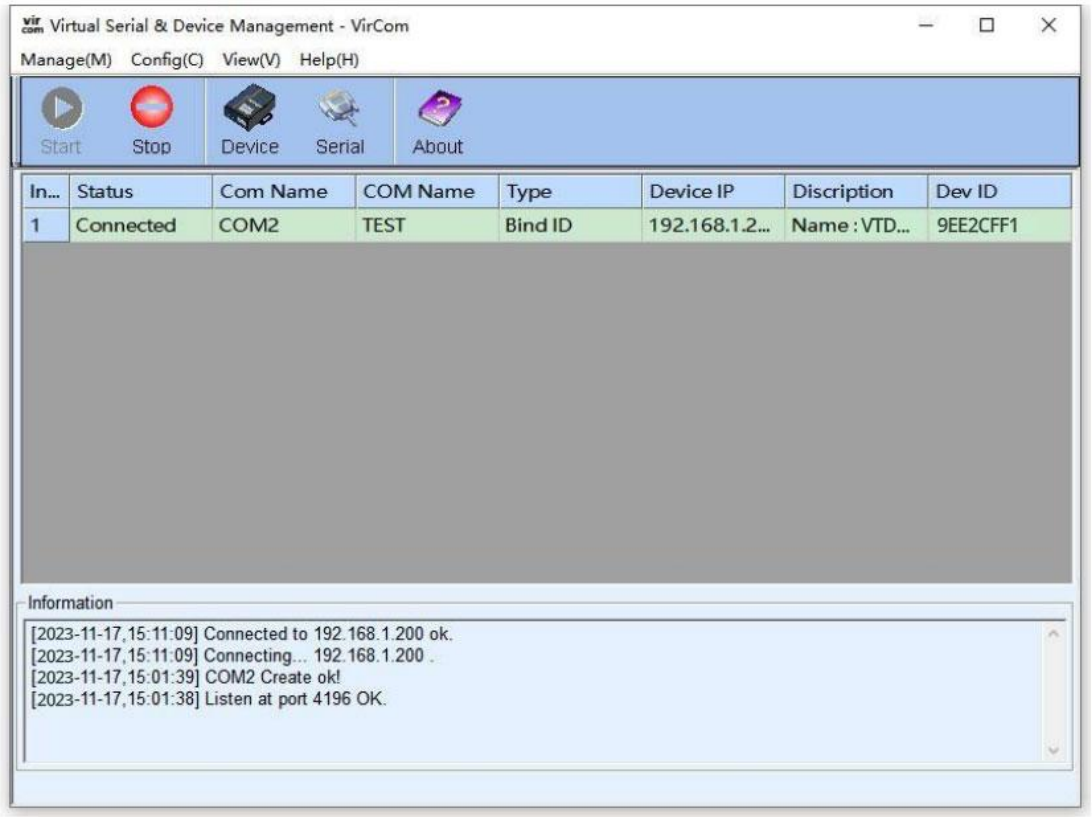


Figure 19 Virtual Serial Port has been connected

Open the SSCOM simulated user serial port program, open COM2 (the virtual serial port in the figure above), then open an SSCOM simulated serial port device, and open COM3 (hardware serial port). At this time, the COM2 data transmission link is as follows: COM2 - Vircom - serial port server network port - serial port server serial port - COM3. Conversely, data can also be transmitted from COM3 to COM2: COM3 - serial port server serial port - serial port server network port - Vircom - COM2. The figure below shows the data transmission and reception of both parties.

If COM3 is replaced with a user serial port device, COM2 can communicate with the user device.

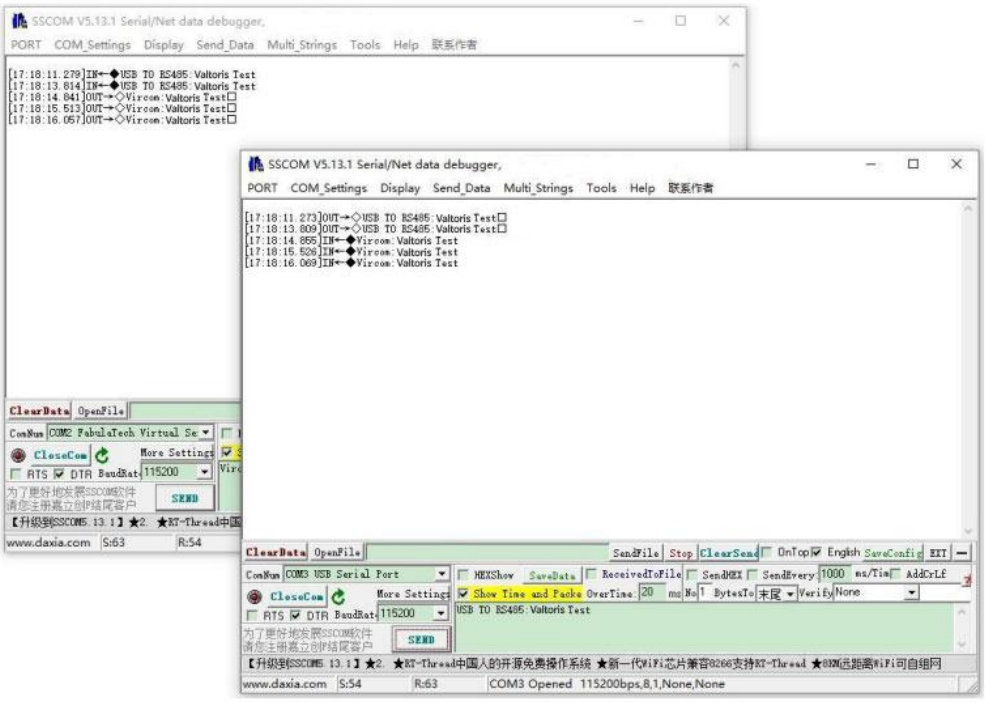


Figure 20 Communication via Virtual Serial Port

5.4 Modbus TCP test

By default, the data of the serial and network port is transparently transmitted. If you need to convert Modbus TCP to RTU, you need to select "Modbus_TCP Protocol" as the conversion protocol in the device setting, as shown in the figure 18 below.

At this time, the device port is automatically changed to 502, the user's Modbus TCP tool is connected to the 502 port of the serial server's IP, the Modbus TCP commands that have been sent will be converted into RTU commands and output via the serial port.

For example, if the serial port server receives the Modbus TCP command of 00 00 00 00 00 06 01 03 00 00 0a, the serial port outputs the command of 01 03 00 00 00 0a c5 cd.

Note: The serial port may send multiple commands of 01 03 00 00 00 0a c5 cd. This is because the default Modbus adopts the storage mode and will automatically train and query commands in turn. How to switch to non-storage mode will be explained later.

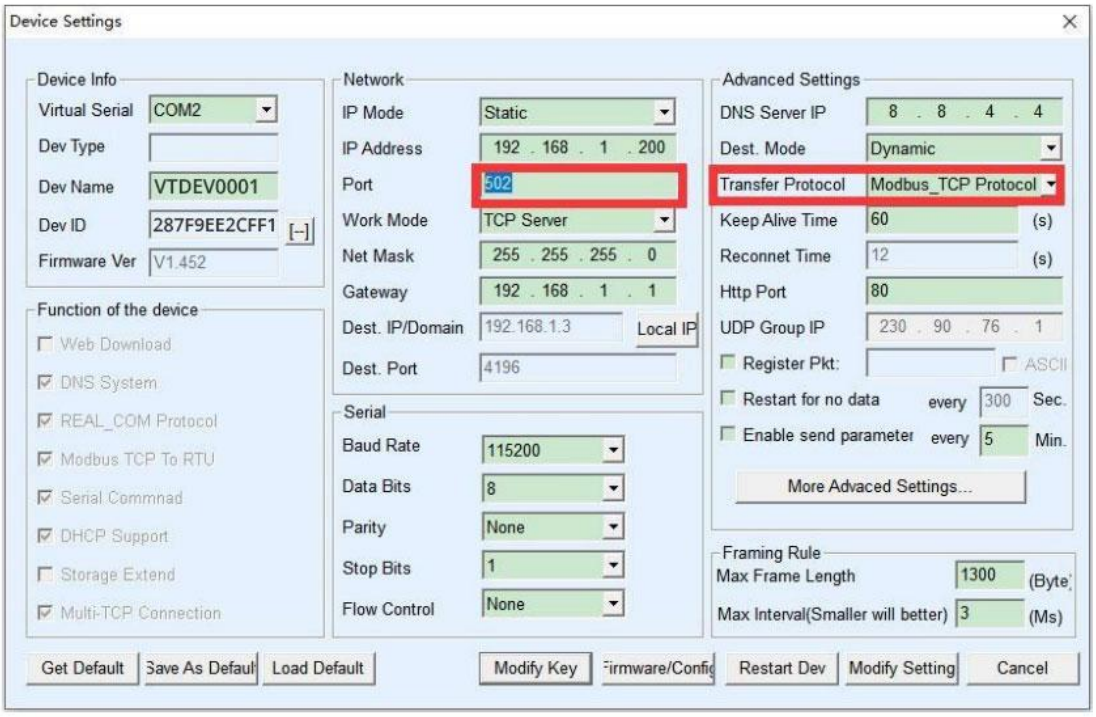


Figure 21 Enable Modbus TCP

If the user's Modbus TCP software is used as a slave, you need to change the working mode to client based on the conversion protocol, and change the destination IP to the IP of the computer where the Modbus TCP software is located, and the destination port is 502, as shown in the figure 22 blow.

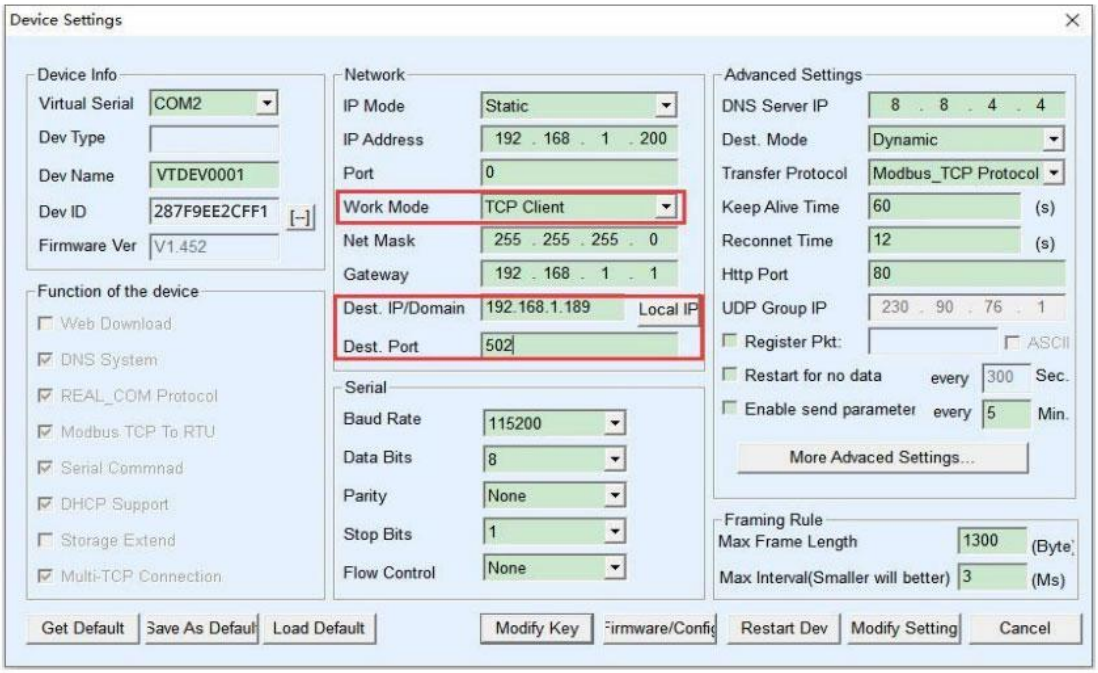


Figure 22 Modbus TCP as client

5.5 Web Configuration

Using Vircom, you can search and configure device parameters in different network segments. Web configuration requires that the computer and the serial server are in the same IP segment first, and the IP address of the serial server must be known in advance. However, Web configuration can be performed on any computer without Vircom.

