

ZLAN7146/7146-5

Multi-function

WIFI Serial Device Server

RS232/485/422 To WIFI

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Content

1.	Summary	5
2.	Function Features	7
2.1	General Software Features	7
2.2	Advanced Software Function	8
3.	Technical Parameters	9
4.	Hardware Instruction	10
5.	Wifi Function	13
5.1	AP Mode	13
5.2	STA Mode	17
5.3	5.8G Usage	17
5.4	Wifi Connection in pairs	17
5.5	Antenna Choose	18
6.	Using Steps	18
6.1	Using Overview	18
6.2	Software Installation	18
6.3	Parameter Configuration	19
6.4	TCP communication test	25
6.5	Virtual serial port test	28
6.6	Modbus TCP test	31
6.7	Web Configuration	32
7.	Work Mode and Transfer Protocol	34
7.1	Virtual Serial Mode	35
7.2	Direct TCP/IP Communication Mode	36
7.2.1	TCP Client Mode	36
7.2.2	The Client connects to Multiple Servers	37
7.2.3	TCP Server Mode	39
7.2.4	Be both Client and Server	39
7.2.5	UDP Mode	40
7.3	Device Pairs-connect Mode	41
8.	Device Debugging	43
8.1	Network Physical Connection	43
8.2	Network TCP Connection	43
8.3	Data Sending and Receiving	44
8.4	ZLVircom Remotely Monitor Data	45
9.	Modbus Advanced Features	46
9.1	Enable Modbus Gateway	47
9.2	Storage Modbus Gateway	47
9.3	Disable Storage Functionality	50
9.4	Multi-host Function	51

9.5	Multi-host Parameter	52
9.6	Non-storage Multiple Hosts	54
9.7	Modbus Under Multi-destination IP	54
9.8	Slave Station Under Client Mode	55
10.	Registration Pack and Heartbeat Pack	56
10.1	Registration Packet	57
10.1.1	Connect to send MAC Addresses	57
10.1.2	Realcom Agreement	58
10.1.3	Custom Registry	59
10.1.4	Transcode Configuration Files	60
10.2	The Heartbeat Packets	60
10.2.1	Implied Heartbeat	61
10.2.2	REALCOM agreement	61
10.2.3	Customize Heartbeat Packets	61
11.	HTTPD Client Communication Function	62
12.	Transcoding Functions	63
12.1	Enable the Transcoding	63
12.2	Case of Transcoding Implementation	65
12.3	Notice	66
13.	Network Interface to Modify Parameters	66
14.	Device Management Function Library	67
15.	Serial Port Modify Parameters	68
16.	Remote device management	68
17.	Firmware upgrade method	71
18.	Multi-wifi Parameter Configuration	73
18.1	Usage scenarios	73
18.1.1	STA Mode Restored to AP	74
18.1.2	Multi-router Backup	74
18.2	Wifi.txt File Format	74
18.3	Download method	76
18.4	Wifi.txt example	77
18.4.1	STA mode restored to AP	77
18.4.2	Multi-router Backup	78
18.5	Notice	78
19.	Order information	80
20.	After-Service	80

1. Summary

ZLAN7146 is another serial device server launched by Shanghai ZLAN after ZLAN7100, ZLAN7142 and ZLAN7144.

7146 adopts the latest WIFI chipset, which has stronger WIFI performance and higher cost performance. Use ARM M4 kernel, main frequency 192MHz, and use real-time operating system. The ZLAN7146-5 supports connecting WIFI hotspots of 5.8G (currently both of them are 2.4G frequency bands in AP mode), and others are similar to 7146.

7146 supports one RS232/485/422 to WIFI, can be as a STA or AP mode. There is no Ethernet interface (RJ45 is for future extended use). Support Modbus TCP to RTU, support sending heartbeat packets, registering packages and transcoding scripts.



Figure 1 ZLAN7146 with Antenna

The high quality power supply design in 9~48V wide voltage provides better industrial

environment adaptability; Can be equipped with installation guide accessories.

The serial device server can easily make serial device connected WIFI network, implement the wireless network upgrade of the serial device. RS232 interface support full duplex, uninterrupted communication. RS485 is embedded 485 lightning protection. The Wifi supports STA mode to connect to the wireless router, or as AP mode which mobile phones and other wifi devices can connect to.

For users using virtual serial port can use ZLAN ZLVircom software to achieve a virtual serial port, the original PC software of serial no need modification. You can also use the Modbus TCP protocol in the Configuration Software to directly connect with the RTU device to realize wifi networking communication.

ZLAN7146 can be applied to:

- PLC Remote Wireless Monitoring
- Power /Electronic /Intelligent Instrument
- Bank /Medical Automation System
- Industrial Automation System
- Information Household Appliances

The typical application is shown as FIG. 2. The original serial devices connect with ZLAN7146, then connect ZLAN7146 to wireless network through the WIFI. Then any data sent by serial device will be transparently transferred to the PC designated by ZLAN7146, and data sent to ZLAN7146 from PC via network will also be transparently transmitted to the serial device.

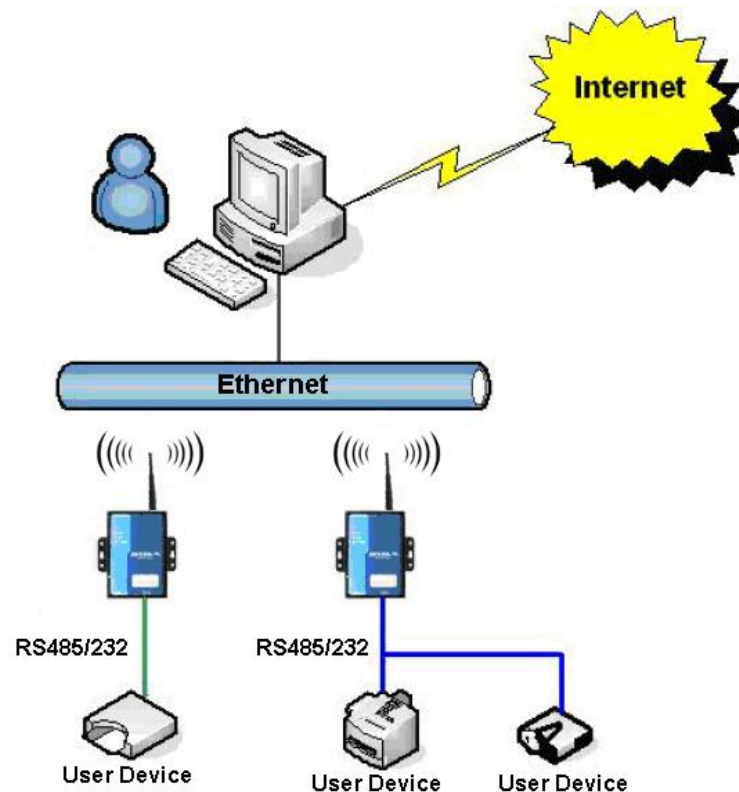


Figure 2 ZLAN7146 Network Structure

2. Function Features

2.1 General Software Features

The main function features of 7146 are as below:

- 1) Support 802.11b/g/n.
- 2) Wide voltage power supply: 9~48V supply scope. The power input type can choose industrial terminal or normal power adapter plug.
- 3) Support three forms of serial port: RS232/485/422. Support hardware flow control CTS/RTS and software flow control XON/XOFF.
- 4) Sticky package optimization, the real-time of serial framing is strong. The serial packet sub-package interval of ordinary WIFI serial port server is over 100ms, ZLAN7146 is optional 1ms~100ms, resolution precision is greatly improved.

- 5) Support upgrading program through Ethernet port in the system. Support remote network upgrades.
- 6) Support wifi connection between modules.
- 7) Provide 4 kinds LINK indicator interface: Link blue indicates the TCP connection established, LINK green indicates the Ethernet cable is connected, WIFI blue indicates establishing wifi connection as AP or STA, WIFI green indicates the wifi function works normal. The abundant indicators can directly shows the device status.
- 8) One-key search configuration. When the wifi and PC or router establish link, using ZLVircom software to one-key search and configure device parameters, the IP of device and PC no need in a segment.
- 9) Support DNS, support as a DHCP client, as a AP mode can also be as a DHCP Server.
- 10) Support TCP sever, TCP client, UDP/UDP multicast. As Server can support up to 30 TCP connections communicating with the networking module at the same time; as Client can connect to 7 destination IP.
- 11) Support the function of device connecting with sending MAC address to facilitate cloud management of devices.
- 12) It supports remote viewing of TCP connection status, serial port data sending and receiving status of devices through software. Virtual serial port supports data monitoring.

2.2 Advanced Software Function

The 4 in ZLAN7146 means it supports advanced software function, including:

- 1) Support Modbus gateway function, support Modbus RTU to Modbus TCP. Can support storage Modbus, and can automatically collect the equipment data. Also can support non-storage Modbus gateway.

- 2) Support for multiple hosts: the network port allows multiple computers to access the same serial port device at the same time in ask-answer query mode.
- 3) Support for custom heartbeat and registration package features: easy to do communication with the cloud and device identification.
- 4) Support function of needing password authentication when TCP establish connection to ensure connection security.
- 5) Support "transcoding" function, which can realize the translation of protocols for specific devices and allow different devices to connect to the unified software platform.
- 6) The data submission and sending function in HTTP mode is supported, and the cloud can directly use HTTP GET instructions to interact with the serial port data of the device.

3. Technical Parameters

Figure			
Interface:	485: Terminal; 232; DB9; 422: Terminal		
Power Supply:	Inside positive outside negative, standard outlet; Two lines terminal		
Size:	L x W x H =9.4cm×6.5cm×2.5cm		
Communicate Interface			
Wifi	802.11a/b/g/n		
Serial	RS232/485/422×1: RXD, TXD, GND, CTS, RTS		
Serial Parameters			
Baud rate:	1200~460800bps	Parity:	None, Odd, Even, Mark, Space
Data size:	5~9	Flow control:	RTS/CTS, XON/XOFF, NONE
WLAN			
WLAN Standard:	802.11 b/g/n		
Frequency Range	2.412GHz-2.484GHz 5.18GHz-5.825GHz		

Transmit Power	2.4G: 802.11b/g/n: +21dBm(Max.); 5G: 802.11a/n: +16.9dBm
Receiving Sensitivity	2.4G: 802.11b/g/n: -96.4dBm 5G: 802.11a/n: -92.8dBm
Antenna Choice	External: external antenna
Hardware	
Power	9~24V (50mA when 24V)
Work Temperature	-40~85℃
Storage Temperature	-45~125℃
Software	
WLAN Work Mode	STA/AP
Security Mechanism	WEP/WPA-PSK/WPA2-PSK
Encryption Type	WEP64/WEP128/TKIP/AES
Protocol	TCP/UDP/ARP/ICMP/DHCP/DNS/HTTP
Net communication method:	Socket, virtual serial port
User Configuration	Web Server, Windows configuration tool ZLVircom
Environment	
Running temperature:	-40~85℃
Storage temp:	-45~165℃
Humidity:	5~95%RH

4. Hardware Instruction

The front view of ZLAN7146 WIFI serial server is shown in Figure 3. ZLAN7146 uses black anti-radiation SECC board. Left and right are with two "ears" to facilitate the installation.

Size:

L x W x H = 9.4cm x 6.5cm x 2.5cm



Figure 3 7146 Front View

Panel Light:

- 1) **ACT:** ACT lights up when green indicates that data is normally transferred between WIFI/Ethernet and RS232/485/422. When the ACT light blinks blue, it indicates that data has been returned from RS232/485/422 to WIFI/Ethernet. If the data is short then blue flashing time is relatively short, need to pay attention to view.
- 2) **LINK:** LINK lights are green when the RJ45 cable is connected. When the LINK light is blue, it indicates that the TCP connection is established or is in UDP mode.
- 3) **POWER:** Indicates that the serial server is powered on.
- 4) **WIFI:** WIFI light is blue indicates the WIFI as STA establishes wifi connection with the router or as AP there have wifi connect it.



Figure 4 Front Interfaces of 7146

The **serial interfaces in front** of the server area shown in Figure 4, from left there have:

- 1) Ethernet port: standard RJ45 interface
- 2) R-, R+, T+, T-: where T+ is RS485A, T- is RS485B; if you need RS422, you can connect these four lines.
- 3) Terminal power supply +, -: voltage is 9~24VDC.
- 4) Power outlet: you can use the standard 5.5mm plug (core for the positive), the voltage 9~24VDC.

The **back panel** of serial server is as shown in Figure 5, from left there have:



Figure 5 The back of 7146

- 1) WIFI antenna. You can choose the extending line antenna, easy to install to the outside of the metal cabinet.

2) Reset switch: putting on the reset mode, will reset wifi work mode to the AP mode, SSID into ZLAN, password is empty, IP into 192.168.1.254.

3) Serial port using standard DB9 male: line sequence as shown in Table 1:

Item	Name	Instruction
2	RXD	The receiving pins of serial device server
3	TXD	The sending pins of serial device server
5	GND	Grounding
7	RTS	After the flow control is enabled, when the pin is 0, the serial device server can accept the data of the serial device.
8	CTS	After the flow control is enabled, when the pin is 0, the serial device server can send the data of the serial device.

5. Wifi Function

Install the antenna and power the module.

5.1 AP Mode

Do not plug the cable, put 7146 power on. After a while you can see WIFI_WORK light began to flash, indicating the wifi function has been normal. By default 7146 is in AP mode and SSID is "ZLAN". See "ZLAN" in the wifi list of PC, connect the wifi.



Figure 6 Search for ZLAN hotspots

After connecting the laptop, you can automatically get an IP address from 7146. Click ZLVircom software "Device Manage" button, you can see a line in the device list, found 7146 device.

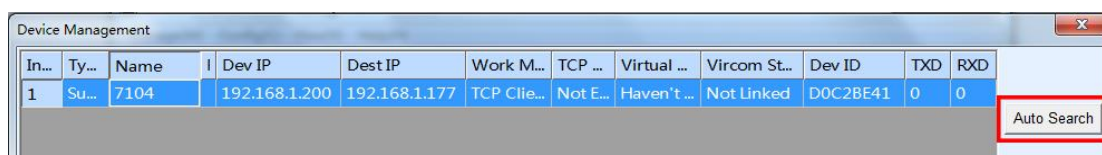


Figure 7 Search for 7146 Device

Double-click the line to open the Device Parameter Edit dialog box.

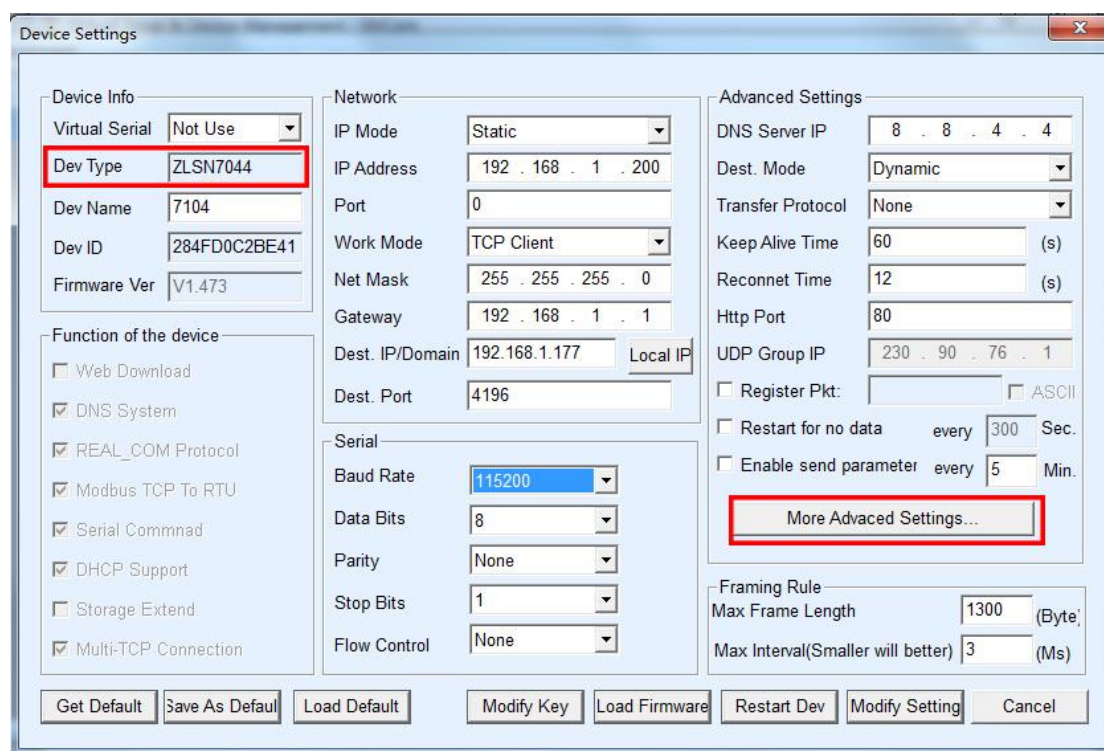


Figure 8 Device Parameter Settings dialog box

Here you can see one of the device model ZLAN7146, ZLSN7044 and so on. Here you can also configure the IP address and baud rate, the meaning of these parameters will introduce after. Please click on "More Advanced Settings", you can configure the 7146 wifi parameters in the open dialog box.

