ZLAN5W12

Rack type

32 ports server

32 serial ports RS232/485/422 to TCP/IP server

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1. Summary

ZLAN5W12 Serial port server is a standard 1U rack-mounted 32 serial port protocol converter between RS232/485/422 and TCP/IP developed by Shanghai ZLAN Information Technology Co., LTD. ZLAN5W12 supports 32 RS232 serial ports /32 RS485/RS422 serial ports (RS422 requires 5W12-422 models), and RS232 supports flow control. Connected to the ZLAN5W12 through one network cable, 32 serial ports can work in full duplex at the same time. Each serial port can be used as TCP server, TCP client, UDP, and UDP multicast. Supports four network ports with the switch function.

ZLAN5W12 uses an IP address for each of the eight serial ports (ports). Different ports are distinguished by ports. It also supports eight IP addresses for eight serial ports. Ports are the same and can be distinguished by IP addresses. A total of 32 IP addresses are required. ZLAN5W12 has the functions of Modbus TCP to Modbus RTU and serial port to Telnet protocol.

ZLAN5W12 uses ARM9 processing chip, which can support high-speed data transmission of 921.6Kbps without packet loss.

Figure 1 ZLAN5W12 32 serial port server

The serial port of the 5W12 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.

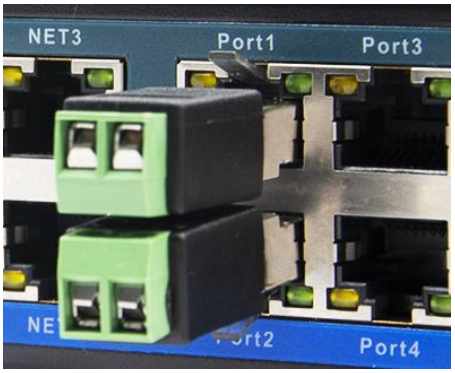


Figure 2 RS232 connector and RS485 terminal

1.1. Hardware

1. 32 serial ports support RS232, RS485, RS422 three serial ports (RS422 needs to order 5W12-422 model).
2. The 32 serial ports can work independently in full duplex without interfering with each other and can be configured with different baud rates.
3. Supports the function of a network switch with four network ports and can be used as a switch.
4. Various indicators. Each serial port has its own TCP connection indicator and data activity indicator.
5. 220V AC power supply.
6. 19-inch standard 1U frame structure design for easy installation, with rack mounting accessories.
7. Passed Level 4 EMC test, industrial grade temperature range.

1.2. Software

1. 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 differentiation: One IP address is changed to 2 to 8 IP addresses with different ports. It is suitable for applications with fixed port numbers (for example, port 520 of Modbus TCP needs to be fixed).
2. Support TCP server, TCP client, UDP mode, UDP multicast.
3. The baud rate ranges from 1200 to 921600bps, and data bits range from 5 to 9. The parity bits can be none, odd, even, marked, or blank. The CTS/RTS hardware flow control and XON/XOFF soft flow control are supported.
4. Supports MQTT gateway function.
5. Support JSON to Modbus RTU, Modbus TCP and 645 instrument protocols, support HTTP POST, HTTP GET format upload data.
6. Supports the function of sending MAC addresses when connected to devices, facilitating device management in the cloud.
7. Provide computer side search, configuration device secondary development kit DLL development library.
8. DHCP dynamically obtains IP addresses and DNS addresses.
9. Supports remote device search and device parameter configuration in the cloud.
10. You can remotely view the TCP connection status of the device through software. The virtual serial port supports data monitoring.
11. ZLAN5W12 supports Modbus gateway function，and Modbus RTU to Modbus TCP.
12. ZLAN5W12 supports Telnet to serial port function，supports embedded Telnet protocols.
13. ZLAN5W12 Supports multiple hosts: In the question-and-answer query mode, multiple computers can access the same serial port at the same time.

2. Technical parameter

Outline			
Interface：	36pcs of RJ45：includes 4 LAN, 32 serial ports.		
Power Supply：	AC220V power supply input，consumption：10W		
Size：	19 inch 1U standard size L x W x H =48cm×18cm×4.4cm		
Telecommunication page			
Ethernet：	4pcs of 10M/100M，Switch structure，random connection		
Serial port：	32 serial ports, each including: RS232/RS485/RS422 (RS422 requires jumper)		
Serial port parameter			
Baud rate：	1200~921600bps	Checkbit：	None, Odd check, even check, Mark, Space
Digit bits：	5～9 位	Flow control：	RTS/CTS，DTR/DCR, NONE
Software			
Protocol：	TCP、UDP、HTTP、MODBUS TCP、MQTT、JSON、DHCP、DNS		
Configuration：	ZLVirCOM tool、Device management library、Web		
Communication：	Socket、Virtual serial port, device management library		
Working mode			
TCP server, TCP client, UDP, Real Com Driver, Modbus TCP, Telnet			
Environment requests			
Operating temperature：	Industrial	-40~85℃	
Storage temperature：	-65~110℃		
Humidity range：	5~95% Relative humidity		

3. Hardware Specifications

3.1. Size and structure

ZLAN5W12 front view, same as Figure 3.

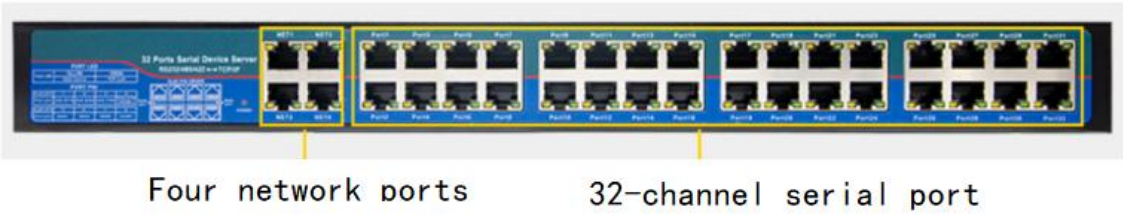


Figure 3 ZLAN5W12 Front view

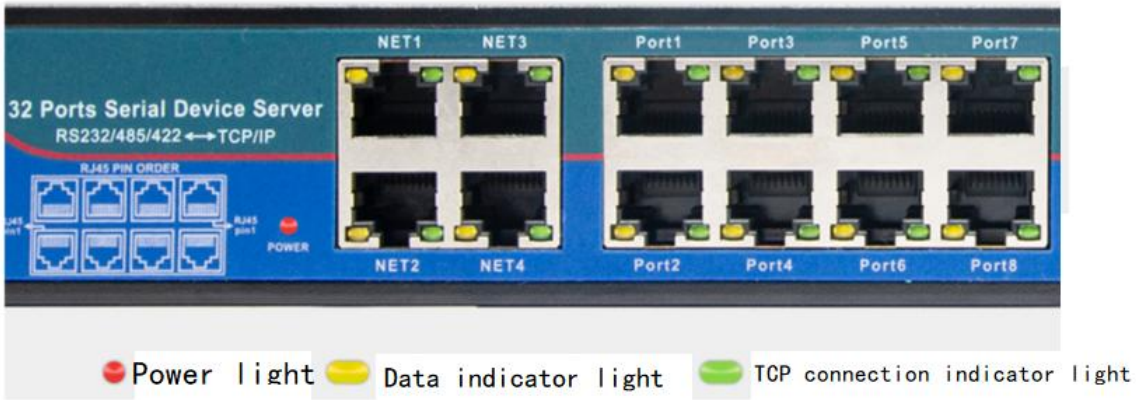


Figure 4 ZLAN5W12 indicators picture

Figure 5 ZLAN5W12 Backside picture

Standard 1U chassis with dimensions of 19 inches L x W x H =48cm x 18cm x 4.4cm. Power supply: 220V AC power supply, equipped with power cable and rack mounting ears. There is a ground point (on the left of the power supply) on the cover. If the ground cable of the power supply line is connected, you do not need to connect the ground cable.

Name	Function
power supply indicator	Red. If the switch is not on after power-on, check whether the switch is set to position 1
4pcs 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~PORT32	First line PORT1, PORT3 … … PORT31 ， 2nd line PORT2, PORT4 … … PORT32 。 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

Users connect the ZLAN5W12 to a switch, hub, or computer network card through NET1 to NET4 network ports. It can also be used for the cascade of ZLAN5W12, expanding to 64 serial servers.

The following figure shows the sequence of network ports：

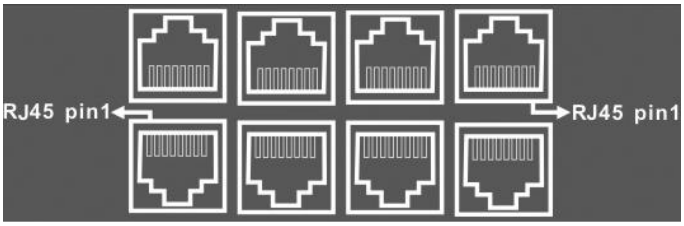


Figure 6 Network cable sequence

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

Once being used as RS232，necessary pins as followings：

RJ45 PIN	Name	Specifications	Corresponding RJ45 to DB9 accessory sequence
2	RXD	Serial server receive pin	2
3	TXD	Serial server send pin	3
5	GND	numerically	5
1	RTS	After flow control is enabled, the serial port server accepts data from the serial port device when the pin is	6，8

		0	
4	CTS	After flow control is enabled, the serial port server sends data to the serial port device only when the pin is 0	4，7

Users can make their own crystal head to connect to the RS232 device, or equipped with Zolan RJ45 to DB9 cable (male), the corresponding line sequence refer to the above table. The equipped DB9 cable can be directly connected to the RS232 DB9 female device. If the device does not have flow control, RTS and CTS can be suspended.

When used as RS485, you only need to connect pin6 (485A) and pin7 (485B). You are advised to make your own RJ45 connector and connect it to the RS485 device through Class 5 shielded network cables.

When used as an RS422, a jumper is required inside the device to change the pin4 from the fluidic CTS of RS232 to the receiving R- of RS422. For specific practices, please consult Zlan engineers.

No.	**ZLAN5W12 RS422 cable**	**The cable corresponds to the user RS422**
6	T/R+（485A）	R+
7	T/R-（485B）	R-
8	R+	T+
4	R-	T-

The ZLAN5W12 complies with the RS485 standard, and each ZLAN5W12 can carry 32 terminal 485 devices. The maximum communication distance is 1200 meters. The 485 terminal resistance is 120 ohms, and it is generally necessary to use the terminal resistance when the wiring exceeds 300 meters. Note that when wiring, 485+ and 485- must be a pair of twisted pairs twisted together to reduce signal interference.

4. Usage

4.1. Usage summary

Connect the power cable to the 220V power port of the device. After the power is on, turn on the switch on the back.

If the front power indicator is on, the power supply to the device is normal. Connect to

the network through any of the four network ports. ZLVircom is used to configure equipment parameters, and the specific configuration method is introduced later. After the configuration, the software is connected to the TCP/UDP of the corresponding PORT port, and the data and the corresponding serial port can be forwarded to each other.

4.2. Software installation

ZLVircom can be used to configure parameters such as device IP and create virtual serial ports. If the virtual serial port function is not required, you can download the no-installation version. Download address：http://www.zlmcu.com/download.htm

Figure 1 ZLVircom version

Software name	Specifications
ZLVircomDevice Management Tool (non-installed version)	Non-installed version does not include the virtual serial port function
ZLVircom-Device Management Tool (Installation version)	Installation version , includes ZLVircom_x64.msi and ZLVircom_x86.msi 。x64 is installed for 64-bit operating systems, and x86 versions are installed for 32-bit operating systems.

Follow the default prompts during installation. After installation, zlvircom will be started every time the computer starts, which is used to create a virtual serial port.

4.3. Parameter Configuration

The following notes describe how to quickly batch edit multiple serial port devices. Configure the ZLVircom version of ZLAN5W12 to be 6.41 or greater. Please note the version：

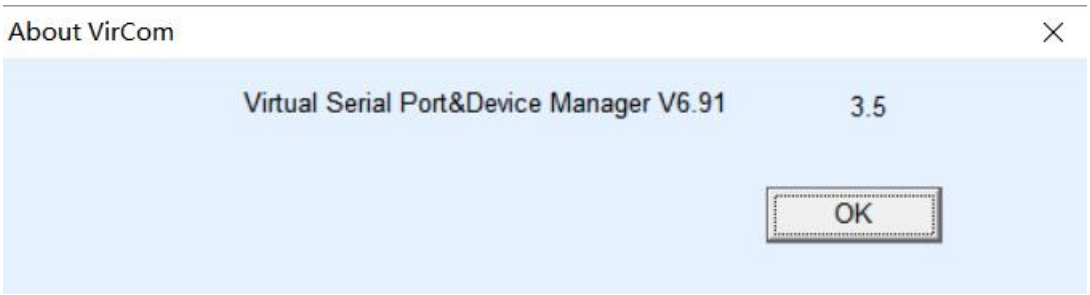


Figure 7 ZLVircom version confirm

After ZLVircom is installed and equipment hardware connection is completed, ZLvircom software is run as shown in Figure 8, and then click "Equipment management" as shown in Figure 9. ZLVircom can be used to search and configure equipment parameters in different network segments, which is very convenient, as long as the equipment and the computer running ZLVircom are in the same switch.

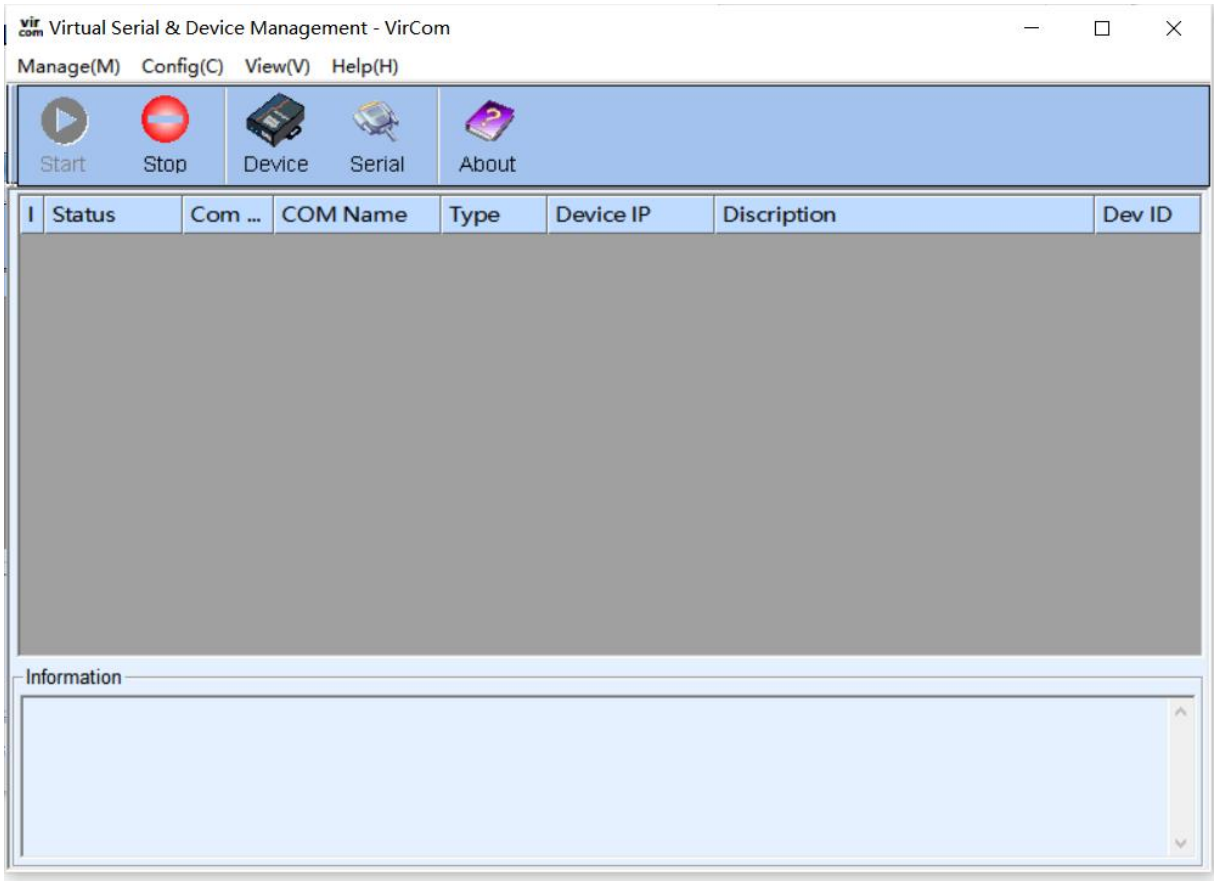


Figure 8 ZLVircom Front view page

You can see a list of devices with at least 32 ports. Because the 32 ports of the same device are selected as required, the different ports of the same device need to be sorted by name so that different ports of the same device are in a continuous area. The method of sorting is to click on the title bar "Device name". Before delivery, the PORT of each device is named E3F78B-01 to E3F78B-32. The E3F78B on the left is the device ID, that is, the last six digits of the first PORT ID. -01 to -32 Indicates the PORT. Note The device name can be changed. If the device name has been changed, you can view the PORT ID of the device from 1 to 32 in the PORT list.

