1 Product description

1.1 Product Introduction

Maxgate800 series is a rail-mounted ARM Cortex-A55 industrial communication intelligent gateway carefully designed by Wuhan MAIWE Communication Co., Ltd. It integrates multiple functions such as switches, Wi-Fi 6/4G/5G (optional), Modbus gateways, CAN gateways, I/O controllers, etc. It supports 2 Gigabit SFP ports, 8 Gigabit RJ45 ports, 12 RS485, 4 CAN, 26 I/O (16 DI + 8 DO + 2 AI), 1 HDMI, 1 USB2.0 and 1 dual Nano SIM card slot; it adopts a high-performance, low-power quad-core 64-bit ARM Cortex-A55 processor with a main frequency of 2ghz, equipped with 2gbyte DDR4, 8gbyte emmc, and runs smoothly. With rich hardware resources and multiple peripheral interfaces, it can transmit the data collected by terminal devices on the LAN, WAN, WLAN or cellular network of this device.

This product has rich protocols, strong stability, good tailor ability and scalability, comprehensive support for various communication interface drivers, and supports multiple hardware platforms and architectures; it provides onboard 8gbyte emmc storage and external USB2. 0 HOST interface, which facilitates customers' secondary development, has the possibility of application self-recovery, and can realize system redundancy function through multiple backup methods. The hardware adopts high-standard industrial protection design, with selected industrial-grade components and high-strength aluminum alloy casing, which is sturdy and durable; low power consumption, wide temperature and wide voltage design, fanless casing for heat dissipation, and supports -40 ℃ ~ +75 ℃ operating temperature, passed strict safety regulations and EMC tests to meet the application needs of harsh industrial environments. Products can be widely used in industrial automation, integrated energy, smart cities, smart transportation, smart mines, smart factories and other fields.

This series of products supports 4 models to choose from, providing Wi-Fi 6, 4G or 5G functions, as shown in the table below.

Table 1-1 product model

Standard model	Gigabit SFP Port	Gigabit RJ45 Port	Antenna interface			RS 485	CAN	DI	DO	AI	Power
			Wi-Fi	4G	5G						
Maxgate800	2	8	/	/	/	12	4	16	8	2	Dual DC12~48V power input
Maxgate800-W	2	8	2	/	/	12	4	16	8	2	
Maxgate800-4G	2	8	/	1	/	12	4	16	8	2	
Maxgate800-5G	2	8	/	/	4	12	4	16	8	2	

1.2 Features

- Support 2 Gigabit SFP ports, 8 Gigabit RJ45 ports, 12 RS485, 4 CAN, 26 I/O (16 DI+8 DO+2 AI), 1 HDMI and 1 USB2. 0, providing users with flexible networking methods
- Adopts 4-core 64-bit ARM Cortex-A55 processor with a main frequency of up to 2ghz to meet edge computing needs
- Support 2GB DDR4 memory and 8GB emmc storage, which facilitates secondary development and can be customized with larger memory and flash
- Based on Debian 10, using Linux 4.0 or higher kernel, supporting apt package manager, easy to download and install software
- Support Docker, secondary development and deployment of own programs quickly
- Support network card, serial port, RS485, GPIO, emmc, HDMI, I2C, RTC, built-in Watchdog, USB, Wi-Fi and other drivers, provides application layer programming sample code and a general cross-compilation environment to facilitate secondary development
- Built-in Modbus gateway, CAN gateway, IO gateway functions, and supports user secondary development
- Support switching function and provide multiple network protocols, such as LACP, VLAN, ERPS, RSTP, IGMP Snooping, SNMP, 802.1X, LLDP, RMON, etc.
- Supports MW-Ringv1/v2, ERPS, STP/RSTP and other ring network redundancy protocols
- Support serial port and CAN port terminal equipment networking, can convert TCP, UDP, Modbus, HTTPD, websocket, MQTT and other protocols
- Support I/O digital/analog detection and control
- The WAN port can be connected to the external network via dynamic/static/pppoe dial-up mode
- Optional 5G or 4G cellular network, dual SIM single standby, customizable 5G LAN
- Optional dual-band Wi-Fi 6, can be used as a wireless client to access wireless networks
- Multiple network access modes including wired, Wi-Fi 6, 4G/5G/5G LAN, etc. (only wired is supported by default)
- Support multiple file systems and multiple network protocols
- Support VPN clients and servers to build private networks
- Support MQTT to connect to Alibaba Cloud, onenet, Tencent Cloud, Huawei Cloud, MAIWE Cloud or other cloud platforms to achieve the interconnection of everything between the end and the cloud
- Support DDM, can detect DDM optical module temperature, voltage, current, transmit optical power, receive optical power, etc.
- Support RTC to provide accurate real-time clock, and the device can continue to keep time even after power failure
- Support 2-way DC12~48V power input, dual input supports power redundancy
- High-strength aluminum alloy housing, IP40 protection grade, fanless housing heat dissipation, the equipment can work reliably in -40 ℃ ~ +75 ℃ harsh industrial environment

1.3 Products

	
MaxGate800	MaxGate800-W
	
MaxGate800-4G	MaxGate800-5G

1.4 Specifications

Table 1-2 Specifications

System message	
Processor	Quad -core 64-bit ARM Cortex-A55, clocked at 2ghz
Operating system	Debian 10 (Linux 4.19.219)
Memory	2GB DDR4
Storage	8 GB emmc

Software features	
Industrial BUS	Support Modbus RTU Master, Modbus RTU Slave, Modbus ASCII Master, Modbus ASCII Slave, UDP Client, UDP Server, UDP Multicast, TCP Server, TCP Client, realcom_MCP, realcom_CCP, realcom_MW, Pair Connection Master, Pair Connection Slave, HTTPD Client, websocket Client, MQTT and other serial port to network modes Support serial port forwarding, RFC2217 Support Modbus slave mapping, Modbus pre-reading, Modbus address mapping batch reading and writing CAN- to-network modes such as UDP Client, UDP Server, UDP Multicast, TCP Server, TCP Client, Pair Connection Master, Pair Connection Slave, Modbus TCP Slave, HTTPD Client, websocket Client, MQTT, etc. Supports packet length, packet interval, heartbeat packet, SSL encryption, and data encryption Support CAN ID filtering Support restart without data
I/O Controller	Support DI, DO, AI detection and DO control DO supports restart and hold, AI supports current type 4-20ma and voltage type 0-10V Support Modbus TCP instructions to read data and control, DI supports 02 function code, DO supports 01/05/0F function code, AI supports 04 function code
Routing function	Support 4G/5G cellular network or Wi-Fi 6 wireless client optional Support static routing, link checking, and network diagnosis Support port forwarding, access control, custom rules, DMZ, qos Supports VPN clients and servers, dynamic DNS, and cloud services
Exchange function	Support port configuration, port speed limit, storm suppression, storm detection, port aggregation, LACP, port statistics Support 8021. QVLAN, port isolation, static unicast MAC binding Support fast ring network, ERPS, RSTP Support IGMP-Snooping, static multicast MAC binding Supports ACL, 802.1X authentication, email logs, alarms, and loopback detection Support SNMP, RMON, LLDP, port mirroring, network diagnosis, optical module DDM
System management	Supports Web, Telnet, and SSH access control WAN supports DHCP, static address, pppoe connection Support DNS, LAN DHCP server Support local/network clock synchronization, automatic adjustment of daylight saving time, system log, scheduled tasks, and certificate management Supports scheduled/immediate restart, configuration file upload and download, and system upgrade
Wi-Fi RF parameters (Max Gate800-W)	
Wireless standards	IEEE802.11b/g/n/ac/ax
Working frequency	2.4 ghz~2.4835ghz 、5.15 ghz~5.835ghz
Modulation	CCK, DQPSK, DBPSK, BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM

Band bandwidth	20mhz/40mhz/80mhz	
Maximum transfer rate (theoretical value)	2.4ghz: 574Mbps 5ghz: 1201 Mbps	
Maximum transmit power	802.11b: 18 ± 1.5dbm 802.11g: 15 ± 1.5dbm 802.11n HT20/HT40: 15 ± 1.5dbm 802.11ac HT80: 13 ± 1.5dbm	
Receive sensitivity	1Mbps: -95 dbm@PER＜ 8% 11Mbps: -88 dbm@PER＜ 8% 54Mbps: -73 dbm@PER＜ 10% 65Mbps: -71.5dbm@PER＜ 10% 1201Mbps: -65 dbm@PER＜ 10%	
Cellular network	**4G cellular network (maxgate 800-4G)**	**5G Cellular Network (maxgate 800-5G)**
Network format	LTE-FDD, LTE-TDD, WCDMA, GSM	5G NR SA/NSA, LTE-FDD, LTE-TDD, WCDMA
Working frequency	LTE-FDD: B 1/3/5/8 LTE-TDD: B 34/38/39/40/41 WCDMA: B 1/5/8 GSM: 900/1800 mhz	5G NR SA: n1/28/41/77/78/79 5G NR NSA: n41/78/79 LTE-FDD: B1/2/3/5/7/8/20/28 LTE-TDD: B34/38/39/40/41 WCDMA: B1/2/5/8
MIMO	/	DL 4 × 4: n1/n41/n77/n78/n79 UL 2 × 2: n41/n77/n78/n79 DL 2 × 2: n 28/LTE
Maximum transfer rate (theoretical value)	LTE-FDD: DL 150Mbps/UL 50Mbps LTE-TDD: DL 130Mbps/UL 30Mbps UMTS (HSPA+/HSUPA): DL 21Mbps/UL 5.76Mbps WCDMA: DL/UL 384 kbps GRPS: DL/UL 85.6kbps EDGE: DL/UL 236.8kbps	5G SA Sub-6: DL 2Gbps/UL 1Gbps 5G NSA Sub-6: DL 2.2Gbps/UL 575Mbps LTE: DL 600Mbps/UL 150Mbps UMTS (DC-HSDPA/HSUPA): DL 42.2Mbps/UL 11Mbps WCDMA: DL/UL 384 kbps
Maximum transmit power	LTE-FDD: 23 dbm ±2 db LTE-TDD: 23 dbm ±2 db WCDMA: 2 4dbm +1/-3 db DCS1800(8-PSK): 26 dbm ±3 db EGSM900(8-PSK): 27 dbm ±3 db DCS1800: 30 dbm ±2 db EGSM900: 33 dbm ±2 db	5G NR n1/41: 23 dbm ±2 db 5G NR n28: 23 dbm + 2/-2.5 db 5G NR n77/78/79: 23 dbm + 2/-3 db 5G NR n41/n78/n79 HPUE: 2 6dbm + 2/-3 db LTE: 23 dbm ±2 db (LTE-TDD B41 HPUE: 26 dbm ±2 db) WCDMA: 23 dbm ±2 db

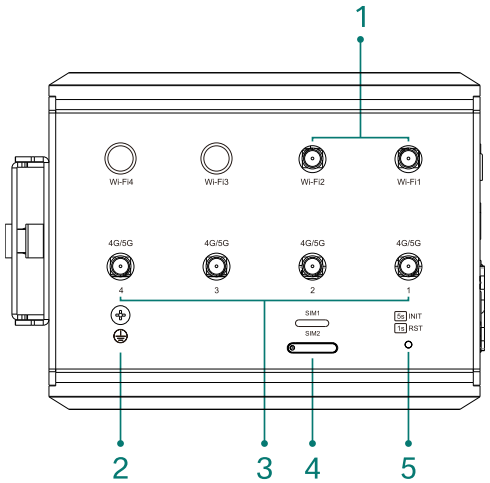
Receive sensitivity	• LTE-FDD(10mhz): - 97 dbm(B1)/- 97.5 dbm(B3)/ -98dbm(B5)/-98dbm(B8) • LTE-TDD(10mhz): -9 6.5 dbm(B34)/-9 7 dbm(B38)/ - 97 dbm(B39)/-97dbm(B40)/ -96dbm(B41) • WCDMA: - 108 dbm(B1)/- 109 dbm(B5)/ - 110 dbm(B8) • DCS1800: -108 dbm • EGSM900: -108 dbm	• 5G NR F DD(5mhz): -106.5dbm(n1)/-101dbm(n28) • 5G NR TDD (100mhz): -92.5dbm (n41)/-92.5dbm (n77)/ -93dbm (n78)/-92.5dbm (n79) • LTE-FDD(10mhz): -101.5dbm(B1)/-100dbm(B2)/ -100.5dbm(B3)/-100.6dbm(B5)/ -97.5dbm(B7)/-101dbm(B8)/- 101.5dbm(B20)/-101dbm(B28) • LTE-TDD(10mhz): -99.5dbm(B34)/-99.3dbm(B38)/ -100.3dbm(B39)/ -98.5dbm(B40)/-99.3dbm(B41) • WCDMA: -112.8dbm(B1)/-112.5dbm(B2)/ -113dbm(B5)/- 113.2dbm(B8)
Interface Specifications		
Gigabit SFP port	2 1000 Base-X Gigabit SFP slots	
Gigabit RJ45 port	8 10/100/1000 Base-T(X) adaptive ports, supporting full/half duplex, MDI/MDI-X adaptive, among which G 1 is the WAN port and the others are LAN ports	
Serial port	Serial port type: 12 -way RS485 Connection method: 2 × 10-position 3.5 mm pitch locking terminal blocks Baud rate: 3 00bps~460800bps Data bits: 7bit, 8bit Stop bit: 1bit, 2bit Check digit: None, odd parity, even parity	
CAN	Number of channels: 4 CAN Connection method: 2×10-position 3.5 mm pitch terminal block with lock Baud rate: 5k bps~ 1000k bps	
DI digital input	Number of channels: 16 DI inputs Connection method: 2×10-position 3.5 mm pitch terminal block with lock Signal type: NPN Level range: wet contact (logic level 0: with DC 18 ~30V external power input; Logic level 1: no external power input) Dry contact (logic level 0: shorted to ground; logic level 1: floating)	

DO digital output	Channels: 8 DO outputs Connection method: 2×10 position 3.5 mm pitch locking terminal blocks Output type: relay output (dry contact) Output mode: normally open Contact resistance: 2.0A @24VDC Contact resistance: ≤100 mΩ Initial insulation resistance: 1000MΩ (min.) @500VDC Electrical life: 50,000 operations (rated load)
AI analog input	Number of channels: 2 AI inputs Connection method: 2×10-bit 3.5 mm pitch latch terminal block, AI occupies 2× 2 bits Input mode: voltage mode (0~10VDC), current mode (4 ma ~20 ma) Noise-free resolution: 12 bits Accuracy: 1%
Wi-Fi antenna	2 -way SMA-K (external thread and internal hole) antenna interface, used to connect 2.4 ghz/5ghz dual-band Wi-Fi antenna (maxgate 800-W)
4G antenna	1 SMA-K (external thread and internal hole) antenna interface, used to connect 4G cellular antenna (maxgate 800-4G)
5G antenna	4 -way SMA-K (male thread female hole) antenna interface, used to connect 5G cellular antenna (maxgate 800-5G)
SIM card	1 way dual Nano SIM card slot, dual SIM card single standby (maxgate 800-4G, maxgate 800-5G)
CONSOLE	1-way CONSOLE port, using Type-C USB interface, used for device debugging
USB	1-way Type-A USB 2.0 interface (HOST), expandable storage
HDMI	1 HDMI interface, supports 1080p@120Hz or 4096x2304@60Hz video output
Button	Or restore factory settings with one click
Indicator light	Power indicator light, operation indicator light, alarm indicator light, Ethernet interface indicator light, electrical port speed indicator light, network indicator light, CELL indicator light, CAN indicator light, serial port indicator light
Power parameters	
Power input	DC12~48V, supports dual power supply redundancy, no polarity
Full load power consumption	＜22 W@ DC24V (5G)
Connection method	5-position 5.08 mm pitch locking terminal blocks
Mechanical parameters	
Dimensions	160×100×128(mm) (excluding rails)
Installation method	35 mm standard DIN rail mounting