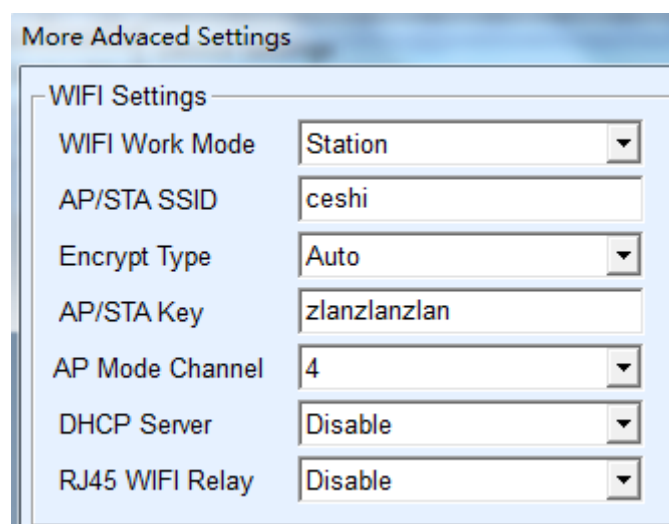


Figure 9 Wifi Parameter Configuration

The meanings of the WIFI parameter are as follows:

Name	Option Values	Instruction
WIFI Work Mode	<ul style="list-style-type: none"> ➤ Wireless AP: 7146 can be as a hotspot to be connected by notebooks, mobile phones, etc., mainly for using the configuration in the first time. ➤ Wireless Station: As STA mode, 7146 will actively connect a hot spot (such as a router). 	
AP or STA SSID	A string of 32 bytes or less	As an AP, this SSID is the hotspot name, when as STA mode, it is the SSID of the pre-connected hotspot. When changing from STA to AP mode, please pay attention to modify the SSID, otherwise it will conflict with the existing SSID on the network.
Encryption type	<ul style="list-style-type: none"> ➤ No encryption: no password mode ➤ WEP64: Password length must be 5 characters. ➤ WEP128: Password length must be 13 characters. ➤ TKIP: TKIP encryption, password 1 to 32 bytes. ➤ AES: AES encryption, password 1 to 32 bytes. ➤ Automatic: usually routers use one of TKIP and AES, when the user is not sure, you can choose automatic mode. 	Generally, when there is no password choose "no encryption", when there is a password just choose "automatic".
AP or STA Password	Different password length according to the type of encryption	As AP mode, this password is the password of computer, mobile phone connecting to 7146. When used as STA mode, this password is the pre-connected AP password.
AP mode Channel Choose	1~11	Only in AP mode the parameter is valid, in STA mode is invalid.
DHCP Server	Enable /Disable	Easy for mobile phones get IP when connecting the hotspot when as AP. Recommend to close DHP Server when non-use, to avoid the DHCP server allocation conflict with router.
RJ45 Wifi	Enable /Disable	Only works in 5.8G mode the Ethernet port

Relay		and wifi interworking. Valid for 7146.
-------	--	--

If the 7146 as AP mode, it has two types password and no password. No password mode you just select "no encryption" type; password method is recommended to use WEP128 encryption, the password length is of 13 bytes.

5.2 STA Mode

When the STA mode is used, the user enters the SSID, encryption mode, and password of the pre-connected router in FIG. 9. When you do not know the router's encryption mode can choose "automatic" mode.

When the STA mode is used, 7146 will automatically connect to the AP hotspot after power-on. At this time, the WIFI_WORK light is flashing quickly, indicating that it is in the connecting state. WIFI_LINK lights will be on when the connection is established.

STA mode support automatic reconnection, such as AP hot restart, 7146 can automatically connect. If you cannot connect to the AP hotspot, please confirm that whether the encryption mode, password, SSID is correct, whether the antenna is installed, whether in the signal range.

5.3 5.8G Usage

In figure 9, select enable in "RJ45 WIFI Relay", and it will work in 5.8G mode. Currently it only supports 5.8G connecting to routers, as 5.8G STA mode. 5.8G AP mode is not supported.

5.4 Wifi Connection in pairs

7146 support 2 modules via wifi interconnect. Interconnection configuration parameters are as follows:

Parameters	Module as AP	Module as STA
WIFI Work Mode	Wireless AP	Wireless Station

AP or STA SSID	Same	Same
Encryption Type	Recommended as "no encryption" or WEP128	Recommended as "no encryption" or WEP128
AP or STA Password	Same	Same

When the 2 7146 establish connection via wifi, WIFI_LINK light will be on.

5.5 Antenna Choose

If you choose to use the built-in antenna module, no need external antenna, if you need an external antenna you need to meet the following characteristics, ZLAN can provide external antenna.

Impedance	50 Ohm
Return loss	-10dB(Max)
Connector type	I-PEX
Frequency Range	2.4~2.5GHz
VSWR	2 (Max)

6. Using Steps

6.1 Using Overview

Please use ZLVircom to do the configuration for 7146. When 7146 access network through Ethernet port or wifi, the computer in same LAN can search and configure the device through the installed ZLVircom software.

6.2 Software Installation

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

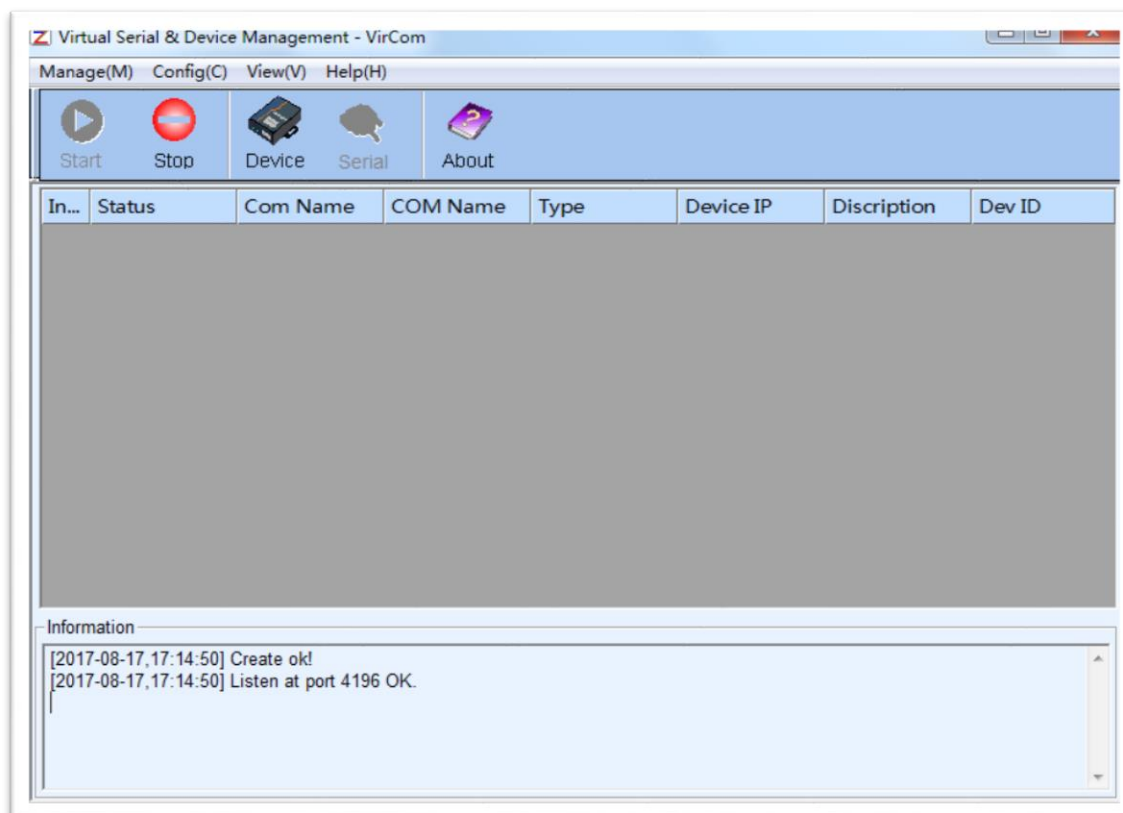
Table 2 ZLVircom Version

Software	Description
ZLVircom Device Management Tool (free-installation version)	This version no have the virtual serial port function
ZLVircom Device Management Tool (installation version)	This version has the ZLVircom_x64.msi and ZLVircom_x86.msi. The 64 bit operating system install x64, 32 bit system install x86 version.

Just follow the default prompt when installing. Upon completion of the installation, ZLVircom will be started each time the computer is started, which is used to boot up to create a virtual serial port.

6.3 Parameter Configuration

After installing ZLVircom, the hardware also connecting, run ZLVircom software as figure 10, and click "Device Manage" as figure 11. Use ZLVircom can search and configure the device parameter in different segment, which is very convenient as long as the device and computer of running ZLVircom are under the same switch.

**Figure 10 ZLVircom Main Interface**

Device Management														
In...	Ty...	Name	I	Dev IP	Dest IP	Work M...	TCP ...	Virtual ...	Vircom St...	Dev ID	TXD	RXD		
1	Su...	90长期测		192.168.1.63	119.90.51.5	TCP Ser...	Not E...	Haven't ...	Not Linked	2F3D333B	0	0		
2	Su...	p2p		192.168.1.188	192.168.1.3	TCP Ser...	Not E...	Haven't ...	Not Linked	4053C85B	0	0	Auto Search	
3	Su...	开发板p2p		192.168.1.222	192.168.10.1...	TCP Ser...	Not E...	Haven't ...	Not Linked	40AEA571	111	0	Add Manually	
4	Su...	40长期测		192.168.1.248	119.90.51.5	TCP Ser...	Not E...	Haven't ...	Not Linked	A3EF280C	0	0	Search Serial	
5	Su...	6842		192.168.1.250	192.168.1.102	TCP Ser...	Not E...	Haven't ...	Not Linked	C9589C2B	0	0	P2P Device	
													Edit Device	
													Search List	
													Back	

Figure 11 Device List

From the device list, you can see all of the current online devices, and you can search for devices that are not in one network segment. There is no need to use

the "Add Manually" function.

Click the "Edit Device" to configure the device parameters.

The screenshot shows the 'Device Settings' window with the following sections:

- Device Info:** Virtual Serial (Not Use), Dev Type (ZLSN2042), Dev Name (6842), Dev ID (284FC9589C2B), Firmware Ver (V1.597).
- Function of the device:**
 - ☐ Web Download
 - ☒ DNS System
 - ☒ REAL_COM Protocol
 - ☒ Modbus TCP To RTU
 - ☒ Serial Commnad
 - ☒ DHCP Support
 - ☐ Storage Extend
 - ☒ Multi-TCP Connection
- Network:** IP Mode (Static), IP Address (192 . 168 . 1 . 250), Port (502), Work Mode (TCP Server), Net Mask (255 . 255 . 255 . 0), Gateway (192 . 168 . 1 . 1), Dest. IP/Domain (192.168.1.149), Local IP, Dest. Port (1024).
- Serial:** Baud Rate (115200), Data Bits (8), Parity (None), Stop Bits (1), Flow Control (None).
- Advanced Settings:**
 - DNS Server IP (8 . 8 . 4 . 4), Dest. Mode (Dynamic), Transfer Protocol (Modbus_TCP Protocol), Keep Alive Time (10 (s)), Reconnet Time (12 (s)), Http Port (80), UDP Group IP (230 . 90 . 76 . 1).
 - ☐ Register Pkt: (), ☐ ASCII
 - ☐ Restart for no data every (50) Sec.
 - ☐ Enable send parameter every (5) Min.
 - More Advanced Settings...
 - Framing Rule:** Max Frame Length (1300 (Byte)), Max Interval (Smaller will better) (3 (Ms)).

Buttons at the bottom: Get Default, Save As Default, Load Default, Modify Key, Load Firmware, Restart Dev, Modify Setting, Cancel.

Figure 12 Device Parameters

In this interface, the user can set the parameters of the device, then click "Modify Setting", and the parameters are set to the flash of the device, with power-off no lost. The device will restart automatically.

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

The meaning of the parameters is described as follows:

Table 3 Parameter Meaning

Parameter Name	Value Range	Instruction
Virtual Serial	Non-in use, created virtual serial port	You can bind the current device to a created virtual serial port.

Dev Type		Show only the model of the core module
Dev Name	Any	You can give the device a readable name, with a maximum of 9 bytes, and support the Chinese name.
Dev ID		The factory's sole ID, cannot be modified.
Firmware Version		The firmware version of core module
Supporting Function		Please refer to the Table 4 "support functions"
IP Mode	Static, DHCP	The user can choose Static or DHCP (Dynamic acquisition of IP)
IP Address		The IP Address of networking products
Port	0~65535	The monitoring port of Networking products when in the TCP Server or UDP mode. As a client, it is best to specify that the port is port 0, which is good for increasing the connection speed, and the system will randomly assign a local port when using the 0 port. At this time the difference from specifying the non-zero port are: (1) local port is 0, module sets up a new TCP connection with PC when restarting, old TCP connection may not be closed, so that the old TCP connection of the host has been unable to close, specify the non-zero port does not have the problem. Generally host wants to close the old connection when the module is restarted. (2) the local port is 0, the time of TCP rebuilding connection is faster.
Work Mode	TCP Server(TCP Server Mode),TCP Client(TCP Client Mode),UDP Mode, UDP Multicast	When set to TCP Server, the network Server needs to actively connect the networking products; When set to TCP Client, the networking product initiates the connection to the network server specified by the destination IP.
Net Mask	Eg: 255.255.255.0	Must be same as net mask of local LAN.
Gateway	Eg: 192.168.1.1	Must be the same as the local LAN gateway. If it is not crossing outer network (such as the cable connecting computer), it is best to set the gateway as the IP address of the connected computer.
Dest. IP/Domain		In the TCP Client or UDP mode, the data will be sent to the destination IP or the computer of domain name instruction.
Dest. Port		In the TCP Client or UDP mode, the data is sent to the destination port of the destination IP.

Baud Rate	1200, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200, 230400, 460800	Serial baud rate
Data Bits	5, 6, 7, 8, 9	
Parity	None, Even, Odd, Mark, Space	
Stop Bits	1, 2	
Flow Control	None (no flow control), CTS/RTS, DTR/DCR, XON/XOFF	RS232 port valid
DNS Server IP		When the destination computer is described by a domain name, DNS server is required to resolve the domain name, which specifies the IP of this DNS server. When the IP mode is DHCP, the parameter is not specified and will be automatically acquired.
Dest. Mode	Static, Dynamic	<p>UDP working mode: if the destination computer is described by a domain name, it's best to choose the static mode; If there are multiple computers in the LAN communicating with networking products through UDP, it is best to choose dynamic mode.</p> <p>TCP server mode: this parameter must be dynamic.</p> <p>TCP client mode: when IP mode is dynamic, the destination IP is reconnected after the device is restarted, so that the correct IP address can be obtained again. Otherwise, it will do direct connection without automatically restarting the device.</p>
Transfer Protocol	NONE, Modbus TCP<->RTU, Real_COM	NONE indicates that the data forwarding from the serial port to the network is transparent; Modbus TCP<->RTU will convert Modbus TCP protocol directly into RTU protocol to facilitate coordination with Modbus TCP protocol; RealCOM is designed to be compatible with the old version of REAL_COM.
Keep Active Time	0~255	(1) Choose 1~255, if the device is in the TCP client working mode, the TCP heartbeat will be sent automatically for every "keep alive time". This can guarantee the TCP availability of links. When set to 0, there will be no TCP

		<p>heartbeat.</p> <p>(2) Set to 0~254, when transformation protocol choose REAL_COM protocol, the device will send a length of 0 to 1 content data for every "keep alive time" to implement the heartbeat mechanism of Realcom. When set to 255, there will be no Realcom heartbeat.</p> <p>(3) Set to 0~254, if the device is working on the TCP client, the device will send the parameters to the destination computer every "keep alive time". When set to 255, no have the parameter sending function. This mechanism is not normally used, users are not required to pay attention.</p>
Reconnect Time	0~255	Once the networking products in a TCP client mode disconnect with the server (as long as in the non-connection status), it will initiates a TCP connection to the Server every while, can be 0~254 seconds, if set 255, never for reconnection. Note first TCP connection would immediately (such as hardware on electricity, through zlvircom software restart equipment, no data), only after the first connection failure will try again after waiting for the "break time", so "break time" will not affect the network and server connection setup time under normal circumstances.
Http Port	1~65535	
UDP Group IP		UDP multicast
Max Frame Length	1~1400	One of the rules of serial. The connected product serial port sends the received data to the network as a frame after receiving the length data.
Max Interval (Smaller will better)	0~255	One of the rules of serial. When there is a pause in the data received by the connected product, and the pause time is greater than that time, the received data is sent to the network as a frame.

The functions supported by the device are explained as follows:

Table 4 Device Supported Function

Name	Instruction
Webpage download	Support to control the serial output command through the web page, only the product with the trailing W has this function.

Domain name system	The destination IP can be the domain name (such as the beginning of the WWW server address).
REAL_COM protocol	It is a non-transparent transmission serial device server protocol, which is suitable for the binding of virtual serial port through Internet. Because the protocol contains the device MAC address, it is helpful for the upper computer to identify the device. In general, it can be without use.
Modbus TCP to RTU	Only the models that the third bit is 4 support this function. Modbus TCP to RTU can be implemented. It also supports multi-host capabilities.
Serial port modify parameters	The serial port modification parameter supports the serial port AT instruction to configure and read the device parameters.
Automatic acquisition of IP	Support for DHCP client protocol
Storage extension EX function	Extended later
Multiple TCP connections	Support more than one TCP connections as a TCP server.
IO port control	Model No. 3 of 4 supports arbitrary custom instructions to control 8 IO outputs.
UDP multicast	UDP multicast
Multi-destination IP	As a TCP client supports simultaneous connection of 7 destination IP.
Proxy server	Support the proxy server functionality (a specific model is required).
SNMP function	Support SNMP to Modbus RTU protocol. Only those with -snmp tails support this feature.
P2 function	Support the ability to access devices in any network through P2P across technology. This feature is supported in model N with trailing patches.

6.4 TCP communication test

After the device parameters are configured, TCP connection communication can be tested with serial port tools and TCP debugging tools.