1. Enter the IP address of the serial server in the browser, such as http://192.168.1.200, and open the following web page:

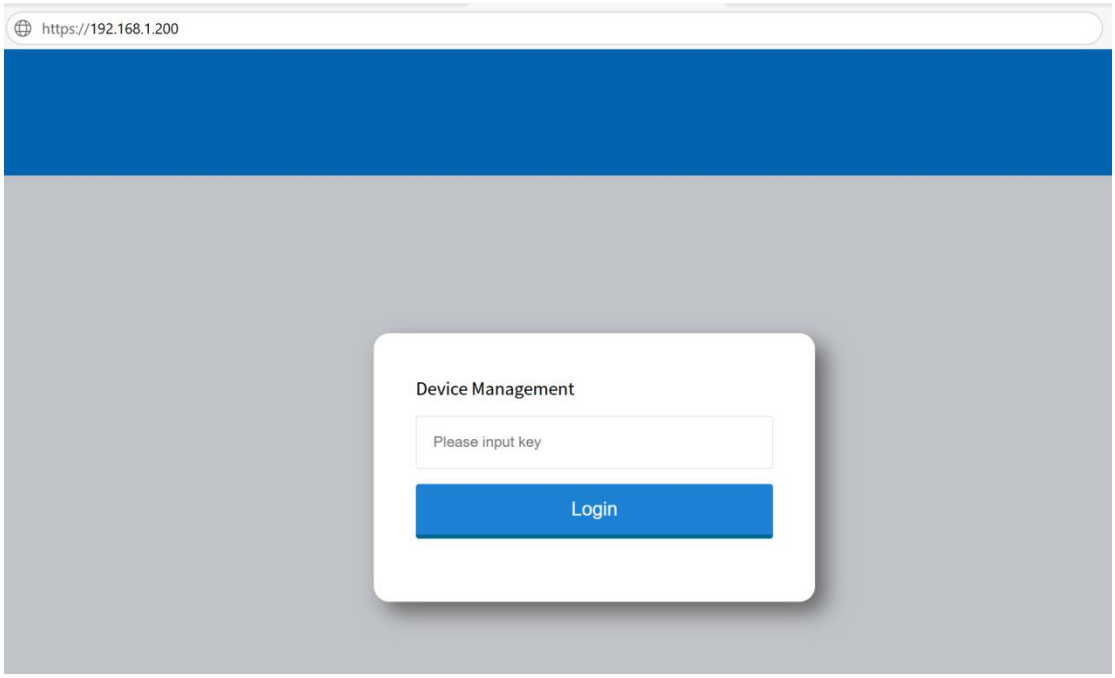


Figure 23 Web login interface

2. Enter Password in Password: default is 123456. Click the login button to login.

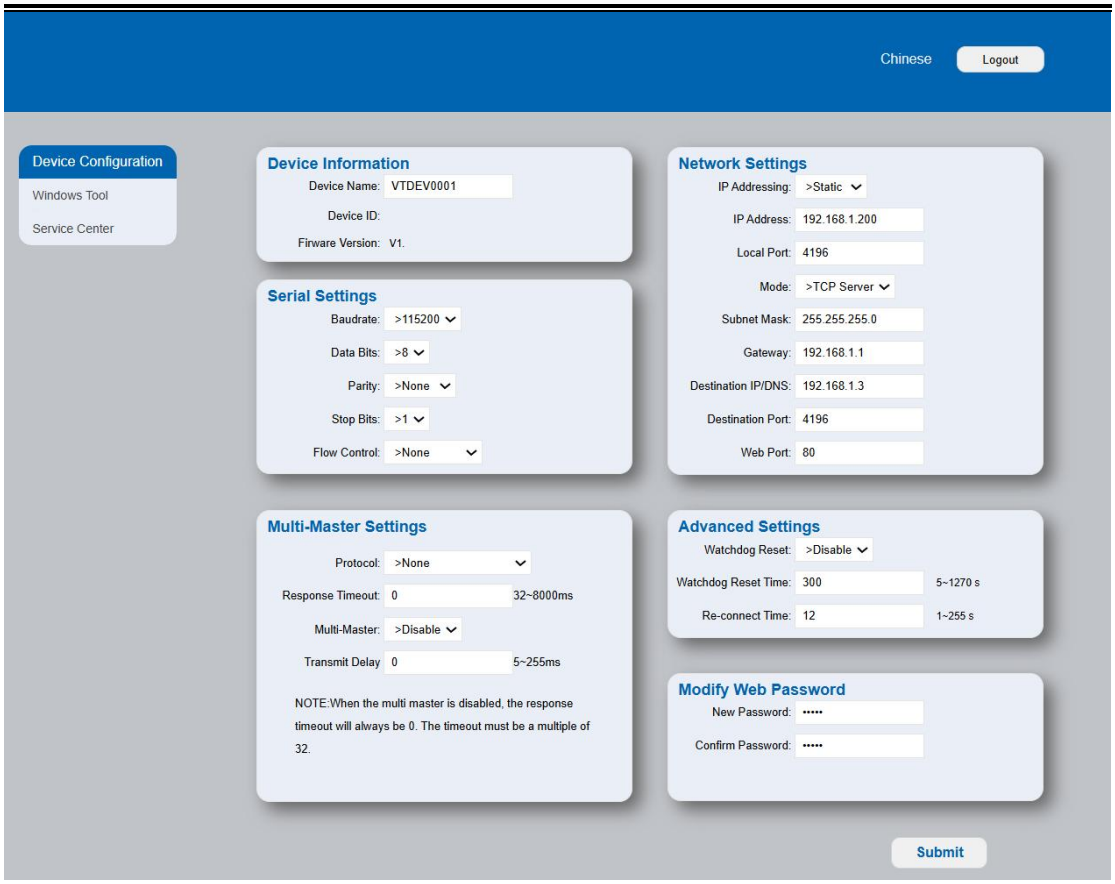


Figure 24 Web configuration interface

3. You can modify the serial port server parameters on the web page that appears. For related parameters, refer to Table 3 Parameter Meaning.

4. After modifying the parameters, click the "Submit Changes" button.

6. Work Mode and Transfer Protocol

Different serial server working modes and conversion protocols can be selected in different application occasions, so that it can be used more stably and reliably, which will be described in detail below.

The use of the serial port server is basically divided into two types: with virtual serial port and non-virtual serial port, as shown in Figure 14 TCP communication diagram and Figure 17 the function of virtual serial port. The virtual serial mode is for the serial interface (COM) on the user software, that is, the user software and devices are serial ports. The user software with the non-virtual serial port mode directly adopt TCP/IP communication, but the user devices still use the serial port.

In non-virtual serial port mode, the "conversion protocol part" is divided into three modes: transparent transmission, Modbus TCP to RTU and Realcom protocol. If the user software is a fixed protocol Modbus TCP protocol and the lower computer is Modbus RTU/ASCII, you need to select the Modbus TCP mode; Realcom protocol is currently

only used when the multi-serial port server is used as a TCP client to connect to a server and the server uses a virtual serial port.

Usage is summarized as follows:

Table 5 network configuration modes

No.	Virtual Serial Port	Device Working Mode	Conversion protocol	Description
1	Use	TCP Server	None	Suitable for situations where user software opens the COM port to actively collect data.
2	Use	TCP Client	None	Suitable for the occasion where the device actively sends data. If you choose TCP server, the device may not be able to reconnect after disconnection.
3	Do not use	TCP Server	Modbus TCP to RTU	Applicable to the case where the user software is Modbus TCP, the user device is Modbus RTU and Modbus TCP is the master station.
4	Do not use	TCP Client	Modbus TCP to RTU	Applicable to the user software is Modbus TCP, the user device is Modbus RTU, and the Modbus RTU is the master station.
5	Use	TCP Client	Realcom Protocol	When the multi-serial port server acts as a TCP client and uses a virtual serial port, it is best to use the Realcom protocol.
6	Do not use	TCP Client	None	Suitable for a large number of devices connected to a cloud. In general, the cloud is a server with a public IP on the Internet.
7	Do not use	TCP Server	None	Applicable when the device and computer are in the same local network, monitoring is done locally without the need to communicate across the Internet.

6.1 Virtual Serial Mode

If the user software uses the COM port for communication, it must use the virtual serial port mode including some PLC software, configuration software, instrument software, etc.

Check if the monitoring computer and the device are both in the local network:

a) If the computer is a server with a public IP leased on the Internet, then the device must use the TCP client method to connect the device to the server. At this time, you can choose ② and ⑤ in Table 5. If it is a multi-serial port server, you must choose ⑤.

b) If they are all in the local network (can ping each other), see whether the host computer actively queries or the device actively sends data. If the device actively sends, you must use the device as a TCP client method ②, otherwise you can choose method ①.

6.2 Direct TCP/IP Communication Mode

If neither Modbus TCP protocol conversion nor the virtual serial port are required, the user software may directly communicate with the network port of the serial server by TCP/IP communication, and the serial server converts TCP/IP data into serial data and sends it to the serial device.

Generally, the above operation is adopted by the users that develop the upper computer to communicate by themselves, which integrates the analysis of the device's serial communication protocol. This method is more flexible and efficient than the virtual serial port. Correspond to ⑥ and ⑦ in Table 7.

The section "5.2 TCP Communication Test" briefly describes how to communicate when the serial port server is used as a TCP server. Here we will describe how TCP client, UDP mode, and multiple TCP connections to communicate with computer software. Among them, the computer software takes SSCOM (serial port debugging, software that imitates user TCP/IP communication) as an example.

The serial server complies with the standard TCP/IP protocol, so any network terminals that complies with this protocol can communicate with the serial server. For any two network terminals (here, the network debugging tool and the serial server) to be able to communicate, their parameter configuration must be paired.

6.2.1 TCP Client Mode

There are two working modes in TCP mode: TCP server and TCP client. Regardless of which mode is adopted, one must be the server and the other must be the client. After that, only the client can access the server. If they all are the servers or the clients, the communication is invalid.

When the serial server is used as a client, there must be three corresponding relationships, as shown in Figure blow.

(1) Working mode correspondence: The working mode of the serial port server is the server mode of the client corresponding to the network tool.

(2) IP address correspondence: The destination IP of the serial port server must be the IP address of the computer where the network tool is located.

(3) Port correspondence: The destination port of the serial server must be the local port of the network tool. After this setting, the serial server can automatically connect to the network tool, and data can be sent and received after the connection is established.

Figure 25 Serial server as a client

6.2.2 The Client connects to Multiple Servers

When the serial server is used as a TCP client, it can connect to 7 destination IP addresses at the same time, and the data sent by the serial port will be sent to 7 destination IPs too. If there are not so many servers, leave the rest of the destination IP vacant. The method is as follow：

Figure 26 The first destination IP and port

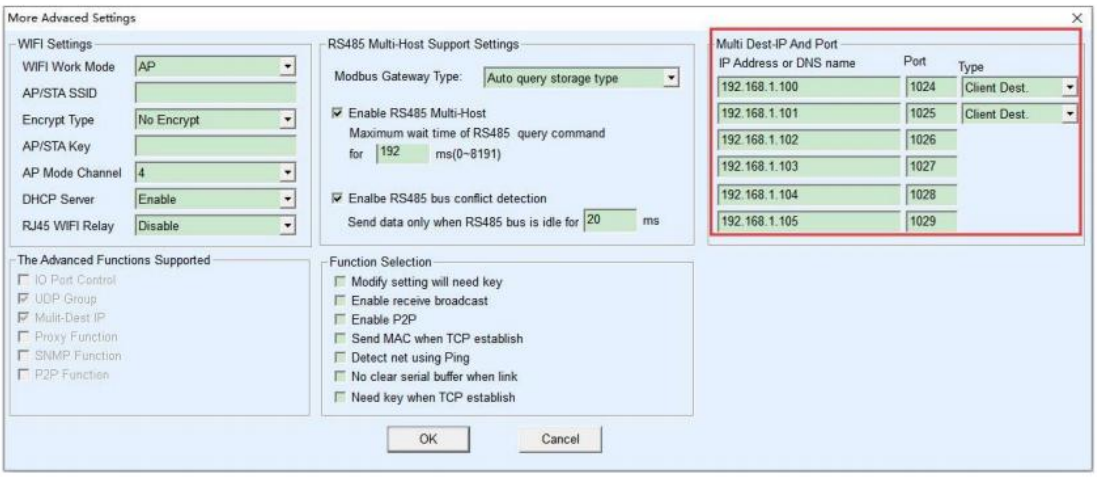


Figure 27 The remaining 2 to 7 IPs and ports

The first IP is set in the device setting interface as shown in Figure 27. The first IP can be a domain name. For the remaining 2~7 destination IPs, click the "More Advanced Setting..." button in the device setting interface to open More Advanced Settings for setting.

After all 7 destination IPs are set up, they can be connected automatically. If they are not connected, they will wait for the "Reconnect Time" time and then reconnect repeatedly.

