Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



EWD103-W14P(485)

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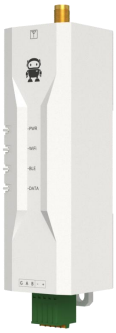
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1. Product Overview

1.1 Product Introduction



The **EWD103-W14P(485)** is a low-power, high cost-performance Wi-Fi & Bluetooth serial server developed by Chengdu Ebyte Electronic Technology Co., Ltd. It complies with Bluetooth 5.2 and IEEE 802.11 b/g/n standard protocols. The module integrates complete hardware and software resources required for Wi-Fi and Bluetooth applications, supports three Wi-Fi operating modes (AP, STA, and AP+STA), and supports low-power Bluetooth, making it highly suitable for low data rate applications and data acquisition scenarios such as smart home and industrial control.

Functionally, this serial server not only supports IEEE 802.11 b/g/n standards and Bluetooth BLE 5.2 protocol, but also enables simultaneous operation of STA mode and BLE slave mode. It supports Modbus protocol conversion and multiple network transmission protocols including TCP, UDP, HTTP, and MQTT.

1.2 Features

★ Supports IEEE 802.11 b/g/n standard, operating in the 2.4 GHz frequency band;
★ Supports Bluetooth BLE 5.2 protocol, operating in the 2.4 GHz frequency band;
★ Supports three operating modes: AP, STA, and AP+STA;
★ Supports Modbus protocol conversion (RTU and TCP);
★ Supports custom heartbeat packet function;
★ Supports simultaneous operation of STA mode and BLE slave mode;
★ Supports WeChat Mini Program (network configuration, TCP, UDP, MQTT);
★ Supports WPA2 Wi-Fi security authentication;
★ Supports multiple network communication protocols including TCP, UDP, HTTP, and MQTT;
★ Supports up to 6 Socket connections;
★ AP access point supports connections of up to 3 STA devices;
★ Supports SNTP network time acquisition (with Internet access);
★ Supports MQTT and MQTTS protocols (Aliyun, Baidu Cloud, OneNet);
★ Supports HTTP protocol;
★ Supports TCP Server / TCP Client and UDP communication modes;
★ Supports TLS encrypted communication;
★ Supports AT command configuration;
★ Supports static IP address assignment and DHCP dynamic assignment;
★ Supports scanning of nearby AP information;
★ Supports fast Wi-Fi connection;
★ Supports Bluetooth-based network configuration;
★ Supports automatic adjustment of Bluetooth packet length;
★ Supports switching between Wi-Fi and Bluetooth slave modes;
★ Bluetooth MTU supports up to 244 bytes;
★ Supports UART online firmware upgrade, making firmware updates more convenient.

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2. Technical Specifications

2.1 Model Specification

Model	Operating Frequency	WiFi Protocol	Bluetooth Protocol	Communication Port	Technical Features
EWD103-W14P(485)	2.4 GHz (WiFi & Bluetooth)	IEEE 802.11b/g/n	BLE5.2	RS485	Supports Modbus protocol conversion (RTU and TCP)

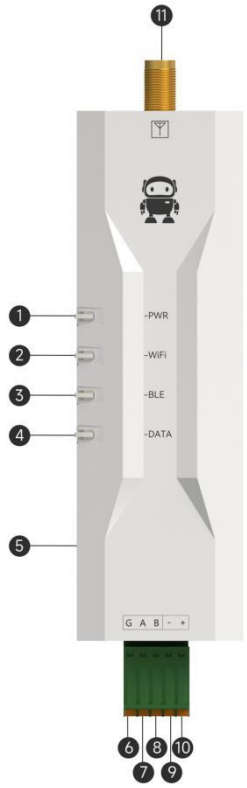
2.2 General Specifications

Parameter	Description
WiFi Protocol	IEEE 802.11b/g/n
Bluetooth Protocol	BLE5.2
Operating Band	2412–2484 MHz (WiFi & Bluetooth), supports global license-free ISM 2.4 GHz band
WiFi Data Rate	●802.11b：1 Mbps、2 Mbps、5.5 Mbps、11 Mbps ●802.11g：6 Mbps、9 Mbps、12 Mbps、18 Mbps、24 Mbps、36 Mbps、48 Mbps、54 Mbps ●802.11n：HT20 (MCS0~MCS7)
WiFi Channel	Supports 20 MHz
WiFi Receive Sensitivity	-99 dBm
BLE Data Rate	1 Mbps
Reference Distance	Approx. 310 m (tested in open environment)
Flash	2MB
RAM	256 KB
Main Frequency	120MHz
RF Interface	SMA-K, external thread with internal hole, characteristic impedance approx. 50 Ω
Communication Interface	RS485, 2.5 mm terminal block
Product Dimensions	80 × 28 × 28.5 mm (see Section 2.4 for details)
Buffer Capacity	1024Btye
Electrical Parameters	
Supply Voltage	8–28 V DC, recommended 12 V/1 A or 24 V/0.5 A
Transmit Power	20dBm
Transmit Current (Avg.)	≈35 mA @ 20 dBm, 12 V supply
Receive Current	≈23 mA @ 12 V supply
Environmental Parameters	
Operating Temperature	–40 °C to +85 °C (industrial grade)
Storage Humidity	10–90 % RH, non-condensing
Storage Temperature	-40℃～+125℃

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2.3 Component Description



No.	Name	Function	Description
1	PWR	Power indicator (red)	Lit when power is supplied
2	WIFI	WiFi connection indicator (blue)	Solid ON: WiFi connected OFF: WiFi not connected
3	BLE	Bluetooth connection indicator (blue)	Solid ON: Bluetooth connected OFF: Bluetooth not connected
4	DATA	Data indicator (yellow)	Flashes during data transmission
5	Restore	Reset button	Long press for approx. 5 s to restore factory settings
6	G	PGND	Isolated ground
7	A	RS485-A	RS485 signal A
8	B	RS485-B	RS485 signal B
9	-	GND	Power negative
10	+	VCC	Power positive (DC 8–28 V)
11	ANT	RF interface	SMA-K, external thread with internal hole

Note:

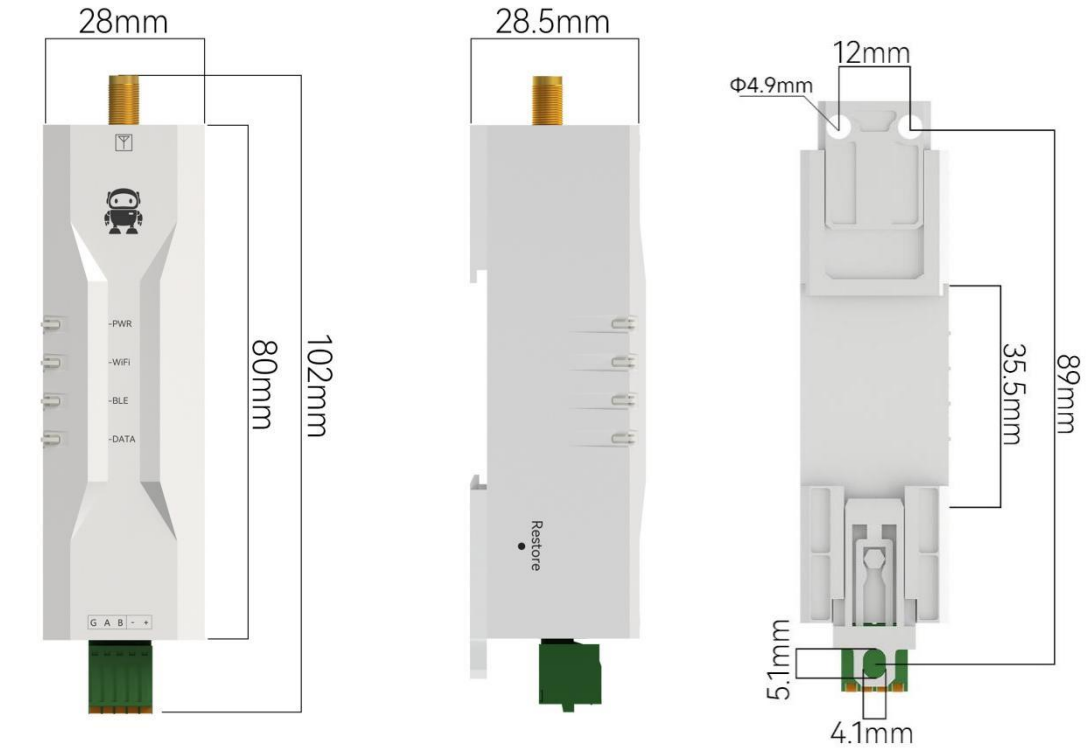
★ If communication becomes unstable when the radio is connected to multiple devices but works normally with a single device, try connecting a 120 Ω resistor in parallel between the 485_A and 485_B terminals.