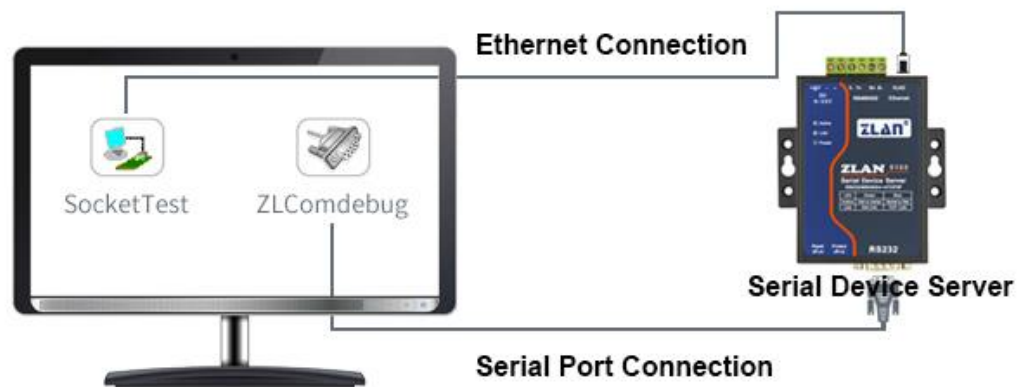
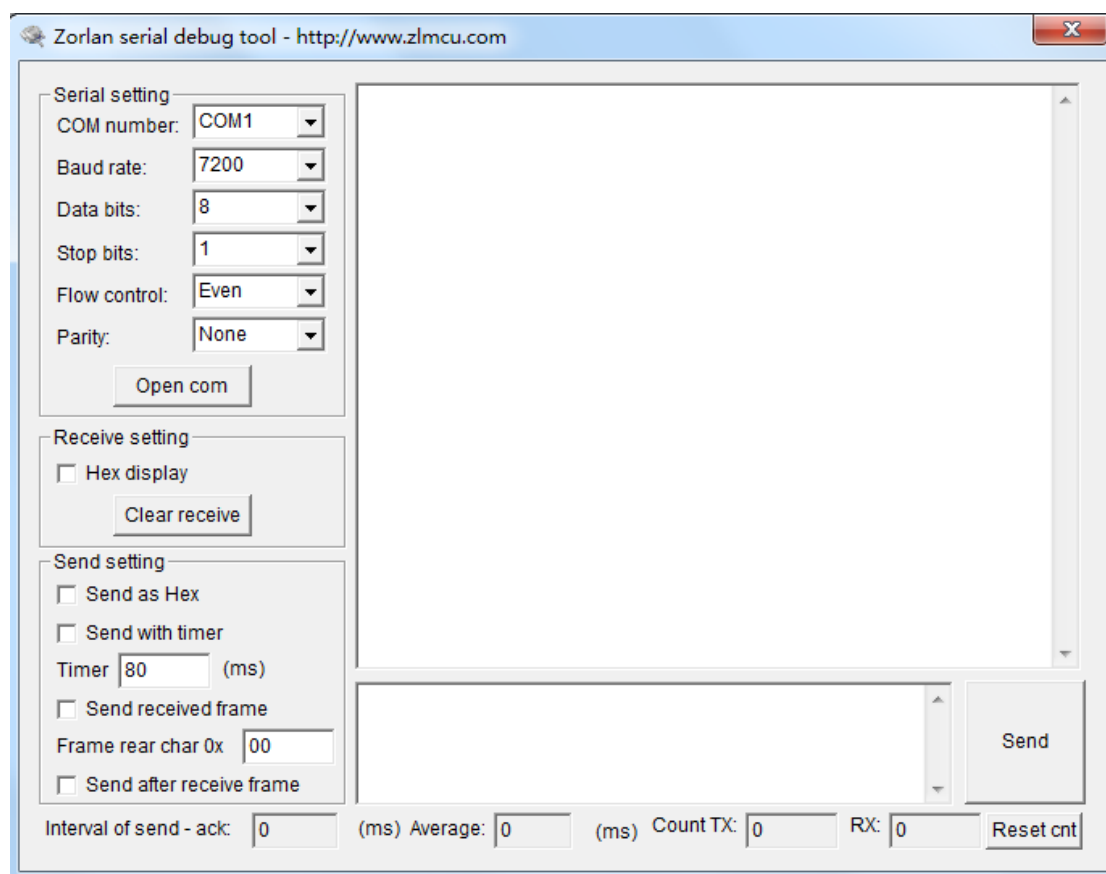
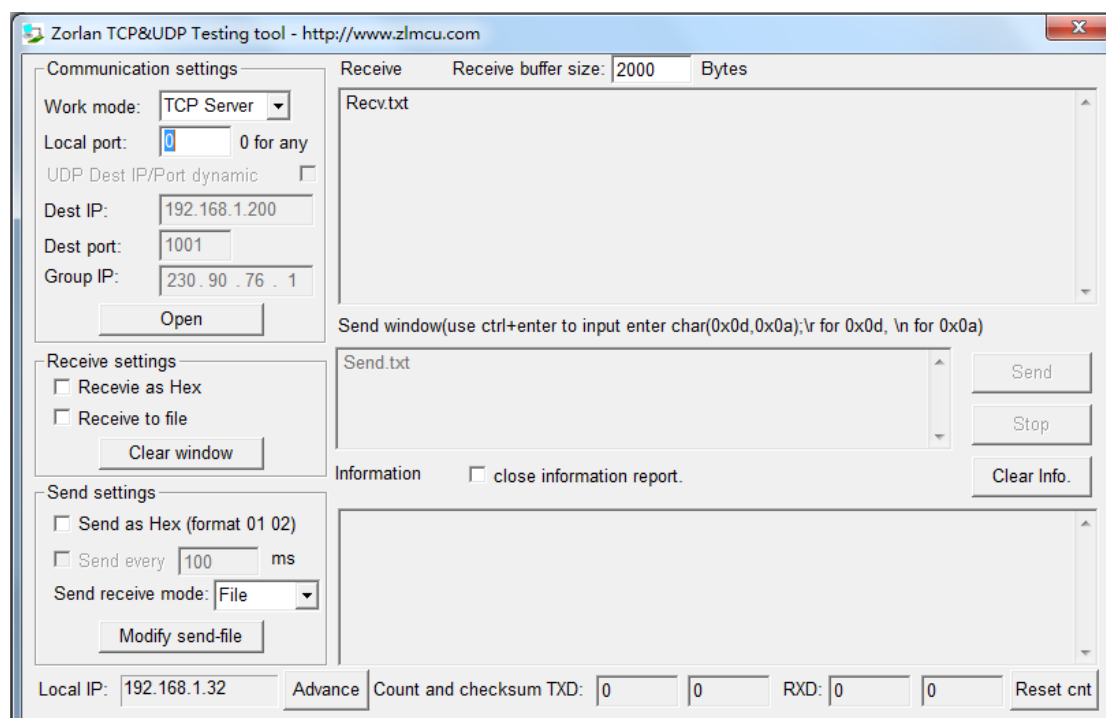


Figure 13 TCP communication diagram

Now suppose the PC COM port (USB to RS232 line) connect with serial port of serial device server, then open the serial debugging assistant ZLComDebug, and open the corresponding COM as figure 14; Open TCP&UDP debugging assistant SocketTest, and as TCP client, fill in the destination IP for the serial port server IP (currently 192.168.1.200), destination port is 4196, and then click "open" button in figure 15. Enter "socket send" in SocketTest and click send, then the data is transferred to RS232 interface through the network port of the serial port server, and then sent to ZLComDebug, which is then displayed in ZLComDebug. Conversely, type "Comdebug send" in ZLComDebug, and clicking send can also be sent to socket test and displayed.

The demonstration demonstrates the data transparent forwarding function from serial port to network port, network port to serial port.

**Figure 14 ComDebug Send-receive Interface****Figure 15 SocketTest Send-receive Interface**

6.5 Virtual serial port test

SocketTest in figure 13 communicates directly with the serial port server through TCP. In order to enable users to communicate with the serial port server with the developed serial port software, it is necessary to add a virtual serial port between the user program and the serial port server. As shown in figure 16, ZLVircom and the user program run on a computer, and ZLVircom virtual a COM port, so that the COM port corresponds to the serial port server. When the user program opens the COM to communicate through ZLVircom → serial device server → to users. Here's how to do this:

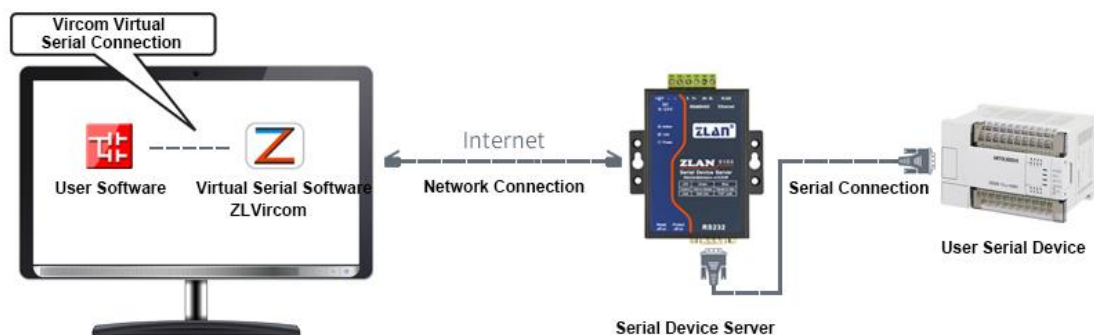


Figure 16 Virtual serial port

Click on the "Serial Manage" of the main interface of ZLVircom, then click "Add", and select COM5, where COM5 is the COM port that didn't exist on the computer.

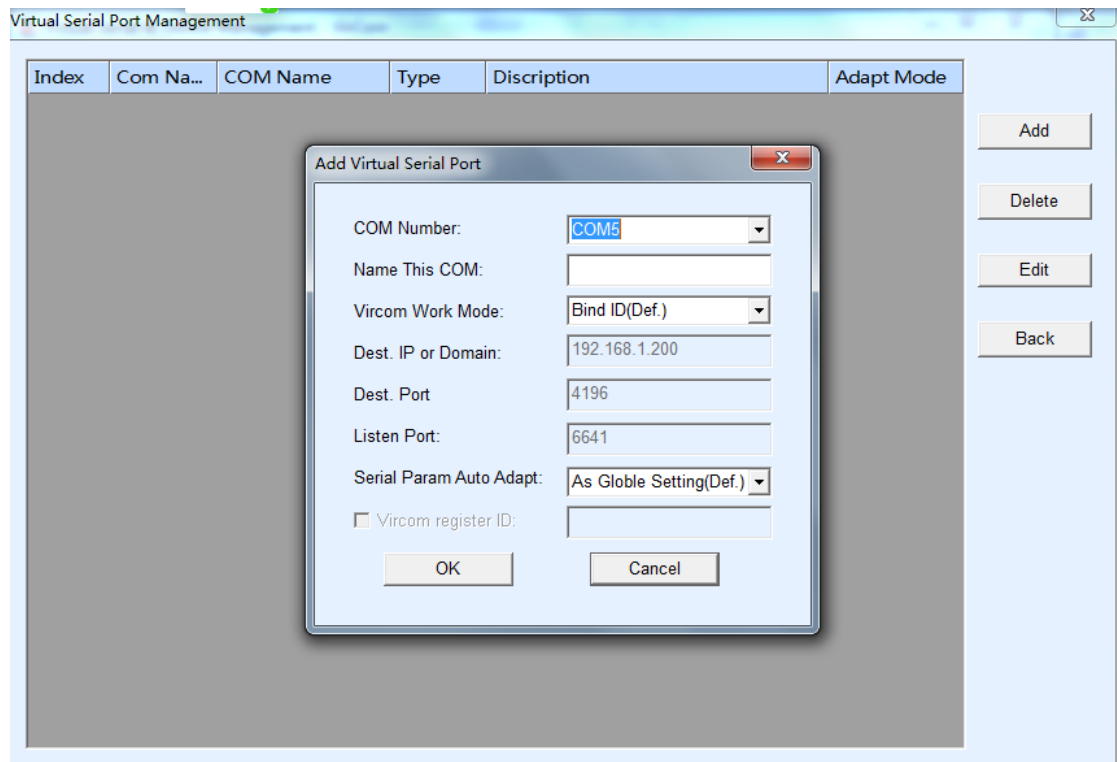


Figure 17 Add Virtual Serial Port

Then enter the “device manage”, and double-click the device that you need to bind to the COM5. As shown in FIG. 12, select COM5 from the "virtual serial port" list in the upper left corner. Then click "modify Settings". And return to the main interface of ZLVircom. You can see that the COM5 has been connected to a device with IP 192.168.1.200. You can use COM5 instead of SocketTest to communicate.

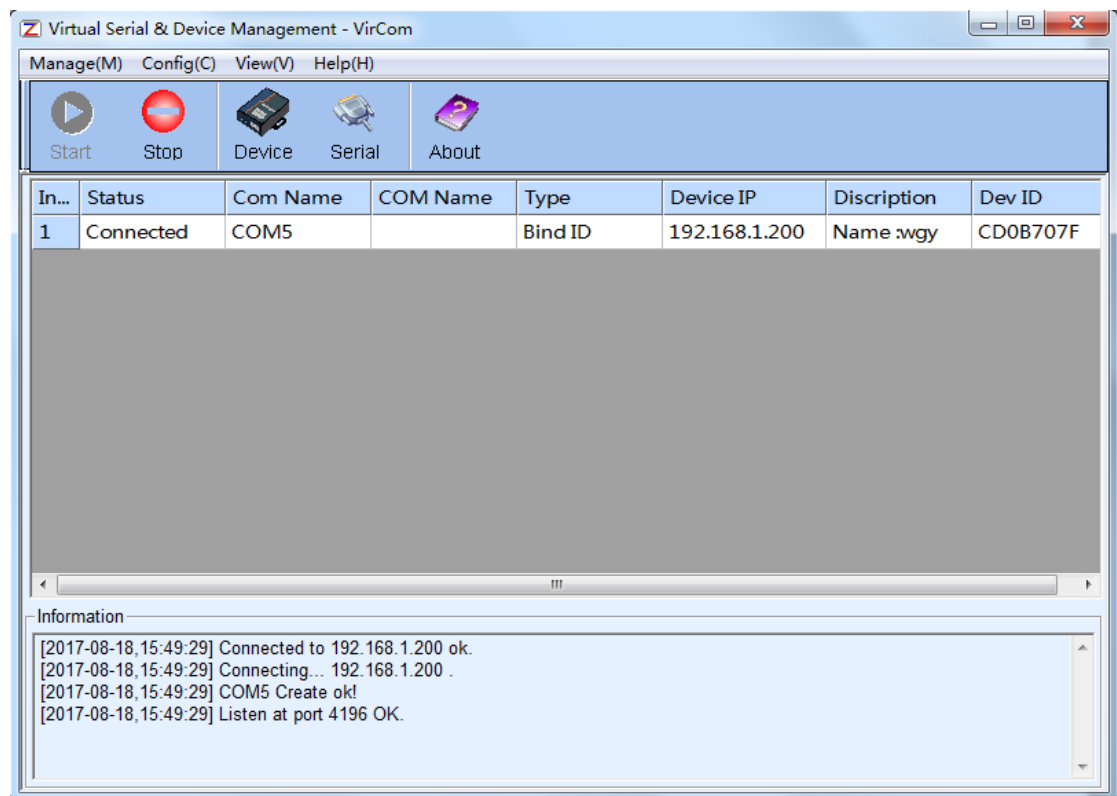


Figure 18 Virtual Serial Port has been connected

Now close the before SocketTest and open a new ZLComdebug as the user's serial port program, now open COM5. At this point, COM5 (virtual serial port) and COM4 (hardware serial port) can send-receive data through networking products. If the serial port of the connected product is not connected to the COM port of PC, but a serial port device, then the COM5 can be opened to communicate with the device. And it's just use the network way now.

