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Wi-Fi Serial Device Server

USR-W650

User Manual

V2.0

Your Trustworthy Smart Industrial IoT Partner

Content

1. Introduction

The USR-W650 is a high-speed, wide-connection, low-latency, and highly stable five-port WiFi wireless client. It features rich hardware interfaces: integrated WiFi wireless roaming, CANFD protocol gateway, 1RS232, 1RS485, Ethernet ports (4*LAN + 1*WAN/LAN), supporting AP/STA/AP+STA/Bridge modes, providing stable and reliable networking solutions for various scenarios and industries.

This product adopts industrial-grade standards, wide temperature and voltage range, robust hardware protection, and has passed multiple rigorous environmental tests. It features 1*RS232/1*RS485 serial port, 1CAN, 5RJ45, supporting various transmission protocols such as MODBUS, MQTT, TCP, UDP, etc. It has built-in dual hardware/software watchdogs, fault self-recovery mechanisms, etc. It can adapt to different industry scenarios and operate robustly and reliably even in harsh and demanding environments. The device supports 5.8G and 2.4G link fast roaming. In a wireless local area network composed of multiple APs, roaming can be achieved without requiring APs to perform handover operations.

The product features a standard DIN rail mounting installation method and is widely used in scenarios requiring centralized WiFi connections with large-scale connectivity and low latency requirements, such as: AGV carts, inspection robots, sorting manipulators, smart warehouses, smart healthcare, smart factories, video surveillance, unmanned parking lots, industrial automation, smart transportation, smart cities, etc.

1.1. Features

Stable and reliable

- ◆Fully industrial design, protection grade IP30;
- ◆Supports horizontal desktop placement and rail-mounted installation;
- ◆Wide voltage DC 12-48V input,with reverse polarity protection;
- ◆Industrial grade wide temperature -40℃~+75℃ wide temperature design, ESD level 4/EFT level3/Surge Level 3 protection;
- ◆Built-in hardware watchdog, fault self-detection, self-repair, and firmware backup and restoration functions to ensure system stability and not crash;

Flexible networking

- ◆Supports IEEE 802.11a/b/g/n/ac, dual-band WiFi (2.4G and 5.8G), AP/STA/AP+STA/Bridge modes for flexible networking;
- ◆Supports fast roaming, network switching as low as 100ms;
- ◆Supports 1 Gigabit WAN/LAN port, 4 Gigabit LAN ports;
- ◆Supports RS232/RS485 for easier serial data acquisition;

◆Supports CANFD protocol, enabling interconnection between CAN devices and network devices, compatible with standard CAN2.0A/2.0B protocols

◆Compatible with mainstream industrial protocols: TCP/UDP/MODBUS/HTTP/MQTT/SNMP, etc.;

◆Supports connection to mainstream cloud platforms such as Alibaba Cloud and Amazon Cloud, allowing devices to easily connect to the cloud;

◆Supports edge computing: active data acquisition, data computation, active data reporting, and data read/write;

◆Supports IPv6 protocol, Dual-Stack Lite (RFC6333), IPv6-in-IPv4 (RFC4213), IPv6-over-IPv4 (6rd);

Powerful Functions

◆Supports comprehensive anti-disconnection mechanisms to ensure data transmission stability

◆Supports wired/STA multi-network intelligent backup function to keep links open at all times;

◆Supports PUSR Cloud service, enabling remote web management of the wireless client's built-in webpage via PUSR Cloud, facilitating centralized device system management and improving maintenance efficiency;

◆Supports SNMP, NTP time calibration, MAC-IP binding, anti-question restrictions and other features Function.

1.2. Specification

Items	Description
Power Supply	DC: 12-48V, 2-pin removable terminal block, reverse polarity protection
Working Current	Avg: 700mA@12V Max: 2A@12V
Ethernet port	
Ethernet port	1*WAN/LAN + 4*LAN, RJ45 connector, 10/100/1000 compatible, 1.5KV isolation protection
Wi-Fi	
Standards & Frequency	IEEE 802.11a/b/g/n/ac 2.4G: 2.412GHz-2.484GHz 5.8G: 5.17GHz-5.25GHz, 5.725GHz-5.835GHz
Working Mode	AP/STA/AP+STA/Bridge
MIMO	2 x 2
Wireless Roaming	√, switching time < 100ms
Transmission Rate	2.4G: 300Mbps 5.8G: 867Mbps

Antenna connector	SMA female connector
Cover range	Outdoor (open space, unobstructed): Coverage radius up to 200m Indoor (office environment with obstacles): Coverage radius up to 40m (subject to environmental factors)
Serial port	
No.	1*RS232/RS485
Signal	RS232: Tx, Rx,G(public) RS485: A, B,G(public)
Baud rates	1200/2400/4800/9600/19200/38400/57600/115200/230400 bps
Data bits	7, 8
Stop bits	1, 2
Parity	NONE, ODD, EVEN
Packaging Interval	Range: 0 ~ 1000ms, default: 0ms
Packaging Length	Length: 5-1460bytes, default: 1000bytes
485 collision prevention	√, default: OFF
CAN Port	
No.	1 * CAN port
Terminator	Bulit-in 120Ω
Signals	CAN_H, CAN_L, GND
Physical Property	
Casing material	Aluminum casing, IP30 protection
Dimensions	119*94*35mm (L*W*H, excluding the guide rail, antenna base and installation parts)
Installation	DIN rail mounting
Operating temperature	-40℃ ~ +75℃
Storage temperature	-40℃ ~ +125℃
Operating humidity	5% ~ 95% RH, non-condensing
Storage humidity	1% ~ 95% RH, non-condensing
EMC protection	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
Software Function	
Work mode	Serial port: TCP Client(SSL), TCP server, UDP client, UDP server, HTTP client(SSL), MQTT client(SSL) CAN port: TCP client, UDP client
Modbus Gateway	Serial: Modbus RTU to Modbus TCP CAN: CAN(FD) to Modbus TCP
IP	DHCP/StaticIP

Registration packet	√
Heartbeat packet	√
WiFi Encryption	WEP/WPA-PSK/WPA2-PSK
Encryption Methods	WEP64/WEP128/TKIP/AES
IOT PLATFORMS	PUSR cloud
User Configuring	Web console(HTTP)
Others	
Reset	Reset button 1>Press and hold for 4~15 to reset to factory settings 2>Quickly ouble-tap to enter SmartAPLink for networking
Indicators	PWR、RUN、WLAN、485、232、CAN
APPROVALS	
Regulatory	CE/RED, RoHS, WEEE

1.3. Indicator description

There are a total of 6 status indicators. Their meanings are as follows:

Item	Description
PWR	Power indicator. Illuminates steadily when power input is correct.
RUN	Operation indicator. Illuminates steadily when internal system starts, flashes with a 500ms cycle after full startup, flashes with a 250ms cycle during upgrade.
WLAN	OFF: STA not enabled. Green steady: RSSI ≥ -60dBm, WLAN connected to AP. Green flashing: RSSI ≥ -60dBm, WLAN connected and data communication in progress. Green off: RSSI ≥ -60dBm, WLAN not connected. Red steady: RSSI < -60dBm, WLAN connected to AP. Red flashing: RSSI < -60dBm, WLAN connected and data communication in progress. Red off: RSSI < -60dBm, WLAN not connected.
RS485	Uplink data: red indicator flashes; Downlink data: green indicator flashes.
RS232	Uplink data: red indicator flashes; Downlink data: green indicator flashes.
CAN	Uplink data: red indicator flashes; Downlink data: green indicator flashes.

Notes:

- The operating status of WAN and LAN is indicated by the WAN and LAN port LEDs.
- The corresponding WAN/LAN LED will only flash when a network cable is connected and the peer network device is also operational.

1.4. Dimensions

Unit: mm

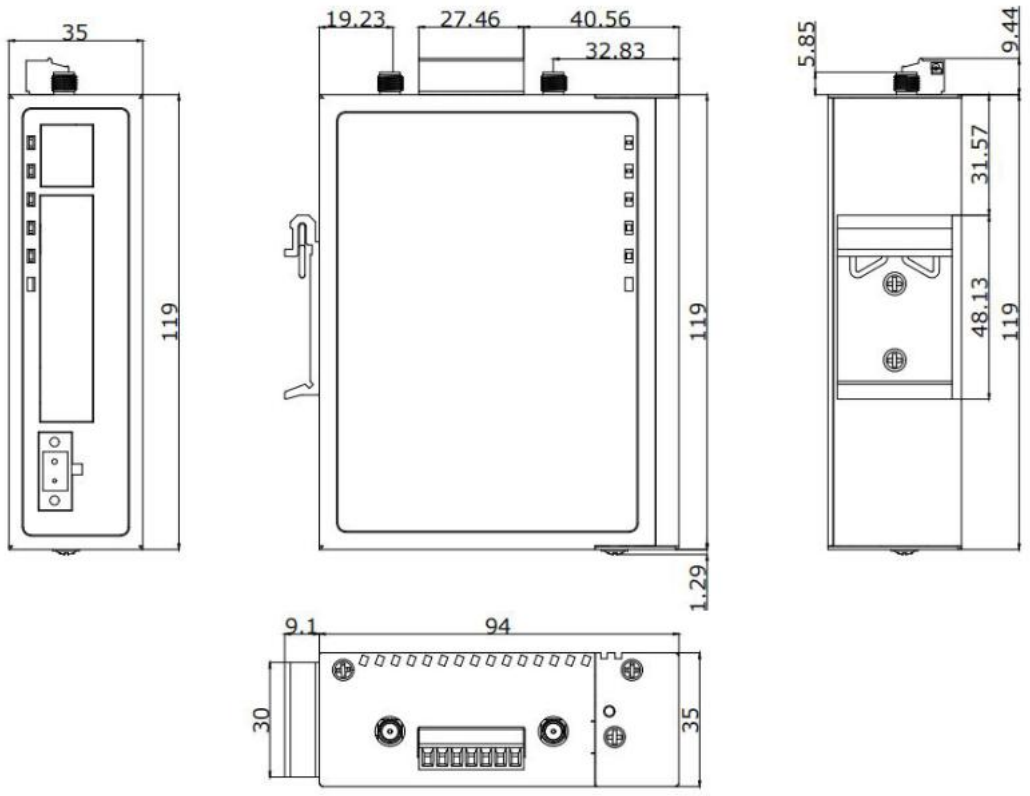


Figure 1. Dimensions

- Sheet metal enclosure, fixing holes on both sides, compatible with rail mounting brackets.
- 119*94*35mm (L*W*H, excluding rail, antenna mounts, and mounting hardware).

