Product Name	GAOTek Healthcare Ethernet Modbus
Product SKU	GAOTek-HI-145
Product URL	https://gaotek.com/product/gaotek-healthcare-ethernet-modbus/

Contact us: sales@gaotek.com

Contents

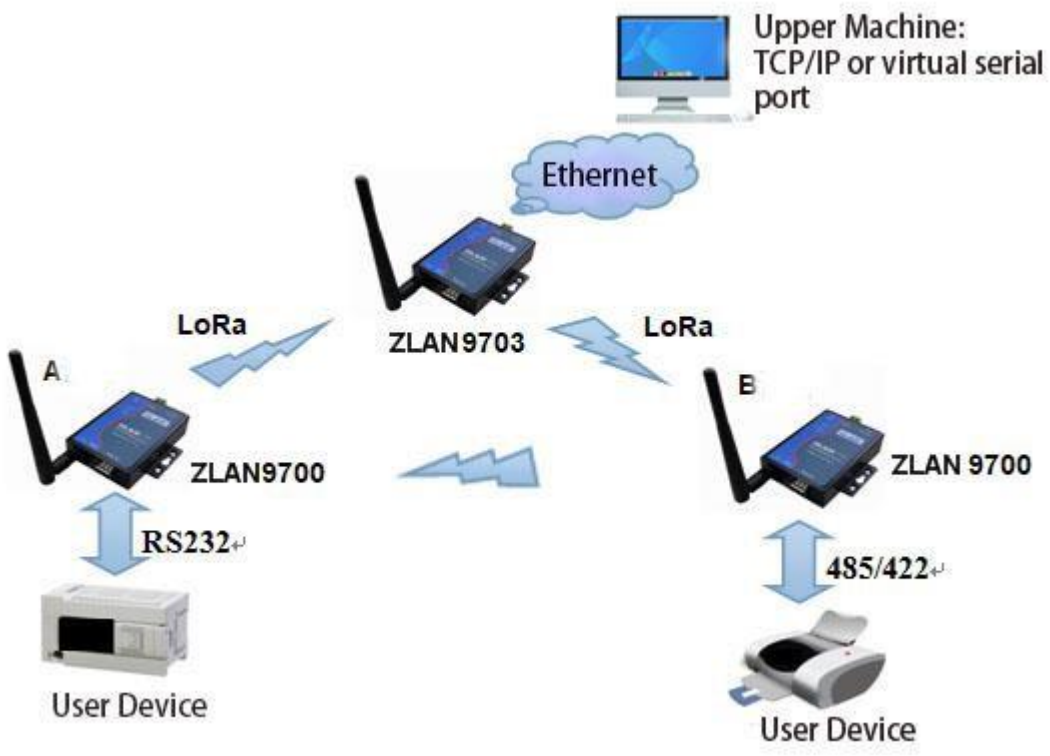
GAOTek Healthcare Ethernet Modbus

1. Summary

The product is a long-distance wireless communication scheme. Compared with GPRS and 4G solutions, it does not require a monthly fee for access to the network, and it has a longer distance compared with WIFI and Zigbee. Hence, this product is becoming more and more widely used in small data long-distance communication.

The product adopts SX1287 chip and use modulation technology to achieve a receiving sensitivity of -140dBm and output power of +20dBm. The outdoor line-of-sight communication distance is 8km, featuring long distance, low power consumption and anti-interference.

Gateway/Ethernet to



Picture 3: When it is used for wireless transmission and communication of two serial port devices, connect two Zlan9700 (A and B in the figure) to the serial port of the device respectively, and then the serial port data of the two devices can be forwarded to each other through the device's network.

Testing Environment	Testing Distance
Unobstructed communication	Around 8 Km
Urban roads travel in straight lines	Around 6 Km
Cities are sheltered by buildings	Around 1 Km

When collecting device data through TCP/IP of the upper computer, a network port is connected to the Ethernet network. Multiple converters can be connected to the device end to collect data, and then the data is transferred to 9743 through the device, which is then

transferred to the computer through Ethernet. Computer and 9743 can adopt Modbus TCP, virtual serial port, JSON, TCP/IP protocol and other modes.

Application:

- Power electronics; intelligent instruments;
- Industrial automation system;
- The internet of things; Climate and geological monitoring
- Building/access/security control system

2. Function

Communication Distance	Testing distance
Within the building	Through 5 floors

2. The device contains multiple to Ethernet functions，realize to TCP/IP。

2.1 Can be configured as TCP Server, TCP Client, UDP, etc.

2.2 Equipped with Windows virtual serial port & device management tool, support virtual serial port.

2.3 Support Modbus TCP to Modbus RTU mode data acquisition.

2.4 Supports Modbus RTU and 645 protocol devices to automatically collect data and send it to the server in JSON format +MQTT protocol.

3 LED indicator lights indicate the direction of data flow, the state of communication, and the running state of the equipment, which can directly reflect the state of the equipment.

3. Technical Parameter

	Working voltage	DC9 - 24V
Data	Working current	9700：30mA@12V 9743：160mA@12V
	Environment Temperature	-40°C to 85°C (-40°F to 185°F)
	Environment humidity	< 95%RH
	Respond speed	The default wireless configuration of the 9600bps takes 70milliseconds to send and receive 1 byte of data.
Wireless Communication	Transmit Distance	The outdoor area has no shelter of 6km - 8km, and the indoor area crosses about 5 floors.
	Frequency range	410MHz - 525MHz
	Wireless channel	115
	Receiving sensitivity	-140dbm
	Transmission power	20dbm
	Modulation method	Patented modulation technology
	Wireless Connection	External SMA male antenna, suction cup antenna 1meters; Working frequency：490MHz
Cable communication	Serial Port Data	Baud Rate：1200~115200bps；Check Bits：None, Even, Odd；Digit 8；Stop bits 1
	Ethernet Protocol	(Only 9743 support TCP/IP protocol) ETHERNET、IP、TCP、UDP、HTTP、ARP、ICMP、DHCP、DNS

Outline	Interface	485/422：Terminal； 232： DB9； Ethernet：RJ45
	Power Supply	Positive inside and negative outside, standard power socket
	Size	L x W x H =9.4cm×6.5cm×2.5cm

4. Hardware

The front view of GAOTek Healthcare Ethernet Modbus to Ethernet/serial port is shown in Figure 4. The product uses black radiation resistant SECC plates. There are two "ears" on the left and right for easy installation.

