ZLSN3007S Embedded networking module user manual

With RJ45 TTL level serial port to network port

ZL DUI 20190910.1.0

Version Information

The History of the revision to this document：

History

Date	Version	File name	Level	Content
2019-09-10	Rev.1	ZL DUI 20190910.1.0	Public	Release

CATALOGUE

1. Summary

ZLSN3007S (hereinafter referred to as 3007S) is the TTL level serial port to Ethernet "super network port", the product has its own network transformer and RJ45 network port, which can be convenient to realize the network of MCU, all kinds of TTL level serial port equipment.

3007S adopts Shanghai ZLAN 7th generation product technology, with strong product software function, software stability and reliability inherit ZLSN3003S; The hardware has low power consumption, industrial temperature range and other excellent characteristics, and has a higher cost performance.

Figure 1 ZLSN3007S Front View

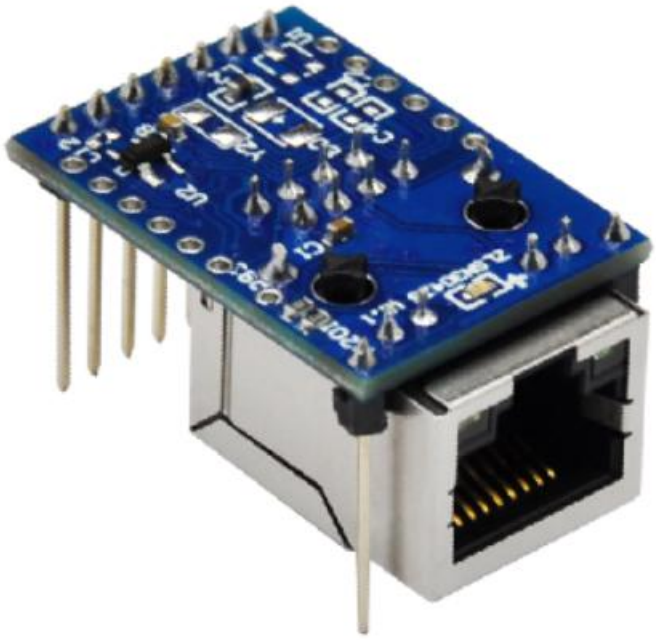

Figure 2 ZLSN3007S Backside view

The 3007S adopts "seamless fitting design". When the 3007S is welded to the user's PCB, it can seamlessly fit with the PCB. As shown in the figure below, the 3007S (right) makes the RJ45 fit to the PCB while the 3003S (left) does not when the pin row is inserted into the user board. This helps to design the position of the network port on the shell.

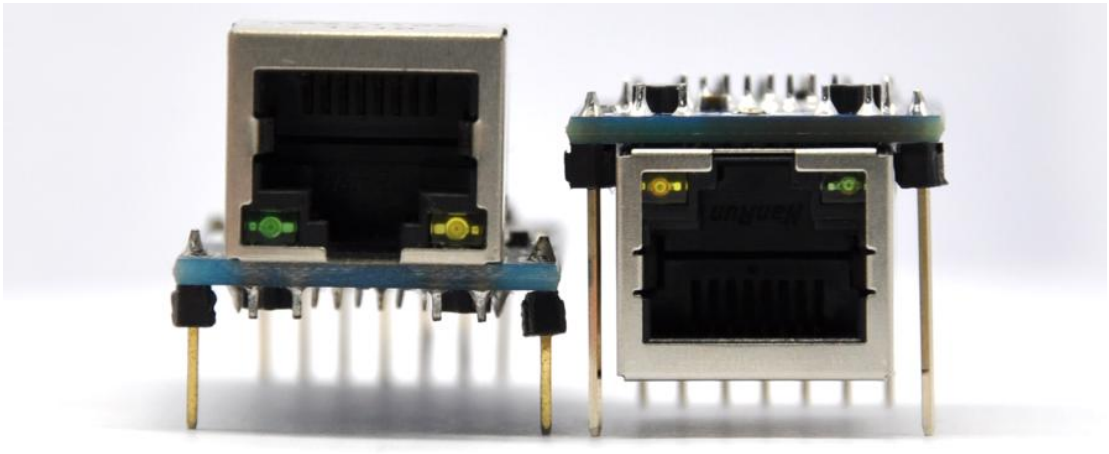

Figure 3 ZLSN3003S and ZLSN3007S's PCB comparation

The 3007S has a 25mA operating current, which is suitable for low-power

applications and greatly improves the problem of circuit board heating.

The 3007S is designed from MCU to power supply chip, and it has realized completely independent intellectual property rights from software and hardware. It is not only made in China, but also created in China！

The 3007S supports two stop bits, data bits smaller than eight (for example, one stop bit for seven data bits), and baud rate up to 921600Bsp.

The 3007S supports six destination IP addresses when serving as a client, and 10 client connections when serving as a server.

The 3007S provides 3.3V power supply by default and supports 5V products (zlsn3007s-5v).

The 3007S supports transparent transmission modes such as TCP server, TCP client, UDP, UDP multicast, and TCP server/client coexistence. It supports Modbus TCP to RTU Modbus gateway mode, Modbus RTU/DLT645 to JSON mode, and RS485 multi-host communication mode. Support HTTP protocol server communication mode, support MQTT communication mode, support password authentication communication, support P2P communication (need to register) and other communication modes. Supports various types of public cloud data transmission.

The 3007S is connected to the user circuit board through the pin row. The main pin row contains pins VCC3, GND, nRST, TXD, RXD, DEF (reset parameters) and so on. The RJ45 network port has a TCP connection indicator (green) and data activity indicator (yellow). Extended pin row can also lead to 485 control pin 485_EN, RS232 flow control CTS, RTS, etc. See the hardware section for details.

The 3007S supports configuration using Windows tool ZLVircom or web page, virtual serial port, and remote program upgrade. Supports cloud device management. Supports custom Web download and configuration. Supports user-defined heartbeat packets and registration packets.

3007S can be widely used in：

- Design of data acquisition and control equipment for Internet of things.
- Security and monitoring.
- Energy monitoring, power meter collection.

- Industrial automation.
- Intelligent transportation.
- RFID Smart card readers and other areas.

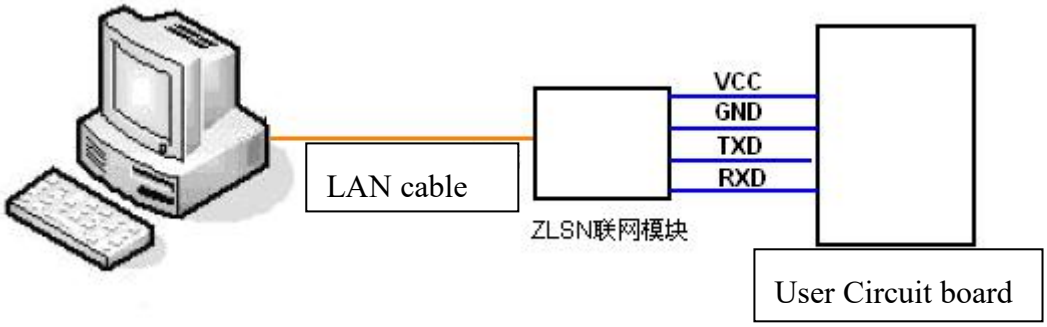

Figure 4 ZLSN3007S Usage map

2. Function

1 Product Features

1.1 Communication is stable and reliable, supporting full duplex, high rate and long time data forwarding, without packet loss. Users can continuously send large amounts of data through serial ports and network ports at the same time, without stopping or losing data.

1.2 RJ45 port and PCB seamless fit design.

1.3 Ultra low power consumption: operating current 45mA.

1.4 Serial port: supports 2 stop bits, less than 8 data bits, and 921600bsp baud rate.

2 Software Features

2.1 Working mode： Supports the coexistence of TCPServer, TCP Client, UDP mode, UDP multicast, and TCPServer/Client. 6 destination IP addresses are connected as clients and 10 client connections are supported as servers.

2.2 Baud rate: 1200 to 921600bps, and you can customize special baud rate. The data bit can be 5 to 9 bits. The parity bit can be None, Odd, Even, Mark, or Space. The data bit can be CTS/RTS, DSR/DTR, XON/XOFF flow control, and 1 to 2 stop bits.

2.2.1 Support for fast bit 9 switching, suitable for use in multi-machine

communication where bit 9 is the address.

2.3 Supports virtual serial ports and is equipped with Windows virtual serial port and device management tool ZLVircom.

2.3.1 When virtual serial ports are used, the on-the-fly technology supports serial port parameter customization.

2.3.2 The virtual serial port driver supports Windows 10 and 64-bit operating systems.

2.3.3 The virtual serial port driver is stable and reliable, and can continuously send full duplex without losing 1 byte.

2.3.4 In virtual serial port mode, the network disconnection function is supported.

2.4 There are various ways to modify module parameters.

2.4.1 Equipped with Windows tool ZLVircom, one-click search LAN devices, manually add devices on the Internet.

2.4.2 All parameters can be set through the serial port of ZLSN3007S. The command format is similar to AT command, and its running status can be directly controlled and read.

2.5 Supports THE restart function of DHCP, DNS, and no data.

2.6 Supports password protection for module parameter modification to prevent unauthorized modification.

3 Advanced software functions

3.1 Supports Modbus TCP to RTU Modbus gateway.

3.2 Support for P2P (registration required) communication.

3.3 Support Modbus RTU/DLT645 to JSON.

3.4 Supports MQTT connections and various public cloud data transmission features.

3.5 Supports RS485 multi-host communication mode.

3.6 Supports user-defined registration packages and heartbeat packages. Connect to send MAC address function.

4 Hardware Features

4.1 super mini size：30.6×21.7mm。

4.2 Low power consumption, maximum current less than 25mA.

4.3 Wide temperature range: supports live working at -40 ℃ to 85℃.

5 Supporting software and technical support

5.1 Supporting software is complete. Equipped with Windows device management tool ZLVircom, one-click search networking module, modify parameters. The UDP/TCP debugging tool SocketDlgTest is configured. Equipped with serial port debugging tool ZLComDebug.

5.2 Provide upper computer development examples including: VC, VB, Delphi, C++Builder, Java, C# routines. It can also provide a DLL library, which can communicate with the networking module directly through the network port.

3. Technical parameters

Outline			
Interface：	TTL level serial port; RJ45 LAN port		
Size：	30.6×21.7mm		
Communication interface			
Serial port：	TTL×1：RXD，TXD，GND，CTS，RTS, RS485_TEN		
Serial port parameter			
Baud rate：	1200~921600bps	Check bits：	None, Odd, Even, Mark, Space
Digit bits：	5～9 位	Flow control：	RTS/CTS ， DSR/DTR ， XON/XOFF，NONE
Software			
Protocol：	ETHERNET、IP、TCP、UDP、HTTP、ARP、ICMP、DHCP、DNS、MQTT、Modbus TCP、DLT/645		
Configuration mode：	ZLVirCOM tool、serial port、Web		
Communication mode：	Socket、virtual port、MQTT、HTTP		
Working mode			

TCP server, TCP client, UDP, UDP multicast, TCP server/client coexistence, MQTT		
Power supply requests		
Power supply：	3.3V DC or 5V，<25mA	
Environment requests		
operation temperature：	Industrial level	-40~85℃
Storage temperature：	-40~105℃	
Moisture range：	5~95%RH	

4. Interface definitions

Module front view as Figure 5：

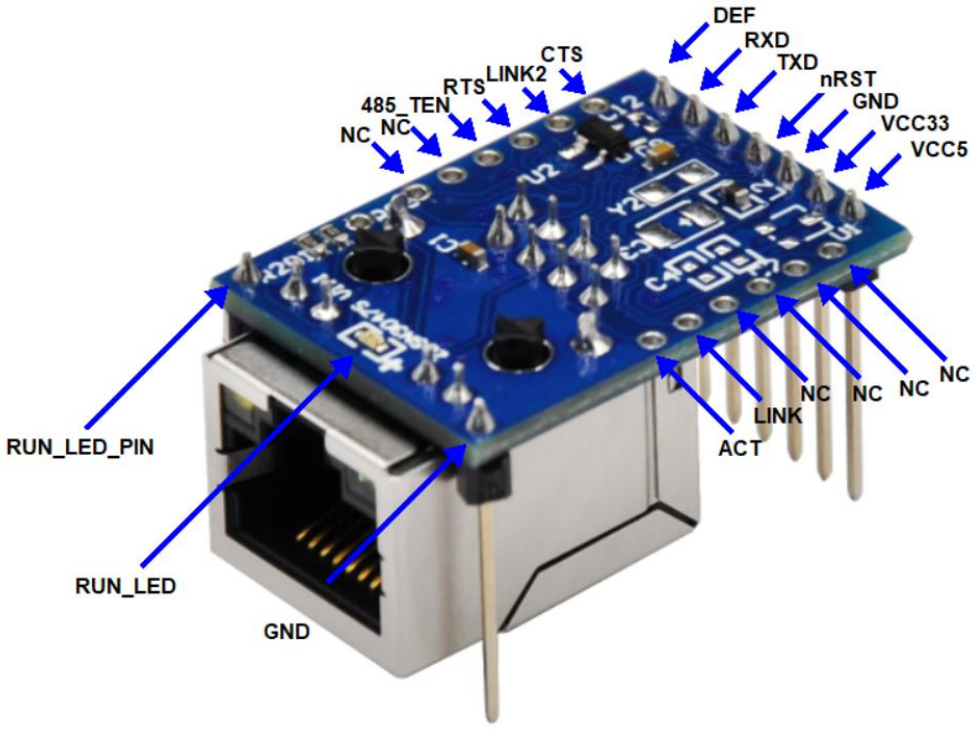

Figure 5 ZLSN3007S Pin map

Pin definitions are shown in Table 1

Table 1 ZLSN3007S Pin definitions

Pin Name	Specifications

VCC5	Normal model: ZLSN3007S pin is dangling；ZLSN3007S-5V，5V power supply input.
VCC33	Default model ZLSN3007S The pin is 3.3V; Zlsn3007s-5v Model The pin is suspended.
GND	Power supply ground.
nRST	Low level reset, can be suspended when not in use. After the power level is lowered, the module is reset and restarted.
TXD	TTL level data output, can be directly connected to 5V or 3.3V USER MCU RXD (TTL level is 3.3V).
RXD	TTL level data input, can be directly connected to 5V or 3.3V USER MCU TXD
DEF/CFG	If the value is 0 and holds for more than one second, the module restarts. The default IP address is 192.168.1.254, the gateway address is 255.255.255.0, and the gateway address is 192.168.1.1. This helps to reset the IP address to the default one if the user forgets it. When it is pulled up to VCC by 1K resistor, it means high, and when it is connected to GND, it means low. It can be suspended by default.
NC	No connection
LINK	If the value is 0, the MODULE has established a TCP connection with the network server (or is in UDP mode) and the network cable connection is normal. In this case, the module can send and receive data normally. If the network cable is removed, the LINK changes to 1. The control of the led for the network port LINK comes from this pin.
ACT	0 indicates that data is being transmitted from the network to the serial port or serial port to the serial port. The control of the NETWORK port ACT LED comes from this pin.
CTS	TTL level, serial port flow control pin, see RTS description.
LINK2	Connect the cable to output low level, otherwise output high level.
RTS	TTL level, serial port flow control pin. （1） Flow Control：When there is no, XON/XOFF these two pins do not