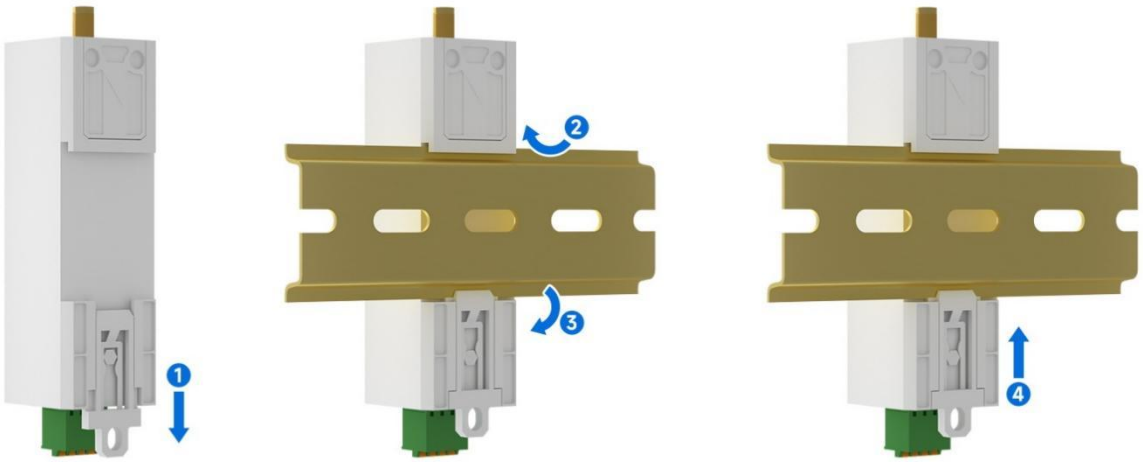
★ EWD103-W14P(485) supports 8–28 V DC power supply. The wiring terminal uses a 5-pin 2.5 mm terminal block.

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2.4 Installation Dimensions





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3. Function Description

The WiFi serial server can operate in WiFi mode or BLE mode via commands.
From the WiFi layer perspective, the device supports AP, STA, and STA+AP modes.
From the BLE layer perspective, only the slave role is supported.
From the service perspective, TCP (server/client), TLS (server/client), UDP, HTTP, MQTT, and Modbus are supported.

3.1 Operating Modes

3.1.1 Access Point (AP Mode)

AP mode functions similarly to a router, allowing wireless devices to connect and establish TCP/IP server, client, and UDP communication.
Up to 3 stations can connect, with a maximum of 6 TCP socket connections.
Use the AT+CWMSAP command to initialize AP mode.

3.1.2 Station (STA Mode)

In STA mode, the device connects to an existing AP and establishes TCP/IP server, client, or UDP communication.
Use the corresponding AT commands to configure STA mode.

3.1.3 SoftAP + STA Mode

The device operates simultaneously in AP and STA modes.
Use AT+CWSAP and AT+CWJAP to enable SoftAP and STA respectively.
Supports connection to one AP and up to two STA devices.

3.2 Service Modes

Service mode refers to supported network protocols and device roles such as server and client.
Supported protocols include UDP, MQTT, HTTP client, etc.
(Note: Except for TLS, which consumes significant resources and can only be used independently.)

3.2.1 TCP server

The device can initialize one TCP server with a maximum of 5 socket connections.
All sockets are shared globally across the device.

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3.2.2 TCP client

The device can connect to external TCP servers.

Up to 6 socket connections are supported in TCP client mode.

3.2.3 TLS Server

The device can initialize a TLS server and supports only one TLS encrypted socket.

TLS 1.2 is supported.

3.2.4 TLS Client

Only a single TLS socket connection is supported in TLS client mode.

3.2.5 UDP

The device can communicate with remote UDP services using AT+CIPSTART.

Supports up to 6 sockets.

(Note: UDP listening is not supported.)

3.2.6 MQTT

Supports IoT platforms such as Alibaba Cloud, Baidu Cloud, and OneNet.

Communication can be established by configuring platform parameters.

3.2.6.1 Alibaba Cloud

Network communication based on Alibaba Cloud requires obtaining parameters such as product key, device name, and client ID.

See Chapter 6 for detailed configuration.

3.2.6 HTTP Client

Only the server URL needs to be configured to initiate an HTTP request.

No need to handle complex HTTP protocol layers.

Refer to the AT command manual for details.

3.3 Modbus

This device supports the Modbus protocol and enables free conversion between RTU and TCP.

Serial data is automatically identified and converted into Modbus-compliant packets for network transmission, and vice versa.

Notes:

1. Modbus support is limited to data conversion and does not perform actual control operations.
2. When Modbus is enabled, protocol transmission is disabled and all data is converted into Modbus format.
3. Only TCP server, TCP client, and UDP modes support Modbus.

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3.4 Heartbeat Packet

Heartbeat packets are available only in TCP client mode.

Custom heartbeat data content is supported.

4. User Guide

Before use, relevant parameters must be configured.

Operations marked with * are mandatory.

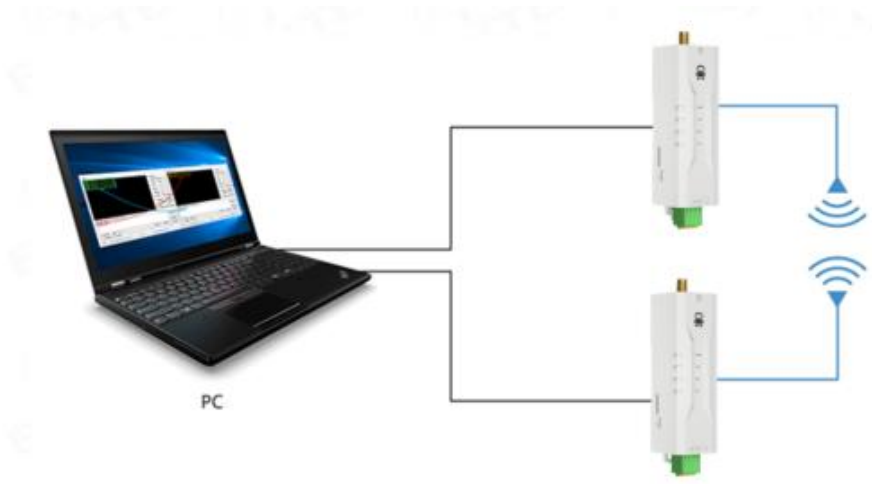
4.1 Preparation

① Prepare two WiFi serial server debugging kits, including EWD103-W14P(485), antennas, 8–28 V DC power adapters, USB-to-RS485 converters, and connection cables (5-pin 2.5 mm terminal).