Size:

Length × Width × Height=9.4cm×6.5cm×2.5cm

Picture 4 9700 Front View

Picture 5 9743 Front View

Panel Lights：

1. ACT：The ACT light is green to indicate that data is being received from and transmitted to the serial port/Ethernet. When the ACT light is blue, the data is being sent to . If the data is relatively short, the flashing time is relatively short, you need to pay attention to check. And the blue is bright, easy to cover the green.

2. LINK：This indicator is only valid for GAOTek Healthcare Ethernet Modbus

.

When the LINK light is green, it means that the RJ45 network cable has been connected. When the LINK light is blue, the TCP connection is established or in UDP mode.

3. POWER：When green, it indicates that 9700/9743 has been powered on; If it is blue, it means that it is in the configuration mode. In the configuration mode, the device can be configured with the AT command AT 9600 baud rate, but in the working mode, the LOLA parameter of the device can also be configured with the serial port search function of the tool.

4. ：The green flashes every second to indicate that the device has been in operation; A constant blue light indicates that data has been received from the network within 10 seconds, indicating to some extent that the network is in a valid communication state.

Picture 6 9743 Front Interface

The front panel of 9700/9743 is shown in Picture 6, from left to are respectively：

1. Network port: Standard RJ45 interface. If bit 9700, this interface is invalid.

2. R-, R+, T+, T-: T+ is RS485A, T- is RS485B; If you need RS422, you need to connect R- and R+.

3. Terminal type power supply +, -: the voltage is 9 - 24VDC.

4. Power socket: can use standard plug 5.5mm (the inner core is positive), voltage 9 to 24VDC. The back plate of 9700/9743 is shown in Fig. 7, from left to are respectively:

Picture 7 9743 Back side 1

Antenna: 1 m suction cup antenna.

2. Conifg Switch: When dialing ON, enter the configuration mode of. At this time, it can be configured with AT instruction. For Zlan9743, the IP of the device is also restored to the default 192.168.1.254。

3. Serial port adopts standard DB9 male head: line sequence is shown in:

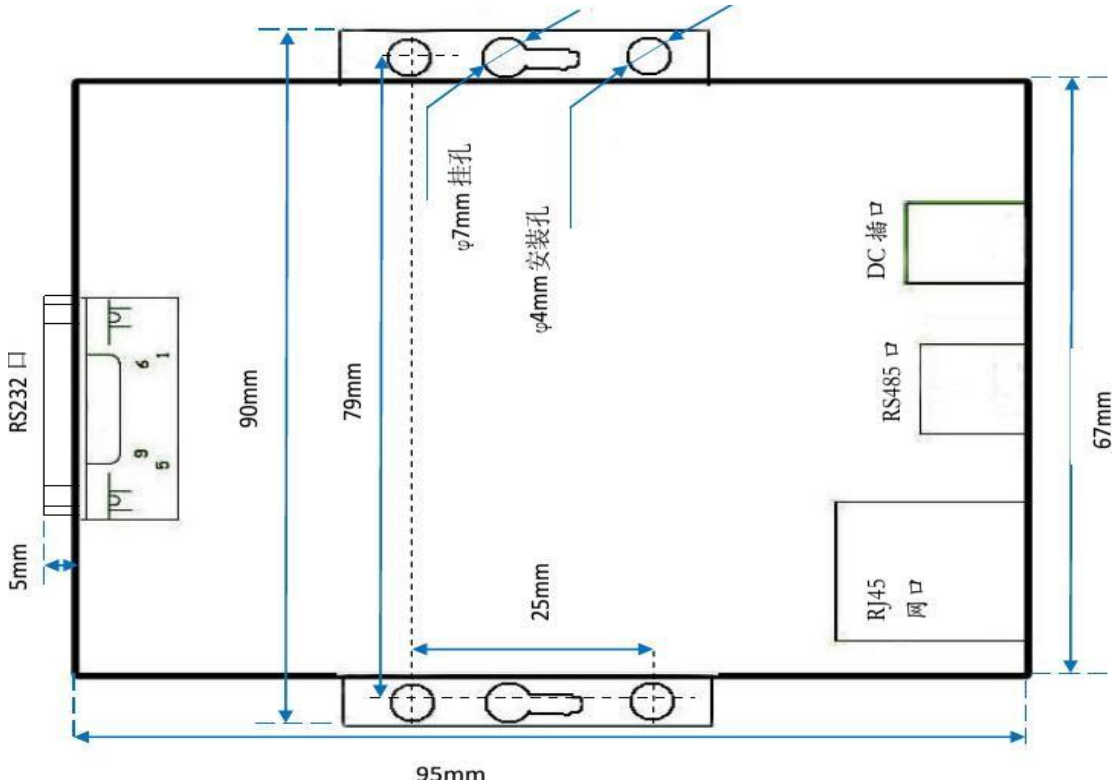
Form 1

NO.	Name	Function
2	RXD	The serial server receives pins
3	TXD	The serial server sends pins
5	GND	Ground wire

7	RTS	After the flow control is enabled, the serial port server will accept data from the serial port device when the pin is 0.
8	CTS	After the flow control is enabled, the serial port server will send data to the serial port device when the pin is 0

5. Outline Size

Length × Width × Height = 9.4cm×6.5cm×2.5cm:



6. Configuration

The devices must be configured with the same parameters to communicate with each other, which include: spread spectrum factor, bandwidth, encoding rate, and frequency. The Config button can be configured using the AT directive when the button is pressed On, but it is more commonly configured using the tool without the need to flip the Config button.

The baud rate of 9600bps is adopted in the default mode. If the user only needs one network on site, no parameter configuration is needed and the power can be used.

6.1 Configuration Steps

1. The device is connected to 9 to 24V DC power supply. You should see the POWER light in green at this point.
2. Connect the RS232 serial port of the 9700/9743 to the serial port of the computer (it can be the serial port of the USB to serial port line).
3. Run 5.41 (http://zlmcu.com/download/.zip) above (" about "dialog box you can see through software version), click on the main interface" equipment management "button, and then click" serial search "button.

