# ZLAN8305/8305L

## 2G/3G/4G Serial Device Server

# User Manual

### RS232/485 to 3G/4G Converter

### Modbus RTU to 3G/4G Modbus TCP

### RS232/485 to MQTT



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**Version Information**

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# Content

# 1. Summary

ZLAN8305/ZLAN8305L is a new cost-effective 4G DTU/ 4G router launched by Shanghai ZLAN. The differences between the two sub-models are as follows:

1) ZLAN 8305: support RS232/485 to 4G, do not support Ethernet port. Support serial port configuration.

2) ZLAN 8305L: supports 4G and Ethernet ports, RS232/485 to 4G/ Ethernet, and Ethernet to 4G. It can be used as a 4G router. Support serial port configuration, Web configuration, ZLVircom LAN configuration. Support the MQTT.


**FIG. 1 ZLAN8305**

The 8305 use the latest 4G chipset, which ensures powerful functions and stability while achieving a lower price and a high cost performance. It supports 7-mode all-netcom system, support all cards of Telecom, Mobile, Unicom. 8305L supports the MQTT protocol and the Modbus TCP to RTU protocol. Industrial temperature range of -45 ~ 85 degrees is supported. Support for custom registry packages and heartbeat packages. Support remote upgrade on

server side.

In addition, 8305 can also be customized for various special needs, including when the network is not available, the local storage of dozens of megabytes of data, when the network in connection then upload the server.

The default 8305 is equipped with a 4G antenna sucker, also can be equipped with guide rail accessories. At the same time, the power supply terminal can provide two power supply modes of power socket and terminal type (the choice of delivery).

8305 is suitable for the following application fields:

1) Data collection in the field of industrial Internet and industrial automation.

2) Power data acquisition and monitoring.

3) Access control, security.

4) Collection and monitoring of hydrological, meteorological and environmental data.

5) Intelligent transportation, vehicle data collection.

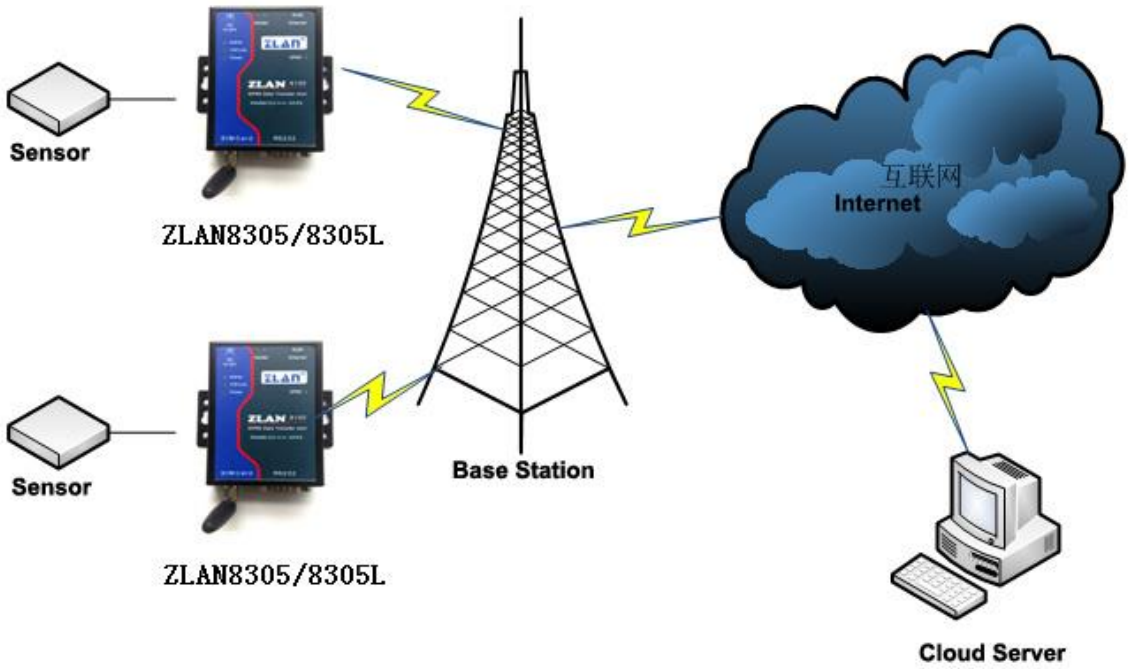

**Figure 2 Application Environment Diagram**

## 1.1 Normal 3G/4G DTU

The normal 3G/4G DTU can be as TCP Server connected by other network devices, since the 8303 IP is not fixed when under 3G/4G mode, usually it isn't as TCP Server,

1) tion.

# 2. Features

1) It supports 7 standard modes, including China Unicom 4G, 3G, 2G, Mobile 4G, 3G, 2G and China Telecom 4G, 3G and 2G networks.
2) Support TCP Server, TCP Client, UDP mode. Support multiple TCP Client connections when as Server.
3) The serial port supports 1200~460800 baud rate, 5~8 bits of data, no check, odd check and even check, 1~2 stop bits, no flow control, hard flow control and soft flow control.
4) Support serial port to 4G, 8305L support serial port to Ethernet port and 4G router application, and support DHCP Server.
5) Support serial port transparent transmission, 8305L support Modbus RTU to Modbus TCP, MQTT protocol.
6) Support serial port AT command configuration, 8305L support WEB configuration, support ZLVirom software to view some parameters.
7) Support for custom registry packages, custom heartbeat packages.
8) 8305L can update the firmware of the device through the WEB, and all models can update the firmware of the device through the ZLVircom software on the server side.

# 3. Technical Parameters

| | |
|---|---|
| **Support Model** | 7 modes are supported:<br>B1 / B3, B5 / B8 @ FDD LTE<br>B34 B38 / B39 B40 / B41 @ TDD LTE<br>B1 / B8 @ WCDMA<br>B34 / B39 @ td-scdma<br>BC0 @ CDMA2000 1 x/EVDO<br>B3 / B8 @ GSM<br>Including Unicom 4G, 3G, 2G, Mobile 4G, 3G, 2G and Telecom 4G, 3G, 2G networks. |
| **Transmission Rate** | LTE-FDD：Max 150Mbps (download) /Max 50 Mbps (uplink)<br>LTE-TDD：Max130Mbps (download) /Max 30 Mbps (uplink)<br>WCDMA：384Kbps (download) /Max384Kbps (uplink)<br>TD-SCDMA：Max 4.2Mbps (download) /Max 2.2 Mbps (uplink)<br>EDGE：296Kbps (download) /Max236.8Kbps (uplink)<br>GPRS：107Kbps (download) /Max85.6Kbps (uplink) |
| **SIM Card** | Voltage: 3V, 1.8V; Size: Big Card（Small card can buy card sets） |
| **Antenna Interface** | Optional 50Ω/SMA glue stick antenna or sucker antenna |
| **Serial Port Type** | RS-232/RS-485 |
| **Serial Port Parameter** | Baud Rate: 1200~460800bps; Data bit: 5～8; Stop bit：1～2; Flow Control: Hardware, Software; Check bit: None, Odd, Even, Mark, Space |
| **Power Supply** | Q2.1 outlet, can be customized to power terminal input |
| **Input Voltage** | DC9V~24V (150mA@12V when dial) |
| **Operating Temperature** | -40~85℃ |
| **Running temperature:** | -40~90℃ |
| **Storage temp:** | 0~95% Non - Condensing |
| **Size:** | L×W×H=9.4cm×6.5cm×2.5cm |

# 4. Hardware Instruction

The front view of ZLAN8305 is shown as FIG. 3.