1.5. Login router

Power on the USR-W650 device， connect PC to USR-W650 via LAN port or via Wi-Fi, users can login router via Chrome or the other browser. The default network parameters are shown in the following table:

Table 1. Default network parameters

Parameter	Default value
2.4G SSID	USR-W650-xxxx
5.8G SSID	USR-W650-xxxx_5G
LAN IP	192.168.1.1
Username	admin
Password	admin
Wi-Fi password	None

Open the browser, enter 192.168.1.1 in the URL blank, and press Enter, it will navigate to the following webpage. After entering the login password, clicking login, the web page will show configuration page of USR-

W650.

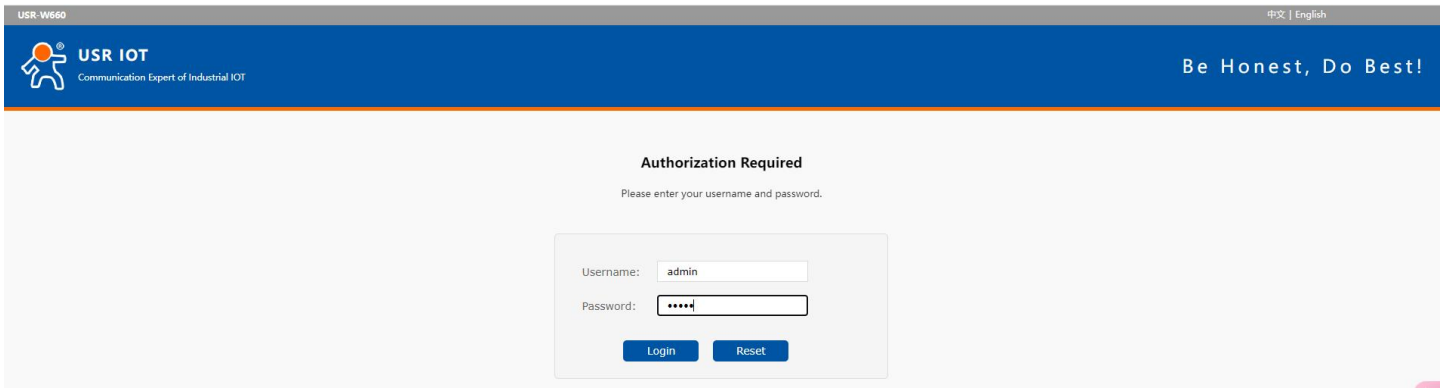


Figure 2. Login Page

1.6. Brief introduction of the webpage

On the left side of the web page is a tab page where you can specifically set some parameters of the module.

- Status: Mainly displays the device's name information, firmware version, routing table, running status, serial port communication status, etc.;
- Network: WAN, LAN, network switching, wireless WiFi hotspot, wireless client, DHCP, network port mode, network diagnosis;
- Serial port server function: serial port parameter setting, communication protocol setting, network AT configuration, serial port heartbeat configuration, no data Reconnection and restart settings;
- Network Testing Function: Network Diagnostics, WiFi Site Survey, Roaming Signal Test, Wireless Link Test;
- CAN Protocol Gateway: Interface settings, conversion settings, network settings, Modbus gateway application;
- Firewall: Port Forwarding, Communication Rules, Access Restrictions;
- Service functions: PUSR cloud service, DDNS, SNMP service;
- System: host name/password settings, scheduled restart, HTTP port settings, NTP time synchronization, access restrictions, logs, backup/upgrade, factory reset, restart, etc.

1.7. System structure

2. Status & System

2.1. System Status

Overview of product information, memory usage, network connection status, connected sites, serial port server communication, routing table, DHCP allocation.

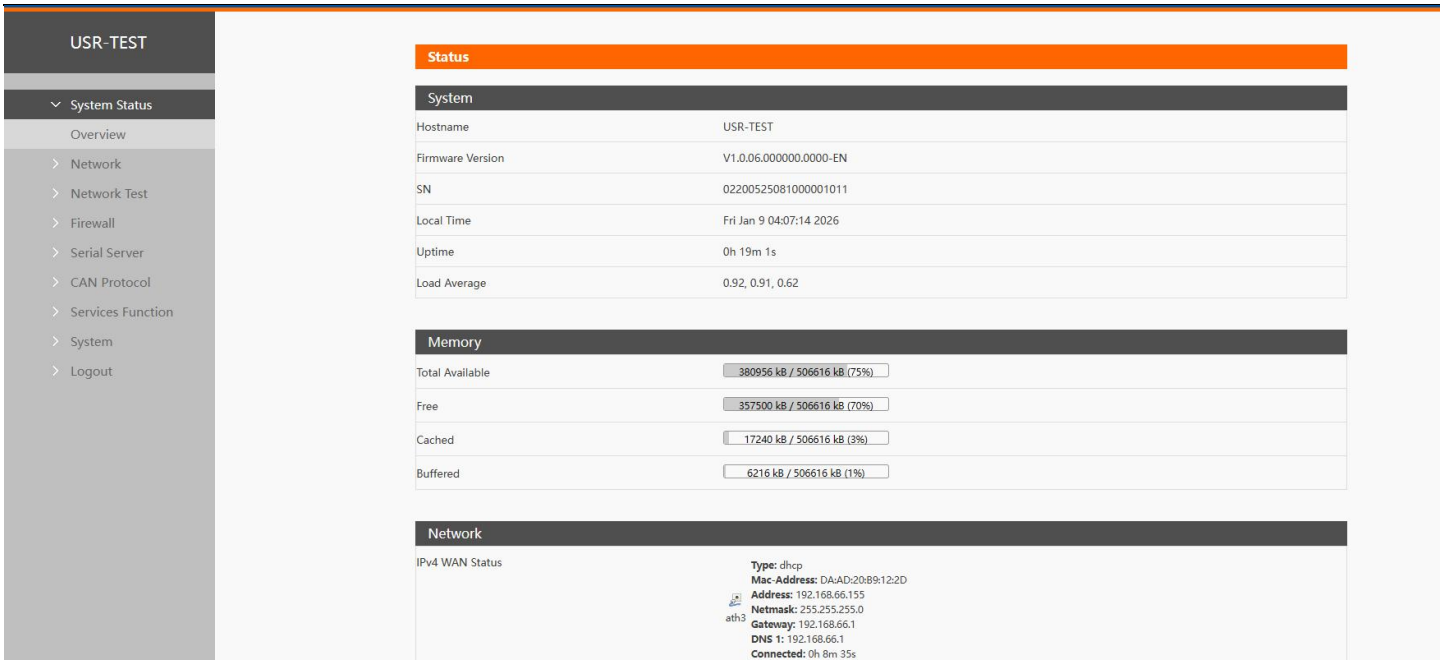


Figure 3. System Status

2.2. Name and password

The default password can be changed, and the default password is admin, and the username cannot be set. This password is the management password (webpage login password). The default host name of the wireless client is USR-W650.