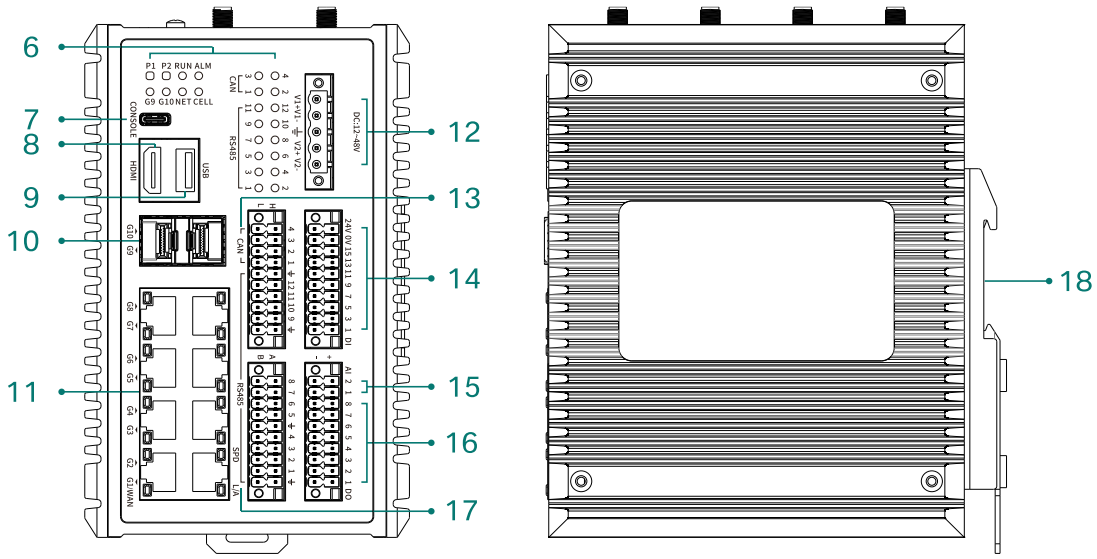
Chassis protection	IP 40
Weight	About 1.75kg (excluding antenna)
Working environment	
Operating temperature	-40 ℃ ~+75 ℃ (maxgate 800-5G: -40 ℃ ~+60 ℃)
Storage temperature	-40 ℃ ~+85 ℃
Relative humidity	5%~95% (no condensation)
Industry Standard	
EMC	IEC 61000-4-2 (ESD): Level 4 (contact discharge ±8kv, air discharge ±15kv) IEC 61000-4-5 (Surge): Level 3 (power supply: common mode ±2kv, differential mode ±2kv; network port: commonn mode ±6kv, differential mode ±2 kv; serial port, CAN: common mode ±4kv, differential mode ±2kv) IEC 61000-4-4 (EFT): Level 4 (power supply: ±4 kv; communication port: ±2kv)

1.5 Interface description

Top view



Main view and right view



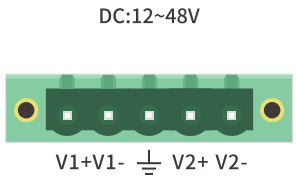
1. Wi-Fi antenna interface
2. Ground screw
3. 4G/5G antenna interface
4. SIM card slot
5. Restart or restore to factory settings button
6. Indicator Lights
7. CONSOLE port
8. HDMI interface
9. USB interface
10. Gigabit optical port
11. Gigabit electrical port
12. Power input terminal block
13. CAN interface
14. DI interface
15. AI Interface
16. DO Interface
17. RS485 serial port
18. DIN-Rail Socket

illustrate:

- Maxgate800 does not have an antenna interface, maxgate800-W has two dual-band Wi-Fi antenna interfaces (Wi-Fi1 and Wi-Fi2), maxgate800-4G has one 4G antenna interface (4G/5G 1), and maxgate800-5G has four 5G antenna interfaces (4G/5G 1-4).
- Port G1 is the WAN port by default, and other Ethernet ports are LAN ports.

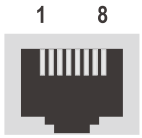
1.5.1 Power interface

It provides 2-way DC12~48V DC power input, uses 5-bit 5.08mm pitch locking terminal block, supports power redundancy and non-polarity. The power interface pin definition is shown in the figure below.



1.5.2 Ethernet interface

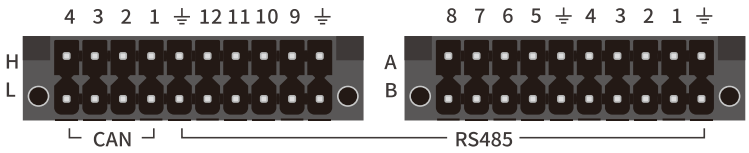
It provides 8 10/100/1000Base-T(X) adaptive ports (G1-G8) and 2 1000Base-X Gigabit SFP slots (G9-G10). The electrical ports use RJ45 connectors and support full-duplex/half-duplex mode adaptive and MDI/MDI-X automatic detection. G1 is WAN and G2-G10 are LAN ports. The electrical port pin definitions are shown in the following table.



Pin Number	MDI signal name	MDI-X Signal Name
1	Send/receive data (TRD0+)	Send/receive data (TRD1+)
2	Send/receive data (TRD0-)	Send/receive data (TRD1-)
3	Send/receive data (TRD1+)	Send/receive data (TRD0+)
4	Send/Receive Data (TRD2+)	Send/Receive Data (TRD3+)
5	Send/receive data (TRD2-)	Send/receive data (TRD3-)
6	Send/receive data (TRD1-)	Send/receive data (TRD0-)
7	Send/Receive Data (TRD3+)	Send/Receive Data (TRD2+)
8	Send/receive data (TRD3-)	Send/receive data (TRD2-)

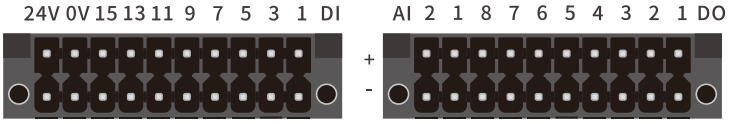
1.5.3 RS 485 serial port and CAN-bus interface

It provides 12 RS485 serial ports and 4 CAN interfaces, using two 2×10 -bit 3.5 mm pitch lockable terminal blocks, where A and B are RS485 serial port 1-12 pins, and H and L are CAN interface 1-4 pins. The pin definitions are shown in the figure below.



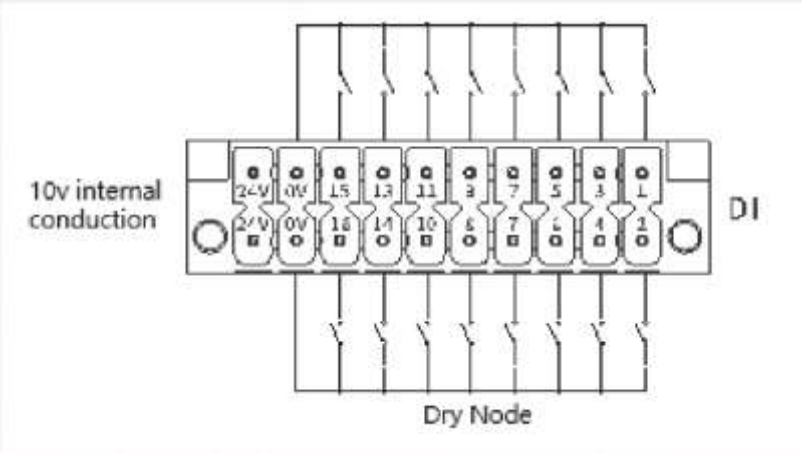
1.5.4 I/O acquisition and control port

It provides 8-channel DO digital output, 2-channel AI analog input and 16-channel DI digital input, adopts 2 2×10 -bit 3.5 mm pitch lock terminal blocks, and provides 1 DC24V power output. The pin definition is shown in the figure below.

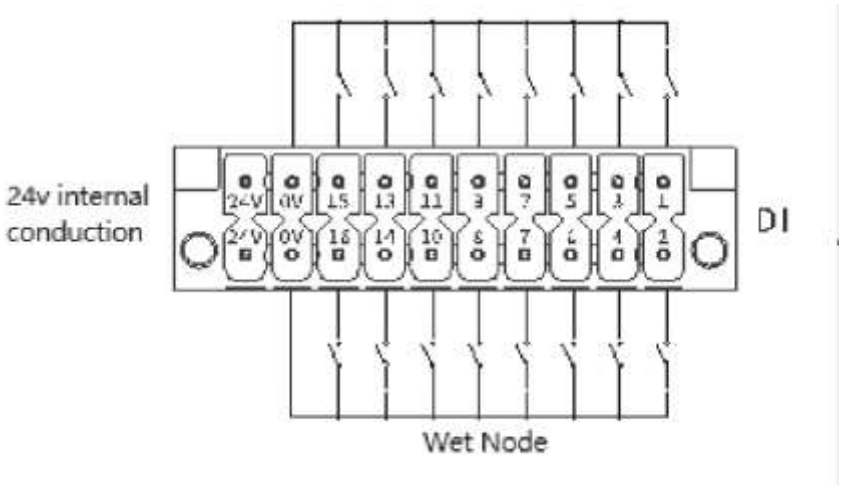


DI interface supports both dry contacts and wet contacts, and no other operations are required.

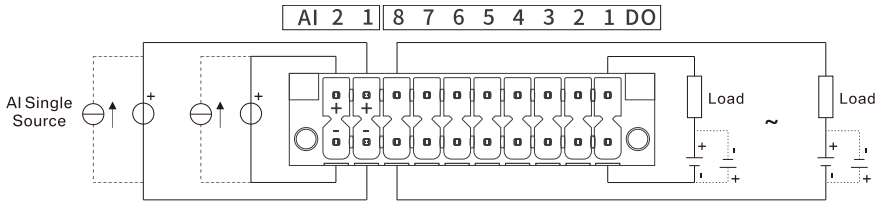
- The dry contact can change the input state by disconnecting/shorting the DI and OV common terminals. The connection method is as shown in the figure below.



- Wet contact NPN type requires external power supply and an open or closed signal to the DI terminal of the device to change the input state. The connection method is as shown in the figure below.



The DO output is a relay passive output with 8 independent normally open contacts. When the relay is closed, it will connect the two contacts on the DO end. The DO load is 2A@24VDC. AI input supports voltage type and current type input, which can be configured on the Web page. The interface uses 2 differential inputs. The signal "+" is connected to the high potential end, and the signal "-" is connected to the low potential end. The voltage detection range is 0 ~10V, current detection range is 4~20ma. The connection methods of DO and AI interfaces are shown in the figure below.



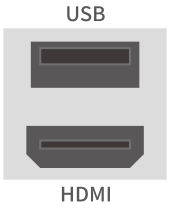
1.5.5 CONSOLE port

It provides 1-way CONSOLE port, which can be used for device debugging. It adopts Type-C USB interface. Use a USB adapter cable to connect one end to the computer and the other end to the device. Note that the computer needs to install the corresponding CH340 driver.

The communication parameters of the debug port are as follows: baud rate: 115200bps, data bits: 8, parity bit: None, stop bit: 1, flow control: None. As shown below.

1.5.6 HDMI and USB interface

It provides 1 HDMI and 1 USB2.0 interface, USB uses Type-A USB2.0 interface. As shown below.



1.5.7 Restart or restore factory settings button

It provides 1 button that can be used to restart the device or restore factory settings. The operation is as follows:

- Restart: Press and release the button immediately (within 1 second) and the device will restart automatically.
- Restore factory settings: Press and hold the button for more than 5 seconds until the RUN light flashes quickly (flashes once every 0.2 seconds), then release it. The device will restore factory settings and restart automatically.

1.5.8 Antenna interface

It provides 1/2/4-way SMA-K (external thread and internal hole) antenna interface.

illustrate:

- Maxgate800 does not support antennas.
- Maxgate800-W supports 2 antenna interfaces for connecting 2.4ghz/5ghz dual-band Wi-Fi antennas.
- Maxgate800-4G supports one antenna interface for connecting a 4G cellular antenna.
- Maxgate800-5G supports 4 antenna interfaces for connecting 5G cellular antennas.

1.5.9 SIM card slot

It provides 1 dual Nano SIM card slot.

illustrate:

- Maxgate800 and maxgate800-W do not support SIM cards.
- Maxgate800-4G supports China Mobile/China Telecom/China Unicom 4G, China Unicom 3G, China Mobile/China Unicom 2G.
- Maxgate800-5G supports China Mobile/China Telecom/China Unicom 5G/4G and China Unicom 3G.

Notice:

This device does not support hot swapping. When installing or removing the SIM card, you must first power off the device, and then install or remove the SIM card while the device is powered off to avoid damage to the SIM card.

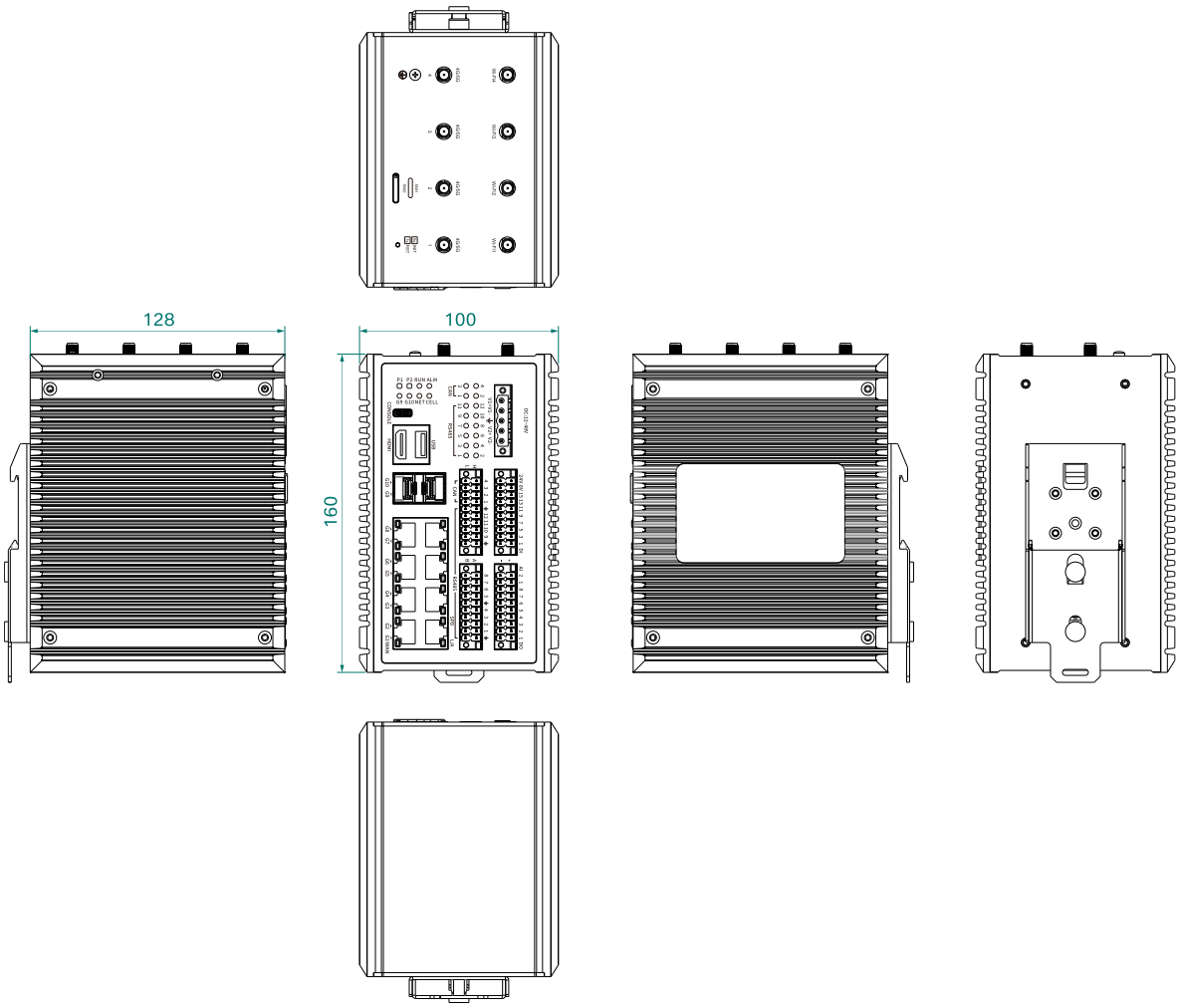
1.5.10 Indicator light

Table 1-3 panel indicator light definition reference table

Indicator light	State	Describe
P1/P2	Always on	The power supply is normal.
	Destroy	The power supply is not connected or is abnormal.
RUN	Flash	The system is operating normally.
	Destroy	The system is starting up or the system is running abnormally.
ALM	Always on	There is an alarm event.
	Destroy	There is no alarm or the alarm function is not enabled.
NET	Always on	WAN/Wi-Fi/4G/5G is connected or a device is connected.
	Destroy	WAN/Wi-Fi/4G/5G is not connected.
CELL	Always on	Mobile network is enabled.
	Destroy	The mobile network is not enabled or the dialing failed.
CAN (1-4)	Flash	The CAN interface sends and receives data.
	Destroy	No data is sent or received on the CAN interface.
RS 485 (1-12)	Flash	The serial port is sending and receiving data.
	Destroy	No data is sent or received on the serial port.
G1-G10 (L/A green light)	Always on	Ethernet port has an active connection.
	Flash	Ethernet port has data transmission.
	Destroy	The Ethernet port does not have a valid connection.
G1-G8 (SPD yellow light)	Always on	Ethernet port speed is 1000M.
	Destroy	The Ethernet port is not connected or the rate is 10/100M.