The dialog box will automatically list the serial ports existing in the computer, select the corresponding serial port and click the "Search" button. At this point, you see the device's ACT light flashing blue, indicating that you are searching. If the hardware connection is normal, the configuration screen will automatically pop up.

Picture 10 Configuration

Click "Default Parameters" to restore the default parameters. Click "Modify parameters" to set the parameters inside 9700/9743. what the parameters mean as below.

6.2 Parameter meaning

1. Spread spectrum factor: 6 to 12, the larger the data transmission will be slower.

2. bandwidth：125 to 500KHz.
3. Encoding rate：1 to 4.

4. frequency：410 to 525，default as 477MHz，default antenna 490MHz，so try to choose a frequency between 470 and 510, so as not to affect the antenna matching. For different networks, different communications are distinguished by different frequencies to prevent spoilage.
5. Baud Rate：baud rate of serial communication，1200 to 460800bps available.
6. Check bit：Serial communication check bit, can be zero, odd check, even check.

   The data bit is fixed at 8 bits, and the stop bit is fixed at 1 bit.

6.3 Attention

1. All devices in the same communication network must have the same parameter.
2. In the same communication network, one module sends data and all the other modules receive data.
3. The 9700/9743 communication is based on connectionless communication, so it's not like there are two modules that can communicate and the Link light will come on. The Link light indicates that has received data within 10 seconds.

7. TCP/IP Configuration

This configuration mode is only valid for GAOTek Healthcare Ethernet Modbus. It is configured to convert data to TCP/IP data. Please note:

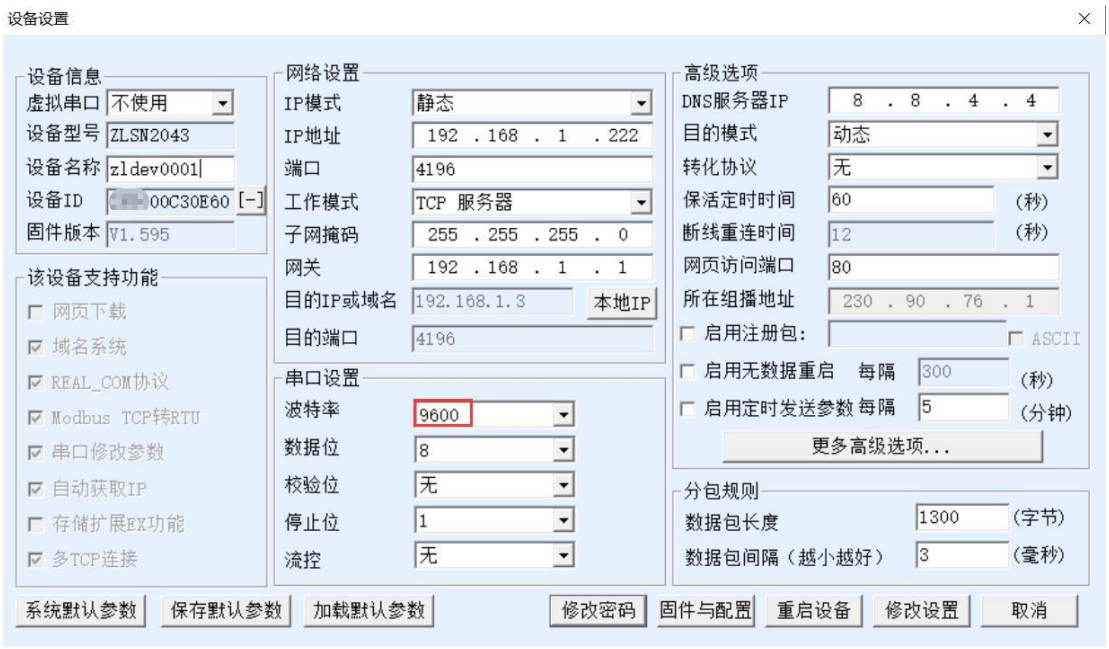
The network part serial port parameters should be configured to be the same as the serial port parameters, in particular the baud rate. If the serial port parameters in the section have not been modified, configure the serial port parameters in Figure 11 to 9600bps.

Other network-related configurations are similar to GAOTek Healthcare Ethernet Modbus products, which are described as follows：

7.1 Parameter Meaning

Please use for configuration. The network parameters of 9743 are configured through the Ethernet interface. When 9743 is connected to the network through the Ethernet port, the computer in the same LAN can search the device through the installed tool.

After the search, a dialog pops up as shown in Figure 11. The parameters are saved in the flash space of 9743. They will be loaded when the power is on and won't be lost when the power is off. The meaning of the parameter is explained as followings：



Picture 11 Network parameters

Form 2 Parameter Meaning

Name	Value Range	Meaning
Virtual serial port	No; created virtual serial port	You can bind the current device to a virtual serial port that has been created.
Item No.		Only the core module model is displayed. 2043 is the network module model of 9743.
Device Name	Any	You can give the device an easy-to-read name, up to 9 bytes, and support Chinese names.
Device ID		Factory unique ID, not modifiable.
Firmware version		The firmware version of the core module
IP Mode	static、DHCP	Users can choose between static orDHCP (dynamic IP acquisition)
IP address		IP address of networked products

Interface	0～65535	The listening port for networked products when they are in TCP Server or UDP mode. As a client, it is better to specify port 0 to improve the connection speed. When using port 0, the system will randomly assign a local port. (1) When the local port is 0, the module restarts with the PC and establishes a new TCP connection. The old TCP connection may not be closed, so the old TCP connection of the upper computer cannot be closed all the time. This problem is not caused by specifying the non-zero port. Generally, the upper computer wants to close the old connection when the module is restarted. (2) When the local port is 0, TCP takes faster time to re-establish the connection.
Working Method	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 to networking products; When set to TCP Client, the

		networked product initiates the connection to the network server specified by the destination IP.
Subnet mask	eg：255.255.255.0	Must be the same as the local LAN subnet mask.
Gateway	eg：192.168.1.1	Must be the same as the local. If it is not across the external network (such as network cable docking computer situation), it is best to set the gateway to the docking computer's IP address。
The destination IP or domain name		In TCP Client or UDP mode, the data is sent to the computer indicated by the destination IP or domain name.
Destination port		In TCP Client or UDP mode, data is sent to the destination port of the destination IP.
Baud Rate	1200、2400、4800、7200、9600、14400、19200、28800、38400、57600、76800、115200、230400、460800	Serial port baud rate
Digit Bits	5、6、7、8、9	
Check Bits	None 、 Even 、 Odd 、 Mark、Space	