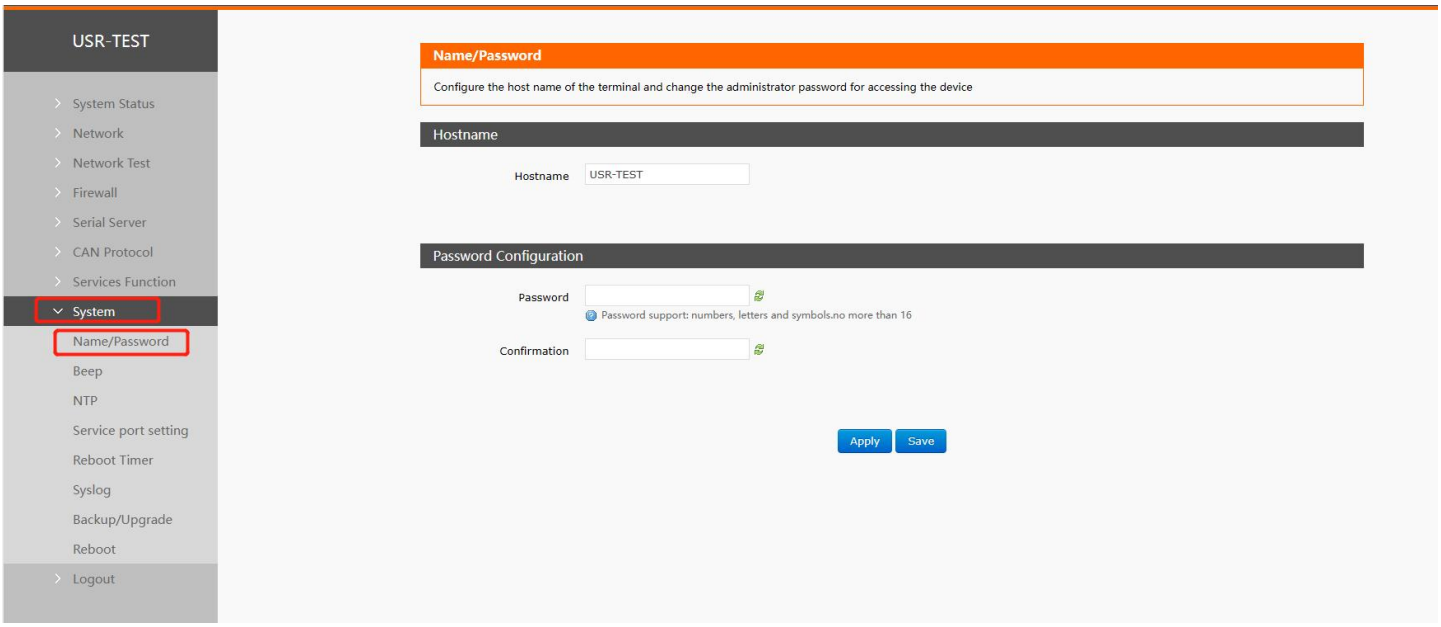


Figure 4. Name and password settings

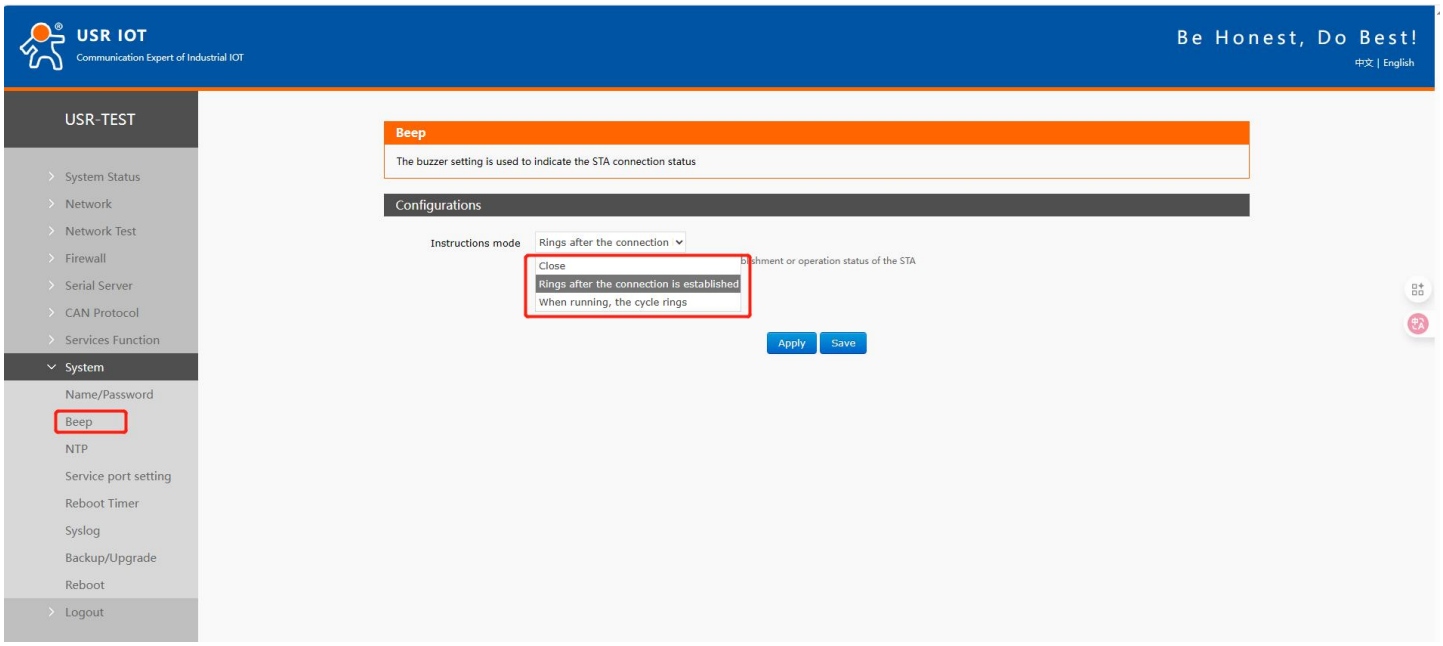
2.3. Beep

Used to indicate the connection status of STA. There are 3 modes: Close, Rings after the connection is established, Cycle rings when running.

Close: Close the beep.

Rings after the connection is established：When W650 successfully connects to the AP, it rings once.

Cycle rings when running: When W650 successfully connects to the AP through STA, it will ring every certain period of time. The cycle rang: 30 - 3600 seconds. The default period is 60 seconds.。



2.4. NTP

➢Time synchronization: The local time can be synchronized through "Sync Browser Time" and the default time zone of the wireless client can be set.

➢NTP calibration: The wireless client can perform network time adjustment, and the NTP client function is enabled by default.

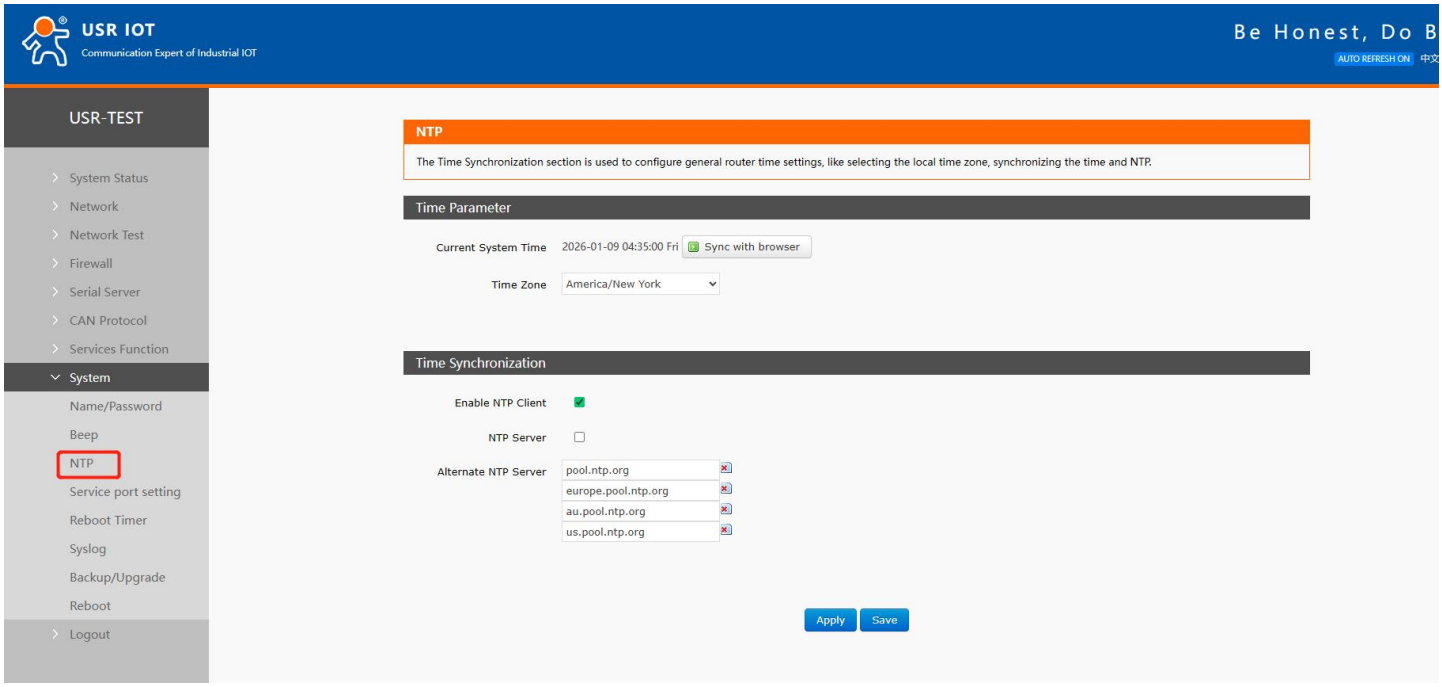


Figure 5. NTP settings

2.5. HTTP/SSH port

USR-W650 can set the login web port number to prevent non-operation and maintenance personnel from easily logging into the wireless client for configuration.

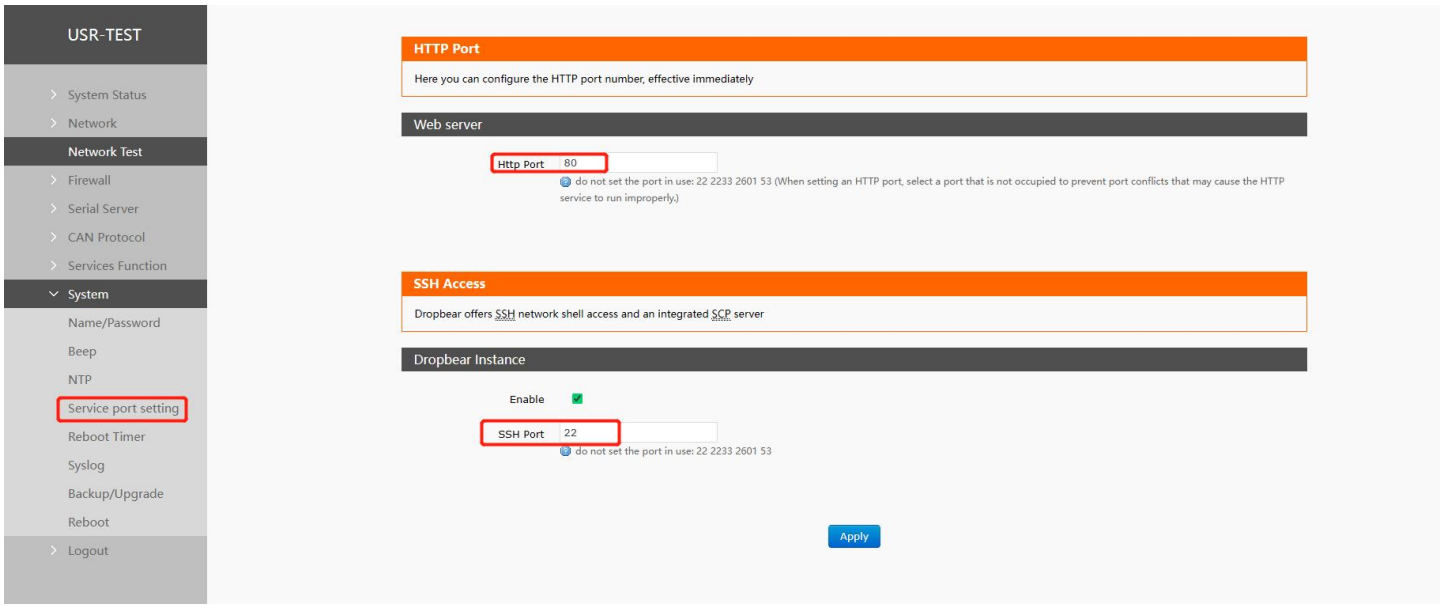


Figure 6. HTTP Port settings

2.6. Reboot timer

The wireless client can be managed to restart regularly at any time of the day, week, or month, and the running cache can be cleared regularly to improve the stability of the wireless client operation. The page setup is as follows.