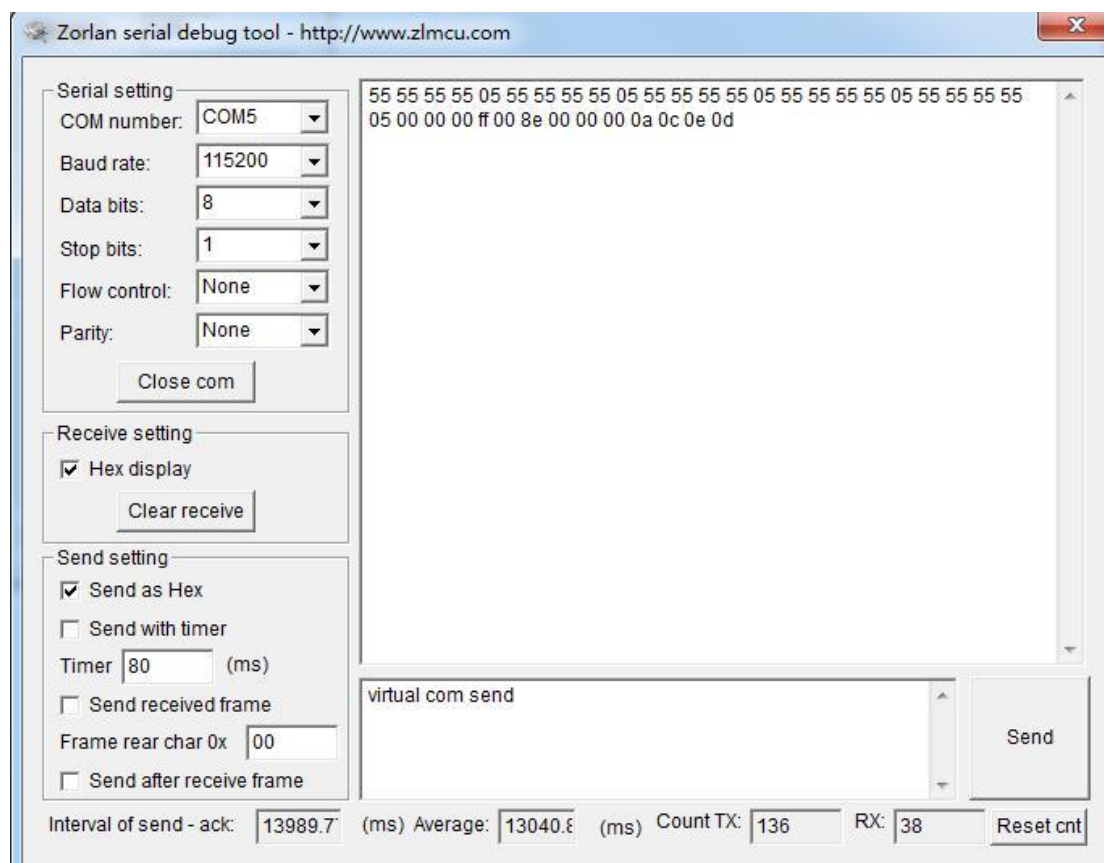
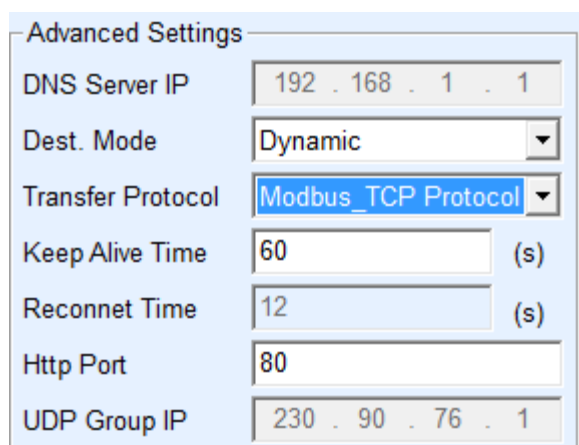


Figure 19 Communication via Virtual Serial Port

6.6 Modbus TCP test

By default, serial and network data is transmitted transparently. If you need to implement the Modbus TCP to RTU, requires selecting “transfer protocol” for "Modbus TCP ↔ RTU" in the Settings dialog, as shown in figure 20. At this point, the device port is automatically changed to 502. At this point, the user's Modbus TCP tool is connected to port 502 of IP of serial port server, and the Modbus TCP instruction sent will be converted into RTU instruction output from the serial port. For example, the serial port server network port receives the Modbus TCP instruction of 00 00 00 00 00 06 01 03 00 00 0a, then the serial port outputs the instruction of 01 03 00 00 00 0a c5 cd. Note: the serial port may send several 01 03 00 00 00 0a c5 cd instructions, because the default Modbus adopts the storage mode, which will automatically poll to query. It'll show you how to switch to non-storage.

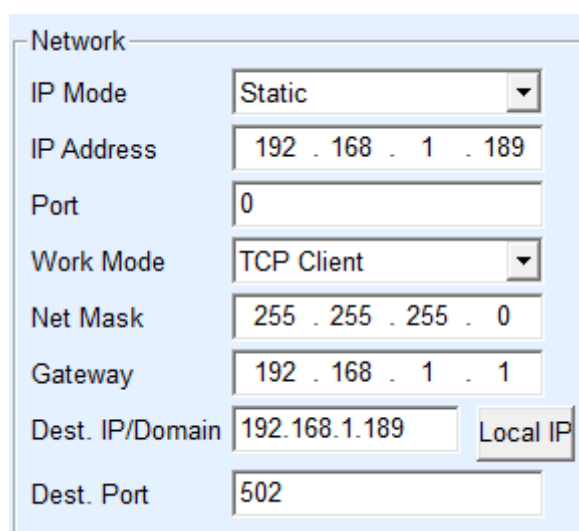


The 'Advanced Settings' window contains the following fields:

Field	Value
DNS Server IP	192 . 168 . 1 . 1
Dest. Mode	Dynamic
Transfer Protocol	Modbus_TCP Protocol
Keep Alive Time	60 (s)
Reconnet Time	12 (s)
Http Port	80
UDP Group IP	230 . 90 . 76 . 1

Figure 20 Enable Modbus TCP

If the user's Modbus TCP software is used as Slave, it is necessary to change the working mode to client based on the transfer protocol selection, and the destination IP change to the computer IP of Modbus TCP software, and the destination port is 502, as shown in figure 21.



The 'Network' window contains the following fields:

Field	Value
IP Mode	Static
IP Address	192 . 168 . 1 . 189
Port	0
Work Mode	TCP Client
Net Mask	255 . 255 . 255 . 0
Gateway	192 . 168 . 1 . 1
Dest. IP/Domain	192.168.1.189
Dest. Port	502

A 'Local IP' button is located next to the 'Dest. IP/Domain' field.

Figure 21 Modbus TCP as Client

6.7 Web Configuration

ZLVircom can be used to search and configure device parameters in different network segments. The configuration of the Web mode requires that the computer and the serial port server are in the same IP segment, and the IP address of the serial port server should be known in advance. But the Web configuration can be done on any computer without ZLVircom.

- 1) Enter the IP address of the serial port server in the browser, such as <http://192.168.1.200>, to open the following page.



Figure 22

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

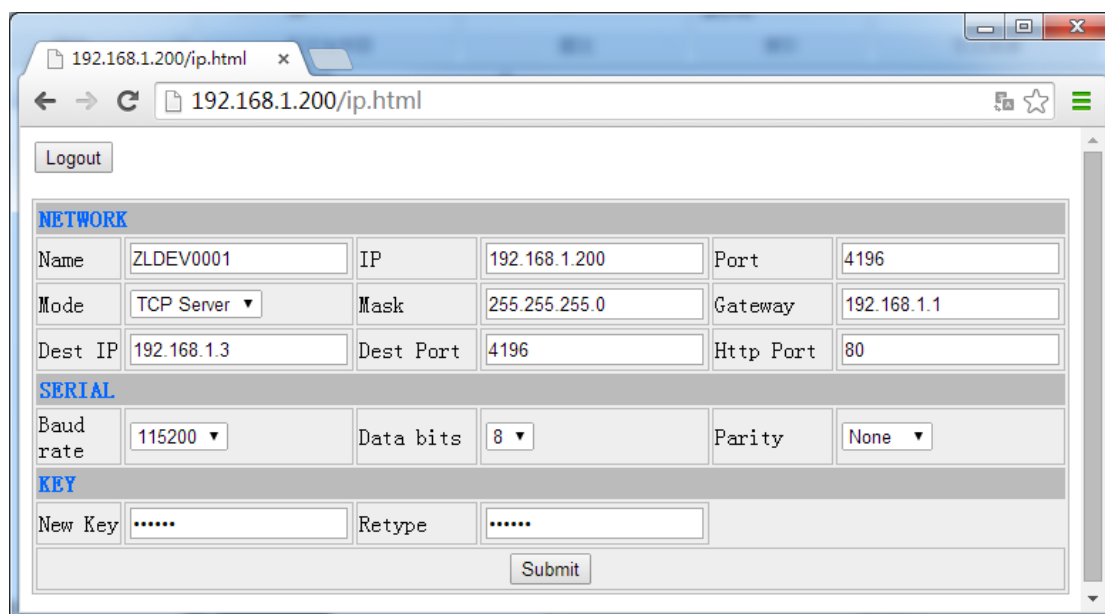


Figure 23 Web configuration interface

- 3) The serial port server parameters can be modified in the web page that appears, and the related parameters can refer to the meaning of the

parameters in table 3.

- 4) After modifying parameters, click the "submit" button.

7. Work Mode and Transfer Protocol

In different applications can choose different work mode, transfer protocol of the serial server, so as to be more stable and reliable use, the details are as following.

The use of serial device server is basically divided into two types: with virtual serial port and non-virtual serial port, as shown in fig.13 TCP communication diagram and fig.16 function of virtual serial port. The user software with virtual serial port needs to be connected is the COM port, that is, both the user software and the user device are serial ports. Non-virtual serial mode user software communicates directly over TCP/IP but user devices are still serial.

In the non-virtual serial port mode, the "Transfer Protocol" is divided into transparent transmission, Modbus TCP to RTU and Realcom protocol. If the user software is a fixed Modbus TCP protocol and the host computer is Modbus RTU, Modbus TCP to RTU mode should be selected. The Realcom protocol is currently only used when a multi-port server is connected to a server as a TCP client and a virtual serial port is used on the server.

Usage is summarized as follows:

Table 5 network configuration modes

No.	Virtual Serial Port Usage	Device Work Mode	Transfer Protocol	Instructions
1	Use	TCP Server	None	Suitable for the user to open the COM port to collect data actively.
2	Use	TCP Client	None	Suitable for the occasion when the device sends data actively. If the TCP server is selected, the problem that the device cannot be reconnected after being disconnected may occur.
3	No Use	TCP	Modbus TCP to	The user software is Modbus TCP, and

		Server	RTU	the user device is Modbus RTU. Modbus TCP is the main station.
4	No Use	TCP Client	Modbus TCP to RTU	The user software is Modbus TCP, and the user device is Modbus RTU. And Modbus RTU is the main station.
5	Use	TCP Client	Realcom Protocol	When using a multi-port server as a TCP client and the virtual serial port is used, it is best to use the Realcom protocol.
6	No Use	TCP Client	None	Suitable for a large number of devices, connected to a cloud way. And under normal circumstances the cloud is a server of public network IP on the Internet.
7	No Use	TCP Server	None	Suitable for devices and computers in the same local network, do local monitoring, no need to communicate across the Internet.

7.1 Virtual Serial Mode

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

Then check whether the monitoring computer and equipment are in the local network:

- 1) If the computer is a public network IP server rented over the Internet, then the device must use TCP client mode to connect the device to the server. At this point, you can select the (2) and (5) in Table 5, and must select (5) if it is a multi-port server.
- 2) All in the local network (can ping each other), then see is the upper computer active query or device active send data. If the device is sent initiaively it must use the device to be TCP client as (2) in Table 5, or you can choose the (1) way.

7.2 Direct TCP/IP Communication Mode

If Modbus TCP conversion is not required and 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 will transfer the TCP/IP data to the serial port data and send it to the serial port device.

Generally, users of this kind of usage develop the network communication software of upper computer by themselves and integrate the analysis of the serial communication protocol of the equipment. This method is more flexible and efficient than virtual serial port. Correspond to (6) and (7) in table 5.

In the section of "6.4 TCP Communication Test", it mainly introduces how to communicate when the serial port server is a TCP server. Here you will learn about TCP clients, UDP mode, and how multi-TCP connections communicate with computer software. The computer software takes SocketTest (the software that imitates the user's TCP/IP to communicate) as an example.

ZLAN serial port server is in compliance with the standard TCP/IP protocol, so any network terminal that conforms to the protocol can communicate with the serial port server. ZLAN technology provides the network debugging tool (SocketDlgTest program) to simulate the network terminal to communicate with the serial port server.

For two network terminals (in this case, the network debugging tool and the serial port server) to be able to communicate, the configuration of the parameters must be matched.

7.2.1 TCP Client Mode

There are two operating modes under TCP mode: TCP Server and TCP Client. No matter which mode is adopted, one side must be the Server side and the other side the Client side. Then the Client side can access the Server side.

When the serial port server is the Client, there must be three corresponding relationships, as shown in figure 24. 1) working mode correspondence: the working mode of the serial port server is the Server mode corresponding to the Client mode of the network tool; 2) IP address correspondence: the destination IP of the serial port server must be the IP address of the computer on which the network tool is located; (3) port correspondence: 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 tools, send and receive data after the connection is established.

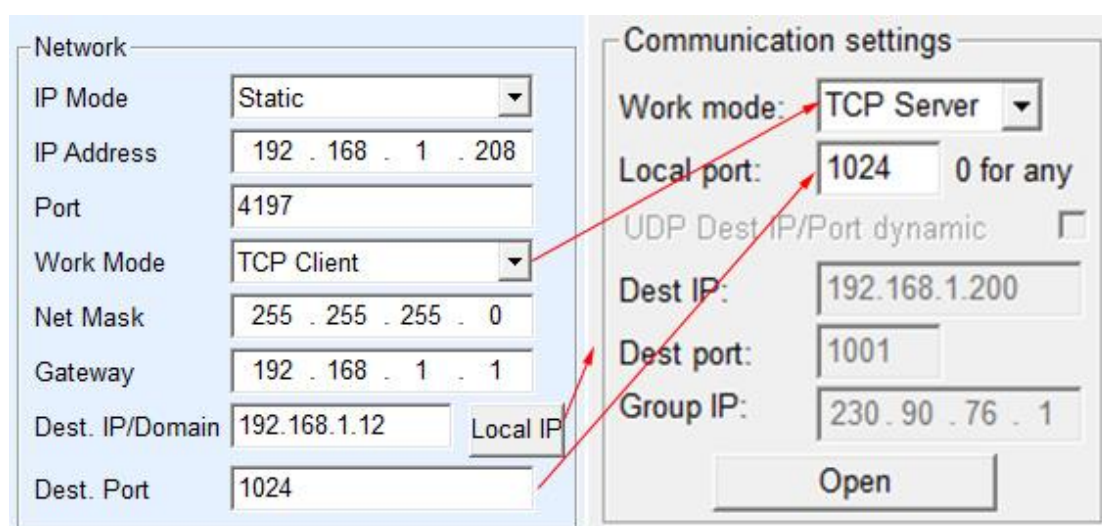


Figure 24 The serial port server as the Client

7.2.2 The Client connects to Multiple Servers

When the ZLAN serial port server is a TCP client, it can connect to 7 destination IP addresses at the same time, and the data sent by the serial port will be sent to 7 destination IP addresses at the same time. If you don't have that many servers, the rest of the destination IP is vacant. Its use method is as follows:

Figure 25 shows a network configuration window titled "Network". It contains several fields for setting network parameters. The "IP Mode" is set to "Static". The "IP Address" is "192 . 168 . 1 . 200". The "Port" is "0". The "Work Mode" is "TCP Client". The "Net Mask" is "255 . 255 . 255 . 0". The "Gateway" is "192 . 168 . 1 . 1". The "Dest. IP/Domain" field is highlighted with a red box and contains "192.168.1.189". To its right is a "Local IP" button. The "Dest. Port" field is also highlighted with a red box and contains "1024".

IP Mode	Static
IP Address	192 . 168 . 1 . 200
Port	0
Work Mode	TCP Client
Net Mask	255 . 255 . 255 . 0
Gateway	192 . 168 . 1 . 1
Dest. IP/Domain	192.168.1.189
Dest. Port	1024

Figure 25 The first destination IP and port

Figure 26 shows a "Multi Dest-IP And Port" configuration window. It contains a table with six rows of destination IP and port settings. The first two rows have a "Client Dest." dropdown menu next to the port field.

IP Address	Port	Action
192.168.1.100	1024	Client Dest.
192.168.1.101	1025	Client Dest.
192.168.1.102	1026	
192.168.1.103	1027	
192.168.1.104	1028	
192.168.1.105	1029	

Figure 26 The rest 2~7 IP and ports

The first IP is set in the device settings interface shown in figure 25, where the first IP can be the domain name. For the remaining 2~7 destination IP, click the "More Advanced Options" button in the device setting interface and open more advanced options for setting.

All 7 destination IP Settings can be automatically connected, if not connected, will wait for "disconnect reconnect" time after repeated reconnect.

Note that if the wifi parameter is set, the number of multi-destination IP will be reduced (because the wifi parameter is temporarily used in the parameter configuration table). If you still need to maintain multiple

destination IP and need to configure the wifi parameter, please use the format of 18.2wifi.txt file to configure the wifi parameter, and leave the parameter table empty.

7.2.3 TCP Server Mode

When the serial port server acts as a Server, there are also three corresponding relationships, as shown in figure 27. There is no explanation here. After this setting, click the open button of the network tool to establish a TCP connection with the serial port server, send and receive data after the connection is established.

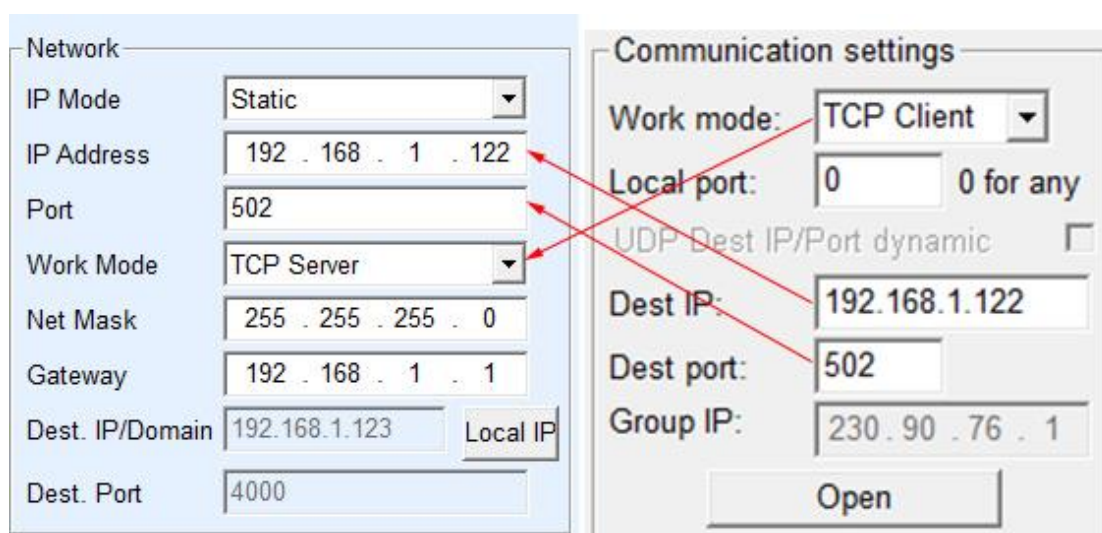


Figure 27 The serial port server as the Server

When the serial server is as Server, it can accept 30 TCP connections simultaneously. The data received by the serial port is forwarded to all established TCP connections. If the data need to be sent only to TCP that has recently received network packets, multi-host function needs to be enabled. Please refer to “9.4 Multi-host Function”.

