ZLAN7110M

Multiple functions serial port to WIFI

Serial port server

RS485 to TCP MQTT JSON
Modbus RTU to Modbus TCP

Version info

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CATALOGUE

1. SUMMARY

ZLAN7110M is a cost-effective WIFI serial server launched by Shanghai ZLAN, which realizes the function of RS485 to wifi. The serial port server can easily connect RS485 serial port device to WIFI wireless network, and realize wireless network upgrade of serial port device. wifi supports STA mode to connect to a wireless router, or AP mode to allow wifi devices such as mobile phones to connect. For users using virtual serial port, ZOLAN ZLVircom software can be used to achieve virtual serial port, and the original serial port PC software does not need to be modified. You can also use the Modbus TCP protocol in the configuration software to directly connect to the RTU device to achieve wifi networking communication.

Figure 1 ZLAN7110M includes sucker antenna

The 7110M is mounted on a rail and features a high temperature flame-retardant housing with an industrial temperature range. You can use MQTT+JSON to connect to the cloud platform.

7110M supports a RS485 to WIFI, can be used as STA or AP mode. It can connect to 2.4G WIFI hotspot without Ethernet interface. 7110M has many advanced functions such as Modbus RTU to Modbus TCP, support for multi-destination IP and port Settings, support for TCP server client coexistence, custom registration package, MQTT function, Modbus RTU to JSON, etc., which is very suitable for iot applications.

The 7110M supports zlvircom tool to search devices and configure device parameters quickly, and supports remote upgrade. Supports AT-like instructions in binary format without switching to AT configuration mode. Supports functions such as restarting without data and Ping detecting network disconnection to ensure stable device operation.

The wifi mode conforms to the 802.11b/g/n 1x1 standard, and supports WEP64, WEP128, TKIP, AES, and automatic (TKIP/AES) encryption modes. When the 7110M and the computer are connected to the same wireless router, the computer and the module can communicate with each other.

High quality power supply design with wide voltage of 9~24V provides better adaptability to industrial environment; Guide mounting accessories are suitable for guide mounting. Has a wealth of indicators, including data active indicator, TCP connection indicator, wifi connection indicator.

7110M applications：

● Power electronics, intelligent instruments；

● Energy monitoring, building automation；

● Smart lighting, smart building, smart home；

● Industrial automation system；

A typical application connection is shown in Figure 2.
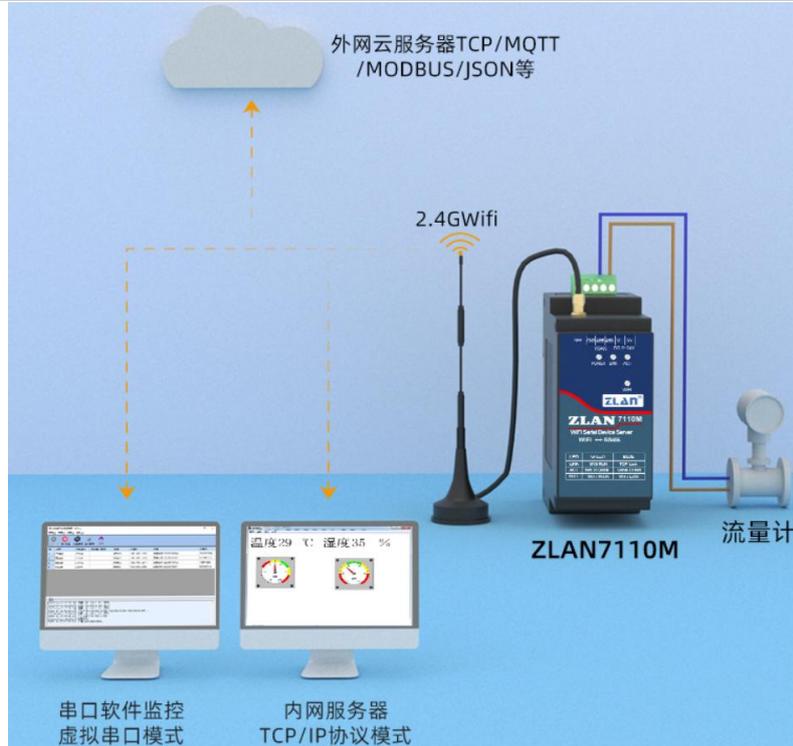
Figure 2 ZLAN7110M Network structure

The original serial device is connected to the ZLAN7110M, and then the ZLAN7110M is connected to the wireless network through WIFI. Any data sent by the serial device is then transparently transmitted to the PC designated by the ZLAN7110M, and the data sent by the PC to the ZLAN7110M over the network is transparently transmitted to the serial device.

2. Function character

1.1 General software functions

7110M main characters：

1　Support 802.11b/g/n standard.

2　Wide voltage power supply: 9 ~ 24V power supply range, power input mode: industrial terminal power supply.

3　Industrial grade temperature range：-40℃~85℃。

4　Support RS485.

5　The module supports a UDP connection to download the firmware upgrade profile to upgrade the program.

6   Support wifi connection between modules.

7   Provide four types of LINK indicator interfaces: LINK blue indicates that TCP connection is established, LINK green blinking indicates that 7110M is running, WIFI blue indicates that wifi connection is established as AP or STA, WIFI green indicates that wifi function is working normally. Various indicators directly display device status.

8   One-Click search for configuration information.

9   WIFI search: When a link is established between wifi and PC or router, ZLVircom software is used to search and configure device parameters in one-click mode. The device IP and PC must be in the same network segment.

10   Supports DNS resolution (only in STA mode) and functions as a DHCP Client.

11   Support TCPServer, TCP Client, and UDP. As a Server, it supports up to 8 TCP connections to communicate with networking modules simultaneously. As a Client, you can connect to three destination IP addresses.

12   Send MAC addresses when a device is connected, facilitating device management by the cloud.

13   You can remotely view the TCP connection status of the device through software. The virtual serial port supports data monitoring.

1.2 Advanced software function

ZLAN7110M support advanced software function，including：

1 Support MQTT function, can use MQTT+JSON function to connect to the cloud platform. Implement Modbus RTU or DLT-645 protocol to JSON.

2 Supports the Modbus gateway function and transfers from Modbus RTU to Modbus TCP. Support ZLMB mode Modbus gateway, support pre-configuration Modbus table, pre-read data, register address mapping.

3 Support custom heartbeat packet and registration packet functions: can facilitate communication and device identification with the cloud.

4 Support http data submission and delivery. The cloud can directly use http GET commands to interact with serial port data of the device.