**Figure 3 ZLAN8305 Front View**

The 8305 is made of anti-radiation metal shell, with two lugs on both sides, which can be fixed with screws; Also can be equipped with guide rail accessories.

**Panel Light:**

| **Indicator** | Green | BLUE |
|---|---|---|
| **Active** | Network send data to serial port | Serial port send data to network |
| **Link** | The network wire of 8305L connect | Always bright: the TCP connection is established |
| **4G** | Power indicator | Flashing means the 4G is dialing, it starts dialing after power on 40s, usually can be dialed in 10s. |

| | | |
|---|---|---|
| | | Always bright: 4G connection success |


**Figure 4 Interface Diagram 1**

**The front interface of ZLAN8305 is shown in figure 4:**

1) Power input: interface form Q2.1 socket, DC+9V ~ +24VDC, power needs over 3W. The default adapter is 12V. Can be customized to power terminal type input.

2) RS485 signal input. Be attention don't connect to power.

3) RJ45 interface, Ethernet access end. Only available for 8305L.

**The back interface of ZLAN8305 is shown in figure 5:**

**Figure 5 Interface Diagram 2**

1) Antenna: 8305 antenna interface using 50Ω/SMA(female), if external antenna must use the antenna suitable for 3G/4G working band. ZLAN can provide a gel antenna and a suction antenna that can be sucked onto a metal shell (by default 2M).

2) SIM card installation: ensure that the device isn't power on when installing the SIM card.

Use the pen and screwdriver to push out the SIM card slot, and the SIM metal surface pushes down into the card slot.

3) DB9: RS232 signal input.

# 5. Configuration

Devices can be configured through serial port and network. Since ZLAN8305 does not have Ethernet port, it usually only uses the serial port configuration, while ZLAN8305L has Ethernet port, so in addition to the serial port configuration, Web configuration and ZlVircom Windows tool network search configuration can be used.

## 5.1 Serial Port Configuration

The serial port configuration is applicable to 8305 and 8305L. Since 8305 has no Ethernet port, it is mainly configured through the serial port.

Download ZL8100ConfigTool (http://www.zlmcu.com/download/ZL8100Conf.zip) version 2.4 above, the software can configure 8100 and 8305/8305L through serial port.

Connect USB to RS232 wire to 8305 serial port, power 8305 and open ZL8100ConfigTool (hereinafter referred to as the configuration tool).

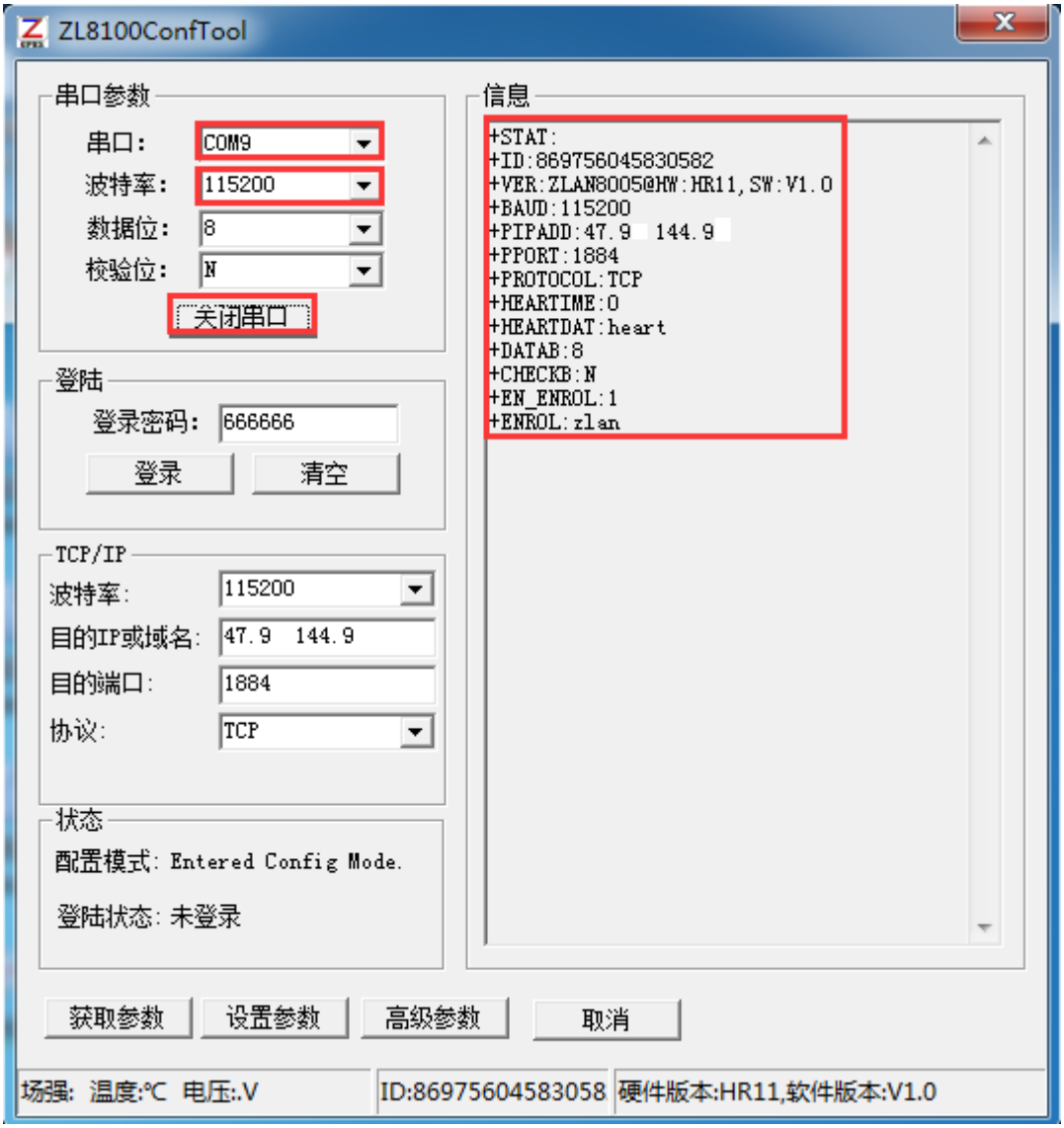


**Figure 6 Configuration tool**

Select the serial port number, COM9 here, and the baud rate is 115200. 115200 here is the factory default setting. If the user has set 8305 to other baud rates (such as 9600), then the actual device baud rate needs to be used here.

After power on, wait for 40 seconds, that is, after the dial-up light starts flashing, select and click "open" serial port. At this time, the configuration tool will try to communicate with the device, and if successful, the parameter information read will be displayed on the right side.