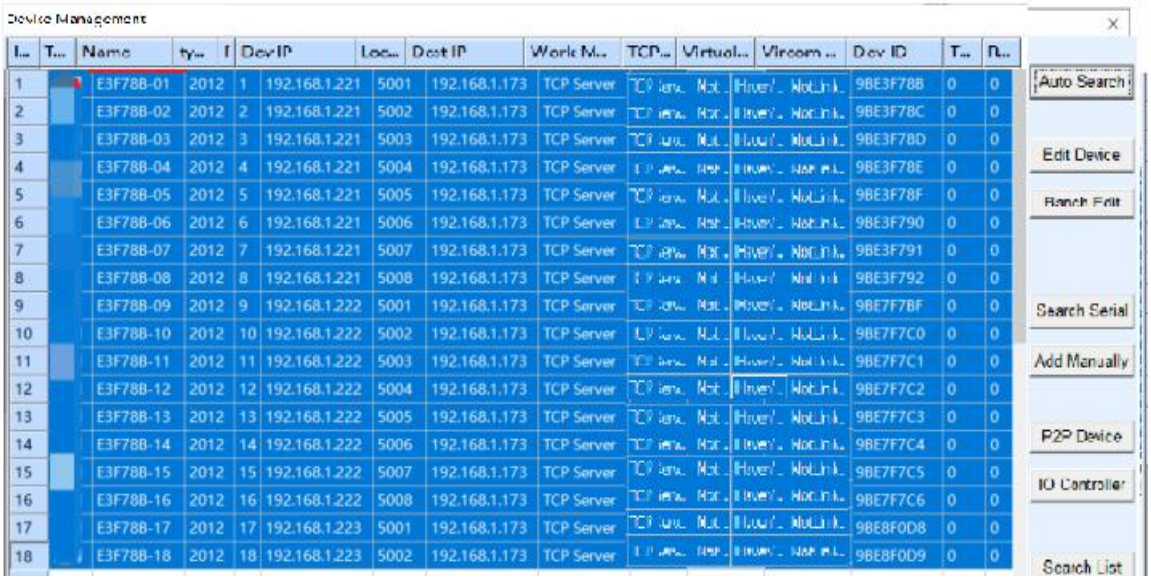


Figure 9 Device list

After sorting, 32 ports of the device are arranged consecutively. Select the first device E3F78B-01 and drag the mouse down until devices with all 32 ports are selected. Then click "Batch Edit". Batch Edit allows 32 ports to be modified at once, with the correct IP and PORT

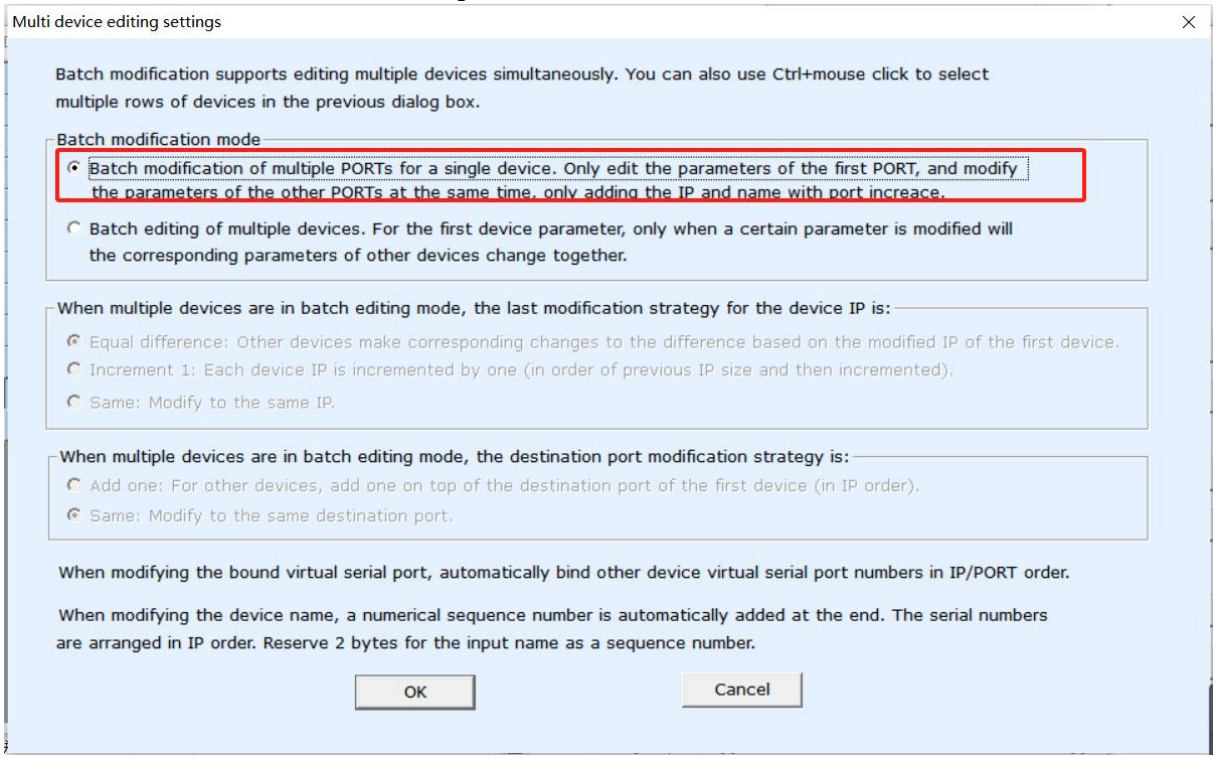


Figure 10 Batch setup options

Because all ports of 1 to 32 channels are selected, the software recognizes all ports of 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

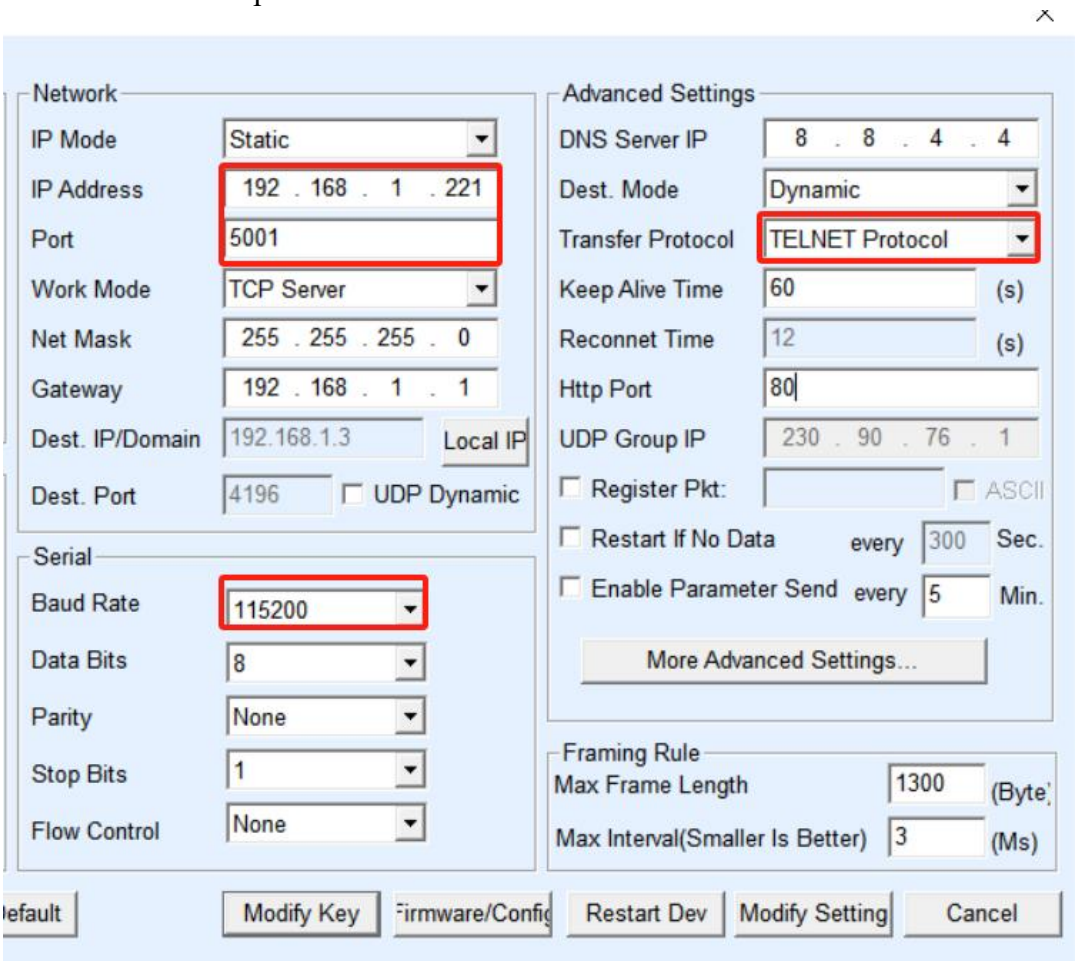


Figure 11 Parameter dialog box

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 32 ports in batches at a time.

The 32 channels have four independent modules. Channels 1 to 8 belong to module 1, 9 to 16 belong to module 2,17 to 24 belong to module 3, and 25 to 32 belong to module 4. The

new IP address and PORT are shown in the following table：

PORT Number	IP	Interface	Module	Name
1~8	192.168.1.221	5001~5008	Module 1	E3F78B-01~ E3F78B-08
9~16	192.168.1.222(each IP added 1）	5001~5008	Module 2	E3F78B-09~ E3F78B-16
17~24	192.168.1.223	5001~5008	Module 3	E3F78B-17~ E3F78B-24
25~32	192.168.1.224	5001~5008	Module 4	E3F78B-25~ E3F78B-32

If the software needs to connect to PORT 20, it first knows that the IP is 192.168.1.223 (8 ports are one IP, 20 belongs to module 3), and then the PORT number is the fourth in this module (20 MOD 8 = 4), so the port is 5004. Therefore, the connected IP address is 192.168.1.223 and port 5004.

Modules 1 to 4 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 is how to change to one PORT, multiple IP.

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

Figure 12 Modifying multiple IP addresses 1

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.

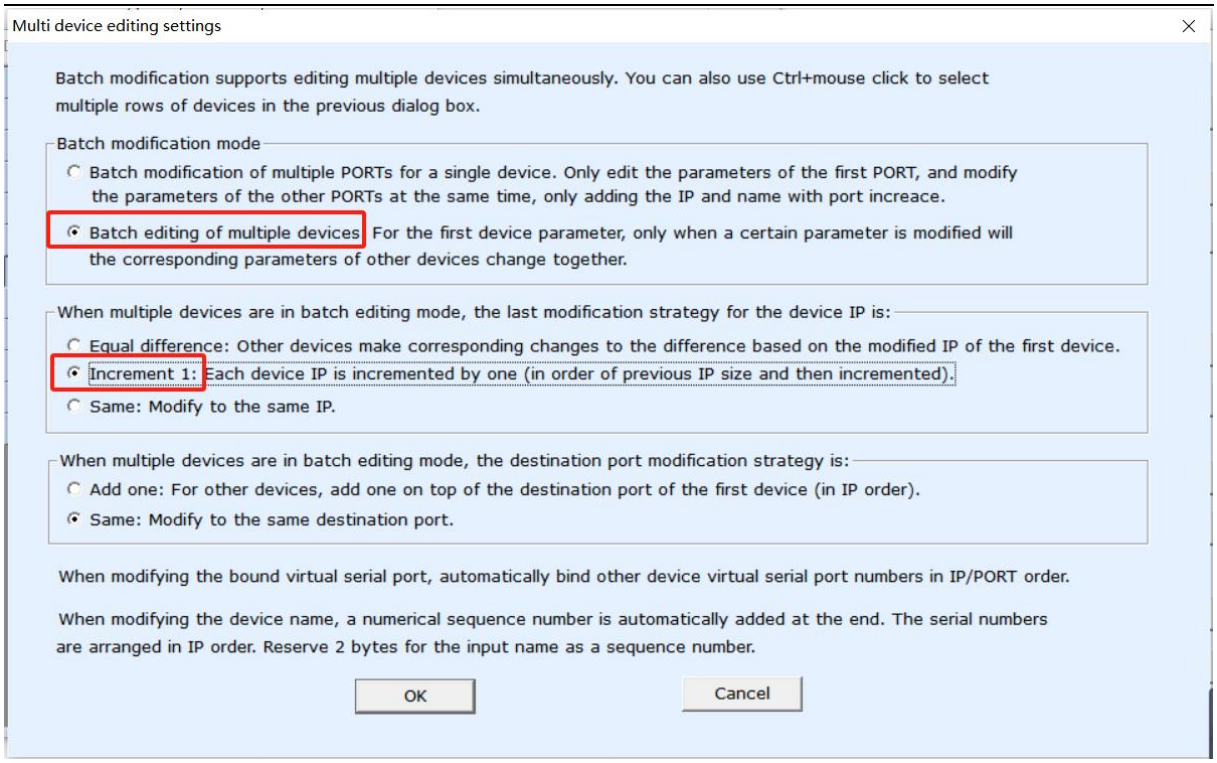


Figure 13 Modifying multiple IP addresses 2

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

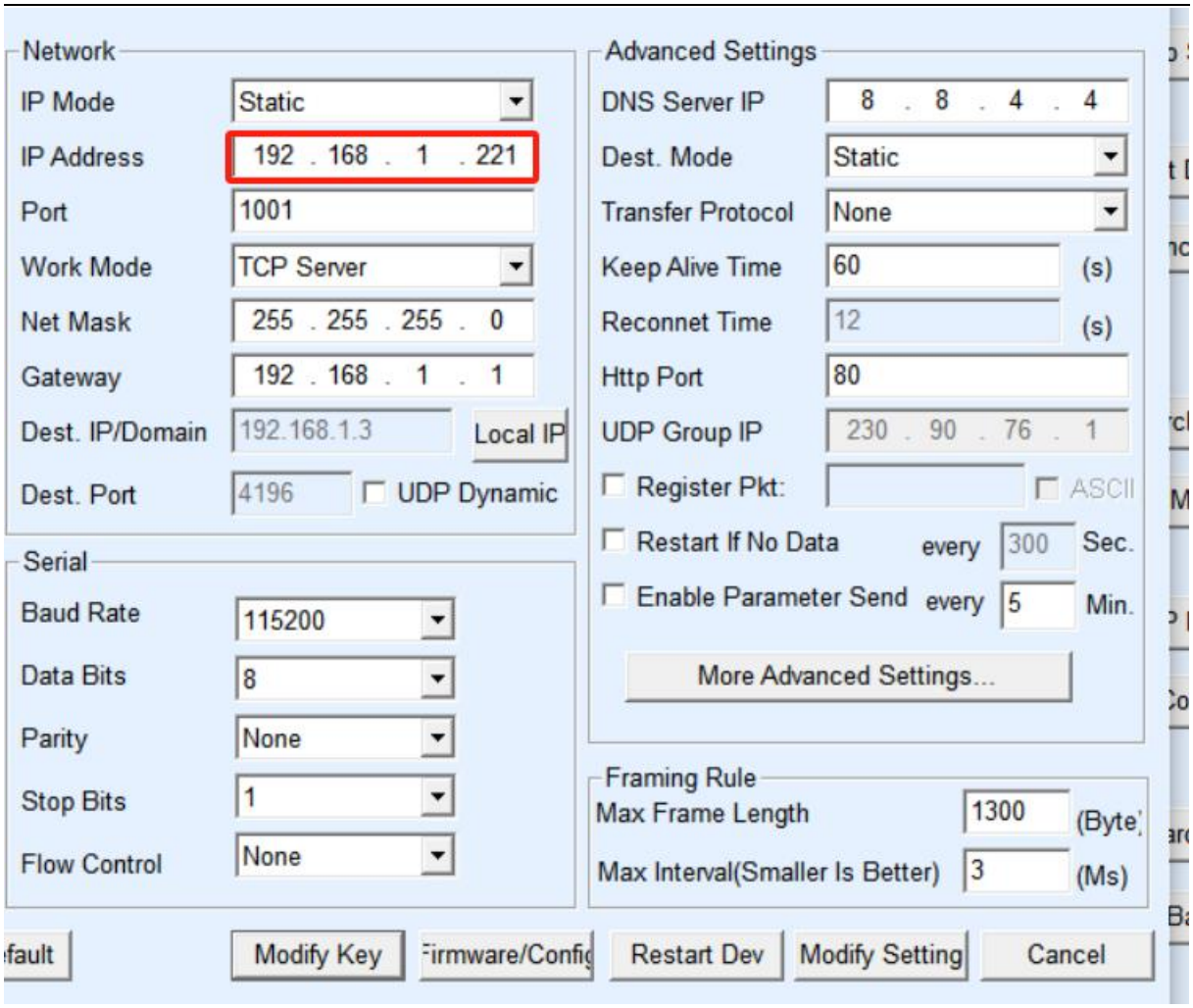
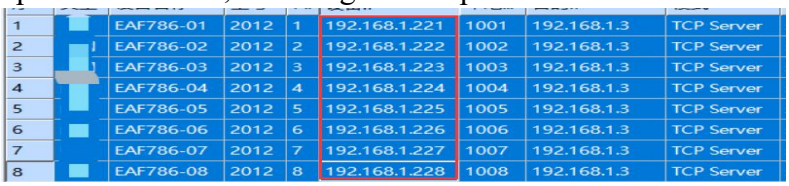


Figure 14 Modifying multiple IP addresses 3

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 15 Result of modifying multiple IP addresses

According to the modification result, there are now 8 IP addresses, ranging from 192.168.1.221 to 192.168.1.228.