1.6 Installation dimensions

Different models of this series of products have different numbers of antenna interfaces, but the installation dimensions are the same, as shown in the figure below. Unit: mm (first angle projection)



2 Fast Internet connection

This device has a built-in web server, which provides a convenient way to access and configure the gateway. Users can use IE, Firefox or Google Chrome to access it.

Chapter is a quick introduction to the maxgate800 gateway product. It is recommended that users read this chapter systematically and follow the instructions to have a basic understanding of the product. For specific function details and instructions, please refer to the subsequent chapters.

If you need relevant information about the product, you can go to the official website link to download the corresponding product manual: https://www.MAIWE.com.cn

2.1 Environment Preparation

This series of gateway products all support connecting to the external network through the WAN port G1. In addition, maxgate800-W can also access the wireless network through Wi-Fi, maxgate800-4G can access the 4G cellular network by installing a 4G SIM card, and maxgate800-5G can access the 5G cellular network by installing a 5G SIM card.

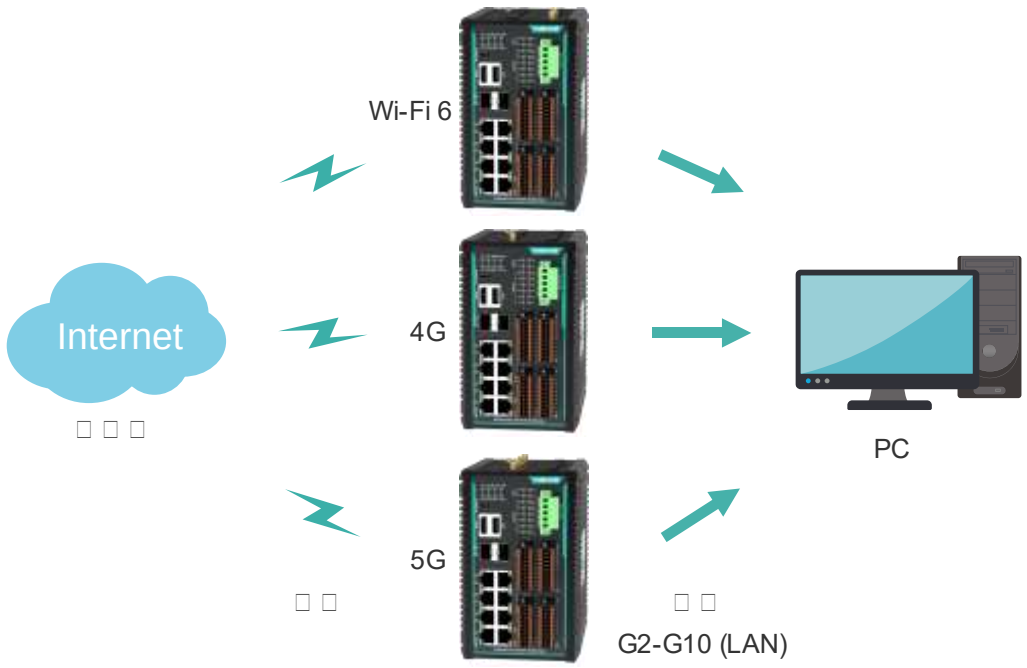


Figure 2-1 Hardware connection

2.2 Log in to the Web

2.2.1 Modify IP address

When accessing the gateway through the Web, the IP address of the gateway, the built-in switch module, and the IP address of the PC must be in the same network segment, so the IP address of the PC must be modified to ensure that it is in the same network segment as the IP address of the gateway. In the local area network. Windows users please refer to the following steps:

Start→Control Panel → Network and Internet Connections→ Network Connections→Local Area Connection→Properties→Internet Protocol (TCP/IP)

The default IP address of the gateway is: 192.168.16.253, the IP address of the switch module is: 192.168.16.254. Set the IP address of the PC to: 192.168.16.X (X is any valid value from 2 to 253 except 253).

Specific Windows system operation interface is shown in Figure 2-2:

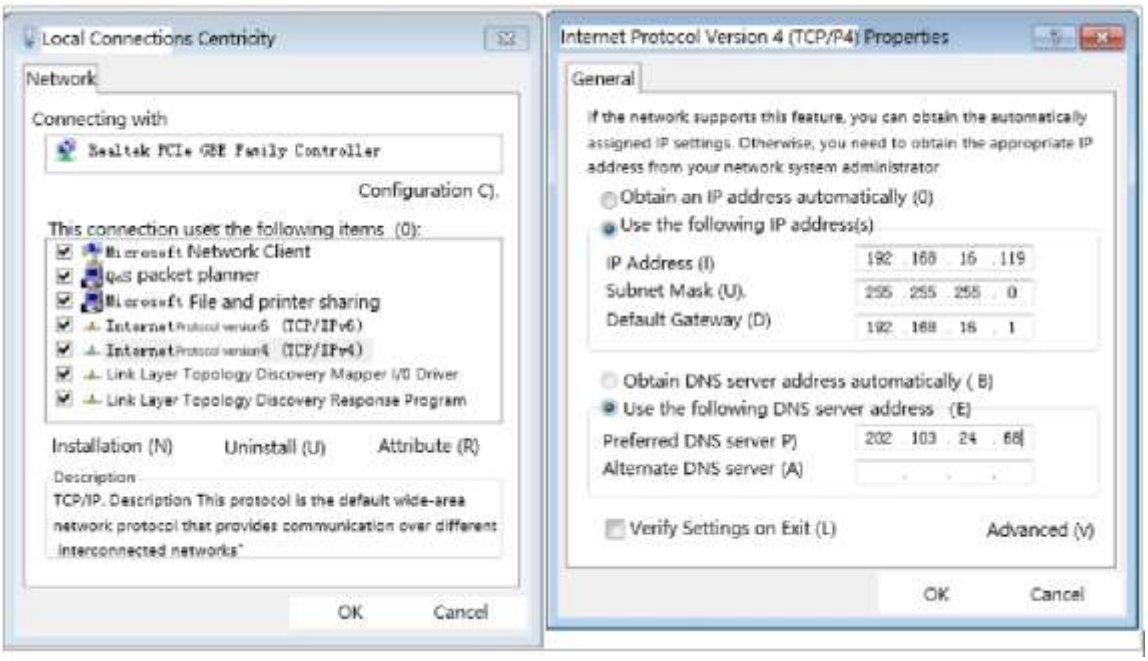


Figure 2-2 IP setting interface in Windows environment

The gateway 's Web interface through the default IP address 192.168.16.253 and perform related configuration operations on it.

2.2.2 Log in to the Web

Open the browser and enter the default IP address of the gateway in the address bar, as shown in Figure 2-3.

Figure 2-3 Web address bar

Pressing the Enter key, the interface shown in Figure 2-4 pops up, prompting the user to enter a user name and password.

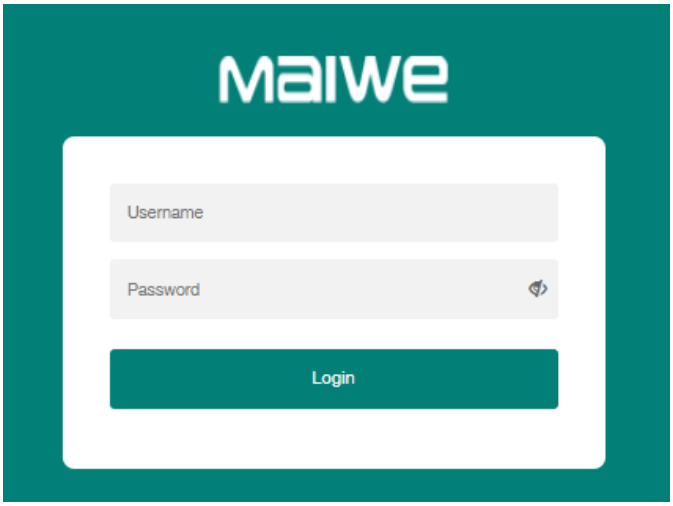


Figure 2-4 Username and Password Interface

The default username and password are both " admin ". If the username or password is incorrect, the browser will display a red error message " Incorrect username or password, please log in again! " in the upper right corner. Enter the correct username and password, and you will enter the main page of the Web server after successful authentication.

After entering the user name and password, click "Login" and the server will perform authentication. After successful authentication, you will enter the main interface of the Web server, as shown in Figure 2-5.

Figure 2-5 Main interface of the Web server

illustrate:

Users can use IE, Firefox, Google and other browsers to access the Web server. Different browsers may display different pages. If it affects normal use, please switch to a mainstream browser such as Firefox, Google and other browsers.

3 Network management function

3.1 Web Page Introduction

After the login verification is passed, enter the gateway's web homepage. The web page is divided into four major areas: the top is the LOGO display and shortcut key area, the left is the menu area, the right is the main function display area, and the bottom is the copyright display area, as Figure 3-1.

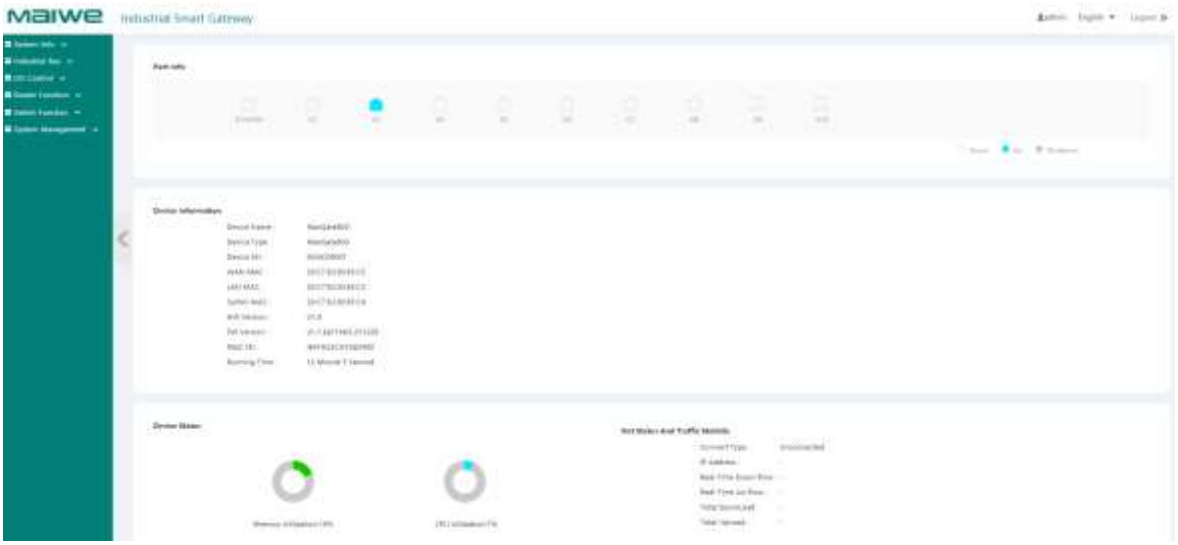


Figure 3-1 Main interface

3.1.1 Top area

The lower area displays the LOGO, currently logged in user, and shortcut keys (to enable switching between Chinese and English and exit), as shown in Figure 3-2.

Figure 3-2 Top area page

There is a "Logout" link in the upper right corner of each page. Users can click "Logout" at any time to log out. Clicking "Logout" will jump to the login page, as shown in Figure 3-3.

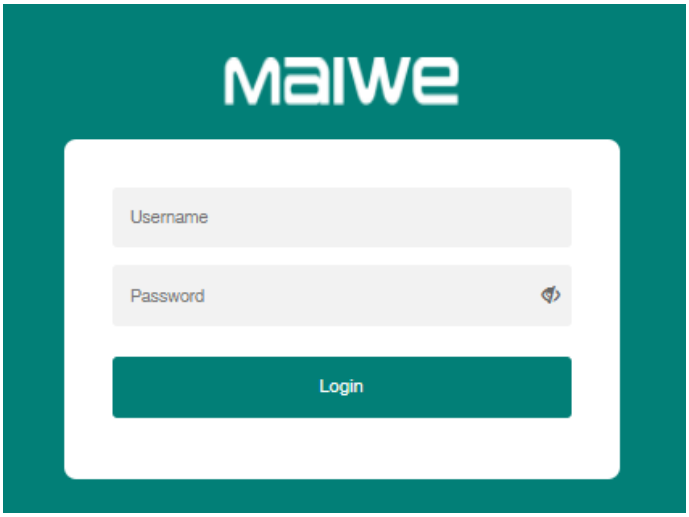


Figure 3-3 page

3.1.2 Left menu area

The left area is the configurable function menu, which adopts a three-level directory structure. The first-level directory is system information, industrial bus, I/O controller, routing function, switching function and system management, and the second-level directory is the sub-function of the corresponding module. Click the first-level and second-level directories to expand or collapse, and click the " " icon to hide the menu bar, as shown in Figure Figure 3-.

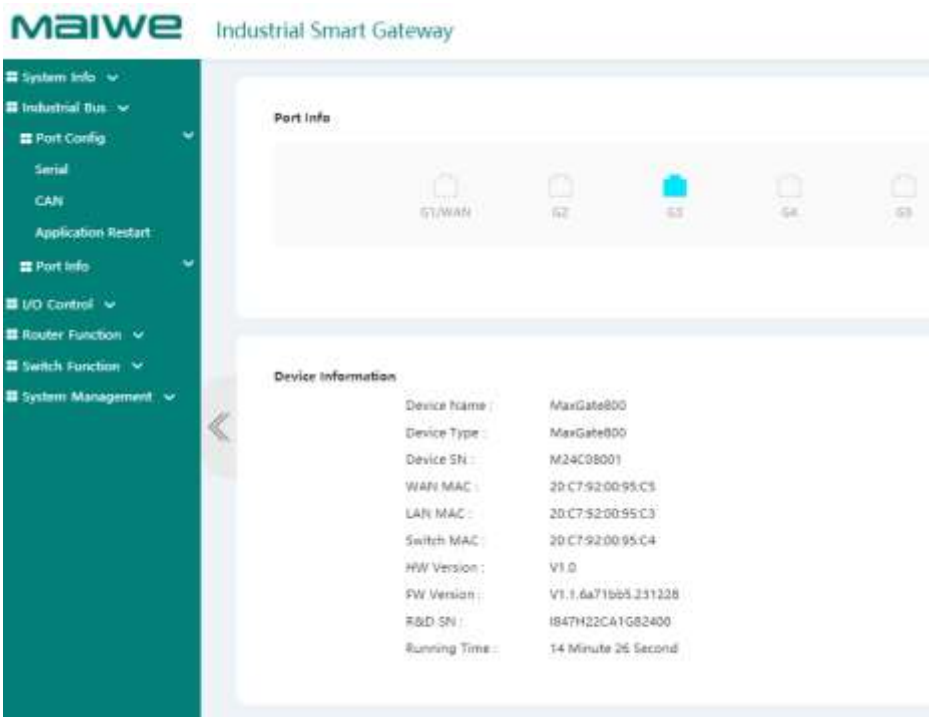


Figure 3-4 Function menu display area

The function menu is shown in the following table.