Stop Bits	1、2	
Flow Control	None 、 CTS/RTS 、 DTR/DCR、XON/XOFF	RS232 serial port available
DNS service device		When the destination computer is described by the domain name, the DNS server is required for domain name resolution. Here, the IP of the DNS server is specified. This parameter is not specified when IP mode is DHCP, and will be automatically obtained.
Objective mode	Static and dynamic	This parameter is only valid for UDP working mode. If the destination computer is in static mode with the best choice of domain name description; If there are multiple computers in the LAN to communicate with the networked product through UDP, it is best to choose the dynamic mode. This parameter must be dynamic in both TCP server and TCP client modes.

Conversion of agreement	NONE、Modbus TCP<->RTU、Real_COM	None means that data forwarding from the serial port to the network is transparent; Modbus TCP<->RTU will convert Modbus TCP protocol directly to RTU protocol for easy coordination with Modbus TCP protocol; Realcom is designed to be compatible with older versions of the REAL_COM protocol.
Keep running time	0 to 255	(1) When 1 ~ 255 is selected, if the device is in TCP client operating mode, it will automatically send TCP heartbeat every "guaranteed time". This ensures TCP validity of the link. When set to 0, there will be no TCP heartbeat. (2) when set to 0 ~ 254, when the conversion protocol is selected as REAL_COM protocol, the device will send a length of 1 and content of 0 data every time to achieve the heartbeat mechanism in the REALCOM protocol. Set to 255 there will

		be no RealCom heartbeat. (3) When set to 0 ~ 254, if the device is working on the TCP client, the device will send the device parameters to the destination computer every guaranteed time. When set to 255, no parameters will be sent. This mechanism is not usually used, and the user should not be aware of it.
Disconnection reconnection	0 to 255	Once the networking product in TCP client mode disconnects from the server (that is, as long as it is not connected), it will initiate TCP connection to the server at regular intervals. This time interval is the disconnection reconnection time, which can be 0 ~ 254 seconds. If set to 255, it means never reconnect. Note that the first TCP connection usually takes place immediately (such as hardware power on, device reboot via software, no data), and only after the first connection fails is it tried

		again after waiting for the "Disconnection and Reconnection Time", so the "Disconnection and Reconnection Time" does not affect the normal connection time between the network and the server.
Web Port Access	1 to 65535	
Multicast address		UDP broadcast
IO interface configuration		9743 doesn't support IO control.
Packet length	1 to 1400	One of the serial port framing rules. After receiving the length data, the serial port of the networked product will send the received data as a frame to the network.
Packet spacing	0 to 255	One of the serial port framing rules. When the data received by the serial port of the networked product has a pause, and the pause time is longer than this time, the received data will be sent to the network as a frame.

7.2 Modify parameter methods.

7.2.1 Method

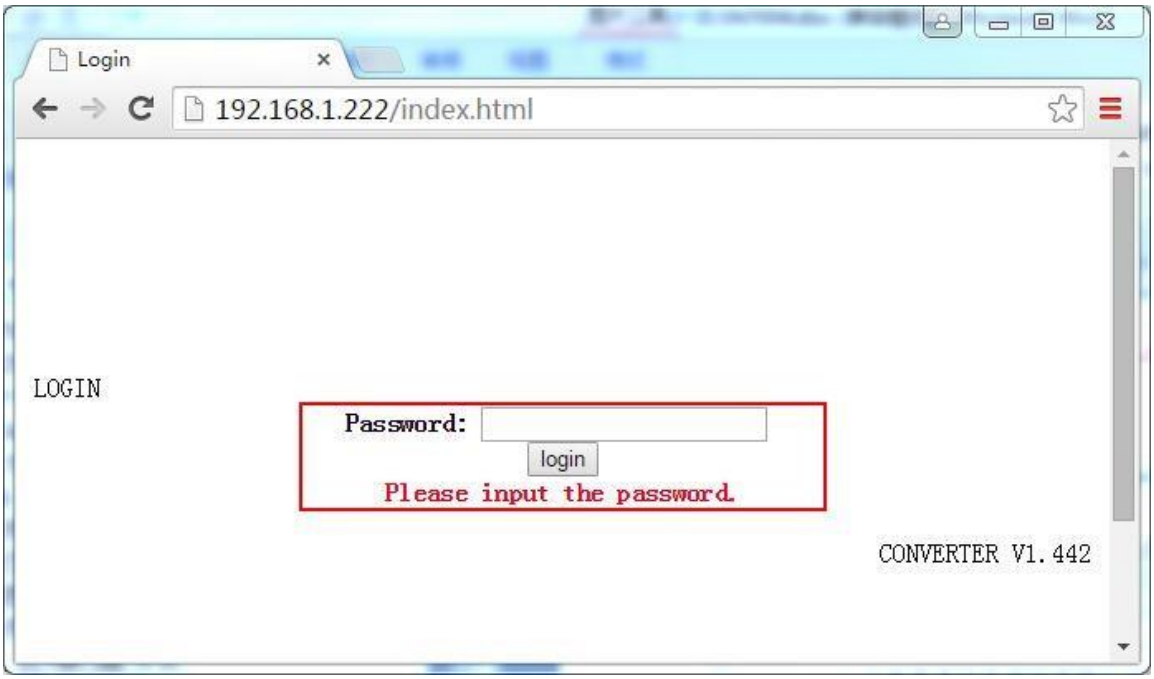
Search through the network and edit the device parameters after finding the device. Its advantages are：

1. PC and networked products do not need to be in the same IP network segment.
2. Parameters can be modified even if there is IP conflict in networked products.
3. It is not necessary to know the IP address of the networked product in advance.
4. There are more types of parameters that can be modified.