② Install antennas and power up the devices. Connect A+ to A and B– to B.



③ Connect both devices to the PC via USB-to-RS485.



④ Open two serial assistants and set baud rate to 115200 bps (default), 8N1.

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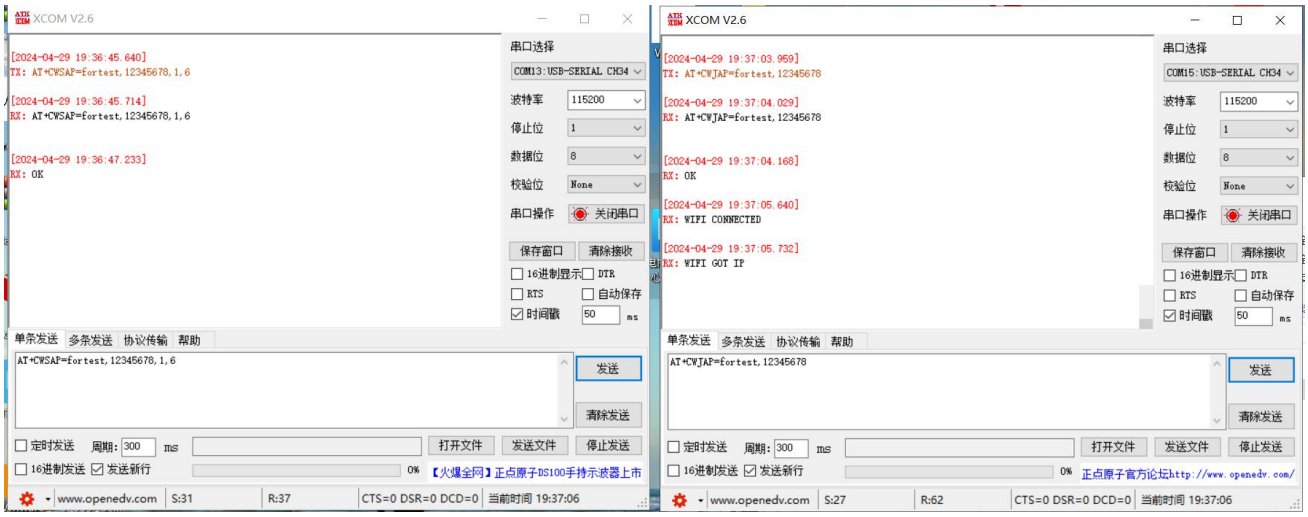
4.2 WiFi Connection

4.2.1 Device-to-Device WiFi Connection

① Device 1: AT+CWSAP=fortest,12345678,1,6 to enable AP.

② Device 2: AT+CWJAP=fortest,12345678 to connect.

③ When “WIFI GOT IP” is returned, the connection is successful.

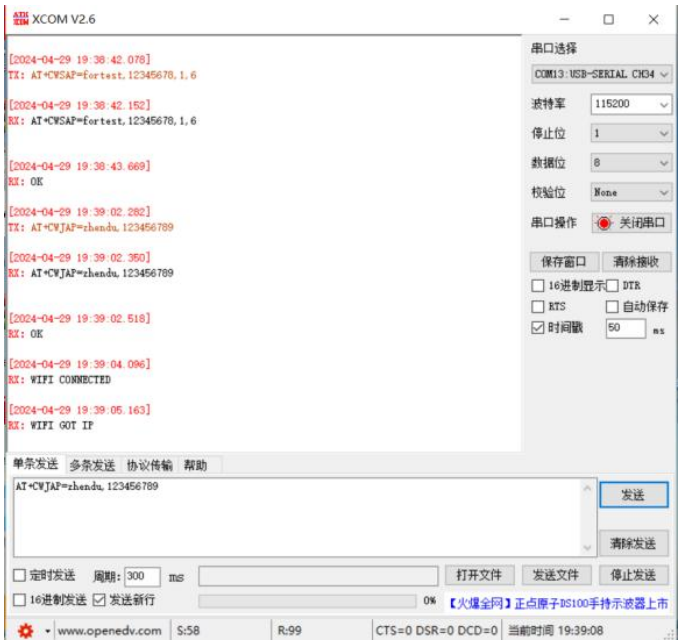


4.2.2 STA + AP Mode

① AT+CWSAP=fortest,12345678,1,6

② AT+CWJAP=zhendu,123456789 (replace with actual AP info)

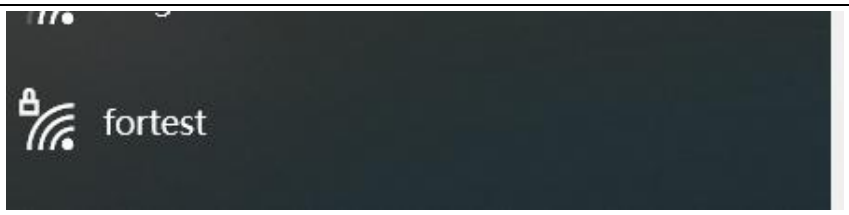
③ Wait for “WIFI GOT IP”.



④ The AP can be scanned and connected via PC or smartphone.

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4.3 Basic TCP / UDP Transmission

4.3.1 TCP Communication Between Devices

① Device 1: Use AT+CWSAP=fortest,12345678,1,6 to initialize AP mode.

② Device 1: Use AT+CIPMUX=1 to enable multiple connections (this must be enabled before starting a server).

③ Device 1: Use AT+CIPSERVER=1,4200 to start the server and listen on port 4200. When “LISTENING” is returned, the server is started successfully. Device 1 configuration is now complete.