Technical parameter

Outline	
RS485 x 1：	3.5mm terminal
Power supply：	3.5mm terminal
Size：	37.6L*83.6W*89.2Hmm
serial port parameter	
Terminal：	485A,485B,GND
Baud rate：	4800~921600bps
Check bits：	None, Odd, Even,Mark,space
digit bits：	7～8 bits
Flow control：	NONE
Antenna	
Antenna：	Default sucker antenna, glue stick antenna can be selected
Wireless standard：	802.11 b/g/n
Frequency range：	2.412GHz-2.484GHz
Transmission rate：	IEEE 802.11 b Standard Mode: 1,2,5.5,11Mbps IEEE 802.11g Standard Mode: 6,9,12,18,24,36,48,54Mbps IEEE 802.11n Standard Mode: 150Mbps @ HT40(MCS7)
Transmission power：	IEEE 802.11n: 12-14dBm@HT20 MCS7 IEEE 802.11g: 16dBm IEEE 802.11b: 18dBm
Receiving sensitivity：	HT20 MCS7 : -70dBm@10% PER(MCS7) OFDM 54M: -75dBm@10% PER CCK, 11M: -88dBm@ 8% PER
Hardware	
Power supply：	9~24V（12V refer to 30mA）
Operating temperature：	-40~85℃

Storage temperature：	-45~100℃
Working humidity：	5%~95% non condensing
Storage humidity：	5%~95% non condensing
Software parameter	
Wireless operating mode	STA/AP
Security mechanism：	WEP64, WEP128, TKIP and AES, auto（TKIP/AES）
Working mode:	TCP server, TCP client (TCP server also exists) UDP, UDP dynamic mode
Conversion protocol:	Modbus TCP、MQTT、JSON
Modbus gateway：	Ordinary Modbus mode、Preconfiguration table（ZLMB）mode
JSON gateway：	Device side support Modbus RTU、DLT-645; server support HTTP POST/GET、MQTT、transparent transfer; Panning and scaling, offline alarm, out-of-limit alarm, change upload, data format conversion;
User configuration：	Windows configuration tool zlvircom、serial port configuration
connect quantity:	TCP server:8pcs; TCP client side:3 destination IP;
Network protocol：	TCP/UDP/ARP/ICMP/DHCP/DNS/MQTT/NTP
Communication mode：	Socket、virtual serial port
User configuration：	Windows configuration tool zlvircom、Device management library

Other software functions	User-defined registration packet Heartbeat packet, send ID on the connection, NTP, and built-in TCP heartbeat

3. Hardware specifications

The front view of ZLAN7110M WIFI serial server is shown in Figure 3. ZLAN7110M flame retardant plastic, back rail buckle, easy to install.

Figure 3 7110M interface and size

Panel lights：

1．Data Activity indicator ACT: If ACT is green, data is being transmitted between the WIFI and RS485. ACT indicator Blinking blue indicates that data is returned from the RS485 port to the WIFI port. If the data is short, the blue blinking period is short, and

you need to pay attention to it.

2．TCP connection indicator LINK: If the LINK indicator blinks green, the device is running properly. If the LINK indicator is blue, the TCP connection is established or is in UDP mode.

3．POWER indicator POWER: The serial port server is powered on.

4．Wifi connection indicator WIFI: When the WIFI light is blue, it means that WIFI has established a wifi connection between the STA and the router or wifi has established a connection with it as the AP. If it blinks green, it is in AP mode. If the STA connection is off for three seconds and blinks for one second, the STA connection is not established.

Figure 3 shows the front ports of the serial server from left to right：

1．Terminal power supply+、-：power voltage is 9～24VDC

2．485A、485B、GND：here the 485A is T+，485- is T-，485GND

3．DEF：The reset button will reset the wifi working mode to AP mode, SSID to ZLAN, password to empty, IP to 192.168.1.254.

4．WIFI antenna. The default antenna is a suction cup antenna, which can be easily installed on the outside of a metal cabinet. Glue stick antennas are also available.

Figure 3 ZLAN7110M Glue antenna

WIFI function

3.1. AP mode

By default, the 7110M is in AP mode and the SSID is ZLAN. See "ZLAN" in the wifi list of your laptop and connect.

Figure 4 search ZLAN hot point

After the connection, click the "Device management" button of ZLVircom software, you can see a line in the device list and find 7110M devices.

Figure 5 search 7110M device

Double-click this line to open the device parameter editing dialog box.

Figure 6 Device parameter setting dialog box

You can also set the IP address and baud rate. These parameters will be described later. Please click "More advanced options" to configure the wifi parameters of the 7110M in the dialog box that opens.

Figure 7 wifi Parameter configuration

WIFI parameter as followings：

Name	Options	Specifications
WIFI working mode	➢　Wireless AP: 7110M serves as a hotspot for connecting laptops and	

	mobile phones. It is mainly used for the first time. ➢ Wireless Station：When in STA mode, the 7110M will actively connect to a hotspot (such as a router).	
AP or STA SSID	A string of less than or equal to 32 bytes	As an AP, this SSID is the hotspot name, and as a STA mode, this is the SSID of the pre-connected hotspot. When changing the STA mode to AP mode, change the SSID. Otherwise, it will conflict with the existing SSID on the network. The value contains a maximum of 32 bytes.
Encryption type	➢ No encryption: no password is used ➢ WEP64:WEP64 encryption, password must be 5 bytes. ➢ WEP128:WEP128 encryption, password must be 13 bytes. ➢ TKIP：TKIP encryption，password 8~16 bits. ➢ AES：AES encryption，password 8～32 bits. ➢ Automatic: Routers generally use one of TKIP or AES. When users are not sure which one is, they can select the automatic mode.	Set the mode to No encryption if there is no password, and set the mode to Automatic if there is a password.
AP or STA password	The password length varies according to the encryption type. The maximum length is 32 bytes	In AP mode, this password is the password for connecting the computer and mobile phone to 7110M. When used in STA mode, this password is the password of the pre-connected AP.

AP Mode channel selection	1～11	This parameter is valid only in AP mode, not STA mode.
DHCP server	Enable/disable	When the mobile phone is connected to the hotspot in AP mode, the IP can be obtained. This parameter cannot be set to disabled.
Network port WIFI communication	Enable/disable	If no, keep the default value.

If the 7110M is used as the AP mode, it can be used in password-free or password-free mode. The password-free mode is "No encryption". If the password is available, you are advised to use the AES encryption mode. In this case, the password must contain at least eight characters.

Check that the module is in AP state by indicating that the WIFI indicator blinks green for 1 second. The STA mode blinks green quickly when it is connected.

3.2. STA mode

When the STA mode is used, please enter the SSID, encryption mode, and password of the pre-connected router as shown below. If you do not know the encryption mode of the router, you can select Automatic mode.

In STA mode, the 7110M automatically connects to the AP hotspot after being powered on. After the connection is established, the WIFI light is steady blue.

The STA mode supports automatic reconnection, for example, the 7110M can be automatically connected after the AP hot spot restarts. If the AP hotspot cannot be connected, check whether the encryption mode, password, and SSID are correct, and whether the antenna is installed and within the signal range.

The WIFI indicator is in the dialing state (3 seconds wait for 1 second continuous blinking) to determine that STA is not connected; If the indicator is steady on, the STA is connected.

Figure 8 ZLAN7110M Connect router configuration

3.3. Wifi couplet

The 7110M supports two modules connecting to each other over wifi. The following table describes the interconnection parameters：

parameter name	Being as AP module	Being as STA module
WIFI working mode	Wireless AP	Wireless Station
AP or STA SSID	Both are same	Both are same
Encryption type	Both are same	Both are same
AP or STA password	Both are same	Both are same
IP mode（only be static）	static	static

When the two 7110M are connected through wifi, the WIFI light is lit. Notice In the pair mode, the IP mode can only be static.

3.4. Antenna options

External antennas must comply with the following characteristics. Zlan can provide external antennas。

impedance	50 ohm
Return loss	-10dB(Max)
Connector type	I-PEX
Frequency range	2.4～2.5GHz
VSWR	2 (Max)

4. Usage steps

The following tests suggest that the module be tested in STA mode.

4.1. Usage summary

Please configure the 7110M using ZLVircom. When the 7110M wifi is connected to the network, the computer in the same LAN can search and configure the device through the installed zlvircom tool.