The default login password is 666666. Before clicking "login", the parameters are read-only and cannot be set or modified. That is: you can click the "get parameters" at the end, but the "set parameters" cannot be achieved. Now click the "login button" :

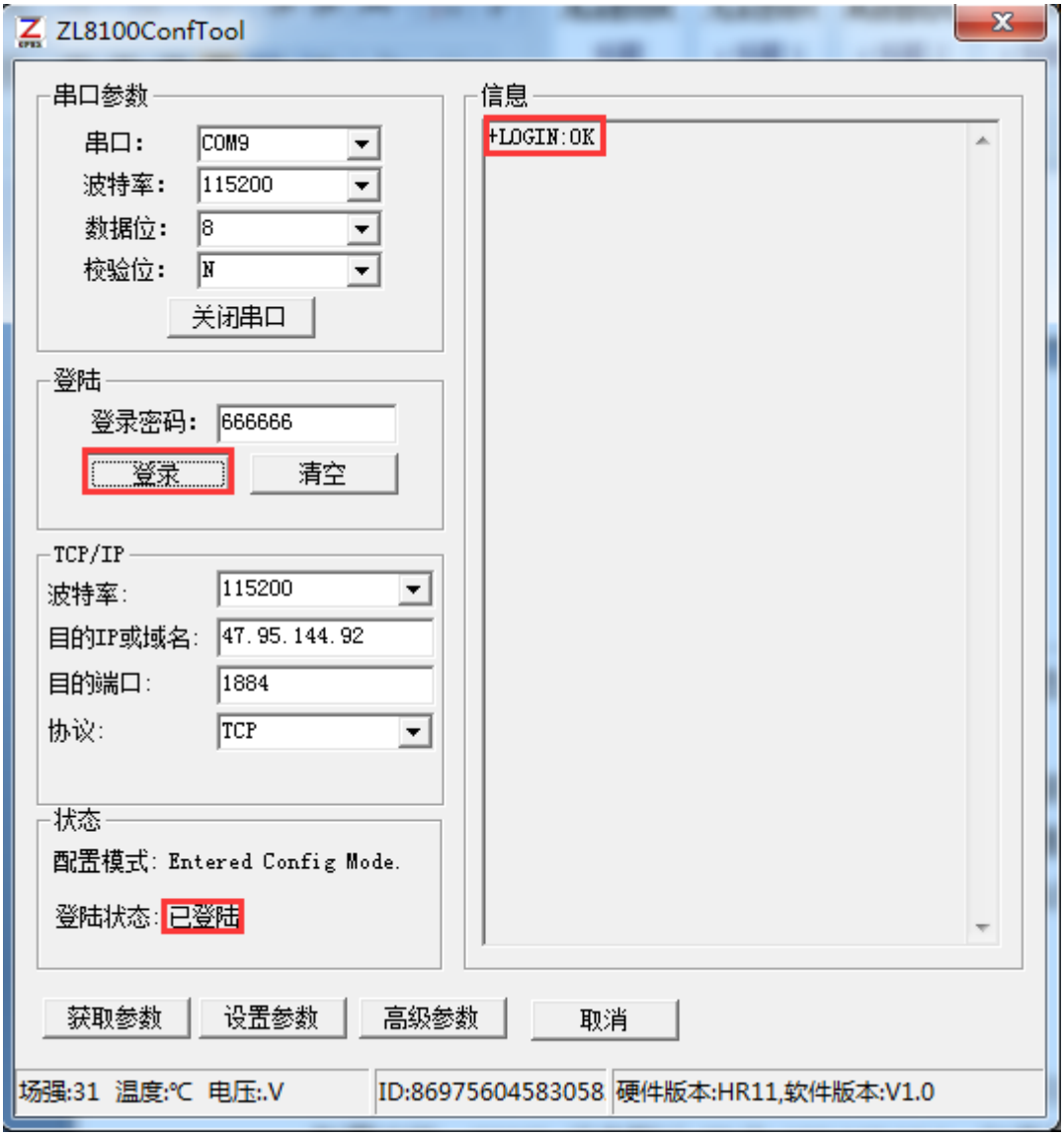


**Figure 7 Configuration tool 2**

You can see that after logging in, the LOGIN status changes to "logged in", and the information of "+LOGIN OK" appears on the right side.

The TCP/IP field sets the main parameters, including baud rate, destination IP, destination port, and protocol. Protocol support TCP or UDP protocol. After modifying the corresponding parameters, click the "set parameters" button to set the new parameters inside the device. After setting the parameters, there is no obvious prompt message. After setting, the device needs to be powered again.

The "get parameters" button can get the parameters of the current device. The "get parameters" button can get the parameters by sending AT instruction, and the data listed on the right is the return data of AT instruction. For the AT directive, refer to the other

sections of this article. Since "get parameters" is automatically executed once "open" succeeds, it is generally not necessary to click the "get parameters" button.

Click on "advanced parameters"

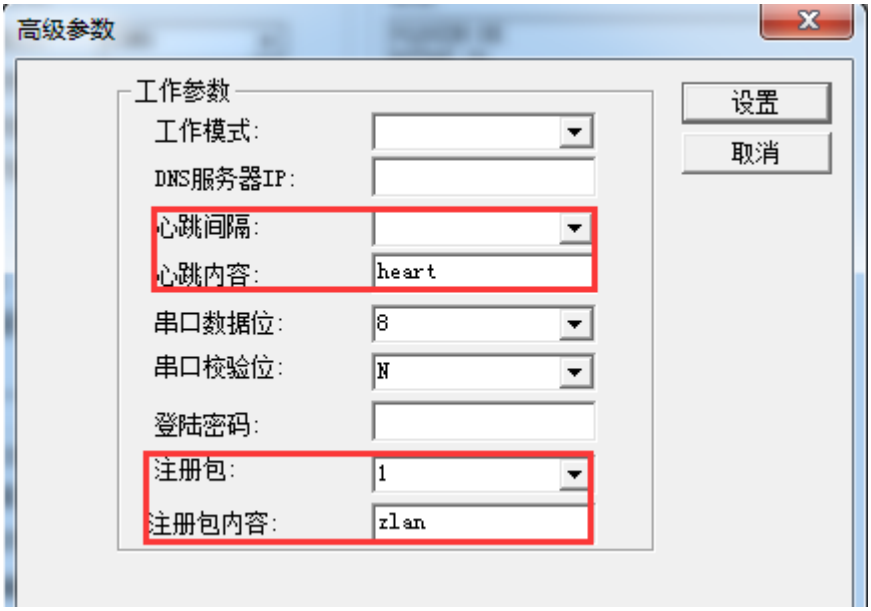


**Figure 8 Configuration tool**

The parameters commonly used here are:

1) Heartbeat interval: if the display is empty, it means there is no heartbeat packet, otherwise 30s, 45s and 60s can be set.

2) Heartbeat content: this is the heartbeat package content.

3) Registry: 1 means enabled, 0 means not enabled.

4) Registry content: the registry content sent after connecting to the server.

After selecting the parameters, click the "set" button to return to the main interface. At this time, there is no need to click the "set parameters" button on the main interface.

## 5.2 Web configuration

Only the ZLAN8305L version with L supports LAN port and Web configuration functions. The default IP of the 8305L device is 192.168.10.1. If you do not know the IP address of the device, you can search the device IP through ZLVircom software.

Change the computer IP to the same network segment as the device, such as

192.168.10.2. If the network is directly connected, the IP can also be obtained dynamically (if not directly connected, the IP may not be assigned by 8305L). Enter the IP address of the device in the browser to enter the login interface. The default password is 666666.