Table 3-1 Menu function description table

Configure Project	Describe	Illustrate
System Information - System Information	Port Information	Port information, such as port status, port quantity, etc.
	Device Information	Device information, including: device name, device model, device number, MAC address, R&D code, hardware version, firmware version, and running time
	Mobile network information	Display current 4G/5G network information
	Device status	Device operation status, such as CPU utilization, memory utilization, etc.
	Network status and traffic statistics	Display the current real-time uplink and downlink traffic and upload and download data traffic
Industrial bus-port configuration	Serial Port	Configure serial port parameters and network working mode
	CAN	Configure CAN parameters and network working mode
	Application restart	Configure the interval for restarting the application when there is no data in the serial port or CAN
Industrial bus -port information	Port Information	Current serial port/CAN configuration parameters and network connection status
I/O Controller - I/O Management	I/O Function	Configure I/O functions
	I/O Status	I/O status monitoring and control
Routing Function- Network Management	Interface	Configure VPN interfaces, including PPTP interfaces and L2TP interfaces
	Client connection	Configure parameters for connecting to wifi
	Mobile network	Configure 4G/5G Internet parameters
	DHCP list	Displays the DHCP client information of the IP address assigned by the current device
	Static routing	Configure static routing table
	Link check	Configure 4G/5G link check parameters
	Network diagnostics	Diagnose the current network connection status
Routing function- firewall	Basic settings	Set basic inbound, outbound and port forwarding rules, and set routing rules for corresponding ports
	Port forwarding	Set port forwarding rules
	Access control	Set IP, MAC and domain name filtering parameters
	Custom rules	Provides custom firewall rule setting function
	DMZ	Set up DMZ host function in LAN

Configure Project	Describe	Illustrate
	QOS	Enable/disable qos traffic bandwidth display function
Routing Function-Service	VPN Servers	Set basic information of PPTP and L2TP servers
	Dynamic DNS	Set the basic information of the dynamic domain name
	Device Cloud Service	Set basic information for the device cloud service
Switching Function-Port Configuration	Port Configuration	Configure basic information of each port of the device, such as rate mode, flow control status, etc.
	Port rate limit	Control and manage the speed of each entrance and exit of the equipment
	Storm Suppression	Limit the speed of unknown unicast, unknown multicast, and broadcast packets received by each port of the device
	Storm Detection	Monitor the rate and manage the port status of multicast and broadcast packets received by each port of the device
	Port aggregation	Set the port to join static aggregation or LACP
	Port Mirroring	Set the mirroring group of a port
	Port Statistics	Statistics and display of specified network data packets received and sent by each port
	Optical Module DDM	Display the performance parameters and real-time parameters of the SFP optical module on the switch
Switching Function - Layer 2 Features	IEEE802.1Q VLAN	Displays a list of 802.1Q vlans and port vlans and allows configuration and management
	MAC address table	Display the MAC address learned by the port
	Static unicast MAC address table	Set a static unicast MAC address and its corresponding port
	Static multicast MAC address	Set a static multicast MAC address and its corresponding port
	IGMP-Snooping	Set IGMP snooping parameters
	LLDP	Setting LLDP Parameters
	Port Isolation	Set the port isolation group
Switching function - ring network redundancy	Fast Ring Network	Set the fast ring network port and ring network type
	ERPS	Set ERPS port and node type, etc.
	RSTP	Set the parameters of the rapid spanning tree
Exchange Features - Advanced Features	SNMP	Provide SNMP agent to manage switch devices
	RMON	Used to realize remote monitoring and management of managed devices by management devices.
	Qos	Set 802.1p priority, port priority, DSCP priority, etc.

Configure Project	Describe	Illustrate
	ACL	Set matching rules and processing actions to implement packet filtering
	802.1X port authentication	Separation of business and authentication
	Email Log	Periodically send system logs to the user's specified mailbox in the form of email
	Alerts	Generate port alarms, network storm alarms, etc.
	Network Diagnostics	Ping Test
	Loopback detection	Monitor and manage switch module network loops
System Management - System Management	Device Address	Set the WAN port working mode and address; set the LAN port and switch address; set the LAN port DHCP server parameters
	System time	Set system time, etc.
	System user	Management of user permissions and passwords
	System log	Display log information and manage it
	Scheduled Tasks	Users define scheduled execution tasks and need to fill in the linux crontab annotation syntax.
	System Restart	Restart the device through software and schedule restart
	Restore factory settings	Reset your device to factory settings
	Certificate upload	Upload the SSL encryption certificate file
	File management	Upload or download configuration files
	System Upgrade	Perform device software upgrades
System Management-Security Management	Web control	Restrict protocol types for accessing the device web
	Telnet control	Telnet function switch
	SSH control	SSH function switch

3.1.3 Right functional area

The right side is the function display area, where you can view and configure various parameters of the function, as Figure 3-4.

Figure 3-4 Functional area on the right side

4 System message

4.1 System message

4.1.1 Port information

The port information section will display the connection and enable status of the G1~G10 network ports in real time. When the port connection is normal, the port icon background color is light blue, when the port is disabled, the port icon is gray, and when the connection is poor or there is no connection, the port icon is colorless. As shown in Figure Figure 4-1.

Figure 4-1 Port Information Page

4.1.2 Device Information

The device information includes the device name, device number, device model, MAC address, R&D code, hardware version, firmware version, and running time. The page is shown in Figure Figure 4-2.

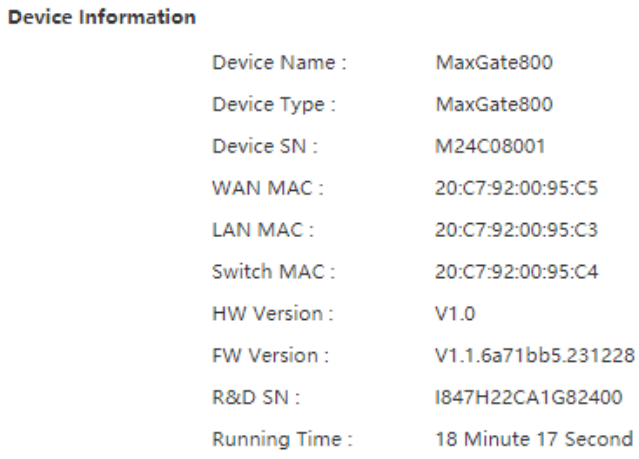


Figure 4-2information page

- Device Name: The name of the device. (Click to modify)
- Equipment number: Describes the device factory number.
- Device Model: Describes the model of the device.

- WAN MAC: The MAC address of the WAN port (G1).
- LAN MAC: MAC address of LAN port (G2~G10).
- Switch MAC: MAC address of the built-in switch.
- Hardware version: The current hardware version of the device.
- Firmware version: The firmware version currently installed on the device.
- R&D code: the current R&D code of the device.
- Running time: The running time is calculated from the time when the device is powered on. When the switch is reset or powered off and restarted, this time will also be reset from zero.

illustrate:
Modify the device name: Click the text content at the device name, and modify the device name in the configuration text box that appears. "√" means to deliver the configuration, and "×" means to cancel the modification operation and hide the configuration text box.

4.1.3 Device status

CPU utilization are represented by the colored parts of the donut pie chart, as shown in the following figure. Changes to this value must be manually refreshed to see this page.

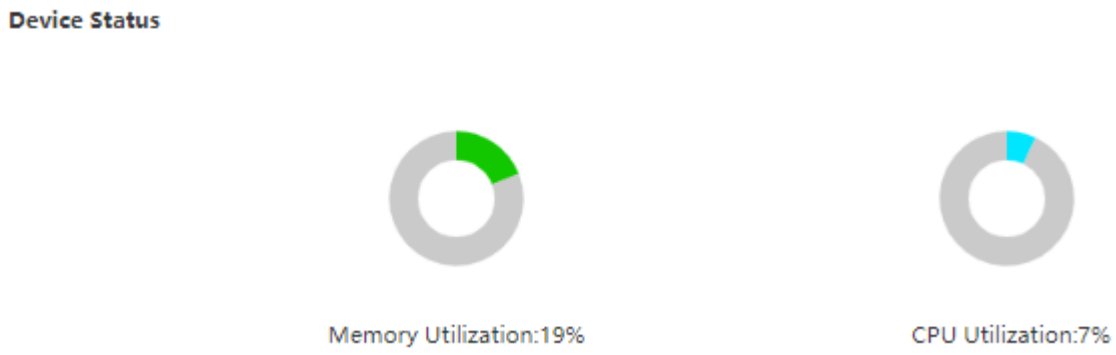


Figure 4-3 Device status page

- Memory utilization: The device memory usage reflects the memory usage.
- CPU utilization: The device CPU usage reflects how busy the CPU is.

4.1.4 Mobile network information

Mobile network information, as Figure 4-4.

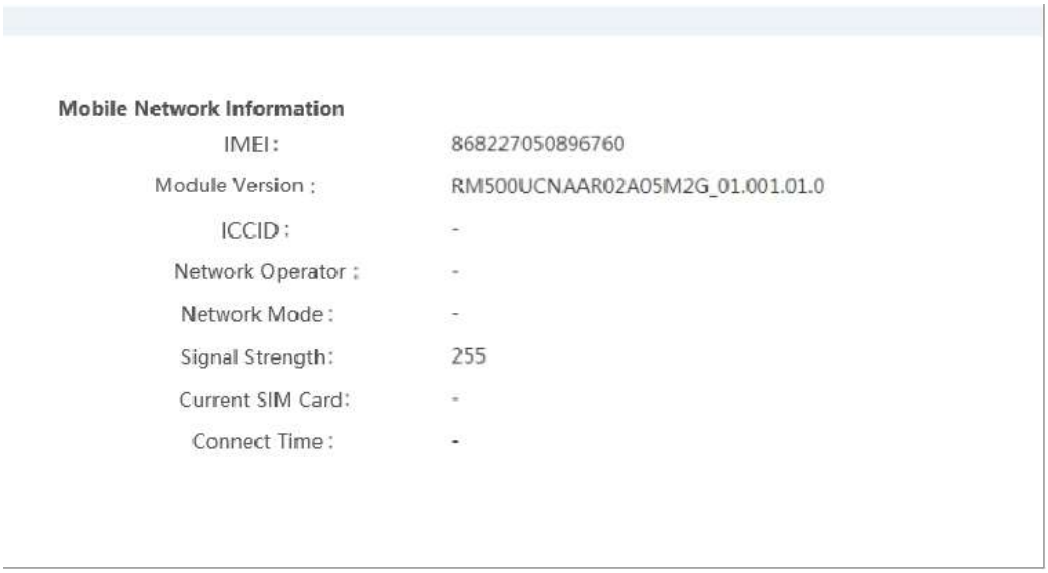


Figure 4-4 Mobile network information

4.1.5 Network status and traffic statistics

The network status and traffic statistics are shown in Figure Figure 4-5.

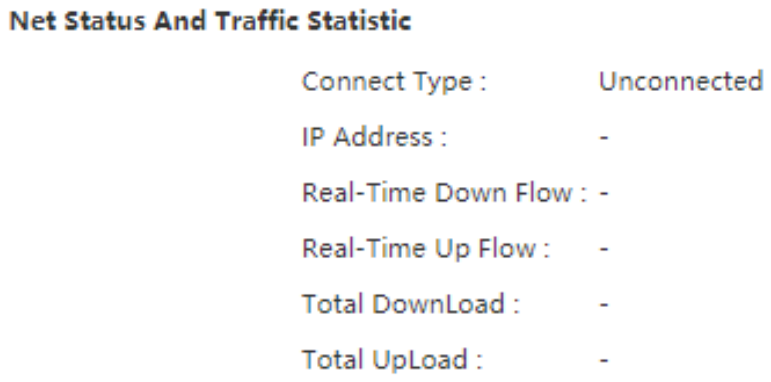


Figure 4-5 Mobile network information

5 Industrial Bus

5.1 Port Configuration

5.1.1 Serial Port

The serial port module includes serial port parameter configuration, network parameter configuration, and network connection number configuration.

This product is an industrial-grade gateway device. It is dedicated to the connection and communication between Modbus TCP devices and modbusrtu/ASCII devices. This series of products also integrates Modbus TCP, Modbus RTU and Modbus ASCII protocols. Users can use it to easily achieve seamless integration of Modbus Ethernet devices and Modbus serial devices or even mixed bus networks with multiple masters and slaves. This device also supports data encryption transmission and JSON format uploading and downloading functions. At the same time, users can also set it up through the Web. Its simplified design not only enables rapid application, but also ensures the flexibility of all actual industrial environment applications. This series of products adopts EMC protection design. The power supply has over-current and over-voltage protection, and can work reliably in harsh and dangerous environments.

The configuration parameter interface is shown in Figure Figure 5-1.

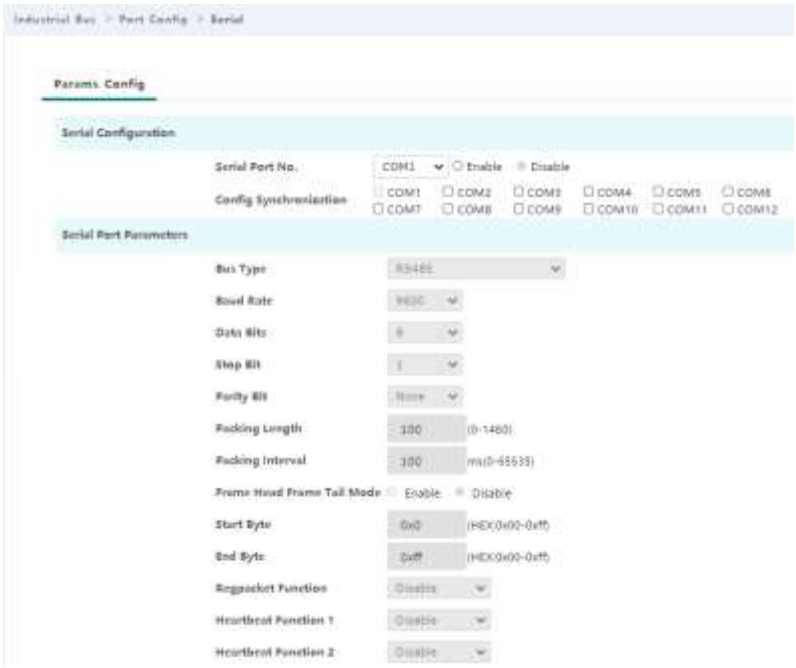


Figure 5-1 port configuration interface

Configuration parameters of this interface is shown in Table 5 -1 Modbus address mapping function parameters is shown Table 5 -2 IGMP configuration description is shown Table 8 -2 8-

66 Figure 8 -66 after Figure 8 -68 two tab pages of the system log page Figure 5-2are shown in REF _Ref88817411 \h * MERGEFORMAT Figure 9-6 -.