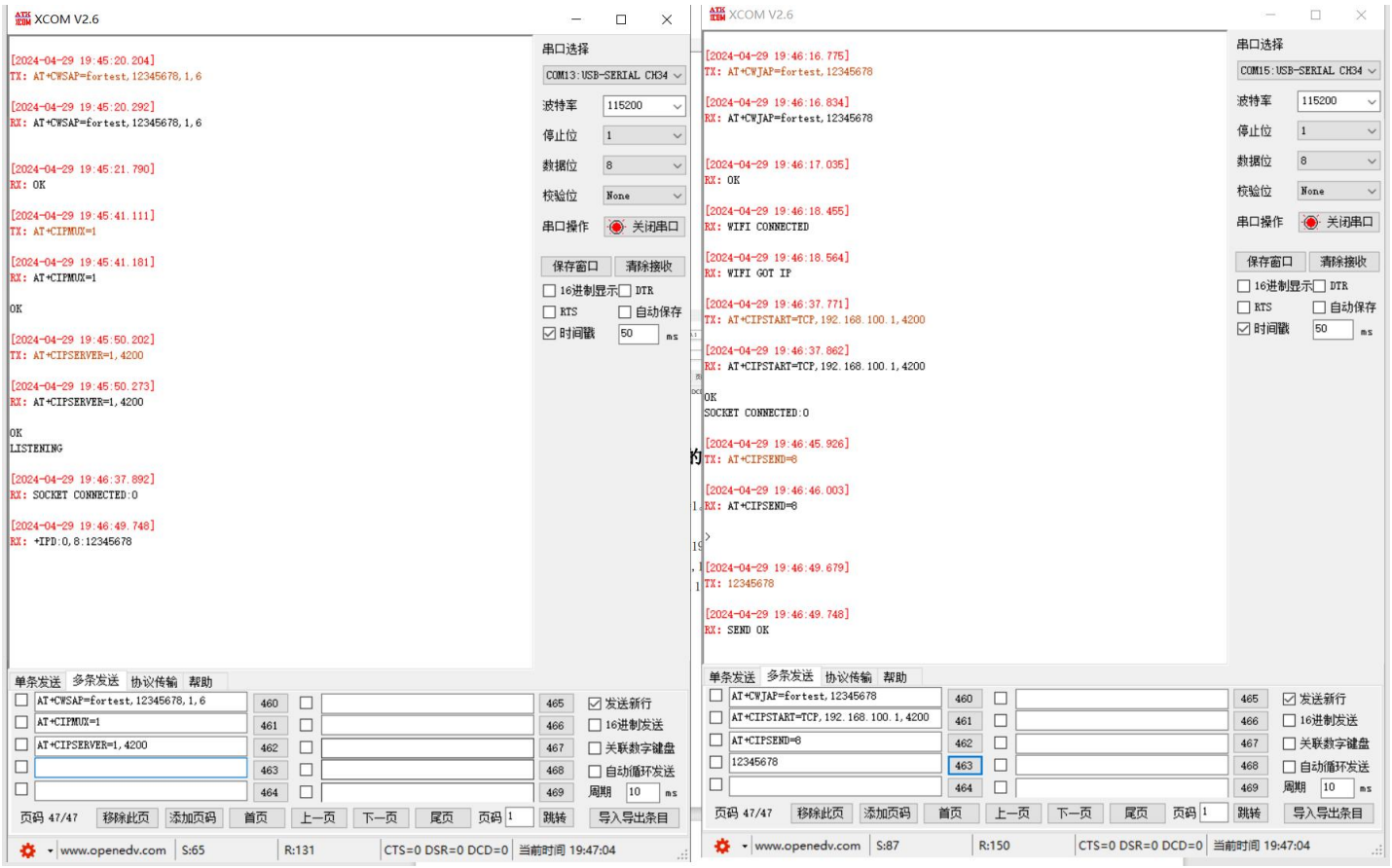
④ Device 2: Use AT+CWJAP=fortest,12345678 to connect to Device 1’s WiFi.

⑤ Wait until “WIFI GOT IP” is returned.

⑥ Device 2: Use AT+CIPSTART=TCP,192.168.100.1,4200 to connect to Device 1’s server.

⑦ Wait until “SOCKET CONNECTED:0” is returned, indicating that the TCP connection is successful.

⑧ Both sides can now send data. Since Device 1 is configured for multiple connections, data must be sent using AT+CIPSEND=<ID>,<LEN>. Device 2 sends data using AT+CIPSEND=<LEN>, as shown below：



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4.3.2 UDP Communication Between Device and PC (PC Must Enable Listening)

① Connect the device and PC to the same WiFi network using AT+CWJAP=zhendu,123456789 (replace parameters with actual WiFi credentials).

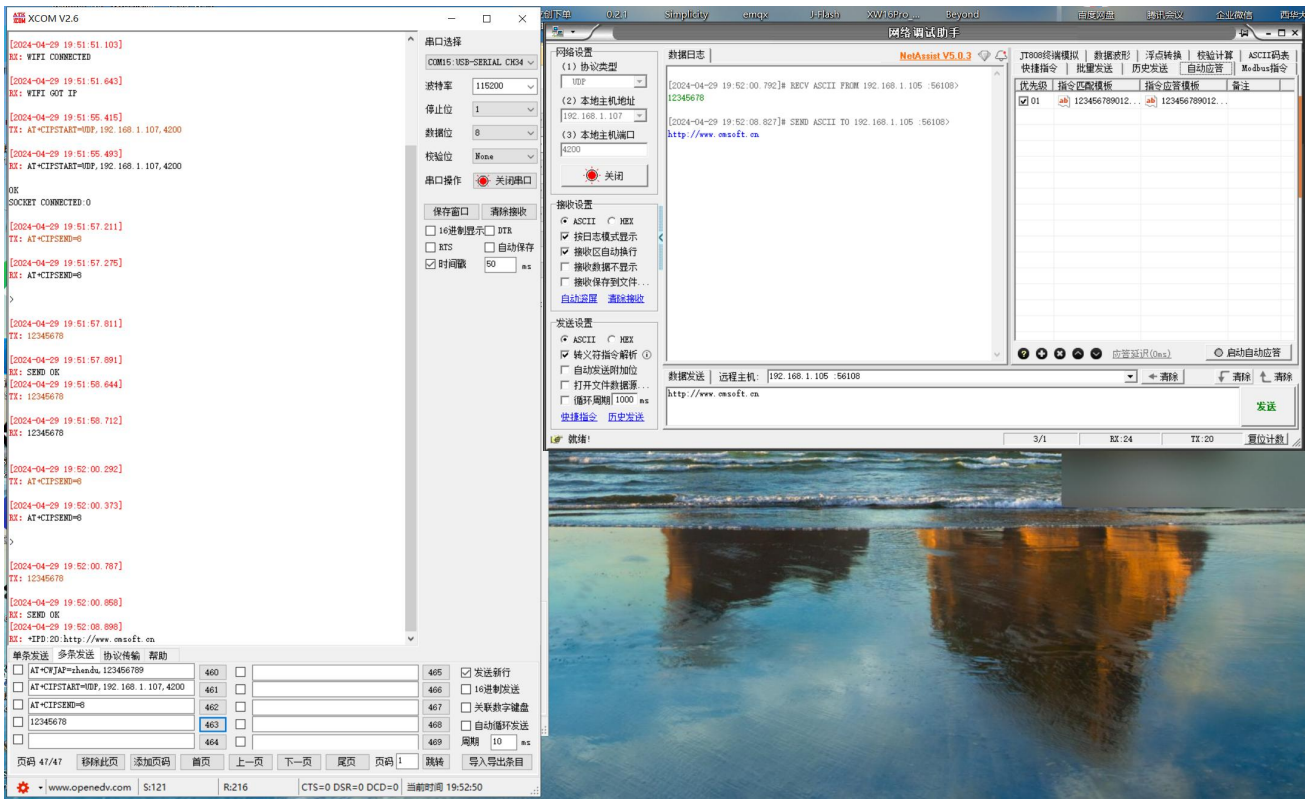
② On the PC, open a network debugging assistant and enable UDP listening.

③ Use AT+CIPSTART=UDP,192.168.1.107,4200. When “SOCKET CONNECT:0” is returned, the connection is successfully created.

④ Use AT+CIPSEND=<LEN> to send data. After successful transmission, “SEND OK” will be returned.

⑤ Since UDP is connectionless, the PC does not know the device IP address initially. Only after the device sends data to the PC can the PC reply. When the device receives data, it is displayed in the format +IPD:<LEN>,<DATA>, where LEN indicates data length and DATA indicates the received content.

⑥ The complete process is shown below：



4.3.3 TLS Communication Between Devices

① Device 1: Use AT+CWSAP=fortest,12345678,1,6 to enable AP mode.

② Device 1: Use AT+CIPMUX=1 to enable multiple connections (required before starting the server).