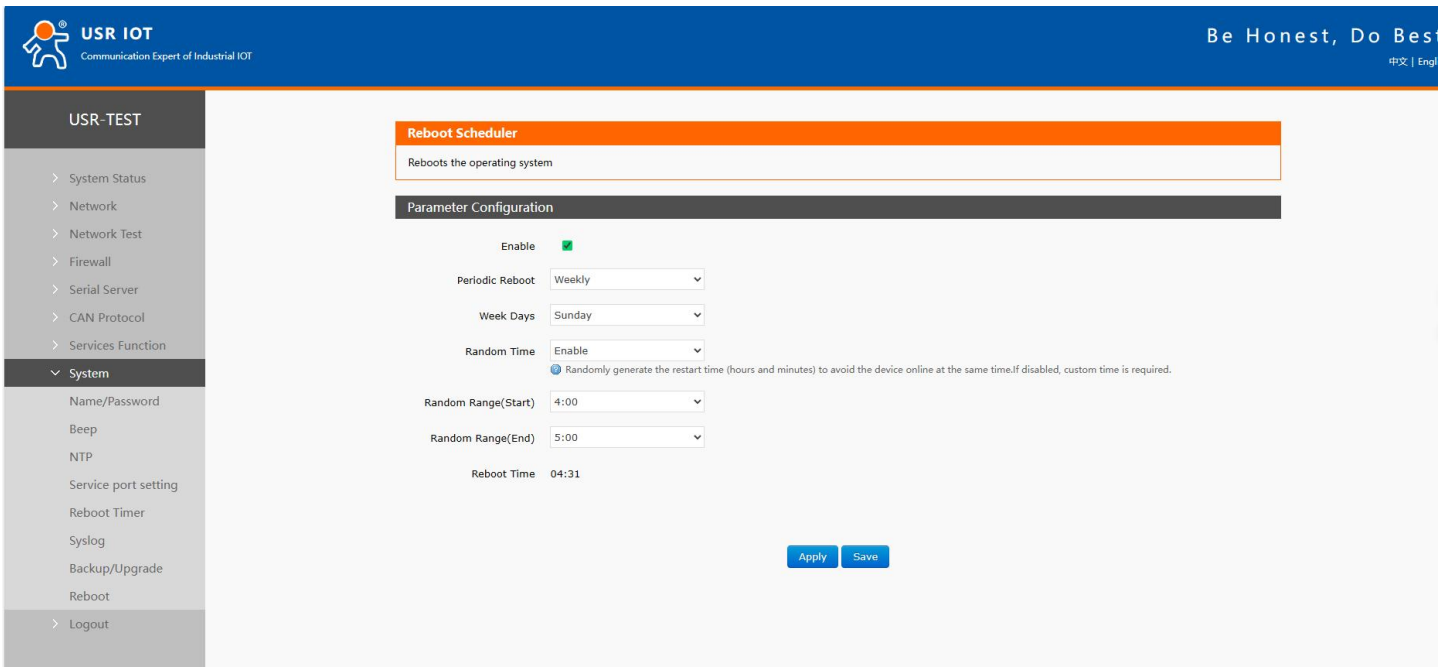


Figure 7. Restart Schedule Settings

2.7. System log information

Log is divided into remote log and local log, located in the system-log function menu.

Remote log

➢Remote log server: IP of the remote UDP server. When the IP is 0.0.0.0, remote log is not enabled;

➢Remote log server port: remote UDP server port;

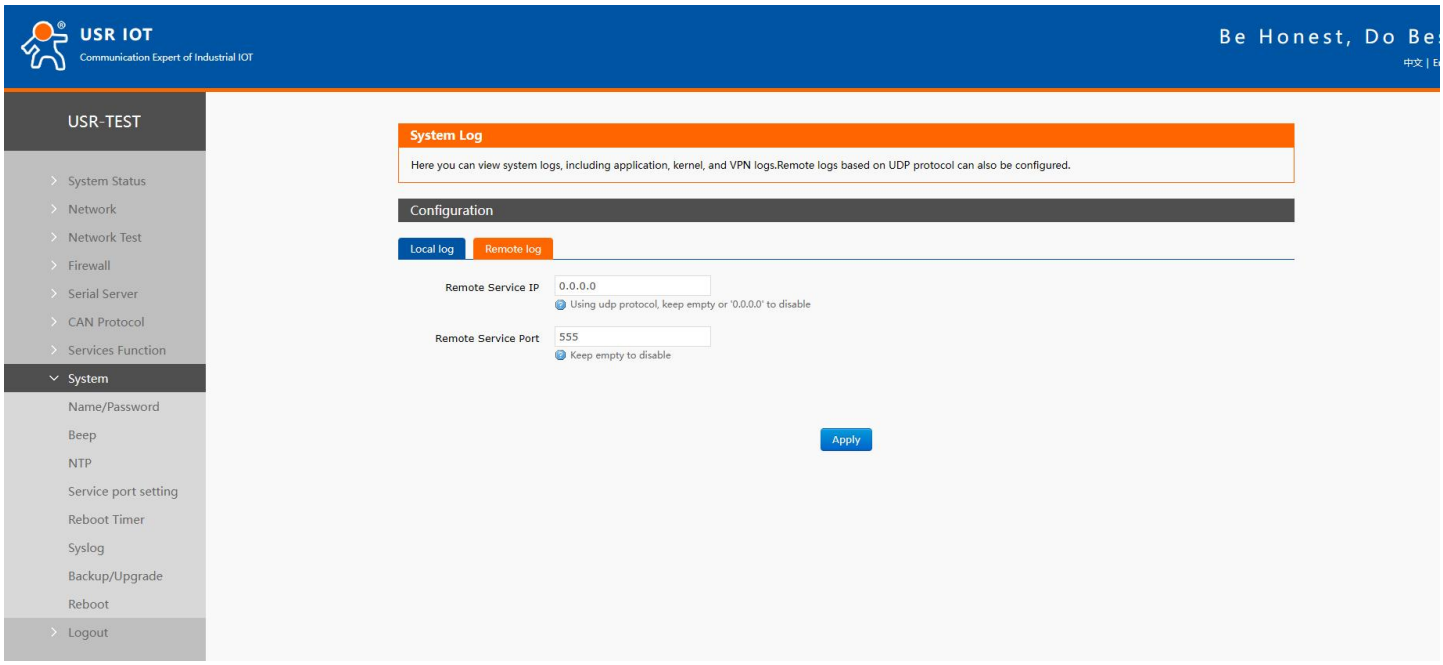


Figure 8. Remote Log

Local log

➢Kernel log level: supports debugging, information, attention, warning, error, fatal error, alert, emergency, a total of 8 levels; debugging is the lowest and emergency is the highest in order; Application log level: same as above;

➢Logs (kernel, application) support instant viewing, clearing, and log file export.

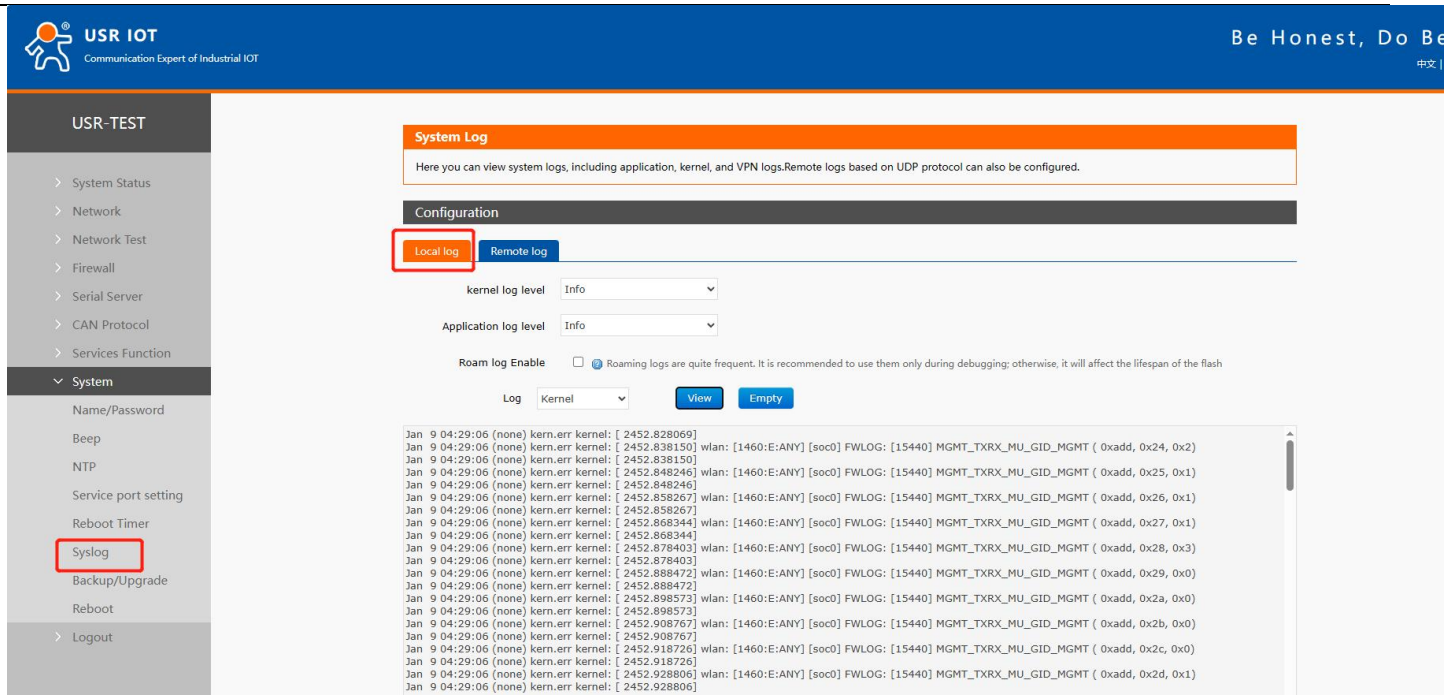


Figure 9. Local Log

2.8. Parameters backup/firmware upgrade

Parameter backup: Click the "Download Backup" button to back up the current parameter file as a compressed package file, such as backup- USR-W650-2022-04-20.tar.gz, and save it locally.

Parameter upload: Upload the parameter file (such as backup-USR-W650-2022-04-20.tar.gz) to the wireless client, then the parameter file will be saved and take effect.

Note:

➢The configuration file of USR-W650 must be imported, otherwise configuration confusion may occur;

➢Try to import and configure the same version of firmware. Large version differences may cause configuration confusion.