5.1.1.1 View log

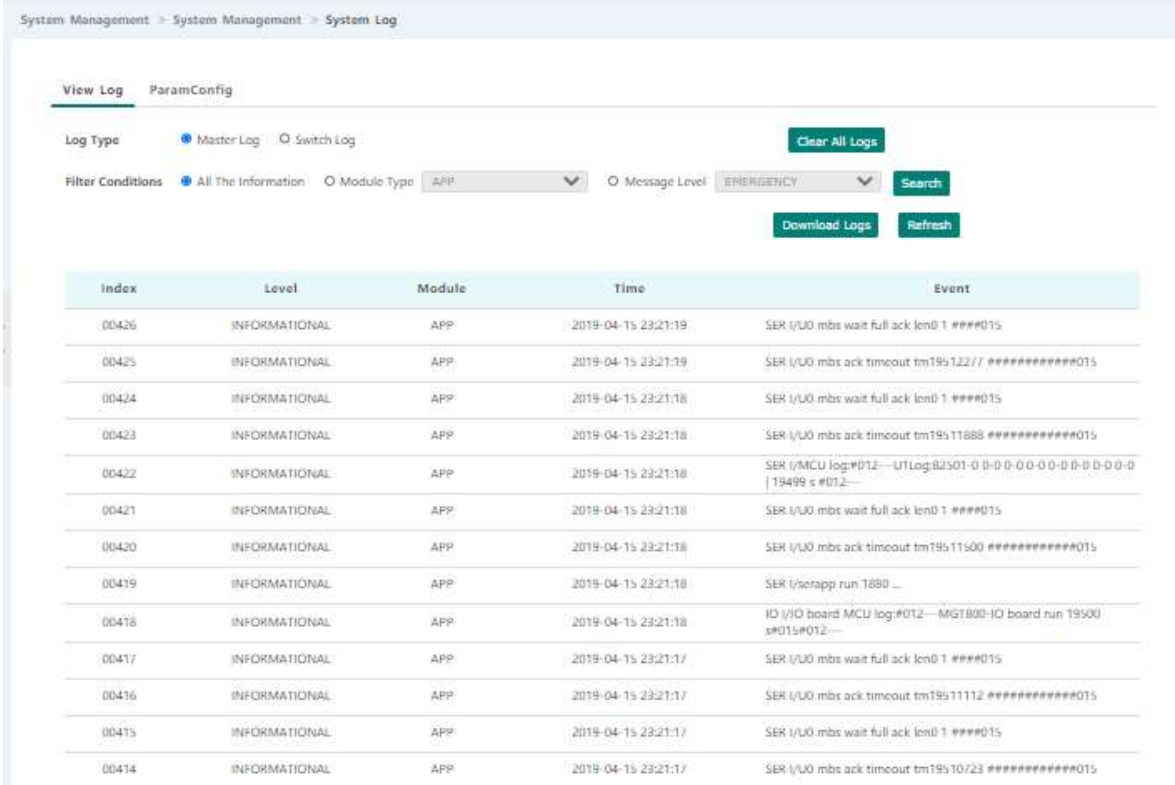


Figure 5-2 View log

- Filter conditions: Display a certain type of log information according to the user's needs. You can switch between "all information", "module type" and "message level". Module type does not specifically refer to individual software modules in the system, but is a general division of a type of software module. Module types are shown in the table below.

Table 5-1 System log-main control module division

Module type	Illustrate
APP	App
DHCPD	DHCP server
NETMASTER	Network management
CRON	Scheduled Tasks
GOAHEAD	Web server
RSYSLOGD	Logging system

Table 5-2 System log - switch module division

Module Type	Illustrate
Web	Web page operation related
LINK	Port connection status changed, link status changed
CONFIG	Device function configuration
AUTH	IEEE802.1X port authentication, user login authentication
STORM	The device detects a network storm.
RING	Ring network function related
SNMP	SNMP function related
SYS	System and equipment related

- Configuration: After configuring the filter conditions, click the "Query" button to refresh the log display information.
- Refresh: Get the latest log information.
- Download log: Click this button to download log information from the Web server and save it to the PC currently accessing the device. The file name is syslog.log. Please use the browser to download it directly.
- Clear all logs: Click this button to clear all log information.

5.1.1.2 Parameter configuration

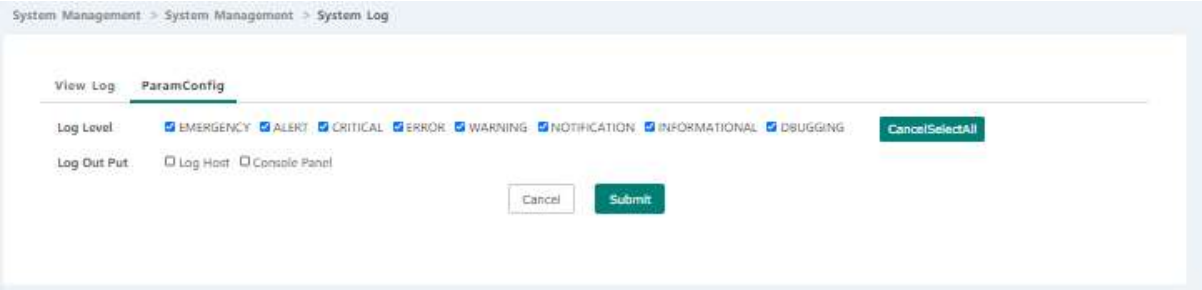


Figure 5-3 parameter configuration

- Log function: Enable or disable the system log function. The default is enabled. Disabling the log function will not delete the log content, but will not generate new log information entries.
- Log level: According to the severity of the log, it is divided into 错误!未找到引用源。

Table 5-3 Log level definition description table

Log level	Definition	Illustrate
0	EMERGENCY	Extremely urgent error
1	ALERT	Errors that need to be corrected immediately
2	CRITICAL	More serious errors
3	ERROR	An error occurred

Log level	Definition	Illustrate
4	WARNING	Warning, there may be some kind of error
5	NOTIFICATION	Information to note
6	INFORMATIONAL	General Tips
7	DEBUGGING	Details

- Log output: The output directions include web page, log host and console.
- Log host IP address: Fill in the IP address of the log host. After selecting the log host in the log output, click the +Add button to fill in this parameter.
- Configuration: After configuring the log parameters, click the " Configure " button to make them take effect, otherwise they will not take effect.

5.1.2 Scheduled Tasks

This page can set custom scheduled tasks through the Crontab command, as shown in the following figure:

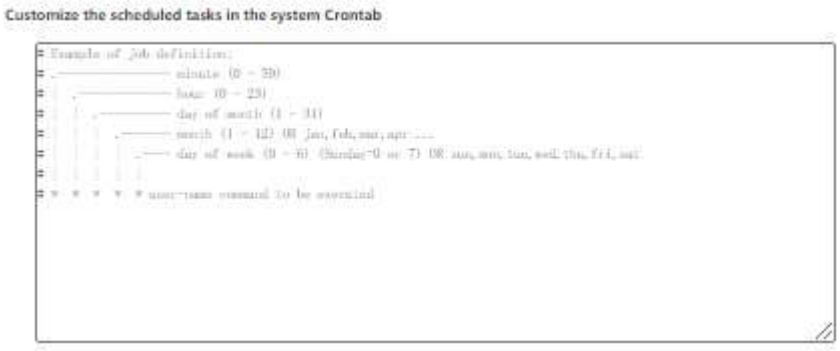


Figure 5-4 planned tasks

Writing a scheduled task requires the user to first understand the setting format of the scheduled task (refer to the notes). After the scheduled task is saved, the corresponding command can be automatically executed without human intervention.

5.1.3 System restart

This operation is used to software restart the device. This restart is different from the hardware reset of power-on restart. It is just a system software reset. Users can remotely restart the device through this function, and the scheduled restart function is also supported, as shown in Figure 9 Figure 5-5.

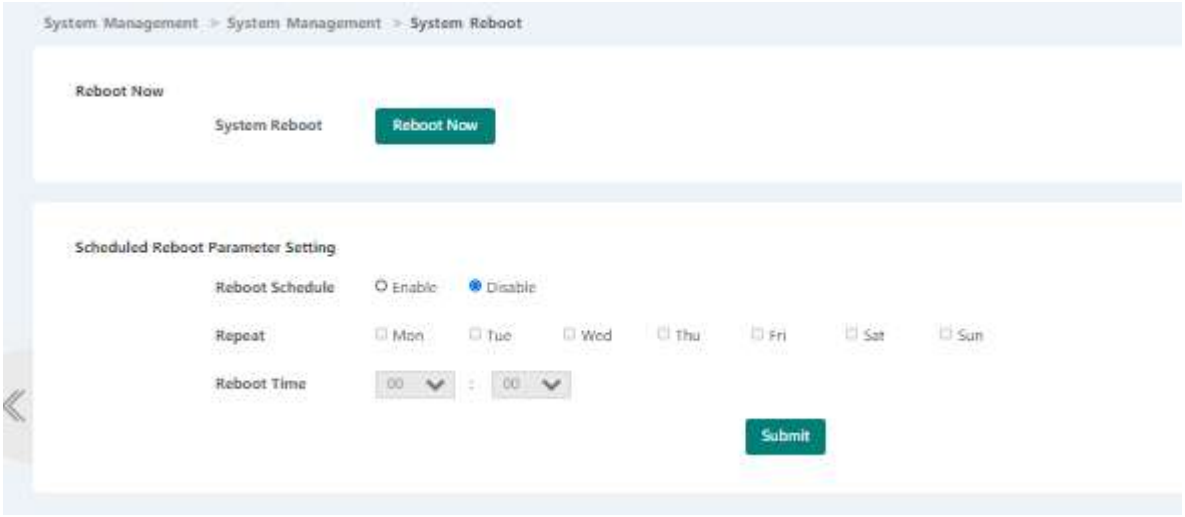


Figure 5-5 System restart page

- System restart: Click the "Restart" button, a confirmation prompt window will pop up, as Figure 5-6

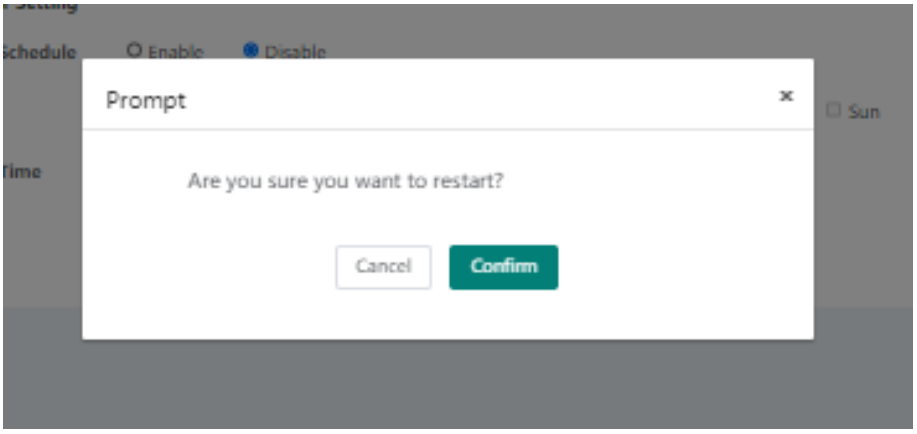


Figure 5-6 System restart confirmation

Click the "OK" button to pop up Figure 5-7

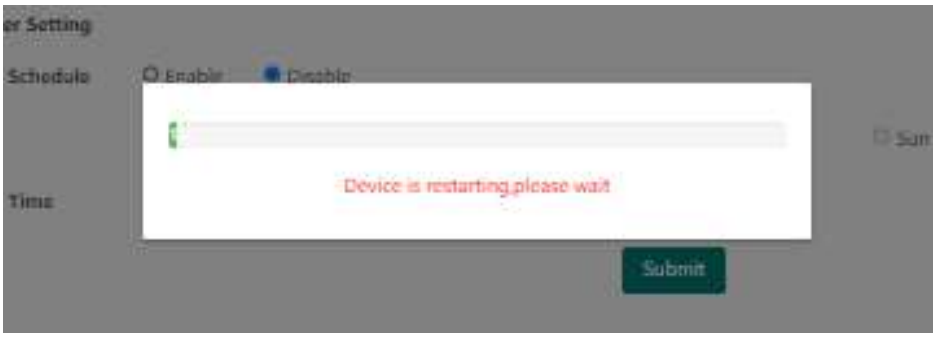


Figure 5-7 System progress bar

After the restart is complete, the web page automatically jumps to the login interface.

The description of various parameters for scheduled restart is as follows:

Parameter	Describe
Turn on the timing function	Enable or disable the scheduled restart function. The scheduled restart function is disabled by default and the restart time is 3:58 am every Monday.
Repeat cycle	Scheduled restart date is cycled from Monday to Sunday and can be selected arbitrarily.
Restart time point	Time of the scheduled restart day, in the format of "hour:minute".

5.1.4 Restore factory configuration

This operation is used to restore the device to factory settings and automatically restart the device. This function is used to restore the device to factory default configuration values once the user sets wrong parameters and causes the device to work abnormally, as shown in Figure 9 Figure 5-8.

Figure 5-8 factory configuration page

Restore factory configuration: Click "Restore Configuration" to pop up a confirmation prompt window, as shown in Figure Figure 5-9.

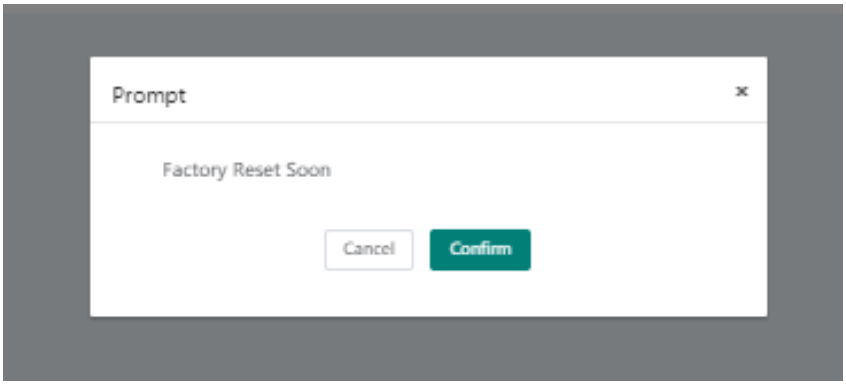


Figure 5-9 Factory restore confirmation

Click the "OK" button and Figure 5-10

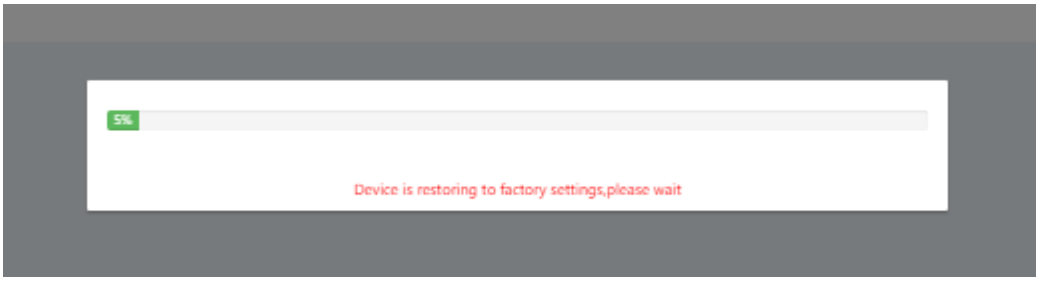


Figure 5-10 Restoring factory configuration progress bar page

After the factory reset, the device automatically restarts. After the restart is completed, the web page automatically jumps to the login interface.

Notice:

Restoring the factory settings will restore all the device settings to the factory defaults. If you want to keep the static IP currently set for the device, please check the "Keep current static IP configuration" option on the right. Otherwise, the main control IP address will also be restored to the default value 192.168.16.253 and the switch module IP address will be restored to the default value 192.168.16.254.