	work, usually RTS=0. （2） When the flow control is set to CTS/RTS and DTR/DSR, RTS=0 and RTS=1 usually indicate that the module cannot receive data, and the user MCU should stop sending data to the module. The module fails to receive data because the module is initializing, TCP connections are not established, and the serial port buffer of the module is full. Only when CTS is set to 0 in user MCU, the module will output data from the serial port. Therefore, after hardware flow control is enabled, CTS=0 must be set externally to the serial port for normal output.
485_TEN	485 Sending control terminal. Normally, the value is 0. When the module sends data to the serial port, it changes to 1. Can be directly connected to the TXD_EN pin of MAX485 chip.
RUN_LED	The module blinks every 2 seconds after running.
RUN_LED_PIN	The control pin output of the running indicator lamp outputs a square wave of 0.5Hz. It also acts as a pin for the module.
GND	Anchor pin for module.

5. Hardware size

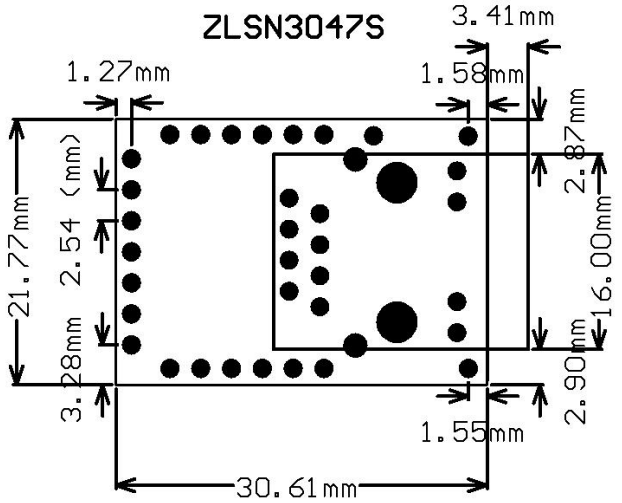

Figure 6 Device size

6. Usage

6.1. Usage summary

After the device runs, you can use the network tool ZLVircom to search for and configure the device. Click "Device Management" to see a list of devices.

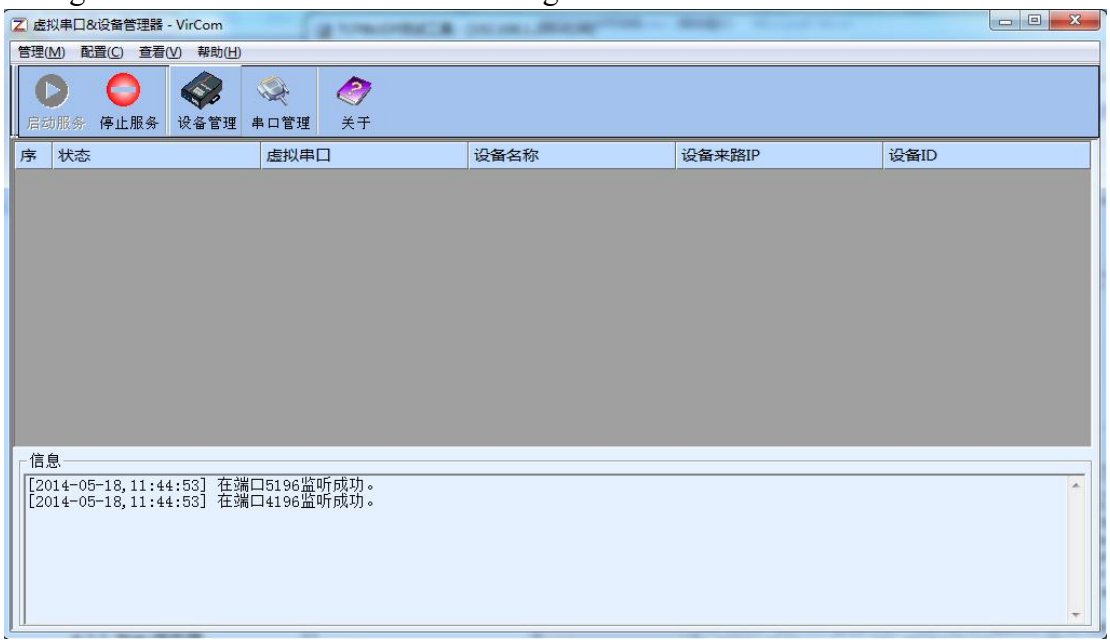

Figure 7 ZLVircom main interface

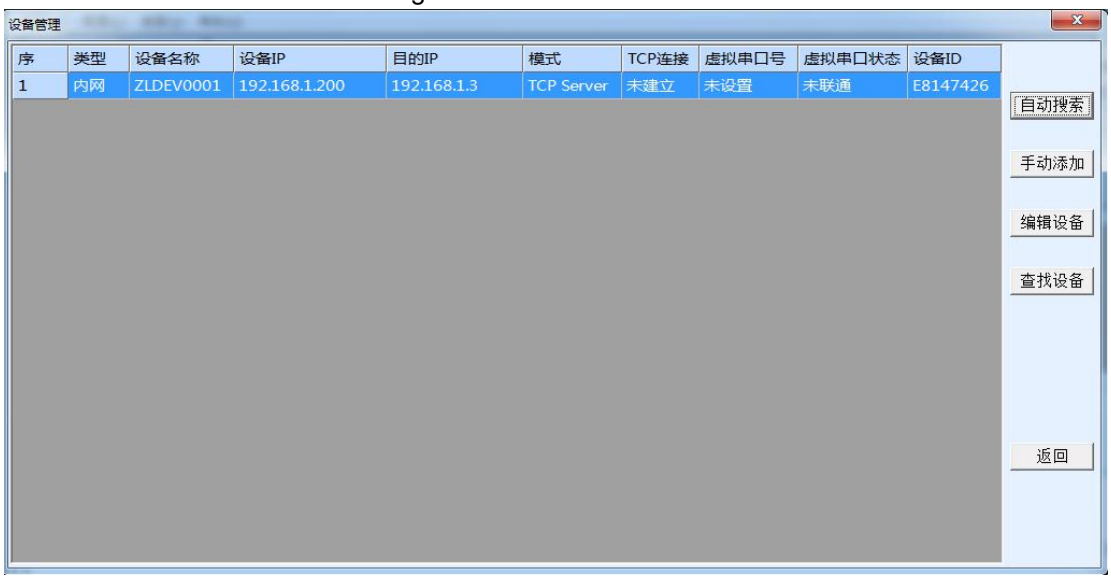

Figure 8 Device list

View all online devices from the device list. Click Edit Device to set the parameters. Parameters Include the IP address and baud rate of the device.

6.2. Software installation

ZLVircom can be used to configure parameters such as device IP addresses and create virtual serial ports. If the virtual serial port function is not required, you can download the installation-free version. Download address : http://www.zlmcu.com/download.htm

Figure 2 ZLVircom Version

Software name	specifications
ZLVircom Device Management Tool (not installed)	The non-installed version does not include the virtual serial port function.
ZLVircom Device Management Tool (Installation version)	The installed version contains ZLVircom_x64. Msi and ZLVIRcom_x86. msi. Install x64 for 64-bit operating systems and x86 for 32-bit operating systems.

Follow the default instructions during installation. After installation, ZLVIRcom will be started every time the computer is started to create a virtual serial port.

6.3. Parameter Settings

After ZLVircom is installed and the hardware connection of the device is completed, run ZLVircom software as shown in Figure 9, and then click "Device Management" as shown in Figure 10. Using ZLVircom, you can search and configure device parameters in different network segments, which is very convenient, as long as the device and the computer running ZLVircom are under the same switch.

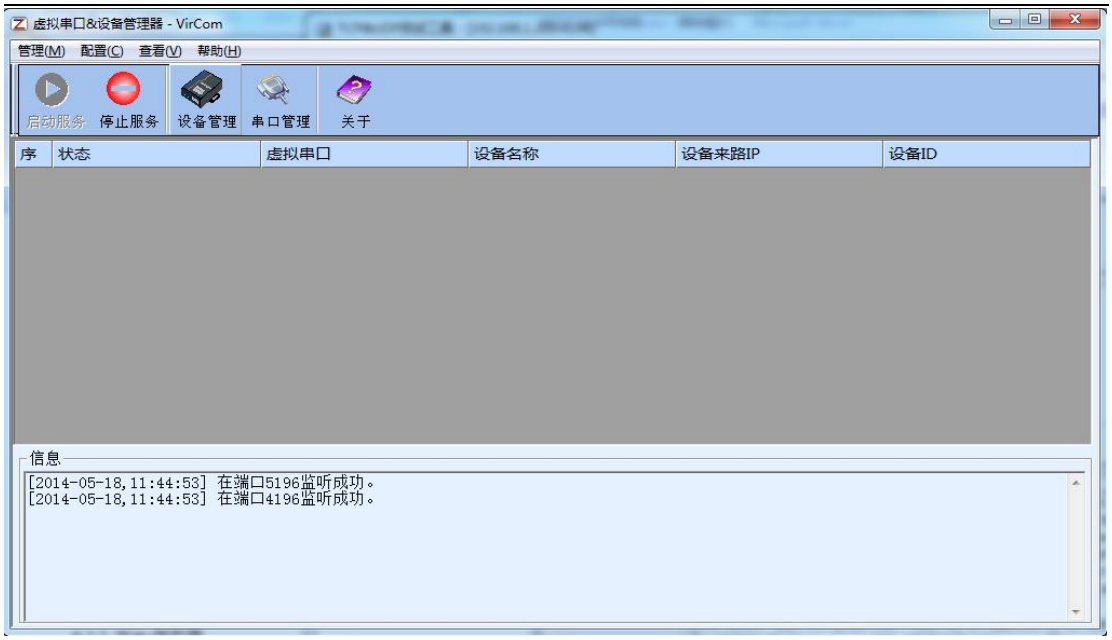

Figure 9 ZLVircom Main page

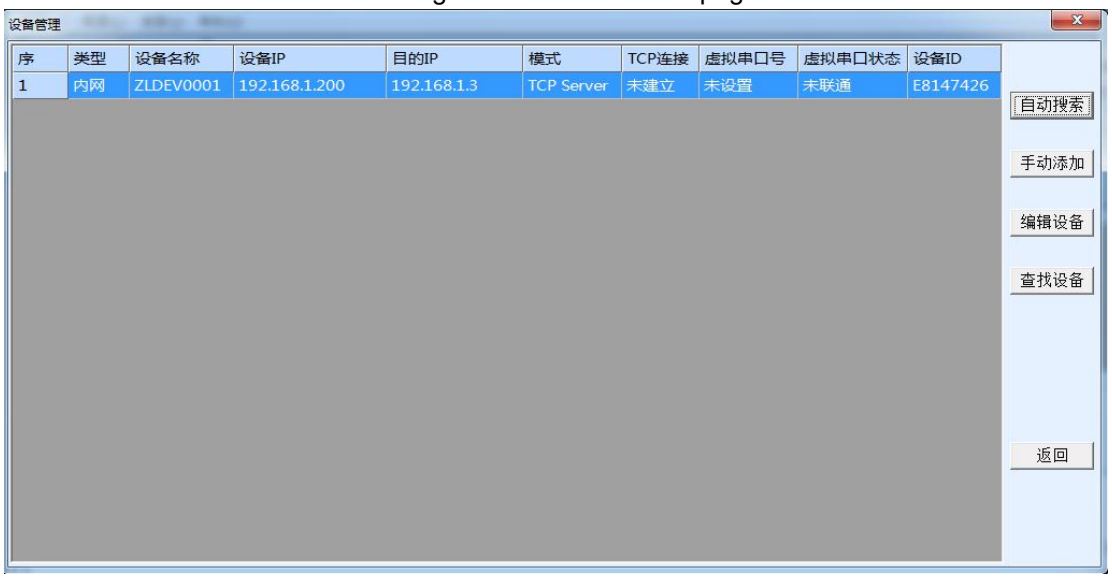

Figure 10 Device list

View all online devices from the device list. Click Edit Device to set the parameters.