③ Device 1: Use AT+CIPSERVER=1,4200,TLS to start a TLS server. When “LISTENING” is returned, the TLS server is started successfully.

④ Device 2: Use AT+CWJAP=fortest,12345678 to connect to Device 1’s AP.

⑤ Wait until “WIFI GOT IP” is returned.

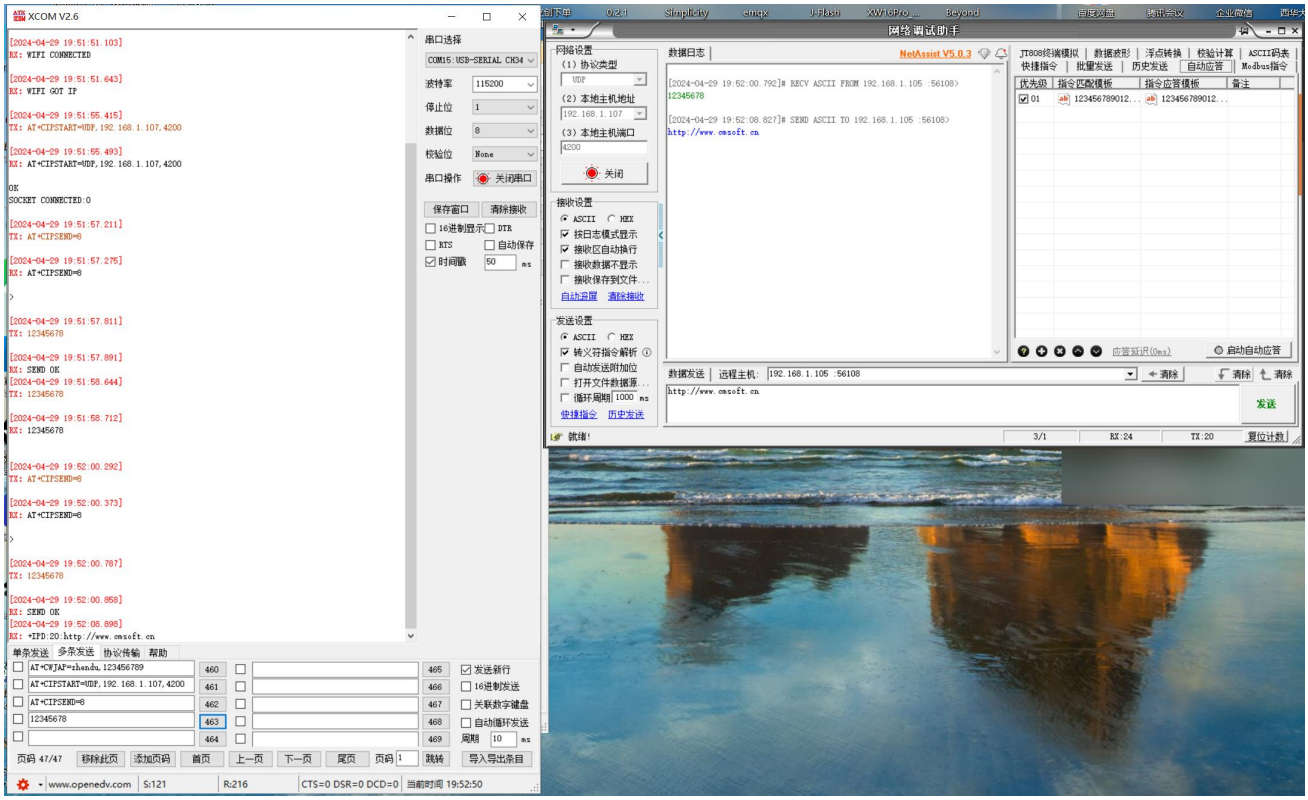
⑥ Device 2: Use AT+CIPSTART=TLS,192.168.100.1,4200. When “SOCKET CONNECTED:0” is returned, the TLS connection is successful.

⑦ Data can now be sent using the AT+CIPSEND command. Refer to the AT command manual for details.

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⑧ The complete configuration process is shown below：



4.3.4 Transparent Transmission Description

① Transparent transmission mode supports only a single connection, i.e., only connection ID 0 can be used.

② Server mode does not support transparent transmission.

③ In client mode, transparent transmission can be enabled using the AT+SAVETRANSLINK command, or after connection by using AT+CIPMODE=1, or directly sending AT+CIPSEND. After entering transparent mode, all serial data is sent through socket link 0.

④ To exit transparent transmission mode, send +++. Note that unlike AT commands, no carriage return or line feed is required—only send the three characters +++.

4.4 HTTP Requests

This section introduces how to perform simple HTTP requests.

① Connect the device to an AP that has Internet access using AT+CWJAP=zhendu,123456789 (replace with actual WiFi credentials).

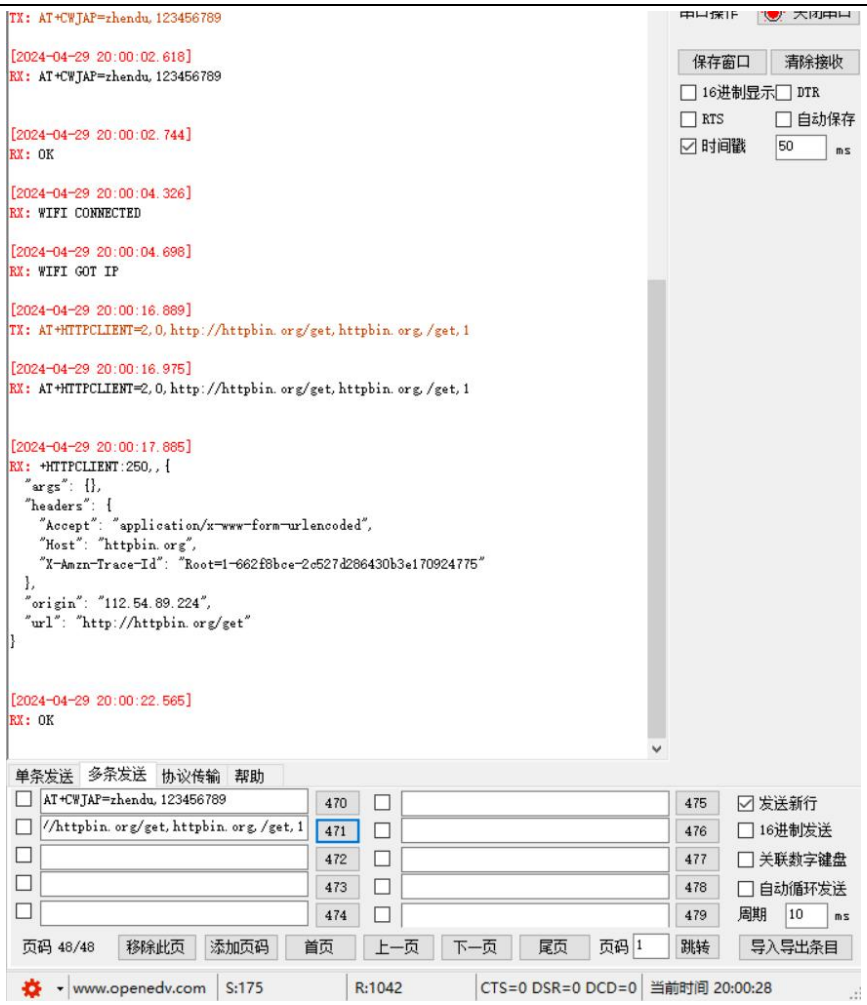
② Wait until “WIFI GOT IP” is returned.