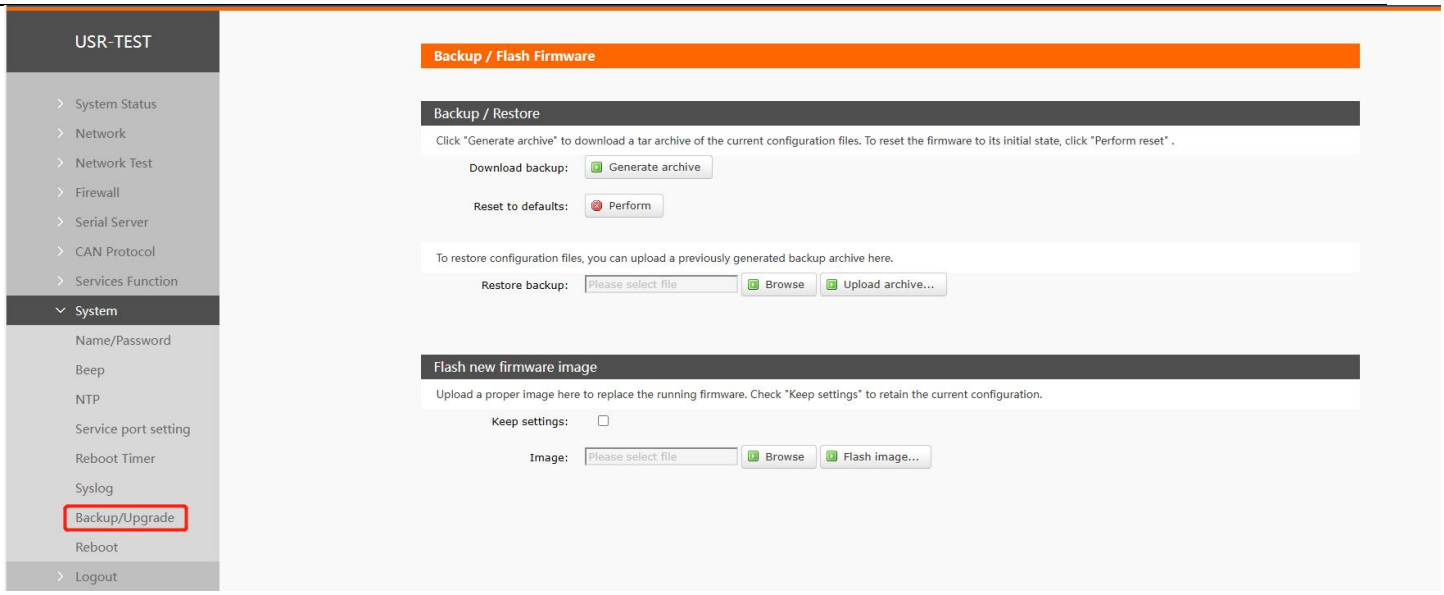
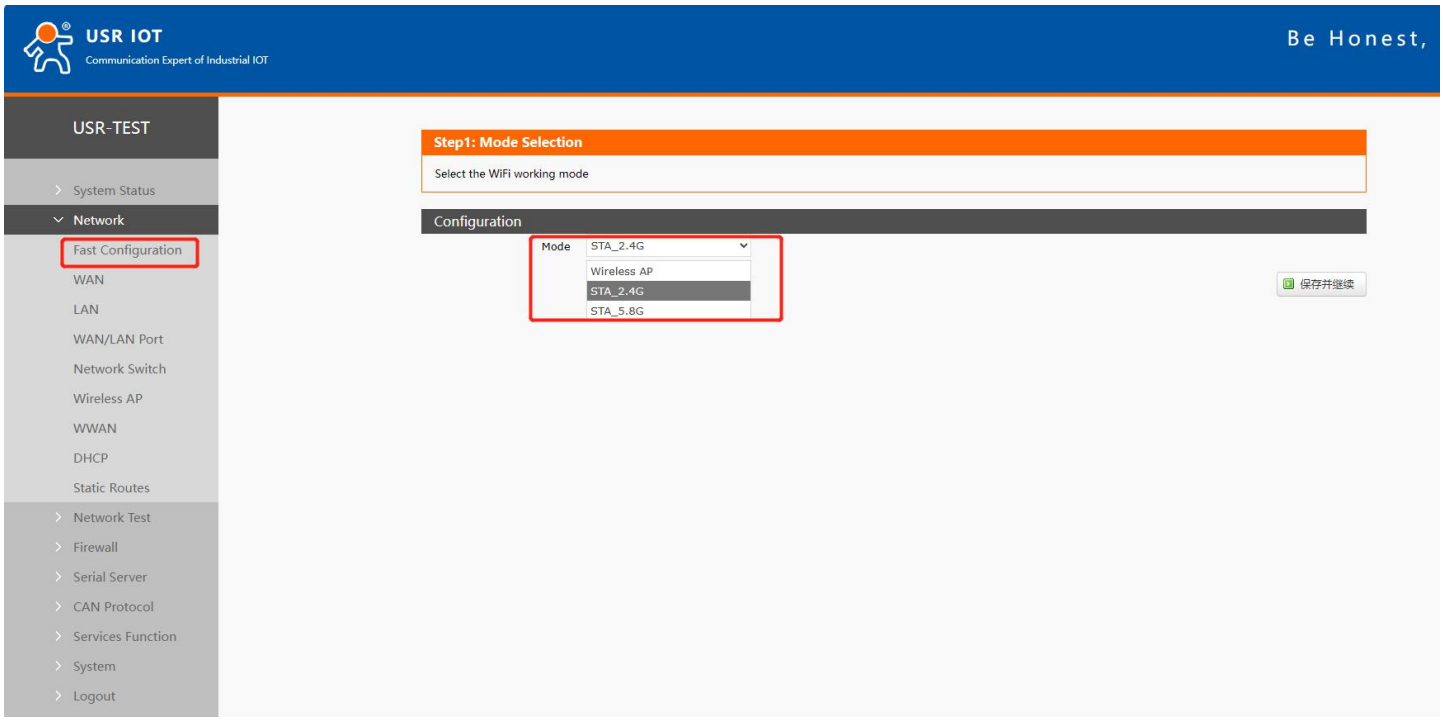


Figure 10. Parameters backup/firmware upgrade

3. Network introduction

3.1. Fast Configuration

This page provides users with a method to quickly configure the USR-W650 wireless client. By following the steps on the page to set the parameters and restarting the device, the device can start working normally and reduce the configuration steps and time. If you need more further configuration, please refer to the relevant chapter.



3.2. WAN interface

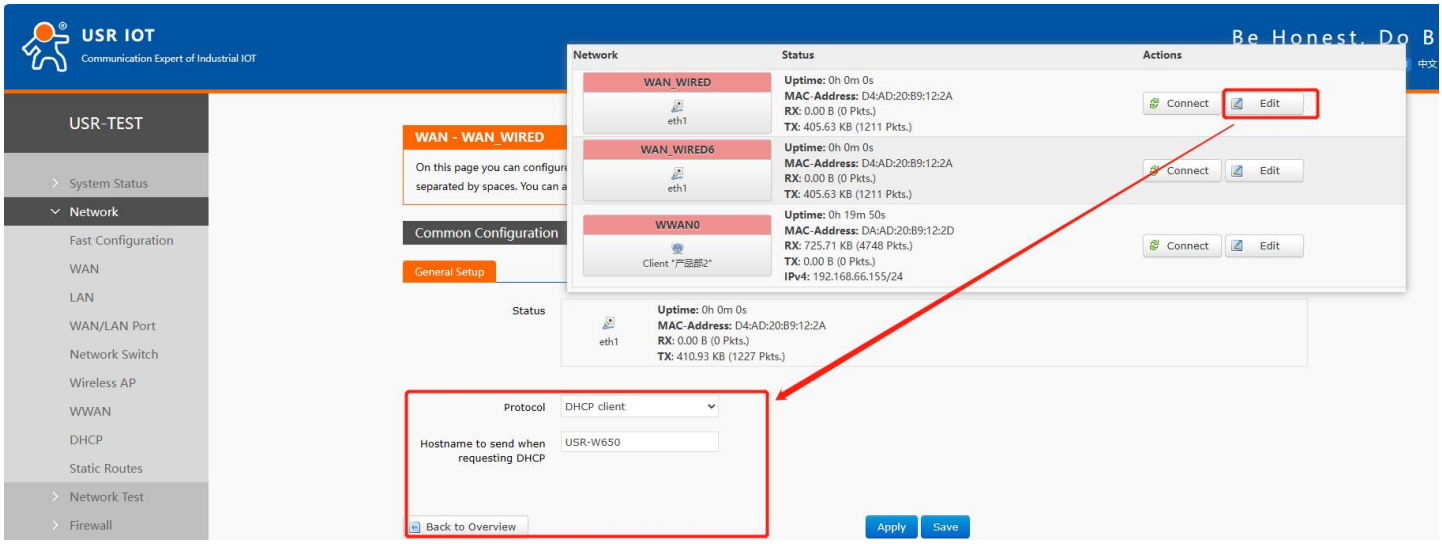
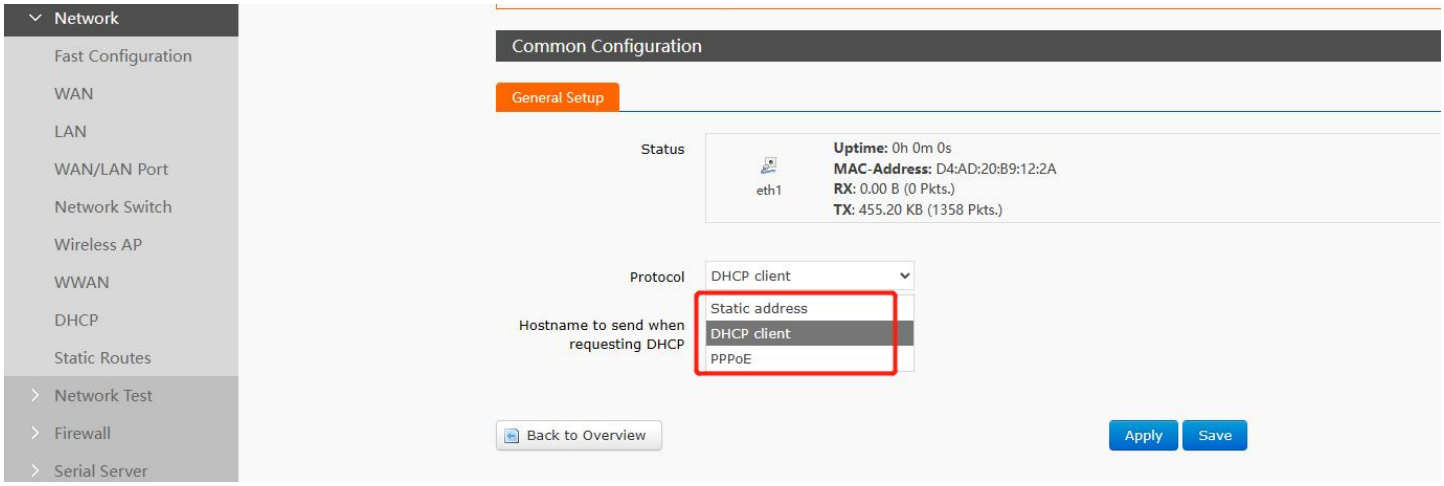