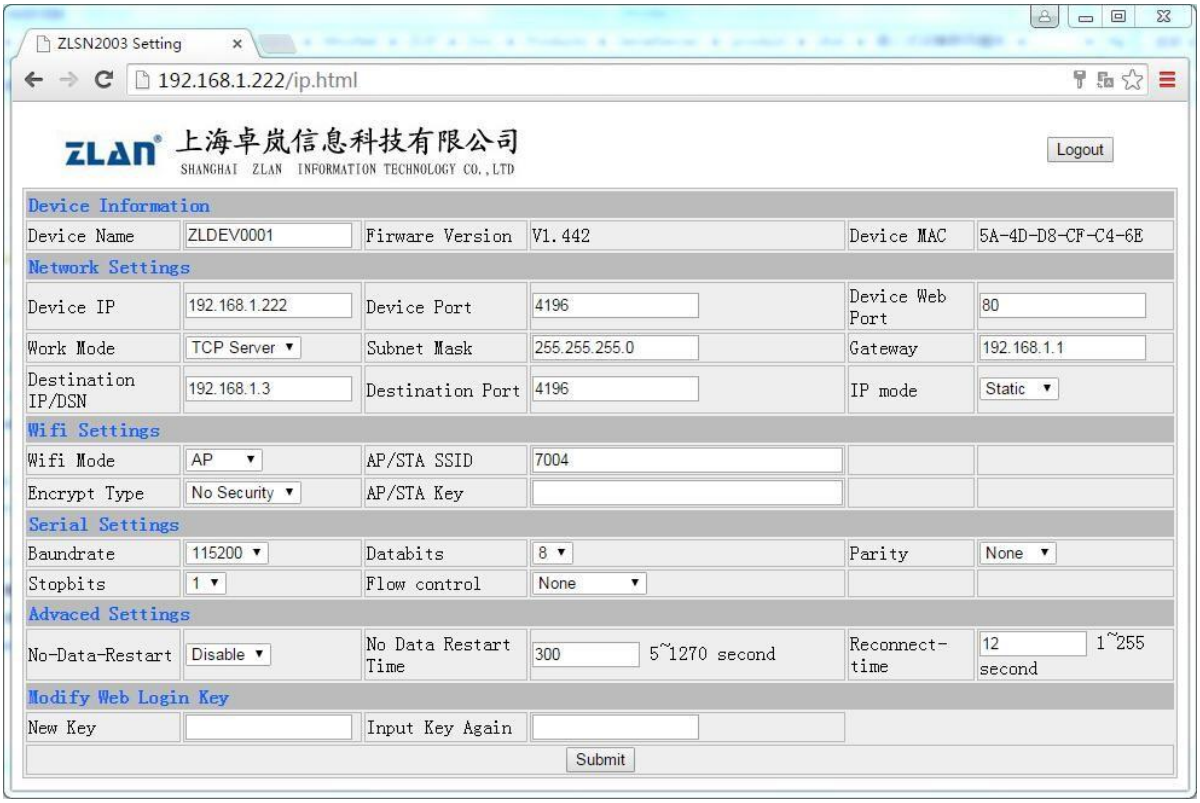
7.2.2 Web Browser

If the user does not have the program installed on the PC, you can change the parameters through the Web login.

1. Enter the IP address of the networked **pro**duct in the browser, e.g. http://192.168.1.200，Website as below.



2. Type in Password：Default is no password. Click the Login button to login.



3. You can modify the parameters of networked products in the webpage that appears. Except for the Web login password parameter, all the other parameters have been explained in the previous parameter table. The Web login password is the password that sets the login of the Web page.

4. After modifying the parameters, click "Submit Modification" button. After modification, please click the "Log out" button. If you do not log out, anyone can enter the configuration interface.

8. Using Steps

8.1 Communication

1. By attaching the antenna to the antenna interface of the device, the suction cup antenna can be attached to the metal chassis surface.

2. If there is only one communication network, no configuration is required, but to prevent interference with other users, it is recommended to configure a special frequency, which can be anywhere between 470 and 510. If the baud rate is not 9600, it also needs to be configured accordingly.

3. Connect all devices to 9 - 24V DC power supply. You should see the POWER light in green at this point.

4. At this point, data received from the serial port of any device (RS232/485/422) will be sent to the serial port of other devices.

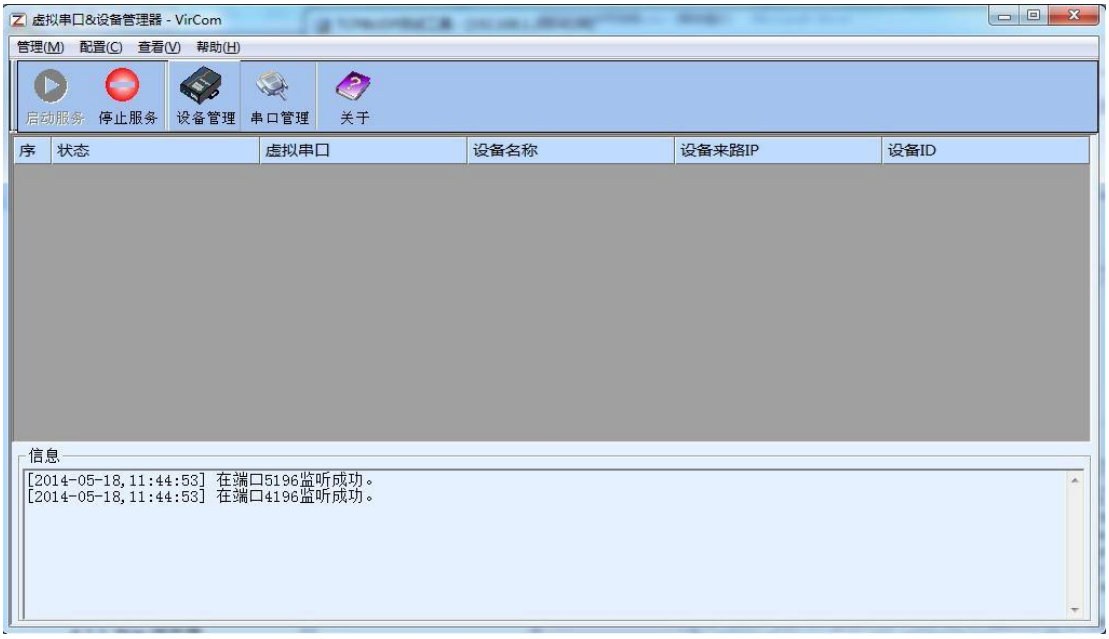
5. In the case of Zlan9743, the only difference is that the data received by will be sent to the network port (TCP/IP connection) as well as to the serial port, and the data received by the network port will also be forwarded to. It is important to configure the baud rate of the network module to be the same as the baud rate of the module.