4.2. Software installation

ZLVircom tt can be used to set parameters such as device IP addresses 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
ZLVircom Device Management Tool (non-installed version)	The non-installed version does not include the virtual serial port function.
ZLVircom-Device Management Tool（installed version）	The installed version contains 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 Settings

After ZLVircom is installed and equipment hardware connection is completed, ZLvircom software is run as shown in Figure 9, and then click "Equipment management" as shown in Figure 10. 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

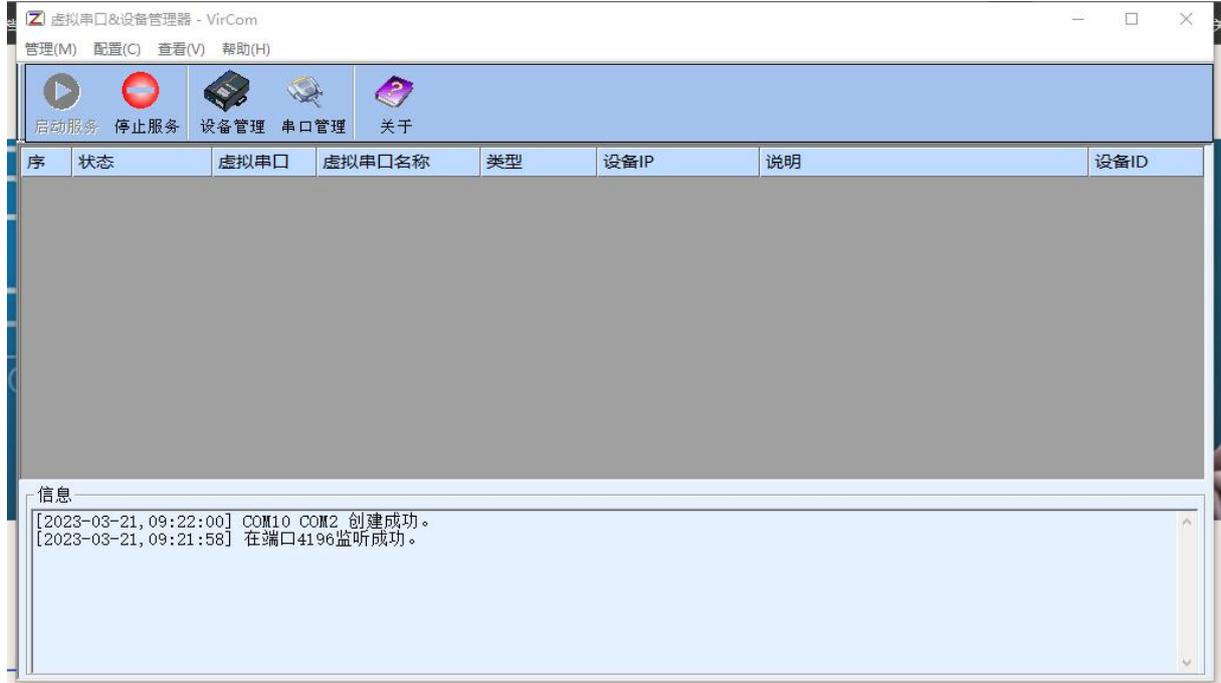running ZLVircom are in the same switch.
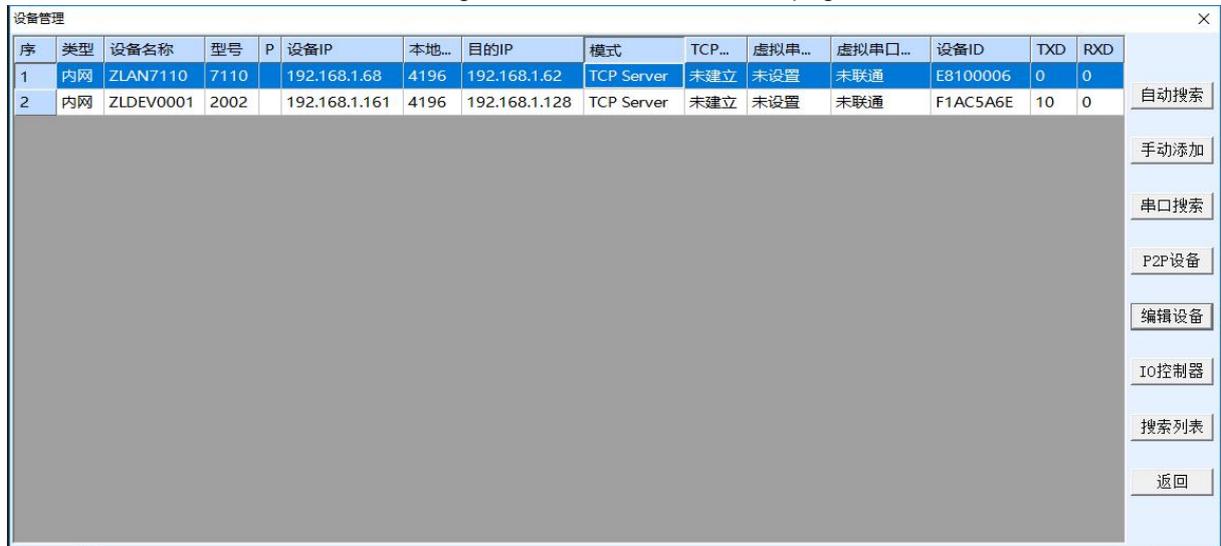

Figure 9 ZLVircom Front view page

Figure 10 device list

View all online devices in the device list. Click "Edit Device" to configure parameters.

Figure 11 device parameter

In this interface, the user can set the parameters of the device, and then click "Modify Settings", then the parameters are set to the flash of the device, power failure is not lost. At the same time, the device automatically restarts.

The main parameters are: baud rate, data bit, check bit in serial port Settings; IP address, subnet mask, gateway in network Settings; Sometimes according to the computer software, you also need to configure the working mode of the serial port server.

The following table describes other parameters：

Figure 2 parameter descriptions

parameter name	value range	Descriptions
Virtual serial port	none 、 created virtual serial port	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		The firmware version of the core module cannot be modified
IP mode	Obtain an IP address statically or dynamically	Users can choose static or dynamic acquisition I
IP address		Local 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 a TCP server to listen for connections on the port. 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, and UDP 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	4800 、 7200 、 9600 、 14400、19200、28800、38400、57600、921600、115200、230400、460800	
Data bits	7、8	
Check bits	None, even, odd	
Stop bits	1、2	
Flow control	none	Only supported no flow control.
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 is dynamically obtained, you do not need to specify a DNS server. The IP address is automatically obtained from the DHCP server.
Destination mode	Static , 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	NONE indicates that data is transmitted transparently from the serial port to the network. Modbus TCP<->RTU converts Modbus TCP to RTU for easy cooperation with Modbus TCP；
Keepalive timing time	0～255 s	Heartbeat interval. 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.	
Disconnected reconnection time	0～255	In TCP client mode, each disconnection Reconnection Time re-initiates a TCP connection to the computer when the connection is unsuccessful. The value ranges from 0 to 255 seconds. 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		none	
Indicates the multicast address		none	
Enable registration package		Do not configure here, please see "Registration package".	
Enable restart without data	The range of timing time is 5 times that of Keepalive Timing Time. You only need to set Keepalive Timing Time. The parameter will be	If no serial port or data is sent or received on the device, the device automatically restarts within the specified time range to ensure long-term and stable running.	
		Keepalive timing	No data restart time
		0~60	0~300 s