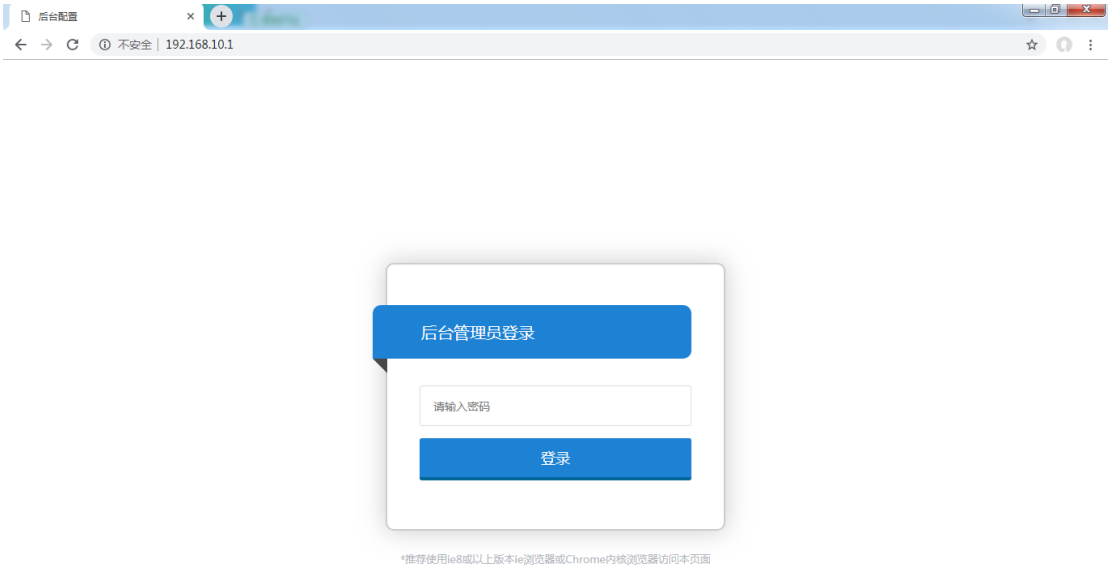


**Figure 9 Web login**

Login to the main interface displays the current state of the device, working mode, IP address and other parameters. The device can operate in two modes:

1) 4G router mode: at this time, both 4G and Ethernet are turned on, and the serial port can connect to the Internet through 4G or Ethernet. At the same time, Ethernet and 4G are interchangeable.

2) Wired mode (off 4G): no 4G function, only serial port to Ethernet function.

Different device information will be displayed according to different modes. The system status in 4G routing mode is shown in the figure below:


**Figure 10 device information**

Click device configuration:


**Figure 11 work mode configuration**

Working mode: select 4G router mode and wired mode.

Click the communication Settings.


**Figure 12 Communication Settings**

Here you can configure serial port parameters, 8305 working on the client or server, destination IP and port. Set heartbeat package, registration package, etc.

Click protocol to select:

**Figure 13 Transformation Protocol**

Here you can select as follows:

1) No protocol: at this point, the serial port and TCP are transparent transport.

2) Modbus protocol: at this time, the serial port is Modbus RTU protocol and the network is Modbus TCP protocol.

3) MQTT protocol: at this point the network is the MQTT protocol, and the serial port data is sent as the payload of the MQTT, where some mqtt-related parameters can be filled in. Click the "MQTT advanced parameters" button to select the configuration of advanced parameters.


**Figure 14 advanced parameters of Modbus**

Click device management:


**Figure 15 Device management**

Here you can update firmware, restart the device, and change passwords.

## 5.3 ZLVircom Configuration

Through the ZLVircom tool, the local cross-network segment can search the device through the network and upgrade the firmware, and manage the device and upgrade the firmware through the cloud. In addition, ZLVircom can be used to create virtual serial ports, and if you do not need the virtual serial port function, you can download the installation-free version.

Download address: http://www.zlmcu.com/download.htm

**Table 1 ZLVircom version**

| Software | Description |
|---|---|
| ZLVircom device management tool (non-installed version) | Non-installed version does not contain virtual serial port function |
| ZLVircom device management tool (installation version) | Installation version, which contains zlvircom_x64.msi and zlvircom_x86.msi. The 64-bit operating system installs x64, and the 32-bit operating system installs the x86 version. |

When installing ZLVircom, follow the default prompt. After installation, zlvircom will be started every time the computer starts up, which is used to start up and create a virtual serial port.

### 5.3.1 LAN management

This usage is only for version 8305L, because 8305 does not have an Ethernet port. Assume that the computer on which ZLVircom is installed is on the same LAN as the 8305L port.

Click "device management" in the main interface of ZLVircom to enter the device management dialog box, and then click "automatic search".

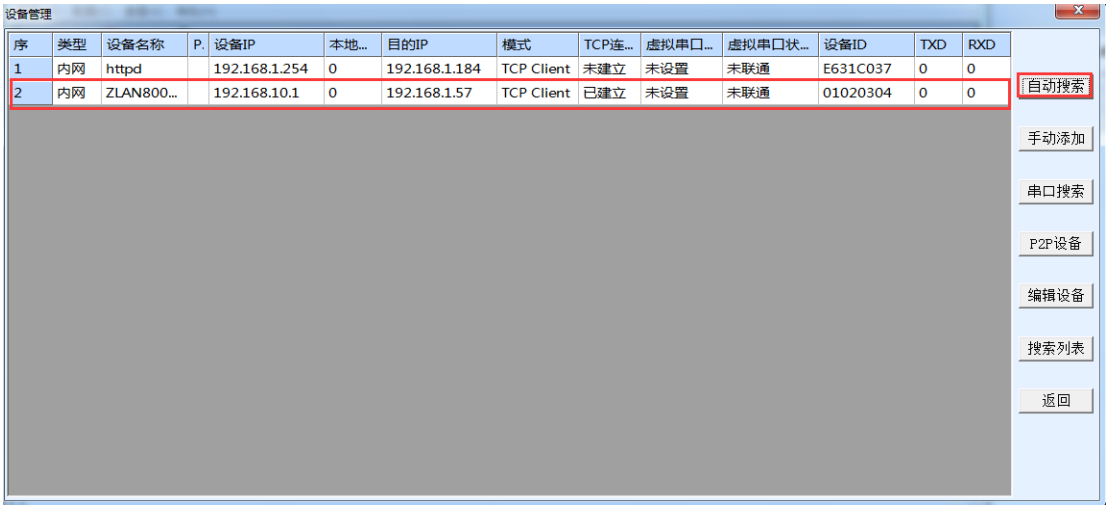


**Figure 16 LAN search**

At this time, the configuration information of the device can be viewed. Currently, it is only supported to be read only and cannot be configured. Double-click to enter device editor, and then click "upgrade firmware".