4.4. Meaning of this parameter

The functions and parameters of each of the 32 serial ports are independent and similar. The following parameters describe the parameters of only one serial port：

Figure 2 Data meaning

Parameter name	value range	Contents
virtual serial port	virtual serial port is not used	You can bind the current device to an existing virtual serial port. Add a COM port in Serial Port Management on the home screen
Device model		Only the model of the core module is displayed
device name	Random	You can give the device an easy-to-read name, up to 9 bytes, support Chinese names.
Device ID		The factory unique ID cannot be modified
Firmware version		Firmware version of the core module
Features supported by the device		See Table 3 for features supported by the device
IP mode	static、DHCP	Users can choose between static or DHCP (dynamic IP acquisition)
IP address		IP address of the serial port server
Interface	0～65535	Listening port of the serial port Server in TCP Server or UDP mode. If you use port 0 as the client, you are advised to set port 0 to improve the connection speed. If port 0 is used, the system randomly assigns a local port. The difference between this and non-zero port is: (1) When the local port is 0, a new TCP connection is established with the PC when the module restarts, and the old TCP connection may not be closed, and the device

		may have multiple fake connections. Generally, the host computer wants to close the old connection when the module restarts; Specifying a non-zero port closes the old connection. (2) If the local port is 0, the TCP connection takes a shorter time to re-establish. When the serial port server is in TCP client mode, it also acts as the TCP server to listen for incoming connections on the port. In this case, the local port number used by the TCP client to connect to the server is Port +1000.
working mode	TCP server mode, TCP client mode, UDP mode, UDP multicast mode	When set to TCP server, the serial server waits for the computer to connect. If TCP client is configured, the serial port server initiates a connection to the network server specified by the destination IP address
Subnet mask	Eg：255.255.255.0	The subnet mask must be the same as that of the local LAN
Gateway	Eg：192.168.1.1	It must be the same as the local LAN gateway
Destination IP address or domain name		In TCP client or UDP mode, data is sent to the computer indicated by the destination IP or domain name.
Destination port		In TCP client or UDP mode, data is sent to the destination port of the destination IP address
baud rate	1200、2400、4800、7200、9600、14400、19200、28800、38400、57600、76800、115200、230400、460800、921.6K	serial port baud rate
digit bits	5、6、7、8、9	
check bits	None, Even, Odd, tag,	

	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	capable only for serial port RS232
DNS server		If the destination IP address is described by a domain name, enter the IP address of the DNS server. If the IP address mode is DHCP, you do not need to specify the DNS server. The DNS server automatically obtains the IP address from the DHCP server.
Destination mode	Static and dynamic	TCP client mode: In static destination mode, the device automatically restarts after five consecutive failed attempts to connect to the server
transfer protocol	NONE 、Modbus TCP<->RTU 、Real_COM、TELNET	NONE indicates that data is transmitted transparently from the serial port to the network. Modbus TCP<->RTU will convert Modbus TCP protocol directly into RTU protocol, which is convenient to cooperate with Modbus TCP protocol; RealCOM is designed to be compatible with the older version of the REAL_COM protocol. It is a virtual serial port protocol. However, it is not necessary to select the RealCom protocol when using the virtual serial port. The TELNET protocol allows the network to log in to our device through TELNET to communicate with the serial port
Keepalive timing time	0～255	Heartbeat interval. (1) If the value ranges from 1 to 255 and the device is in TCP client working mode,

		the device automatically sends TCP heartbeat packets at Keepalive intervals. This ensures the TCP validity of the link. If the value is set to 0, there is no TCP heartbeat. (2) If the value is set to 0 to 254, and the conversion protocol is REAL_COM, the device will send data with length 1 and content 0 at keepalive intervals to implement the heartbeat mechanism in the Realcom protocol. If the value is set to 255, there is no realcom heartbeat. (3) When the value is set to 0 to 254, if the device works on the TCP client, the device will send device parameters to the destination computer at keepalive intervals. If the value is set to 255, no parameter is sent, enabling remote device management
Disconnected reconnection time	0～255	In TCP client mode, when the connection fails, the TCP connection is re-initiated to the computer at disconnection Reconnection time intervals. The value ranges from 0 to 254 seconds. If the value is set to 255, the reconnection is never performed. Note that the first TCP connection (such as hardware power-on, device restart through zlvircom software, and no data light) is generally carried out immediately, and only after the first connection fails will it wait for the "disconnection reconnection time" to try again, so the "disconnection reconnection time" will not affect the normal connection establishment time between the network and the server.
Web access port	1～65535	default is 80

Indicates the multicast address		Used once UDP broadcast
Enable registration package		When a TCP connection is established, the registration packet is sent to the computer. The realcom protocol must be selected after the registration package is enabled. TCP server and TCP client modes are supported.
Packet length	1~1400	One of the serial port framing rules. Serial port server After receiving data of this length, the serial port sends the received data to the network as one frame.
Packet interval	0～255	Serial frame rule 2. When the data received by the serial port server stops for a period longer than the specified period, the received data is sent to the network as a frame.

The functions supported by the device are described as follows：

Chart 3 Functions supported by the device

Name	Specifications
Domain name system	The destination IP address can be a domain name (such as the first www server address).
REAL_COM protocol	A non-transparent serial port server protocol, suitable for multiple serial port servers to bind virtual serial ports over the Internet. Because the protocol contains the MAC address of the device, it helps the host computer to identify the device. Generally, it can not be used
Modbus TCP to RTU	Can realize Modbus TCP to RTU. It also supports the multi-host function
Serial port modification parameter	Support serial port class AT instruction to configure and read device parameters
Automatic acquisition IP	Supports the DHCP client protocol

Multi-tcp connections	The TCP server supports more than one TCP connection
UDP broadcast	UDP broadcast
Multi purpose IP	As a TCP client, seven destination IP addresses can be connected at the same time
P2P function	Supports the function of accessing devices in any network through P2P traversing technology. Models ending in N support this function.
TELNET function	Connect to the Zlan serial port server through Telnet to monitor the serial port of the device

4.5. 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. Conversion Protocol Switching between None and TELNET Protocol.
3. Modify only one or more of the following parameters：
   a) Local port , destination port
   b) Baud rate, data As, check bit, flow control, stop bit
   c) Device name, packet interval, and packet length

4.6. TCP Communication test

Because the functions and parameters of each of the 32 serial ports are independent and similar, the subsequent communication describes the configuration of only one serial port.

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

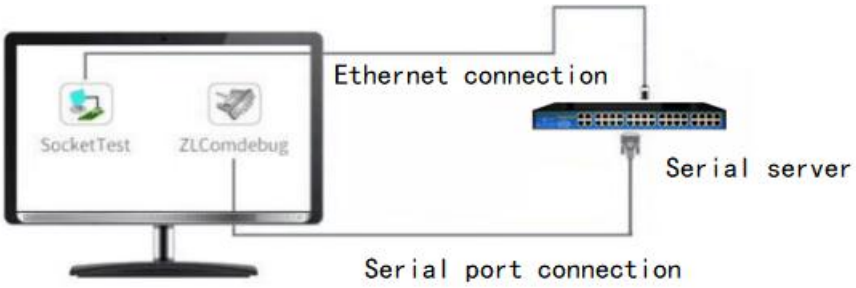


Chart 16 TCP Communication diagram

Now suppose the PC COM port (USB to RS232 line) and serial port serial port server connection, then open the ZLComDebug (http://www.zlmcu.com/download/Comdebug.rar) serial debugging assistant, and open the corresponding COM figure 17. Open TCP&UDP debugging assistant SocketTest (http://www.zlmcu.com/download/SocketTest.rar), and as a way of TCP client, fill in the destination IP for a serial port server IP (currently 192.168.1.221), The destination port is 5001, then click the "Open" button in Figure 18. On the Ttest of SocketTest, input "socket send" and click send, the data is transferred to RS232 interface through the network port of the serial server, and then sent to ZLComDebug, which is then displayed in ZLComDebug. On the other hand, input "Comdebug send" in ZLComDebug and click "send" to send to socket test.

This section demonstrates the transparent data forwarding function of serial port to network port and network port to serial port server.

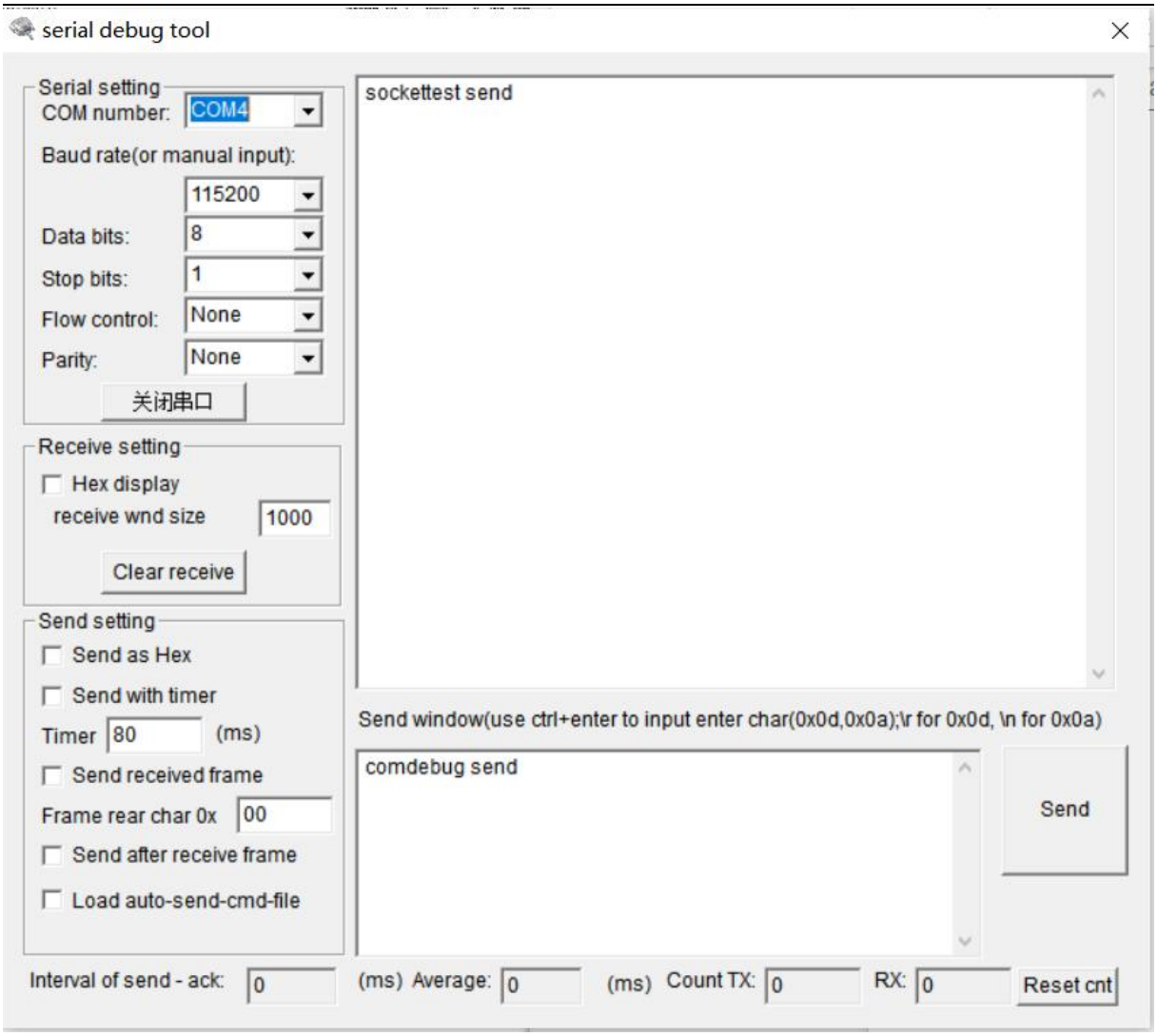


Chart 17 comdebug Transceiver interface

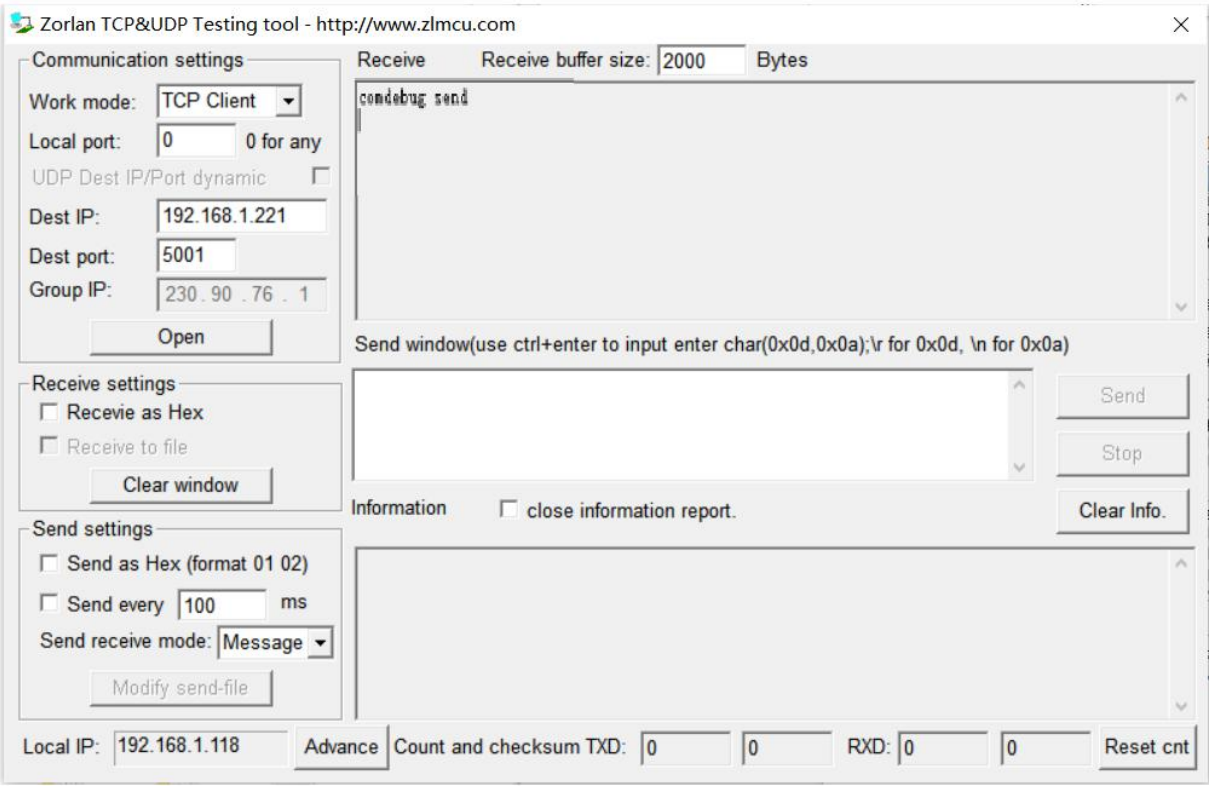


Chart 18 sockettest Transceiver interface

4.7. Virtual serial port test

The SocketTest shown in Figure 16 communicates directly with the serial server through TCP. In order to enable users to communicate with the serial server even with the developed serial software, a virtual serial port needs to be added between the user program and the serial server. As shown in Figure 19, ZLVircom and the user program run on a computer. ZLVircom virtualizes a COM port and makes this COM port correspond to this serial port server. When the user program opens COM communication, it can be sent to the user serial port device through the ZLVircom serial port server. This procedure is demonstrated below：

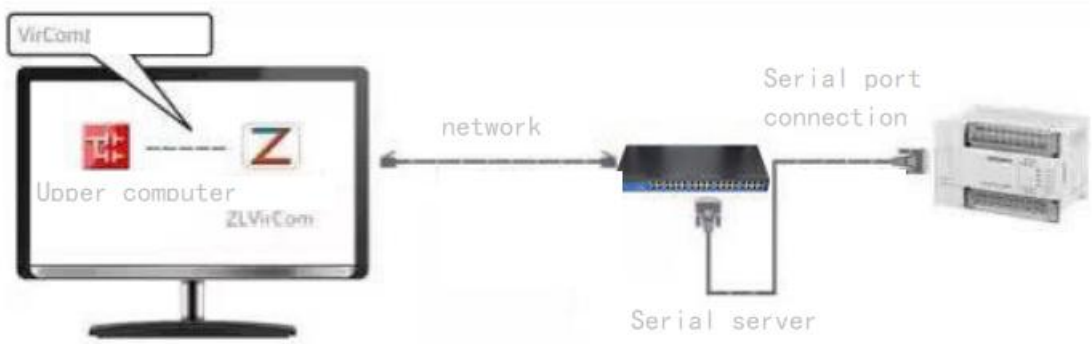


Figure 19 Functions of the virtual serial port

Click "Serial port management" in the main interface of ZLVircom, then click "Add", select to add COM5, where COM5 is the COM port that does not exist in the computer.