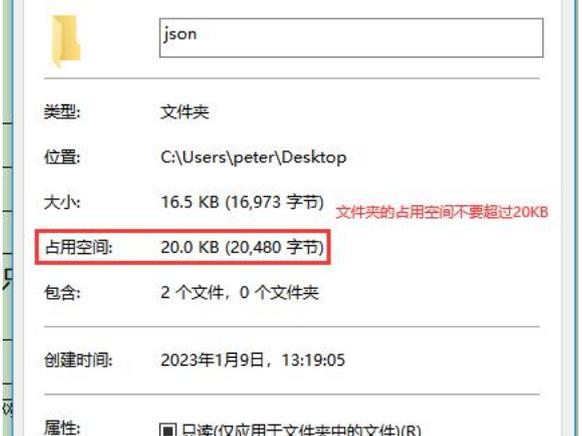| | automatically changed. | 61~120 | 1~30 min |
		121~192	1~72 hour
		193~255	1~72 day
The periodic sending parameter is enabled	0~255 min	If the device is working on a TCP client, the device will send device parameters to the destination computer at user-set intervals.	
Packet length	1～1400	One of 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	Keep the default value and cannot be configured.	
System default parameter		After clicking, the parameter field is changed to the default parameter	
Save default parameters		Save the current parameter area, you can click "load default parameters" to directly modify the parameters of the parameter area, saving the trouble of gradually modifying parameters.	
Load default parameters		Directly change the parameters in the parameter area to the default parameters saved by the user, saving the trouble of modifying parameters step by step.	
Change password		nonsupport	
Firmware and		Click on it to enter a new page where you can update the firmware or download the configuration	

configuration		to the device. For details about firmware upgrade, see Firmware Upgrade Method. Registration packet For details about how to download the heartbeat packet configuration, see Registration Packet and Heartbeat Packet. For MQTT and JSON configurations, see Zolan MQTT and Turn JSON Modbus gateway USES advanced tutorial, download address: http://www.zlmcu.com/download.htm, download, the size of the folder does not exceed 20 KB. Due to the limited memory space of the 7110M, the larger the downloaded JSON file, the number of multi-destination IP and connected clients will be affected. When the JSON file is too large, TCP server mode: disconnect the client from the 7110M server and restart the server before downloading. TCP client mode Clears the multi-destination IP address, and then restarts to download it again.
Restart the device		Clicking will restart the device without modifying the device parameters
Modify Settings		Download the parameters to the device and restart the device
cancel		Cancel modifying parameters and return to the previous page

Figure 12 Advanced parameter

Figure 12 Advanced parameters can be set. The following table describes the parameters：

Figure 3 More advanced options

Parameter	Name	Range	Contents
WIFI parameter	WIFI working mode		
	AP or STA SSID		
	Encryption type		
	AP or STA password		
	AP Mode channel selection		
	DHCP server		
	Ethernet WIFI connection		
Multi-host function device	Modbus gateway type		7110M doesn't support
	Support RS485 multi masters		
	RS485 Command response timeout		
	Supports RS485 bus conflict detection		

	Idle time of the RS485 bus		
Set the multi-destination IP address and port	IP address or domain name		For details, see Connecting a Client to Multiple Servers
Function selection and enablement	The password is required to modify the parameter		Subsequent extension
	Allows receiving broadcast data		After receiving a UDP broadcast packet, the device uploads its own parameters.
	Start P2P function		Subsequent extension
	TCP sends MAC addresses when it is established		The device sends its own MAC parameters when TCP is established
	Enable Ping to detect network disconnection		If the destination IP address cannot be pinged for four consecutive times, the device restarts to ensure that the device is connected to the network. 保活定时时间 60 （秒）
	The serial port is not cleared when TCP is established		Subsequent extension
	TCP establishment requires password authentication		Subsequent extension

4.4. TCP communication test

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

Figure 13 TCP Communication diagram

Now suppose the PC COM port (USB turn RS485 lines) 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 14; 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 192.168.1.68), The destination port is 4196, then click the "Open" button as shown in Figure 15. On the Ttest of SocketTest, input "socket send" and click send, the data is transferred to the RS485 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 demonstration shows the function of transparent data forwarding of serial port to network port and network port to serial port of serial port server.

Figure 14 comdebug receive and send screenshot

Figure 15 sockettest receive and send screenshot

4.5. Virtual Serial Port Test

The SocketTest shown in Figure 13 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 16, 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 16 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.
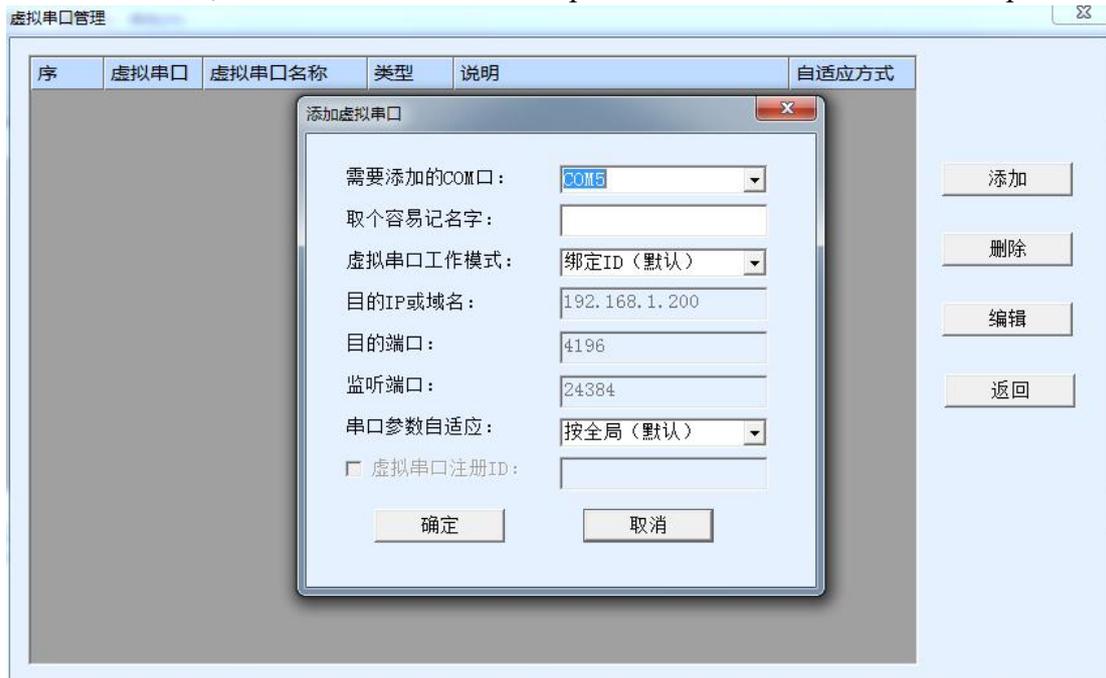

Figure 17 Adding a virtual serial Port

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 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 192.168.1.200. COM5 can be