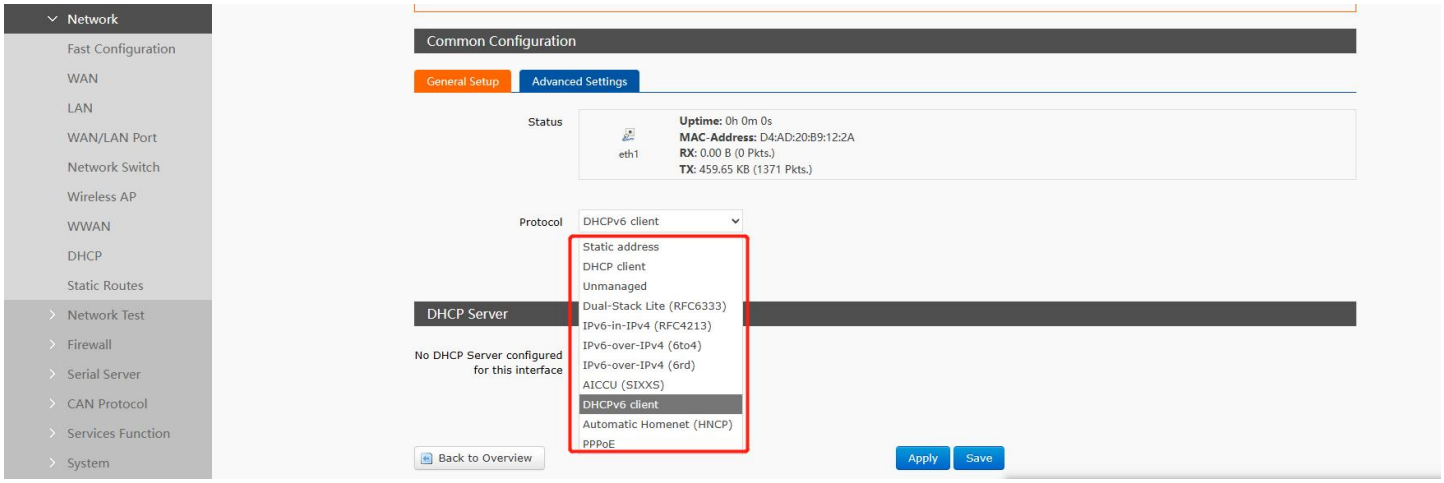
Figure 11. WAN Interface settings

WAN_WIRED: Settings for IPv4

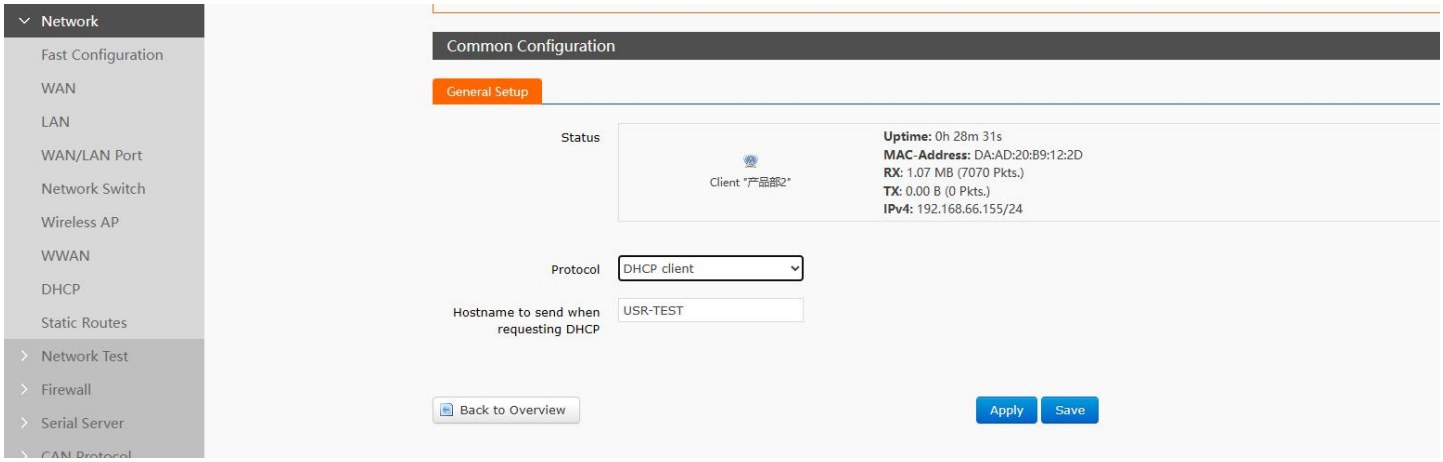
The protocol support DHCP client, PPPoE, static address.



WAN_WIRED6: Settings for IPv6



WWAN0: Settings for STA mode.



➢The WAN port IP cannot be in the same network segment as the LAN port IP;

➢The network port of this WAN port can be set to LAN, which is convenient for customers to communicate with multiple devices on the LAN. For specific settings, please refer to the network port mode configuration.

3.2.1. WAN_IPv4

3.2.1.1. DHCP Client

The upper-level router must enable the DHCP service, and use a network cable to connect the upper-level router LAN and this wireless client WAN, so that W650 can obtain the IP.

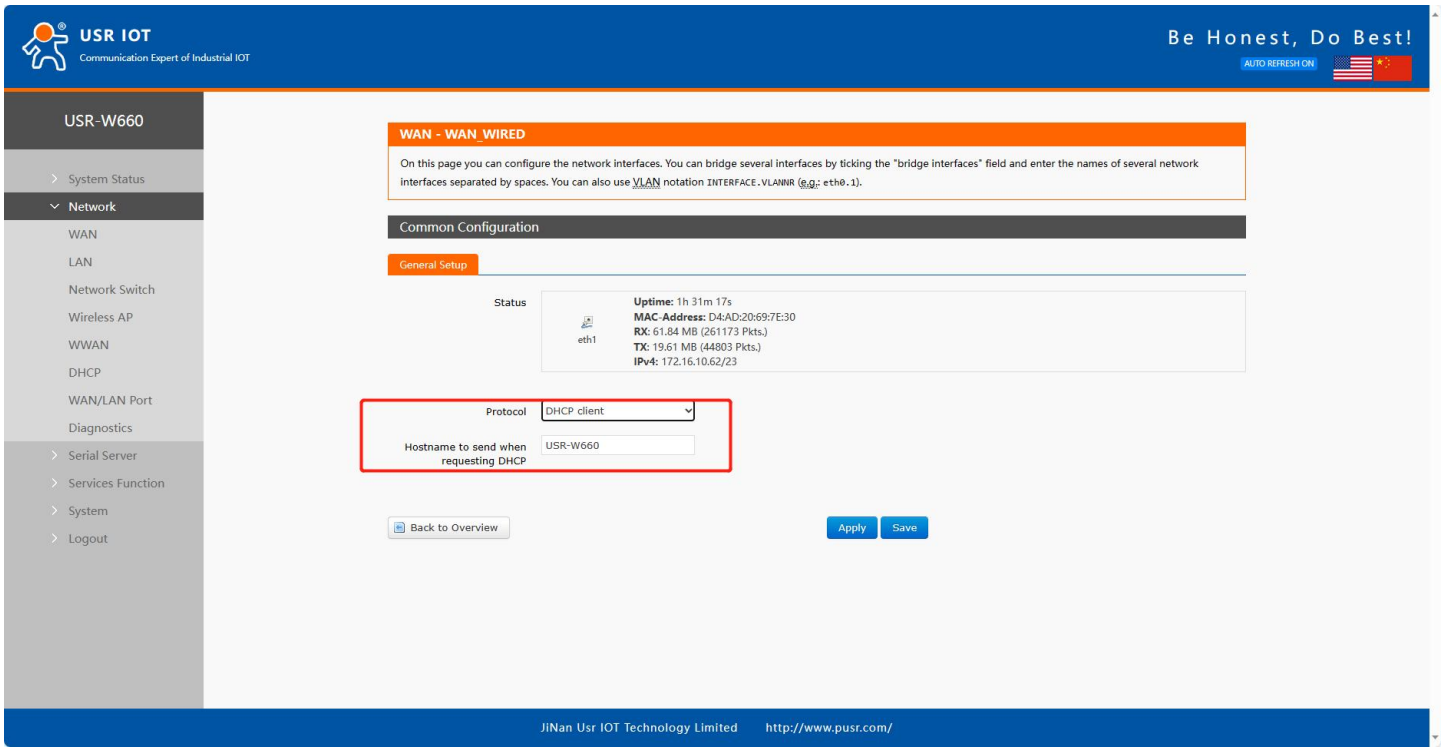


Figure 12. DHCP Client settings

3.2.1.2. Static IP

Fill in the IP address in the same network segment as the upper-level router. The IP, gateway and subnet mask must be filled in correctly. If it is a dedicated public network cable, the IP, subnet mask, gateway and DNS server must be filled in correctly according to the operator's IP, subnet mask, gateway and DNS server.