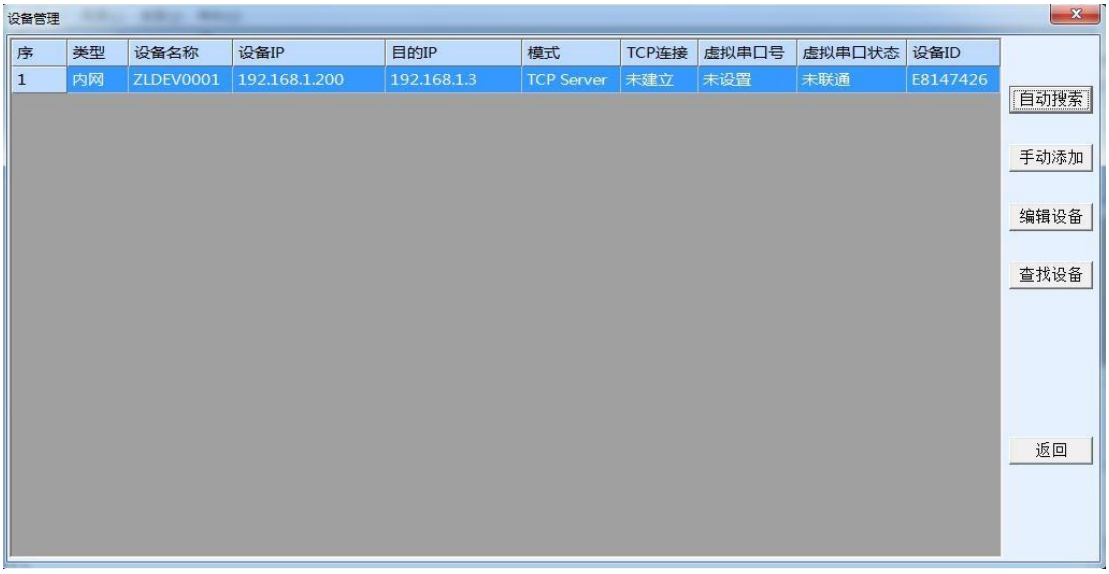
8.2 Network communications

Since the network communication part of Zlan9743 is relatively complex, we will explain it separately here.

8.2.1 Device Search

Run the software, click "Device Management", and you'll see a list of devices.

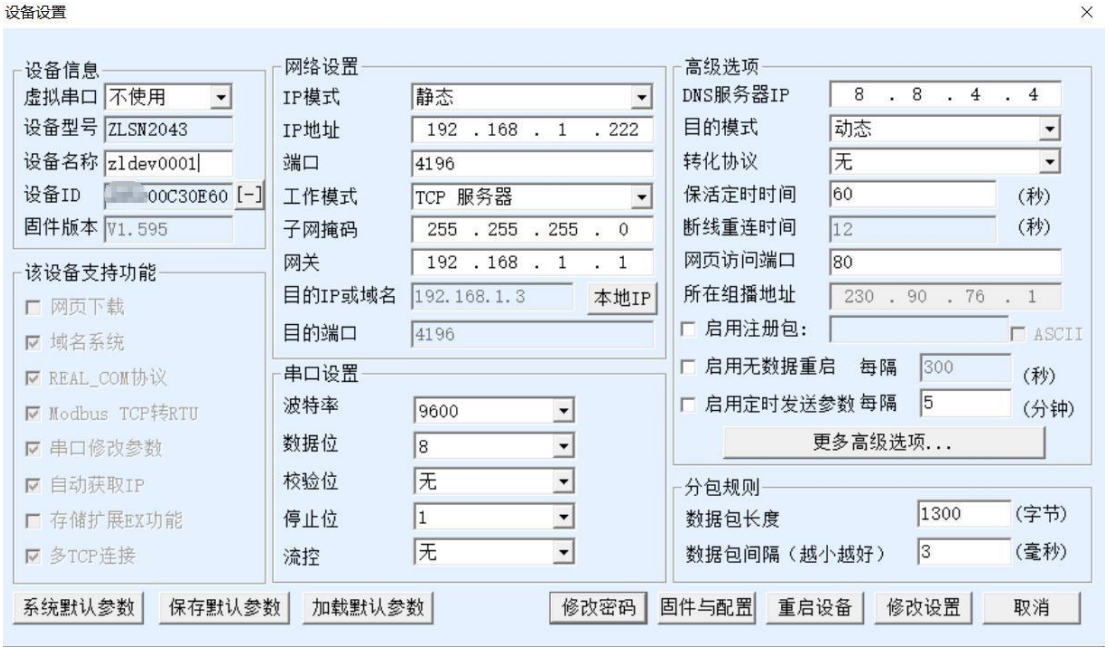




To see all currently online devices in the device list, you can search for devices that are not in a network segment. There is generally no need to use the "add manually" feature.

8.2.2 Parameter Configuration

Double-click on a row of devices to edit device parameters.



Picture 16 Device editing interface

In this interface, the user can set the parameters of the device, and then click "Modify Settings", the parameters will be set in the flash of the device, power down will not be lost. At the same time the device will automatically restart.

8.2.3 TCP/IP Telecommunication

Now you need to test the networked product's TCP/IP pass-through communication capabilities. forwards whatever data a computer sends to a networked product's port. Whereas what data receives, what data does it send to the computers on the network.