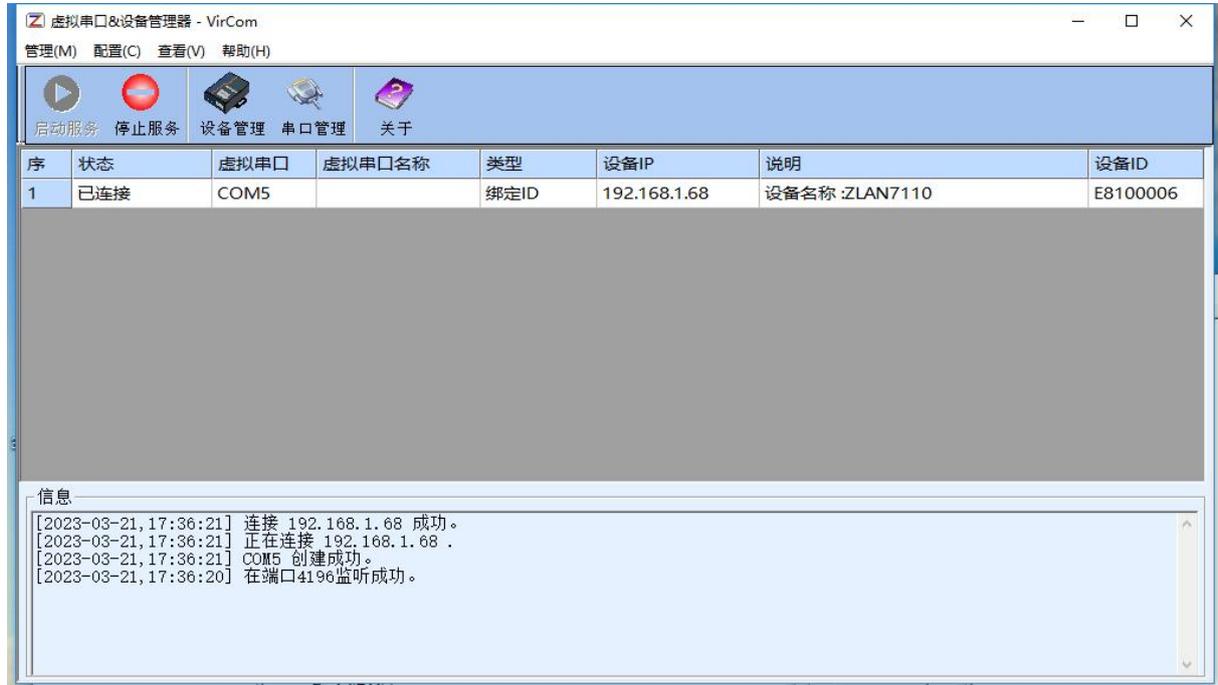used instead of SocketTest to communicate at this time.

Figure 18 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 COM19(hardware serial port). The data link sent by COM5 is as follows: COM5ZLVircom serial port Server network port Serial port Server serial port COM19. Conversely, COM19 to COM5 can also transmit data: COM4 serial port server serial port Serial port server network port ZLVircomCOM5. Figure 19 shows the two parties sending and receiving data.

If the COM19 is replaced by the user serial port device, the COM5 can realize the communication with the user device.
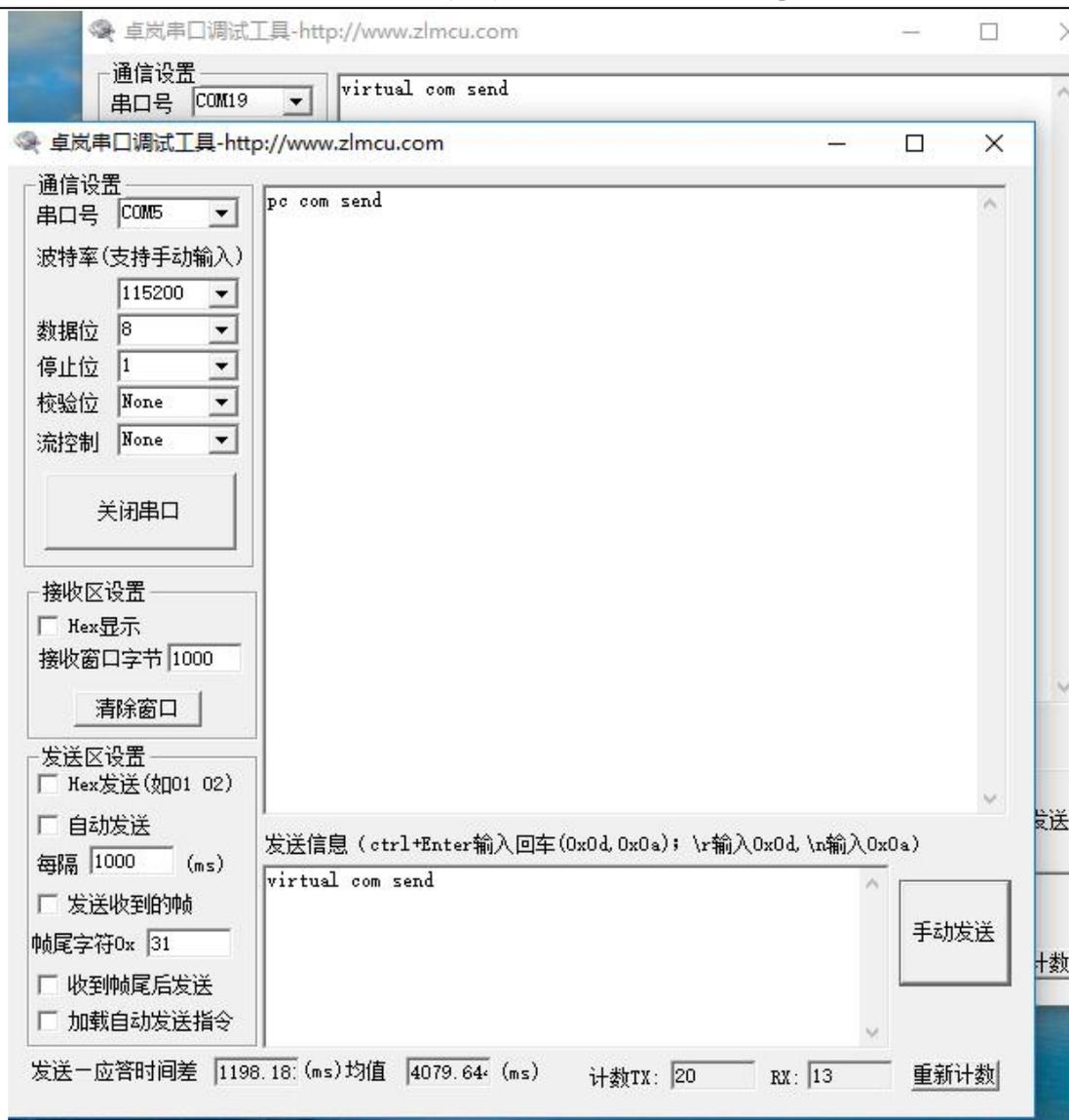
Figure 19 Communication through the virtual serial port

4.6. Modbus TCP test

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 20. 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 0a, the serial port outputs the command 01 03 00
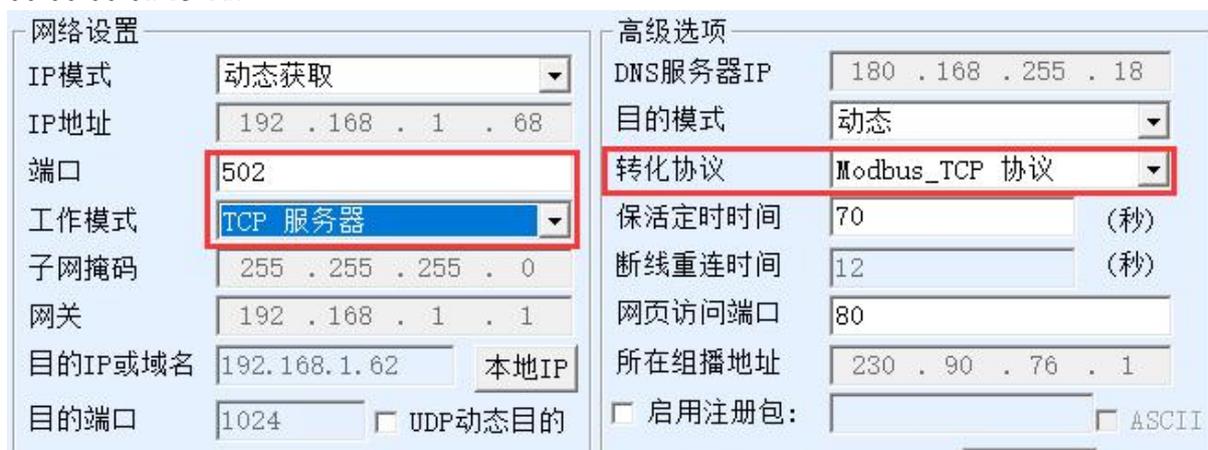
00 00 00 0a c5 cd.