7.2.4 Be both Client and Server

The ZLAN serial server supports accepting TCP connections when the device is on a TCP client, which means that it also has TCP server functions.

The image shows a 'Network' configuration window. It contains several fields: 'IP Mode' is set to 'Static'; 'IP Address' is '192 . 168 . 1 . 200'; 'Port' is '1024' (highlighted with a red rectangle); 'Work Mode' is 'TCP Client'; 'Net Mask' is '255 . 255 . 255 . 0'; 'Gateway' is '192 . 168 . 1 . 1'; 'Dest. IP/Domain' is '192.168.1.189' with a 'Local IP' button next to it; and 'Dest. Port' is '1024'.

Figure 28 Both Client and Server

By default, when configured with ZLVircom, if the working mode is changed to "TCP Client" mode, the port (that is, the local port) automatically becomes 0 (0 means a random free port is 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. As shown in figure 28, the computer software can now connect to port 1024 of 192.168.1.200 for communication, and the device will also connect to port 1024 of 192.168.1.189 as the Client. It should be noted that since the local port 1024 is occupied by the Server, when the local port is used as the Client, it is "port +1", that is, the software on 192.168.1.189 sees that the incoming port of the device is $1024+1=1025$.

7.2.5 UDP Mode

In UDP mode, the parameter configuration is shown in figure 29. The left side is the configuration of the serial port server in ZLVircom, and the right side is the setting of the network debugging tool SocketDlgTest. First, both must be UDP working modes. In addition, as indicated by the red arrow, the destination IP and destination port of the network tool must point to the local IP and port of the serial server. As indicated by the blue arrow, the destination IP of the serial port server must be the IP address of the

computer where the network tool is located, while the destination port of the serial port server must be the local port of the network debugging tool. Only when these network parameters are configured the two-way UDP data communication can be guaranteed.

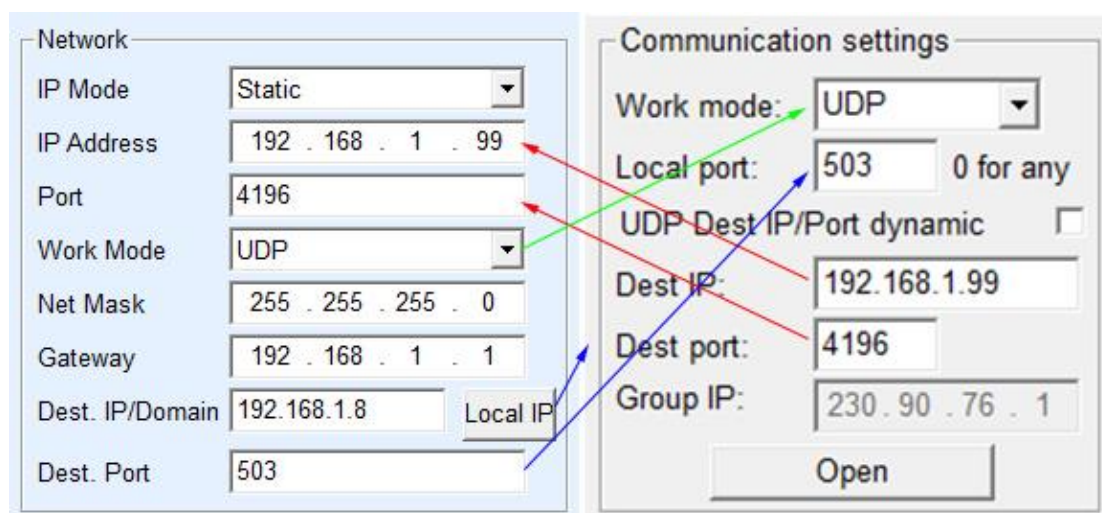


Figure 29 UDP mode parameter configuration

7.3 Device Pairs-connect Mode

If the upper machine is not a Socket program (SocketDlgTest) or a virtual serial port, but two devices are connected through a network port, the configuration method is similar. First, the user needs to connect two devices and computers to the same LAN. ZLVircom runs on this computer and is only connected to the computer for configuration purposes, after which the computer does not need to be connected.

Click ZLVircom's device management to find the two devices, as shown in figure 31. Then click "Device Edit" to configure the device. Device pair-connection can be divided into TCP pair and UDP pair. In the case of TCP pairing, the parameters of the two devices are shown in figure 30. The parameters shown by the arrows must correspond as if they were connected to a PC. After a successful TCP connection, you can view the connection status by going back to the device management dialog box, as shown in figure 29. If both devices are "connected",

the TCP link for both devices has been established.

These two must be different

Network	
IP Mode	Static
IP Address	192 . 168 . 1 . 209
Port	0
Work Mode	TCP Client
Net Mask	255 . 255 . 255 . 0
Gateway	192 . 168 . 1 . 1
Dest. IP/Domain	192.168.1.2 Local IP
Dest. Port	419

Network	
IP Mode	Static
IP Address	192 . 168 . 1 . 2
Port	419
Work Mode	TCP Server
Net Mask	255 . 255 . 255 . 0
Gateway	192 . 168 . 1 . 1
Dest. IP/Domain	192.168.1.111 Local IP
Dest. Port	4196

Figure 30 TCP device pairing parameter configuration

In...	Ty...	Name	I	Dev IP	Dest IP	Work M...	TCP ...	Virtual ...	Vircom St...	Dev ID	TXD	RXD	
1	Su...	LYH		192.168.1.2	192.168.1.3	TCP Ser...	Estab...	Haven't ...	Not Linked	B8AC6D4F	0	0	
2	Su...	LYH		192.168.1.209	192.168.1.2	TCP Clie...	Estab...	Haven't ...	Not Linked	B7F74C2A	0	0	Auto Search

Figure 31 successful TCP device pairing check

In the case of UDP pair-connection, the configuration parameters are shown in figure 32, and the parameters corresponding to the arrows must be one-to-one. As long as the parameters of UDP pair are configured correctly and the connection status is not checked, the data sent will be automatically sent to the specified device.

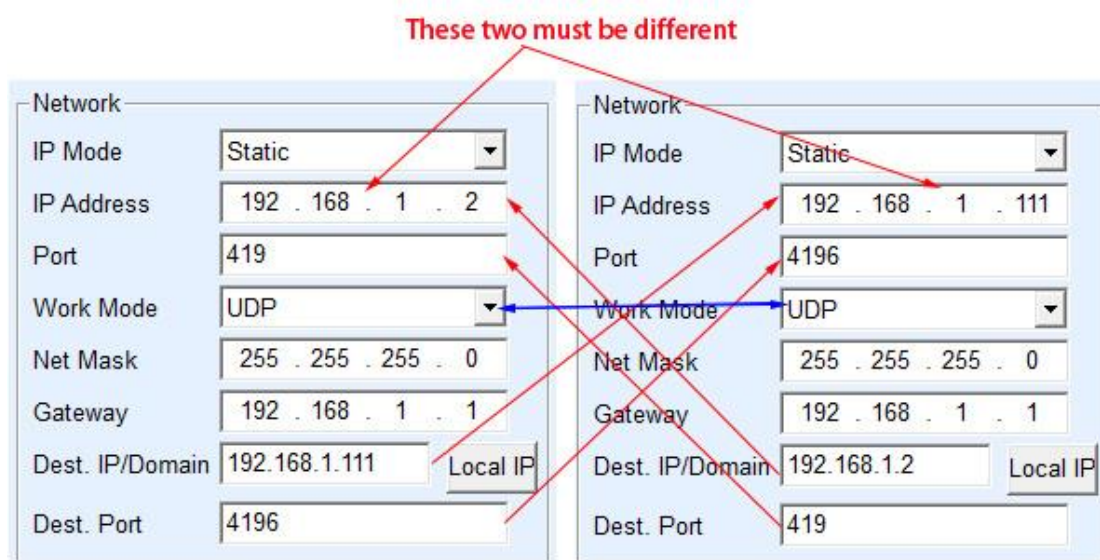


FIG. 32 configuration of UDP device pairing parameters

Finally, we need to remind that if the device is connected to each other, in addition to the above settings of the Ethernet port parameters, the serial port parameters must also be correctly set. Mainly is the serial port server baud rate and so on needs to be consistent with user's equipment baud rate and so on. With this setup, the user device can send data to each other through the serial ports of the two serial servers.

8. Device Debugging

8.1 Network Physical Connection

Confirm the wifi connection is normal through wifi_work and wifi_link indicator lights.

8.2 Network TCP Connection

When the device is in dynamic accessing IP mode, cannot directly connect to the computer network interface. Because no have DHCP server to be able to use (general DHCP server is the router in LAN). So please specify IP when connecting directly. The computer also needs to specify a fixed IP address.

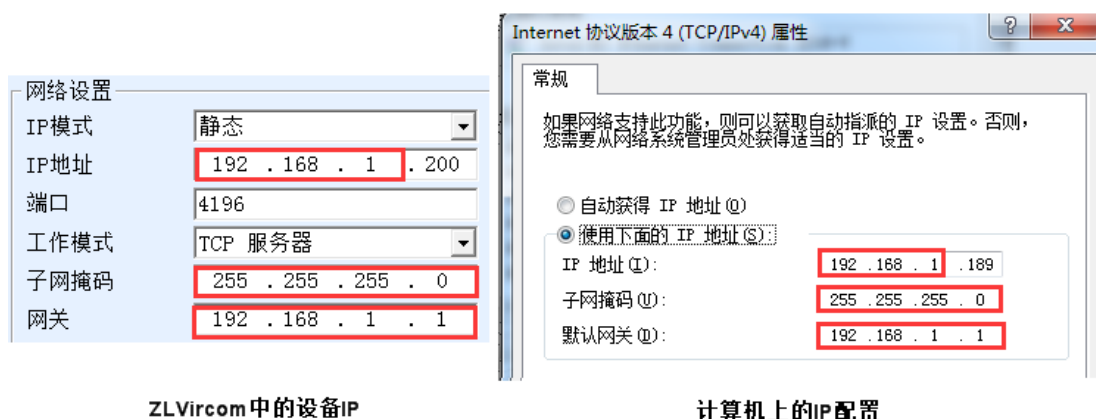


Figure 33 configure on the same network segment

When configured with static IP, both the device and the computer need to be on the same network segment (unless communicating across gateways), either directly or through a switch, as shown in figure 33.

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

After the configuration, the Link light turns blue when the TCP connection is established by using the steps of “6.4 TCP Communication Test” or “6.5 Virtual Serial Port Test”. The Link light blue can also be seen through ZLVircom, as in the device management list, if the TCP connection is listed as "established" then the Link light is blue, as shown in figure 34, which facilitates remote diagnosis.

Device Management												
In...	Ty...	Name	I	Dev IP	Dest IP	Work M...	TCP Conn...	Virtual ...	Vircom St...	Dev ID	TXD	RXD
1	Su...	ZLDEV00...		192.168.1.234	192.168.1.3	TCP Ser...	Established	Haven't ...	Not Linked	A10B...	45	1

Figure 34 Connection status and data send/receive status

8.3 Data Sending and Receiving

When the Link light turns blue, data can be sent and received between the software and the serial port server. If the software sends a message, the Active

light turns green for at least a second. The data is also output from 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 device will reply to the right instruction. If there is a reply (the serial port sends data to the network port), “Active” will turn blue. Otherwise, please check the serial port parameters or the connection of the serial port line.

In order to facilitate remote debugging, ZLVircom also supports remote viewing of data sent and received, as shown in figure 34, where TXD is the amount of data sent by the serial port server. When refreshing the list of devices, a change in this value indicates that data has been sent, and the Active light is also green. If you see a change in the RXD value it indicates that the serial device has returned data. Active is blue.

8.4 ZLVircom Remotely Monitor Data

In the case of virtual serial port, ZLVircom supports real-time capture of data sent and received from the virtual serial port. It is convenient for users to debug the system. The use method is as follows:

It is assumed that the virtual serial port communication has been established according to the “6.5 Virtual Serial Port Test” method. Now you need to monitor the data passing through the virtual serial port. Open the ZLVircom menu/configuration/software configuration/open the vircom configuration dialog box.

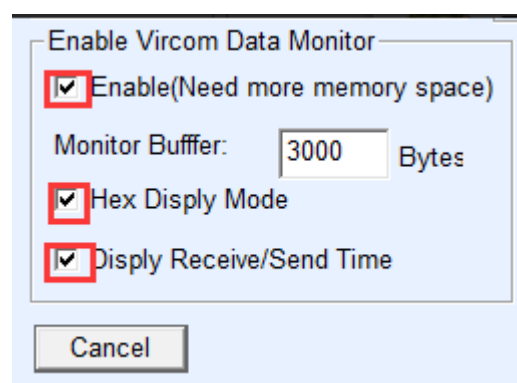
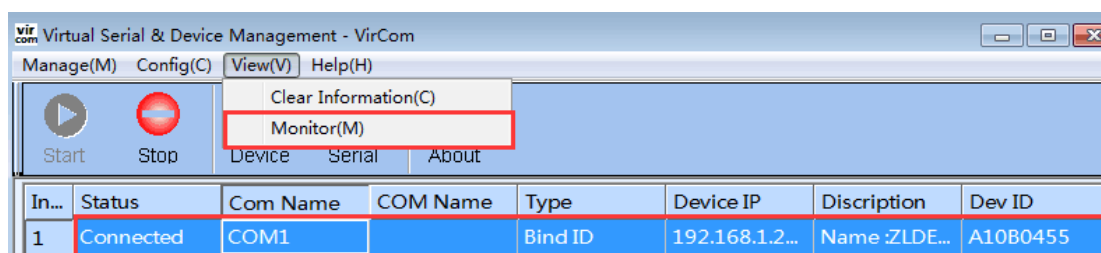
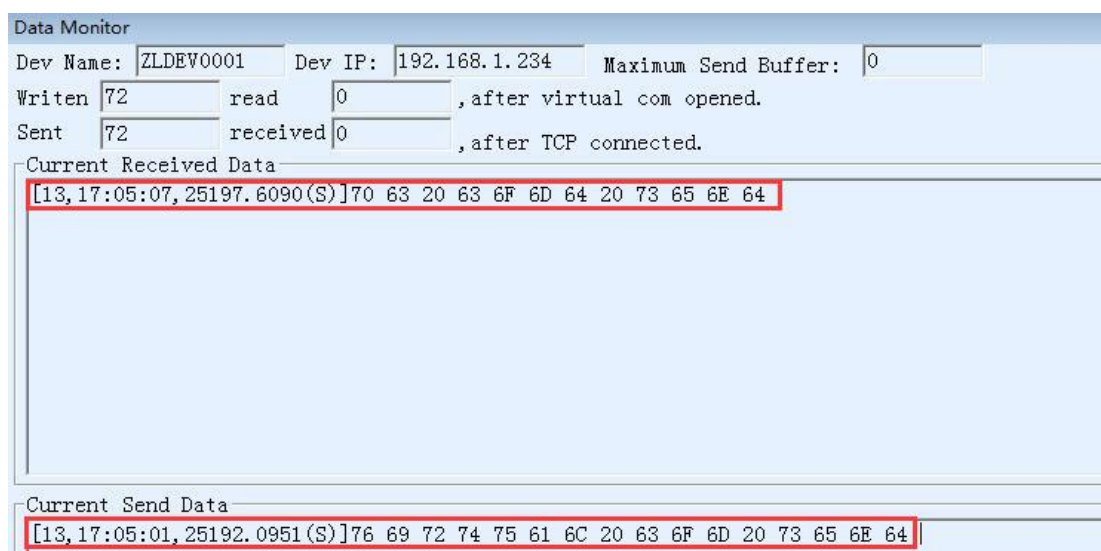


Figure 35 enabling ZLVirocm monitoring

Select the three options of enable monitoring, hexadecimal monitoring mode, and display the time of send-receive data, as shown in figure 33. 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 the menu/view/monitor, as shown in figure 36.

**Figure 36 Open ZLVirocm monitoring**

From the open dialog box, you can see the instructions issued by the upper computer and the instructions returned by the device, as shown in figure 37. This function can be convenient for field communication debugging.

**Figure 37 monitor send-receive data**

9. Modbus Advanced Features

The serial port server with Modbus gateway function does not have station address

and register. It is a communication bridge. It will generate Modbus RTU designation according to Slave ID, function code, register No. and register number in Modbus TCP instructions sent to Modbus gateway by user software and output them from the serial port. Think of it as a protocol "translator."

9.1 Enable Modbus Gateway

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

By default, a serial port server is in ordinary transparent transmission mode, if you need to Modbus gateway pattern, please choose the option "Modbus TCP \leftrightarrow RTU" in the "transfer protocol". The device then automatically changes the "port" parameter to 502 (the Modbus server's port). The Modbus gateway is thus enabled.

If the serial port RTU device is the slave station, then the host computer Modbus TCP software connects to port 502 of Modbus gateway. At this time, Modbus gateway needs to work in TCP server mode. If the serial port RTU is the main station, the Modbus gateway works on the TCP client side, and the destination IP fills in the IP of the computer on which the Modbus TCP software resides, and the destination port is generally 502.

9.2 Storage Modbus Gateway

7146 is a Modbus gateway with register storage. Compared with ordinary ZLAN5142 (the end of which is 2 or 0 is non-storage), 7146 can save the read contents of the registers in the gateway. In this way, the speed of Modbus TCP query can be greatly improved, and the performance is superior when supporting multi-host access.