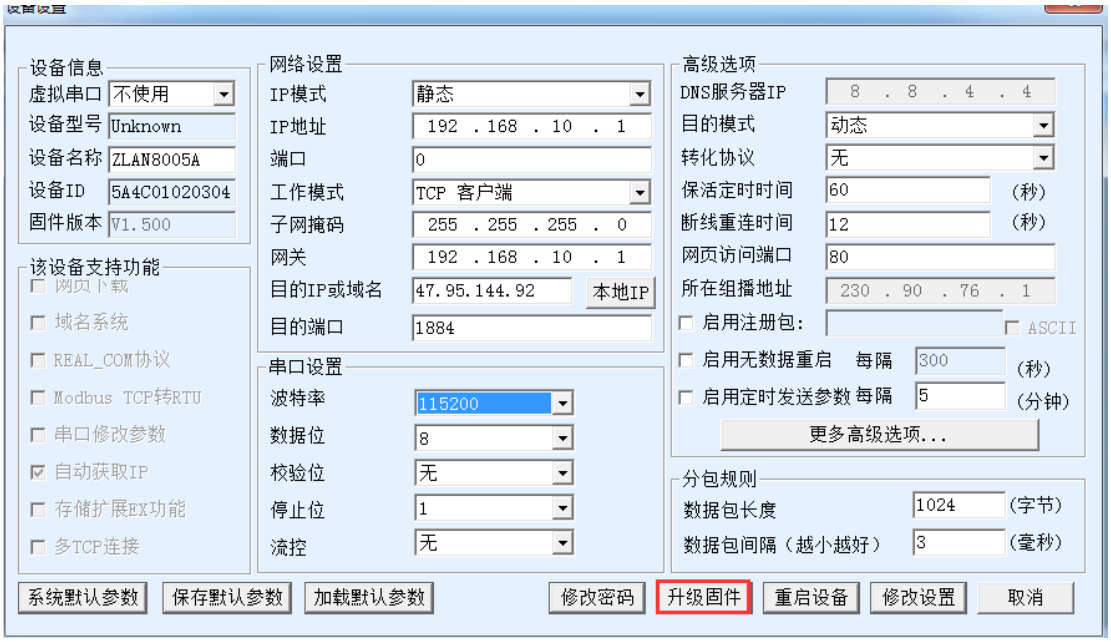


**Figure 17 firmware update**

Select the firmware that needs to be upgraded to upgrade:

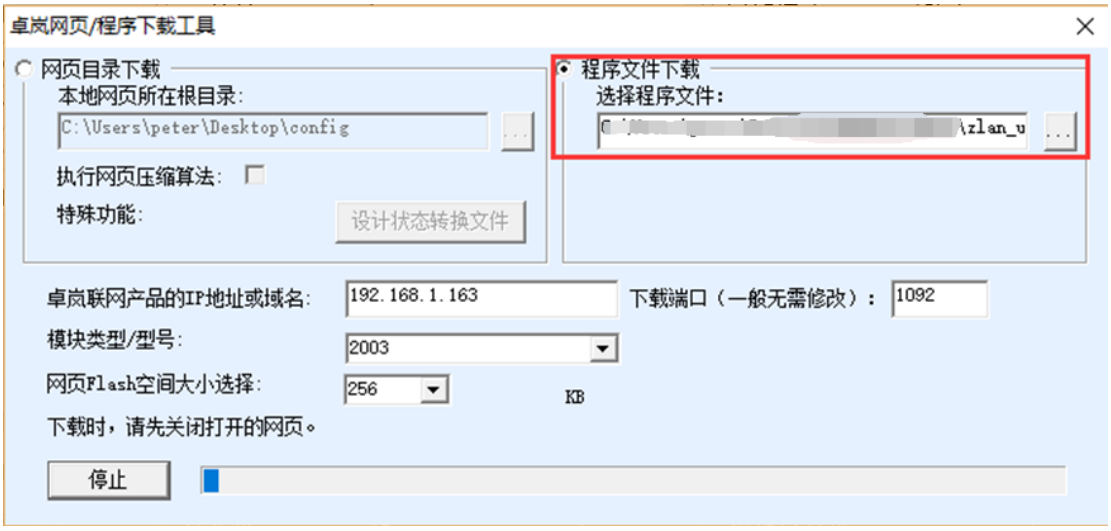


**Figure 18 firmware upgrade**

## 5.3.2 Remote Manage and Upgrade

This method can be used for 8305L and 8305 models. Suppose the device is connected to the cloud on port 1884. Then run the ZLVircom tool on the server, click the menu "configuration", enter the "software configuration", and change the listening port to 1884

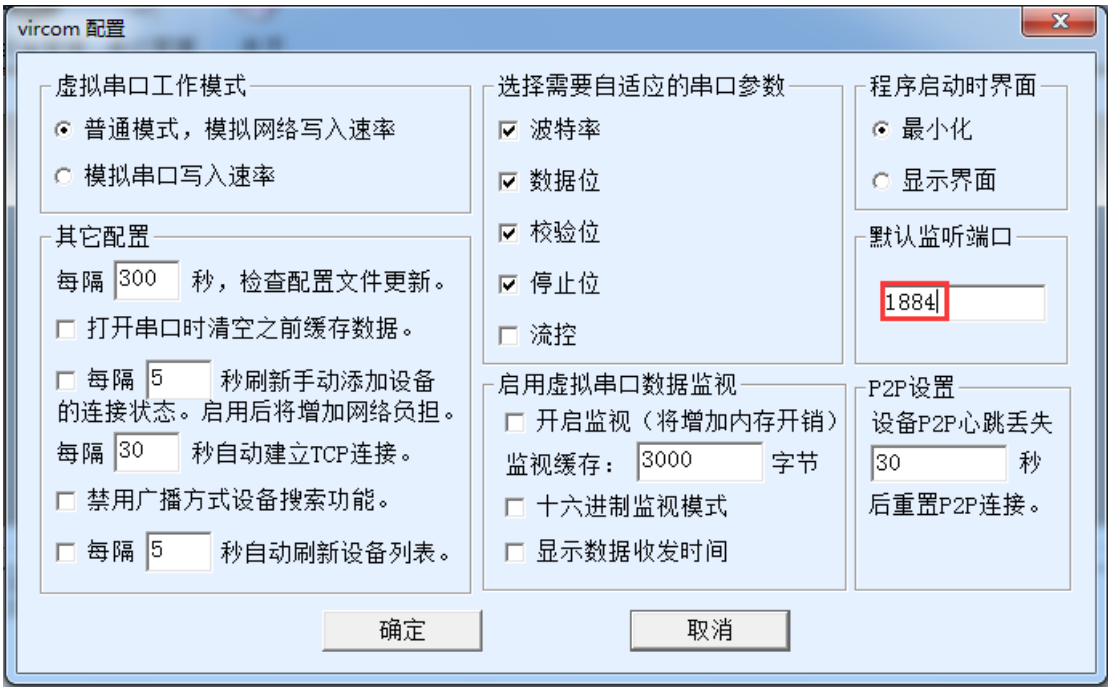


**Figure 19 Modify the listener port**

Pop-up dialog prompts:

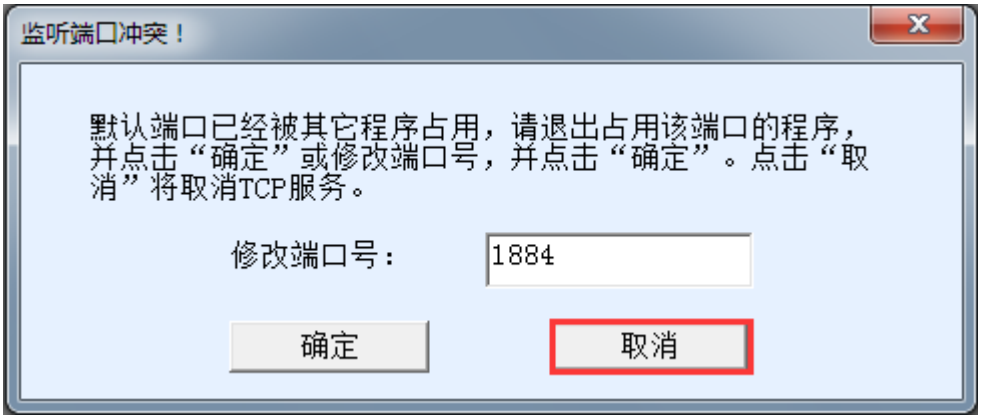


**Figure 20 Modify listener port 2**

Be sure to select the cancel button in this step. After 1-2 minutes, you can see the connected device when you enter device management. You can perform device management and firmware upgrade as described in the "LAN management" section.