5.1.5 Certificate upload

When the serial port/CAN works in client mode and needs to connect to an encryption server, and the server also needs to authenticate the encryption certificate of this gateway, it is necessary to upload the encryption certificate. The gateway provides 8 groups of certificate scheme upload channels, and the serial port/CAN can use any certificate scheme.

Figure 5-11 Certificate upload page

5.1.6 File Management

This operation allows the user to save all current configurations of the device into a file. This configuration file can be used to back up and restore all configurations of the device. This function allows users to easily configure multiple devices or switch modules with one configuration file, as shown in Figure Figure 5-12.

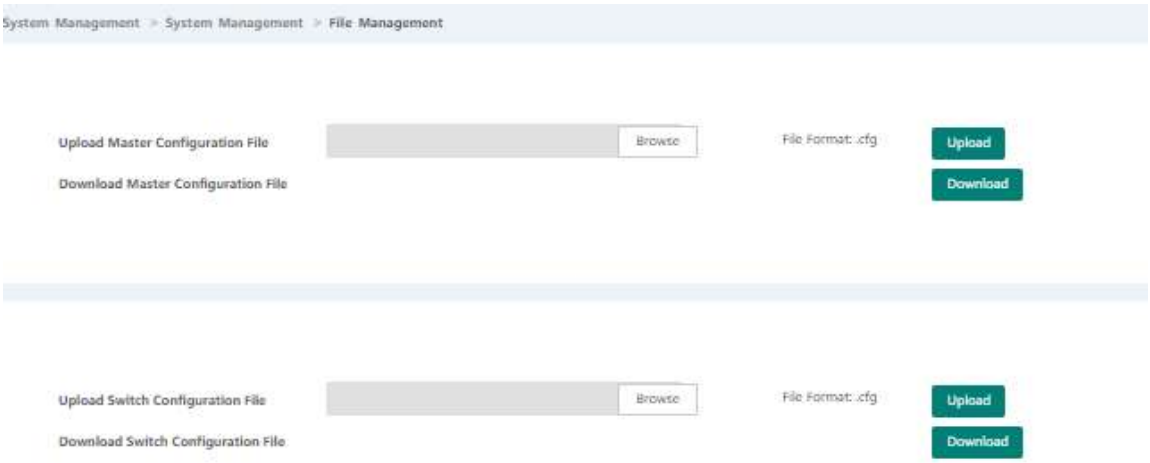


Figure 5-12 File management page

Upload configuration file: To upload a configuration file, you need to click the "Select File" button to select a configuration file with a ". Cfg " suffix. Please be careful not to select a configuration file that is not for this device. Uploading the wrong file may cause damage to the device., click the "Upload" button, and a confirmation prompt window will pop up, as shown in Figure 9 Figure 5-13.

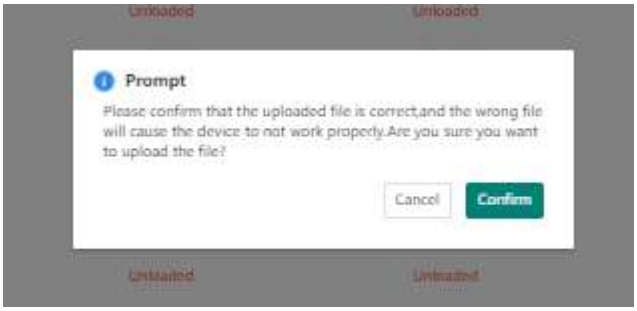


Figure 5-13 Upload configuration file confirmation

Click the "OK" button and

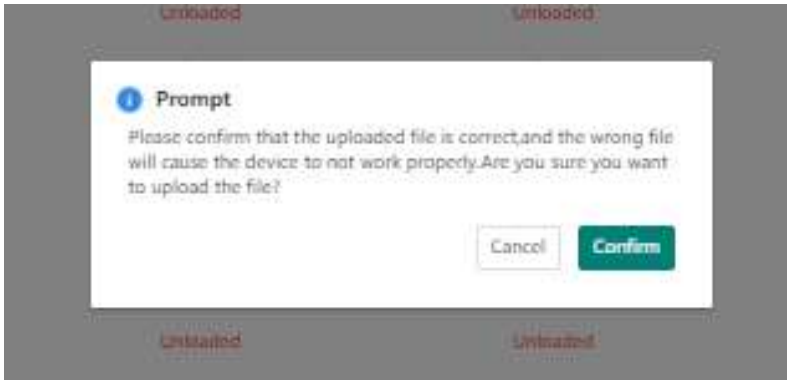


Figure 5-14

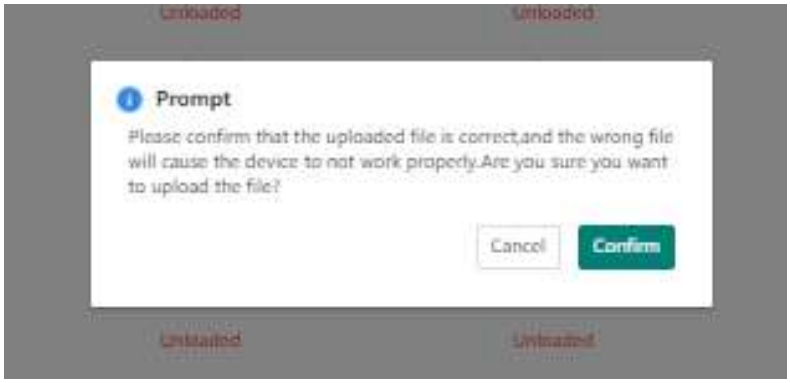


Figure 5-14 File upload progress bar page

After the image upload is completed, Figure 5-15

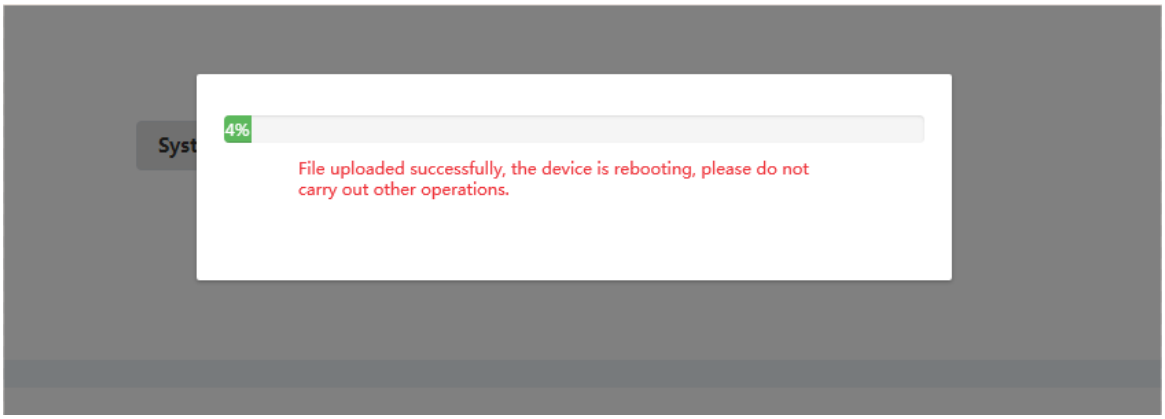


Figure 5-15 Restart progress bar page

After the file is uploaded successfully, the device automatically restarts. After the restart is completed, the web page automatically jumps to the login interface.

- Download the configuration file: Click the "Download" button to download the configuration file of the main control or switch module to the access PC. The downloaded configuration file is named " Systemcfg.cfg (Switchcfg.cfg)". This device does not support multi-threaded download tools such as Thunder, please use the browser to download directly.

Notice:

- When uploading a configuration file, be sure not to select a configuration file that is not of your own model. Uploading the wrong file may cause damage to the device;
- Do not cut off the power supply during the configuration file uploading process, otherwise the device may be damaged.

5.1.7 System Upgrade

This operation is used to upgrade the device software system, which is divided into main control upgrade and switch upgrade. Users can obtain the corresponding upgrade program through email or our company website. Please pay attention to the matching of device model and version. Using incompatible upgrade programs may cause permanent damage to the device, as shown in Figure 9 Figure 5-16.

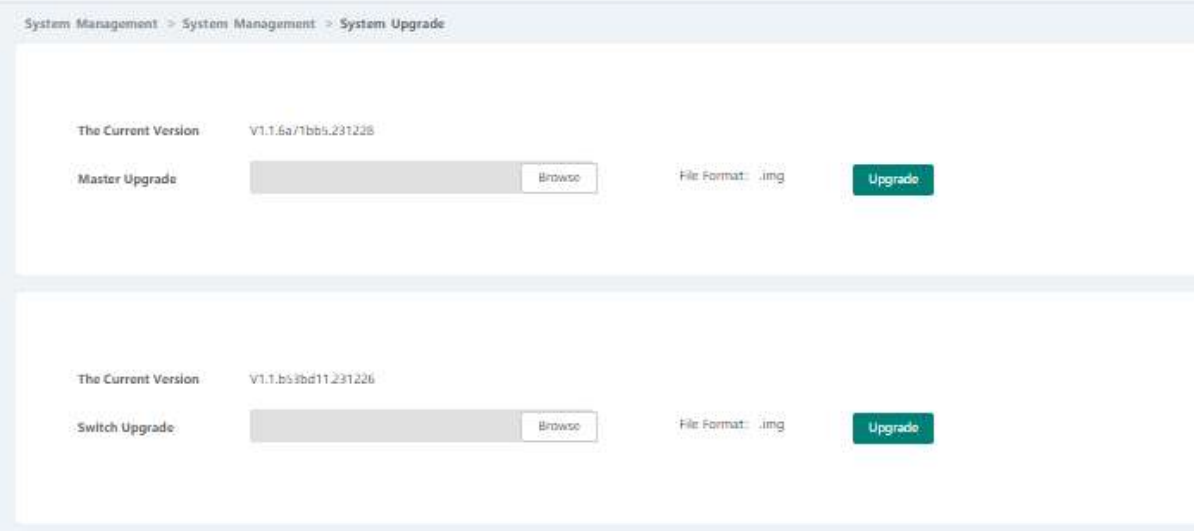


Figure 5-16 Restoring factory settings progress bar page

Version upgrade: To upload an image file, you need to first click the "Select File" button to select the upgrade file with the ".img " suffix. Please be careful not to select an image file that is not for this model. Uploading the wrong file may cause damage to the device. Click the "Upgrade" button and a confirmation prompt box will pop up, as shown in Figure 9

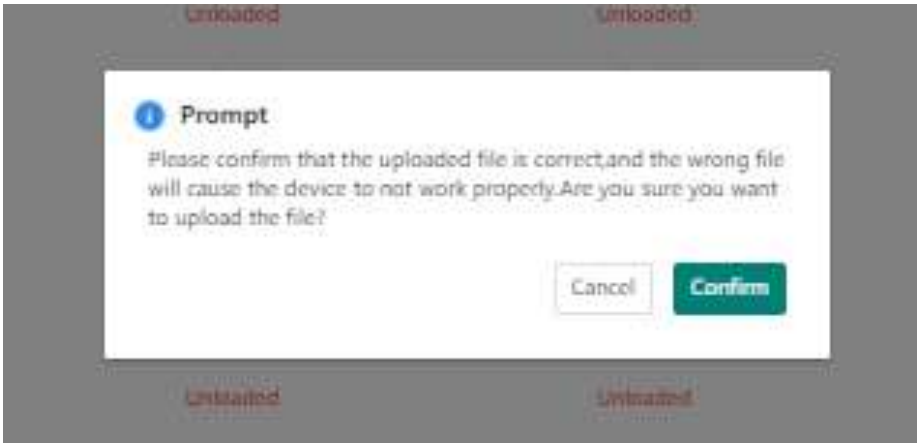


Figure 5-17.

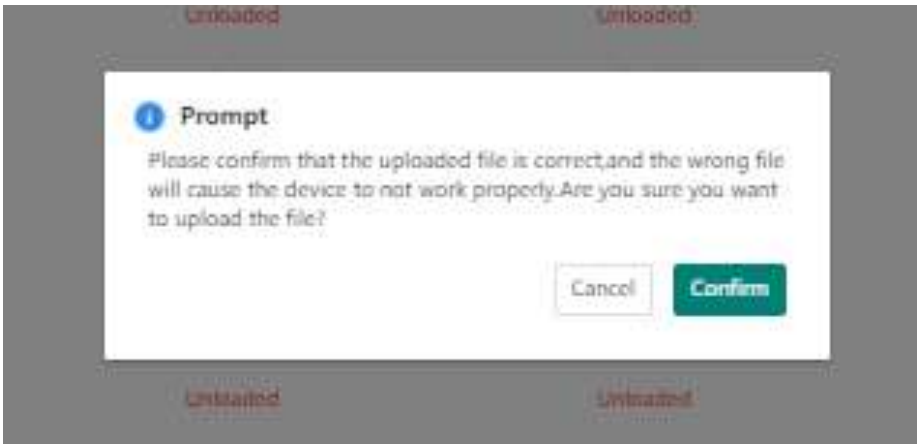


Figure 5-17 upgrade confirmation prompt

Click the "OK" button, and Figure 5-18

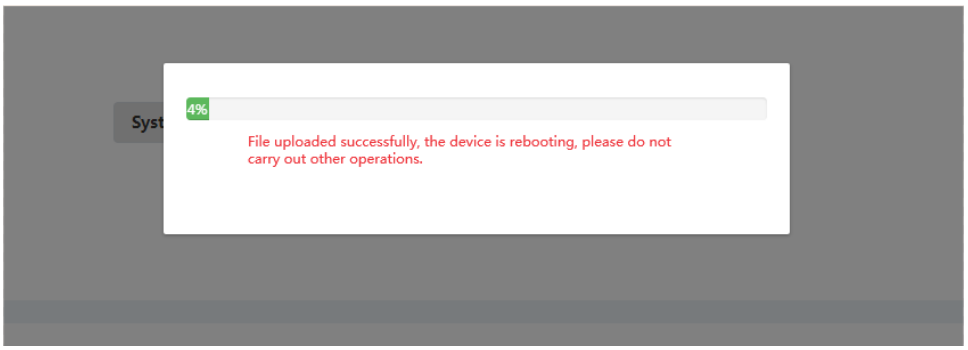


Figure 5-18 Image file upload progress bar page

After the image upload is completed, Figure 5-19

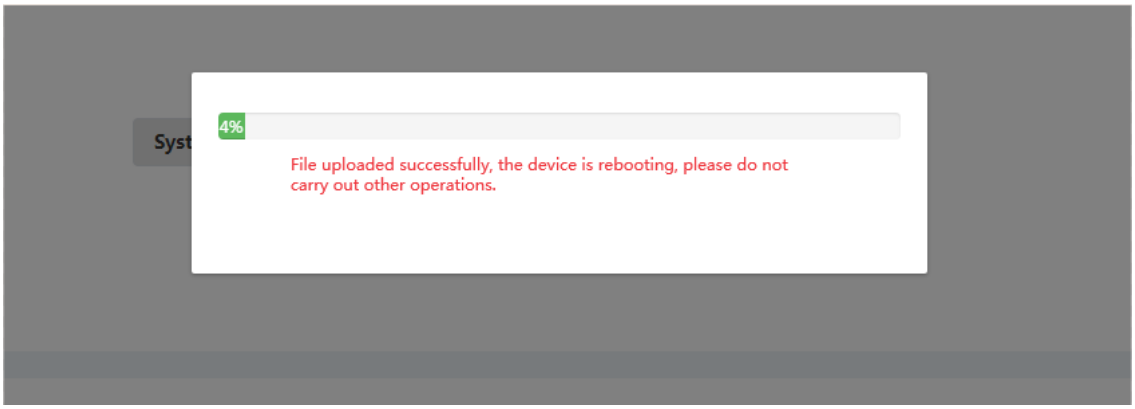


Figure 5-19 Image upgrade progress bar page

Figure 5-20 Restart progress bar page

After the restart is completed, the web page automatically jumps to the login interface.