Figure 11 device parameter

On this interface, users can set device parameters and click "Modify Settings" to set the parameters in the flash of the device. The parameters will not be lost during power failure. At the same time, the device automatically restarts.

The main parameters are as follows: Baud rate, data bit, parity bit in serial port Settings; IP address, subnet mask, gateway in network Settings; Sometimes, the working mode of the serial port server needs to be configured according to the computer software.

The meanings of other parameters are described as follows：

Figure 3 parameter specifications

Name	Value range	Content
Virtual serial port	virtual serial port that is not used or created	You can bind the current device to an existing virtual serial port. Add a COM port in Serial Port Management on the main window.
Device model No.		Only the core module model is displayed
Device name	Random	You can give the device an easy-to-read name that is up to 9 bytes long and supports Chinese names.
Device ID		Unique factory ID, which cannot be changed.

Firmware version		Firmware version of the core module
The functions supported by the device		For details, see Figure 4
IP mode	static、DHCP	Users can choose static or DHCP (dynamically obtain IP)
IP address		IP address of the serial port server
Interface	0～65535	Serial port Server Listening port when the serial port Server is 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 port and non-zero port is as follows :(1) when the local port is 0, a new TCP connection will be established with the PC when the module restarts. The old TCP connection may not be closed, and the device may have multiple false connections. Generally, the upper computer wants to close the old connection when the module restarts. Specifying a non-zero port closes an old connection. (2) When the local port is 0, the TCP connection takes longer to establish. When the serial port server is in TCP client mode, it also listens for incoming connections on the port as a TCP server. 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 mode	When the TCP server is configured, the serial port server waits for the computer to connect. When the serial port server is set as a TCP client, the serial

		port server proactively initiates a connection to the network server whose destination IP address is specified.
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 address 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	serial port baud rate
Digit bits	5、6、7、8、9	
check bits	None, even, odd, mark, space	
Stop bits	1、2	
Flow control	No flow control, hard flow control CTS/RTS, hard flow control DTR/DCR, asthenosphere control XON/XOFF	only available for RS232 port
DNS server		If the destination IP address is described by a domain name, enter the DNS server IP address. If THE IP address mode is DHCP, the DNS server is automatically obtained from the DHCP server

Objective mode	Static, dynamic	In TCP client mode: In static destination mode, the device automatically restarts after five consecutive attempts to connect to the server fail
Conversion of agreement	NONE 、 Modbus TCP<->RTU、Real_COM	NONE indicates that data is transparently forwarded from the serial port to the network. Modbus TCP<->RTU converts Modbus TCP to RTU. RealCOM is designed to be compatible with the old REAL_COM protocol. It is a virtual serial port protocol. However, you do not need to select RealCOM when using the virtual serial port.
Keepalive time	0～255	Heartbeat interval. (1) If the value is set to 1 to 255 and the device works in TCP client mode, the device automatically sends the TCP heartbeat at keepalive Time. This ensures the TCP validity of the link. If the value is set to 0, the TCP heartbeat is unavailable. (2) When the value is set to 0-254 and the REAL_COM protocol is selected as the conversion protocol, the device will send a data with 1 length and 0 content at the interval of keepalive time to realize the heartbeat mechanism in Realcom protocol. When set to 255, there will be no RealCom heartbeat. (3) When the value is set to 0 to 254, if the device works on the TCP client, the device sends device parameters to the destination computer at intervals. If 255 is set to 255, no parameter is sent and remote device management can be implemented.
Reconnection time of disconnection	0～255	In TCP client mode, if the connection fails, the system resends the TCP connection to the computer every Disconnection Reconnection Time. The value ranges from 0 to 254 seconds. If 255 is

		set, the reconnection is never performed. Notice The first TCP connection (for example, hardware power-on, device restart through zlvircom, and no data indicator) is usually made immediately. After the first connection fails, the system waits for reconnect time and tries again. Therefore, reconnect time does not affect the normal connection establishment time between the network and the server.
Web access port	1～65535	Default is 80
Multicast address		UDP Used in multicast
Enabling the Registration Package		This registration packet is sent to the computer when a TCP connection is established. You must select the RealCOM protocol after enabling the registration package. Supports TCP server and TCP client.
Packet length	1～1400	One of the rules for serial framing. Serial port server After receiving data of this length, the serial port sends the received data as a frame to the network.
Packet interval	0～255	Serial port framing rule two. When the data received by the serial port of the serial server stops and the stop time is longer than this period, the serial port sends the received data as a frame to the network.

The following describes the functions supported by the device：

Figure 4 Functions supported by the device

Name	Sepcifications
Web page download	Support through web pages to control serial output instructions, only

	the suffix W products have this function.
domain name system	The destination IP can be a domain name (such as the WWW server address at the beginning).
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 upper computer to identify the device. In general, you can not use it.
Modbus TCP to RTU	Modbus TCP can be converted to RTU. It also supports multiple hosts.
Serial Port Modification Parameters	Supports serial port AT commands to configure and read device parameters.
Automatic access to IP	DHCP client protocol is supported
Storage extended EX function	Subsequent extension
multiple tcp connections	The TCP server supports more than one TCP connection.
IO Port control	Supports any custom instructions to control up to eight IO outputs.
UDP multicast	UDP multicast
Multi purpose IP	A TCP client can connect to six destination IP addresses at the same time.
Proxy server	Supports the proxy server function (specific model required).
SNMP function	Supports SNMP to Modbus RTU. Only the suffix ending with -SNMP supports this function.
P2P function	Supports access to devices in any network through P2P traversal technology. Models with suffix N support this function.

6.4. TCP communication test

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

Figure 12 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 13. 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 192.168.1.200), The destination port is 4196, then click the "Open" button in Figure 14. Enter "Socket Send" in SocketTest and click "Send". The data will be transferred to RS232 through the network port of the serial port server and then sent to ZLComDebug, which will be displayed in ZLComDebug. Conversely, enter "Comdebug send" in ZLComDebug and click "Send" to send the socket test and display it.

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

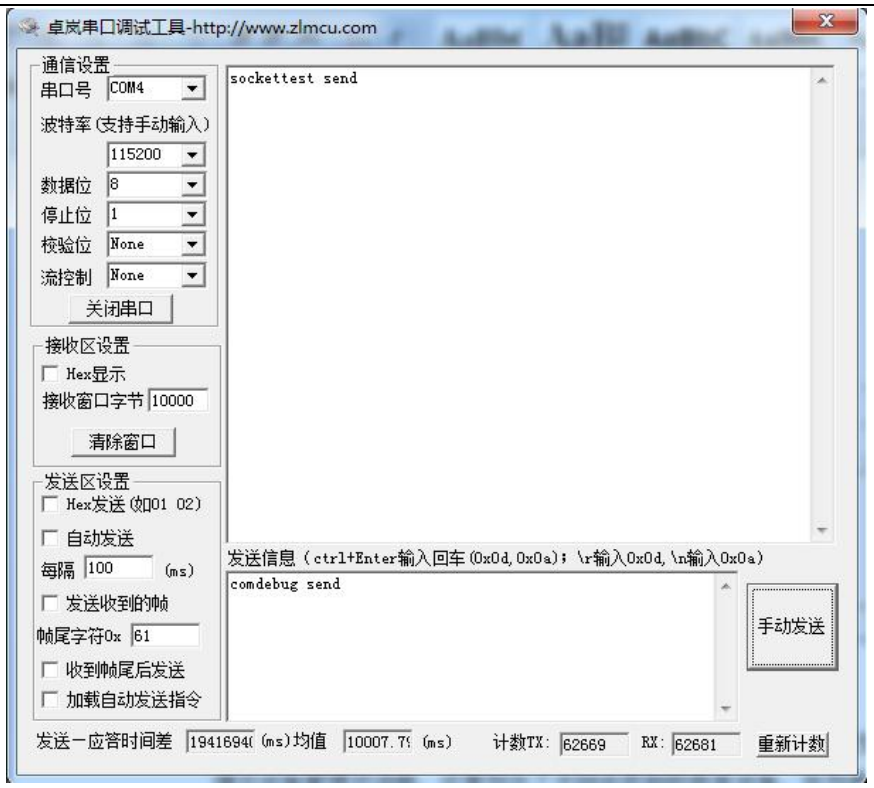

Figure 13 comdebug receive and send page

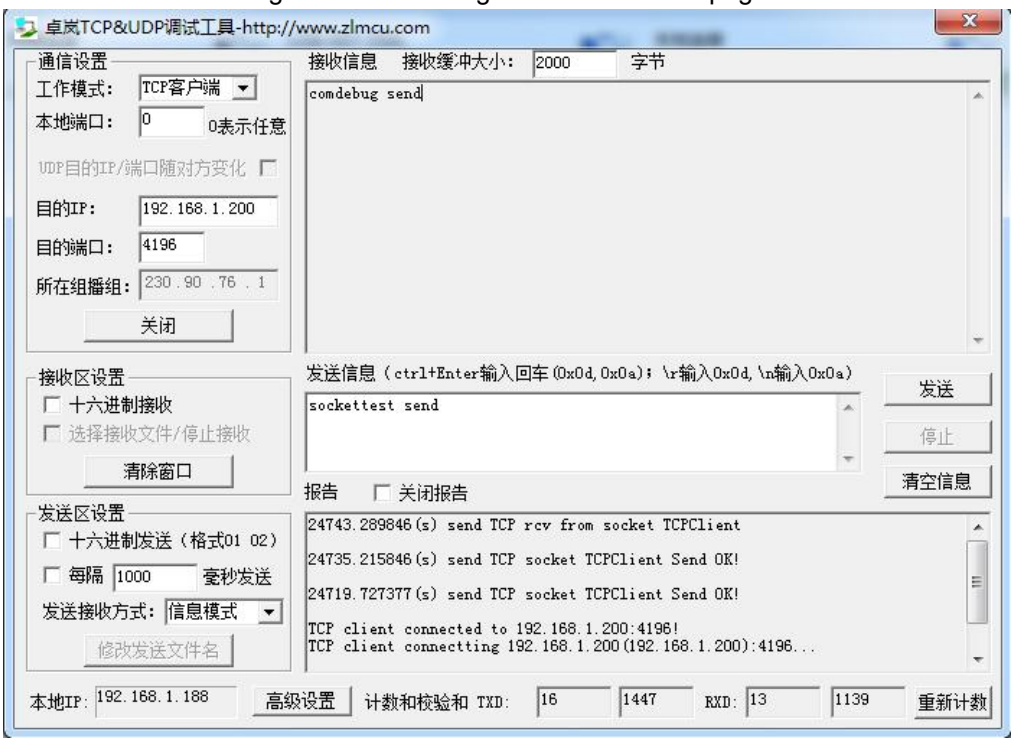

Figure 14 sockettest receive and send page

6.5. Virtual Serial Port Test

The SocketTest in Figure 12 communicates directly with the serial port server through TCP. In order to make the serial port software developed by the user also communicate with the serial port server, a virtual serial port needs to be added between the user program and the serial port server. As shown in Figure 15, ZLVircom and the user program run on the same computer. ZLVircom virtualizes a COM port and makes this COM port correspond to the serial server. When the user program opens COM communication, it can be sent to the user serial port device through ZLVircom serial server. This is illustrated below：

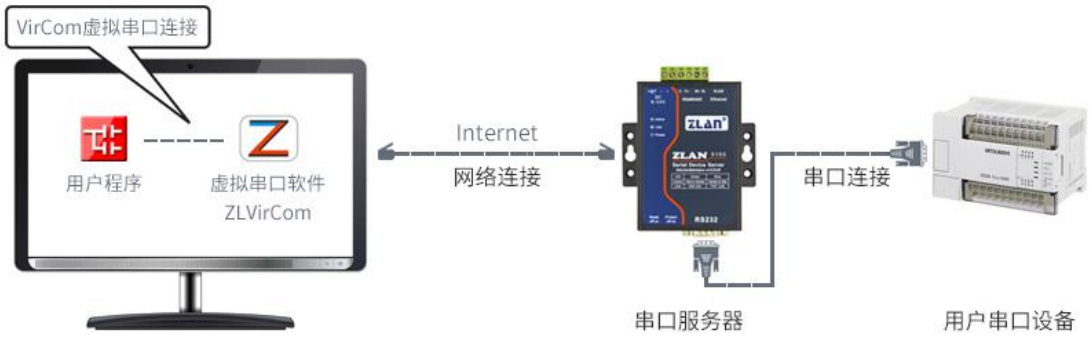

Figure 15 Functions of the virtual serial port

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

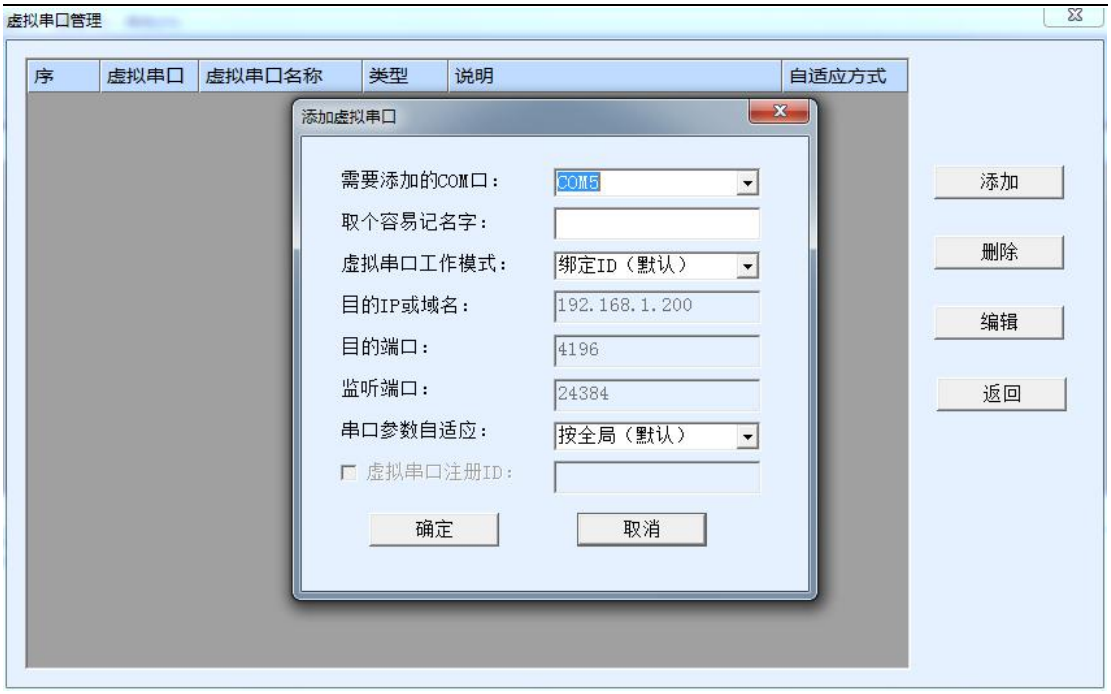

Figure 16 Adding a Virtual Serial Port

Then go to Device Management and double-click the device that you want to bind to COM5. As shown in Figure 11, select COM5 from the "Virtual Serial Ports" list in the upper left corner. Then click "Modify Settings". Return to the main interface of ZLVircom. You can see that COM5 is connected to the device whose IP address is 192.168.1.200. COM5 can be used instead of SocketTest for communication at this time.