6.2.3 TCP Server Mode

When the serial port server is used as the server, there are also three corresponding relationships, as shown in Figure 28, which will not be explained here. After setting, click the open button of the network tool to establish a TCP connection with the serial server, and then you can send and receive data after the connection is established.

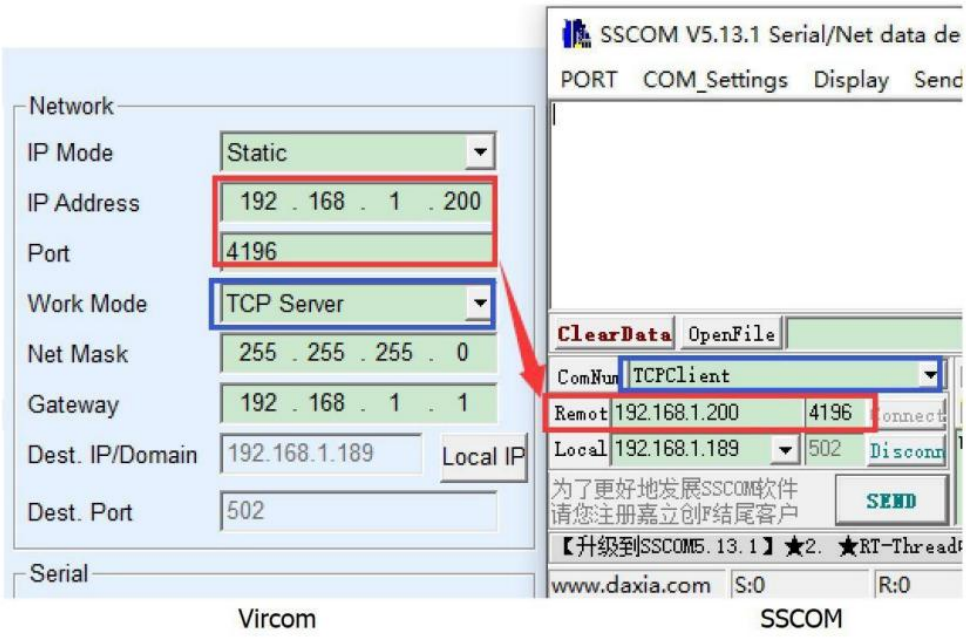


Figure 28 The serial port server as TCP Server

When the serial port server is used as a server, it can accept 30 TCP connections at the same time. The data received by the serial port will be forwarded to all established TCP connections. If you need to realize that data is only sent to the TCP that has recently received network packets, you need to enable the multi-host function, please refer to 8.4 Multi-host function.

6.2.4 Acting as both client and server

The serial server can accept TCP connections even when the device is in the TCP client mode, that is, it also has the TCP server function.

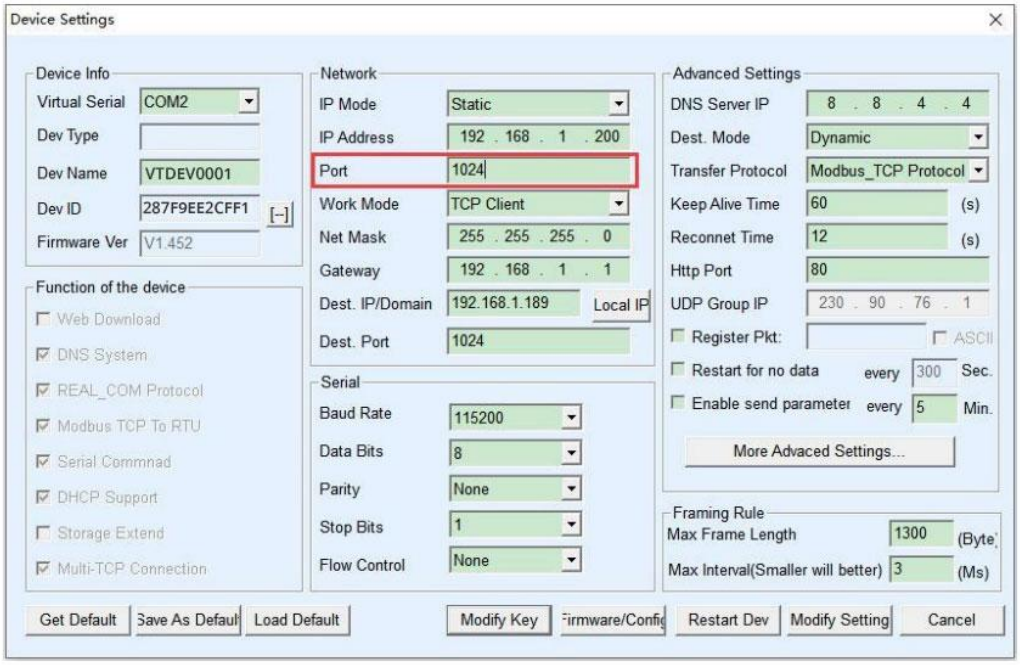


Figure 29 Acting as both Client and Server

By default, when using Vircom for configuration, if you change the working mode to "TCP client", the port (that is, the local port) will automatically become 0 (0 means a free port is randomly selected). In order to support the TCP server mode, the computer software must get the local port of the device, so a value needs to be specified here.

As shown in Figure 29, the computer software can now connect to the 1024 port of 192.168.1.200 for communication, and the device will also act as a client to connect the 1024 port of 192.168.1.189. It should be noted that since the local port 1024 is occupied by the server, the local port when used as a client is "port+1", that is, the software on 192.168.1.189 sees that the incoming port of the device is 1024+1 =1025

6.2.5 UDP Mode

In UDP mode, the parameter configuration is shown in Figure 30. The left side is the configuration for the serial server in Vircom, and the right side is the setting for the serial debugging tool SSCOM. First of all, both sides must be in UDP working modes. In addition, indicated by the red arrow, the destination IP and the destination port of the network tool must point to the local IP and local port of the serial server.

As indicated by the blue arrow, the destination IP of the serial server must be the computer IP where the network tool is located, and the destination port of the serial server must be the local port of the network debugging tool. Only after these network parameters are configured can two-way UDP data communication be ensured.

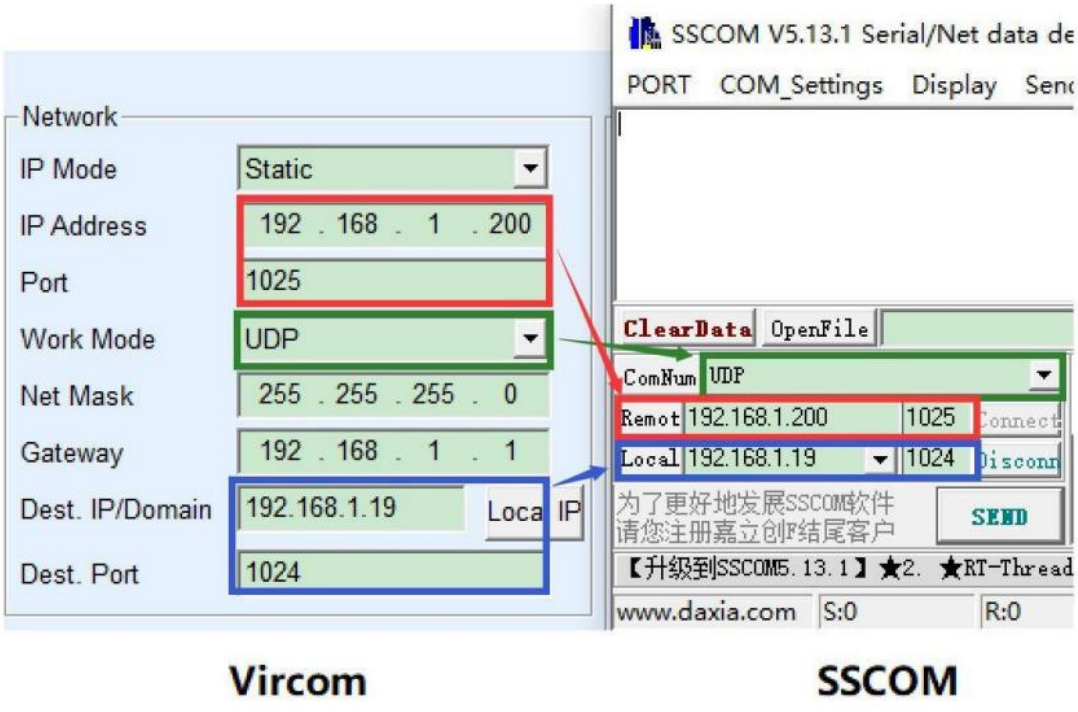


Figure 30 UDP mode parameter configuration

6.3 Device Connecting Method

If the host computer does not adopt the SSCOM program or the virtual serial port, but two devices are connected through a network port, the configuration method is similar. First, the user needs to connect two devices and one computer to the same local area network. The computer runs Vircom, and the purpose of connecting to the computer is only for configuration. After the configuration is completed, the computer does not need to be connected.

Click on Vircom's device management to find these two devices, as shown in Figure 32. Then click "Edit Device" to configure the device. Device connections can be divided into TCP and UDP. If it is TCP connection, the parameters of the two devices are shown in Figure 31. The parameters shown by the arrows must correspond like the way of connecting with a PC. After the TCP connection is successful, you can view the connection status by returning to the "Device Management" dialog box, as shown in Figure 33. If the statuses of the two devices are both "Connected", it means that the TCP link between the two devices has been established.

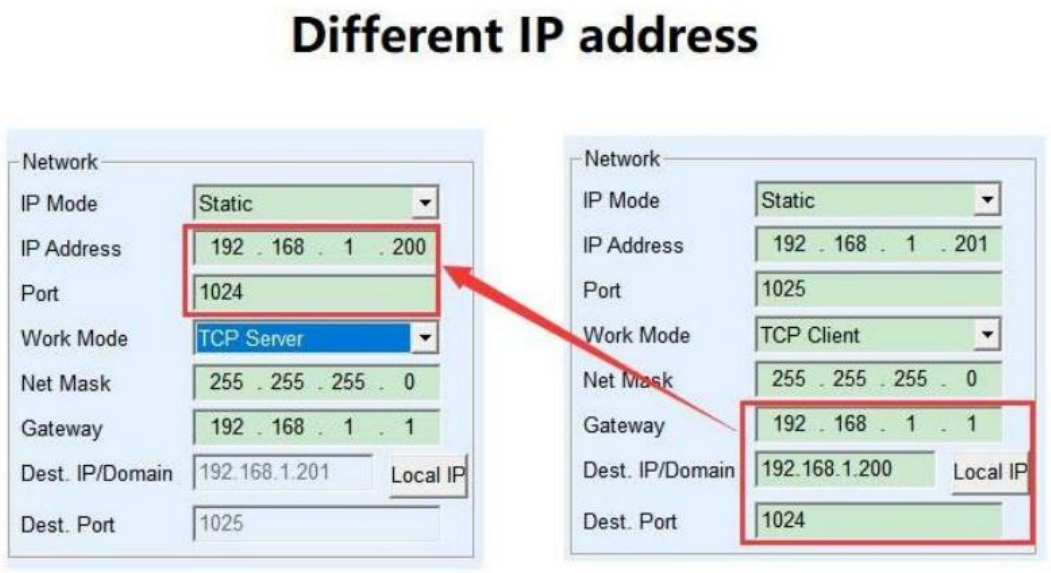


Figure 31 TCP device pairing parameter configuration

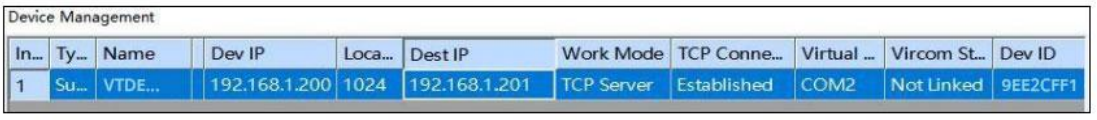


Figure 32 successful TCP device pairing check

If it is in UDP mode, the configuration parameters are shown in Figure 33, and the parameters corresponding to the arrows must be one-to-one. The UDP connection does not need to check the connection as long as the parameter configuration is correct, the sent data will be automatically sent to the designated device.