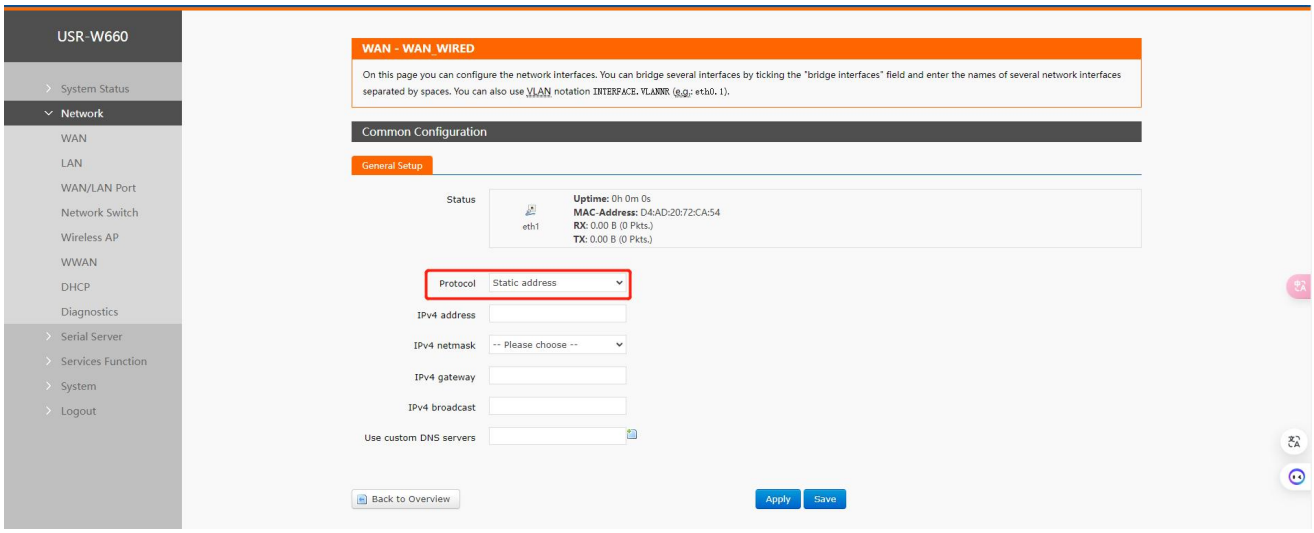


Figure 13. Static IP settings

3.2.1.3. PPPoE

Only wired WAN can be set, which needs to be filled in according to the correct user name and password given by the operator.

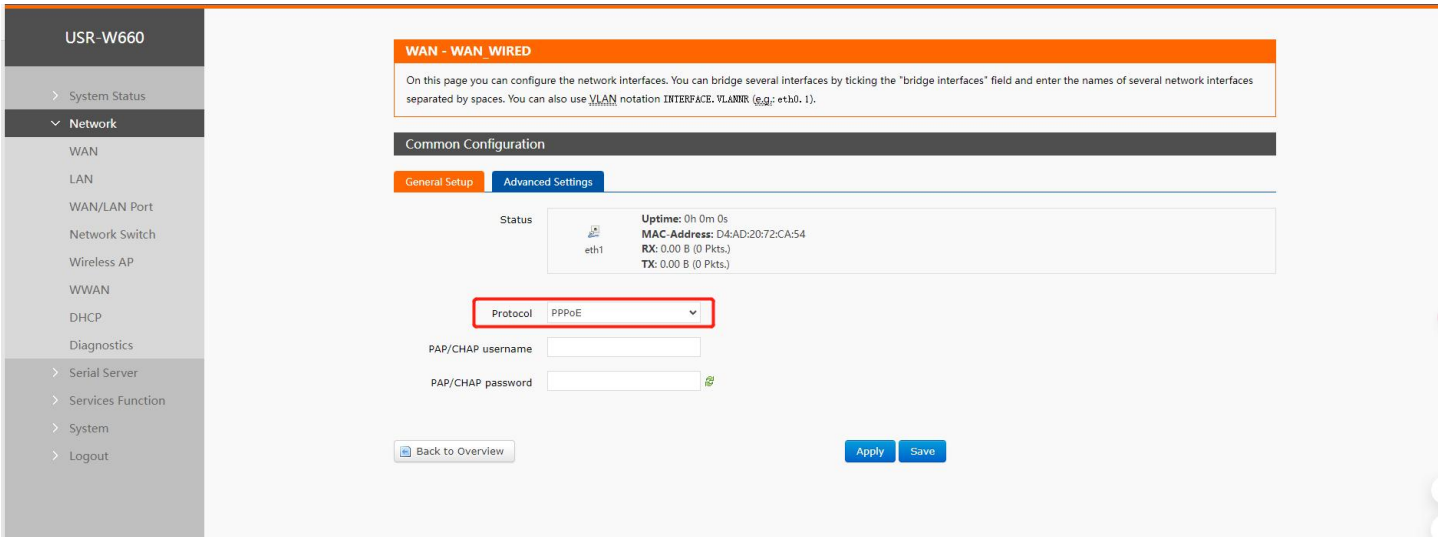
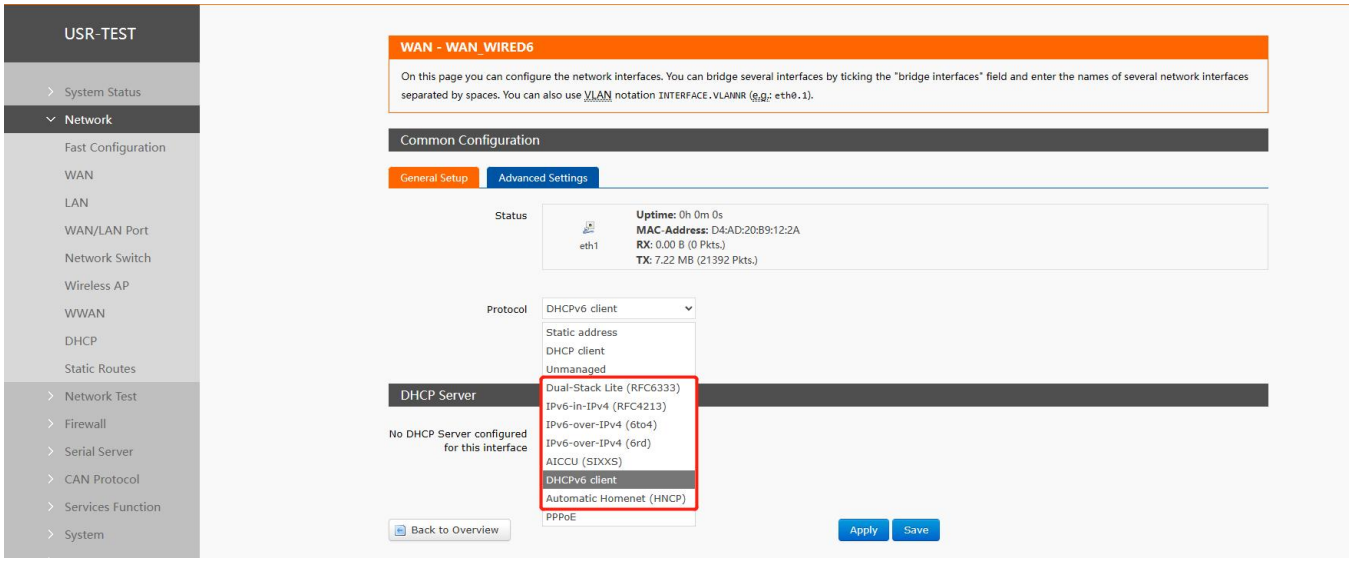


Figure 14. PPPoE settings

3.2.2. WAN_IPv6



- Dual-Stack Lite (RFC6333): Lightweight dual-stack protocol, a transition solution for carrying IPv4 data over IPv6 networks when IPv4 addresses are insufficient.
- IPv6-in-IPv4 (RFC4213): Encapsulates IPv6 packets within IPv4 for transmission, enabling IPv6 network communication over IPv4 environments.
- IPv6-over-IPv4 (6to4): IPv6 transition technology based on public IPv4, connecting different IPv6 networks via 6to4 relays.
- IPv6-over-IPv4 (6rd): IPv6 transition technology deployed by ISPs, encapsulating IPv6 packets within IPv4 for transmission via specific relays.

- AICCU (SIXXS): Client protocol for connecting to SIXXS IPv6 tunnel service, requires a registered SIXXS account.
- DHCPv6 Client: Automatically obtains IPv6 address and network parameters from the ISP, adapting to IPv6 network environments.
- Automatic Home Network (HNCP): Automatic configuration protocol for home network devices, enabling automatic synchronization of network parameters among devices within the home.

3.3. LAN interface

The LAN port is a local area network. There are 4 LAN ports and 1 WAN/LAN port.