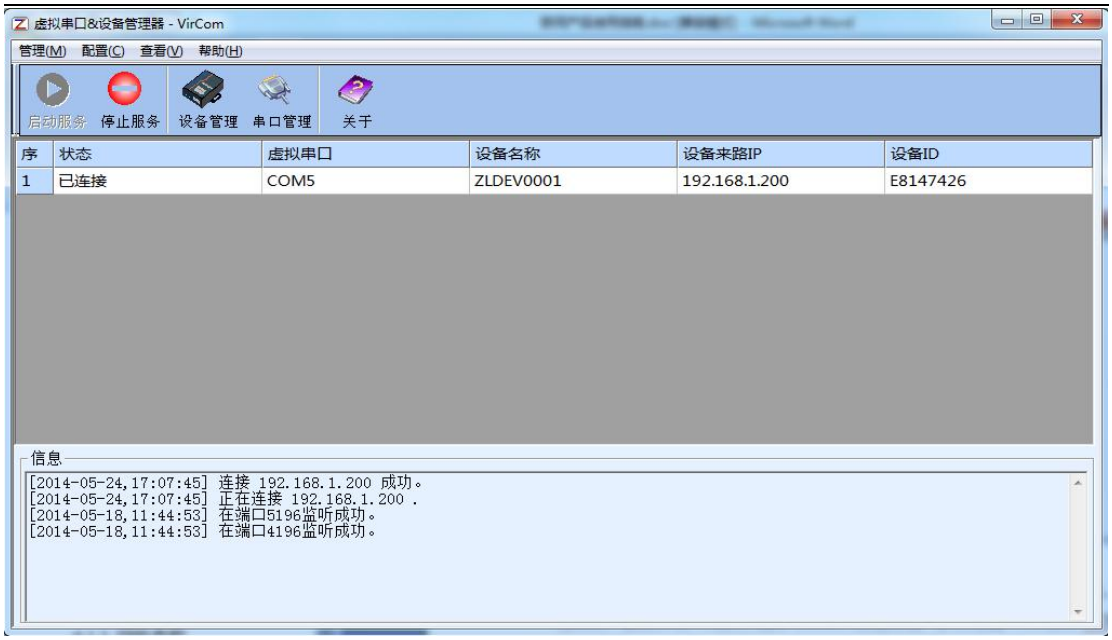

Figure 17 The virtual serial port is connected

Open ZLComdebug to simulate the user's serial port program, open COM5(virtual serial port above), and open another ZLComdebug to simulate a serial port device, open COM4(hardware serial port). In this case, COM5 sends data through the following links: COM5ZLVircom Serial server network port Serial server serial port COM4. Conversely, COM4 to COM5 can also transmit data: COM4 serial server serial port Serial server network port ZLVircomCOM5. Figure 18 shows how both parties send and receive data.

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

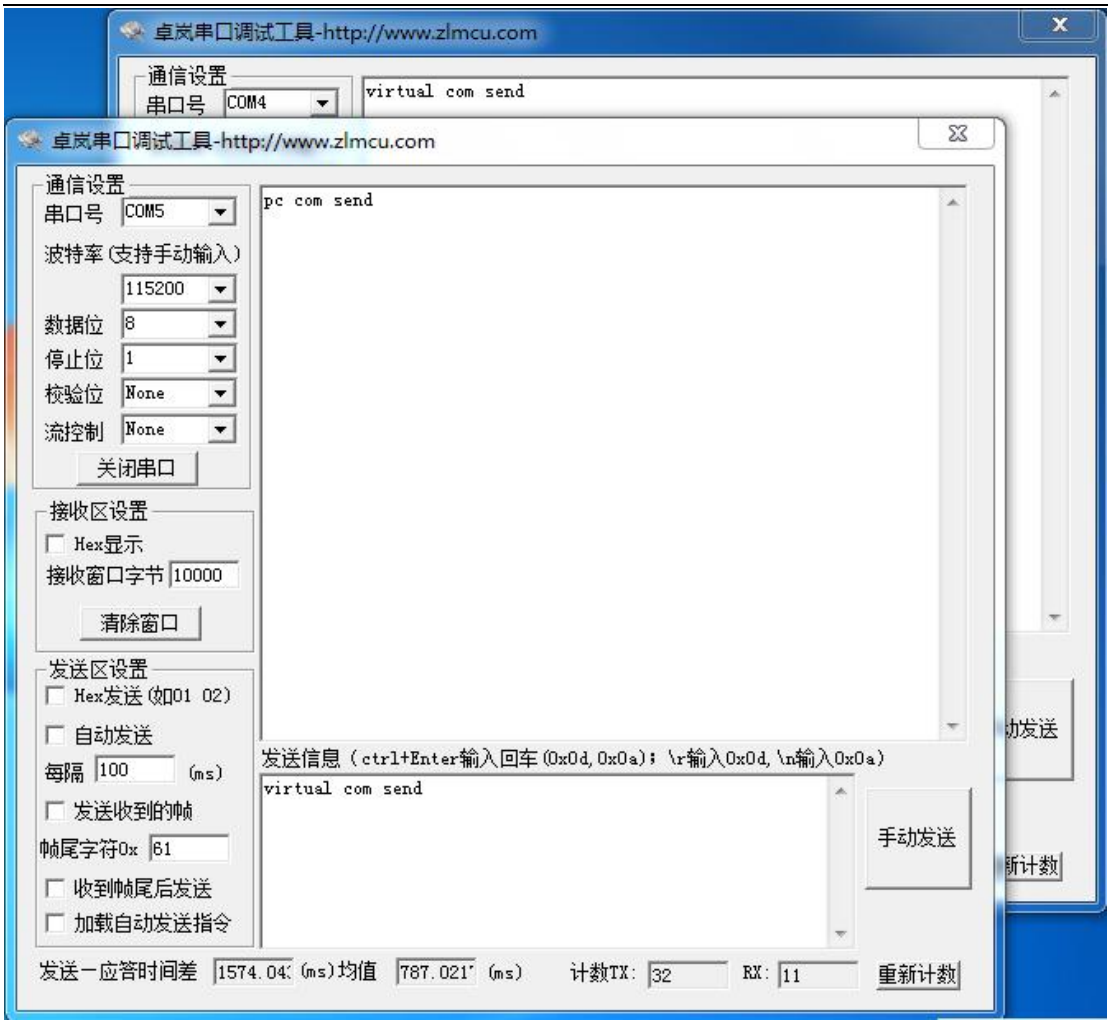

Figure 18 Communicates through the virtual serial port

6.6. Modbus TCP Testing

By default, data is transparently transmitted through serial ports and network ports. To convert Modbus TCP to RTU, select Modbus TCPRTU as the conversion protocol in the device Settings dialog box, as shown in Figure 19. In this case, the device port automatically changes to 502. When the Modbus TCP tool is connected to port 502 of the IP address of the serial port server, the Modbus TCP command sent by the user is converted to RTU command and output from the serial port. For example, after the serial port server receives the Modbus TCP command 00 00 00 00 06 01 03 00 00 0A, the serial port outputs 01 03 00 00 00 00 0A C5 CD command. Note: The serial port may send multiple 01 03 00 00 00 00 A C5 CD commands. This is because

the default Modbus uses storage mode and will automatically train query commands. How do I switch to non-storage.

Figure 19 start Modbus TCP function

If the Modbus TCP software is used as a Slave, you need to change the working mode to client, the destination IP address to the IP address of the computer where Modbus TCP software is installed, and the destination port to 502 after selecting the conversion protocol, as shown in Figure 20.

Figure 20 Modbus TCP Being client

6.7. Web configuration

You can use ZLVircom to search for and configure device parameters in different network segments. In Web configuration, ensure that the computer and the serial server are in the same IP segment and know the IP address of the serial server in advance. But Web configuration can be done on any computer without ZLVircom.

1. Enter the IP address of the serial port server in the address box of the browser, for example,

http://192.168.1.200.

Figure 21

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

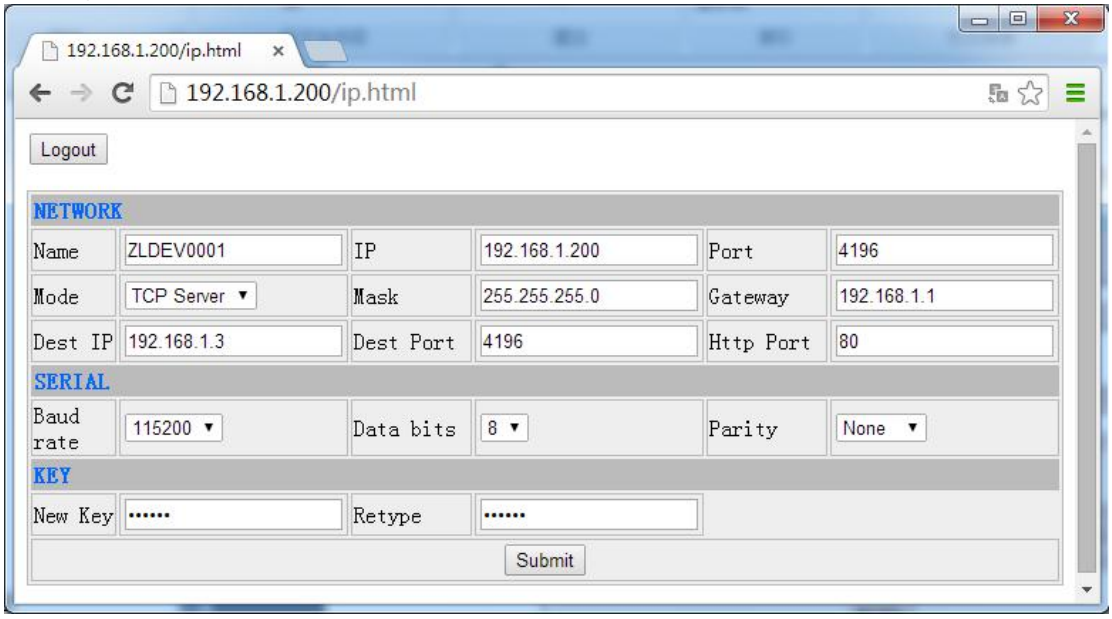

Figure 22 Web configuration page

3. You can modify serial port server parameters on the displayed web page. For details about related parameters, see Table 3 parameter meanings.

4. After modifying parameters, click "Submit modification" button

7. Working mode and transformation protocol

In different application scenarios, you can choose different working modes and conversion protocols of serial port servers to ensure more stable and reliable use, as described in the following sections.

There are two types of serial port servers: virtual serial port and non-virtual serial port, as shown in Figure 12 TCP communication diagram and Figure 15 function of virtual serial port respectively. In virtual serial port mode, the user software to be connected is the COM port, that is, the user software and the user device are both serial ports. Non-virtual serial mode User software is direct TCP/IP communication but user devices are still serial port.

In non-virtual serial port mode, the conversion protocol can be divided into transparent transmission, Modbus TCP to RTU, and Realcom. If the user software uses Modbus TCP of a fixed protocol and the lower computer uses Modbus RTU, select Modbus TCP to RTU. The Realcom protocol is only used when multiple serial servers serve as TCP clients to connect to a server and virtual serial ports are used on the server

The usage is summarized as follows：

Figure 5Network configuration mode

No.	Virtual serial port usage	device working mode	Conversion of agreement	specifications
1	Use	TCP server	none	It is suitable for user software to open COM port to collect data actively.
2	Use	TCP client	none	This method is recommended when the device actively sends data. If you select the TCP server, the device may be disconnected and cannot be reconnected.
3	none	TCP server	Modbus TCP to RTU	The software is Modbus TCP and the device is Modbus RTU. And Modbus TCP master station.