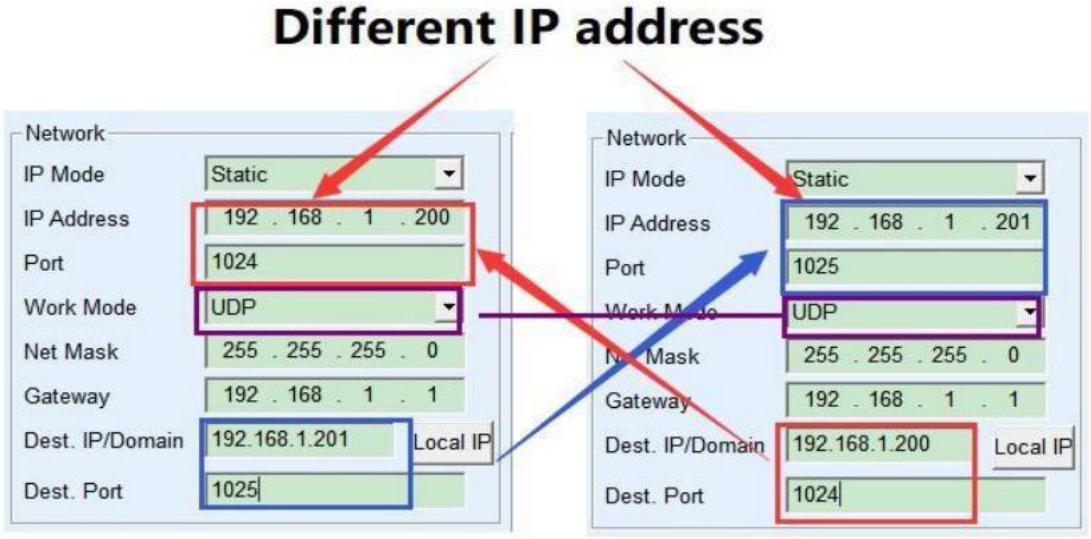


Figure 33 configuration of UDP device pairing parameters

Finally, we need to remind that if the device is connected, in addition to the network port parameters set according to the above, the correct serial port parameters must also be set. Mainly, the baud rate of the serial server needs to be consistent with the user device's. After setting, the user equipment can send data to each other through the serial ports of the two serial servers.

7. Device Debugging

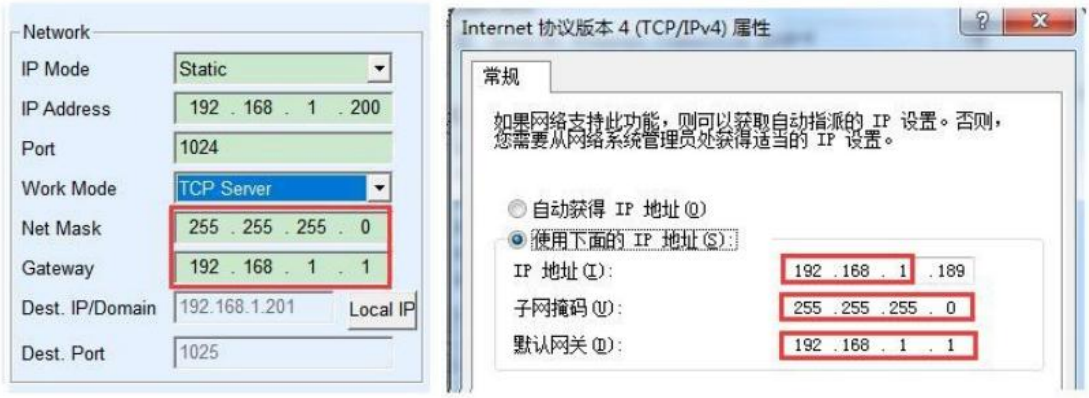
7.1 Network Physical Connection

The serial server can use a crossover cable or a network cable to connect to the switch or the computer network port directly.

After the connection is established, the first step is to check whether the Link light is green, otherwise, please check whether the network cable is connected.

7.2 Network TCP Connection

When the device is used as a dynamic IP, it cannot be directly connected to the computer network port. Because there is no DHCP server available (usually the DHCP server is the router in the LAN). Therefore, please specify the IP when connecting directly. At the same time, the computer also needs to specify a fixed IP.



Device IP in Vircom **IP configuration on computer**

Figure 34 configured in the same network segment

Whether it is directly connected or through a switch, when configured as a static IP, the device and the computer need to be in the same network segment (unless it is cross-gateway communication), as shown in Figure 34 above.

Since Vircom supports searching and configuration across network segments, the IP address that can be searched but cannot be communicated is generally not configured correctly. In this case, you can use Vircom to configure the device in the same network segment.

After configuration, please use 5.2 TCP communication test or 5.3 virtual serial port test, you can see that the Link light turns blue when the TCP connection is established. The blue link light can also be seen through Vircom. For example, in the device management list, if the TCP connection column is "established", it means the link light is blue, as shown in Figure 35. This can facilitate remote diagnosis.

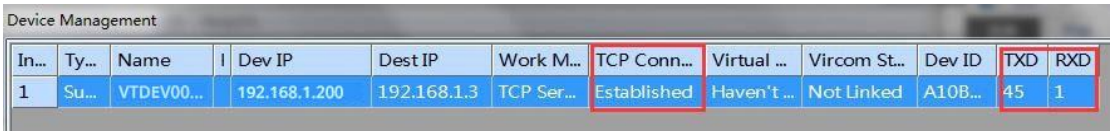


Figure 35 Connection status and data send/receive status

7.3 Data Sending and Receiving

When the Link light turns blue, data can be sent and received between the software and the serial server. By now, if the software sends a data, the Active light will turn green, and the duration will generally be at least 1 second. The data will also be output from the serial port of the serial server, but whether the output data is correct depends on whether the serial port parameters (including the baud rate, data bit, stop bit and parity bit) are configured.

For the serial device that has send the correct demand. It will respond. Once there is a reply (the serial port sends data to the network port), the Active indicator will turn blue.

Otherwise, please check the serial port parameters or whether the serial cable is connected.

In order to facilitate remote debugging, Vircom also supports remote viewing of data sent and received. As shown in Figure 35, TXD is the amount of data sent by the serial port server serial port. When the device list is refreshed, if this value changes, it indicates that there is data sent. The Active light will also be green; if you see the value of RXD changing, it indicates that the serial device has returned data, and Active is blue.

7.4 Vircom Remotely Monitor Data

When using the virtual serial port, Vircom supports real-time capture of the data of the virtual serial port. It is convenient for users to debug the system, and the method is as follows:

It is assumed that the communication of the virtual serial port has been established according to the method of 5.3 virtual serial port test. Now you need to monitor the data through the virtual serial port. Open Vircom's menu/Config/software setting/open the Vircom configuration dialog box.

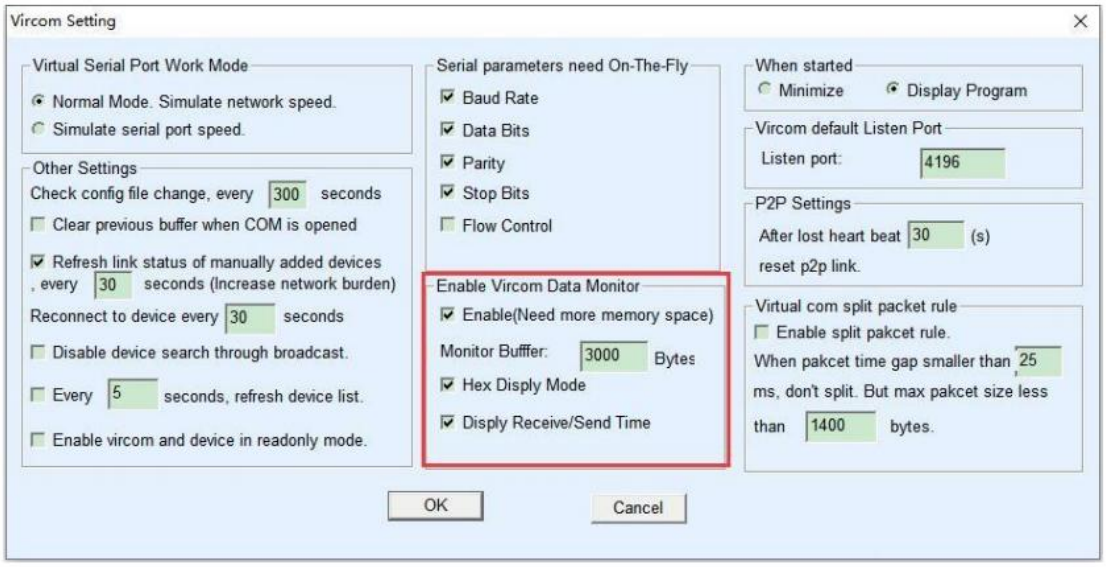


Figure 36 enabling Vircom monitoring

Check in front of the three options: open monitoring, hexadecimal monitoring mode, and display data sending and receiving time, as shown in Figure 31. Then click OK. Assuming that data has been sent and received before, now select a virtual serial port to be monitored in the main interface, and then select Menu/View/Monitor, as shown in Figure 36.

Figure 37 Open Vircom monitoring

From the opened dialog box, you can see the instructions sent by the host computer and the instructions returned by the device, as shown in Figure 38. This function can facilitate on-site communication debugging.

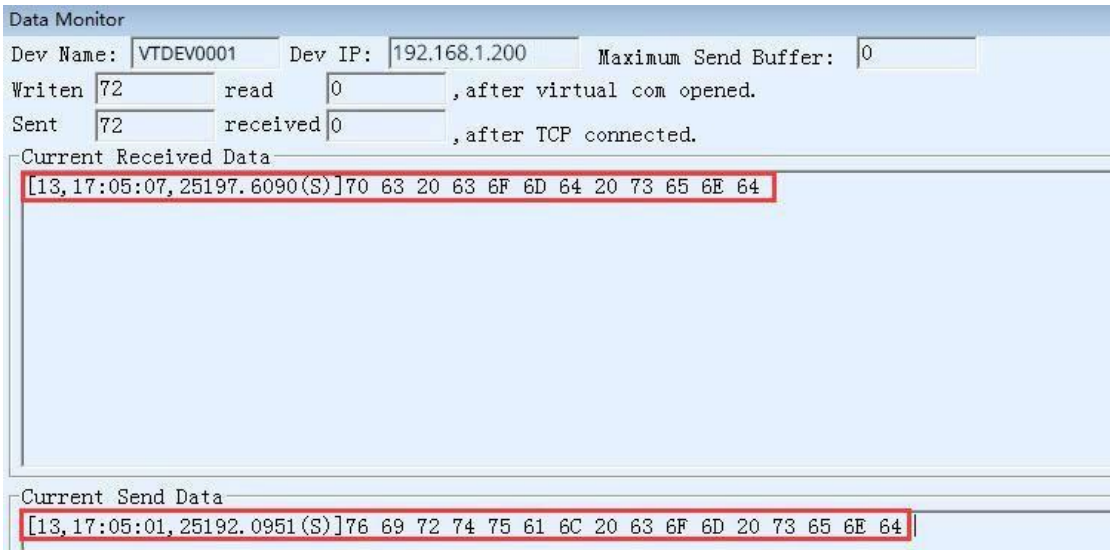


Figure 38 monitor sending & receiving data

8.Modbus Advanced Features

The serial port server with Modbus gateway function does not have station address and register itself. It is a communication bridge. It will generate Modbus RTU command according to the Salve ID, function code, register number and register quantity in the Modbus TCP command sent by the user software to the Modbus gateway, and output it from the serial port. It can be regarded as a protocol "translator".

8.1 Enable Modbus Gateway

First of all, the serial port server should support Modbus gateway, that is, the "Modbus TCP to RTU" function in Table 4 Device Supported Functions in the Device Settings dialog box should be checked.

By default, the serial port server is in normal transparent transmission mode. If you need to convert it to Modbus gateway mode, please select the "Modbus TCP protocol" option in "Conversion protocol". After that, the device automatically changes the "Port" parameter to 502 (the port of the Modbus server). In this way, the Modbus gateway is enabled.

If the serial port RTU device is used as a slave, the host computer Modbus TCP software connects to the Modbus gateway's port 502. At this time, the Modbus gateway needs to work in TCP server mode; if the serial port RTU is used as a master, the Modbus gateway works in TCP client mode, and the destination IP is filled with the IP of the computer where the Modbus TCP software is located, and the destination port is generally 502.

8.2 Storage Modbus Gateway

The contents of the read registers can be saved inside the gateway, so that the speed of Modbus TCP query can be greatly improved, and the performance is better when supporting multi-host access.