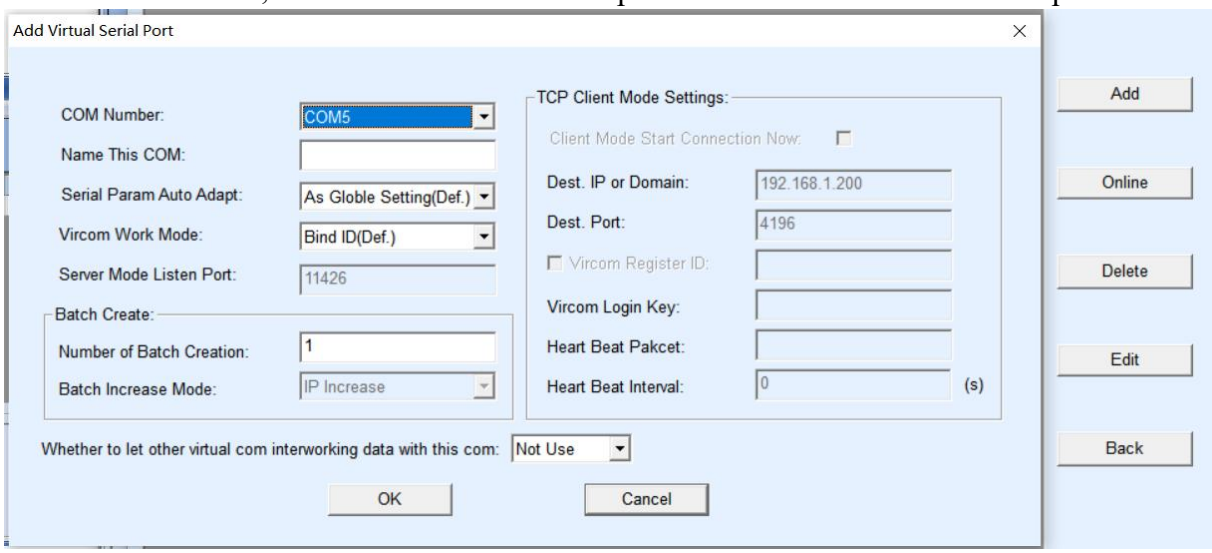


Figure 20 Adding a virtual serial Port

Then go to Device Management and double-click the device that you want to bind to COM5. Select COM5 from the Virtual Serial Port list in the upper left corner. Then click "Modify Settings". And return to ZLVircom's main interface. You can see that COM5 has connected to the device whose IP address is 192.168.1.211. COM5 can be used instead of SocketTest to communicate at this time.

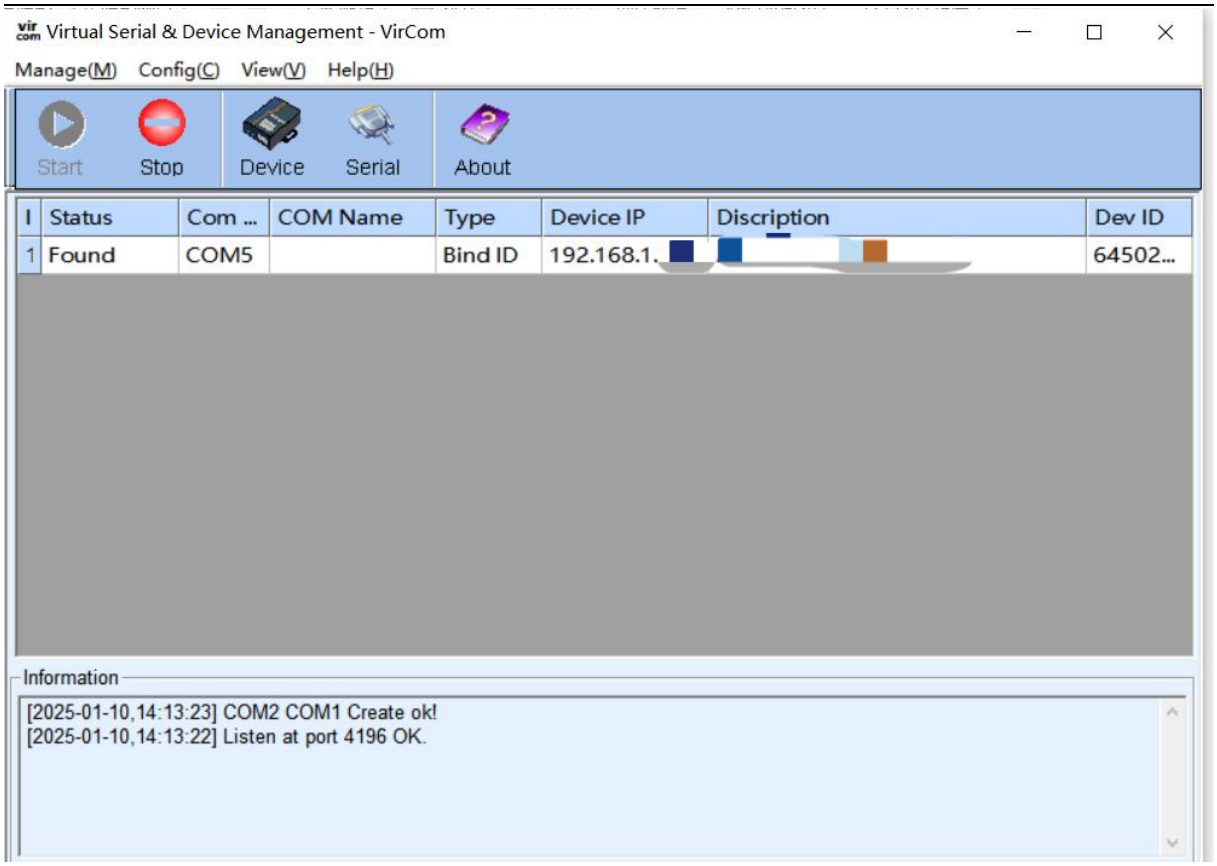


Figure 21 The virtual serial port is connected

Open ZLComdebug to simulate the user's serial port program, open COM5(the above virtual serial port), and open a ZLComdebug to simulate a serial device, open COM4(hardware serial port). The data link sent by COM5 is as follows: COM5ZLVircom serial port Server network port Serial port Server serial port COM4. Conversely, COM4 to COM5 can also transmit data: COM4 serial port server serial port Serial port server network port ZLVircomCOM5. Figure 22 shows the two parties sending and receiving data.

If the COM4 is replaced by the user serial port device, the COM5 can realize the communication with the user device.

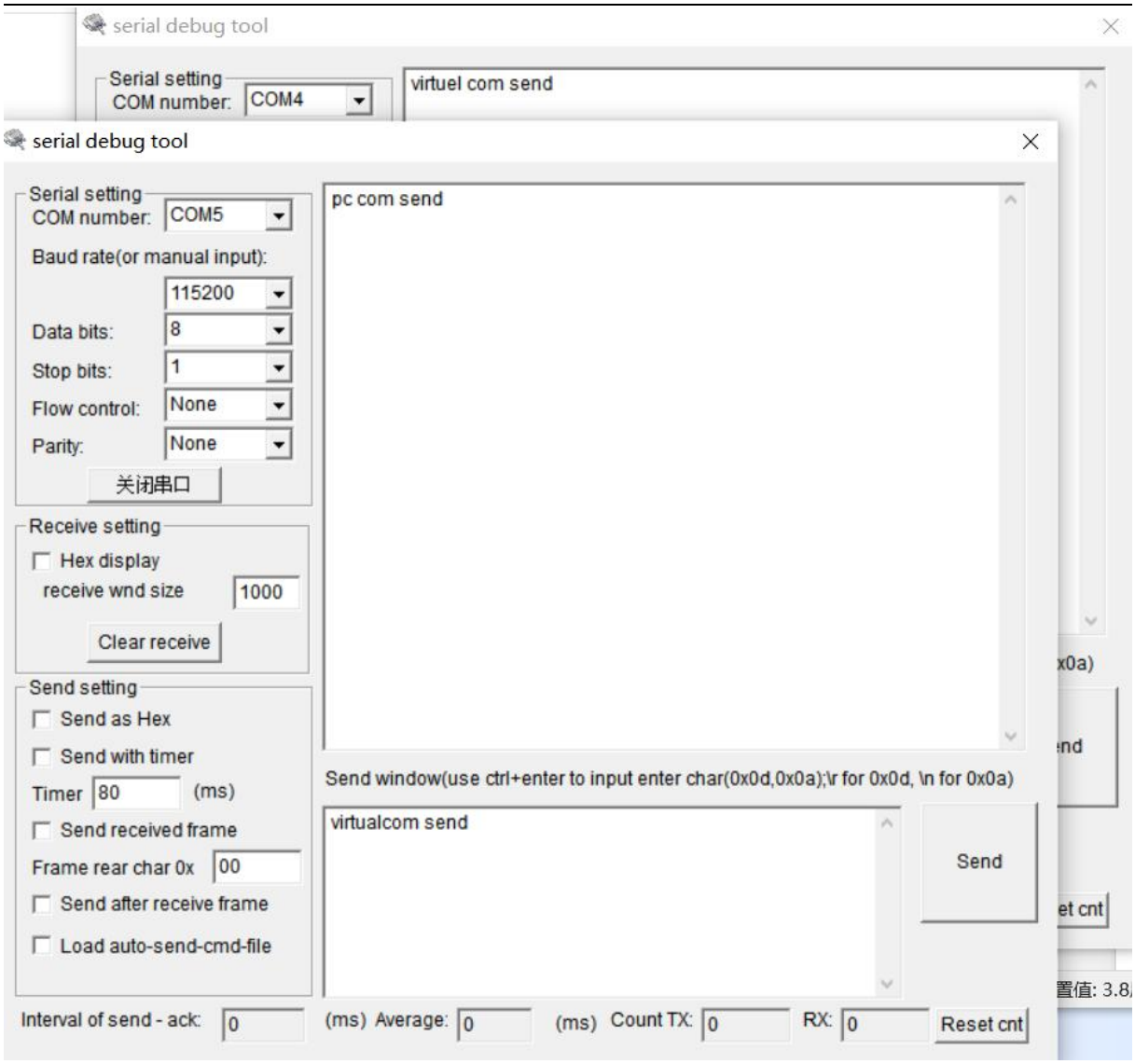


Figure 22 Communication through the virtual serial port

4.8. Modbus TCP testing

By default, serial port and network port data are transmitted transparently. If you need to convert Modbus TCP to RTU, you need to select "Modbus TCPRTU" as the conversion protocol in the device setup dialog box, as shown in Figure 23. In this case, the device port automatically changes to 502, and the Modbus TCP tool connects to port 502 of the serial port server IP address. The Modbus TCP command is converted to RTU command and output from the serial port. For example, if the port of the serial port server receives the Modbus TCP command 00 00 00 00 00 06 01 03 00 00 00 00 00 0a, the serial port outputs the command 01

03 00 00 00 00 00 a c5 cd. Note: The serial port may send more than one 01 03 00 00 00 00 0a c5 cd command, this is because the default Modbus is stored mode, will automatically rotate the query command. I'll explain how to switch to non-storage mode later.

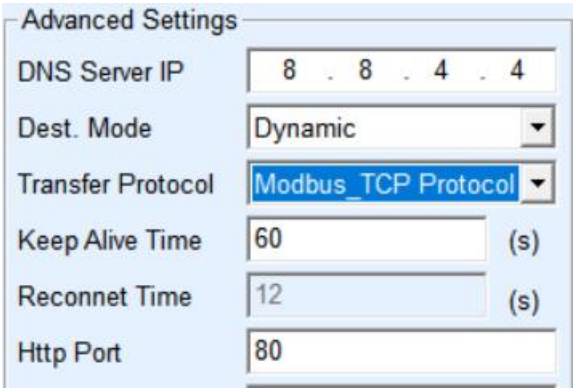


Figure 23 start Modbus TCP function

If the Modbus TCP software of the user is used as the Slave station, it is necessary to change the working mode to the client on the basis of selecting the conversion protocol, change the destination IP address to the IP address of the computer where the Modbus TCP software is located, and the destination port is 502, as shown in Figure 24.

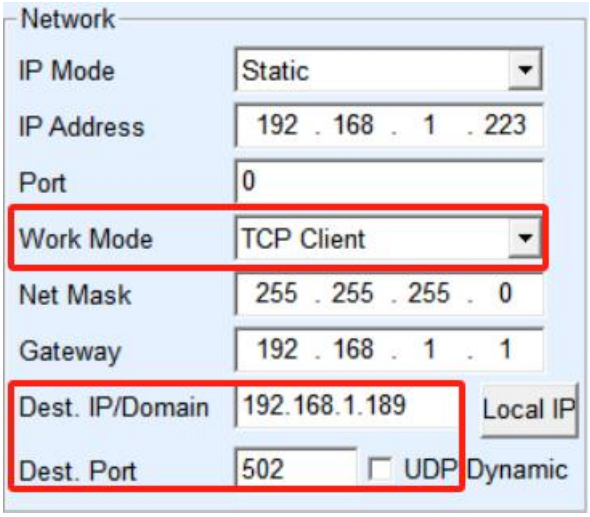


Figure 24 Modbus TCP being client side

4.9. Web configuration way

ZLVircom can search and configure device parameters in different network segments. Web configuration requires first to ensure that the computer and the serial server are in the same IP segment, and the IP address of the serial server needs to be known in advance. But

Web configuration can be done on any computer without ZLVircom.

1. Enter the serial port server IP address in the address box of your browser, for example, http://192.168.1.221.

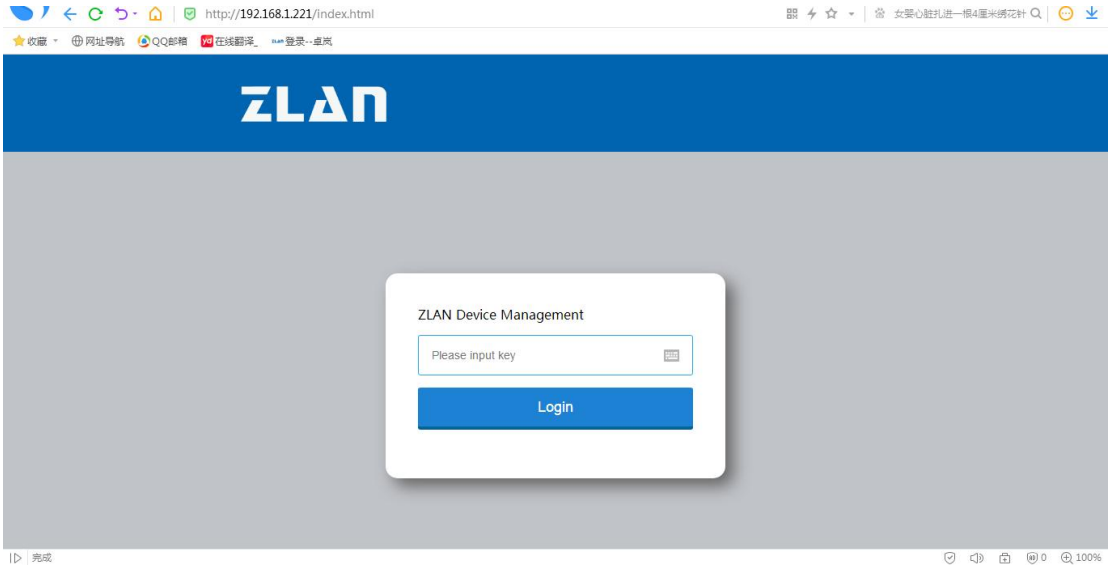


Figure25 web login in web page

2. Enter the Password in Password. The default password is 123456. Click the login button to sign in.

Figure 26 Web configuration web-page

3. You can modify serial port server parameters in the displayed web page. For details about related parameters, see Table 2.
4. Click the "Submit Modification" button after modifying the parameters.

5. Working mode and conversion protocol

In different applications can choose different serial server working mode, conversion protocol, so as to be more stable and reliable use, the following details.

The use of serial port server is basically divided into two types: with virtual serial port and non-virtual serial port, as shown in Figure 16 TCP communication diagram and Figure 19 function of virtual serial port. The user software that needs to be connected with the virtual serial port is a serial port (COM port), that is, the user software and the user device are serial ports. Non-virtual serial port mode The user software is directly TCP/IP communication but the user device is still serial port.

In the non-virtual serial port mode, the conversion protocol section is divided into transparent transmission, Modbus TCP to RTU, Realcom, and TELNET. If the user software uses the Modbus TCP protocol and the lower computer uses Modbus RTU, select Modbus TCP to RTU. Realcom is used only when a multi-serial port server serves as the TCP client to connect to a server and the virtual serial port is used on the server. TELNET is used to monitor the serial port of the device when the server is connected to the Zlan module through Telnet.

Usage is summarized as follows：

Figure 4Network configuration mode

No	Virtual serial port usage	Equipment operating mode	Transfer protocol	Specifications
1	Yes	TCP server	none	It is suitable for the occasion when the user software opens COM port to collect data actively
2	Yes	TCP client	none	If the TCP server is selected, the device may fail to reconnect after disconnection
3	No	TCP server	Modbus TCP to RTU	The user software is Modbus TCP and the user device is Modbus RTU. And the Modbus TCP master station
4	No	TCP client	Modbus TCP to RTU	The user software is Modbus TCP and the user device is Modbus RTU.