Figure 20 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 21.

Figure 21 Modbus TCP being as client side

If the 7110M device is on the TCP client and the time of the TCP server data is less than 4 seconds from the last time, the Modbus RTU data responded by the serial port is converted to Modbus TCP. The converted transaction ID (the first two bytes of the Modbus TCP data frame) will be the same as the transaction ID of the data from the TCP server. If more than 4 seconds, the transaction identifier is incremented from 0.

The 7110M device is on the TCP server, and the transaction identification is the same as

that on the TCP client.

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: virtual serial port and non-virtual serial port, as shown in Figure 13 TCP communication diagram and Figure 16 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 part" is divided into transparent transmission, Modbus TCP to RTU two modes. If the user software uses the Modbus TCP protocol and the lower computer uses Modbus RTU, select Modbus TCP to RTU.

Usage is summarized as follows：

Figure 4Network configuration mode

No	Virtual serial port usage	Equipment operating mode	Conversion protocol	Specifications
1	Use	TCP server	none	It is suitable for the occasion when the user software opens COM port to collect data actively.
2	Use	TCP client side	none	If the TCP server is selected, the device may fail to reconnect after disconnection.
3	None	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	None	TCP client side	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	None	TCP client side	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.
6	None	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.

See if 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 in Table 4.

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, you must use mode (2). Otherwise, you can use mode (1).

5.2. Direct TCP/IP communication

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 the ⑤ and ⑥ in Table 4.

The section "6.4TCP 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 server complies with the standard TCP/IP protocol, so any network terminal that complies with the 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, 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 relationships, as shown in Figure 22. (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.
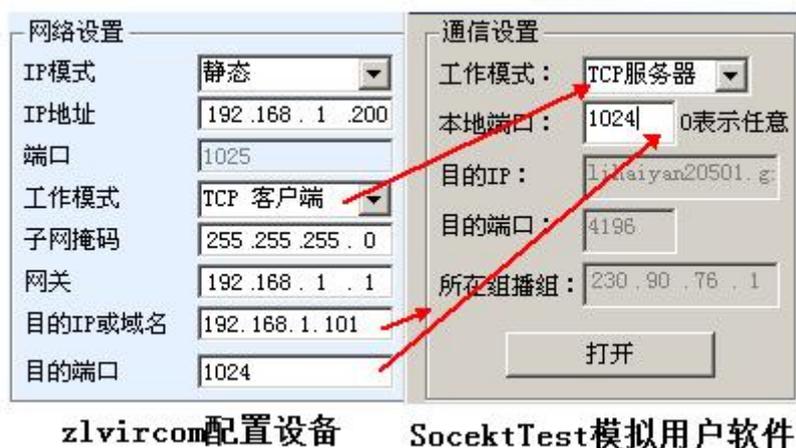
Figure 22 serial server being as the client side

5.2.2. The client connects to multiple servers

When the Zlan serial port server serves as the TCP client, four destination IP addresses can be connected at the same time. Data sent from the serial port is sent to the four 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 23 The first destination IP address and port number

Figure 24 rest of 2～4 IP and ports

The first IP is set in the device setup screen shown in Figure 23, where the first IP can be a domain name. Remaining 2 to 4 destination IP addresses On the device Settings screen, click More Advanced Options to open more advanced options.

All four 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 25, 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 25 The serial server serves as the server

When the serial port server serves as the server, it can accept a maximum of eight TCP connections simultaneously. The data received by the serial port is forwarded to all established TCP connections.

Note: The number of TCP client connections supported is limited by the size of the JSON file downloaded by the user. The larger the JSON file, the fewer TCP clients can be connected. Before downloading the JSON file, disconnect the TCP client to save space for downloading the JSON file.

5.2.4. Be both client and server

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 26 As both client and server

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 26, the computer software can now connect to the 1024 port of 192.168.1.200 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 1024 is occupied by the server, the local port used by the client is "port +1", that is, the software on 192.168.1.189 sees that the incoming port of the device is 1024+1=1025.

5.2.5. UDP mode

In UDP mode, parameter configuration is shown in Figure 27. 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.
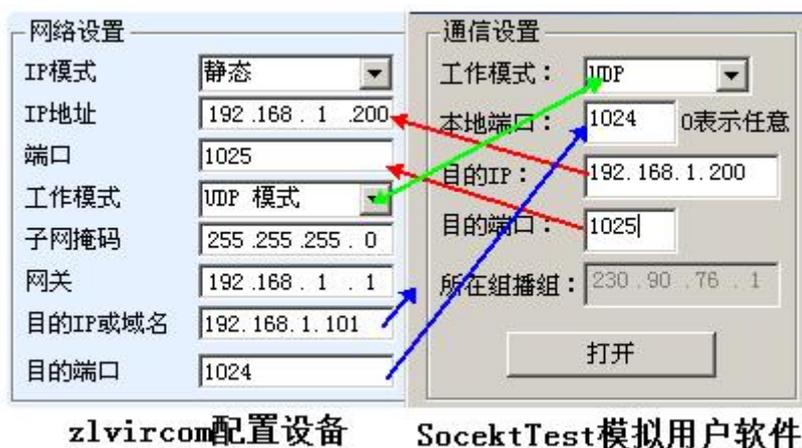

Figure 27 UDP Mode parameter configuration

5.3. Devices Couplet method

If the host computer is not a Socket program (SocketDlgTest) or a virtual serial port, but two devices are connected through network ports, the configuration method is similar. First, the user needs 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, and the computer does not need to be connected after configuration.

Click on ZLVircom's device management to find these two devices, as shown in Figure 29. Then click "Device Edit" to configure the device. Device pairs can be classified into TCP pairs and UDP pairs. In TCP interconnection mode, the parameters of the two devices are shown in Figure 28. The parameters shown by the arrows must correspond to each other, just as they correspond to the PC connection. After the TCP connection is successful, you can return to the Device Management dialog box to check the connection status, as shown in

Figure 29. If the status of the two devices is Connected, the TCP link between the two devices is established.
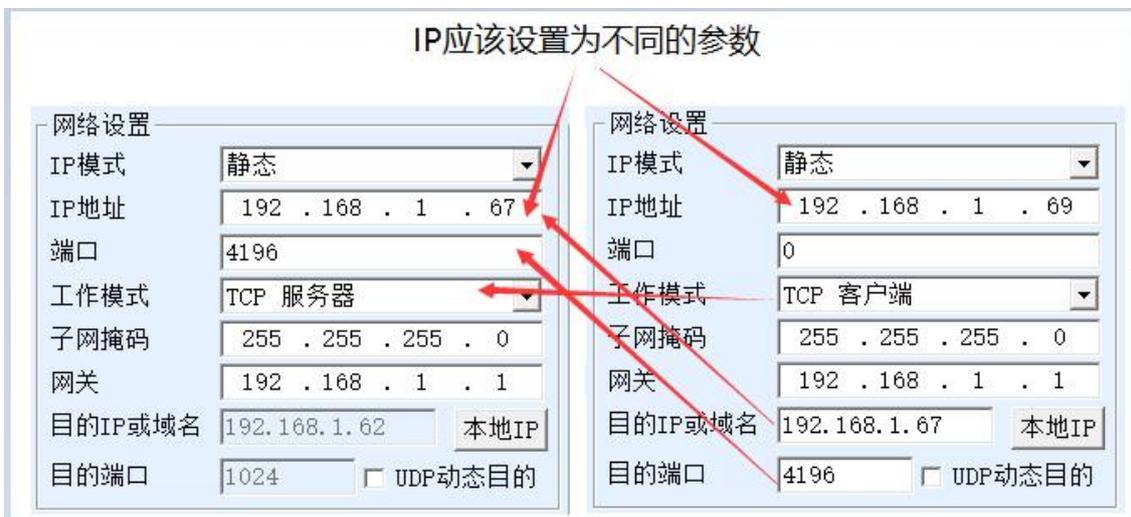