Notice:

- When a device needs to be upgraded, you must first make sure that the upgrade file is correct, otherwise the device software may be damaged and cause device failure.
- Do not operate the device during the upgrade process.
- The entire upgrade process is not allowed to be powered off, as this may cause permanent damage to the device.

5.2 Security Management

5.2.1 Web Control

Web server by protocol, as shown in the following figure.

Figure 5-21 Web control page

- Web server transmission protocol: This option is used to enable the transmission protocol supported by the web server. The default is to support http and https. It is recommended that users do not modify this option.
- HTTP: HTTP (hypertexttransferprotocol) is the abbreviation of Hypertext Transfer Protocol. It is used to transmit data in WWW mode. For details on the HTTP protocol, please refer to RFC2616.
- HTTPS: HTTPS is a secure version of the HTTP protocol, developed for confidentiality purposes, and its security foundation is the TLS protocol.

When the device IP address is the default IP, the user directly enters " https://192.168.16.253 " in the browser's address bar and clicks the Enter key. At this time, the web server is accessed through the https protocol.

5.2.2 Telnet control

This device supports the Telnet login control function. After the Web page configuration is enabled, Telnet login can be used remotely. The configuration page is shown in the figure below.

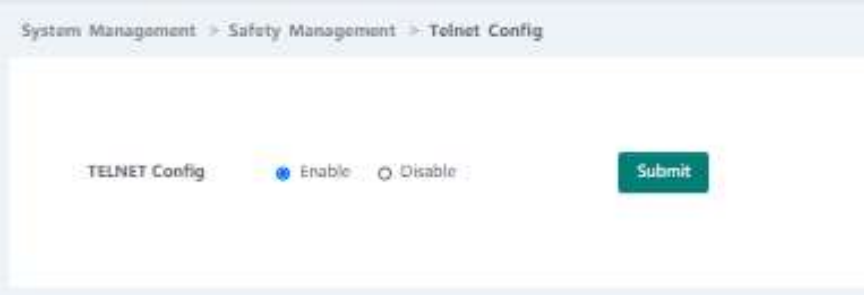


Figure 5-22 Telnet control page

The Telnet protocol is a member of the TCP/IP protocol suite and is the standard protocol and main method for Internet remote login services. Users can log in to the remote host through the local computer to work. Telnet is simple and practical, but Telnet is a clear text transmission protocol. It transmits all the user's content, including usernames and passwords, in clear text on the Internet. In today's society that pays attention to information security, it obviously needs to be improved. For security reasons, it is recommended to use SSH control with higher security.

Telnet control is disabled by default. After enabling Telnet control, you can directly use the computer command line to log in via Telnet. Enter the command prompt and enter telnet + IP, for example: telnet 192.168.16.253. User name is admin, password is admin. (Also using mobaxterm terminal)

After successful login, the page is as shown below.

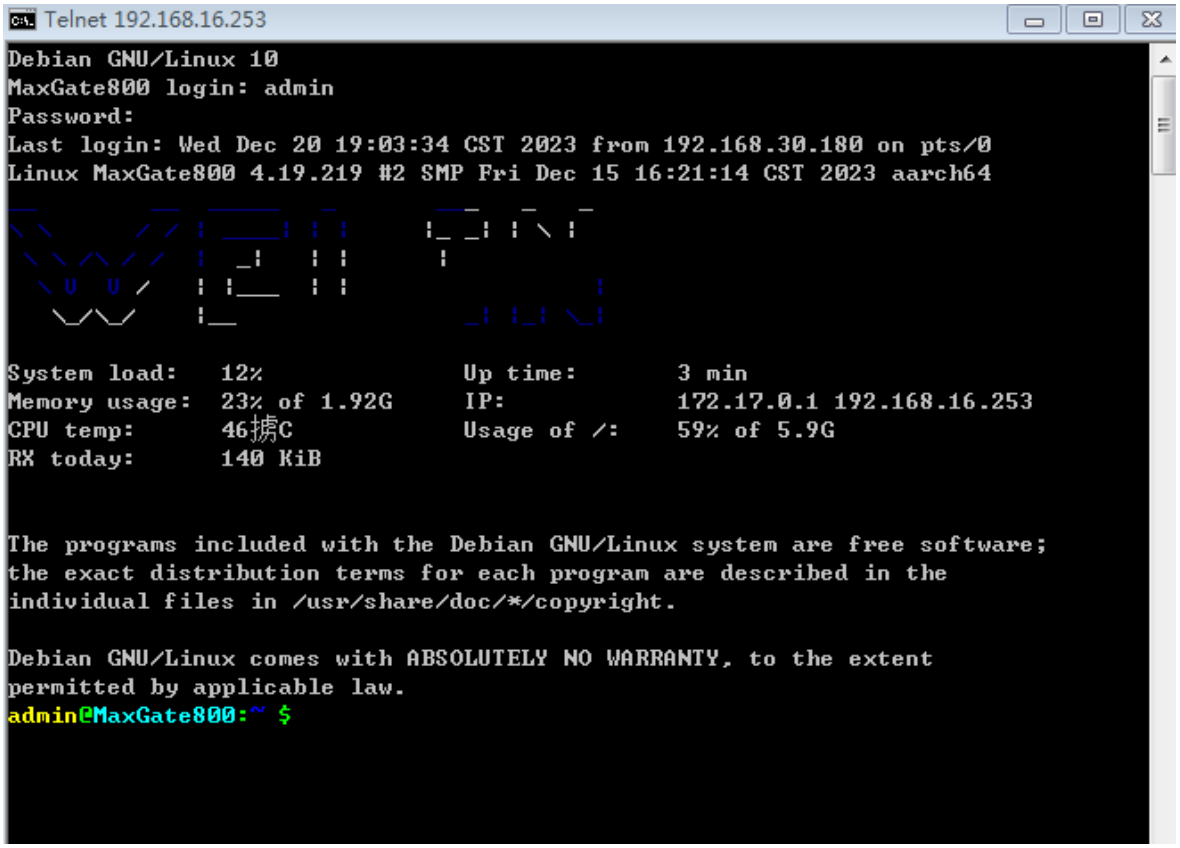


Figure 5-23 Telnet login success page

5.2.3 SSH Control

This device supports SSH login control. After the Web page configuration is enabled, you can log in remotely using SSH. The configuration page is shown in the figure below.

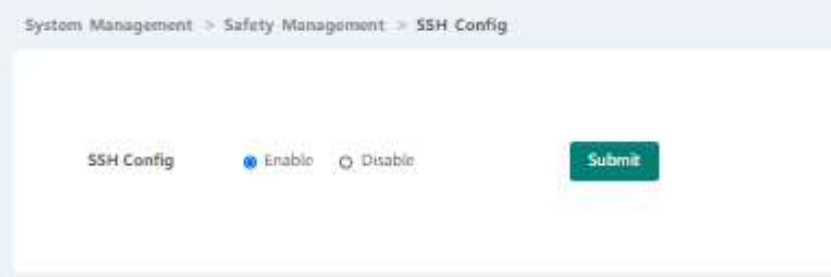


Figure 5-24 SH control page

SSH (Secure Shell) is a security protocol based on the application layer, which provides users with the function of logging into a remote computer from a local computer. SSH login is based on key exchange technology. The information transmitted through SSH remote login is encrypted. Even if it is intercepted from the network, the real information cannot be obtained. It can make up for the defect of Telnet login control in transmitting information insecurely in the network.

SSH provides two levels of security authentication: password-based authentication and key-based authentication. The configuration for SSH login is as follows:

Enable the SSH function. On the SSH control page of the web page, click Enable and then click Configure. After configuration, the upper right corner of the page will display Operation Success or Success, indicating that the configuration is successful.

Use the mobaxterm terminal SSH function to log in to the gateway, username admin, password admin.

After successful login, the page will be as shown below.

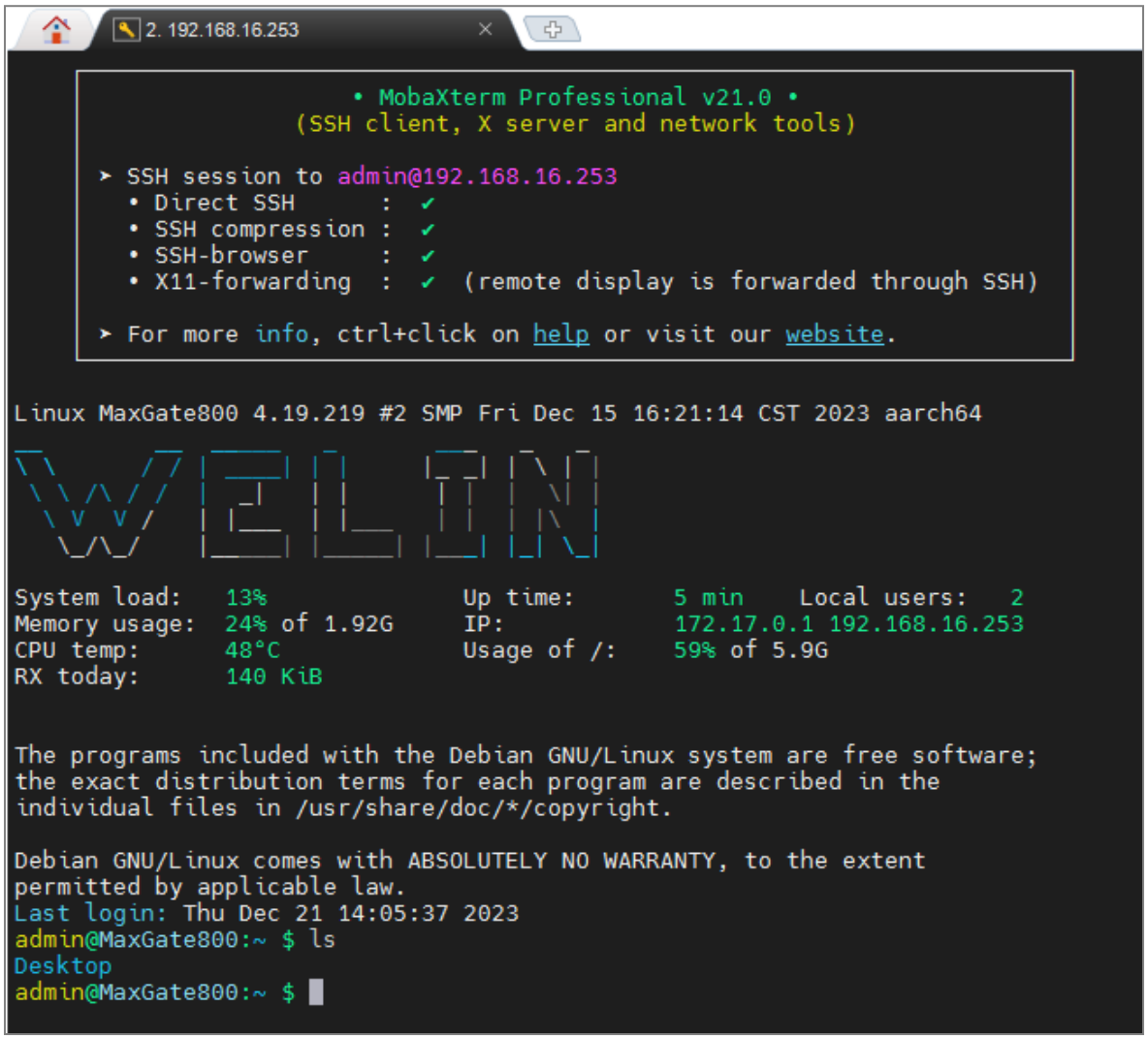


Figure 5-25 SSH login success page

6 Principle Overview

6.1 Modbus Communication Principle

The Modbus protocol is a client/server application layer protocol. The communication process follows the following process:

- The client sends a request to the server
- The server analyzes and processes the client request and sends the result
- If an error occurs, the server returns an exception code

The message data field sent by the client to the server device includes additional information, and the server uses this information to perform the operation defined by the function code. If there is no error related to the requested Modbus function in a correctly received modbusadu, the response data sent by the server to the client includes the requested data; if there is an error related to the requested Modbus function, the field includes an exception code, and the server application can use this field to determine the next operation.

- There is no error: The master sends a data request, and after the slave receives the request, the verification code is successfully verified, indicating that the processing is error-free and the operation in the function code is executed.

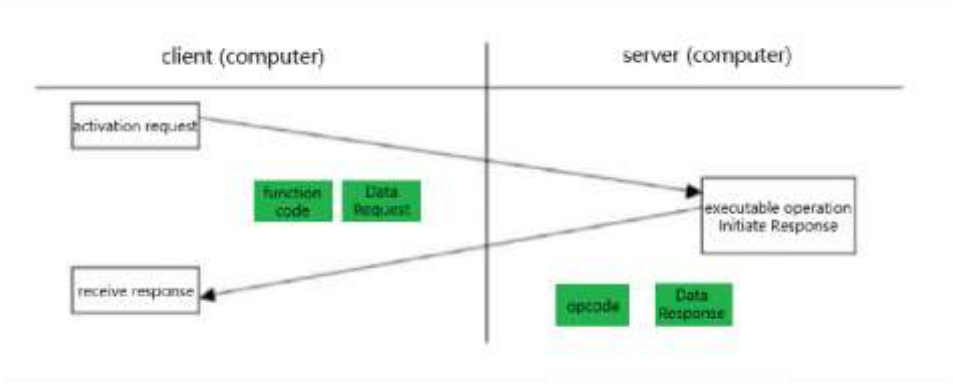


Figure 6-1 Modbus normal communication diagram

- **Handling of abnormal response:** The host sends a data request, and after the slave receives the request, it fails to check the check code, indicating that there is an error in the transmission. Return error code and exception code.

Figure 6-2 Modbus abnormal communication diagram

6.2 Transmission mode

6.2.1 Modbusrtu mode

RTU mode communicates on Modbus serial link. Each 8-bit byte in the message contains two 4-bit hexadecimal characters.

Main advantages: higher data density, higher throughput rate than ASCII code mode at the same baud rate, and more data can be transmitted. Interoperability between Modbus devices is only if each device has the same mode RTU or ASCII code, and the default setting must be RTU mode. RTU message frame:

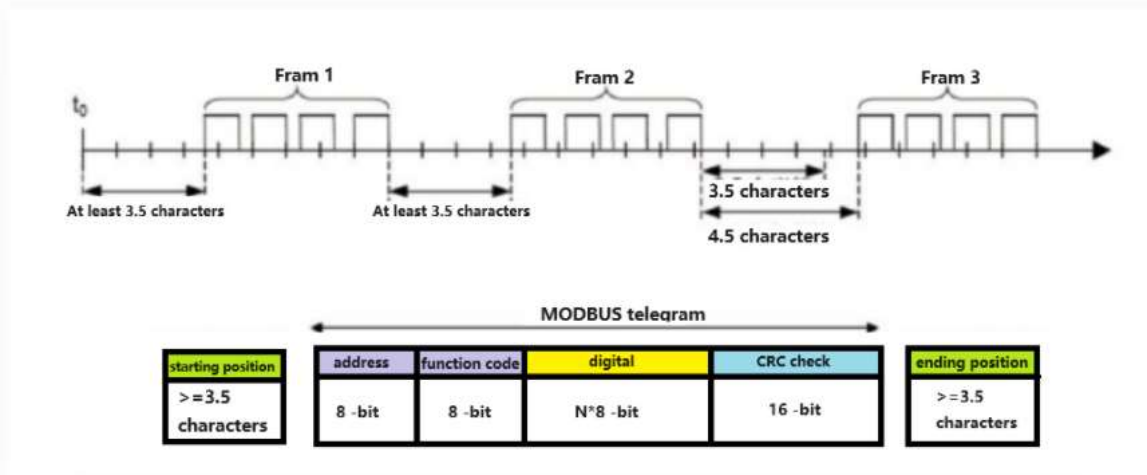


Figure 6-3 modbusrtu message frame

6.2.2 Modbus ASCII code mode

When a device on a Modbus serial link is configured to communicate using ASCII mode, each 8-bit byte in the message is sent as two ASCII characters. This mode is used when the communication link or device cannot comply with the timing management of RTU mode.