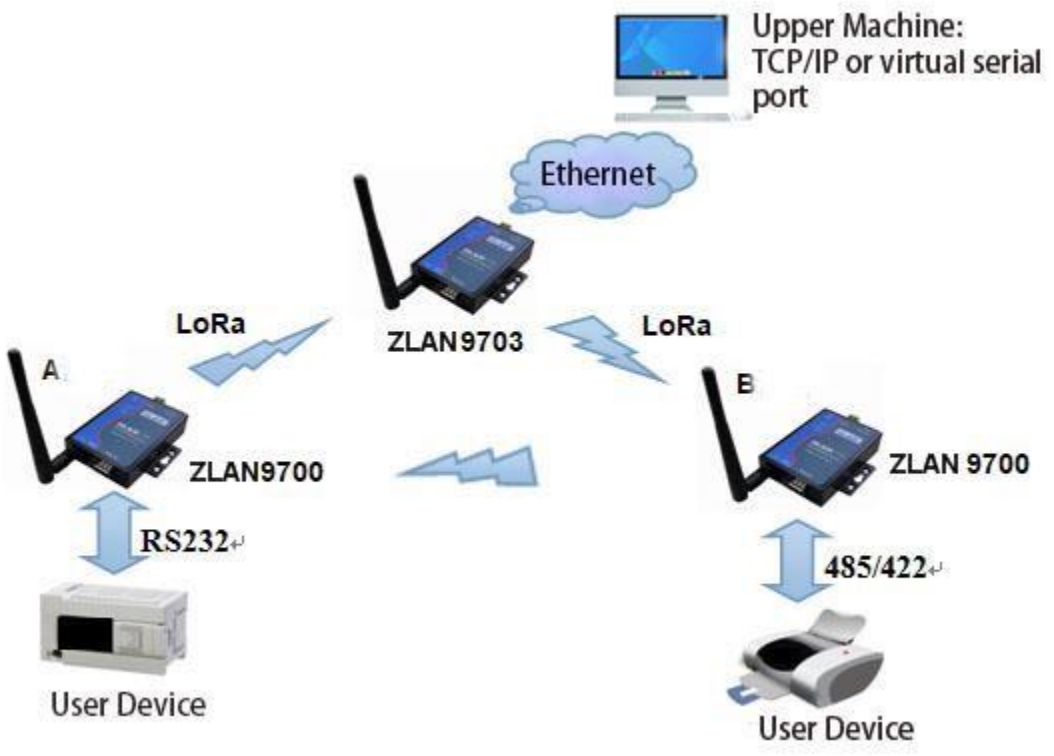
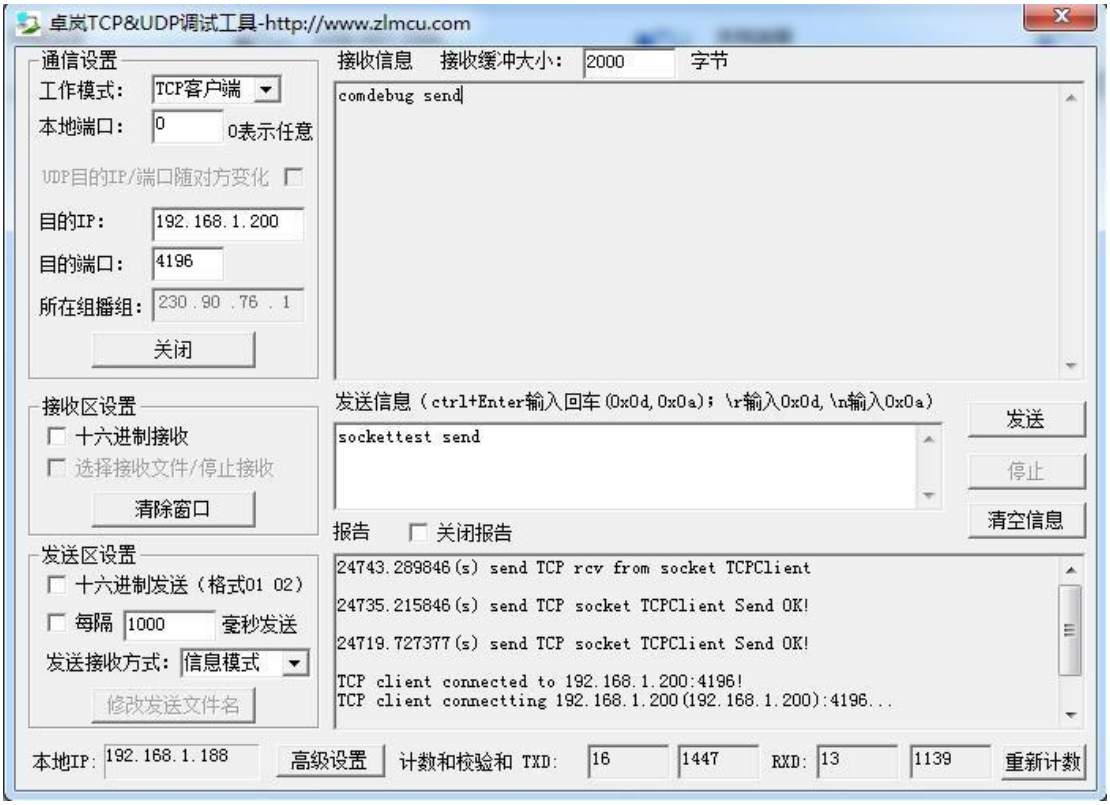


Diagram of pass-through communication

Open TCP&UDP debugging assistant SocketTest (http://zlmcu.com/download/SocketTest.zip), and as a way of TCP client, to IP networking products (currently 192.168.1.200) 4196 port connection, can establish a TCP link and networking products. The data sent by SocketTest can then be forwarded by the network to the user's device en route.