				And Modbus RTU is the master station.
5	Yes	TCP client	Realcom protocol	When the multi-serial port server serves as the TCP client and the virtual serial port is used, the Realcom protocol is recommended
6	No	TCP server	Telnet protocol	This mode applies to monitoring device serial ports when connecting to the Zlan serial port server over Telnet
7	No	TCP client	none	It is suitable for connecting a cloud with a large number of devices. In general, the cloud is a server with a public IP address on the Internet
8	No	TCP server	none	Applicable to devices and computers on the same local network, local monitoring, no need to cross the Internet communication.

5.1. Virtual serial port mode

If the user software uses the COM port to communicate, it must use the virtual serial port mode. Including some PLC software, configuration software, instrument software and so on.

Then see if the monitoring computers and devices are on the local network：

a) If the computer is a server with a public IP address leased on the Internet, the device must use TCP client mode to connect the device to the server. In this case, you can select 2 and 5 in Table 4. If multiple serial servers are used, you must select 5.

b) All in the local network (can ping each other), it depends on whether the host computer actively queries or the device actively sends data. If the device acts as the TCP client to send packets, mode 2 must be used. Otherwise, mode 1 can be used.

5.2. Direct TCP/IP communication mode

If the Modbus TCP protocol is not required and the virtual serial port is not required, the user software may directly communicate with the network port of the serial port server for TCP/IP communication, and the serial port server converts TCP/IP data to serial port data and sends it to the serial port device.

Generally, the user of this kind of usage develops the host computer network communication software by himself, which integrates the analysis of the serial communication protocol of the device. This method is more flexible and efficient than virtual serial port. Correspond to 7 and 8 in Table 4.

The section "3.4.6TCP Communication Test" mainly describes how to communicate when the serial server acts as a TCP server. Here we will talk about how TCP clients, UDP mode, and multi-TCP connections communicate with computer software. The Ttest computer software is based on SocketTest (software that mimics user TCP/IP communication) as an example.

Zlan serial port to network port module complies with the standard TCP/IP protocol, so any network terminal that complies with the protocol can communicate with the serial port server, Zolan technology provides a network debugging tool (SocketDlgTest program) to simulate the network terminal to communicate with the serial port server.

For two network terminals (in this case, the network debugging tool and the serial server) to communicate, their parameter configurations must be paired.

5.2.1. TCP client side mode

There are two working modes in TCP mode: TCP server and TCP client. No matter which mode is used, one side must be the server and the other side is the client, and then the client can access the server.

When the serial server is the client, there must be three mappings, as shown in Figure 27. (1) Working mode: The working mode of the serial port server is the server mode of the network tool corresponding to the client. (2)IP address: The destination IP address of the serial port server must be the IP address of the computer where the network tool is located. (3) Port: The destination port of the serial port server must be the local port of the network tool. After this setting, the serial port server can automatically connect to the network tool and send

and receive data after the connection is established.

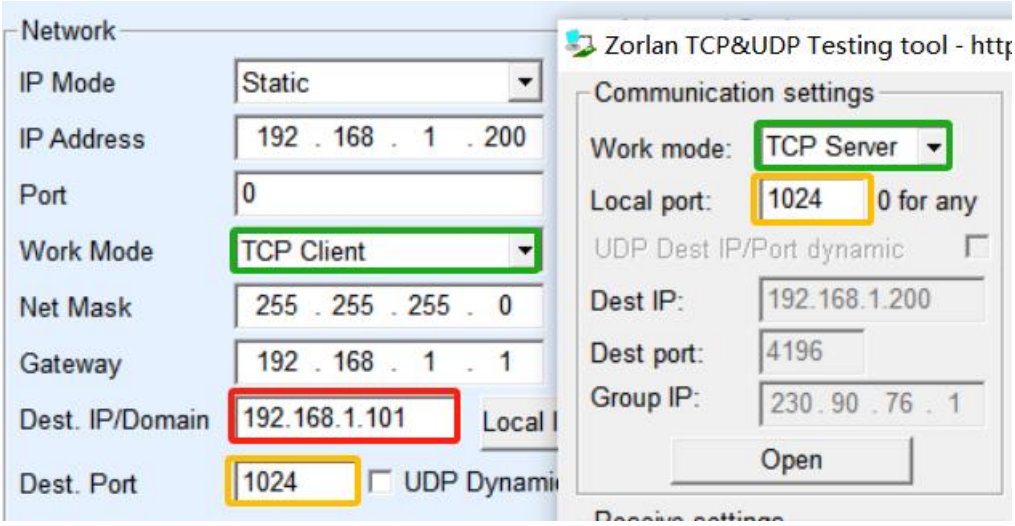


Figure 27The serial server serves as the client

5.2.2. The client connects to multiple servers

When the ZLAN serial port server serves as the TCP client, seven destination IP addresses can be connected at the same time. Data sent from the serial port is sent to all seven destination IP addresses at the same time. If there are not that many servers, the rest of the destination IP is vacant. Its use is as follows：

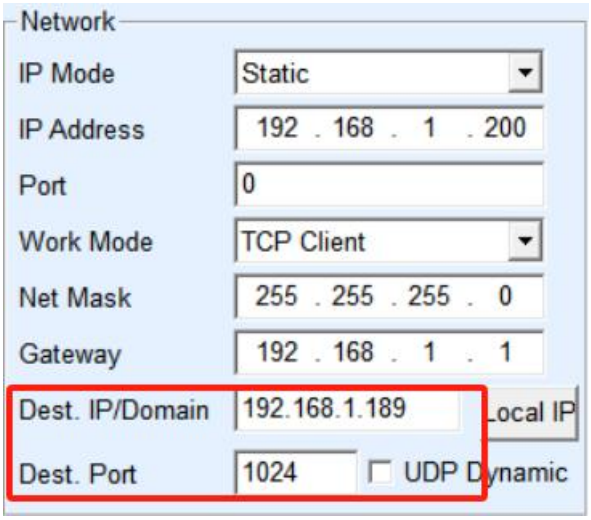


Figure 28The first destination IP address and port number

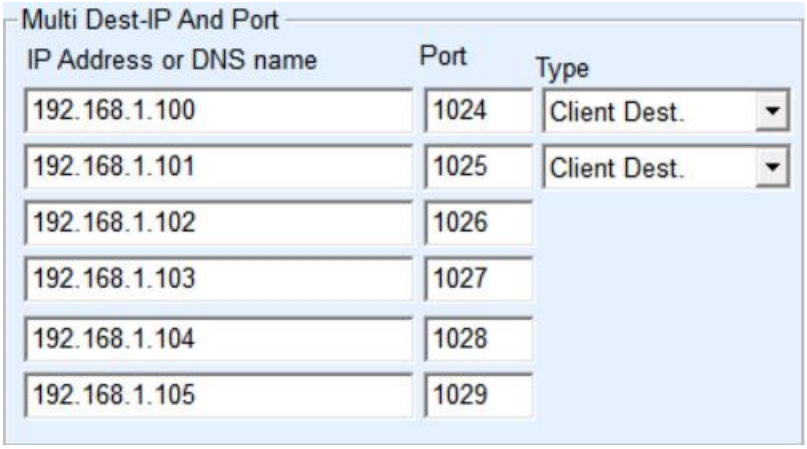


Figure 292 to 7 IP addresses and ports remain

The first IP address is set in the device setup screen shown in Figure 28, where the first IP address can be a domain name. Remaining 2 to 7 destination IP addresses On the device Settings screen, click More Advanced Options to open more advanced options.

All seven destination IP addresses can be automatically connected after being set. If the destination IP addresses fail to be connected, they are reconnected repeatedly after the Disconnection time.

5.2.3. TCP server mode

When the serial server acts as the server, there are also three mappings, as shown in Figure 30, which are not explained here. After this setting, click the open button of the network tool to establish a TCP connection with the serial port server. After the connection is established, you can send and receive data.

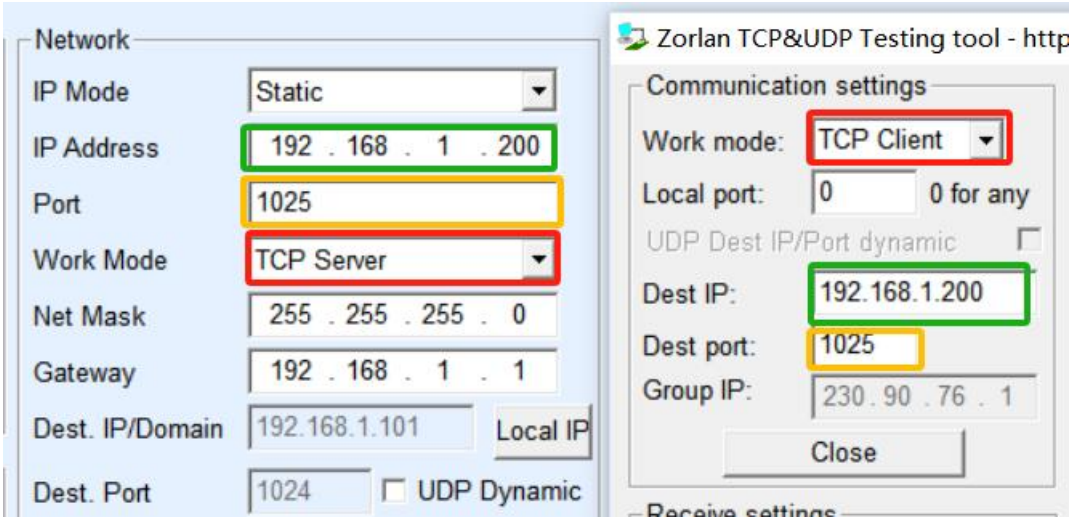


Figure 30The serial server being as server side

When the serial port server serves as the server, it can accept 100 TCP connections at the same time. The data received by the serial port is forwarded to all established TCP connections. If you want to send data only to the TCP that has recently received network packets, you need to enable the multi-host function. For details, see 4.7.4 Multi-Host Function.

5.2.4. Being as both of client side and server side

Zlan serial port server supports the device in the TCP client mode can also accept TCP connections, that is, also has the TCP server function.

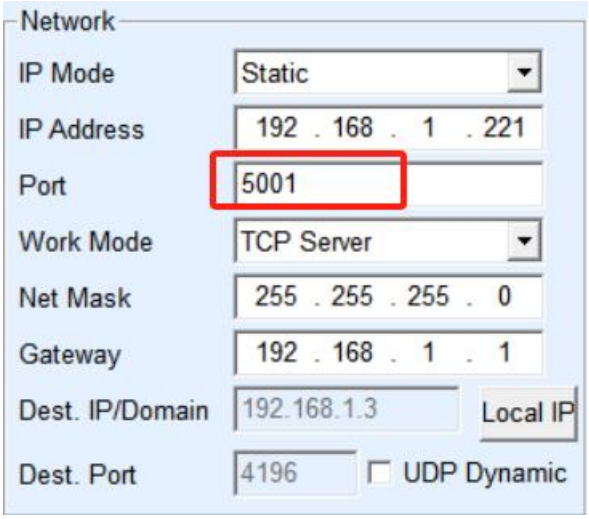


Figure 31Being as both of client side and server side

By default, when ZLVircom is configured, if the working mode is changed to "TCP

client" mode, the port (that is, the local port) will automatically become 0 (0 means that an idle port is randomly selected). In order to support the TCP server mode, the computer software must know the local port of the device, so a value needs to be specified here. As shown in Figure 31, the computer software can now connect to port 5001 of 192.168.1.221 for communication. In addition, the device acts as a client and connects to port 1024 of 192.168.1.189. Note that because the local port 5001 is occupied by the server, the local port used by the client is port +1000, that is, the software on 192.168.1.189 sees that the incoming port of the device is 5001+1000=6001.

5.2.5. UDP mode

In UDP mode, parameter configuration is shown in Figure 32. The left side is the configuration of serial server in ZLVircom, and the right side is the setting of network debugging tool SocketDlgTest. First, both must be in UDP working mode. In addition, the destination IP address and port of the network tool must point to the local IP address and port of the serial port server. The blue arrow indicates that the destination IP address of the serial port server must be the IP address of the computer where the network tool is installed, and the destination port of the serial port server must be the local port of the network debugging tool. These network parameters must be configured to ensure two-way UDP data communication.

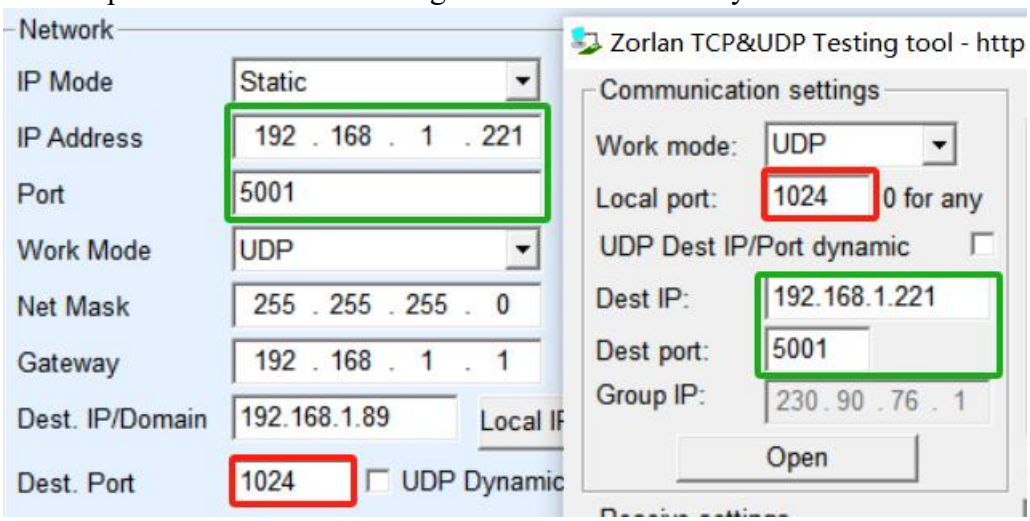


Figure 32 UDP Mode parameter configuration

5.3. TELNET protocol

When you log in to the serial port server using some Telnet tools, double-characters are displayed. For example, when you log in to the system using Telnet in windows. In this case, the conversion protocol needs to be selected as the TELNENT protocol. After you log in through Telnet, there are no more double characters.

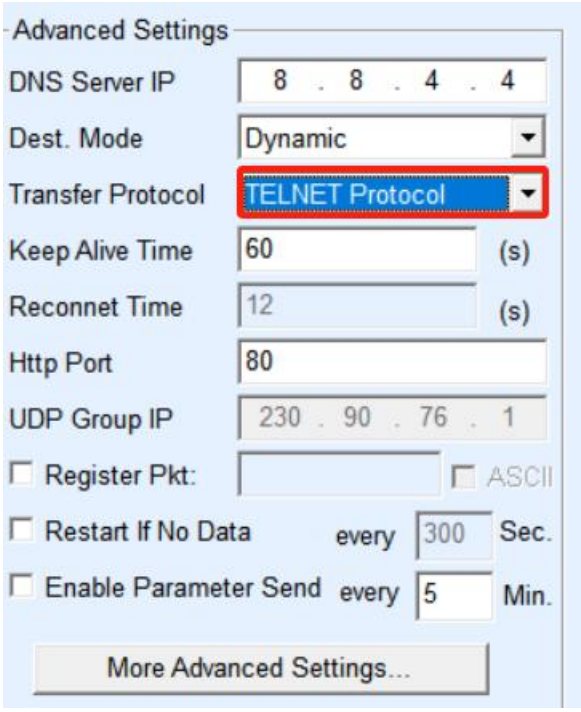


Figure 33 TELNET protocol

If the TAB key fails to be associated and two characters are displayed when secureCRT is used, it indicates that secureCRT is not in one character at a time mode. In this case, you only need to change the device port to 23, because the Send SGA (Only 23 ports) function is automatically selected in secureCRT. Therefore, when our device is on port 23, it will automatically enter the mode of "one character at a time"

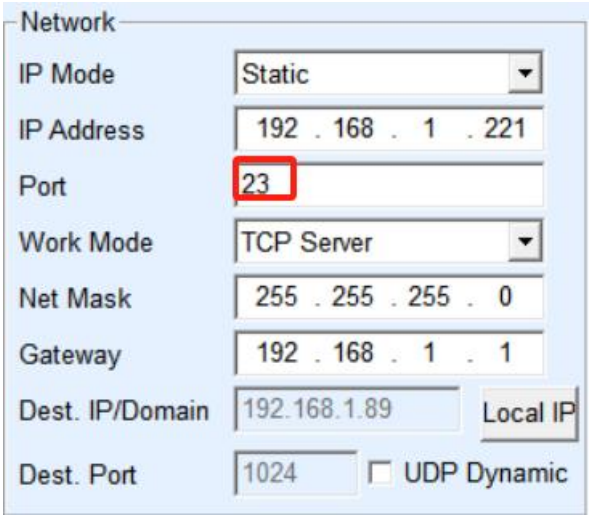


Figure 34 Terminal is 23

For details about how to modify the secureCRT, see Precautions for Monitoring Serial Ports in Telnet Mode.

6. Device Debug

6.1. Network physical connection

The module can be connected to the 10M/100M switch or directly connected to the computer network port using the crossover network cable or the direct network cable.

6.2. Network TCP connection

If the device dynamically obtains IP addresses, do not directly connect to the network port of the computer. Because there is no DHCP server to use (generally DHCP servers are routers in the LAN). Therefore, specify the IP address for direct connection. The computer also needs to specify a fixed IP address.