Figure 28 TCP Configure device pairing parameters

序	类型	设备名称	型号	P	设备IP	本地...	目的IP	模式	TCP...	虚拟串...	虚拟串口...	设备ID	TXD	RXD
1	内网	ZLAN7110	7110		192.168.1.67	4196	192.168.1.62	TCP Server	已建立	未设置	未联通	E8100007	0	0
2	内网	ZLAN7110	7110		192.168.1.69	0	192.168.1.67	TCP Client	已建立	未设置	未联通	E8100006	0	0

Figure 29 TCP The device interconnection is successfully checked

In UDP couplet mode, the configuration parameters are shown in Figure 30. The parameters corresponding to the arrows must be one-to-one. UDP pair connection Data is automatically sent to the specified device if the parameters are correctly configured without checking the connection status.

Figure 30 UDP Configure device pairing parameters

Finally, you need to remind that if the device is in pair, in addition to the network port parameters according 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 configuration, user devices can send data to each other through the serial ports of the two serial servers.

6. Device commissioning

6.1. Physical network connection

Use the wifi indicator to confirm that the wifi connection is normal.

6.2. Internet TCP connection

When the device is connected to the wireless router in STA mode, the device can be set to static IP or dynamic IP acquisition. When the device is connected to the 7110M device in AP mode in STA mode, the device must be set to static IP mode, because the 7110M AP mode cannot be used as a DHCP server.

When configured with static IP, devices and computers need to be on the same network segment (unless they communicate across gateways).

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, perform 6.4 TCP Communication Test or 6.5 Virtual Serial Port Test. You can see that the Link indicator turns blue when a TCP connection is established. The blue Link light can also be seen through ZLVircom. For example, in the device management list, if the TCP connection is listed as "established", the Link light is blue, as shown in Figure 31, which can facilitate remote diagnosis.

序	类型	设备名称	型号	P	设备IP	本地...	目的IP	模式	TCP...	虚拟串...	虚拟串口...	设备ID	TXD	RXD
1	内网	ZLAN7110	7110		192.168.1.69	0	192.168.1.100	TCP Client	已建立	未设置	未联通	E8100006	0	0

Figure 31 connection status

6.3. Data sending and receiving

When the Link indicator turns blue, data can be sent and received between the software and the serial port server. If the software sends data, the Active light turns green for at least

one second. Data is also 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 responds to correct command delivery. Once a response is received (the serial port sends data to the network port), the Active color turns blue. Otherwise, check whether the serial port parameters or the serial cable are connected properly.

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. Convenient for users to debug the system, the use method is as follows:

It is assumed that virtual serial port communication has been established according to the method of 6.5 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.
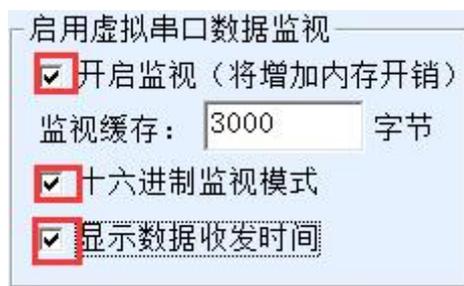
Figure 32 Start ZLVirocm monitoring

Tick the three options of enable monitoring, hexadecimal monitoring mode, and display data sending and receiving time, as shown in Figure 32. 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 33.

Figure 33 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 34. This function can facilitate the field communication debugging.

Figure 34 Monitor send and receive data

7. Modbus function

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

Enable the Modbus gateway

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.

ZLMB Modbus gateway can realize the functions of pre-setting, register mapping, batch reading　　　　and　　　　so　　　　on　　　　,　　　　usage　　　　for　　　　eg.　　　**:** http://zlmcu.com/download/Configurable_Modbus_gateway_ZLMB.pdf

8. MQTT and JSON function

Take reference of document《ZLAN MQTT and JSON to Modbus gateway usage》**:** http://www.zlmcu.com/FAQ/MQTT%20and%20JSON%20to%20Modbus%20Gateway.pdf

9. Register packet and heartbeat packet

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

9.1. 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 identify the module is very important, and it is necessary to achieve Internet of Things communication.

Shanghai Zlan serial server provides the following registration package methods.

9.1.1. Send MAC address under 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. To use it, click "More Advanced Options" in the device Settings dialog box, find "Send MAC address when TCP is established" in the lower middle part, tick the box in the front, then go back to the Settings screen and click "Modify Settings".
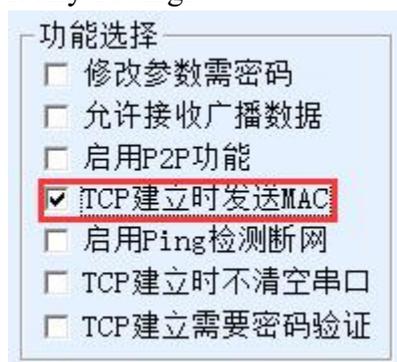

Figure 35 Send MAC address under connection

9.1.2. Customize registration packets and heartbeat packets

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 36 Set the registration packet and heartbeat packet

Registration package: Fill in the registration package information of 31, 32, 33, 34. 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. Note: When sending hexadecimal, each byte must be separated by a "space".

Heartbeat packet: Enter the registration packet information of 35, 36, 37, 38. Note that this is in hexadecimal, which means that the actual data sent is the string 5678. If you want a string display, click the "ASCII" option next to it. Note: When sending hexadecimal, each byte must be separated by a "space".

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 configuration of sending MAC addresses is the same for each device, but the registration package is naturally different due to different MACs.

After the device is connected to the cloud software, the device sends heartbeat packets to the cloud at the interval set by the user.

This mode supports registered packets and heartbeat packets in UDP mode.

Note: Using this feature conflicts with the JSON feature, and only one feature can be used at the same time.

9.2. 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.

For details, see "Customize Registration Packages and heartbeat Packets".

9.2.1. Implicit heartbeat

Even if no heartbeat packets are set, the implicit heartbeat function is enabled on the Zlan device when the TCP client is deployed. 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.

10. Httpd client side Telecommunication

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 software development workload in the cloud.

When the Internet of Things acquisition terminal and the web server (httpd program) interact, if the data can be submitted to the web server in accordance with the specification format of the http GET and POST instructions, then the web server can use the existing php/asp language to process and store the data. This saves the user the effort of redeveloping the web application interface.

In order to support this feature, you need to download a httpd.txt configuration file in the Zlan serial port server. Downloads can be made using zlvircom's firmware upgrade feature.

Zlan httpd client communication features include：

1. Send on the device: Support GET/POST mode to directly convert serial port data into http format, which can be directly recognized by the server.

2.Web server delivery: The Web server can also send the required data to the serial port server through the GET/POST command, and the valid data content can be output from the serial port of the serial port server. When the serial server receives the data, it can also give a specific reply to the Web server, indicating that the data is received.