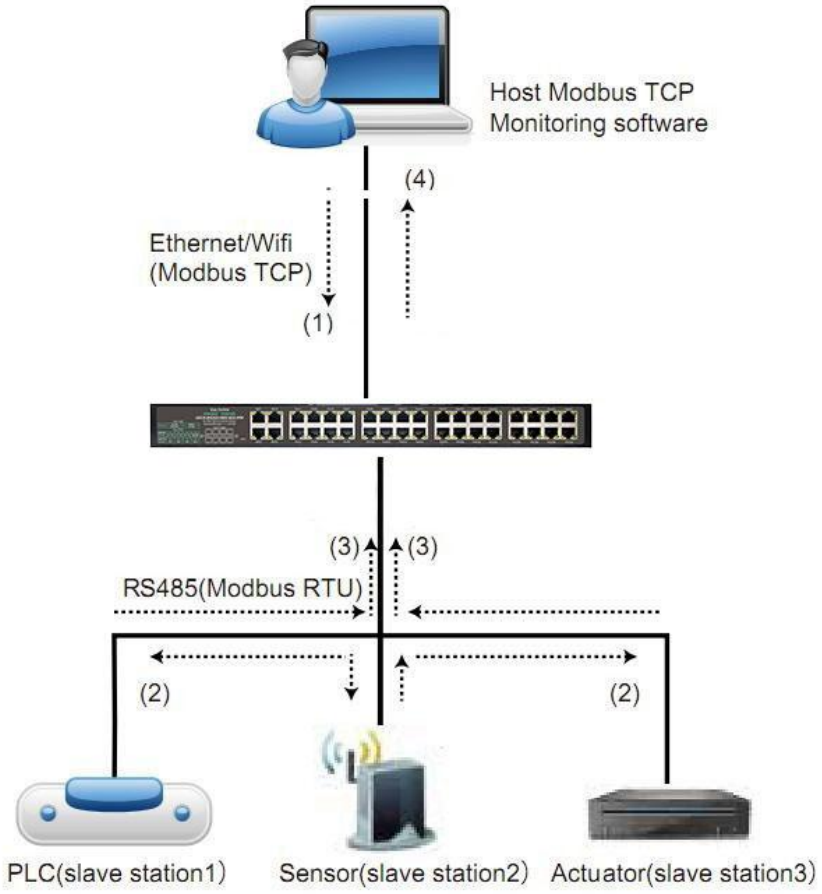


Figure 39 Storage Modbus Gateway

As shown in Figure 39: The direction of ordinary Modbus TCP data flow is （1）→（2）→（3）→（ 4 ）. That is, the Modbus TCP command is first converted into the corresponding command of Modbus RTU, and then the device responds to the Modbus RTU command to the Modbus gateway, and then the Modbus gateway converts it into Modbus TCP again and sends it to the monitoring host computer.

Modbus TCP is a network communication with a very fast transmission speed, and it can generally respond within 3ms, while Modbus RTU is RS485, which generally has a speed of only 9600bps, and it generally takes at least 30ms to send and return a command. In this way, the query response time of ordinary non-storage Modbus gateways is relatively long. In addition, if there are many host computers querying data at the same time, the serial port will be congested. If the network is compared to a highway and the serial port is compared to a single-plank bridge, then the original method is to pass the traffic of the highway on the single-plank bridge.

The register-saving Modbus gateway solves the above problems. It can temporarily save the register data obtained in the Modbus gateway, so that when the Modbus TCP query, the Modbus gateway can immediately return the command, which demonstrates Modbus TCP can be operated quickly. On the other hand, the serial port server can take the initiative to send instructions from the serial port to automatically update the contents of the currently saved register data, and save a copy of the latest register value.

In addition, this serial server is a fully automatic configuration-free Modbus gateway, users do not need to configure the required register address, function code, slave address, etc. The serial server will automatically recognize and dynamically add these registers according to the Modbus TCP commands sent from the network port.

16CH-RS232/485/422-ETH can response quickly when monitored by multiple computers. No matter what baud rate of the serial port is, it can generally response the data to the host within 3ms, which showed a good updating speed of serial port data.

The register-saving Modbus gateway is a real Modbus TCP to Modbus RTU. It really takes advantage of the fast speed of Modbus TCP and the ability to query by multiple hosts at the same time.

Note that when the serial port server is used as a TCP client, it does not have the storage function and will automatically switch to the non-storage type.

The characteristics of storage Modbus are listed below:

1) The first Modbus TCP query command is non-storage type. Because you must wait for the RTU device to return data slowly before returning the register content to the network port.

2) If a specific command is no longer inquired by the host computer on the network side

within 5 seconds, this command will be automatically deleted and no longer sent to the RTU device from the serial port.

3) At present, it can store 10K Modbus cache. For ordinary single-register query, about 500 instructions can be stored at the same time.

4) When more commands are being queried at the same time, they are sent in order. The first command sends → the first command response → waits for 485 anti-collision time (refer to the multi-host section) → The second command sends... Return to the first command after the last command has been answered.

8.3 Disable Storage Functionality

Although the storage type Modbus has a faster response speed, some users do not want the serial port device to receive a large number of query commands, which affects the internal processing speed of the instrument. In this case, the storage type function can be turned off.

To disable the storage type, click the "More Advanced Options" button in the "Parameter Configuration" dialog box and select the non-storage type Modbus gateway. Then return to the device settings and click Modify Settings.

Note that when using the Web method to configure the conversion protocol, the default is a non-storage Modbus gateway.

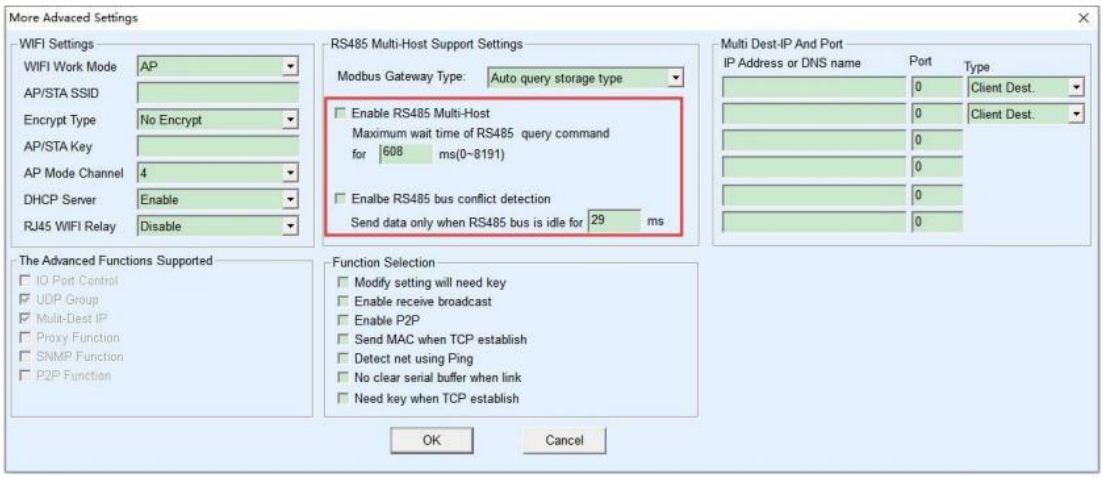


Figure 40 disable the storage function

8.4 Multi-host Function

As shown in Figure 41, "RS485 multi-host support" and "RS485 bus conflict detection function" are the multi-host functions. They are generally enabled and disabled

at the same time. After enabling, the device with the conversion protocol of Modbus TCP has the function of storage-type Modbus gateway, otherwise it is a non-storage-type Modbus gateway; if the conversion protocol is None, the user-defined RS485 protocol can generally also have the function of serial port devices accessed by multiple hosts at the same time, which is impossible in a pure RS485 network, because multiple masters sending at the same time will cause conflicts on the RS485 bus. The multi-host of this serial port server can "coordinate" the RS485 bus to achieve the purpose of multi-host access.

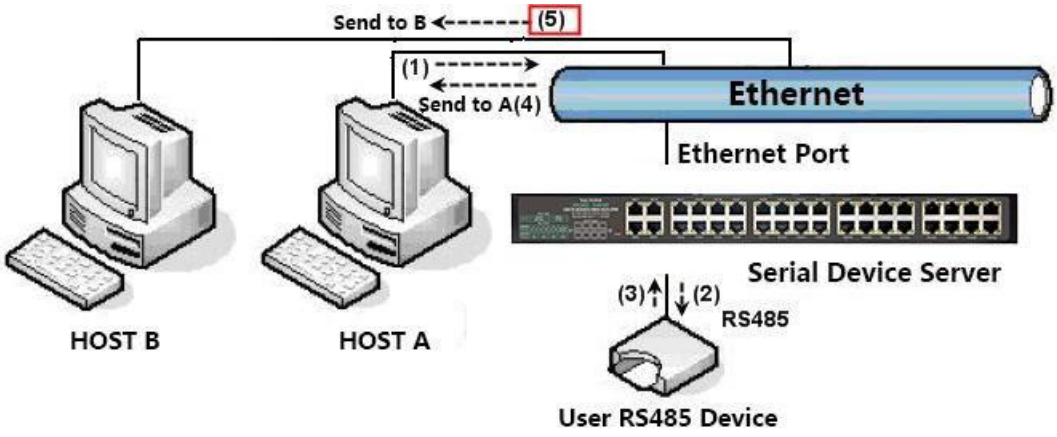


Figure 41 Multi-host function demonstration

As shown in Figure 41, in the normal mode, when two hosts: host A and host B are connected to the serial server at the same time, host A sends (1) command, RS485 device receives (2) command, RS485 device returns (3)) command, but the serial port server will send (4) to host A and (5) to host B at the same time. Since the host B did not send the query, but it also received the response command (5), the host B may generate a communication abnormal error. In the multi-host mode, there will only be command (4) but not command (5), because the serial server will automatically remember the host that needs to be returned, and only return the instructions to the most recent communication host, and the query of host A will only reply to A, host B queries and replies to host B.

Another function is that in the normal mode, when the host A and the host B send data at the same time, the combination of instructions will be generated on the RS485 bus, so that it cannot be recognized normally; in the multi-host mode, the serial server can schedule A and B to use the bus. Prioritize the conflict problem of simultaneous access by multiple machines in an effective way.

When the conversion protocol is "None", the multi-host function is not enabled by default.When you need to enable multiple hosts, please click "More Advanced Settings" in the device configuration dialog box, and then check "RS485 multi-host support".

8.5 Multi-host Parameter

The meanings of "RS458 multi-host support" and "RS485 bus collision detection function" are described as follows.

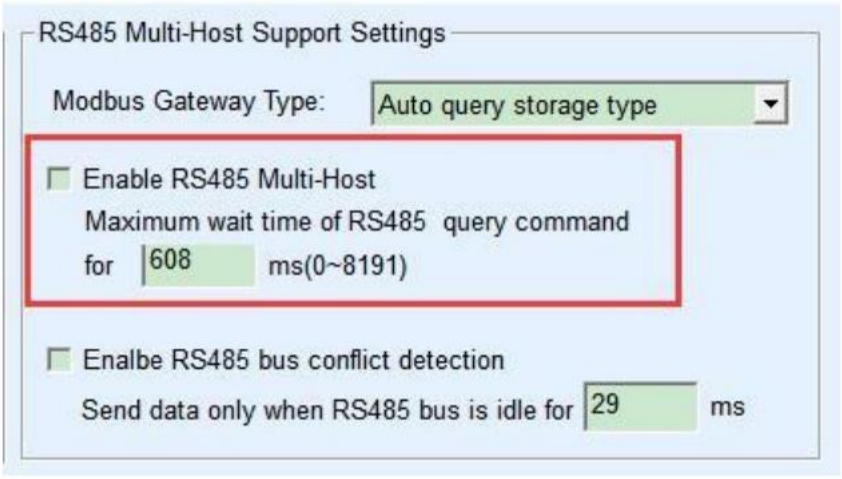


Figure 42 RS485 multi-host support

The RS485 command response timeout is the maximum time interval from when the serial server starts sending this command to when it receives a response. The time filled in should be greater than the actual maximum time interval because if it is judged to be a timeout, the next command will be sent.