# 6. Communication test

## 6.1 Communication of Server and Device

This test is suitable for 8305 and 8305L.

Assuming the following networking structure as shown in the figure below, 8305 is configured to connect to port 4196 of server 116.226.72.135. Use the method in the "serial port configuration" section. After the configuration is completed, the power will be re-powered, and it will take 40-50 seconds to connect to the server.


**FIG. 21 Networking Structure Diagram**

We run TCP tool SocketDlgTest on the server (http://www.zlmcu.com/document/tcp_debug_tools.html).

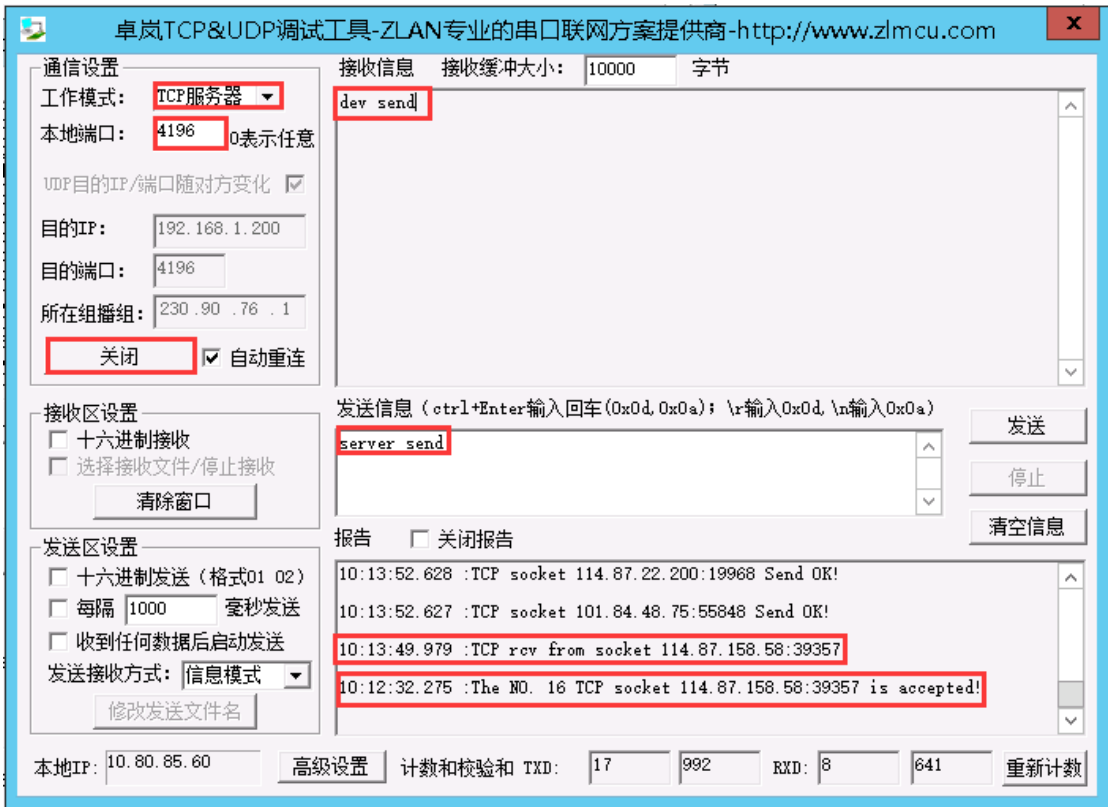


**Figure 22 Server-side tools**

Select the local port of 4196 as shown in the figure (note that if you run the ZLVircom tool, you need a different port), and then click the "open" button. When 8305 connects to the server, it will display information of "The NO... Is accepted!".

Now connect serial port of 8305 to the usb to serial port 232 wire, and open a serial port debug tool (http://www.zlmcu.com/document/com_debug_tools.html), and open the correct com port. The diagram below:

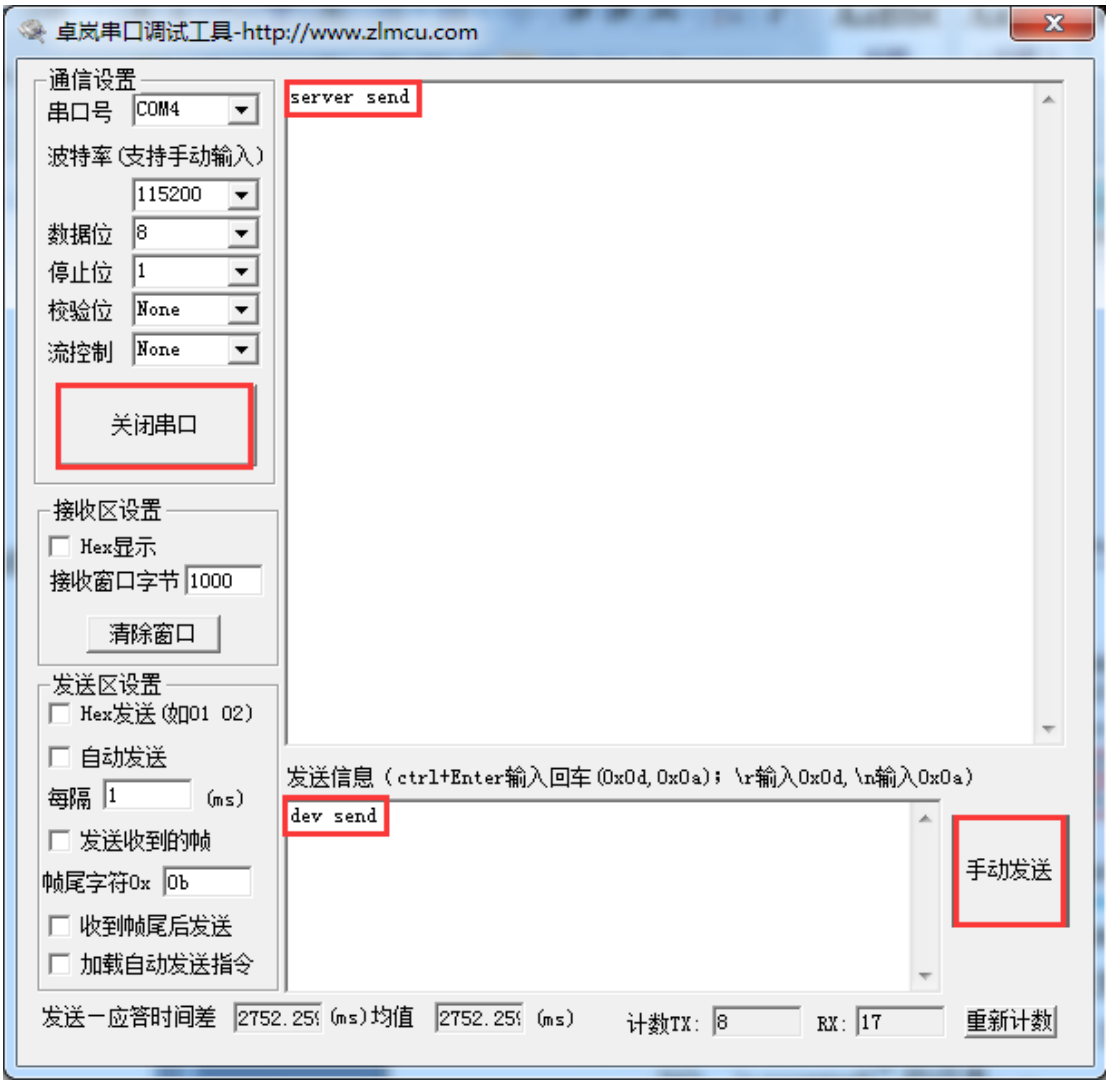


Figure 23 Serial Port Debugging tool on device side

Now if you send data through the serial port, you will receive the corresponding data "dev send" on the server side, and if you send data “server send” through the server side, you will receive the same data through the serial port tool. This demonstrates the two-way communication between serial port to 4G network.

## 6.2 8305L test

The following test is suitable for model 8305L.

## 6.2.1 Transparent Transmission Test

Connect the computer serial cable to the device. On the WEB set the device to wired mode, TCP server mode, local port 4196. Select convert protocol to no protocol.

Open SocketTest network debugging software and Comdebug serial debugging software. Set SocketTest to the client mode, the destination IP is set to the device IP, and the destination port is the local port 4196 of the device. Click to open the connection device. Set the Comdebug software's serial port parameters to be consistent with the device's serial port parameters. Comdebug and SocketTest software can carry two-way communication through the device.

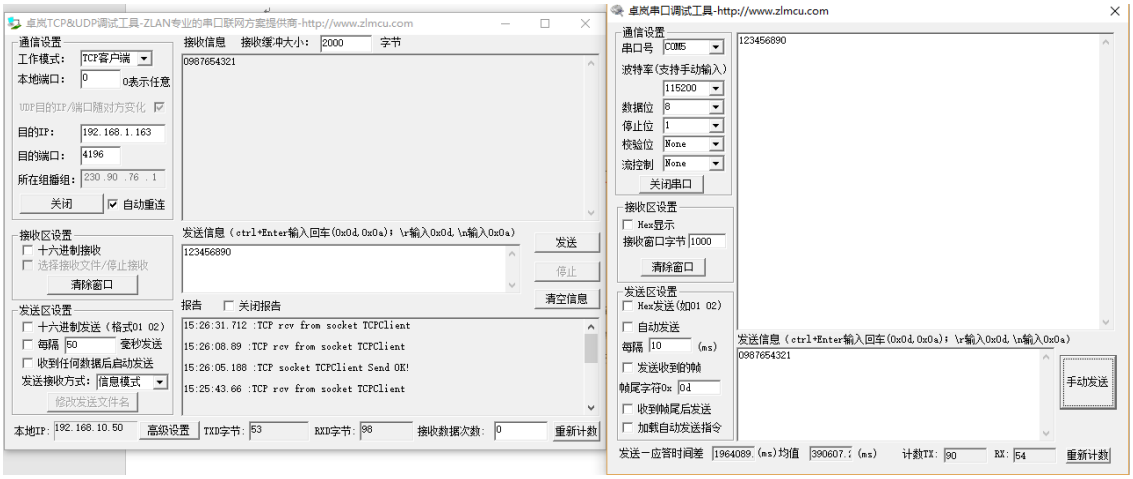


**Figure 24 Transparent Transport Test**

## 6.2.2 Modbus Protocol Conversion Test

The configuration parameters are basically the same as the no protocol pass-through test. All that is required is to change the conversion protocol to MODBUS. MODBUS RTU protocol can be converted into MODBUS TCP protocol of the network, and MODBUS TCP protocol of the network can be converted into MODBUS RTU protocol of the serial port.

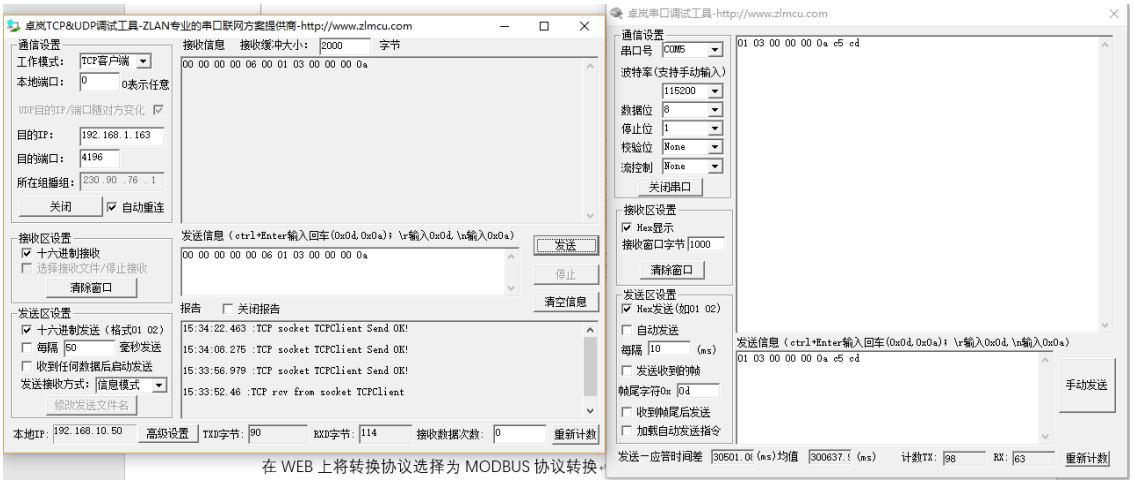


**Figure 25 Modbus protocol conversion test**

## 6.2.3 MQTT Protocol Test

This test is to connect BAIDU cloud to do a test. Create a new theme on BAIDU cloud called zlansub, which allows publishing and subscription. The device is configured as a client mode to connect the IP of BAIDU cloud and port 1883, and the conversion protocol is selected as MQTT protocol.

Enter the ID, username, and password of the MQTT. Since the theme of publish and subscribe on BAIDU cloud is zlansub, the theme of publish and subscribe configured by the device is also zlanusb. The advanced parameters of MQTT are not configured in this test, but are actually configured as required.