③ GET request: Use AT+HTTPCLIENT=2,http://httpbin.org/get,httpbin.org,/get,1. Refer to the AT command manual for parameter details. Note that the URL must start with http:// or https://. Wait for “OK”. If data is returned, the server response will be output before “OK”.

④ The process is shown below：

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4.5 MQTT

MQTT v3.1 and v3.1.1 are supported. Any MQTT cloud platform supporting these versions can be connected. This section uses Alibaba Cloud as an example.

4.5.1 Alibaba Cloud

① Configure the device to work in STA mode and connect to a router with Internet access.

② Visit the Alibaba Cloud IoT platform at aliyun.com.

③ Click to enter the public example.



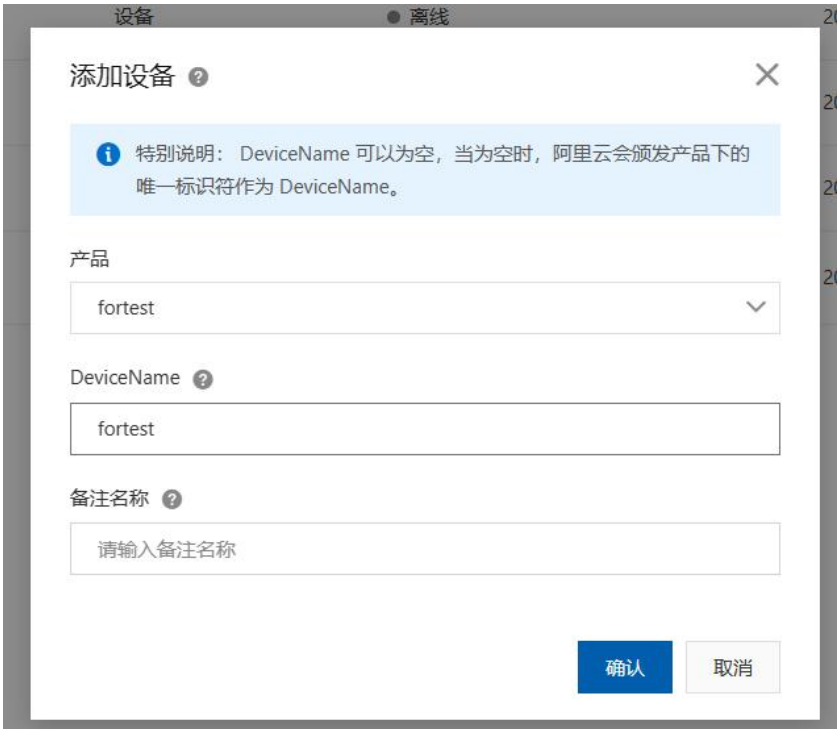
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④ In the left navigation bar, select “Products” and create a product.



⑤ Select “Devices” in the left navigation bar, add a device, and choose the created product.

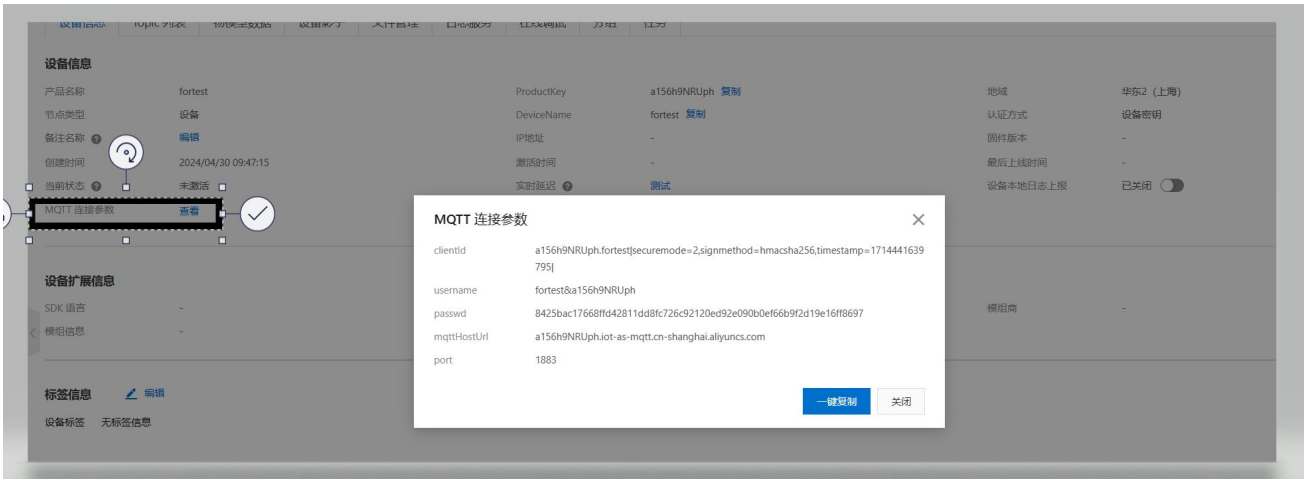


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⑥ Click “View Details” to obtain the required connection parameters.

Note: If parameters contain special characters such as commas, escape them with a backslash. For example, ,asd should be entered as \,asd.



⑦ Configure MQTT user information using AT+MQTTUSERCFG=0,0,a156h9NRUph.fortest|securemode=2\,signmethod=hmacsha256\,timestamp=1714441911497|,fortest&a156h9NRUph,cc2a9489408d1b6c6843552e6c60a2409af224c2c4761badb0174c9d623cf5d2,0,0(ensure all marked backslashes are properly escaped).

⑧ Configure connection parameters using AT+MQTTCONNCFG=0,120,0,lwt,LWT,BYE,1,0

⑨ Initiate connection using AT+MQTTCONN=0,a156h9NRUph.iot-as-mqtt.cn-shanghai.aliyuncs.com,1883,0. Note that this command may take some time to respond.

⑩ The configuration process is shown below.

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⑪ The device status can also be viewed as online on Alibaba Cloud.



⑫ Note: Alibaba Cloud only allows subscription to predefined object models.

⑬ MQTT data transmission is supported only via AT commands (AT+MQTTPUB / AT+MQTTPUBRAW).

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4.6 Heartbeat Packet Usage

① Device 1: Use AT+CWSAP=fortest,12345678,1,6 to initialize AP mode.

② Device 1: Use AT+CIPMUX=1 to enable multiple connections.

③ Device 1: Use AT+CIPSERVER=1,4200 to start the server. When “LISTENING” is returned, configuration is complete.

④ Device 2: Use AT+CWJAP=fortest,12345678 to connect to Device 1’s WiFi.

⑤ Wait until “WIFI GOT IP” is returned.

⑥ Device 2: Use AT+CIPSTART=TCP,192.168.100.1,4200 to connect to the server (use AT+CIFSR to query the server IP if needed).

⑦ Wait until “SOCKET CONNECTED:0” is returned.

⑧ Use AT+CIPHEARTBEAT=6,6,2,1,hello word to configure a 6-second heartbeat packet.



4.7 Modbus TCP and Modbus RTU Conversion

4.7.1 TCP to RTU

① Connect to WiFi using AT+CWJAP=Gene,Yjh666..., and wait for “WIFI CONNECTED” and “WIFI GOT IP”.