4	none	TCP client	Modbus TCP to RTU	The software is Modbus TCP and the device is Modbus RTU. And Modbus RTU master station.
5	use	TCP client	Realcom protocol	When a multi-serial server functions as a TCP client and uses virtual serial ports, the Realcom protocol is recommended.
6	none	TCP client	none	Suitable for a large number of devices, connected to a cloud mode. Generally, the cloud is a server with a public IP address on the Internet.
7	none	TCP server	none	This mode is used when devices and computers are on the same local network and are monitored locally without inter-Internet communication.

7.1. Virtual serial port mode

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

Then see if the monitoring computer and equipment are all on the local network：

a) If a computer rents a server with a public IP address on the Internet, the device must use the TCP client mode to connect the device to the server. In this case, you can select ② and ⑤ in Table 5. For a multi-serial server, you must select ⑤.

b) Are in the local network (can ping each other), then see is the upper computer active query or the device active send data. If the device proactively sends TCP packets, the device must be used as the TCP client (2). Otherwise, you can select (1).

7.2. Direct TCP/IP communication mode

If Modbus TCP conversion 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 through TCP/IP, and the serial port server converts TCP/IP data to serial port data and sends it to the serial port device.

Generally, such users develop their own PC network communication software, which integrates the analysis of the serial communication protocol of the equipment. This method is more flexible and efficient than virtual serial port. Corresponding to ⑥ and ⑦ in Figure 5.

In the "6.4TCP communication test" section, the serial port server as a TCP server is briefly described how to communicate. This section describes how TCP clients, UDP modes, and multiple TCP connections communicate with computer software. For example, the computer software SocketTest (software that imitates the user's TCP/IP communication) is used as an example.

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

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

7.2.1. TCP client mode

In TCP mode, there are two working modes: TCP server and TCP client. In either mode, one party must be the server and the other party must be the client. Then the client can access the server.

When the serial server is the client, there must be three correspondences, as shown in Figure 23. (2)IP address mapping: The destination IP address of the serial port server must be the IP address of the computer where the network tool resides. (3) Port mapping: The destination port of the serial port server must be the local port of the network tool. In this way, the serial port server can automatically connect to the network tool and send and receive data after the connection is established.

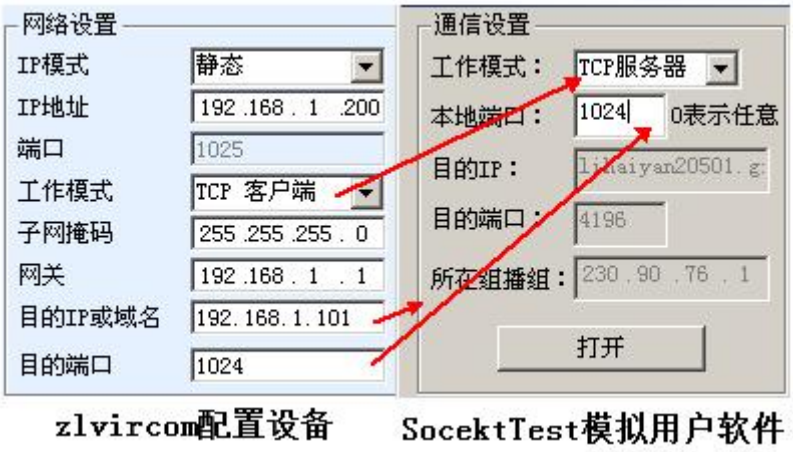

Figure 23serial port server as the client

7.2.2. The client connects to multiple servers

When ZLAN serial port server functions as a TCP client, seven destination IP addresses can be connected at the same time, and the data sent by the serial port will be sent to the seven destination IP addresses at the same time. If there are not so many servers, the remaining destination IP is vacant. Its use is as follows：

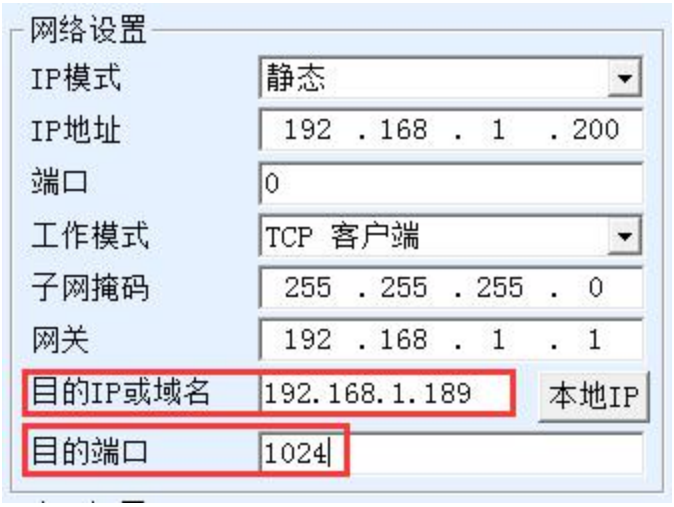

Figure 24The first destination IP address and port

Figure 25 left 2～7 IP and serial port

The first IP is set in the device setup interface as shown in Figure 24, where the first IP can be a domain name. For the remaining 2 to 7 destination IP addresses, click More Advanced Options on the device Settings screen to open more advanced options.

After all seven destination IP addresses are set, the system automatically connects to the IP addresses. If the IP addresses fail to connect to the IP addresses, the system will wait for the Reconnect period and reconnect the IP addresses repeatedly.

7.2.3. TCP server mode

When the serial server is used as the server, there are also three corresponding relationships, as shown in Figure 26, which are not explained here. Click the open button of the network tool to establish a TCP connection with the serial port server. After the connection is established, data can be sent and received.

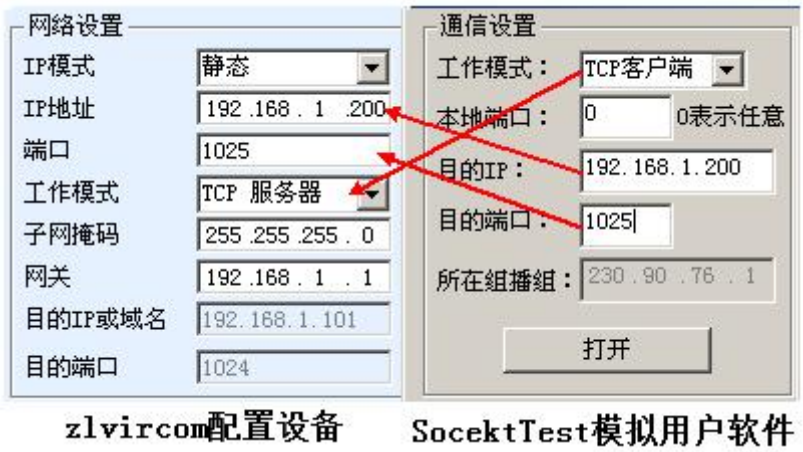

Figure 26The serial port server functions as the server

When the serial port server functions as a server, it can accept up to 30 TCP connections

simultaneously. The data received by the serial port is forwarded to all established TCP connections. To enable TCP to send data only to the recently received network packets, enable the multi-host function. For details, see 9.4 Multi-Host Function.

7.2.4. Do both client and server

ZLAN 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 27Do both client and server

By default, when ZLVircom is used for configuration, if the working mode is set to TCP Client, the port (that is, the local port) is automatically changed to 0 (0 indicates that an idle port is randomly selected). In order to be able to support TCP server mode, the computer software must know the local port of the device, so you need to specify a value here. As shown in Figure 27, the computer software can now communicate with port 1024 at 192.168.1.200. The device also connects to port 1024 of 192.168.1.189 as a client. Note that local port 1024 is occupied by the server. As a client, the local port uses port +1. That is, the software on 192.168.1.189 sees that the port from which the device comes is 1024+1=1025.

7.2.5. UDP mode

In UDP mode, the parameter configuration is shown in Figure 28. On the left is the configuration of the serial server in ZLVircom, and on the right is the configuration of the network debugging tool SocketDlgTest. First, both must work in UDP mode. In addition, as indicated by the red arrow, the destination IP address and destination port of the network tool must point to the local IP address and port of the serial server. As indicated by the blue arrow, the destination IP

address of the serial port server must be the IP address of the computer where the network tool resides, 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 bidirectional UDP data communication.

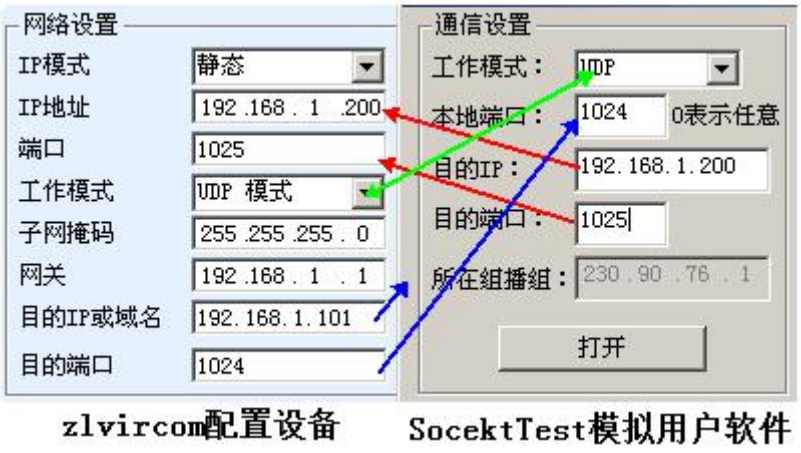

Figure 28 UDP Mode Parameter Configuration

7.3. Device couplet mode

If the host is neither a Socket program (SocketDlgTest) nor a virtual serial port, but two devices are connected through a network port, the configuration method is similar. You need to connect two devices and computers to the same LAN. ZLVircom runs on this computer. The purpose of connecting the computer is only for configuration. After configuration, the computer can not be connected.s

Click on ZLVircom's device Management to find these two devices, as shown in Figure 30. Then click Device Edit to configure the device. Device couplet can be divided into TCP couplet and UDP couplet. If TCP is connected, the parameters of the two devices are shown in Figure 29. The parameters shown in the arrow must correspond to each other in the same way as the connection to the PC. After the TCP connection is successful, you can check the connection status by returning to the Device Management dialog box, as shown in Figure 30. If the status of the two devices is Connected, the TCP link between the two devices is established.

图 29TCP 设备对联参数配置

序	网络	设备名称	设备IP	目的IP	模式	TCP连接	虚拟串口
1	内网	ZLDEV0001	192.168.1.201	192.168.1.200	TCP Client	已建立	未设置
2	内网	ZLDEV0001	192.168.1.200	192.168.1.1	TCP Server	已建立	未设置

Figure 30TCP The device couplet is successfully checked

If UDP couplet is used, the configuration parameters are shown in Figure 31. The parameters corresponding to the arrow must be one-to-one. UDP couplet As long as the parameters are correctly configured, you do not need to check the connection status. The sent data is automatically sent to the specified device.

Figure 31UDP Configure device couplet parameters

Finally, it is necessary to remind you that if the device is couplet, in addition to the above Settings, you must also set the correct serial port parameters. The baud rate of the serial port server must be consistent with that of the user's device. After this setting, user devices can send

data to each other through the serial ports of the two serial servers.

8. Equipment debugging

8.1. Physical network connection

The serial port server can connect to the 10M/100M switch or computer network port using crossover cable or direct cable.

After the connection is established, check whether the Link indicator is green. Otherwise, check whether the network cable is properly connected.

8.2. Network TCP connection

When the device is used to dynamically obtain IP addresses, it cannot be directly connected to the network port of the computer. There is no DHCP server available (usually a DHCP server is a router on a LAN). Therefore, specify an IP address for direct connection. The computer also needs a fixed IP address.

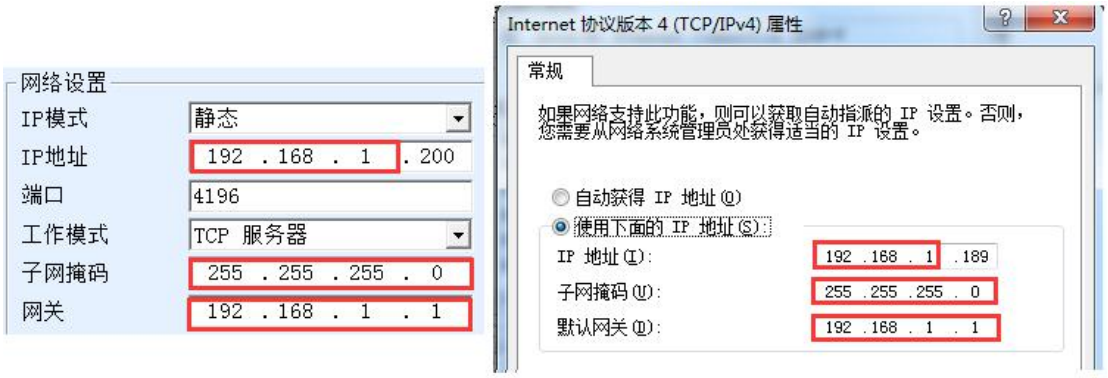

Figure 32 The configurations are on the same network segment

When configured as a static IP address, the device and computer need to be on the same network segment (except for communication across gateways), whether directly or through a switch, as shown in Figure 32.

ZLVircom supports cross-network segment search and configuration, so the IP address that can be searched but cannot be communicated is not configured properly. In this case, ZLVircom can be used to configure the device in the same network segment.

After the configuration is complete, you can see the Link indicator turns blue when establishing the TCP connection using the steps in 6.4 TCP Communication Test or 6.5 Virtual

Serial Port Test. Link indicator blue can also be seen through ZLVircom. For example, in the device management list, if the TCP connection column is "established", the Link indicator is blue, as shown in Figure 33, which is convenient for remote diagnosis.