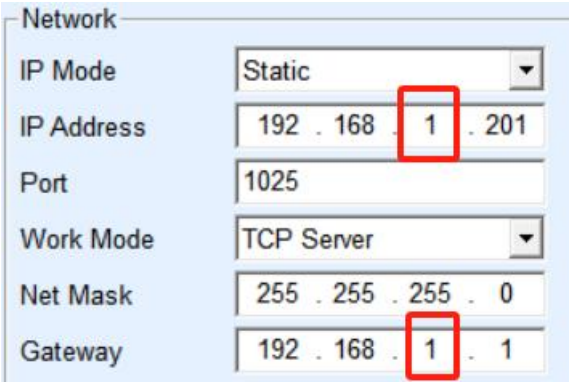
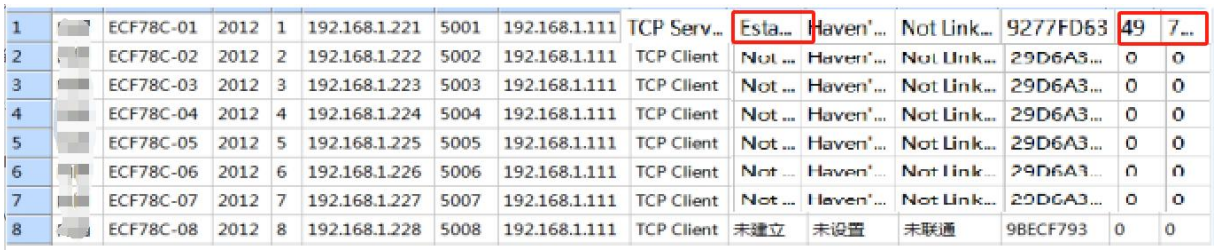


Figure 35 It must be on the same network segment

Whether connected directly or through a switch, when configured with static IP, the device and the computer need to be on the same network segment (unless communicating across gateways), as shown in Figure 35.

Since ZLVircom supports cross-network segment search and configuration, the IP addresses that can be searched but cannot be communicated are generally not well configured. In this case, ZLVircom can be used to configure devices on the same network segment.

After the configuration is complete, you can use the steps in 3.4.6 TCP Communication Test or 3.4.7 Virtual Serial Port Test to see that the network port indicator is steady green when a TCP connection is established. The green light can also be seen through ZLVircom. For example, in the device management list, if the TCP connection is listed as "established", the green light is on in the table, as shown in Figure 36, which can facilitate remote diagnosis.



1		ECF78C-01	2012	1	192.168.1.221	5001	192.168.1.111	TCP Serv...	Esta...	Haven'...	Not Link...	9277FD63	49	7...
2		ECF78C-02	2012	2	192.168.1.222	5002	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
3		ECF78C-03	2012	3	192.168.1.223	5003	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
4		ECF78C-04	2012	4	192.168.1.224	5004	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
5		ECF78C-05	2012	5	192.168.1.225	5005	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
6		ECF78C-06	2012	6	192.168.1.226	5006	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
7		ECF78C-07	2012	7	192.168.1.227	5007	192.168.1.111	TCP Client	Not ...	Haven'...	Not Link...	29D6A3...	0	0
8		ECF78C-08	2012	8	192.168.1.228	5008	192.168.1.111	TCP Client	未建立	未设置	未联通	9BECF793	0	0

Figure 36 Connection status and data sending and receiving status

6.3. Data sending and receiving

When the network port is green on, data can be sent and received between the software and the serial port server. If the software sends data, the yellow indicator of the network port blinks for at least one second. Data will also be output from the serial port of the serial port

server, but whether the output data is correct depends on whether the correct serial port parameters (baud rate, data bit, stop bit, check bit) are configured.

The serial port device usually replies to the correct command delivery. Once there is a reply (the serial port sends data to the network port), the yellow light blinks. Otherwise, check the serial port parameters or whether the serial port cable is improperly connected.

In order to facilitate remote debugging, ZLVircom also supports remote viewing of data sent and received. As shown in Figure 36, TXD is the amount of data sent by serial port server. When refreshing the device list, if the value changes, it indicates that there is data sent, and the yellow light will blink. If you see the value of RXD changing, it indicates that the serial device has returned data. The yellow light will flash.

6.4. ZLVircom Remote monitoring data

In the case of using virtual serial port, ZLVircom supports real-time capture of data sent and received by virtual serial port. To facilitate users to debug the system, use the following methods：

Assume that the communication of the virtual serial port has been established according to the method of 3.4.7 Virtual Serial Port test. Now you need to monitor the data through the virtual serial port. Open ZLVircom's menu/Configuration/Software configuration/Open vircom configuration dialog box.

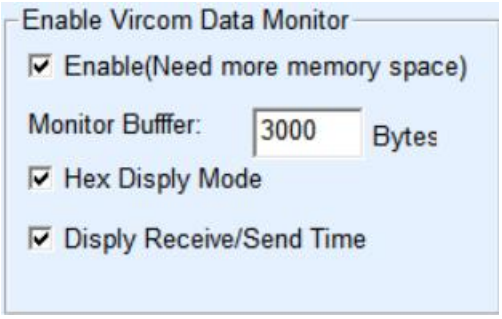


Figure 37 start ZLVirocm monitoring

Check the three options of enable monitoring, hexadecimal monitoring mode, and display data sending and receiving time, as shown in Figure 37. 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 38.

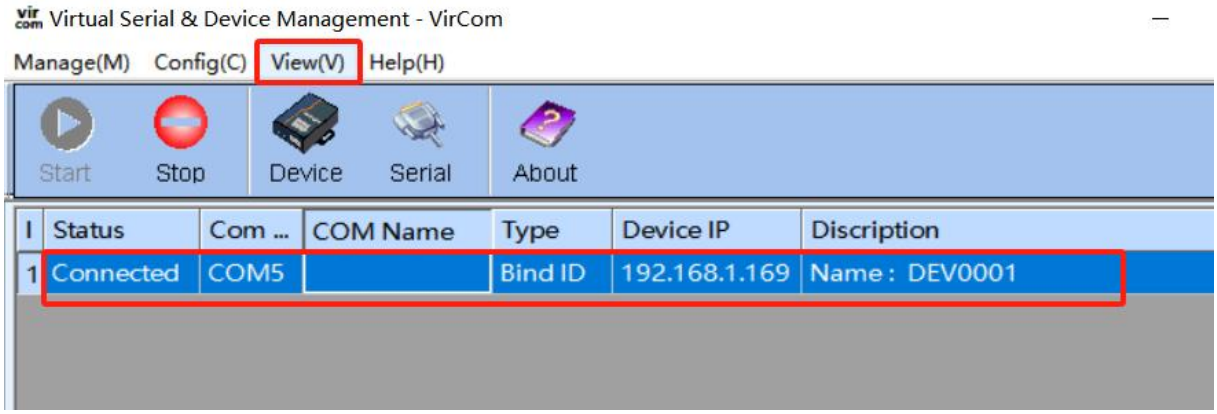


Figure 38 start ZLVirocm monitoring

From the open dialog box, you can see the instructions sent by the host computer and the instructions returned by the device, as shown in Figure 39. This function can facilitate the field communication debugging.

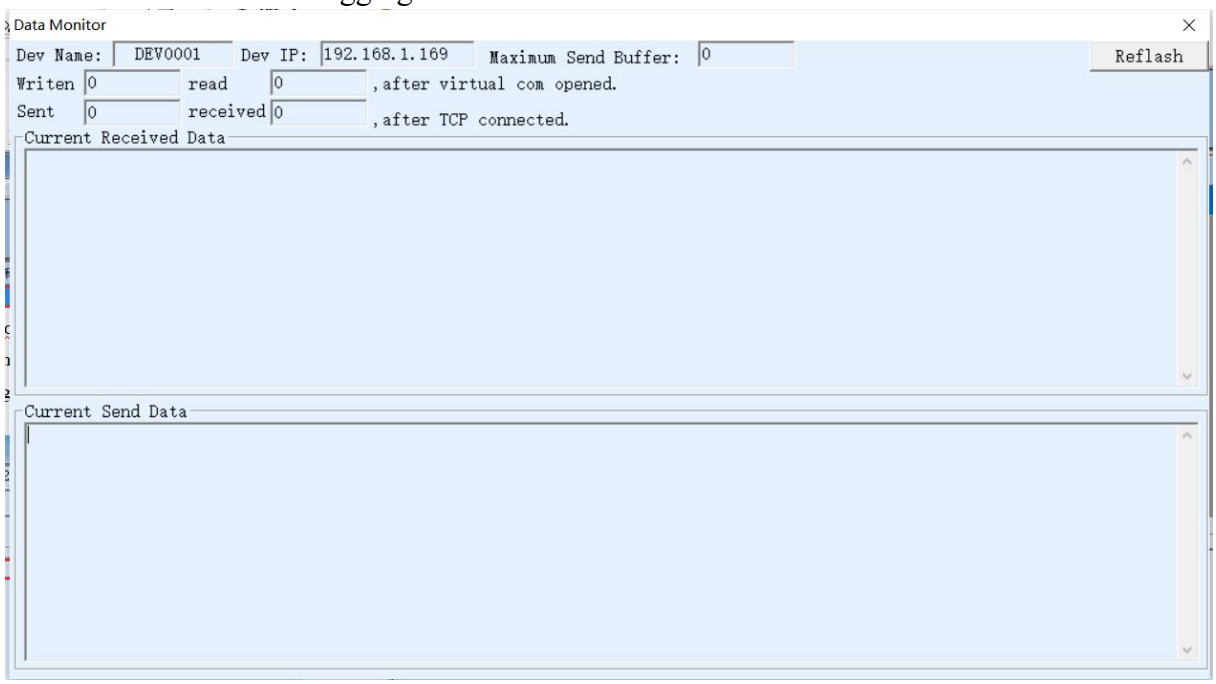


Figure 39 Monitor send and receive data

7. Modbus Advanced function

Serial port server with Modbus gateway function itself does not have station address and register, it is a communication bridge, it will generate Modbus RTU specification according to

the user software to Modbus gateway in the Modbus TCP instruction, function code, register number, register number, and output from the serial port. Think of it as a protocol "translator".

7.1. Start Modbus gateway

First of all, the serial port server should support Modbus gateway, that is, the function of "Modbus TCP to RTU" in the function supported by the device in Table 3 of the device setup dialog box should be checked.

By default, the serial port server is in common transparent mode. If you want to switch to Modbus gateway mode, select Modbus TCPRTU in Conversion Protocol. The device automatically changes Port to 502 (port of the Modbus server). The Modbus gateway is enabled.

When the serial port RTU device serves as the slave station, the Modbus TCP software on the upper computer connects to port 502 of the Modbus gateway, and the Modbus gateway needs to work in TCP server mode. If serial port RTU is used as the primary station, the Modbus gateway works on the TCP client, and the destination IP address is the IP address of the computer on which the Modbus TCP software is installed. The destination port is usually 502.

7.2. Storage Modbus gateway

ZLAN5W12 can save the contents of the read registers inside the gateway, so the speed of Modbus TCP queries can be greatly improved, and the performance is better when supporting multi-host access.

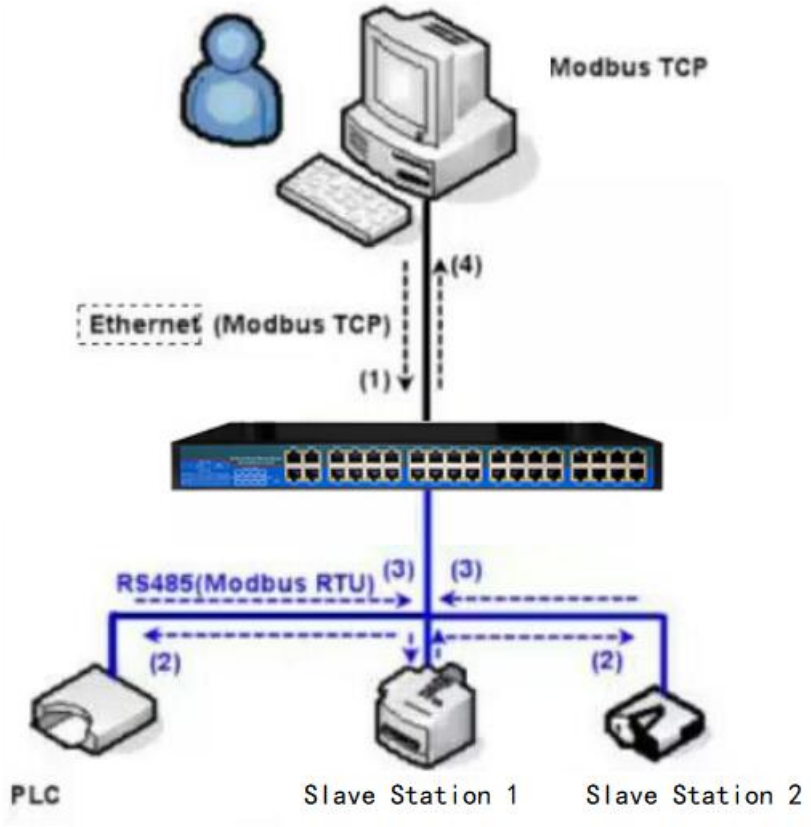


Figure 40 存 Storage Modbus gateway working ways

As shown in Figure 40, the normal Modbus TCP data flow direction 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 is converted into Modbus TCP and sent to the monitoring host computer.

We know that Modbus TCP is a network communication, the transmission speed is very fast, generally within 3ms can answer, while Modbus RTU is RS485, generally only 9600bps speed, generally send and return an instruction at least 30ms. In this way, the query response time of the common non-storage Modbus gateway is relatively long. In addition, if there are a lot of upper computers to query data at the same time, then the serial port will be congested. If the network is like a highway and the serial port is like a single-log bridge, then the original way is to pass the traffic of the highway on the single-log bridge.

Register-saving Modbus gateway solves the above problems. It can temporarily save the

register data obtained by the query in the Modbus gateway, so that when the Modbus TCP query comes, the Modbus gateway can immediately return the command, and really bring the fast characteristics of Modbus TCP into play. On the other hand, ZLAN5W12 can actively send instructions from the serial port to automatically update the data content of the currently saved register and save a copy of the latest register value.

In addition, the module is also a fully automatic configuration free Modbus gateway, the user does not need to configure the required register address, function code, slave station address, etc. ZLAN5W12 automatically identifies and dynamically adds these registers according to Modbus TCP instructions from the network port.

When monitored by multiple computers, ZLAN5W12 can show good response speed, no matter what baud rate the serial port is, it can generally give the host response data within 3ms. And it shows a good speed of real-time update of serial data.

The register-saving Modbus gateway is the real Modbus TCP to Modbus RTU, which really plays the advantages of fast Modbus TCP and multi-host query at the same time.

Notice When the serial port server serves as the TCP client, it does not have the storage function and automatically switches to the non-storage mode.

The features of storage Modbus are listed below：

1. The first Modbus TCP query instruction is non-stored. Because you must wait for the RTU device to return the data slowly before you can return the register contents to the network port.
2. If a specific command is no longer queried by the host computer on the network within 5 seconds, the command is automatically deleted and no longer sent from the serial port to the RTU device.
3. It is currently possible to store 10K of Modbus cache, and for ordinary single-register queries, about 500 instructions are stored simultaneously.
4. When multiple instructions are queried at the same time, they are sent in order of priority, the first instruction is sent, the first instruction is answered and waits for 485 anti-conflict time (refer to the multi-host part), the second instruction is sent... . Do not return to the first command until the last command has been answered.

7.3. Disable the storage-type function

Although the memory Modbus has a fast response speed, some users do not want the RTU device to not want to receive a large number of query instructions, which affects the internal processing speed of the instrument. At this point, you can disable the storage function.

To disable storage type, click the "More Advanced Options" button in the "Parameter Configuration" dialog box and select Simple Modbus TCP to RTU. Then go back to device Settings and click Modify Settings.

Notice When you configure the conversion protocol in Web mode, it is a non-storage Modbus gateway by default.

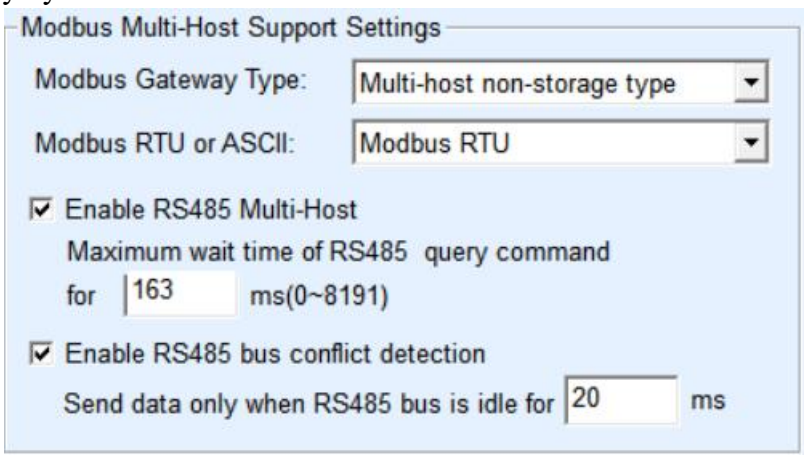


Figure 41 updated zlvircom configuration

7.4. Multi masters function

"RS458 multi-host support" and "RS485 bus conflict detection function" are the multi-host functions of Zlan. They are generally enabled and disabled simultaneously. After this function is enabled, the device whose protocol is converted to Modbus TCP has the function of a storage Modbus gateway; otherwise, it is a non-storage Modbus gateway. If the conversion protocol is none, the user-defined RS485 protocol can generally also have the function of a serial port device accessed by multiple hosts at the same time, which can not be achieved in a pure RS485 network, because multiple master stations send conflicts on the RS485 bus at the same time. The multi-host of Zlan serial port server can "coordinate" the RS485 bus to achieve the purpose of multi-host access.