Advantages: The time interval between character transmissions can reach 1 second without causing errors. Disadvantages: Since one byte requires two characters, this mode is less efficient than RTU. ASCII code message frame:

Beginning	Address	Function	Data	LRC	End
1 character	2 characters	2 characters	0 to 2x252 characters	2 characters	2 characters CR,LF

Figure 6-4 ASCII code message frame

RTU and ASCII mode comparison:

Comparison between modbusrtu and ASCII modes:		
Model	RTU	ASCII
Coding system	8-bit binary	Hexadecimal

Comparison between modbusrtu and ASCII modes:		
	Each ASCII character in the message contains 2 hexadecimal characters	Each ASCII character in the message contains 1 hexadecimal character
Bits per Byte	1 start bit	1 start bit
	8 data bits	7, 8 data bits
	Odd/even parity check 1 bit	
	Parity check None	
	If there is a parity check, it is 1 stop bit	
	If no parity check is performed, the value is 2.	
Error Checking	CRC	LRC

6.2.3 Modbustcp Mode

The Modbus protocol defines a simple protocol data unit (PDU) that is independent of the underlying communication layer. The Modbus protocol mapping on a specific bus or network can introduce some additional fields on the application data unit (ADU).

Figure 6-5 General Modbus frame

Starts the Modbus transaction creates a Modbus application data unit. This function code indicates to the server which operation to perform. Modbus application data unit on TCP/IP: describes the encapsulation of Modbus request or response in the modbustcp/IP network. Modbus request/response on TCP/IP:

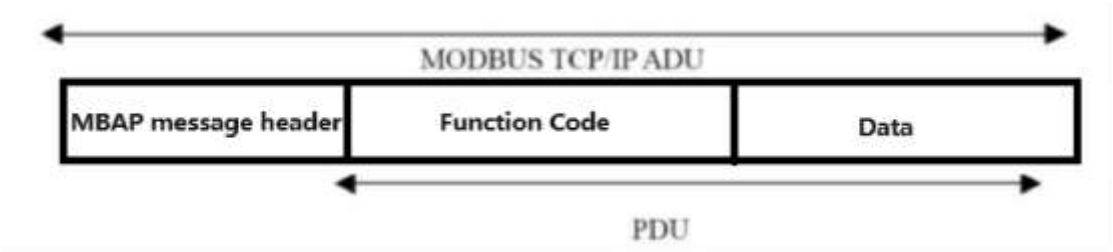


Figure 6-6 Modbus request/response over TCP/IP

Is used on TCP/IP to identify the Modbus application data unit. This header is called MBAP header (Modbus protocol header). This header provides some differences compared to the modbusrtu application data unit used on the serial link:

- Modbus serial link is replaced by a single byte unit identifier in the MBAP message header. This unit identifier is used for communication with devices that support multiple independent Modbus terminal units using a single IP address, such as bridges, routers, and gateways.
- Modbus requests and responses in a way that the recipient can verify the completion of the message. For modbuspdu with fixed -length function codes, only the function code is sufficient. For function codes that carry variable data in the request or response, the data field includes the number of bytes.
- When carrying Modbus over TCP, even if the message is divided into multiple packets for transmission, the service carries additional length information in the MBAP message header so that the receiver can identify the message boundaries. The existence of explicit and implicit length rules and the use of CRC-32 error checking codes will cause minimal undetected interference in request or response messages.

MBAP header description The MBAP header includes the following fields:

Area	Length	Describe	Client computer	Server
Transaction meta-identifier	2 bytes	MODBUS request/response transaction identification code	Client starts	The server re-copies from the received request
Protocol identifier	2 bytes	0=MODBUS protocol	Client starts	The server re-copies from the received request
Length	2 bytes	The number of bytes	Client Initiate (Request)	Server (response) start
Unit Identifier	1 byte	Identification code of a remote slave connected to a serial link or other bus	Client startup	The server re-copies the received request

The message header is 7 bytes:

- Transaction Identifier: Used for transaction pairing. In the response, the Modbus server copies the transaction identifier of the request.
- Protocol Identifier: Used for multiplexing within the system. The value 0 identifies the Modbus protocol.
- Length: The length field is the number of bytes of the next field, including the unit identifier and the data field.
- Unit identifier: For intra-system routing, use this field. Designed for communication to Modbus or Modbus+ serial link slaves via a gateway between an Ethernet TCP-IP network

and a Modbus serial link. The Modbus client sets this field in the request and the server MUST return this field with the same value in the response.

6.3 Modbus basic architecture diagram

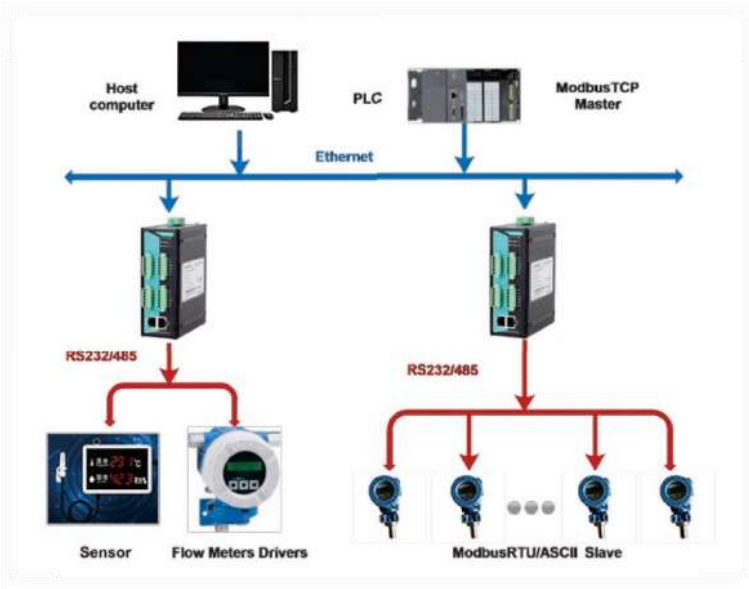


Figure 6-7 Modbus basic architecture diagram slave mode

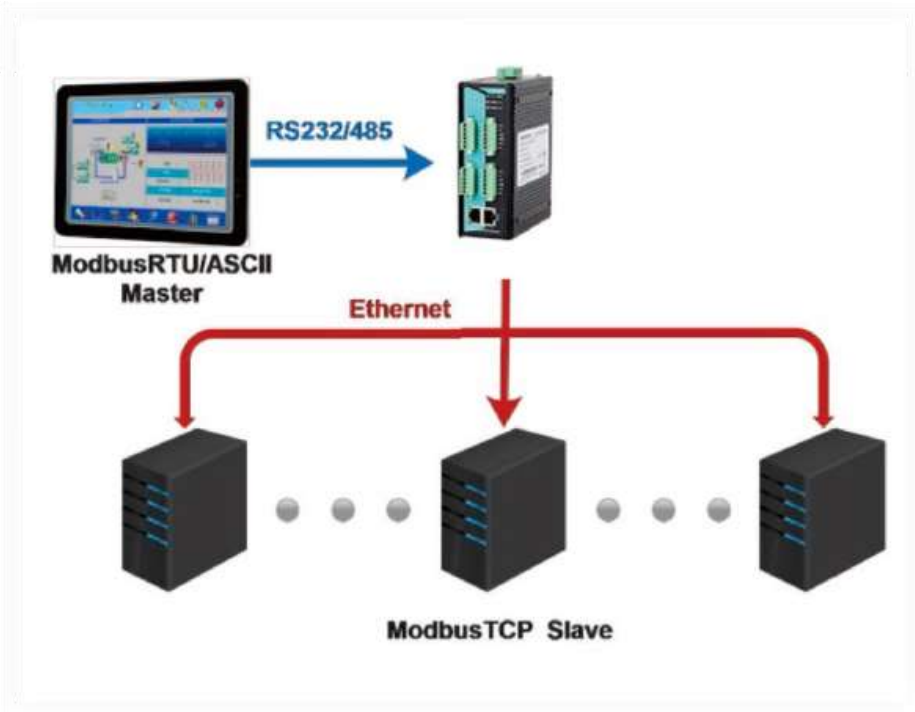


Figure 6-8 Modbus basic architecture diagram Master mode

6.4 Modbus parameter settings

6.4.1 Initial delay

Modbus gateway device is powered on, it will take a while to start Modbus. This function is to adapt to the scenario where the slave device takes too long to start. In order to prevent the slave from sending a request message before the initialization is completed, the gateway sets the initialization delay time to determine the time delay from initialization to when the first request frame can be sent.

6.4.2 Modbustcp exception

This parameter is used to check whether there are modbustcp communication abnormalities in the Modbus monitoring software. If the data returned by the slave station is abnormal or the Id address is abnormal, the gateway will form a message to notify the master station of the communication abnormality.

6.4.3 Modbus response timeout

Modbus is a master-slave protocol. The host needs a response timeout when accessing the slave. This time is the "Modbus receive timeout" of the gateway. This parameter exists between steps 2 and 3 in the figure below. After the gateway forwards the request to the slave device, if it does not receive a response within the parameter time, it is considered a timeout response, so it sends an abnormal response message back to the master device.

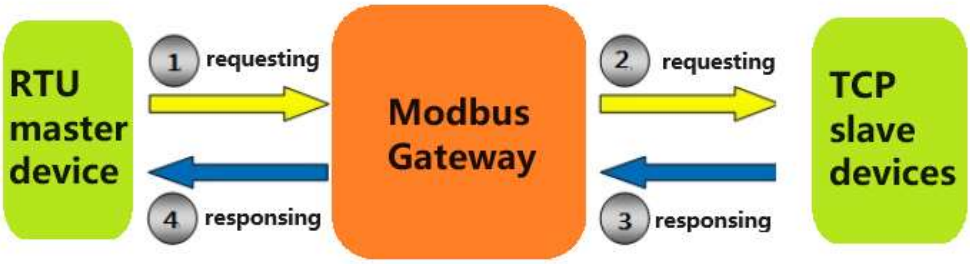


Figure 6-9 Modbus communication process

6.4.4 Inter-character time

An RTU message frame, the time interval difference between this frame message and the next frame message is the character interval time. At some customer sites, the serial port does not have a FIFO cache and cannot meet the standard specifications of the Modbus protocol for time. However, the character interval time allows customers to define it themselves and is compatible with old equipment with poor time requirements. Frame delay

The time interval between the current RTU response and the next RTU request, the default is 0ms. This function is to prevent the slave device from being unable to process RTU requests

quickly. Setting the time interval allows the RTU slave device to have sufficient time to process the request.

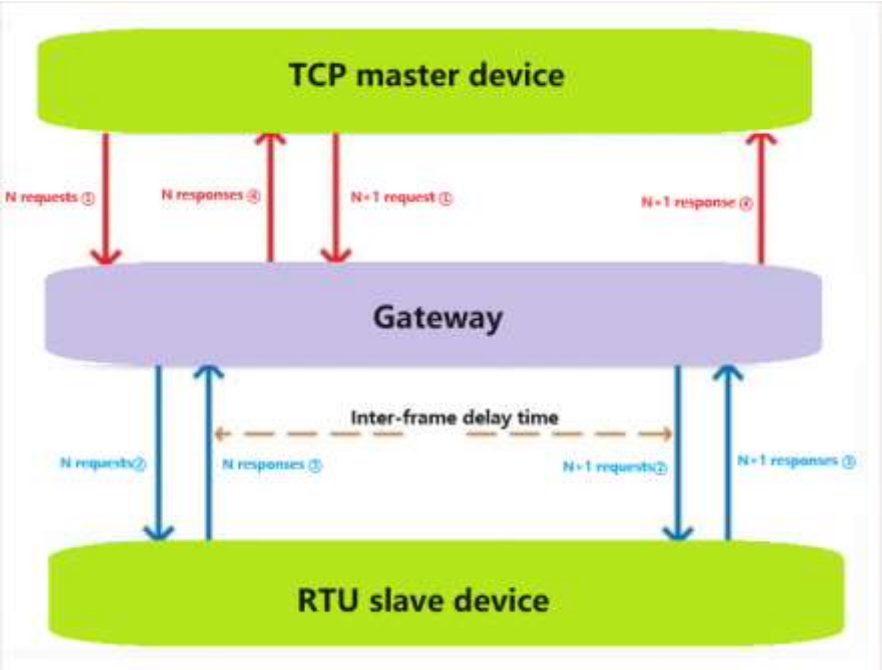


Figure 6-10 Modbus communication process

6.4.5 Slave address mapping

The Modbus protocol stipulates that all slave devices must have unique ID numbers (1 ~ 247). This ID number is used to identify the slave address in response to requests from the master device. The Modbus device ID number is set by the manufacturer.

Slave ID mapping: Each slave device has 2 ID addresses, namely virtual ID address and real ID address. The real ID exists in the slave device, and other devices directly access the slave device through the real ID. The virtual ID exists in the gateway and is the unique access address of the slave device at the gateway. Other devices use the virtual ID to indirectly access the slave device through the gateway.

ID message processing process,

- ①The master station device uses the virtual ID to access the gateway;
- ②The gateway converts the virtual ID into a real ID to access the slave device;
- ③The slave device sends back a response using the real ID;
- ④The gateway converts the real ID into a virtual ID and sends back a response.

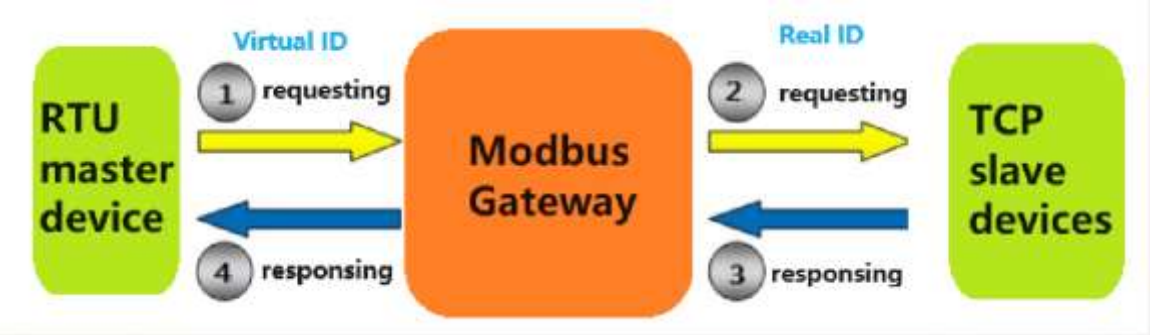


Figure 6-11 ID mapping

The gateway implements the ID mapping function by setting the ID range and ID offset. The ID range starts from the slave station's start ID and ends at the slave station's end ID. Only channels whose channel type is slave mode can be mapped, including serial port slaves (rtuslave or asciislave) and tcpslave. The slaveid mapping table relationship is virtualid + idoffset = realid, where virtualid and realid range from 1 to 247.

7 FAQ

- The web idle timeout is 10 minutes, and it will jump to the login page after timeout.
- Disable the automatic translation pop-up window in the upper right corner of Google Chrome: Settings->Advanced->Language->Ask to translate web pages that are not in your language;
- The interface language will not change after the device is powered off, restarted, or upgraded, but will be restored to the factory language after restoring the factory configuration.
- Please try to use Google or Firefox browser to access the Web.
- When using a higher version of Google Chrome to access via HTTPS, the console may display invalid printing due to unauthenticated security certificates. To block this, right-click the shortcut to launch Google Chrome and select the target, then add "-ignore-certificate-errors" (space-separated).