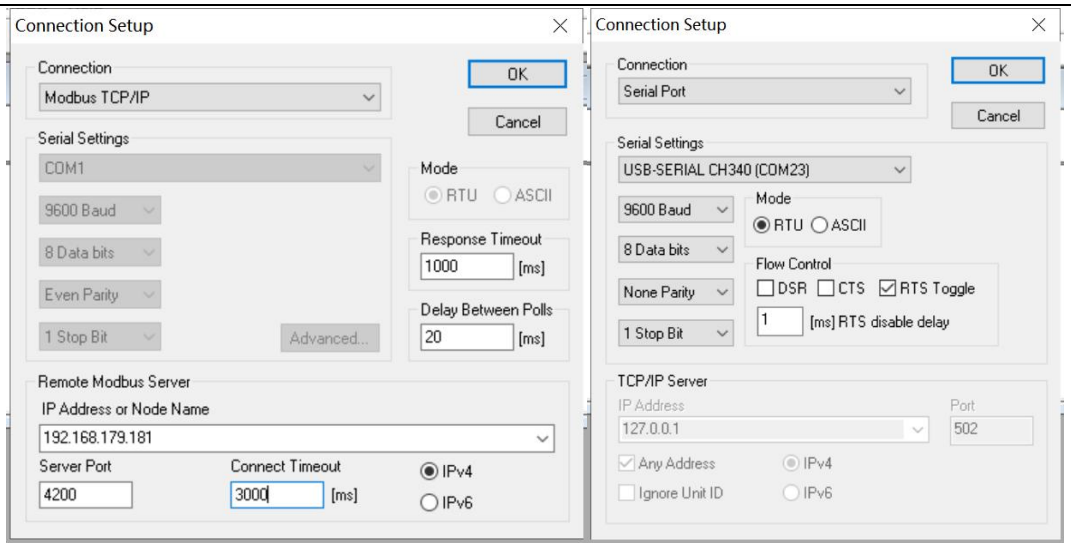
② Enable multiple connections using AT+CIPMUX=1.

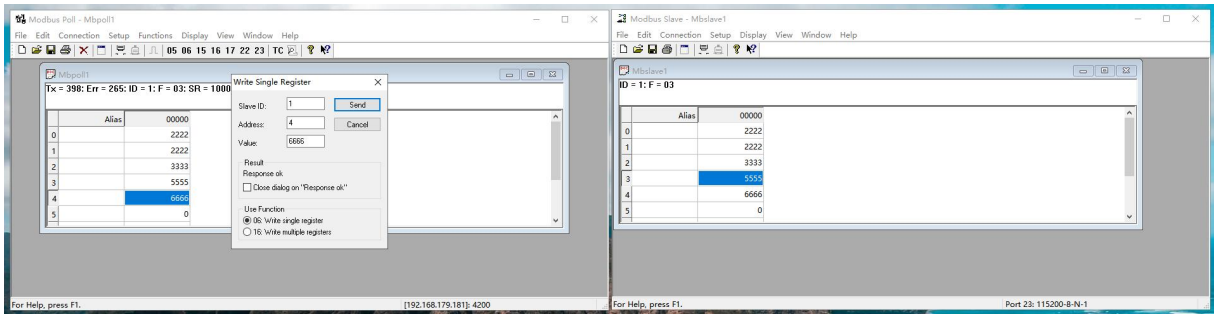
③ Establish a TCP connection using AT+CIPSERVER=1,4200.

④ The result is shown below.

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4.7.1 RTU to TCP

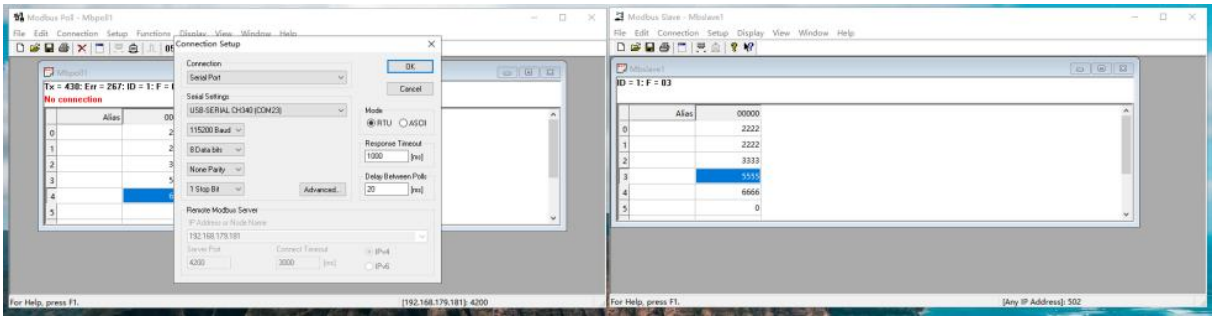
① Connect to WiFi using AT+CWJAP=Gene,Yjh666... .

② Establish a TCP connection using AT+CIPSTART=TCP,192.168.179.107,502.

③ AT+MODBUSEN=1

④ AT+CIPSEND

⑤ The result is shown below：



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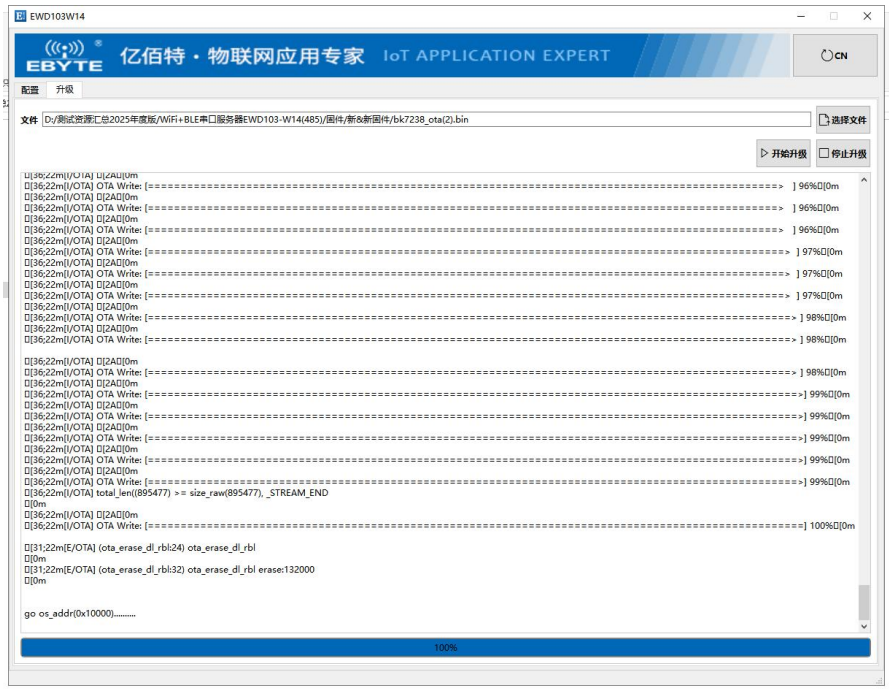
4.8 PC Software Configuration and Firmware Upgrade

① Configure the EWD103-W14P(485) using PC software.



② Existing configuration commands in the PC software remain valid.

③ Firmware upgrade success interface is shown below.