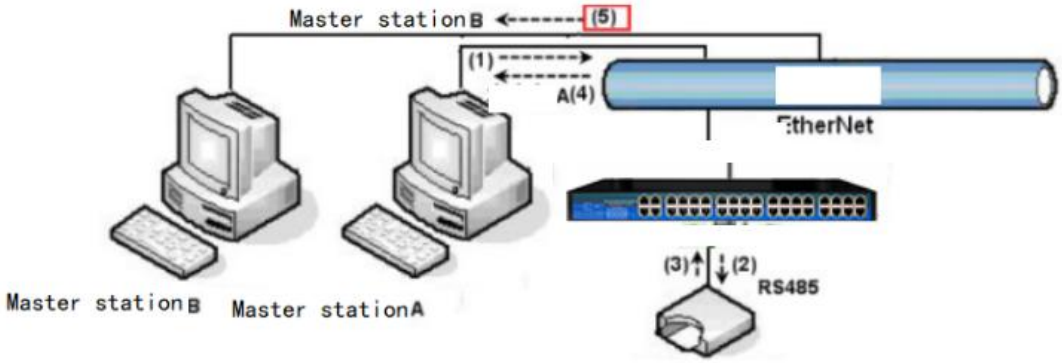


Figure 42Multi-host function demonstration

As shown in Figure 42, in ordinary mode, when two hosts: host A and host B are connected to the serial port server at the same time, host A sends (1) instruction, the RS485 device receives (2) instruction, and the RS485 device returns (3) instruction, but the port end of the serial port server sends (4) to host A and (5) to host B at the same time. Because host B did not send the query, but it also received the reply instruction (5), host B may generate a communication exception error. In multi-host mode, there will be only instructions (4) and no instructions (5), because the serial server will automatically remember the host that needs to be returned, and only the command will be returned to the most recent communication host, host A queries will only reply to A, host B queries will reply to host B.

Another effect is that in the ordinary mode, host A and host B send data at the same time will produce a combination of instructions on the RS485 bus, so that it can not be recognized normally; In the multi-host mode, the serial port server can schedule the sequence of A and B in using the bus, so as to effectively solve the conflict problem of multi-machine simultaneous access.

If the conversion protocol is set to None, the multi-host function is disabled by default. To enable multiple hosts, click More Advanced Options in the Device configuration dialog box and select RS485 Multi-Host Support.

7.5. Multi-masters parameter

The meanings of RS458 Multi-host support and RS485 bus conflict detection are described as follows.

Figure 43 RS485 Multi masters support

The response timeout period of an RS485 command is as follows: Indicates the maximum interval between sending the command and receiving the response from the serial port on the server. The value must be greater than the actual maximum interval. Because if it is determined to be a timeout, the next instruction will be sent.

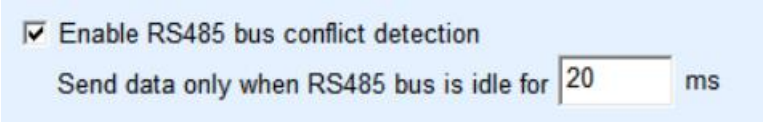


Figure 44 RS485 Conflict prevention idle time

RS485 bus collision time: indicates how many milliseconds the serial port server waits to send the second command after receiving the reply of the first command. This parameter actually defines the speed of instruction rotations. The recommended value is above 20ms. Generally, you do not need to change the value of Maximum Wait time 3 seconds.

When the user uses ZLVircom to select the conversion protocol as "after Modbus TCP to RTU", ZLVricom will automatically check the above two enable boxes (unless the user manually enters the advanced option to remove), and the above two times will be automatically configured according to the baud rate. However, if the Modus command is long or the protocol is converted to None, you need to manually set the two parameters.

The following describes the recommended Settings of the preceding parameters：

1. Figure 44 shows the anti-collision time of the RS485 bus. Generally, you can set the value to twice the value of Packet Interval in the lower right corner of the parameter configuration page, but the value cannot be less than 20.
2. Figure 43 shows the "RS485 command response timeout time", which is generally determined by the length of the command to and from the reply. If the send command is N bytes and the reply is M bytes, the recommended value is "packet interval" x (N+M+5) +100.

7.6. Non-storage multi-host

Some places must use non-storage Modbus, this is because when a certain event occurs to

read the register data, but the read data is the data before the storage collection, which is logically incorrect, so it must also support non-storage Modbus collection. But on the other hand, it is also necessary to support multiple hosts at the same time, and you only need to select a non-storage modbus gateway type.

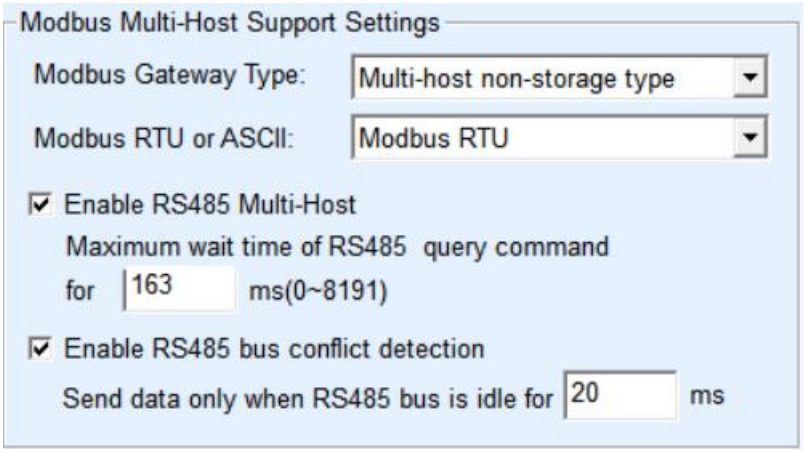


Figure 45 Multi-host non-storage Settings

7.7. Modbus for multi-destination IP addresses

As shown in Figure 42, if the serial port device (RTU device) acts as the primary station and the network port device (Modbus TCP device) acts as the secondary station, there are multiple network port secondary devices at the same time. In this case, you can use the serial port server as a client to connect to multiple network ports by referring to 5.5.2.5.2.2 Connecting a Client to Multiple Servers.

In this case, the following functions need to be implemented: When the serial port RTU sends commands to multiple network port devices, the network port device identifies whether to send commands 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 port server, it is converted into an RTU command and sent to the RTU device through the serial port.

At this time, it should be noted that the two check marks "RS485 bus collision prevention time" as shown in Figure 44 and "RS485 command response timeout time" as shown in Figure 43 need to be removed. Otherwise, the preceding forwarding function cannot be implemented.

Another application method is: Although the serial port server is connected to multiple

network port devices as a Client, the RTU device is not the master station, but the network port device sends first, and the RTU device replies (as the slave station). In this case, the two checkboxes of RS485 bus Conflict Prevention time and RS485 command response timeout time need to be selected, so that multiple hosts can access an RTU device at the same time.

For the new version of ZLVircom, the above Settings can be completed by directly selecting "the device does the slave station for the client" in the Modbus gateway type.

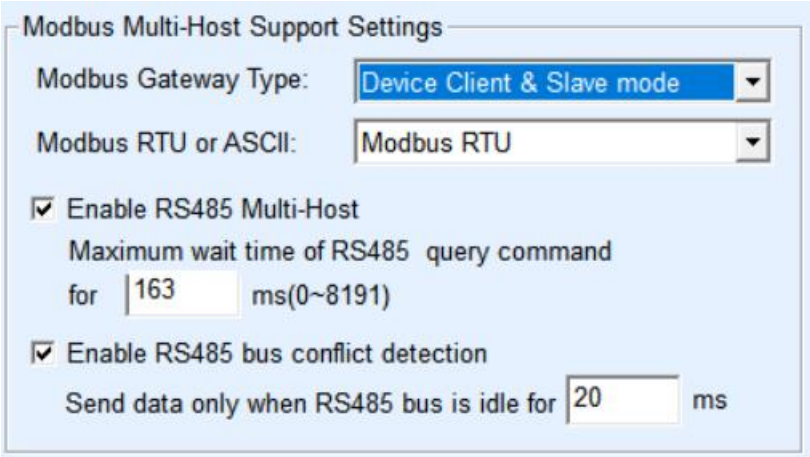


Figure 46 updated version zlvircom configuration

8. Register packets and heartbeat packets

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

8.1. Registration packets

The definition of the 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 on the Internet, and the modules are scattered in various collection and monitoring points. How to make the cloud software identification module is very important, is necessary to achieve the Internet of Things communication.

Shanghai Zlan serial server provides the following registration methods.

8.1.1. Send MAC address once connected

Send MAC address on connection: When the module is connected to the cloud, it sends its mac address to the cloud. Since the MAC address is unique, the device can be uniquely identified. This method is simple and effective because it does not require registration package writing for each device. How to use it: click "More Advanced Options" in the device Settings dialog box, find "Send MAC address when TCP is established" in the upper middle, tick in the front, then go back to the Settings interface, click "Modify Settings".

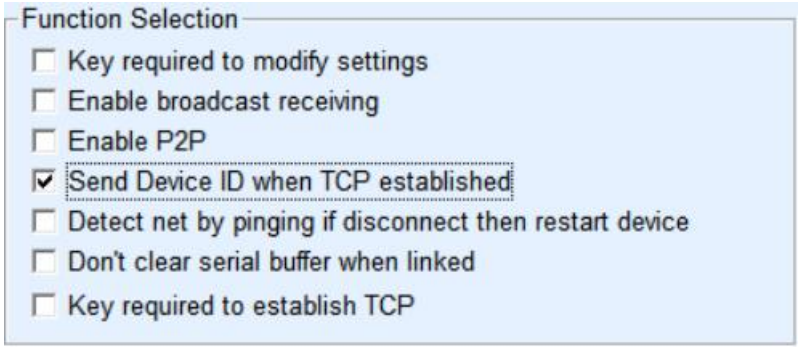


Figure 47Send MAC address on connection

8.1.2. Realcom protocol

Realcom protocol is a mature protocol containing registration packets and heartbeat packets. Users can use this protocol to realize registration packets and heartbeat packets. To enable the Realcom protocol, perform the following operations: In the Device Settings dialog box, set Conversion Protocol to REAL_COM protocol. Note that the part of enabling the registration package must be left blank.

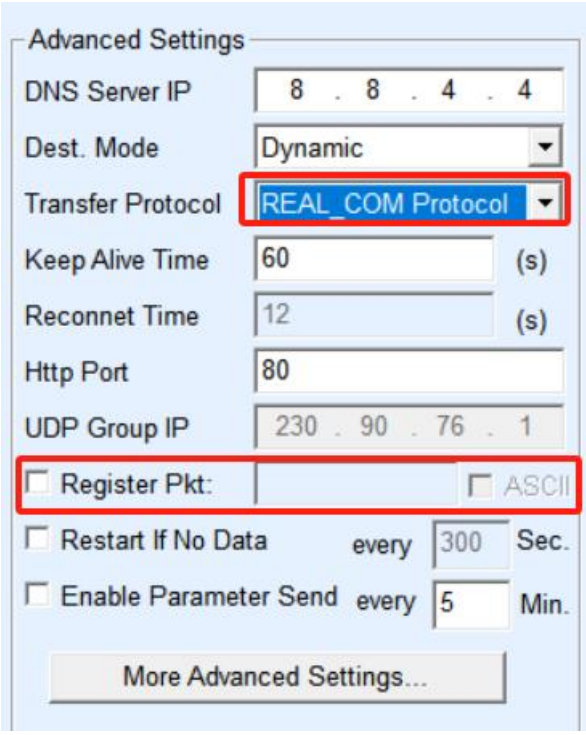


Figure 48start realcom protocol

When the Realcom protocol is enabled, it will not be transparent transmission communication, which has the following characteristics：

1. When 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. MAC[5] to MAC[0] indicates the MAC address of the device.
2. When the device sends data to the network, it automatically adds the 3-byte prefix FA 01 01.
3. At a keepalive interval, the device sends a 1-byte heartbeat packet of 00 to the software. The REAL_COM protocol can be used as the registration package of the device because the registration package contains the MAC address. However, due to its fixed format, only cloud software can design the REALCOM protocol to be compatible with this approach。

8.1.3. Customize the registration package

The custom registration package mode allows the user to fill in any registration package format. The method is as follows: On the device Settings page, perform the following configurations：

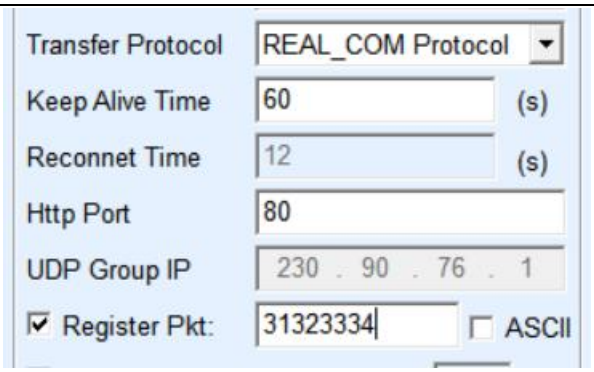


Figure 49configurate register packet

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

When the device is connected to the cloud software, it can automatically send the hexadecimal registration package of 31, 32, 33, and 34. This registration package method is more flexible, allowing the device to adapt to the existing cloud registration package format; However, there is no wildcard such as MAC in the registration package, so you need to configure a different registration package for each device, which is complicated. The above two methods of sending MAC addresses and REALCOM are the same for each device, but the registration package is naturally different due to different MACs.

The maximum registered package length is 33 bytes. This mode supports registered packets and heartbeat packets in UDP mode.

8.1.4. Configuration documents

Configuration files can be used for longer registration packages.

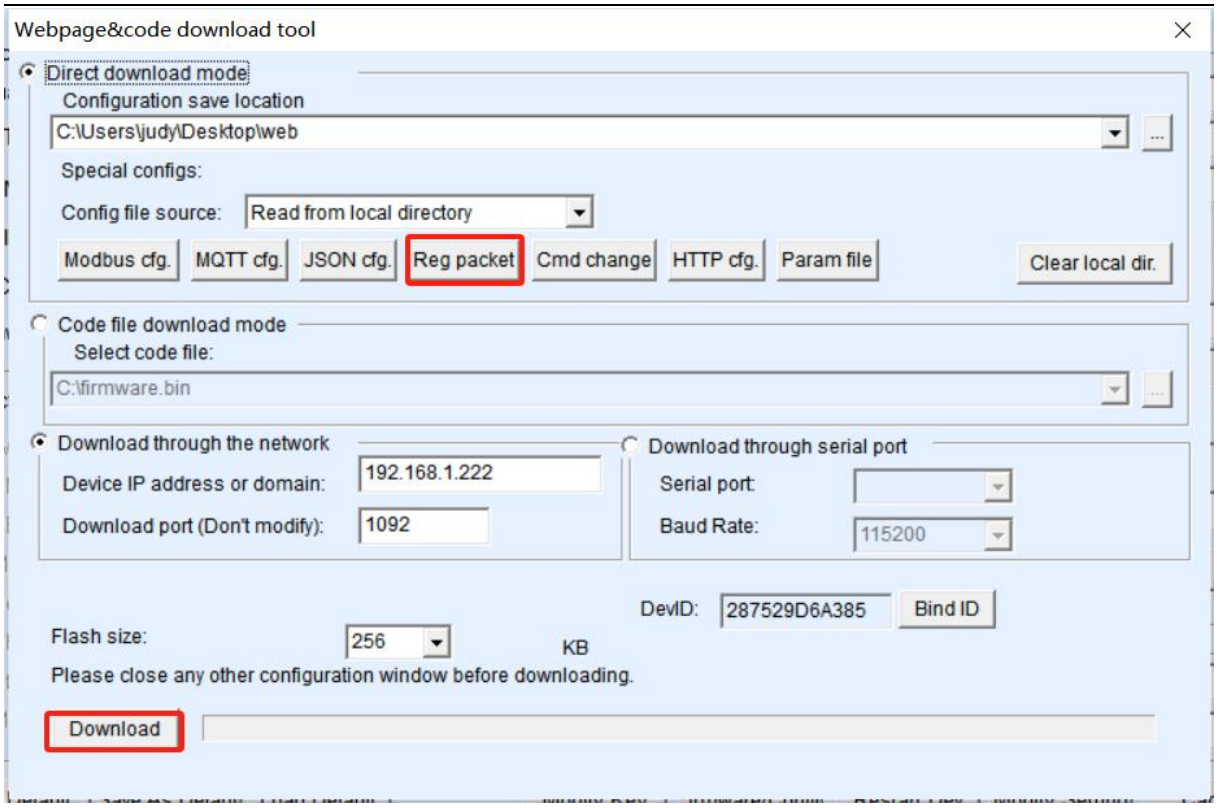


Figure 50download register packet

Click the "Firmware and Configuration" button in the parameter setting dialog box to open the "Configure Web page/program download tool". In the dialog box that appears, select "Configure Web Page directory download" and select an empty directory as the directory for storing the configuration file. Then click the "Register Package" button.