Figure 33 Connection status and data sending status

8.3. Data sending and receiving

When the Link indicator turns blue, data can be sent and received between the software and the serial port server. At this point, if the software sends a data, the Active light turns green for at least a second. Data is also output from the serial port of the serial server, but whether the output data is correct depends on whether the correct serial port parameters (baud rate, data bit, stop bit, parity bit) are configured.

If the serial port sends a command correctly, the serial port device responds. If the serial port sends data to the network port, the Active turns blue. Otherwise, check whether serial port parameters or serial cables are properly connected.

In order to facilitate remote debugging, ZLVircom also supports remote viewing of data sent and received, as shown in FIG. 33, where TXD is the amount of data sent by the serial port of the serial server. When refreshing the device list, if this value changes, it indicates that data has been sent, and the Active light will also be green. If you see RXD changing, the serial port device has returned data. Active is blue.

8.4. ZLVircom Remote monitoring data

When the virtual serial port is used, ZLVircom supports real-time capture of data sent and received by the virtual serial port. It is convenient for users to debug the system：

Assume that the virtual serial port has been set up according to 6.5 Virtual Serial Port Test. Now you need to monitor the data going through the virtual serial port. Open the menu/configuration/software configuration/virCOM configuration dialog box of ZLVircom.

Figure 34 start ZLVirocm monitoring

Check in front of enable monitoring, hexadecimal monitoring mode, and display data sending and receiving time, as shown in Figure 34. Then click OK. Assuming that data has been sent and received before, select a virtual serial port that you want to monitor from the home screen, and then select Menu/View/Monitor, as shown in Figure 35.

Figure 35 Start ZLVirocm monitoring

From the open dialog box, you can see the instructions sent by the upper computer and the instructions returned by the device, as shown in FIG. 36. This function can facilitate the field communication debugging.

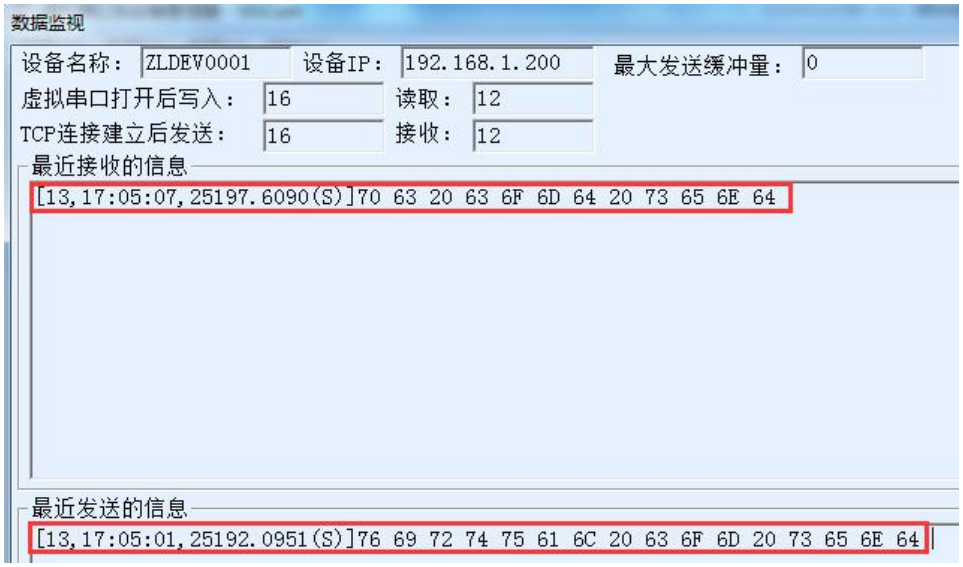

Figure 36 Monitor incoming and outgoing data

9. Modbus Advanced function

The serial port server with Modbus gateway function has no station address and register itself. It is a communication bridge. It will generate Modbus RTU according to the Salve ID, function code, register number and register quantity in the Modbus TCP instruction sent by the user software to Modbus gateway, and output it from the serial port. Think of it as a protocol "translator"

9.1. Start Modbus Gateway

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

By default, the serial port server works in transparent transmission mode. If you want to convert the serial port server to Modbus gateway mode, select Modbus TCPRTU in Conversion Protocol. After that, the device automatically changes port to 502 (the port of the Modbus server). This enables Modbus gateway.

The serial RTU device serves as the slave, so the Modbus TCP software of the upper computer connects to port 502 of Modbus gateway. In this case, Modbus gateway needs to work in TCP server mode. If the serial port RTU serves as the master station, the Modbus gateway works on the TCP client, and the destination IP address is the IP address of the computer where the Modbus TCP software is installed. The destination port is usually 502.

9.2. Storage Modbus gateway

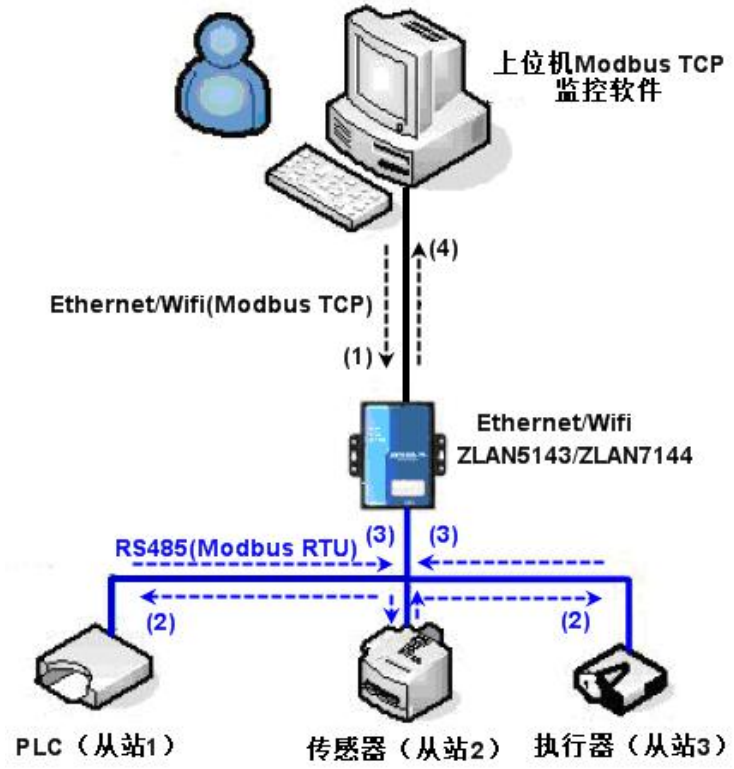

Figure 37Storage Modbus Gateway mode of operation

As shown in Figure 37, the normal Modbus TCP data flow direction is (1), (2), (3) and (4). That is, the Modbus TCP command is first converted into the corresponding Modbus RTU command, and then the device answers the Modbus RTU command to the Modbus gateway, and then the Modbus gateway converts the Modbus TCP command again and sends it to the monitoring upper computer.

We know that Modbus TCP is the network communication, the transmission speed is very fast, generally can answer within 3ms, while Modbus RTU is RS485, generally only 9600bps speed, generally send and return an instruction takes at least 30ms. 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 compared to a highway, serial port is compared to a single-plank bridge, then the original way is to pass the traffic flow of the highway on a single-plank bridge.

The features of the storage Modbus are listed below：

1. The first Modbus TCP query instruction is non-storage. This is because you have to wait for

the RTU device to slowly return data before you can send the register contents back to the network port.

2. If a specific command is no longer queried by the upper 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 can currently store 10K of Modbus cache and about 500 instructions at a time for ordinary single-register queries.
4. When there are multiple instructions at the same time in the query, in accordance with the order of sending, the first instruction to send the first instruction to reply waiting for 485 anti-conflict time (refer to the multi-host part) the second instruction to send..... . Return to the first instruction again after the last instruction is answered.

9.3. Disable the storage function

Although the storage Modbus has fast response times, some users do not want RTU devices to receive a large number of query instructions, affecting the internal processing speed of the instrument. In this case, you can disable the storage function.

To disable the storage type, click the "More advanced options" button in the "Parameter Configuration" dialog box, remove one support as shown in Figure 38 and then click OK. Then go back to device Settings and click Modify Settings.

Notice When you configure the conversion protocol in Web mode, the Modbus gateway is not a storage mode by default.

Figure 38storage function is disabled

For the new version of ZLVircom, you can directly select simple Modbus TCP to RTU from

Modbus gateway type to complete the above Settings.

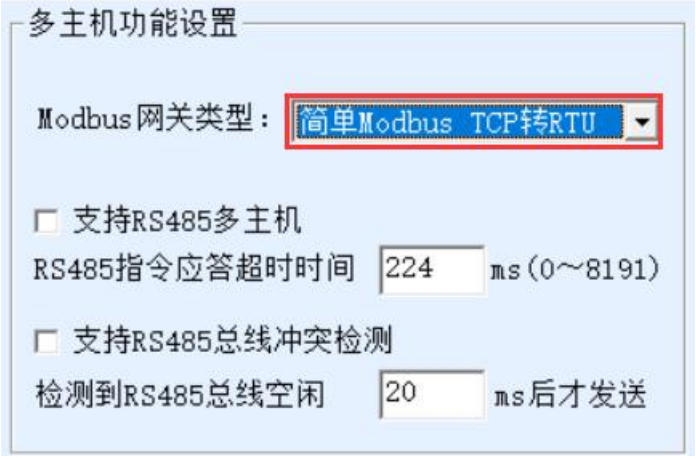

Figure 39 updated version for zlvircom configuration

9.4. Multi-masters function

As shown in Figure 38, "RS458 multi-host support" and "RS485 bus conflict detection function" are the multi-host functions of Zhuolan. They are generally both enabled and disabled. After Modbus TCP is enabled, the device has the storage Modbus gateway function. Otherwise, the device has the non-storage Modbus gateway function. If the conversion protocol is none, it is generally possible to make the user-defined RS485 protocol also have the function of serial port equipment accessed by multiple hosts at the same time, which cannot be realized in the pure RS485 network, because multiple master stations will be sent at the same time in the RS485 bus conflict. The multi-host of zolan serial server can "coordinate" the RS485 bus so as to achieve the purpose of multi-host access.

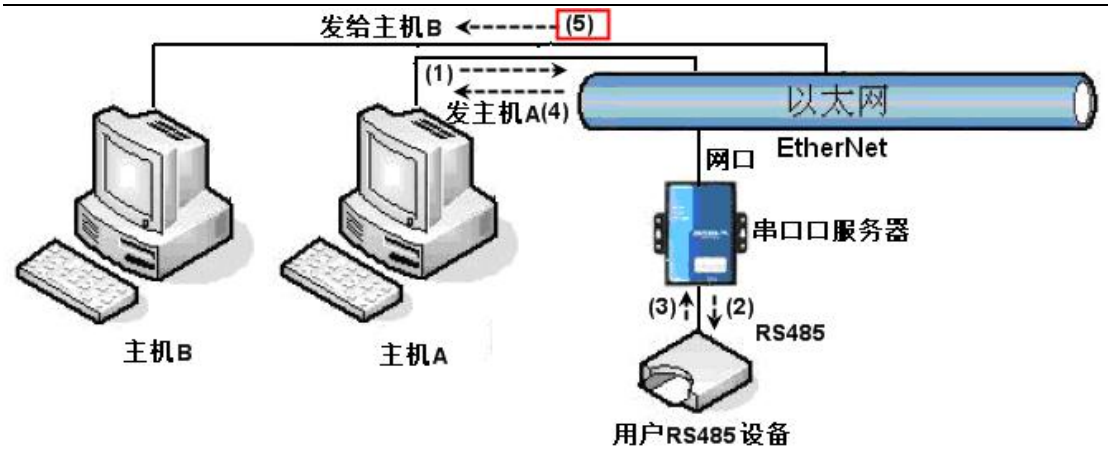

Figure 40Multi-host function demonstration

As shown in Figure 40, when two hosts, host A and host B, are connected to the serial server at the same time, host A sends the command (1), the RS485 device receives the command (2), and the RS485 device returns the command (3). However, the port of the serial server sends the command (4) to host A and the command (5) to host B. Because host B did not send a query, but it also received a reply command (5), host B may generate a communication exception error. In multi-host mode, there is only instruction (4) but no instruction (5), because the serial server automatically remembers the host to be returned and only returns the instruction to the nearest communicating host. The query from host A is returned to host A, and the query from host B is returned to host B.

Another function is that, in common mode, host A and host B simultaneously send data will produce instructions on the RS485 bus merge, so as to not be identified normally; In multi-host mode, the serial port server can schedule the sequence of A and B using the bus to effectively solve the problem of simultaneous access conflict.

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

9.5. Multi-master parameter

RS458 Multi-host support and RS485 Bus conflict detection are described as follows:

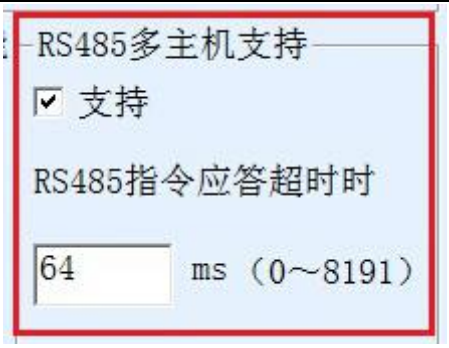

Figure 41 RS485 Multi-master support

The timeout time of RS485 command reply is the maximum interval between the serial port of the serial server sending the command and receiving the reply. The specified time must be greater than the actual maximum interval. Because if a timeout is determined, the next instruction will be sent.

Figure 42 RS485 Conflict prevention idle time

RS485 bus conflict time: indicates the number of milliseconds that the serial port server waits to send the second instruction after receiving the reply of the first instruction. This parameter actually defines the speed of instruction rotation. It is recommended that the value be greater than 20ms. You do not need to change the maximum waiting time 3 seconds parameter.