3. The input and output data can be converted between hexadecimal and string, so that the Web server can send data by character, and the serial port can output hexadecimal data to control the serial port device.

For more information, refer to the Zlan httpd Client Communication Mode documentation.

11. 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 whose destination port is 1092 on the network. 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 the UDP parameter modification command 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 implemented directly using the device management library of the 13 Device Management library.

12. 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".

13. Modify serial port parameters

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 port 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 commands, and there is no need to switch between command mode and communication mode, which is more flexible and convenient to use.

2. It can realize a variety of applications, such as reading the MAC address of the serial port server, such as 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 TCP IP Protocol Stack.

14. 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.
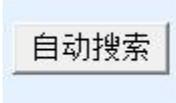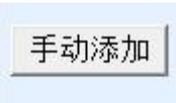
Figure 37 Auto search

2. Manual add: There are two cases：

Figure 38 Manual 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 39 Client 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 40 Timed transmission parameter

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

15. Firmware upgrade method

You can use this method to upgrade the firmware of any device that is found in the device list by means of automatic search or manual addition.

The upgrade method is divided into Zlan server upgrade and user LAN upgrade (consult Zlan engineers for details). Zlan server upgrade is only applicable to the case that users can connect to the public network and want to upgrade the latest 7110M firmware; The user LAN is for users who cannot connect to the public network, or who want to upgrade their 7110M device to a firmware that is not the latest version

15.1. Zlan server upgrade

1. 1. Create a folder and create a file in the folder, for example, 7110M Firmware upgrade Configuration file. bin. The value must be a.bin file.

2. Open the 7110M Firmware Upgrade Configuration file. bin file and enter the following information：

```
[OTA]
OTA_SERVER_IP=www.p2p-zlan.com
OTA_SERVER_PORT=8081
```

```
OTA_FIRMWARE_FILE_NAME=xxxxxxxx.rbl
```

- [OTA]：Firmware upgrade mark；

- OTA_SERVER_IP：Upgrade the IP address of the firmware server. If the upgrade mode is Zlan server, do not change it here. If the user LAN upgrade mode is used, change the value to the IP address of the user server；

- OTA_SERVER_PORT：Port number of the firmware upgrade server. If the upgrade mode is Zolan server, do not change it here. If the user LAN upgrade mode is used, change the value to the port number of the user server；

- OTA_FIRMWARE_FILE_NAME ： Please obtain the upgrade file name from Shanghai Zlan engineers.

3. In Program File Download, select the 7110M Firmware Upgrade Configuration file. bin file, select network download or serial port download (you need to select the serial port number and baud rate), and click download.
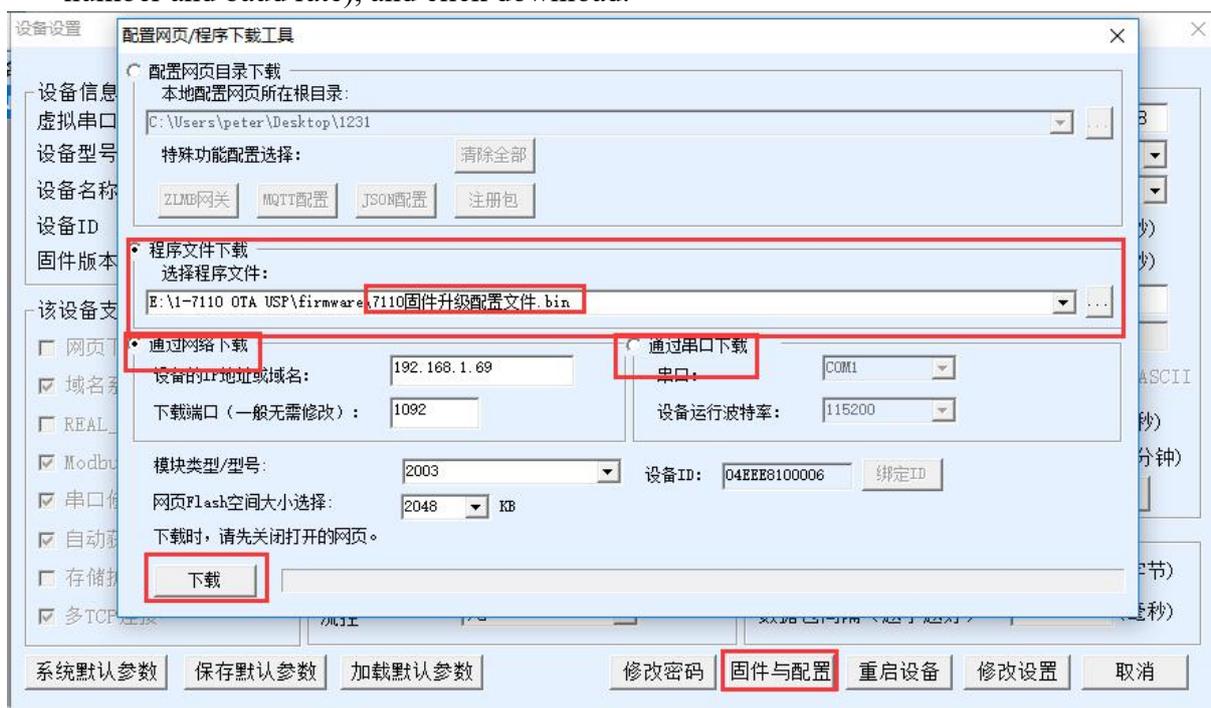

Figure 41Program file download

4. Please wait 5 minutes after downloading. When the upgrade is successful, the WIFI and TCP lights of the device will be steady blue and then off. If this does not happen, restart

the device and try again.

5. After you click Download, the software downloads the configuration file to the device. The device connects to the server according to the configuration file information, and then downloads the firmware from the server for upgrade. When the server receives the request and successfully connects, the connection time is displayed.

Figure 42 Server display information

6. During the download process, you can see that the ACT light of the device is steady green. After the firmware is downloaded, the device will recognize the firmware. If the firmware is different from the firmware in the current device, the version will be upgraded. During the upgrade process, the Wifi light and Link light of the device will enter the blue steady state, and then the device will automatically restart and the upgrade is completed. If the firmware is the same, the device restarts without upgrading.

7. If the configuration file download fails, please restart the device (ZLVirCOM software restart or power on the device again), and then try again, download failure will not cause damage to the device.
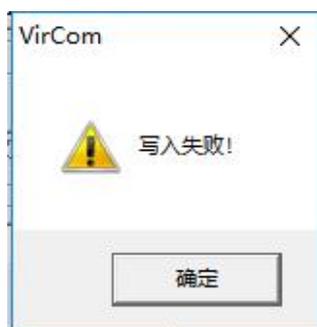

Figure 43 Write failure

8. If the ACT indicator of the device does not turn on green immediately after the firmware file is downloaded to the device, wait and observe for one minute. (Users who upgrade

the LAN can also observe the http server page to check whether the connection is established.) One minute later, if the status is not displayed, check whether the configuration file is correct. If it is correct, restart the device and try again. If it does not work after several attempts, users who upgrade through Zlan server please contact the after-sales service to restart the server to solve the problem; User LAN upgrade users please shut down the server, then re-establish the server, and try again.

9. Notice：

1. Manually restarting the device when you download the configuration file or firmware to the device will not damage the device. Do not power off the device during the firmware upgrade. Otherwise, the device will be damaged.

2. ZLVircom checks the firmware version number to see if the new firmware has been downloaded successfully.

Figure 44 Firmware version number

16. Ordering

Item No	Function
ZLAN7110M	2.4Gwifi server

17. After sales service

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