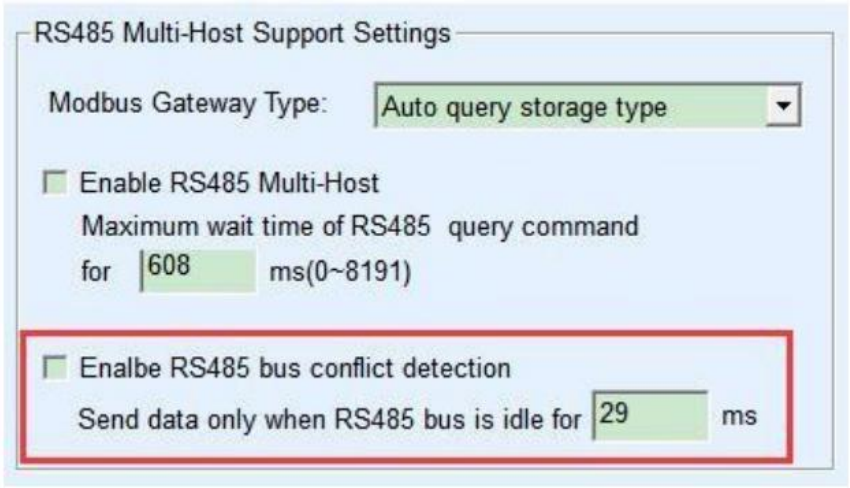


Figure 43 RS485 anti-collision idle time

RS485 bus conflict time: indicates how many milliseconds the serial server waits after receiving the reply of the first command before sending the second command. This parameter actually defines the speed of the command rotation. The value is recommended to be more than 20ms. The parameter "maximum waiting time 3 seconds" generally does not need to be modified.

When the user uses Vircom to select the conversion protocol as "Modbus_TCP Protocol", Vricom will automatically check the above two enabling boxes (unless the user manually enters the advanced option to remove it), and the above two times will also be automatically configured according to the baud rate . However, if the user's Modbus command is relatively long or the conversion protocol is "None", these two parameters need to be configured manually.

The following describes the recommended settings of the above parameters:

1. Figure 43 shows the "RS485 bus anti-collision time". Generally, it can be set to twice the "Packet Interval" in the lower right corner of the parameter configuration interface, but the minimum should not be less than 20.
2. Figure 42 shows the "RS485 command response timeout", which is generally determined according to the length of the back and forth response command. If the sending command is N bytes and the response is M bytes, the recommended value is: "Packet interval" ×(N+M+5)+100.

8.6 Modbus Under Multi-destination IP

As shown in Figure 41, if the serial device (RTU device) is used as the master station and the network port device (Modbus TCP device) is used as the slave station, and there are multiple network port slave devices at the same time. At this time, you can use the method described in 6.2.2 Client Connecting Multiple Servers to let the serial port server as a client connect to these multiple network port devices at the same time.

The function that needs to be realized at this time is: when the serial port RTU sends a command, it can be sent to multiple network port devices, the network port device recognizes whether to send it to itself through the Slave ID field, and only the network port device corresponding to the Slave ID responds. After the network port response is sent to the serial server, it is converted into an RTU command and output from the serial port to the RTU device.

At this time, it should be noted that it is necessary to remove the two check marks shown in Figure 43 as "RS485 bus anti-collision time" and Figure 42 as "RS485 command response timeout time". Otherwise, the above forwarding function cannot be realized. Another application method is: Although the serial server is connected to multiple network port devices as a Client, the RTU device is not the master station, and the network port device still sends it first, and the RTU device responds (as a slave station). At this time, the "RS485 bus anti-collision time" and "RS485 command response timeout time" still need to be checked, so that multiple hosts can access one RTU device at the same time.

9. Registration Pack and Heartbeat Pack

Registration packets and heartbeat packets are a function suitable for communication between devices and cloud software.

9.1 Registration Packet

The definition of a registration package is that when the computer software and the serial port server module (hereinafter referred to as the module) establish a TCP connection, the module will first send a string of codes to the software so that the software can know which module is communicating with itself. This string of codes is the registration package.

The registration package is very suitable for the monitoring of the Internet of Things, because the cloud software generally runs on the public network server of the Internet, and the modules are scattered in various collection and monitoring points. How to make the cloud software recognize the module is very important and is necessary to realize the communication of the Internet of Things.

Our serial port server provides the following multiple registration report methods.

9.1.1.Send MAC Address On Connection

Its method is to send its mac address to the cloud when the module is connected to the cloud. Since the MAC address is unique, it can identify the corresponding device. This method is simple and does not require writing a registration package for each device, so it is simple and effective. How to use it: Click "More Advanced Settings" in the device settings dialog box, find "Send MAC address when TCP is establish" in the upper middle, tick the front, and then return to the setting interface and click "Modify Settings".

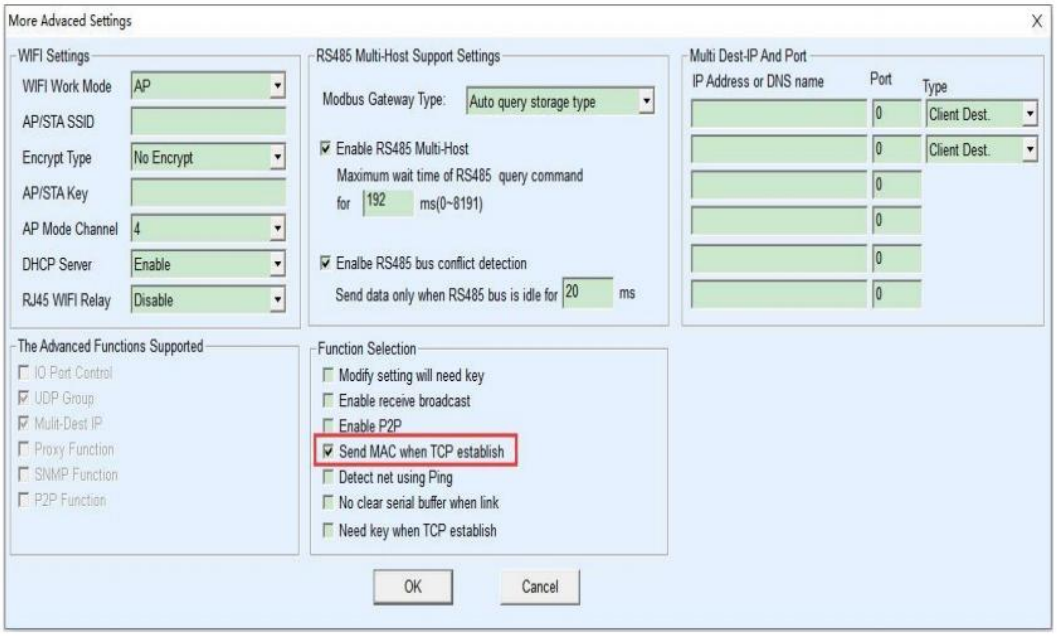


Figure 44 Sending MAC address on connection

9.1.2 Realcom Agreement

The Realcom protocol is a protocol containing a registration package and a heartbeat package. Users can use this protocol to realize the functions of the registration package and heartbeat package. The method to enable the Realcom protocol is: in the "Device Settings" dialog box, select "Conversion Protocol" to "REAL_COM Protocol", and note that the part of enabling the registration package needs to be blank and unchecked.

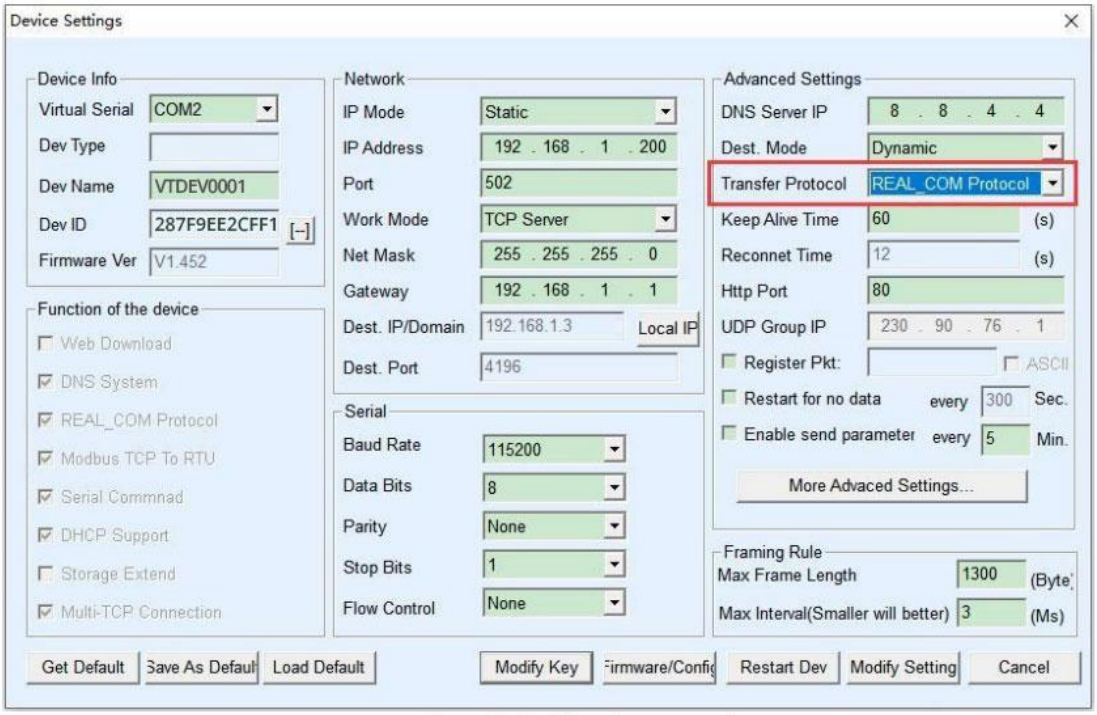


Figure 45 Enable the realcom protocol

After the Realcom protocol is enabled, it will not be transparent transmission communication. It has the following characteristics:

1. After the device establishes a TCP connection with the cloud, the device automatically sends a hexadecimal registration packet FA 07 13 02 FA 02 MAC[5] MAC[4] MAC[3] MAC[2] MAC[1] MAC[0] FA FF. Among them, MAC[5]~MAC[0] is the MAC address of the device.

2. When the device sends data to the network, it will automatically add the 3-byte header prefix of FA 01 01.

3. Every keep-alive timing interval, the device sends a 00 1-byte heartbeat packet to the software. The REAL_COM protocol can be used as a device registration package because it contains the MAC address in the registration package. However, due to its fixed format, only the cloud software can design the REALCOM protocol to be compatible with this method.

9.1.3 Custom registration package

The custom registration package method allows users to fill in any registration package format. The method is: in the device settings interface, configure as follows:

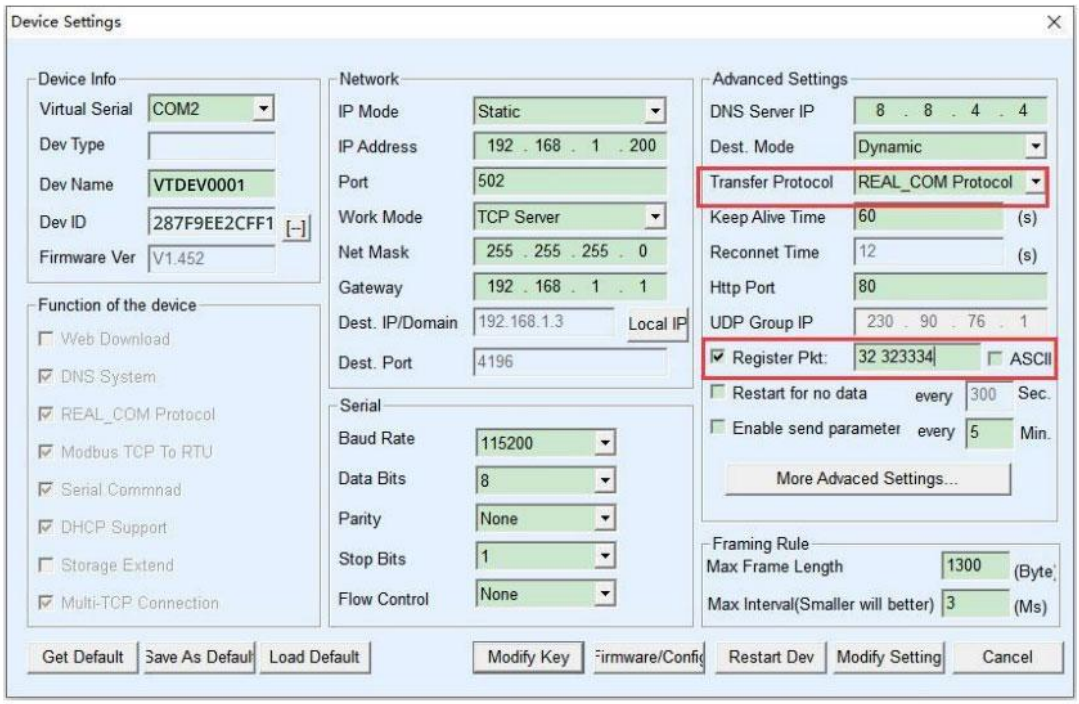


Figure 46 Set registration package

The difference from the REAL_COM protocol is that the registration package is enabled here, and the registration package information such as 31 32 33 34 is filled in. Note that this is hexadecimal, which means that the data actually sent is a string of characters 1234. If you need to display the string, click the "ASCII" option next to it.