When the user uses ZLVircom to set the conversion protocol to "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 automatically set according to the baud rate. However, if the user's Modus command is long or the conversion protocol is "None", you need to manually configure the two parameters。

The following describes recommended values for the preceding parameters：

1. Figure 42 shows RS485 Bus Collision Prevention time. Generally, you can set it to twice of Packet Interval at the lower right corner of the parameter configuration interface, but the minimum value cannot be less than 20.
2. Figure 41 shows "RS485 instruction reply timeout time", which is generally determined by the length of the back and forth reply instruction. If the sending instruction is N bytes and the

reply is M bytes, it is recommended to set the value as "packet interval" x (N+M+5) +100.

9.6. Non-storage Multiple Hosts

Some places must use non-storage Modbus, this is because when an event occurs, the PLC reads the data in the register, but the data read is the previous data collected by the storage model, which is logically incorrect, so the model 3 must also support non-storage Modbus acquisition. On the other hand, it is necessary to support multiple hosts at the same time. To support this mode, you can change the maximum waiting time of RS485 bus to "2" on the basis of storage Modbus gateway (using 1.565 or later firmware). Here 2 is a special value to let the module know that it needs to disable the storage-type functionality.

Figure 43 Multi-host non-storage Settings

Notice You must set the value to 2 again each time you set Modbus TCP mode to Modbus TCP mode, because the value will automatically change to 3 if you select Modbus TCP mode again.

For the new version of ZLVircom, you can directly select "Non-storage Modbus Gateway" from Modbus gateway type to complete the above Settings.

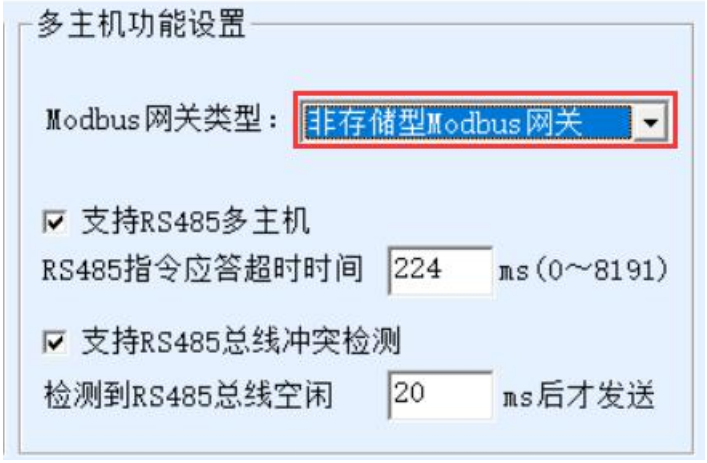

Figure 44 updated version for zlvircom configuration

9.7. Modbus under multi purpose IP

As shown in Figure 40, if the serial port device (RTU device) serves as the master and the network port device (Modbus TCP device) serves as the slave, and multiple network port slave devices exist simultaneously. In this case, you can connect the serial port server as a client to multiple network port devices by referring to 7.2.2 Connecting Multiple Servers from Clients.

After the serial port RTU sends a command to multiple network port devices, the network port device identifies whether to send the command to itself through the Slave ID field. Only the network port device corresponding to the Slave ID responds. The network port sends the response to the serial port server and converts it into an RTU command. The RTU command is output from the serial port to the RTU device.

At this time, it should be noted that "RS485 bus anti-collision time" shown in Figure 42 and "RS485 instruction reply timeout time" shown in Figure 41 should be removed. Otherwise, the forwarding function cannot be implemented.

Another application mode: 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 the first message, and the RTU device responds (as the slave). In this case, you still need to check RS485 bus conflict Prevention time and RS485 instruction reply timeout time. In this way, multiple hosts can access one RTU device at the same time.

For the new version of ZLVircom, you can directly select "device does slave for client" in Modbus gateway type to complete the above Settings.

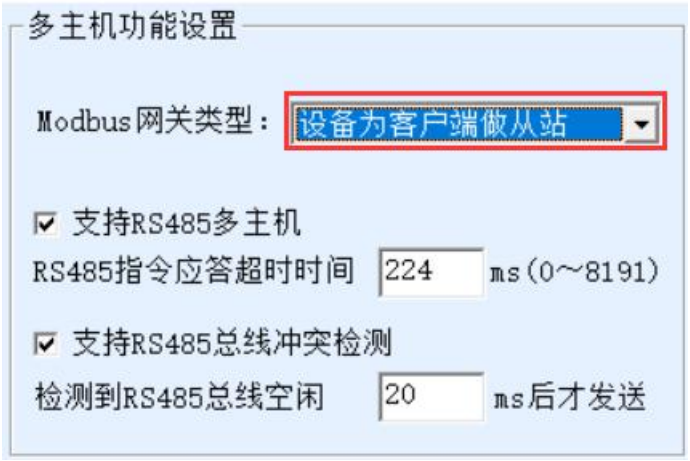

Figure 45 Updated version for zlvircom configuration

10. Registration package and heartbeat package

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

10.1. Registration packet

The definition of the registration package is that when the computer software establishes a TCP connection with the serial server module (hereinafter referred to as the module), the module will first send a string of code to the software, so that the software can know which module is communicating with it. This code 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 can cloud software identify modules that are important and necessary for iot communication.

The serial port server of Shanghai Zhuolan provides the following registration modes.

10.1.1. Send the MAC address on the connection

Connect to send MAC address: the method is that the module sends its MAC address to the cloud when it connects to the cloud. Because MAC addresses are unique, devices can be uniquely identified. This approach is simple and efficient because it does not require a registration package for each device. To use: In the device Settings dialog box, click "More advanced options", find "Send MAC address when TCP is established" in the middle and upper part of the box, tick in

front, then go back to the Settings screen, click "Modify Settings".

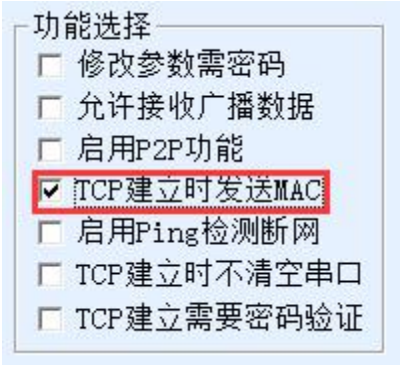

Figure 46Send MAC address on connection

10.1.2. Realcom protocol

Realcom protocol is a mature protocol with registered packets and heartbeat packets. Users can use this protocol to implement the functions of registered packets and heartbeat packets. To enable the Realcom protocol, perform the following steps: In the Device Settings dialog box, set Conversion Protocol to REAL_COM protocol. Note that the enabling registration package part is left blank.

Figure 47Start realcom protocol

After enabling Realcom protocol, it will not be transparent transmission communication, it has the following characteristics：

1. After a TCP connection is established between the device and the cloud, the device automatically sends a hexadecimal registration package 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] are MAC addresses of the device.
2. The device automatically adds a 3-byte header prefix of FA 01 01 when sending data to the network.

3. The device sends a 00 - byte heartbeat packet to the software at every keepalive time.

REAL_COM can be used as a device registration package because the registration package contains MAC addresses. But because of its fixed format, only cloud software can design the REALCOM protocol to accommodate this approach.

10.1.3. Custom registration package

In the customized registration package mode, users can enter any registration package format. To do this, perform the following steps on the device Settings page：

Figure 48Setting the Registration Package

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

After the device is connected to the cloud software, the device automatically sends the hexadecimal registration package 31, 32, 33, and 34. This registration package mode is flexible, allowing the device to adapt to the existing cloud registration package format. However, the registration package does not contain a wildcard such as MAC. Therefore, you need to configure a different registration package for each device, which is tedious. The above two methods of sending MAC addresses and REALCOM have the same configuration for each device, but the registration packages are naturally different due to different MAC addresses.

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

10.1.4. Configuration File

A configuration file can be used for longer registration packages.

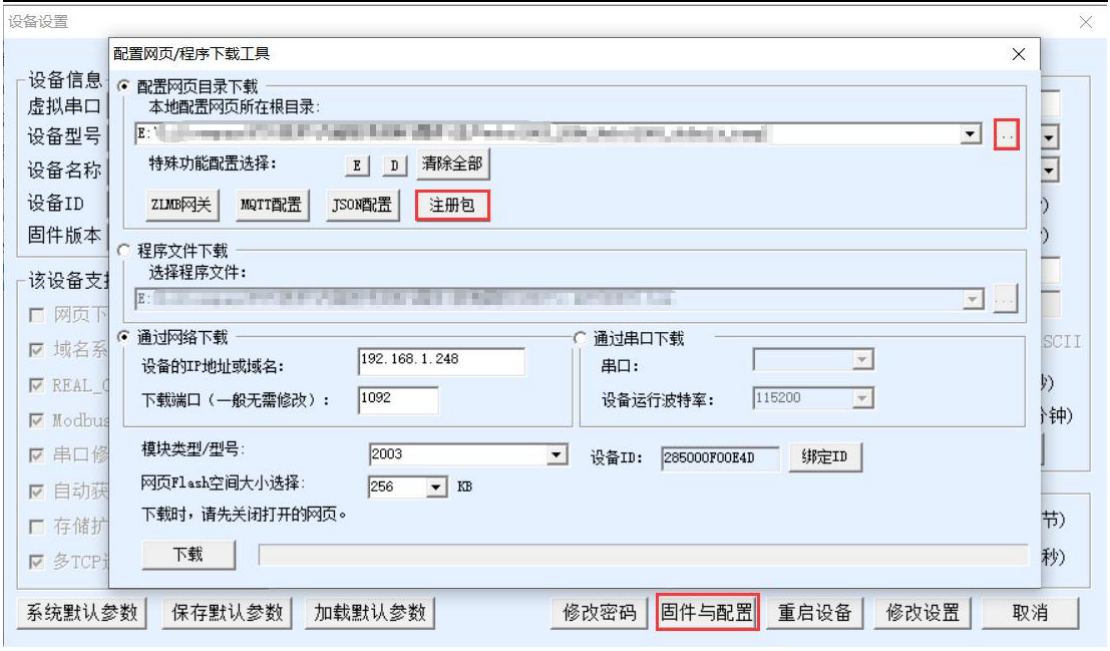

Figure 49Download registration Package

In the dialog box that is displayed, click Firmware and Configuration to open Configure Web page/Program Download Tool. In the dialog box that is displayed, select Configure Web page Directory download and select an empty directory for storing the configuration file. Then click the "Register package" button.

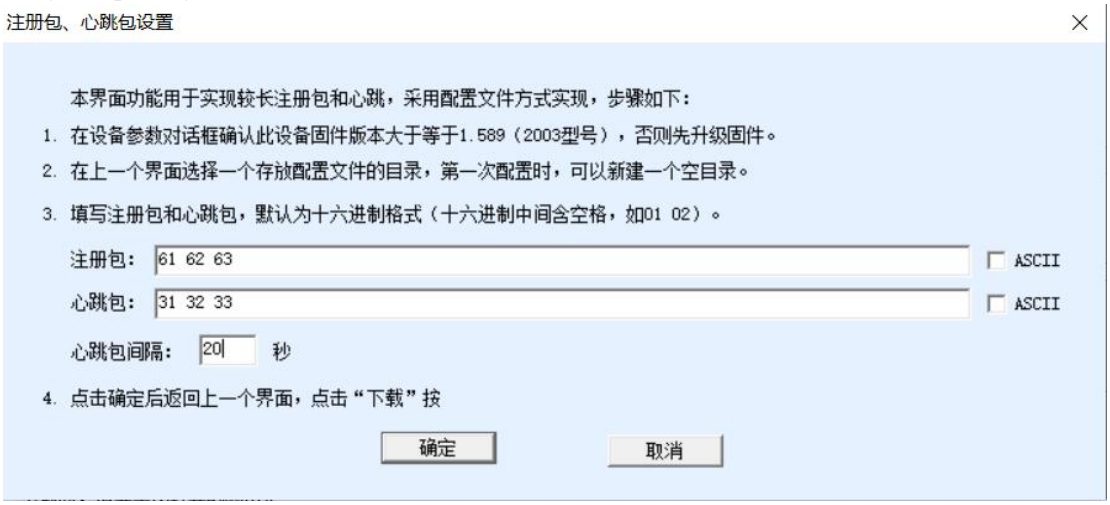

Figure 50Configuring registration Packages

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

10.2.Heartbeat packets

Heartbeat packets are used to check whether communication links are down. This is done by sending a heartbeat packet to the server software every once in a while, which is discarded after being received by the server and not considered valid data for communication.

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

Figure 51 Keepalive time

Figure 51as shown，The sending time of heartbeat packets is set by Keepalive Time.

10.2.1. Implied heartbeat

Even if no heartbeat packet is set, the zolan device will enable the implicit heartbeat function when it is on the TCP client. Therefore, the implicit heartbeat function means that the device sends data, but the server does not receive the heartbeat data. Therefore, it cannot perform the first function of the heartbeat packet, that is, the server detects whether the device is active. However, because the device actually sends data, it can perform the second function of heartbeat packets, that is, the device can check whether the TCP connection is normal. Once the detection disconnects, the device can automatically re-establish the TCP connection.

10.2.2. REALCOM protocol

As described in 10.1.2Realcom, Realcom can send 1 byte data of 00 at every keepalive time. This data is the heartbeat packet of Realcom.

10.2.3. Customizing heartbeat Packets

Fill in the registration package as described in 10.1.3 Customizing a Registration Package. Then add heartbeat packets as follows: Click the "More Advanced options" button in device Settings, in the second line of multi-destination IP and port, write the hexadecimal heartbeat packets, and change the option on the right to "Parameter Packet Destination".