sockettest receive and send interface

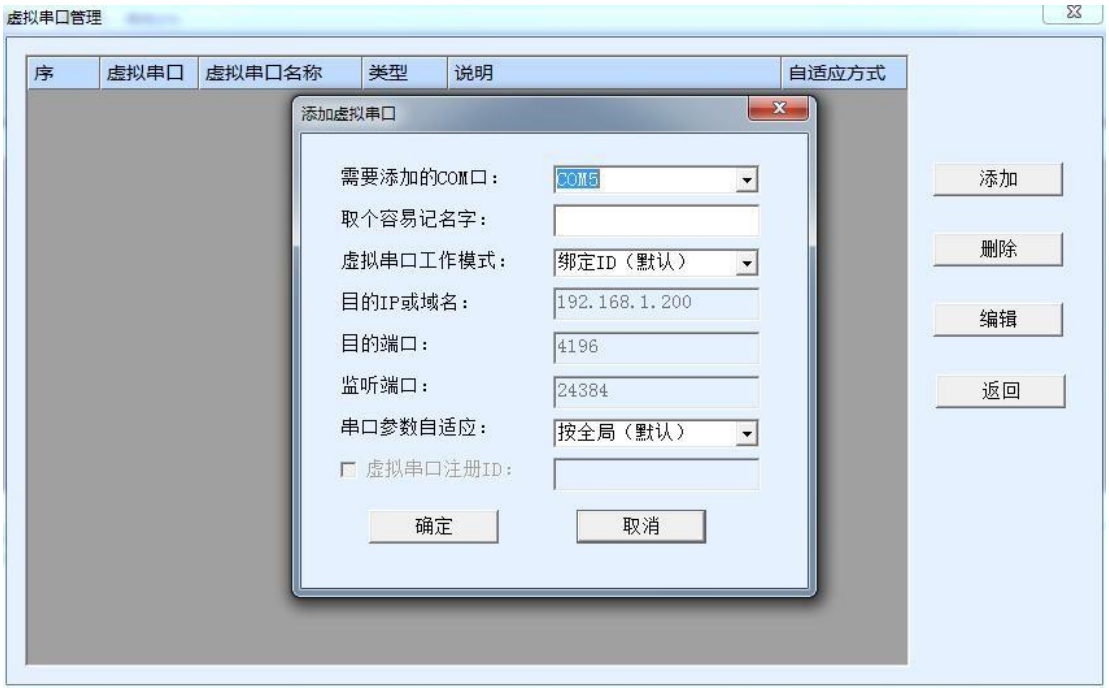
If the device is returning data, the received information can be seen through the TCP/IP debugging tool.

8.2.4 Virtual serial port

The SocketTest in Figure 18 communicates directly with the serial port server through TCP. In order to allow users to communicate with the serial port server, a virtual serial port needs to be added between the user program and the serial port server. As shown in Figure 19, and the user program run on a single computer, and virtualizes a COM port that corresponds to the serial server. When the user program opens COM communication, it can be sent to the user serial port device through the serial port server. Here's how to do this：

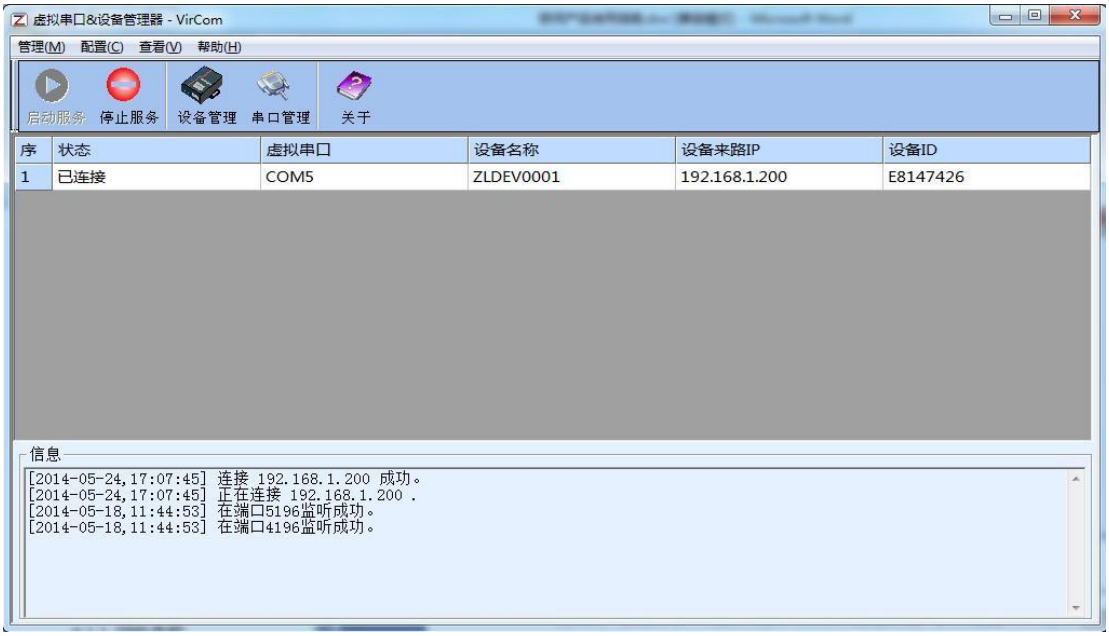
Virtual serial port function

Click "Serial Port Management" on the main interface of, then click "Add" and select "Add COM5", where COM5 is the original non-existent COM port of the computer.



Picture 20 add virtual serial port

Then go to Device Management and double-click the device that needs to be bound to COM5. As shown in Figure 16, select COM5 from the list of Virtual Serial Ports in the upper left corner. Then click "Modify Settings." And returns to the main interface of . You can see that COM5 is already connected to a device with IP 192.168.1.200. You can use COM5 instead of SocketTest to communicate at this point.



The virtual serial port has been connected

8.2.5 Modbus TCP Testing

By default, serial and network port data is transmitted transparently. If you want to convert Modbus TCP to RTU, select the conversion protocol as "Modbus TCPRTU" in the Device Setup dialog box, as shown in Figure 22. At this point, the device port is automatically changed to 502. At this point, the user's Modbus TCP tools (such as Modscan32, ModPoll, etc.) connect to port 502 of the IP of the serial port server, and the Modbus TCP instructions sent will be converted into RTU instructions and output from the serial port.

start Modbus TCP function

8.2.6 Format testing

The device supports the formal delivery protocol to the cloud platform, and can independently collect the data of Modbus RTU instrument and 645 instrument. The whole process can be configured visually.