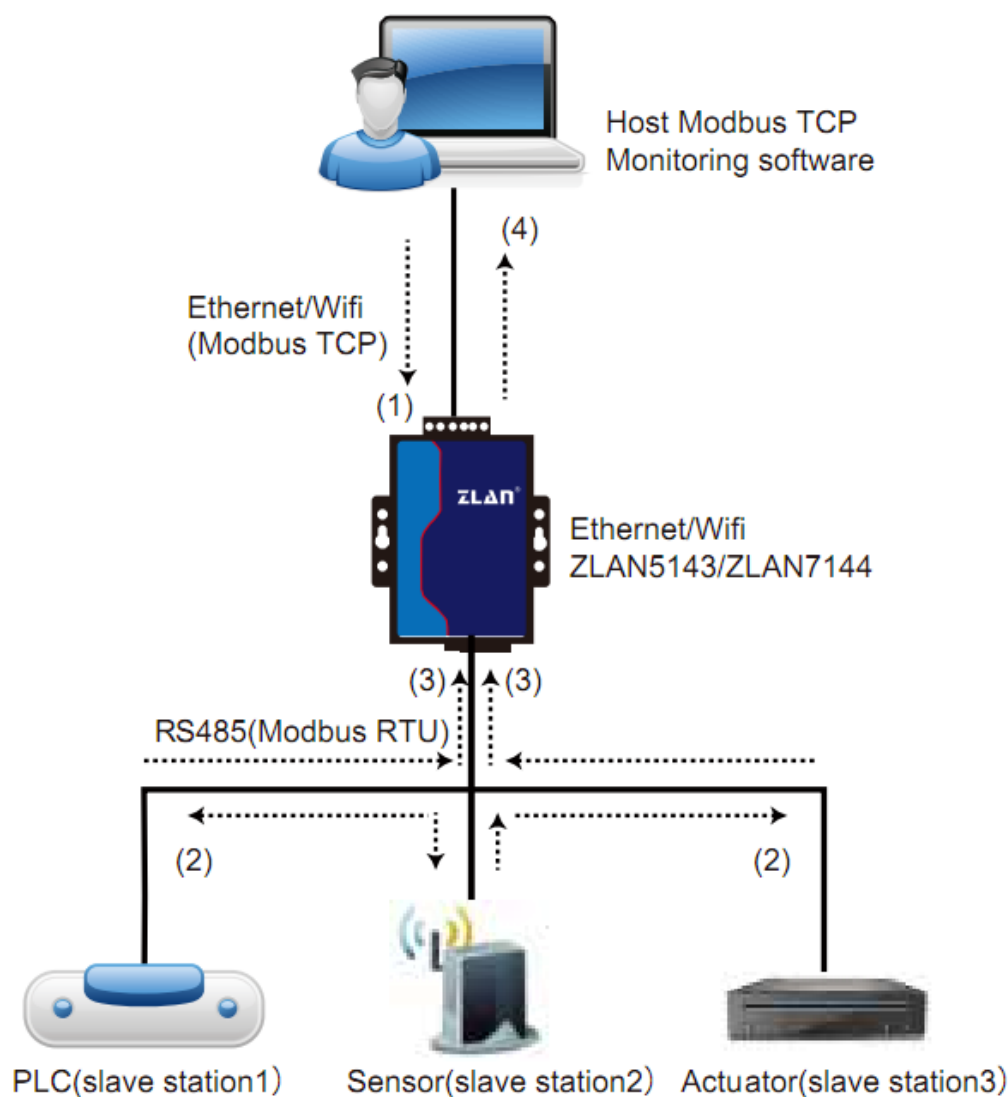


Figure 38 Storage Modbus Gateway

As shown in figure 38: ordinary Modbus TCP data flow direction (1) → (2) → (3) → (4). In other words, Modbus TCP instruction is first converted into corresponding Modbus RTU instruction, and then the device responds Modbus RTU instruction to Modbus gateway, which is then converted into Modbus TCP again and sent to the monitoring host computer.

As we know, Modbus TCP is a network communication with a fast transmission speed, which can be answered within 3ms, while Modbus RTU is RS485 with a speed of only 9600bps. Generally, it takes at least 30ms to send and return an instruction. Such a common non-storage Modbus gateway has a relatively long

query response time. In addition, if there are many upper computers to query data at the same time, the serial port will be congested. If the network is compared to the highway, the serial port is compared to the single-log bridge, then the original way is to pass the traffic flow of the highway on the single-log bridge.

Register save Modbus Gateway (7146) solves the above problem. It can temporarily save the register data obtained from the query in the Modbus gateway, so that when Modbus TCP query comes, Modbus gateway can immediately return the instruction, and truly give play to the rapid characteristics of Modbus TCP. On the other hand, 7146 can actively send instructions from the serial port to automatically update the data content of the currently saved register and save a copy of the latest register value.

In addition, 7146 is a fully automatic Modbus Gateway without configuration. Users do not need to configure required register addresses, function codes and slave station addresses. The 7146 will automatically recognize and dynamically add these registers according to Modbus TCP instructions sent from the network port.

When monitored by multiple computers, 7146 can show a good response speed. Regardless of the baud rate of the serial port, it can generally give the upper response data within 3ms. And it shows a good real-time update speed of serial data.

Modbus gateway with register storage is a real Modbus TCP to Modbus RTU, which gives full play to advantages of fast speed and multi-host simultaneous query of Modbus TCP.

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

The features of the storage Modbus are listed below:

- 1) The first Modbus TCP query instruction is non-stored. Because you have to

wait for the RTU device to slowly return data before returning the register contents to the network port.

- 2) If a particular instruction is no longer queried by the host computer on the network side within 5 seconds, the instruction is automatically deleted and no longer sent from the serial port to the RTU device.
- 3) Currently, it can store 10K Modbus cache. For ordinary single-register query, about 500 instructions can be stored at the same time.
- 4) When there are multiple instructions at the same time were queried, send in accordance with the order, send first instruction → first instruction reply → wait for 485 anti-collision time (refer to many host part) → the next instruction to send... . Return to the first instruction after the last instruction has been answered.

9.3 Disable Storage Functionality

Although the stored Modbus has a fast response speed, some users do not want the RTU device to receive a large number of query instructions, which will affect the internal processing speed of the instrument. You can turn off the storage function at this point.

To disable storage, click the “more advanced options” button in the “Parameters Setting” dialog box and remove one of the support and one of the enable options shown in figure 39 by clicking ok. Then go back to device Settings and click modify Settings.

Note that when configuring the transfer protocol in a Web method, the default is a non-storage Modbus gateway.

0 . 0 . 0 . 0	The Advanced Functions Supported		RS485 Multi-Host Support
Port 0	<input checked="" type="checkbox"/> IO Port Control	<input checked="" type="checkbox"/> UDP Group	<input type="checkbox"/> Support
<input type="checkbox"/> Need Authentication	<input checked="" type="checkbox"/> Multit-Dest IP	<input type="checkbox"/> Proxy Function	Maximum wait time of RS485 query command
Name	<input type="checkbox"/> SNMP Function	<input type="checkbox"/> P2P Function	192 ms (0~8191)
Key			
RS485 Bus Collision Detection Function			
<input type="checkbox"/> Enable	Send data only when RS485 bus is idle for 20 ms		
Wait max. of 3 (S) before timeout and send if bus always busy			

Figure 39 disables the storage function

9.4 Multi-host Function

As shown in figure 39, "RS458 multi-host support" and "RS485 bus collision detection function" are ZLAN's multi-host functions. They are generally both enabled and disabled at the same time. After enabling, the device that converts the protocol into Modbus TCP has the function of storage Modbus gateway; otherwise, it is a non-storage Modbus gateway. If the conversion protocol is none, generally, the user-defined RS485 protocol can also have the function of serial devices accessed by multiple hosts at the same time, which cannot be achieved in the pure RS485 network, because the sending of multiple master stations at the same time will cause conflicts on the RS485 bus. The multi-host of ZLAN serial port server can "coordinate" the RS485 bus so as to achieve the purpose of multi-host access.

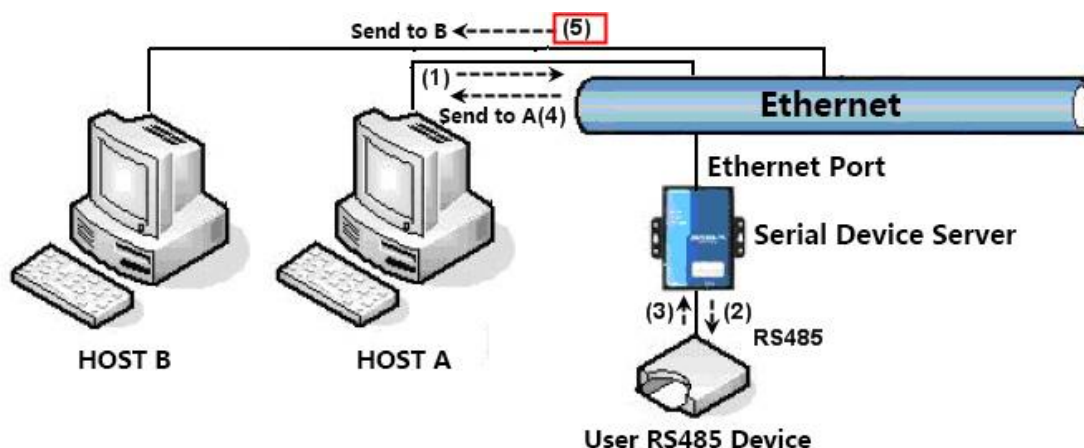


Figure 40 multi-host function demo

As shown in figure 40, in normal mode, when two hosts, host A and host B, are connected to the serial port server at the same time, host A sends (1) instruction, RS485 device receives (2) instruction, and RS485 device returns (3) instruction, but the serial port server sends (4) to host A and (5) to host B at the same time. Since host B did not send a query, but it also received a reply instruction (5), host B may generate a communication exception error. In the multi-host mode, only instructions (4) will be given and no instructions (5) will be given, because the serial port server will automatically remember the host that needs to be returned and only return the instructions to the nearest communication host. The query of host A will only reply to A, and the query of host B will reply to host B.

Another effect is that in normal mode, when host A and host B send data at the same time, the instruction combination will be generated on the RS485 bus, so that it cannot be recognized normally. In the multi-host mode, the serial port server can schedule the priority of A and B on the use bus, so as to solve the conflict problem of simultaneous access of multiple machines in an effective manner.

If the conversion protocol is "none", the default is not to enable multi-host function. If you need to enable multi-host, please click "more advanced options" in the device configuration dialog box, and then check "RS485 multi-host support".

9.5 Multi-host Parameter

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

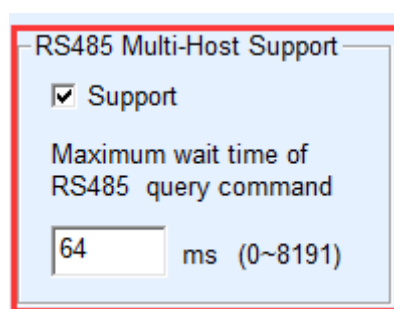
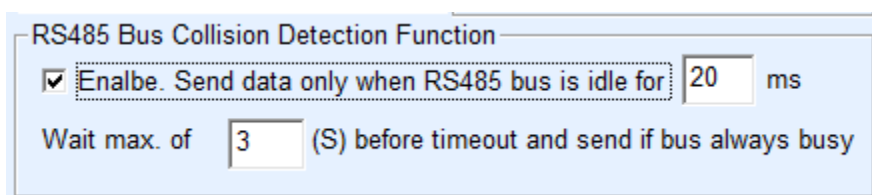


Figure 41 RS485 multi-host support

RS485 instruction reply timeout is: the maximum time interval between the start of sending this instruction and the receipt of the reply by the serial port server. The filling time should be greater than the actual maximum time interval. If the timeout is determined, the next instruction is sent.



RS485 Bus Collision Detection Function

☒ Enable. Send data only when RS485 bus is idle for 20 ms

Wait max. of 3 (S) before timeout and send if bus always busy

Figure 42 RS485 conflict free time

RS485 bus collision time: indicates how many milliseconds the serial server waits to send the second instruction after receiving the reply of the first instruction. This parameter actually defines the speed of instruction rotation. This value is recommended above 20ms. The "maximum wait time is 3 seconds" parameter does not need to be modified.

When the user use ZLVircom to select "Modbus TCP to RTU" as the transfer protocol, ZLVricom will automatically select the above two enabled boxes (unless the user manually enters the advanced option to remove), and the above two times will be automatically configured according to baud rate. However, if the user's Modus instruction is relatively long or the conversion protocol is "none", these two parameters need to be manually configured.

The following is the recommended setting values of the above parameters:

- 1) Figure 42 shows the "RS485 bus anti-collision time", which can be set as twice of the "packet interval" in the lower right corner of the parameter configuration interface, but the minimum value should not be less than 20.
- 2) Figure 41 shows "RS485 instruction reply timeout time", which is generally determined according to the length of the reply instruction. If the sending instruction is N bytes and the reply is M bytes, the recommended value is:

"packet interval" * (N+M+5) +100.

9.6 Non-storage Multiple Hosts

In some places, non-stored Modbus must be used. This is because when an event occurs, PLC will read the data in the register, but the data read is the data before the storage collection, which is logically incorrect. Therefore, 7146 must also support non-stored Modbus collection. However, on the other hand, it is also necessary to support multiple hosts at the same time. In order to cooperate with this approach, the maximum waiting time of RS485 bus can be changed to "2" on the basis of stored Modbus gateway (using 1.565 and above version of firmware). The 2 here is a special value that lets the module know that it needs to disable the stored function.

0 . 0 . 0 . 0

Port 0

☐ Need Authentication

Name

Key

The Advanced Functions Supported

- ☒ IO Port Control
- ☒ UDP Group
- ☒ Mult-Dest IP
- ☐ Proxy Function
- ☐ SNMP Function
- ☐ P2P Function

RS485 Multi-Host Support

☒ Support

Maximum wait time of RS485 query command

192 ms (0~8191)

RS485 Bus Collision Detection Function

☒ Enable. Send data only when RS485 bus is idle for 20 ms

Wait max. of 2 (S) before timeout and send if bus always busy

Figure 43 multi-host non-storage Settings

Note that each time Modbus TCP mode is set, the value must be set to 2 again, because re-selecting Modbus mode will automatically change to 3.

In this way, the functions of Modbus in model 3 will be similar to that of ZLAN5142, with multiple hosts and no storage functions.

9.7 Modbus Under Multi-destination IP

As shown in figure 40, if the serial port device (RTU device) is the master station

and the Modbus TCP device (Modbus TCP device) is the slave station, and multiple network port slave station devices exist simultaneously. In this case, the serial port server can be used as the client to connect to multiple network port devices at the same time according to the method introduced in "7.2.2 Client Connect to Multiple Servers".

At this point the need to achieve the function is: when instructions sent from the serial RTU can be sent to more than one network device, the network device identify whether to send their own through the Slave ID field, only the network devices corresponding to Slave ID make a response. After the network port reply is sent to the serial port server, it is converted into RTU instruction and output from the serial port to the RTU device.

At this point, it is important to note that the two checkmarks shown in figure 42 as "RS485 bus anti-collision time" and figure 41 as "RS485 instruction reply timeout time" need to be removed. Otherwise, the above forwarding function cannot be realized.

Another application method is that although the serial port server connects multiple network port devices as a Client, the RTU device is not the main station, but the network port device sends first and the RTU device answers (as the slave station). At this time, "RS485 bus conflict prevention time" and "RS485 instruction response timeout time" need to be checked, so that multiple hosts can access a RTU device at the same time.

9.8 Slave Station Under Client Mode

Sometimes 7146 is used as a client to connect to a cloud server. But 7146 as the slave station, that is, the cloud is the active query, 7146 response mode.

Figure 44 Modbus TCP conversion in Client Mode

Special Settings are required to keep the serial Numbers of the send and reply consistent.

Figure 45 Modbus TCP protocol transformation in Client Mode

Set the total idle time to 4, which is a special value to let 7146 know to switch to TCP client/cloud priority mode above the reply number.

10. Registration Pack and Heartbeat Pack

Registration and heartbeat packs are a feature that suitable for communication between devices and cloud-based software.

10.1 Registration Packet

The registry is defined as a string of code that is sent to the software when a TCP connection is established between the computer software and the serial server module (hereinafter referred to as the module) so that the software knows which module is communicating with it. This string of codes is the registry.

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, while the modules are scattered in various collection and monitoring points. How to make the cloud software identification module is very important and necessary for the realization of Internet of things communication.

Shanghai ZLAN serial server to provide the following types of registration.

10.1.1 Connect to send MAC Addresses

Connect to send MAC addresses: this is not only for model 4 (like 5143), but also for regular models. It does this by sending its MAC address to the cloud when the module is connected to the cloud. Since the MAC address is unique, the device can be uniquely identified. This approach is simple and effective without having to write a registry 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 middle and upper part, check the box in the front, then go back to the Settings interface and click "modify Settings".

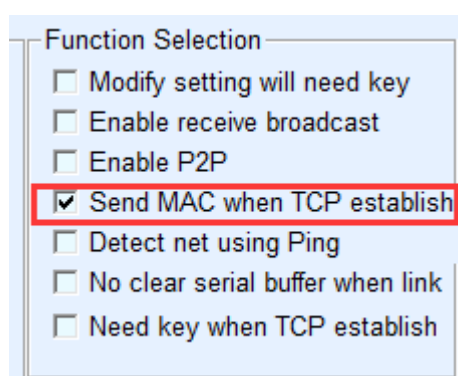
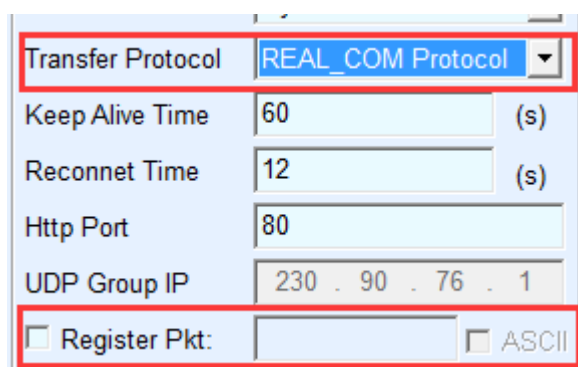


Figure 46 Connect to send MAC Addresses

10.1.2 Realcom Agreement

The Realcom protocol is a mature protocol with registry and heartbeat packages that users can use to implement registry and heartbeat package functionality. The way to enable Realcom protocol is to select "REAL_COM protocol" as "REAL_COM protocol" in the device Settings dialog box.