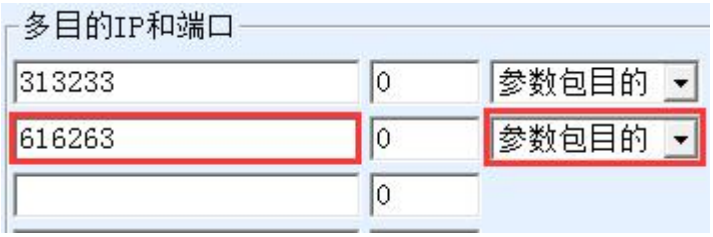

Figure 52Custom registration package

Notice The total number of registered packets and heartbeat packets must be less than 33 bytes. The first line is actually the registration package.

10.2.4. Configuration files

Refer to how to use the configuration file of the registration package.

11. Httpd Client communication function

This function is used to send the data from the serial server directly to the server program based on the Web architecture, which can simplify the cloud software development workload.

When the Internet of Things acquisition terminal and web server (HTTPD program) to interact, if the data can be submitted to the Web server in accordance with the STANDARD format of HTTP GET and POST instructions, then the Web server can use the existing PHP/ASP language for data processing and storage. This saves the user the effort of redeveloping the Web application interface.

To support this feature you need to download an httpd. TXT configuration file from the ZLAN serial server. The download can be achieved using zlVircom's firmware upgrade feature。

ZLAN HTTPD client communication features include：

1. Sent from the device: The serial port data can be directly converted to HTTP in GET/POST mode, which can be directly identified by the server.
2. Web server delivery: The Web server can also use the GET/POST command to send the required data to the serial port server. The valid data can be output from the serial port server.

When the serial server receives data, it can also send a specific reply to the Web server indicating that the data was received.

3. Supports any conversion of input and output data between hexadecimal and string, so that the Web server can deliver data in the form of characters, and the serial port can control serial port devices by outputting hexadecimal data.

For details, please refer to the ZLAN HTTPD Client Communication documentation.

12. P2P Function introduction

The P2P function allows users to connect to a device through an ID (not an IP address) anytime and anywhere and directly implements P2P links between devices and computers without requiring server forwarding. The device does not need to have a public IP address or perform port mapping. It has the characteristics of easy to use and high communication efficiency.

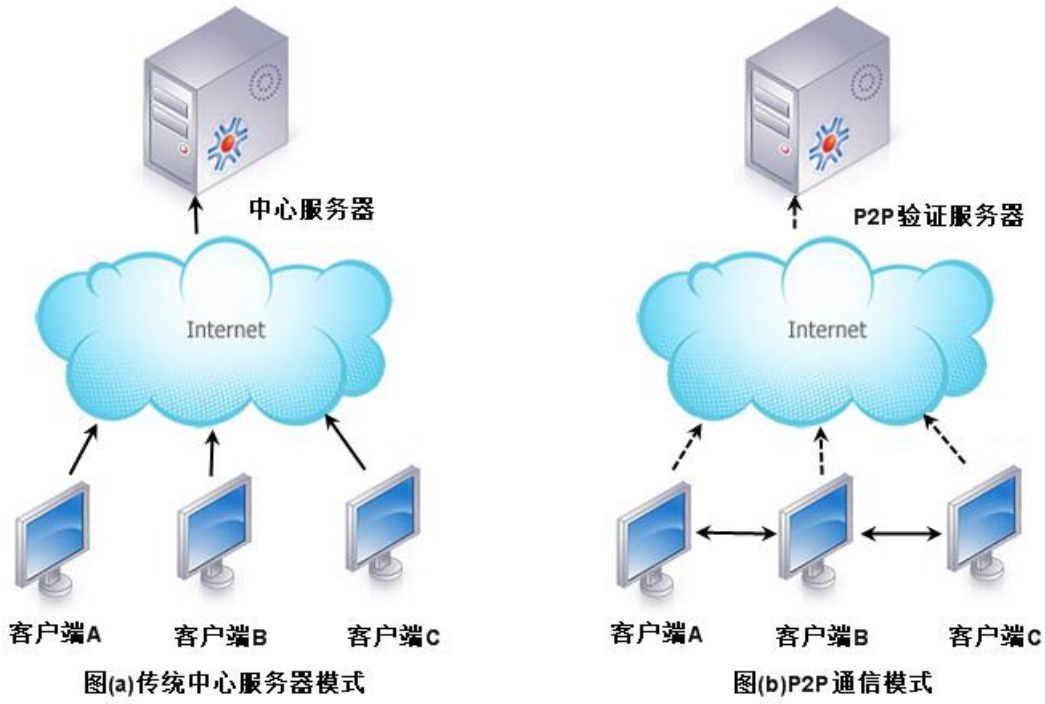

Figure 53Comparison between traditional mode and P2P mode

Although P2P mode also has a central server, but the central server only plays the role of verification and matchmaking, does not participate in the forwarding of data communication.

P2P products provided by ZLAN must be used with the specified P2P authentication server

in two ways：

1. The P2P product uses the default P2P server of Zhuo LAN after delivery, and users do not need to configure it. Use is the client software also use zhuolan default P2P server unicom equipment.
2. Users use their own P2P server, buy P2P server software from Shanghai Zhuolan, and the P2P products point to their own P2P server.

In addition to providing P2P product chips, ZLAN can provide：

1. The PC uses the DEVELOPMENT library of P2P protocol, which is convenient for users to integrate THE P2P function into their own PC software.
2. The software ZLVircom supports P2P device management and virtual serial port based on P2P.

P2P product chips can provide users with simple device networking solutions, allowing users to connect devices around the world through ID without building complex cloud platforms. Refer to the zolan P2P Introduction document for specific usage methods.

13. Network Port Modification Parameters

Network port parameter modification implements the function of searching for devices and modifying device parameters like zlVircom software, that is, managing devices and modifying parameters through the network port of the serial port server. Suitable for users who integrate search and configuration functions into their software.

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

1. Computer software sends UDP broadcast packets with port 1092 on the network. When the device receives the packet, it returns its information to the computer software to search 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 ZLAN Networking Product UDP Management Port Protocol document. You can also use the device Management functions

library in 14 device Management functions library.

14. Device management function library

This feature is suitable for users who need to integrate device management functions into their own software.

The "UDP management port protocol" is already integrated into the device management function library ZLDevManage. This is a DLL Windows platform development library, can be VC, VB, Delphi and other development tools to call.

Provides a detailed API interface documentation and VC call Demo case. It can realize device search, parameter modification, P2P function invocation, etc.

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

15. Modify serial port parameters

Users can read and set parameters by sending commands to the serial port of the serial server. Suitable for selecting chip or module level products through serial port control and configuration users. The parameters include THE IP address, baud rate, device name, and working mode. After setting the new parameters, restart the serial port server by running the serial port command.

ZLAN serial command has the following characteristics：

1. Serial port command uses 10 bytes of data lead code, so it is not necessary to distinguish communication data or command through another configuration pin pull low pull high, and there is no need to switch between command mode and communication mode, so the use is more flexible and convenient.
2. The command set contains various formats such as save parameter, do not save parameter, and restart device.
3. For example, you can read the MAC address of the serial server and change the working mode of the serial server. When you switch from the TCP server to the TCP client mode, you can actively connect to the server. You can disconnect the connection to the TCP server when switching from the TCP client to the TCP server.

For details about how to modify parameters over a serial port, see "Modifying Parameters over a Serial Port and Hardware TCPIP Stack".

16. Remote device management

Remote device management means that the ZLVircom software can be used to maintain and manage the device, including restarting the device, modifying parameters, and upgrading firmware. This feature is suitable for users who manage devices through ZLVircom.

For ZLVircom software, as long as the device can be found in the device list, remote management can be carried out. Remote device management is classified into the following scenarios：

1. Automatic search: Under the same switch, no matter whether the device and computer are on the same network segment, ZLVircom on the computer searches for devices in the following way: ZLVircom sends broadcast query. After receiving the query, all devices reply their parameters to ZLVircom tool. This method searches all devices at once.

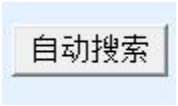

Figure 54Auto search

2. Manual addition: There are two scenarios

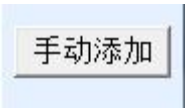

Figure 55Manually add

   a) Large routers split the network: On some large networks, the broadcast packets are split by the router. As a result, the broadcast packets cannot reach the device, but the IP address of the ping device can be pinged. In this case, you need to add them manually. To manually add IP addresses, click Manually add in the Device Management dialog box to add the first and last IP addresses for each device.
   b) The public network server queries Intranet devices: The serial port server is on the internal network in TCP server mode, and zlvircom is on the server with a public IP address. In this case, you need to create a 1092 UDP port mapping on the router of the network where the device resides to map it to the IP address of the device. Then zlVircom manually adds the device. The IP address is the public IP address of the

device.

3. TCP client: When the device functions as the TCP client, it initiates a TCP connection to port 4196 of the destination IP address (116.15.2.3). After the connection is established, zlVircom will automatically send its parameter system to UDP port of destination port (4196 in this case) at each live time, thus enabling zlVirCOM to search for devices on this computer (116.15.2.3). If the destination port is not 4196, you need to modify the default parameter receiving port of ZLVIRcom by modifying the menu/configuration/software configuration/default listening port. After that, start ZLVIRcom. If TCP port conflict pops up, you do not need to continue the execution.

Figure 56 Client

4. Regularly send parameters: Even if the serial port server uses the TCP server, you can select Regularly send Parameters to send parameters to the destination port of the DESTINATION IP address (116.15.2.3 in this example) every five minutes. Zlvircom, which receives parameters on this port of the server, can manage these devices.

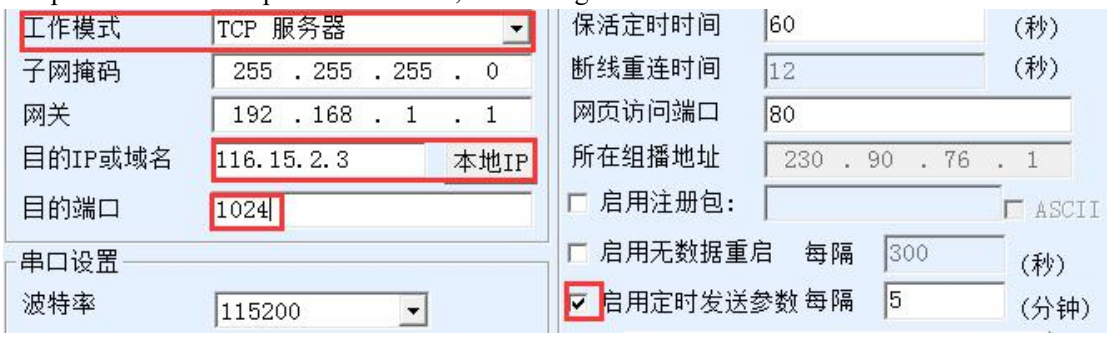

Figure 57Timing send parameter

To facilitate device identification, name the device easily to be remembered when you need to remotely manage the device.

5. Device operation management: After the cloud management function of the device is enabled, the device can be seen on the specified back platform equipped with Zhuolan device cloud

management. You can configure devices, upgrade firmware, and download configurations.

17. Firmware Upgrade Method

Different models can upgrade their own programs, but not each other. You can use this method to upgrade firmware of devices that are found in the device list through automatic search, manual addition, or P2P search.

1 Get ZLSN2003 firmware file from Zhuo LAN, such as 1.539(2003).bin.

2 In ZLVircom tool, first search for the device to be upgraded, and then enter the device parameter editing dialog box. First click "Restart device" once.

Figure 58 upgrade button

After the device is restarted, search for the device in the same way and enter the dialog box again. Click the upgrade Firmware button in the lower right corner of the dialog box.

Figure 59Upgrade button

3 As shown in Figure 61, select the Program File Download option. In the program file, select the firmware file. The IP address of the serial port server is automatically entered, and the module type/model is automatically selected. And then CLICK download.

Figure 60ZLSN2003 Firmware Upgrade Method

4 At this point, the download progress bar starts to move, and the download time is about 30 seconds. During the download process, you will see the ACT light of the device flashing, and at the end of the download, you will see the LINK light flashing several times. Then the program pops up "transmission completed LINK light flashing device do not power off" prompt box. Note: this is only the completion of transmission, flash writing process takes about 3 seconds, at this time the LINK light will blink, please do not power during this period.

5 After downloading the general program will automatically restart, generally without power. If you see the running indicator blinking, if it does not automatically restart, please stop the LINK indicator blinking for more than 30 seconds and power on again.

6 Web configuration page update: After the firmware upgrade, the internal configuration page of the module must be updated. Otherwise, the communication is not affected. Web pages can be downloaded without web configuration. To download the Web, change the "Program File" download mode to "Web Directory Download" as shown in Figure 61. Select the root directory of the local web page as the directory of the web page file to be downloaded (the directory can be obtained from Zolan), click Download, and download all files in the local web page directory to the internal file system of the device.

Figure 61ZLSN2003 web upgrade method

7 Notice：

7.1 If a message is displayed indicating download failure, the device will not be damaged. In this case, restart the download. In addition, at the end of the download, when the LINK light flashes, do not power off, otherwise the device will be damaged.

7.2 You can use ZLVircom to view the firmware version to check whether the new firmware has been downloaded successfully.

Figure 62Check the firmware version after the upgrade

18. After-sales service and technical support

Shanghai ZLAN Information Technology Co., Ltd.

Address: 12 floor, D building, No. 80 CaoBao road, Xuhui District, Shanghai, China

Phone: 021-64325189

Fax: 021-64325200

Web: http://www.zlmcu.com

Email: support@zlmcu.com