When the device is connected to the cloud software, it can automatically send a hexadecimal registration package of 31 32 33 34. This registration package method is more flexible and allows the device to adapt to the existing cloud registration package format; however, there is no wildcard such as MAC in the registration package, and different registration packages need to be configured for each device separately, which is more cumbersome. The above two methods of sending MAC address and REALCOM have the same configuration for each device, but the registration package is naturally different due to different MAC.

The longest registration package length is 33 bytes. This method supports registration packages and heartbeat packets in UDP mode.

9.1.4 Configuration File

The serial port server is supported to write a configuration file, so as to realize a completely customized registration package by the user, and the MAC address wildcard

can be used, which can solve the trouble of writing a custom registration package for each device, and there is no limit on the length of the registration package.

9.2 Heartbeat Packets

Heartbeat packets are mainly used to detect whether the communication link is disconnected. The implementation method is that the device sends a heartbeat packet data to the server software at regular intervals. This data will be discarded after being received by the server and will not be regarded as valid communication data.

The heartbeat packet has two main functions: first, it can let the host computer software know that the device is active; second, if the device fails to send a heartbeat, the device on the TCP client will automatically re-establish the TCP connection, so it is a means to restore network communication.

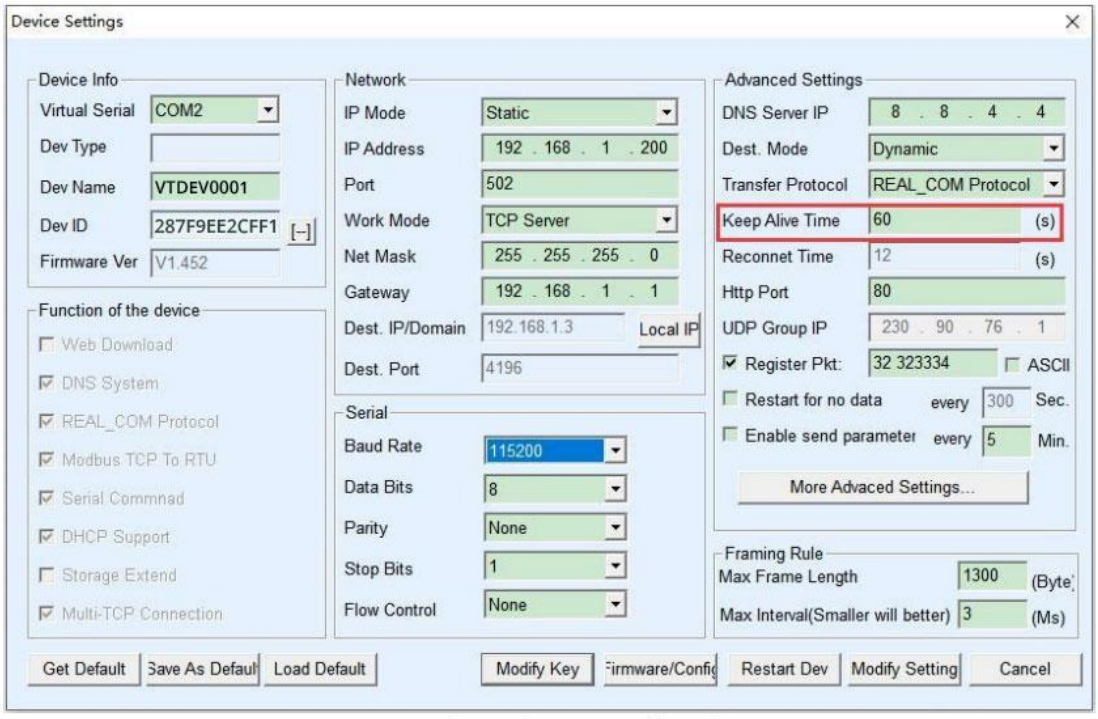


Figure 47 Keep Alive time

As shown in Figure 42, the sending time of the heartbeat packet is set by the "Keep Alive Time".

9.2.1 Implied Heartbeat

Even if you don't set any heartbeat packets, the implicit heartbeat function will be enabled when the Valtoris device is on the TCP client.

Therefore, the implicit heartbeat function means that the device sends data, but the server cannot actually receive the heartbeat data. Therefore, it cannot play the first function of the heartbeat packet, that is, the server detects whether the device is active or

not; but because the device actually sends data, it can play the second function of the heartbeat packet, that is, the device detects the TCP connection is normal, once the disconnection is detected, the TCP connection can still be automatically re-established.

9.2.2 REALCOM Protocol

As described in 9.1.2 Realcom protocol, REALCOM protocol can send a 1-byte data of 00 every keep-alive time. This data is the heartbeat packet of realcom protocol.

9.2.3 Customize Heartbeat Packets

First, fill in the registration package according to the method of 9.1.3 customizing the registration package. Then add the heartbeat packet as follows: Click the "More Advanced Settings" button in the device settings, write the hexadecimal heartbeat packet in the second line of the multi-destination IP and port, and change the option on the right to "Param. Dest".

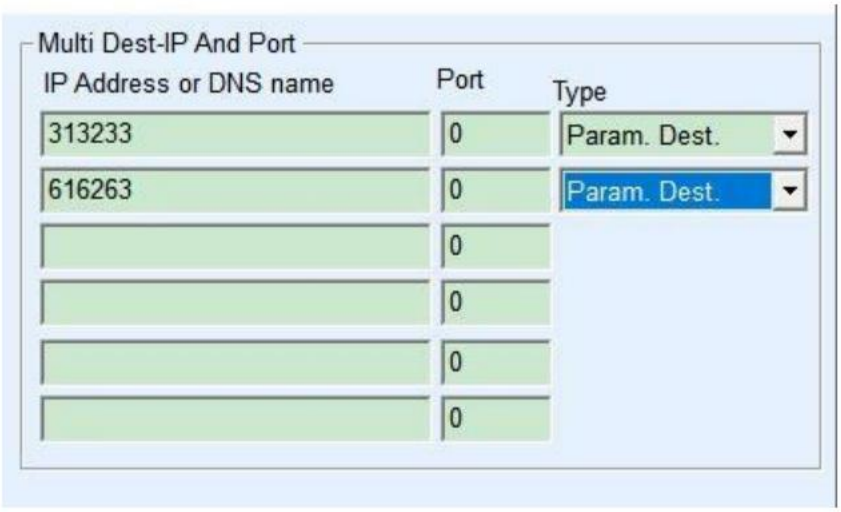


Figure 48 Customized registration package

Note that the sum of the registration packet and the heartbeat packet should be less than 33 bytes. The first line is actually the registration package.

10. Remote Device Management

The so-called remote device management refers to the ability to maintain and manage the device through Vircom software, including restarting the device, modifying parameters, and upgrading firmware. This function is suitable for users who use Vircom for device management.

For Vircom software, as long as the device can be found in the device list, it can be managed remotely. The remote management of equipment is divided into the following situations:

1. Automatic search: The device and the computer are on the same switch. At this time, no matter whether they are in the same network segment or not, the Vircom search method on the computer is: Vircom sends a broadcast query. After receiving the query, all devices will reply with their own parameters. Vircom tools. This method searches all devices at once.

2. Manually add: There are two situations:

a) Large-scale routers divide the network: In some large-scale networks, broadcast packets are divided by routers, so that the broadcast packets cannot reach the device end, but the ping device IP is all connected. At this time, it generally needs to be added manually to solve the problem. The method of adding manually is to click "Add manually" in the "Device Management" dialog box to add the first and last IP to query the devices one by one.

b) The public network server queries the internal network equipment: the serial port server is in the internal network and acts as a TCP server mode, and Vircom is on the public network IP server. At this time, you need to do a 1092 UDP port mapping on the router of the network where the device is located, and map it to the IP where the device is located, and then Vircom manually adds the device. The IP is the public network IP of the device.

3. TCP client: When the device acts as a TCP client, it will initiate a TCP connection to port 4196 of the destination IP (116.15.2.3). After the connection is established, it will automatically send its own parameter system to the UDP port (note that it is not the TCP port) of the destination port (here 4196) at each keep alive timing, so that Vircom can be able to do so on this computer (116.15.2.3) The device is found. If the destination port is not 4196, you need to modify the Vircom's default parameter receiving port. The method is to modify the menu/configuration/software configuration/default listening port, and then start Vircom. If a TCP port conflict pops up, just ignore it and continue execution.

4. Sending parameters at regular intervals: Even in a serial server in TCP server mode, you can check the "Send parameters at regular intervals" function, and the parameters will be sent to the destination port of the destination IP (here 116.15.2.3) every 5 minutes. Vircom that receives parameters on this port of this server can manage these devices.

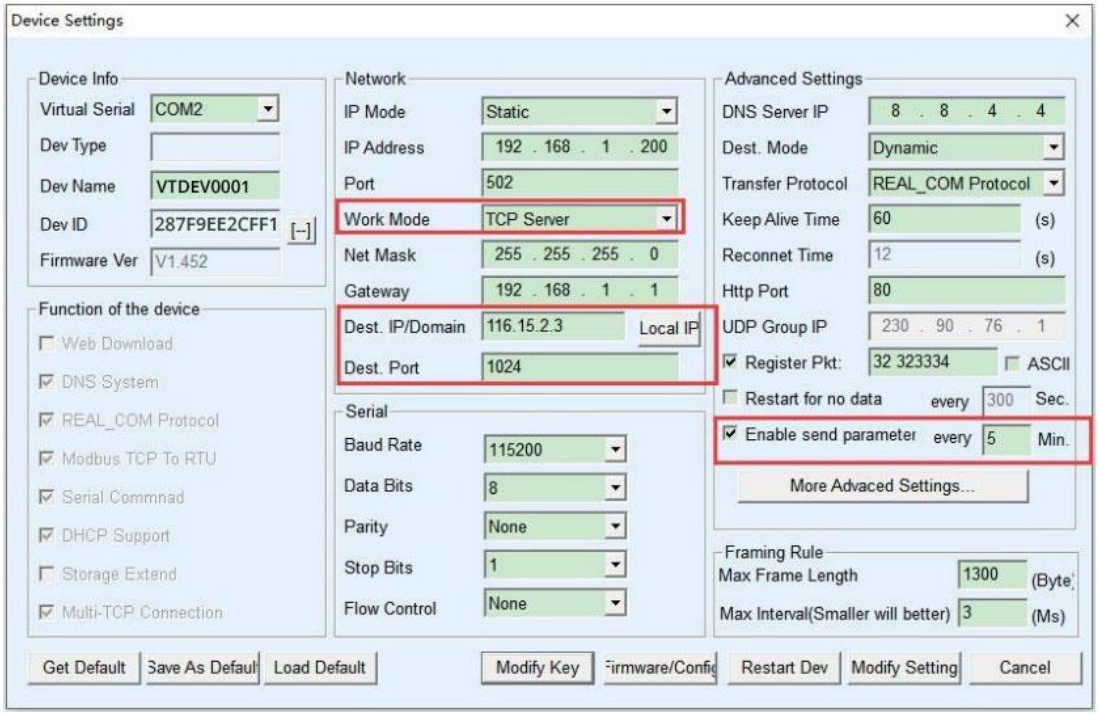


Figure 49 Timing sending parameters

In order to facilitate the identification of the device, if you need to perform remote management, please give the device a name that is easy to remember.

11. MQTT and JSON

For related usage, please refer to：《 MQTT and JSON User Manual 》

12. Firmware upgrade method

16 CH-RS232/485/422-ETH can upgrade their own programs, but not mutually upgrade programs. Whether it is by automatic search, manual addition can use this method to upgrade the firmware.

1. Obtain the firmware file of 16 CH-RS232/485/422-ETH from Valtoris.

2. Search for the device that needs to be upgraded in Vircom tool at first, and then enter the device parameter editing dialog box. Click on "Restart Dev".