**Figure 47 Enable the realcom protocol**

It is not a transparent transport after the Realcom protocol enabled. It has the following features:

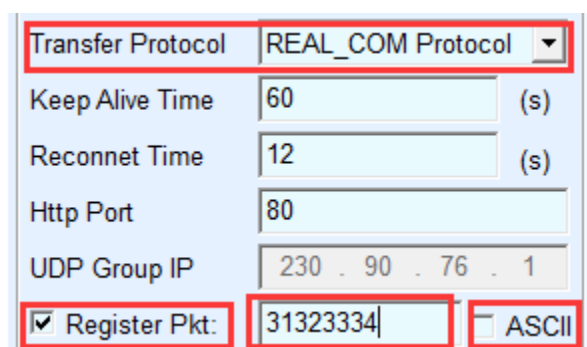
- 1) When a TCP connection is established between the device and the cloud, the device automatically sends a hex registry FA 07 13 02 FA 02 MAC[5] MAC[4] MAC[3] MAC[2] MAC[1] MAC[0] FA FF. The MAC[5]~MAC[0] is the MAC address of the device.
- 2) When the device sends data to the network, it will automatically add the 3-byte header prefix of FA 01 01.
- 3) The device sends a 00 byte heartbeat packet to the software every keep-alive time.

The REAL_COM protocol can be used as a registry for devices because the registry contains MAC addresses. But because it is a fixed format, it can only be designed in the cloud software that REALCOM protocol to be

compatible with this way.

10.1.3 Custom Registry

The custom registry format allows users to fill in an arbitrary registry format. The method is: in the device setting interface, the configuration is as follows:



Transfer Protocol	REAL_COM Protocol		
Keep Alive Time	60	(s)	
Reconnect Time	12	(s)	
Http Port	80		
UDP Group IP	230 . 90 . 76 . 1		
<input checked="" type="checkbox"/> Register Pkt:	31323334	<input type="checkbox"/> ASCII	

Figure 48 Set up the registry

The difference with the REAL_COM protocol is that the registry is enabled and the registry information 31 32 33 34 is filled in. Note that this is hexadecimal, which means that the actual data sent is the string 1234. If you need a string display, click the "ASCII" option.

When the device is connected to the cloud software, it can automatically send the hexadecimal registration package of 31 32 33 34. This registration method is more flexible, can let the device to adapt to the existing cloud registration format; However, there is no wildcard like MAC in the registry, so it is tedious to configure a different registry for each device. The above two methods of sending MAC addresses and REALCOM are the same for each device configuration, but they are naturally different for different MAC registries.

The maximum registered package length is 33 bytes. This mode supports UDP mode registration packages and heartbeat packages.

Note that if the wifi parameter or multi-destination IP parameter is set, it

will conflict with the custom registry heartbeat packet. At this time, it is recommended to use the transcode configuration file described in the next section to realize the registry and heartbeat packet.

10.1.4 Transcode Configuration Files

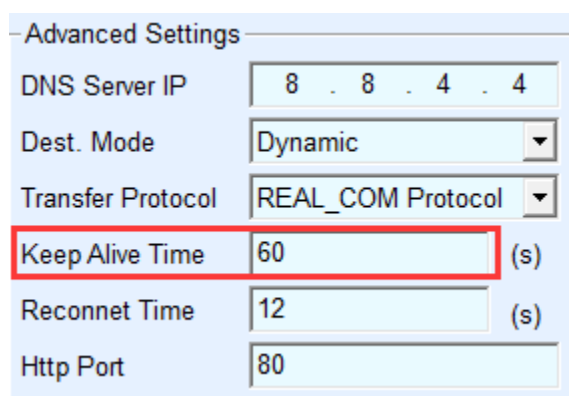
ZLAN 5143 series supports the "transcoding" function, which can write a transcoding configuration table for the serial server, so as to realize the user's fully customized registration package, and can use MAC address wildcard, can solve the trouble of writing a custom registration package for each device, and there is no limit on the length of the registration package.

Specific use method can consult ZLAN about "transcoding" function configuration, or refer to "12 Transcoding Function".

10.2 The Heartbeat Packets

Heartbeat packet is mainly used to detect whether the communication link is disconnected. The implementation method is that the device sends a heartbeat packet data to the server software every once in a while, which will be discarded by the server after receiving and will not be regarded as valid data for communication.

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 a heartbeat, the device on the TCP client will automatically re-establish a TCP connection, so it is a means to restore network communication.



Advanced Settings	
DNS Server IP	8 . 8 . 4 . 4
Dest. Mode	Dynamic
Transfer Protocol	REAL_COM Protocol
Keep Alive Time	60 (s)
Reconnet Time	12 (s)
Http Port	80

FIG. 49 Keep-alive time

As shown in figure 49, the sending time of the heartbeat packet is set by the "Keep alive time".

10.2.1 Implied Heartbeat

Even if no heartbeat packets are set, the ZLAN device enables the implied heartbeat when it is on the TCP Client. Therefore, the implied heartbeat function means that the device has sent data, but the server cannot receive the heartbeat data. Therefore, it cannot play the first function of heartbeat packet, that is, the server can detect whether the device is active or not. However, since the device actually sends data, it can play the second function of heartbeat packet, that is, the function of the device to detect whether the TCP connection is normal. Once the detection is broken, the TCP connection can still be re-established automatically.

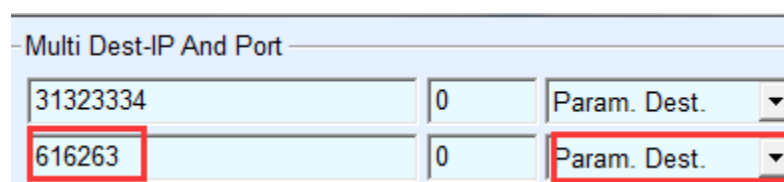
10.2.2 REALCOM agreement

As described in the "10.1.2 Realcom Protocol", the Realcom protocol can send a byte data of 00 at every guaranteed time, which is the heartbeat packet of the Realcom protocol.

10.2.3 Customize Heartbeat Packets

First, fill in the registration package according to the method of "10.1.3 Custom Registration Package". Then increase the heartbeat packet as

follows: click the "more advanced options" button in the device Settings, write the hexadecimal heartbeat packet in the second line of the multi-destination IP and port, and change the option on the right to "Parameter Packet Destination".



Multi Dest-IP And Port		
31323334	0	Param. Dest.
616263	0	Param. Dest.

Figure 50 Custom Registry

Note that the total number of registered and heartbeat packets is less than 33 bytes. The first line is actually the registry.

11. HTTPD Client Communication Function

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

When the collection terminal of the Internet of things interacts with the web server (HTTPD program), if the data can be submitted to the web server in the standard format of HTTP GET and POST instructions, 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.

To support this feature, download a configuration file of httpd.txt from the ZLAN serial port server. Download can be done using the firmware upgrade feature of zlvircom.

The features of ZLAN HTTPD Client communication include:

- 1) Device send: support to directly convert serial data into HTTP format by GET/POST, which can be directly recognized by the server.

- 2) Web server issue: the Web server can also send the required data to the serial port server through the GET/POST instruction, where 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 send a specific reply to the Web server indicating that the data has been received.
- 3) Support arbitrary conversion of input and output data between hexadecimal and string, convenient for the Web server to send data in character mode, and the serial port to control the serial device in hexadecimal data output.

For more information, please refer to the "ZLAN HTTPD Client Communication Mode" document.

12. Transcoding Functions

ZLAN serial port server transcoding function can achieve different device protocol into a unified protocol function.

Table 6 Transcoding Examples

Ethernet Port Instruction	Serial Port Instruction
01 02 03 04	a1 a2 a3 a4
11 12 13 14	b1 b2 b3 b4
21 22 23 24	c1 c2 c3 c4

As shown in table 5, when the network port receives 01 02 03 04 the serial port will output instructions of a1 a2 a3 a4. Similarly, when the serial port receives b1 b2 b3 b4, the network port actually sends 11 12 13 14. This enables the conversion of different protocols. This is just a simple example of a "transcode" function that can actually be converted to more complex protocols.

12.1 Enable the Transcoding

The configuration files converted by the command are written to the httpd.txt file and then downloaded to the ZLAN serial port server. To do this, create a new

httpd.txt document in the web page directory. If the user does not have a web directory, make a new webs directory and then make a separate httpd.txt file.

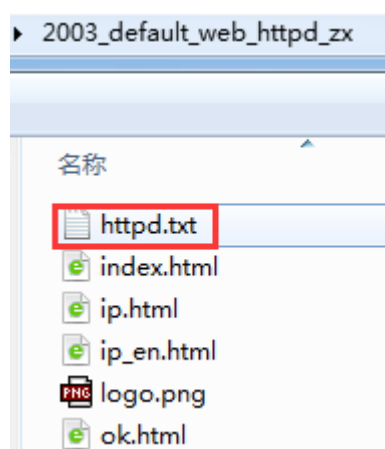


Figure 51 Web Directory

Now click the "upgrade firmware" button in "device configuration", and the web and firmware download page will pop up:

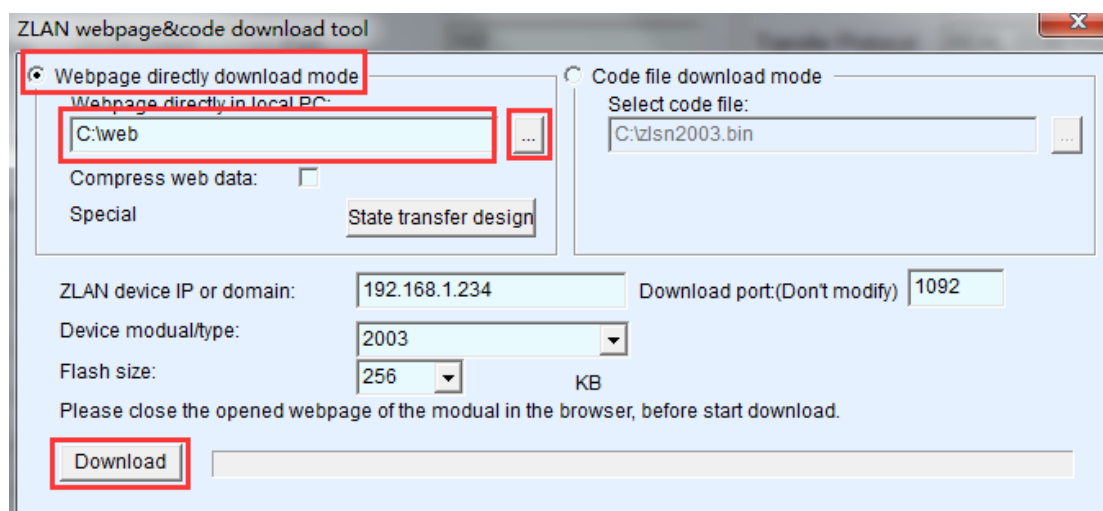


Figure 52 Download of http.txt

As shown above, select the web directory to download, then select the web directory you just created, and then click the "download" button to download httpd.txt into the device. Above IP, model, space size, port will be automatically filled in without configuration. Note: any time httpd.txt is updated, the device needs to be repowered.

12.2 Case of Transcoding Implementation

Because transcoding function is more complex, the length is longer. Without going into detail here, it is also possible to write the configuration file httpd.txt by using ZLAN engineer if necessary. ZLAN can also provide the configuration file httpd.txt for the existing case. At present, there are several typical cases as follows:

- 1) Fixed command translation and conversion.
- 2) Complex command conversion: the conversion of commands with wildcards, which can be shifted and assembled, such as the conversion of non-standard RS485 instructions into standard Modbus RTU instructions.
- 3) Multi-TCP connection recognition: when there are multiple TCP connections, the network port send data to the serial port will increase 4 byte prefix of IP+port. When a serial port is connected to a network port, the IP address + port can also be added to send data to the specified TCP connection.
- 4) Add the MAC address before sending TCP or UDP to identify the device.
- 5) IP filtering: the device only receives data from the network port with the specified IP address.
- 6) IO pin control: control the level of some output pins by any specified command.
- 7) Automatically query the content of the instrument of the lower computer, assemble the returned instruction and send it to the cloud software in a fixed format.
- 8) Implement heartbeat packets and registration packets with wildcards of any length.
- 9) Multiple serial instructions are combined and sent to the cloud after the combination.
- 10) The super-long serial instruction is split into several smaller instructions to be

read by the network device.

12.3 Notice

- 1) When "httpd.txt" is not stored, the device will be used as a normal serial port server. Transcoding is disabled.
- 2) To delete "httpd.txt" you can simply change "httpd.txt" to "1.txt" and then download it again. Re-downloading the firmware of the device will also delete the "httpd.txt" file, and downloading the firmware progress bar will delete the "httpd.txt" file if it only moves 1 frame. Refer to the following sections for download firmware methods.
- 3) The device must be restarted after downloading the "httpd.txt" file.
- 4) When an "http.txt" editing error causes syntax parsing to fail, which can cause a device startup exception, set the "def" switch (reset switch) of the device to "On" and re-power it. This will start without "httpd.txt". Please download the new "httpd.txt" or delete "httpd.txt" and then set "def" back to the "Off" position.

13. Network Interface to Modify Parameters

Network interface modification parameter is a function to search and modify device parameters like zlvircom software, that is, to manage the device and modify parameters through the network interface of the serial port server. Suitable for users who integrate search and configuration functions into the user's software.

Network interface modification parameters are realized through "UDP management port protocol", such as:

- 1) Computer software sends UDP broadcast packets with destination port of

1092 in the network. When the device receives the data packet, it will return its information to the computer software to achieve the purpose of searching the device.

- 2) The computer software sends the UDP modification parameter command to the 1092 port of the device to achieve the purpose of modifying the device parameter.

The detailed introduction of network interface modification parameters can be referred to the document of "UDP Management Port Protocol of ZLAN Networking Product". It can also be implemented directly using the device management function library of the "14 Device Management Function Library".

14. Device Management Function Library

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

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

Provide detailed API interface introduction documents and VC call Demo case. Can realize the 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. Please refer to "ZLAN WinP2p and equipment management development library" for details.

15. Serial Port Modify Parameters

Users can read and set parameters by sending instructions to the serial port of the serial port server. Suitable for users choose chip or module level products to control and configure through the serial port. Parameters that can be set include: IP address, baud rate, device name, working mode, etc. After setting the new parameters, you can restart the serial port server through the serial port instruction.

ZLAN serial instruction has the following characteristics:

- 1) The serial instruction uses 10 bytes of data leading code, so there is no need to distinguish the communication data or command through the pull down and pull up of another configuration pin, and there is no need to switch the command mode and communication mode, which is more flexible and convenient to use.
- 2) The command set contains a variety of command formats such as save parameters, do not save parameters, restart devices, and so on.
- 3) Can achieve 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 TCP Server to TCP Client mode, can actively connect to the server; You can disconnect from the TCP server when switching from the TCP Client to the TCP Server.

Please refer to “Serial port modification parameters and hardware TCP/IP protocol stack” for detailed operation methods.

16. Remote device management

The so-called remote device management refers to the maintenance and management of the device through ZLVircom software, including restarting the

device, modifying parameters and upgrading firmware. This feature is suitable for users who manage devices through ZLVircom.

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

- 1) Automatic search: under the same switch of the device and computer, whether in the same network segment or not, the method of ZLVircom on the computer search for devices are: ZLVircomsend broadcast query→All devices will reply their parameters to the ZLVircom tool after receiving the query. This method searches all devices at once.

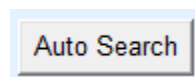


Figure 53 automatic search

- 2) Manual add: divided into two cases:

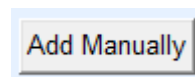


Figure 54 add manually

- a) Large routers split the network: in some large networks, the broadcast packets are split by the router so that the broadcast packets cannot reach the device, but pinging device IP is enabled. At this point, you generally need to manually add to solve. The method of manual addition is to click "manual addition" in the "device management" dialog box to add the first and last IP to query the devices one by one.
- b) Public network server query internal network equipment: the serial server in the internal network and as a TCP Server mode, zlvircom in the public network IP server. At this time, a port mapping of 1092 UDP should be made on the router of the network where the device is located, which is mapped to the IP of the device. Then, zlvircom will manually add the

device, and the IP is the public network IP of the device.

- 3) TCP Client: when the device is a TCP Client, it initiates a TCP connection to port 4196 of the destination IP (116.15.2.3). When the connection is established, each hold time automatically sends its own parameter system to the UDP port (not TCP) on the destination port (4196 in this case,), enabling zlvircom to 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 by changing the menu/configuration/software configuration/default listening port, and then starting zlvircom will ignore the execution if TCP port conflict pops up.

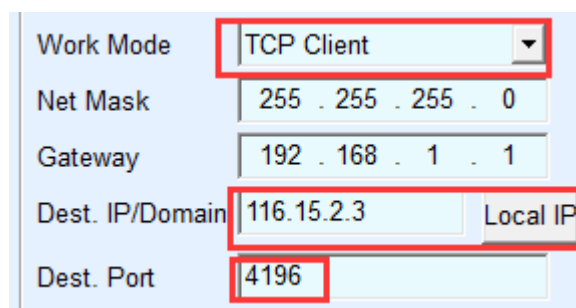


Figure 55 client

- 4) Timing sending parameters: even if the serial server is in the mode of TCP server, you can check the "timing sending parameters" function and send parameters to the destination port of the destination IP (in this case, 116.15.2.3) every 5 minutes. Zlvircom, which receives parameters on this port of the server, can manage these devices.