**Figure 26 MQTT Settings**

The data is sent from the serial port of the device and published to the BAIDU cloud MQTT server through the theme of zlansub. At the same time, because the device has subscribed to the theme of zlansub, the MQTT server sends the information to the device after receiving the information published by the device, which forms a spontaneous self-collection test of the serial port. At the same time, we also subscribe to the theme of zlansub on BAIDU cloud, so we can also receive the data of zlansub theme on BAIDU cloud.

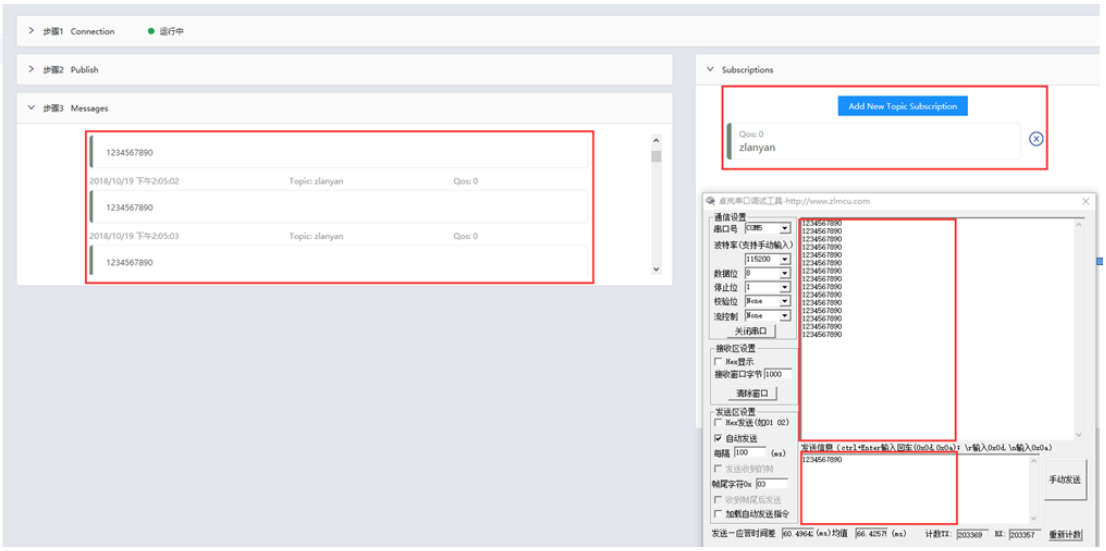


**Figure 27 MQTT Test**

# 7. The AT command

## 7.1 Login and Configuration

### 7.1.1 Enter Configuration Mode

**Instruction:** REQUEST CFG MODE

**Function:** enter the configuration mode, send this instruction in the device startup stage, and enter the configuration mode after the device is started.

**Return:** CFG MODE\r.

### 7.1.2 Landing

**Instructions:** ZL+LOGIN=666666\r\n

**Function:** login, modify the device parameters need to be in the login state to succeed.

**Return:** +LOGIN:OK\r\n(success) or +LOGIN:NG\r\n(failure)

### 7.1.3 Get Device Status

**Instructions:** ZL+STAT?\r\n

**Function:** inquire the signal strength, temperature and voltage of the device

**Return:** +STAT: strength, temperature, voltage\r\n

## 7.2 Serial Port Parameters

### 7.2.1 Gets Serial Port Parameter

**Instructions:** ZL+BAUD?\r\n

**Function:** get baud rate

**Return:** +BAUD:n\r\n, n represents the specific BAUD rate

### 7.2.2 Get Check Bit

**Instructions:** ZL+CHECKB?\r\n

**Function:** get the check bit

**Returns:** +CHECKB:N/O/E\r\n

N: no check

O: parity

E: odd parity

### 7.2.3 Fetch data bit

**Instructions:** ZL+DATAB?\r\n

**Function:** get data bits

**Returns:** +DATAB:5/6/7/8\r\n

### 7.2.4 Set serial port parameters

**Instructions:** ZL+BAUD=n\r\n

**Function:** set baud rate, n represents the value to be set

**Returns:** +BAUD:n\r\n

### 7.2.5 Set check bit

**Instruction:** ZL+CHECKB= N/O/E \r\n

**Function:** set check bit

**Returns:** +CHECKB:N/O/E\r\n

N: no check

O: parity

E: odd parity

### 7.2.6 Set data bit

**Instructions:** ZL+DATAB=5/6/7/8\r\n

**Function:** set data bit

**Returns:** +DATAB:5/6/7/8\r\n

## 7.3 Network Parameters

### 7.3.1 Get the destination IP or domain name

**Instructions:** ZL+PIPADD?\r\n

**Function:** gets the destination IP or domain name

**Returns:** +PIPADD=ip\r\n

### 7.3.2 Get destination port

**Instructions:** ZL+PPORT?\r\n

**Function:** gets the destination port

**Returns:** +PPORT=n\r\n

### 7.3.3 Get the device working mode

**Instructions:** ZL+PROTOCOL?\r\n

**Function:** gets the device's working mode

**Returns:** +PROTOCOL=TCP/UDP\r\n

### 7.3.4 Get DNS server IP

**Instructions:** ZL+PDNS?\r\n

**Function:** gets the DNS server IP address

**Returns:** +PDNS=ip\r\n

### 7.3.5 Set the destination IP or domain name

**Instructions:** ZL+PIPADD=ip\r\n

**Function:** sets the destination IP or domain name

**Returns:** +PIPADD=ip\r\n

### 7.3.6 Set destination port

**Instructions:** ZL+PPORT=n\r\n

**Function:** sets the destination port

**Returns:** +PPORT=n\r\n

### 7.3.7 Set operating mode

**Instructions:** ZL+PROTOCOL=TCP/UDP \r\n

**Function:** sets the working mode

**Returns:** +PROTOCOL=TCP/UDP\r\n

### 7.3.8 Set up DNS server IP

**Instructions:** ZL+PDNS=ip\r\n

**Function:** set DNS server IP address

**Returns:** +PDNS=ip\r\n

## 7.4 Registration package and heartbeat package

### 7.4.1 Query the registry content

**Instructions:** ZL+ENROL?\r\n

Query registry contents (default registry hexadecimal)

**Returns:** +ENROL:1234567890\r\n

### 7.4.2 Enable to register packages

**Instructions:** ZL+EN_ENROL?\r\n

Query to enable registry (1 enable 0 disable)

**Returns:** +EN_ENROL:1\r\n

### 7.4.3 Set the registry content

**Instructions:** ZL+ENROL=123456\r\n

Set the register package content (default register package hexadecimal) to the actual register package 0X12 0X34 0X56

**Returns:** +ENROL:123456\r\n

### 7.4.4 Enable/disable registration packages

**Instructions:** ZL+EN_ENROL=1\r\n

Enable/disable registration packages

**Returns:** +EN_ENROL:1\r\n

# 8. Accessories to choose

**Model selection:**

| Model | Function | Instruction |
|---|---|---|
| ZLAN8305 | 4G to serial port | Without Ethernet port |
| ZLAN8305L | 4G to serial port, Ethernet to serial port, 4G router | Including Ethernet network port |

**Antenna selection:**

Glue stick antenna or sucker antenna can be selected. The default of sucker antenna is 2M, and 3M antenna can be customized.

**Power input:**

The default is a plug Q2.1 socket, which can be customized as terminal power input.

Guide rail mounting accessories are available.

# 9. After-service

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