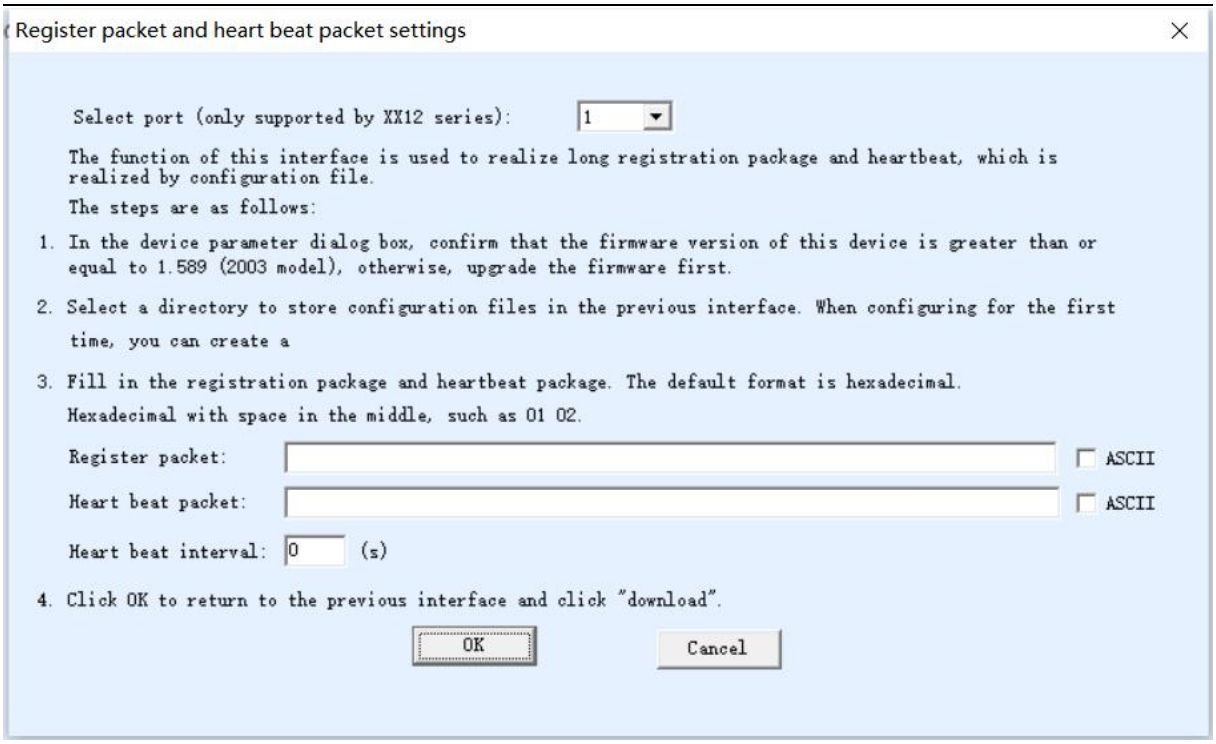


Figure 51 configurate register packet

Here, set the registration packet, heartbeat packet, heartbeat packet interval and click OK. After returning to the previous screen, click the "Download" button to download the configuration file to the device.

8.2. Heartbeat packets

The heartbeat packet is used to detect whether the communication link is down. The method of implementation is that every once in a while the device sends a heartbeat packet data to the server software, and the data will be discarded after the server receives it, and will not be regarded as valid communication data.

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

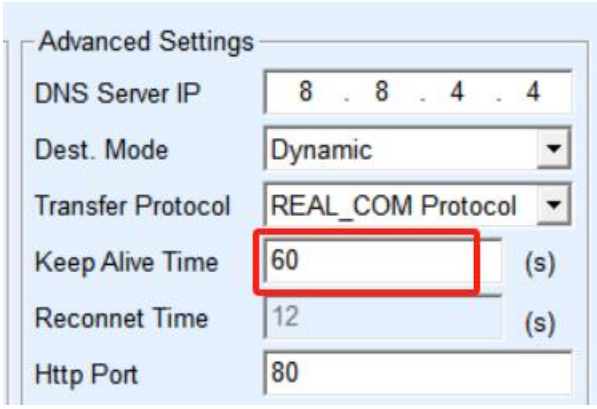


Figure 52Keepalive time

As shown in Figure 52, the sending time of the heartbeat packet is set by the Keepalive Timing time.

8.2.1. Hidden heartbeat

Even if no heartbeat packets are set, the implicit heartbeat function is enabled on the Zlan device when the TCP client is deployed. Therefore, the implied heartbeat function means that the device sends data but the server does not receive the heartbeat data. Therefore, it can not play the first function of the heartbeat packet, that is, the function of the server to detect the activity of the device; However, because the device actually sends data, it can play the second function of the heartbeat packet, that is, the function of the device to detect whether the TCP connection is normal. Once the connection is detected, the TCP connection can be automatically re-established.

8.2.2. REALCOM protocol

As described in 8.8.1.8.1.2Realcom protocol, the REALCOM protocol can send a 1-byte data of 00 at every keepalive interval. This data is the heartbeat packet of the realcom protocol.

8.2.3. Customize the heartbeat packet

Fill in the registration package by following instructions in 8.1.3 Customizing the Registration Package. Add heartbeat packets as follows: Click "More Advanced Options" on the device, enter the hexadecimal heartbeat packet in the second line of the multi-destination IP address and port, and change the option on the right to "Parameter Packet Destination".

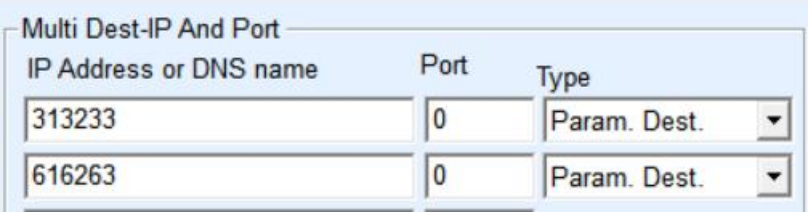


Figure 53Customize the registration package

The sum of the registered packet and heartbeat packet must be less than 33 bytes. The first line is actually the registration package.

8.2.4. Configuration documents

For details, see how to use the configuration file of the registration package.

9. Modify network port parameters

Network port parameter modification is to realize the function of searching equipment and modifying equipment parameters like zlvircom software, that is, to manage equipment and modify parameters through the network port of serial server. Suitable for users who integrate search and configuration capabilities into their software.

Network port modification parameters are implemented through the UDP Management Port Protocol, for example：

1. The computer software sends UDP broadcast packets over the network with destination port 1092. When the device receives the packet, it will return its information to the computer software to search for the device.
2. The computer software sends UDP parameter modification commands to port 1092 of the device to modify the device parameters.

For details about network port modification parameters, see the Zolan Network Products UDP Management Port Protocol. It can also be done directly using the device management library of the 10 Device management library.

10. Device management library

This feature is intended for users who need to integrate device management functions into

their own software.

The "UDP management port protocol" has been integrated in the device management function library ZLDevManage. This is a DLL windows platform development library, can be called by VC, VB, Delphi and other development tools.

Provide detailed API interface documentation and VC call Demo cases. It can realize device search, parameter modification, P2P function call and so on.

Can be gained from ZLan website development libraries: search for "equipment management function library" in http://zlmcu.com/download.htm pages. For details, please refer to "Zlan WinP2p and Device Management Development Library"

11. Serial port modification parameter

You can read and set parameters by sending commands to the serial port of the serial port server. It is suitable for users who choose chip or module level products to control and configure through serial ports. You can set the following parameters: IP address, baud rate, device name, and working mode. After the new parameters are set, you can restart the serial port server by using the serial port command.

Zlan serial command has the following characteristics：

1. Serial instructions use 10 bytes of data lead code, so there is no need to pull down the configuration pin to distinguish between communication data and command, and there is no need to switch between command mode and communication mode, which is more flexible and convenient to use.
2. The command set contains various command formats, such as save parameters, do not save parameters, and restart the device.
3. It can realize various applications, such as reading the MAC address of the serial port server, for example, changing the working mode of the serial port server. When switching from the TCP server to the TCP client mode, it can actively connect to the server. When switching from a TCP client to a TCP server, you can disconnect from the server.

For details about how to modify serial port parameters, see the Serial Port Modification Parameters and Hardware TCPIP Protocol Stack.

12. Remote device management

The so-called remote equipment management means that ZLVircom software can maintain and manage the equipment, including restarting the equipment, modifying parameters and upgrading the firmware. This function is suitable for users who manage equipment through ZLVircom.

For ZLVircom software, as long as the device can be found in the device list, it can be managed remotely. Remote device management can be divided into the following types：

1. Automatic search: When the device and the computer are on the same switch, whether they are on the same network segment or not, the ZLVircom search device on the computer is as follows: ZLVircom sends a broadcast query. All the devices reply their parameters to the ZLVircom tool after receiving the query. This method searches all devices at once.

Figure 54Automatic search

2. Manual add: There are two cases：

Figure 55Manual add

   a) Large router Split network: On some large networks, broadcast packets are divided by routers. As a result, broadcast packets cannot reach the device, but the IP address of the device can be pinged. In this case, you need to manually add the solution. To manually add an IP address, click Manually Add in the Device Management dialog box to add the first and last IP addresses.
   b) Public network server Query Intranet devices: serial port server in the internal network and as a TCP server mode, zlvircom in the public network IP server. At this time, we need to do a 1092 UDP port mapping on the router of the network where the device is located, map it to the IP of the device, and then zlvircom manually adds this device, IP is the public IP of the device.
3. TCP client: Acting as a TCP client, the device initiates a TCP connection to port 4196 of the destination IP address (116.15.2.3). After the connection is established, zlvircom automatically sends its own parameter system to the UDP port (not TCP port) of the

destination port (in this case, 4196) at each keepalive time, so that ZLVircom can search for devices on this computer (116.15.2.3). If the destination port is not 4196, the default parameter receiving port of zlvircom needs to be modified. The method is to modify the menu/configuration/software configuration/default listening port, and then start zlvircom. If the TCP port conflict pops up, the execution is ignored and continued.

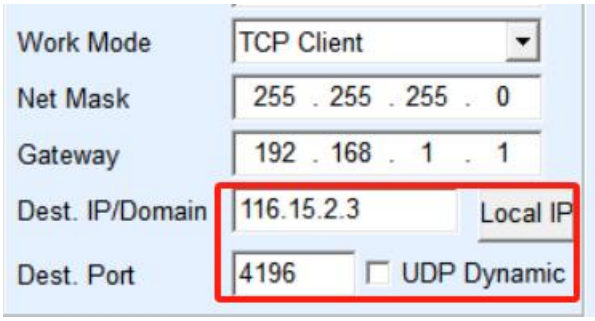


Figure 56Client side

4. Periodic sending parameters: Even if the serial port server is in TCP mode, you can select periodic Sending parameters to send parameters to the destination port of the destination IP address (in this case, 116.15.2.3) every five minutes. zlvircom, which receives parameters on this port of the server, manages these devices.

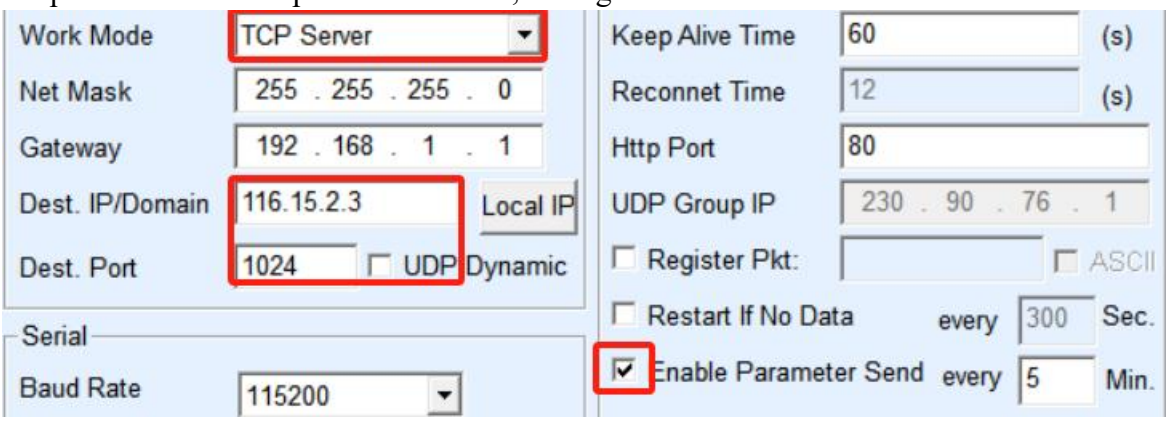


Figure 57Timed transmission parameter

To facilitate device identification, if you need to remotely manage the device, give the device a name that is easy to remember.

5. Device management: After enabling the cloud management function on the device, you can see the device on the specified back platform equipped with Zolan device cloud management. You can configure devices, upgrade firmware, and download configurations.

13. Firmware upgrade method

Figure 58 Module firmware

The firmware of the module can be downloaded via Vircom software. 1.442 in the firmware name is the firmware version. Select any PORT number from 1 to 8 in the device list and click the "Edit" button (or double click). Then click on "Firmware and Configuration".

Figure 59 Upgrade step 1

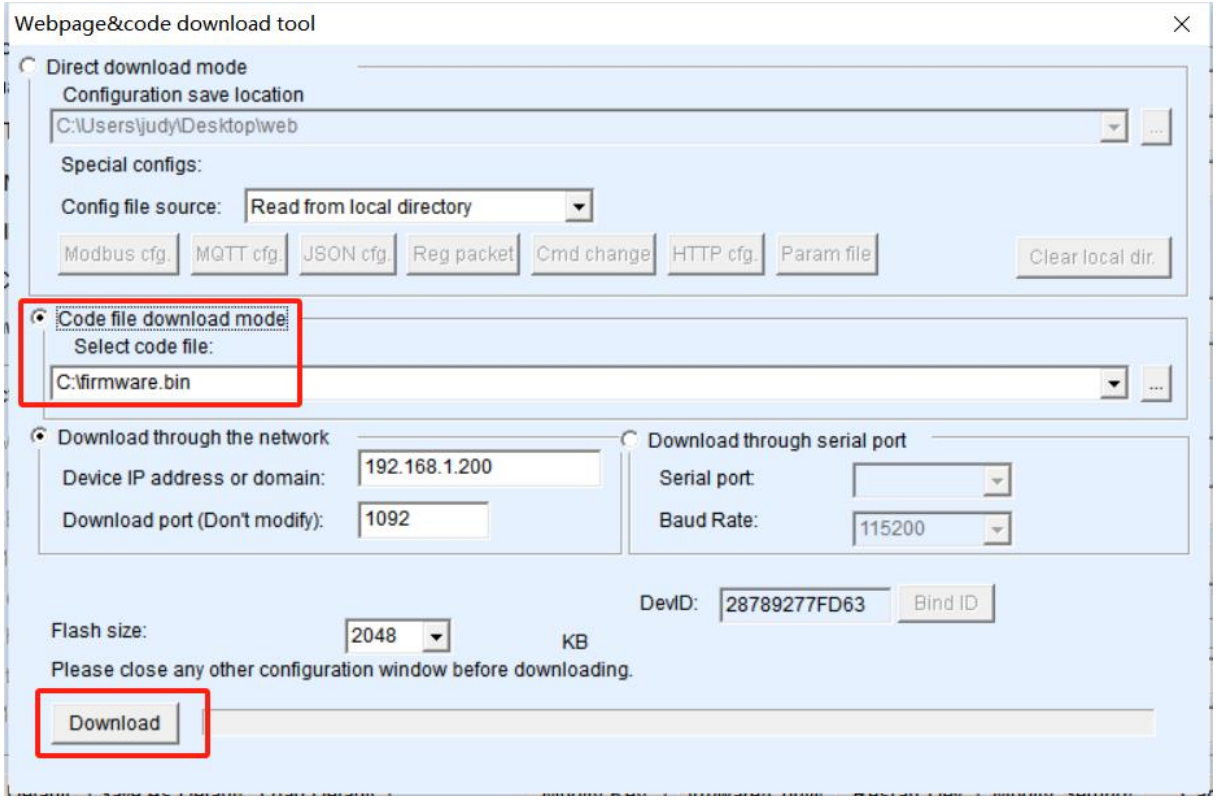


Figure 60 Upgrade step 2

Select "Program File Download", then select the corresponding upgrade file, and click "Download". The download process takes about half a minute. The system automatically

restarts after the upgrade. Then PORT1 to PORT8 are upgraded. After the upgrade, you can view that the firmware version has been changed.

14. Item Number options

Item	Specifications
ZLAN5W12	32 ports serial server
ZLAN5G12	16 ports serial server
ZLAN5812	8 ports serial server
ZLAN5W12-422	32 ports serial server includes RS422
ZLAN5G12-422	16 ports serial server includes RS422
ZLAN5812-422	8 ports serial server includes RS422

15. Packing

Figure 61 ZLAN5W12 packing

Packing list

Item	Quantity	Specifications

ZLAN5W12	1	
power supply cable	1	
Rack lug	2	1pc on each side

16. After sales service

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