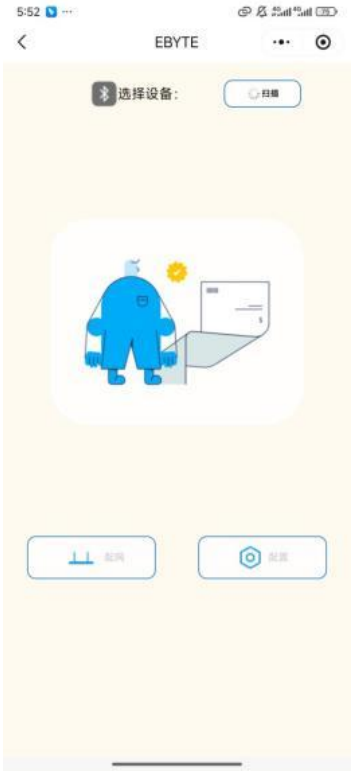
Note: Re-upgrading firmware on a module that has already been upgraded is invalid. No progress log is displayed during serial server firmware upgrade.

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4.9 WeChat Mini Program

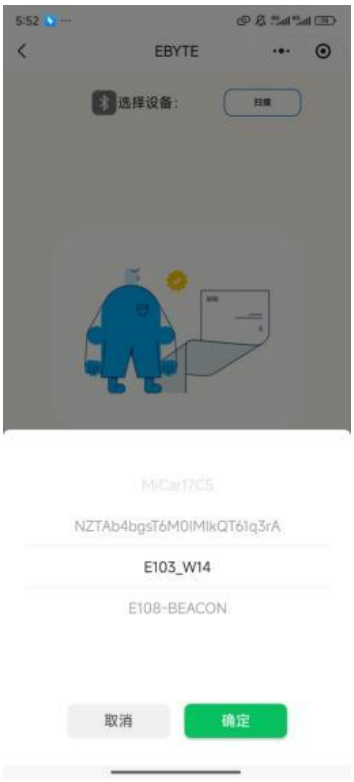
① Open the WeChat mini program on a mobile phone：



② Use AT+BLEINIT=2 to initialize Bluetooth LE, then use AT+BLEADVSTART to start Bluetooth LE advertising.
Next, use AT+CWSTARTSMART=1 to enable SmartConfig.
Click the scan button in the WeChat mini program. When “E103-W14” appears in the list, select it and confirm.

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③ Follow the on-screen steps and click “Next” to complete the WiFi connection：



④ WiFi connection successful：

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5. Connection Diagrams for Testing and Practical Applications

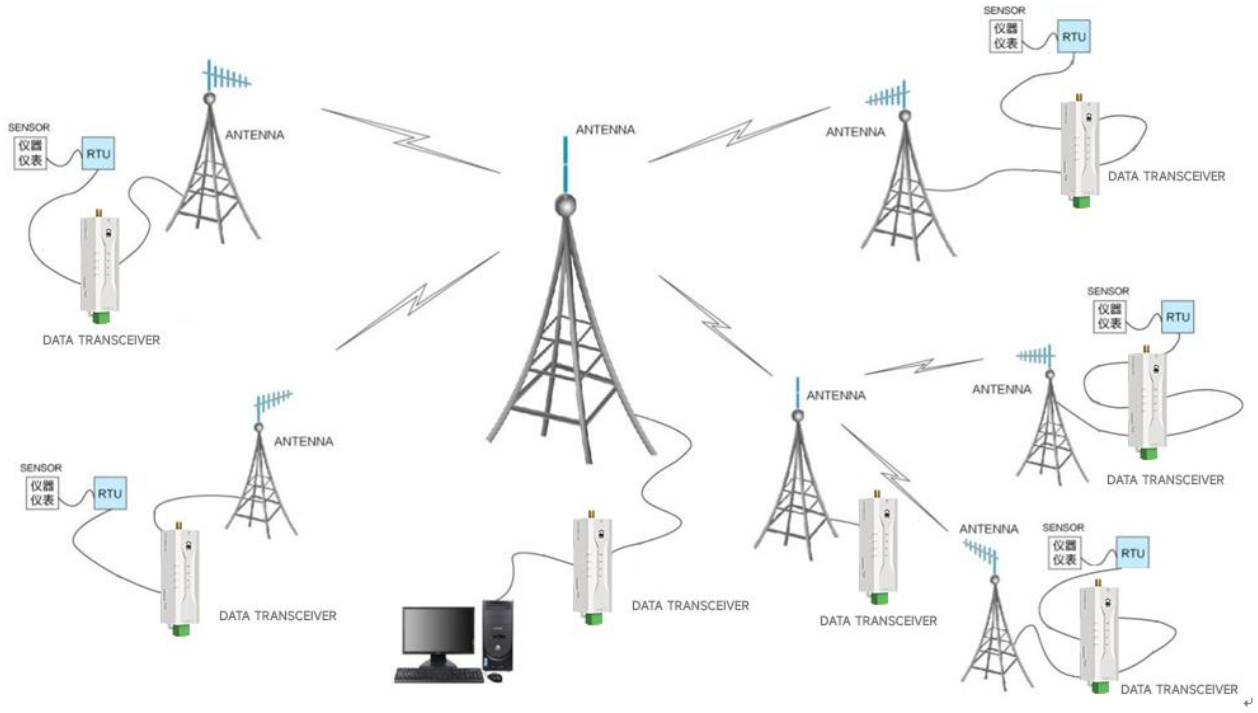


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6. Application Fields

Ebyte wireless data radios are suitable for various point-to-point and point-to-multipoint wireless data transmission systems, such as smart homes, IoT upgrades, power load monitoring, power distribution automation, hydrological and water condition monitoring, water supply pipeline monitoring, urban streetlight monitoring, air defense alarm control, railway signal monitoring, centralized railway water supply control, oil and gas pipeline monitoring, GPS positioning systems, remote meter reading, electronic crane scales, automatic target reporting, earthquake monitoring, fire prevention and anti-theft systems, environmental monitoring, and other industrial automation systems, as shown below：



7. Precautions

1. Do not operate this radio in flammable locations (such as coal mine tunnels) or near explosive hazards (such as detonators).
2. Use an appropriate regulated DC power supply with strong resistance to high-frequency interference, low ripple, and sufficient load capacity. It is recommended that the power supply also provide overcurrent, overvoltage, and lightning protection to ensure reliable operation.
3. Do not use the radio in environments that exceed its specified operating conditions, such as high temperature, high humidity, extremely low temperature, strong electromagnetic fields, or dusty environments.
4. Do not allow the radio to continuously operate at full transmission power, as this may damage the transmitter.
5. The radio ground must be properly connected to the ground of external devices (such as PCs, PLCs) and the power supply ground. Otherwise, communication interfaces may be damaged. Never plug or unplug serial ports while powered on.
6. During testing, a matched antenna or a 50 Ω dummy load must be connected; otherwise, the transmitter may be damaged. If an antenna is connected, keep a distance of more than 2 meters from the antenna to avoid injury. Do not touch the antenna during transmission.

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7. Wireless communication distance varies with the environment and is affected by temperature, humidity, obstacle density, obstacle size, and electromagnetic interference. To ensure stable communication, it is recommended to reserve more than 50% communication margin.
8. If the actual communication distance is unsatisfactory, analyze and improve it by optimizing antenna quality and installation methods. You may also contact support@cdebyte.com for assistance.
9. When selecting a power supply, in addition to reserving a recommended 50% current margin, ensure that the ripple voltage does not exceed 100 mV.

8. Important Notice

1. Ebyte reserves the right of final interpretation and modification of all contents in this manual.
2. Due to continuous improvements in product hardware and software, this manual may be updated without prior notice. Please refer to the latest version for accurate information.

Revision History

Version	Revision Date	Description	Maintainer
1.0	2026-1-19	Initial version	Hao

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