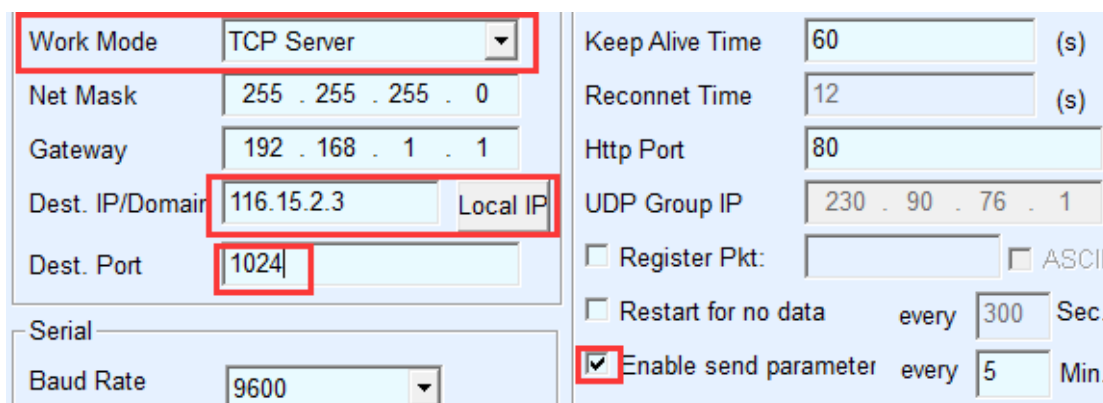


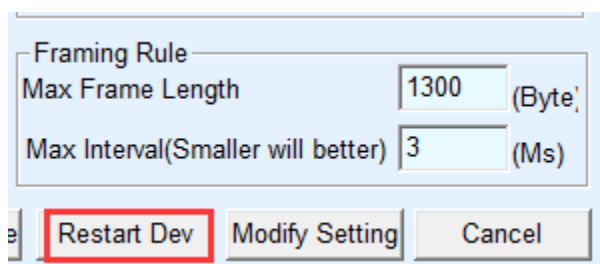
Figure 56 timing sending parameters

To facilitate device identification, give the device an easy-to-remember name if remote administration is required.

17. Firmware upgrade method

ZLSN7146 can upgrade their own programs, but not each other. Firmware updates can be applied to devices found in the device list, whether through automatic search, manual addition, or P2P search.

- 1) Get the ZLSN7146 firmware file from ZLAN, such as 1.539(7146).bin.
- 2) In the ZLVircom tool, first search for the device that needs to be upgraded, and then go to the device parameter edit dialog box. First click "restart device" once.

**Figure 57 upgrade button**

After the device is restarted, use the same method to search the device again and enter the dialog again. Click the "upgrade firmware" button in the lower right corner of the dialog box.

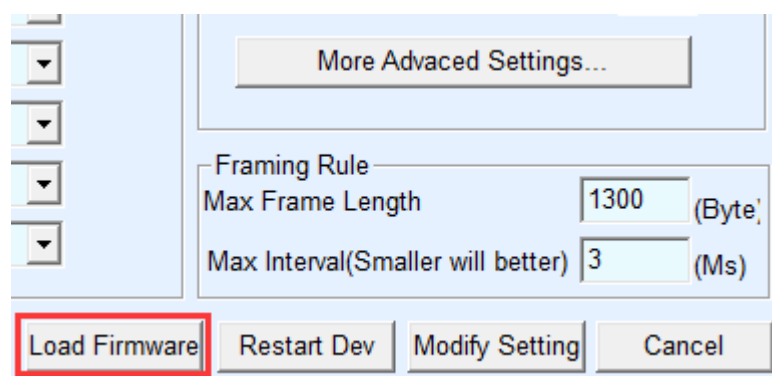
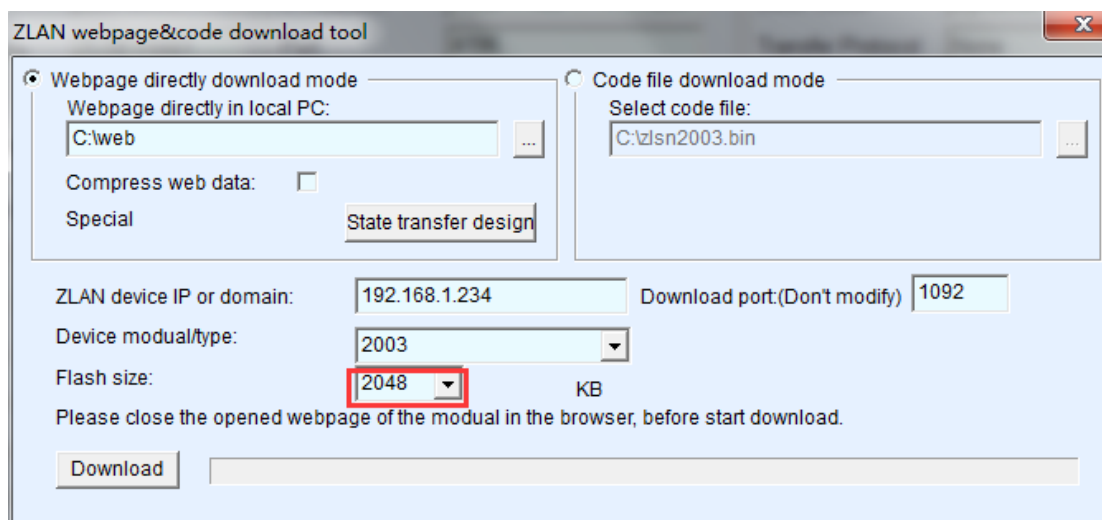


Figure 58 upgrade button

- 3) As shown, select the “program file download” radio option. In the program file, select the firmware file. The IP address part of the serial port server has been filled in automatically, no need to write again, and the module type/model has been selected automatically. Then click download.

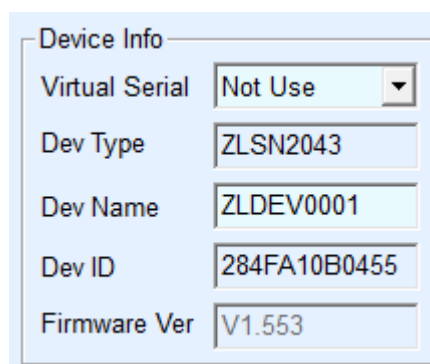
**Figure 59 Firmware upgrade method of ZLSN2003**

- 4) The download bar starts to move, and the download takes about 30 seconds. The ACT lights on the device will flash during the download, and the LINK lights will flash a few times at the end of the download. Then the program pops up the prompt box of "do not power off the LINK light blinking device after transmission". Note: this is only after the transmission is completed, it will take about 3 seconds to write the flash process. At this time, the LINK light will flash, please don't power off in the time.
- 5) Generally after the completion of the download the procedures will automatically restart, generally without power. See the running indicator light flashing. If there is no automatic restart, please power on again after the LINK light flashing stop for more than 30 seconds.
- 6) Web configuration interface update: after firmware upgrade, the configuration page inside the module also needs to be updated, otherwise it cannot be

configured through the Web again, but it does not affect the communication. Web pages can also be downloaded without a web configuration. To download the Web, change the "program file" download mode to "Web directory download" as shown in the figure. And select the root directory where the local web page is located as the directory where the web files need to be downloaded (the directory can be obtained from ZLAN), click download, and download all the files in the local web page directory to the internal file system of the device.

7) Note:

- a) If download under AP mode
- b) If the prompt fails, the device will not be damaged. Please restart the download. In addition, at the end of the download, please do not power off when the LINK light flashes, otherwise the device will be damaged.
- c) Check out the firmware version number of ZLVircom to find out whether the new firmware has been downloaded successfully.



Device Info	
Virtual Serial	Not Use
Dev Type	ZLSN2043
Dev Name	ZLDEV0001
Dev ID	284FA10B0455
Firmware Ver	V1.553

Figure 60 check firmware version after upgrade

18. Multi-wifi Parameter Configuration

18.1 Usage scenarios

The function of multi-wifi parameter configuration is to enable ZLSN7146 to have multiple WIFI parameters, such as 3, which can be applied in: STA mode recovery

to AP, multi-router backup and other occasions.

18.1.1 STA Mode Restored to AP

When the STA mode parameter configuration is wrong, it can be switched to AP mode, so that the laptop can connect to the wifi module again and reconfigure.

By default, if the module is used as STA mode, and if the configured SSID and password are wrong, the router will not be connected. At this time, you must use reset switch to reset to AP mode or search through the Ethernet port of the module, and then reconfigure WIFI parameters with the ZLVircom tool. In some cases, it is not convenient to toggle the reset switch of the module and connect to the Ethernet port, so the WIFI parameters are rotated between STA→AP→STA→AP. When the WIFI parameters are in AP mode, the user can connect to the module and reconfigure. The WIFI parameter switch will stop when any WIFI connection is established. Duration at STA and AP can be set when switching.

18.1.2 Multi-router Backup

Choose to switch between multiple routers, such as STA1 → STA2 → STA3 ... → STA1 →.... As STA1 is connected to the first router, if not success, switch to STA2 mode and connect to the second router. This allows for multiple router backups, and if one of the routers fails to establish a WIFI connection, you can switch to a second router.

This method allows two routers to be placed on site. When the first router fails to establish WIFI connection, it can immediately switch to the second router to realize hot standby.

18.2 Wifi.txt File Format

Wifi.txt is a configuration file whose contents are as follows:

DEFAULT_WIFI_TIME=10

WIFI_CONFIG_COUNT=2

WIFI_MODE1=STA

WIFI_SSID1=TP-LINK_2312

WIFI_CRYPT1=AUTO

WIFI_KEY1=12345678

WIFI_BRIDGE1=0

WIFI_DHCP1=0

WIFI_TIME1=10

WIFI_MODE2=AP

WIFI_SSID2=TEMP_AP

WIFI_CRYPT2=NONE

WIFI_IP2=192.168.1.200

WIFI_TIME2=10

We assume that the WIFI parameters configured with ZLVircom are DEFAULT_WIFI parameters, and the WIFI.txt configuration file contains WIFI1 parameters, WIFI2 parameters... WIFIN parameters, etc. After download the wifi.txt to ZLSN7146, it will circularly switch between DEFAULT_WIFI → WIFI1 → WIFI2 → ...WIFIN → DEFAULT_WIFI →

DEFAULT_WIFI_TIME=10 means the amount of time that stay in DEFAULT_WIFI, in seconds, so here is 10 seconds. WIFI_CONFIG_COUNT=2 indicates how many wifi parameters are in wifi.txt (DEFAULT_WIFI is not included).

WIFI_MODE1=STA represents the working mode of WIFI1, with a value of STA or AP.

WIFI_SSID1= tp-link_2312 represents the SSID of the connected router, or its own SSID name if it is AP mode.

WIFI_CRYPT1=AUTO indicates the encryption mode, or if there is no password, it will be NONE. Otherwise, just write AUTO. Other optional WEP64, WEP128, AES, TKIP are not commonly used.

WIFI_KEY1=12345678 represents the router's wifi password.

WIFI_BRIDGE1=0 indicates whether the network port and wifi are interconnected, while 0 indicates not. You can ignore this line if you don't care, and the default is not interconnected.

WIFI_DHCP1=0 indicates whether the DHCP server function is enabled, while 0 indicates not. When this line is not written by default, the DHCP server is turned on in AP Mode and DHCP server is turned off in STA Mode.

The line WIFI_TIME1=10 cannot be omitted, indicating how long it will be stay if the WIFI connection cannot be established in WIFI1 mode. Here it is 10 seconds.

WIFI_IP2=192.168.1.200, which means the IP is set to static mode and the IP address is 192.168.1.200. This is because if the IP is acquired dynamically in the STA mode, the IP may not be acquired in the AP mode when the router is not connected, so it must exist as a static IP.

18.3 Download method

The procedure of downloading wifi.txt to ZLSN7146 is to create a new wifi.txt document in the web page directory. If the user does not have a web directory, make a new webs directory and then make a separate wifi.txt file.

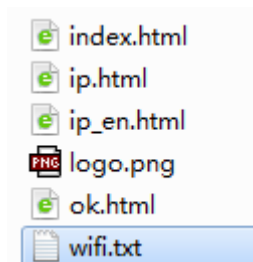


Figure 61 web directory

Now click the "upgrade firmware" button in "device configuration", and the web and firmware download page will pop up:

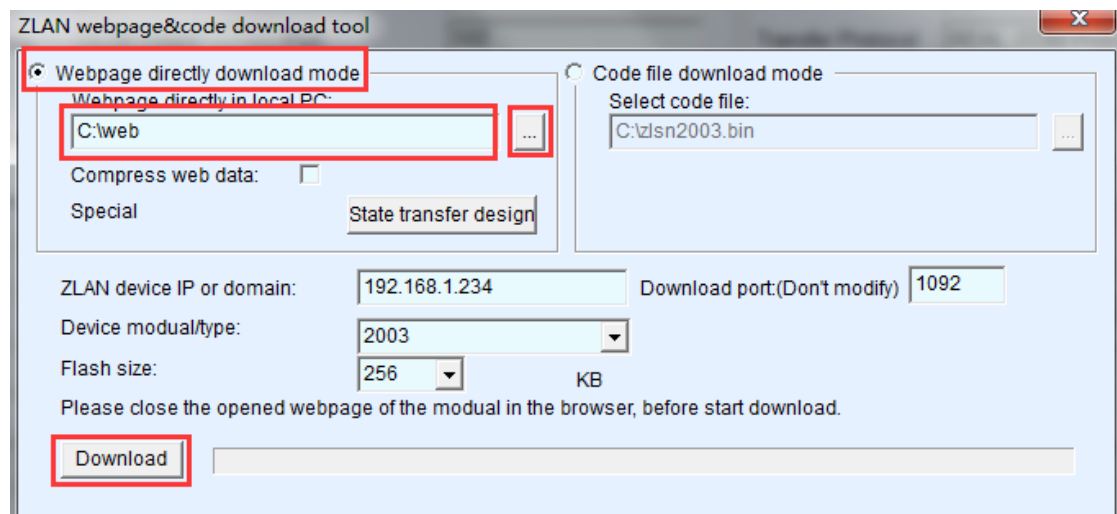


Figure 62 download of wifi.txt

As shown above, select the web directory to download, then select the web directory you just created, and then click the "download" button to download wifi.txt into the device. Above IP, model, space size, port will be automatically filled in without configuration. Note: any time wifi.txt is updated, the device needs to be repowered.

18.4 Wifi.txt example

18.4.1 STA mode restored to AP

DEFAULT_WIFI_TIME=120

WIFI_CONFIG_COUNT=1

WIFI_MODE1=AP

WIFI_SSID1=TEMP_AP

WIFI_IP1=192.168.1.200

WIFI_TIME1=300

When the wifi parameter configured by zlvircom is STA mode, if the connection fails for 2 minutes, it will switch to AP mode. The hotspot name is TEMP_AP, and it will stay for 5 minutes. If there is no laptop connection, it will try to connect in STA mode.

18.4.2 Multi-router Backup

DEFAULT_WIFI_TIME=60

WIFI_CONFIG_COUNT=1

WIFI_MODE1=STA

WIFI_SSID1=TP-LINK_2312

WIFI_CRYPT1=AUTO

WIFI_KEY1=12345678

WIFI_TIME1=60

When the wifi parameter configured by ZLVircom cannot be connected for 1 minute, try to connect to the router of tp-link_2312, and then connect to the parameter configured by ZLVircom if cannot connect. Do this again and again until a wifi connection is established.

18.5 Notice

- 1) If there is no wifi.txt, only the wifi parameter configured by ZLVircom exists, which is the same as the usage of non wifi.txt. The content of wifi.txt is empty, just like it does not exist.
- 2) When the reset switch DEF is on, wifi.txt will not be loaded. If the module is abnormal due to an abnormal wifi.txt format during debugging, you can set DEF to the reset position and then download wifi.txt again.

- 3) If the wifi connection is established, but the TCP connection cannot be established, the second wifi parameter will not be switched.
- 4) Note that after downloading wifi.txt, you need to restart the module before it can take effect.
- 5) After upgrading the firmware, wifi.txt will be lost and need to be downloaded again.
- 6) Download firmware failure:
 - a) When there is wifi.txt, there will be wifi switch. At this time, if the firmware needs to be upgraded, the wifi connection shall be established first, otherwise the module will be reset constantly, thus the firmware cannot be upgraded.
 - b) When switching between various wifi parameters, the IP address of the device may switch between the IP set in the main interface of the device and WIFI_IP1. Therefore, if the download fails, the IP of the download interface may be incorrect. At this time, it is necessary to go back to the device search interface and search the device again to obtain the current real IP before downloading.
- 7) If the STA mode is to automatically fetch IP (IP mode is DHCP), DEFAULT_WIFI_TIME needs to be reduced appropriately. The reason is that the IP cannot be obtained without wifi connection, but the IP will be tried for about 1 minute before the timing starts, so DEFAULT_WIFI_TIME should be 60 less than the usual value, but not 0.
- 8) When ZLSN7146 switches from the default STA parameter of DEFAULT_WIFI to the AP parameter of WIFI1, the wifi parameter seen on the web interface is WIFI1 (although the DEFAULT_WIFI parameter is seen from zlvircom). If you need to modify wifi parameters through the web, you need to modify all wifi parameters, including STA/AP, SSID, password and encryption

mode.

19. Order information

Model	Function
ZLAN7146	2.4G
ZLAN7146-5	2.4G/5G
ZLAN7146N	2.4G P2P
ZLAN7146N-5	2.4G/5G, P2P

20. After-Service

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