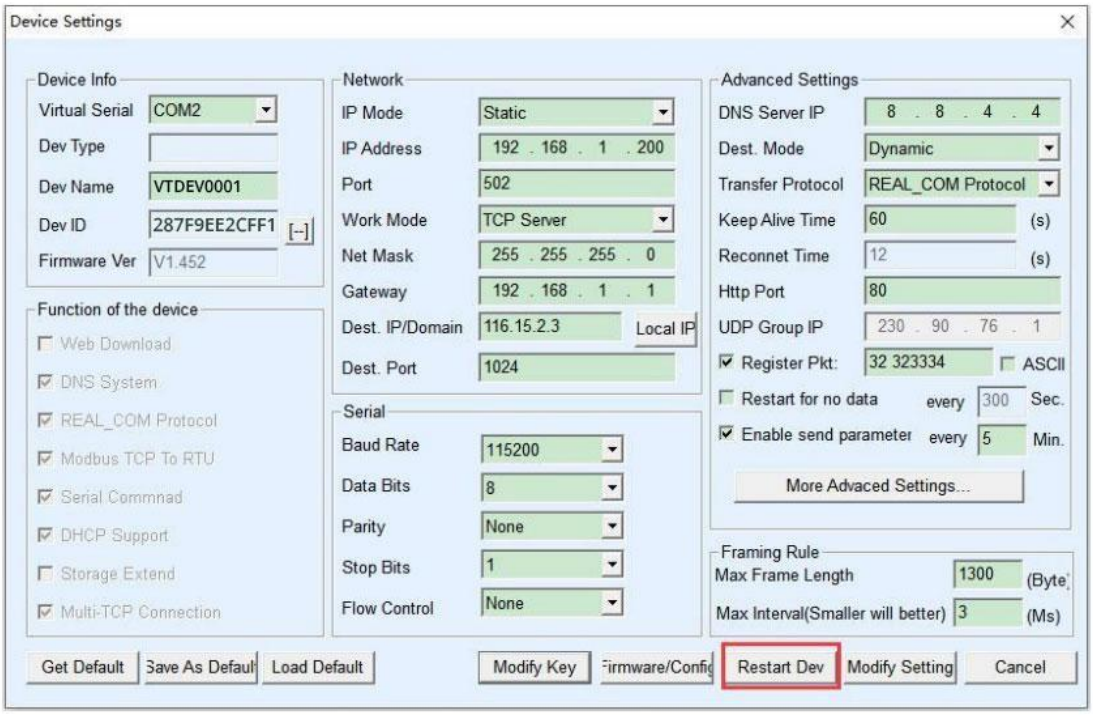


Figure 50 Restart the device

After the device restarts, use the same method to search for the device again, and enter this dialog box again. Click the "Firmware/Config" button in the lower right corner of the dialog box.

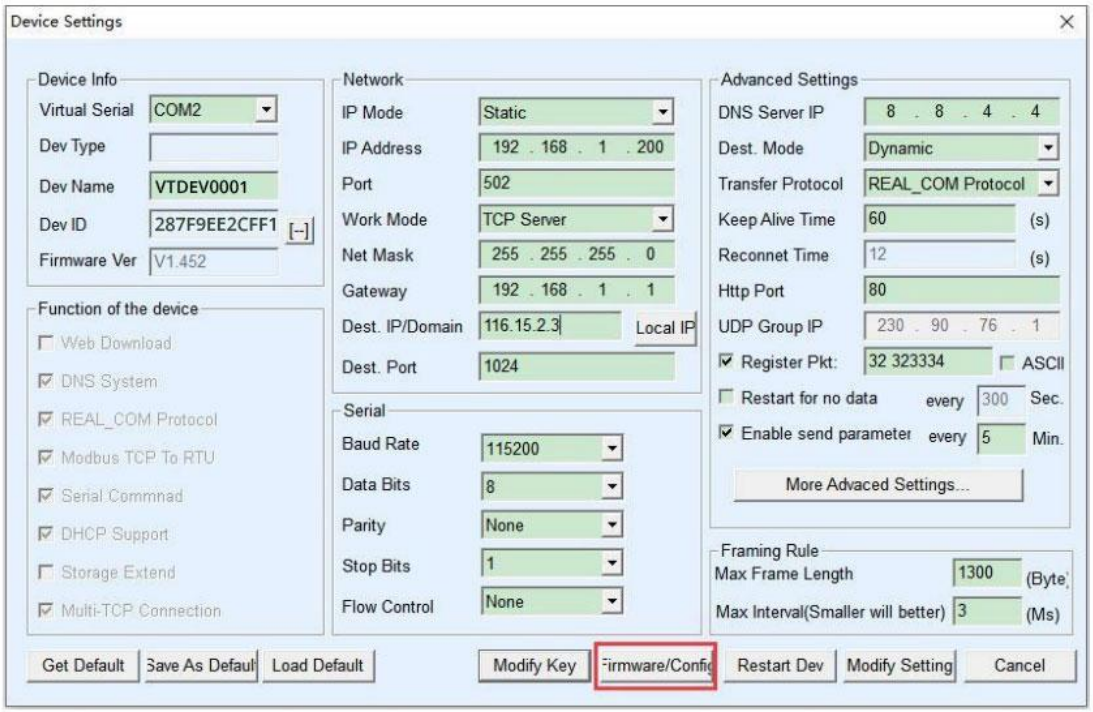


Figure 51 Upgrade firmware

3. As shown in Figure 52, select the "Program File Download" option. In the program file, select the firmware file. The IP address part of the serial server has been filled in automatically, and there is no need to write it again. The module type/model has been automatically selected. Then click download.

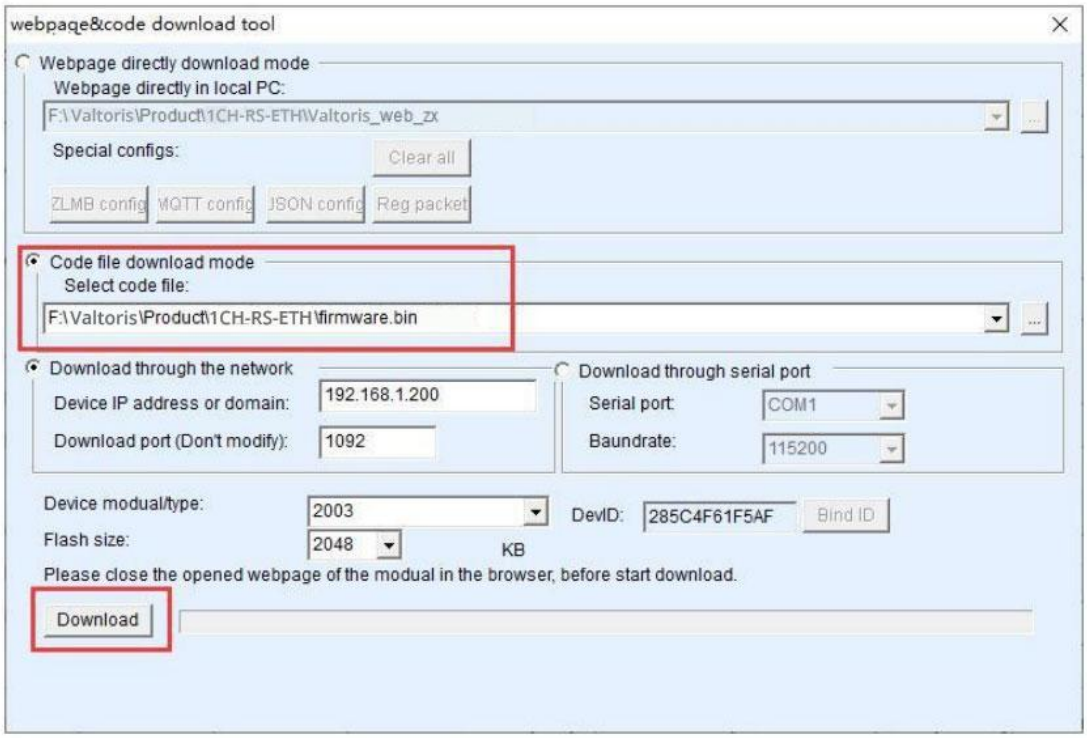


Figure 52 16CH-RS232/485/422-ETH firmware upgrade method

4. By now, the download progress bar starts to move, and the download time is about 30 seconds. During the download, you will see the ACT light of the device flashing, and at the end of the download, you will see the LINK light flashing a few times. Then the program pops up a prompt box "Do not power off the device when the LINK light flashes after the transmission is complete". Note: This is only the completion of the transfer. The flash writing process takes about 3 seconds. At this time, the LINK light will flash. Please do not cut off the power during this period.

5. After the download is complete, the general program will restart automatically, and there is generally no need to cut off the power. If you see the running indicator flashing, if it does not restart automatically, please stop flashing the LINK indicator for more than 30 seconds, and then power on again.

6.Web configuration interface update: After firmware upgrade, the internal configuration web page of the module also needs to be updated, otherwise it will no longer be able to configure via Web, but it will not affect communication. It is not necessary to download the web page if there is no need for web configuration. The way to download the Web is: as shown in Figure 47, change the "program file" download

mode to "web directory download". And select the root directory where the local web page is located as the directory where the web page file to be downloaded is located (the directory from Valtoris), click download, and download all the files in the local web page directory to the internal file system of the device.

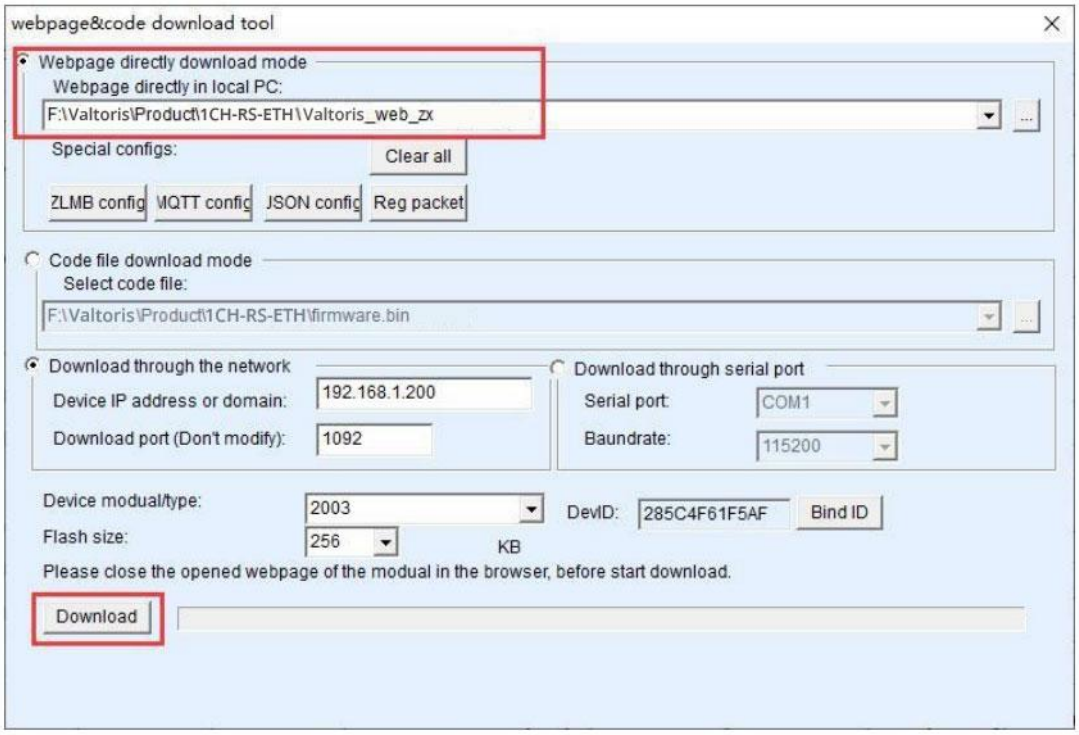


Figure 53 16CH-RS232/485/422-ETH web upgrade method

7. Notice:

7.1 If it prompts that the download failed and the device will not be damaged, please restart the download. In addition, at the end of the download, when the LINK light is flashing, do not power off, otherwise the device will be damaged.

7.2 Check the firmware version number by Vircom, and you can know whether the new firmware has been downloaded successfully.

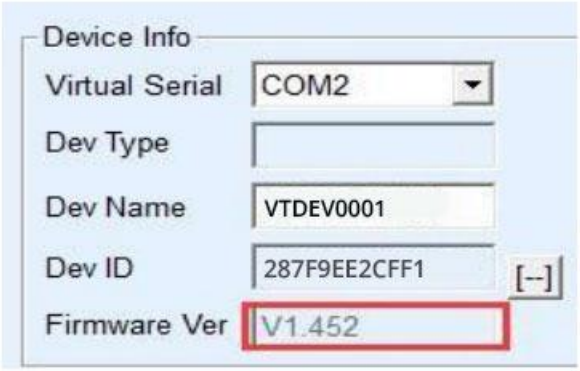


Figure 54 Check the firmware version after the level is completed

13. After-sales service and Technical Support

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