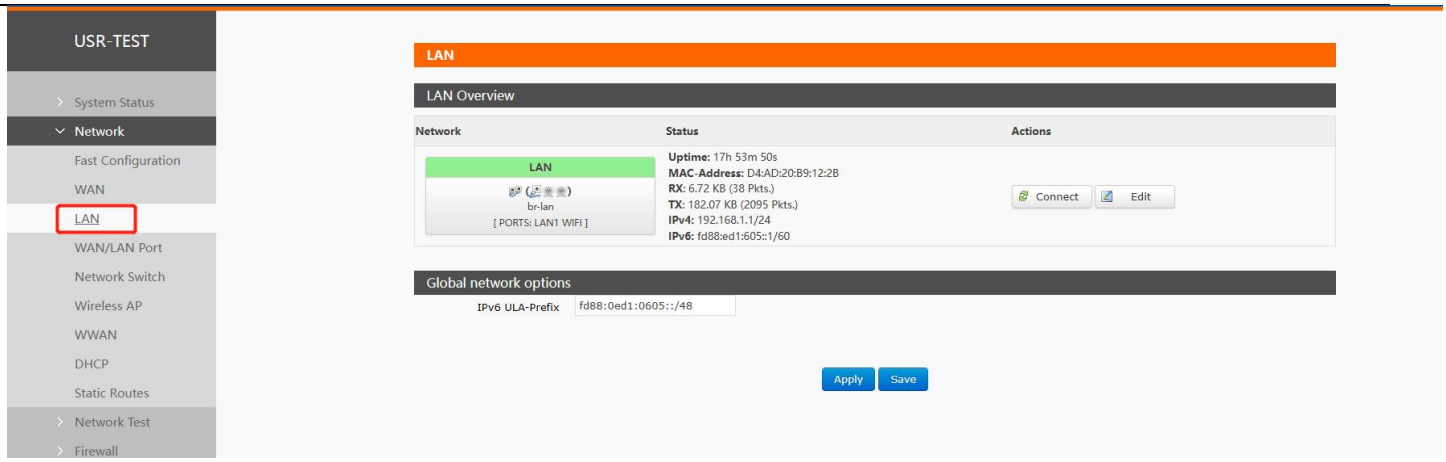


Figure 15. LAN Interface settings

3.3.1. General setup

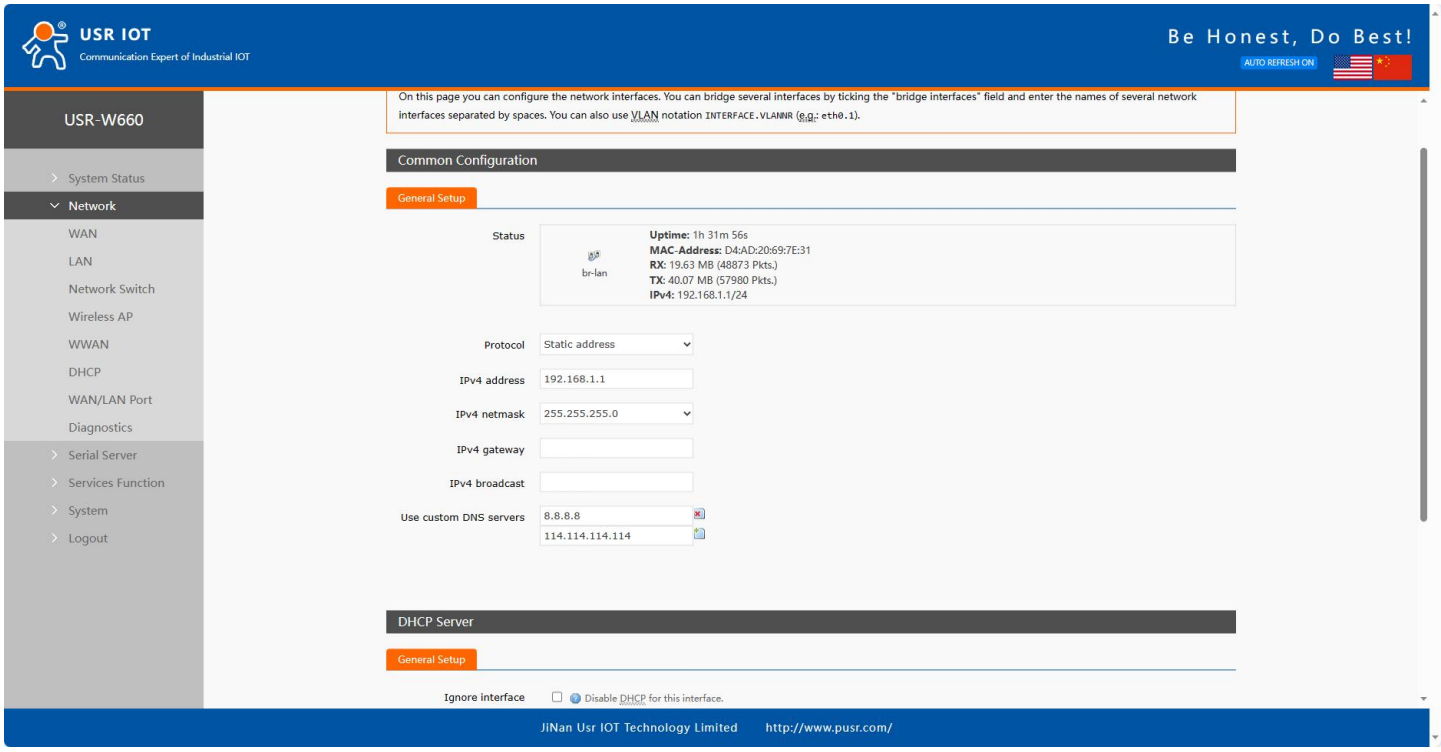


Figure 16. General setup settings

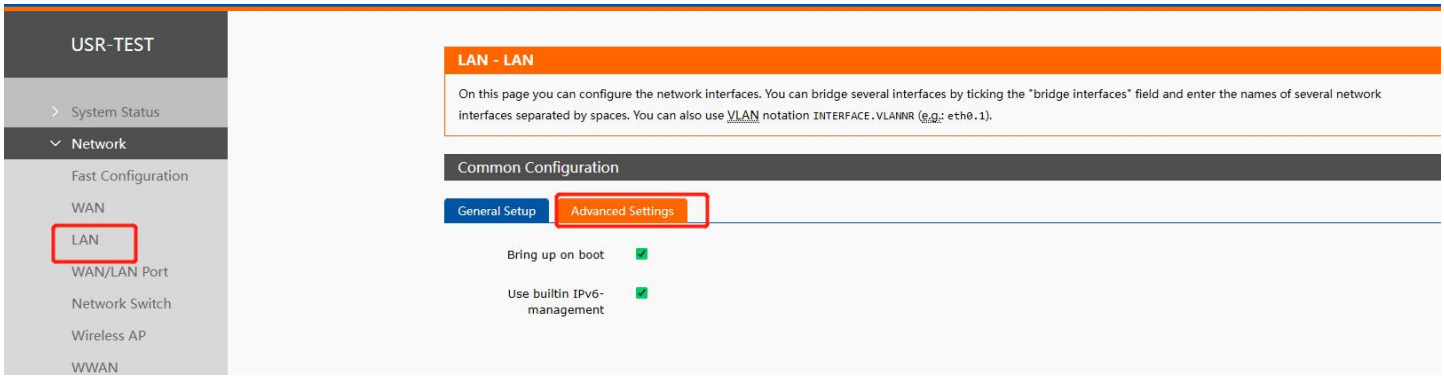
Note:

- 4 LAN ports, 1 WAN/LAN switchable port.
- Default static IP address is 192.168.1.1, subnet mask 255.255.255.0. These parameters can be modified, e.g., change static IP to 192.168.2.1.
- WiFi interface is bridged to the LAN port.
- DHCP server function is enabled by default. All devices connected to the wireless client's LAN port can automatically obtain an IP address.
- Has simple status statistics function.

- IPv6 Assignment Length: Assigns a specified length fixed part to each public IPv6 prefix, generally use default.
- IPv6 Assignment Hint: Uses this interface's hexadecimal subprefix ID to assign the prefix part, generally use default.

3.3.2. Advanced settings

It can be set whether to start up on boot and whether to use the built-in IPv6 management. It is recommended to keep both options enabled by default.



3.3.3. DHCP Server IPv4

The DHCP Server function of the LAN port is turned on by default (you can choose to turn it off), and all network devices connected to the LAN port can automatically obtain IP addresses.

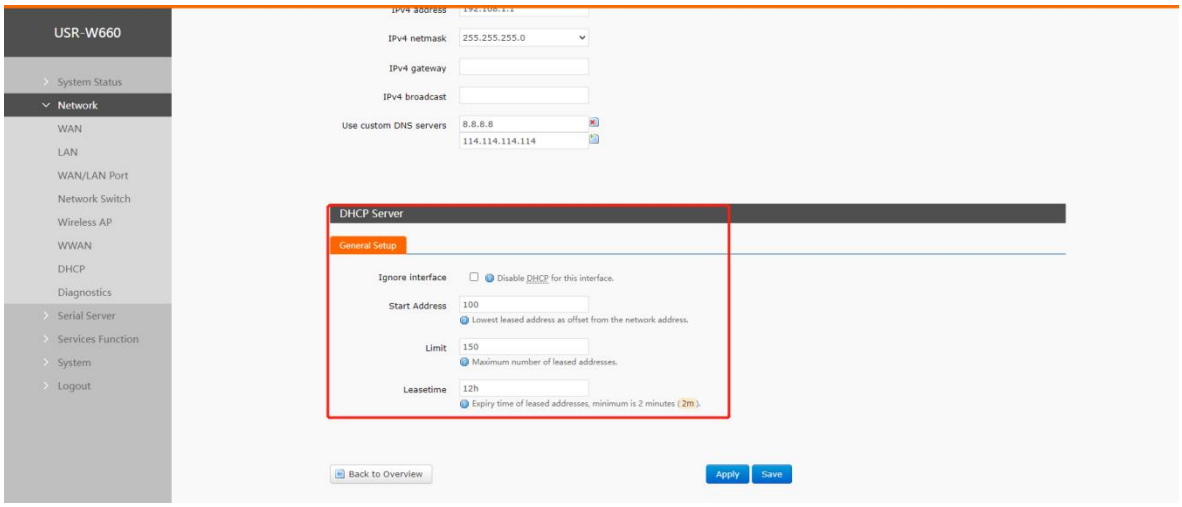


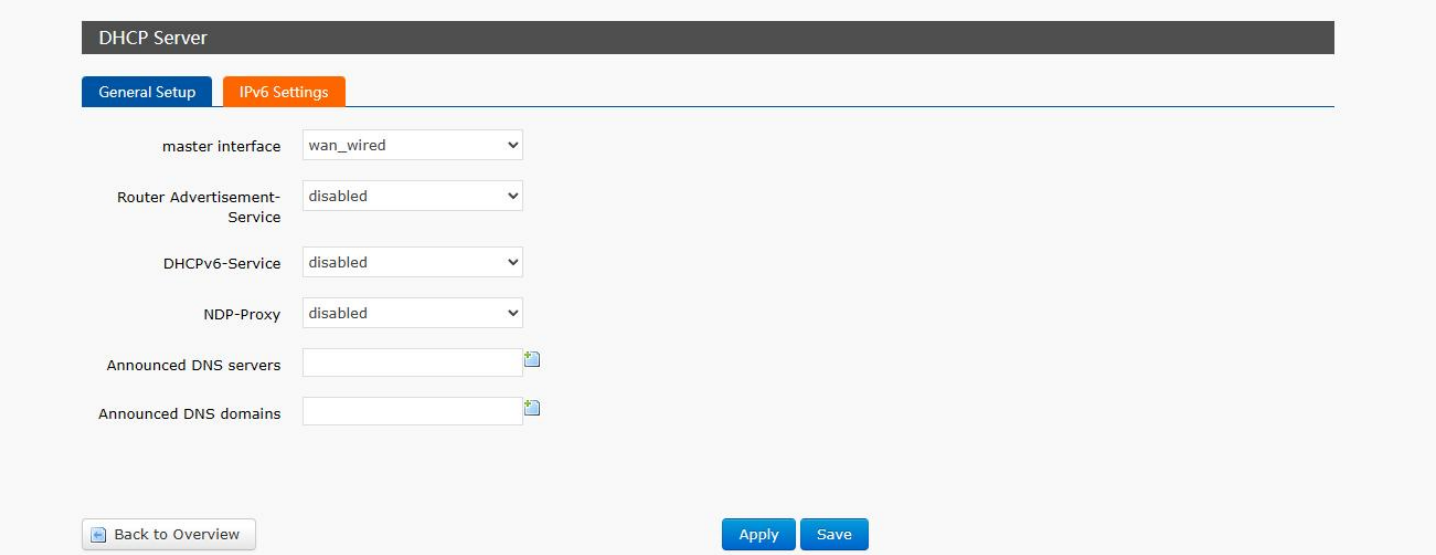
Figure 17. DHCP Server settings

Note:

- Can adjust the starting address of the DHCP pool and the address lease time.
- DHCP default allocation range starts from 192.168.1.100.
- Default lease period is 12 hours, can be set in "h"-hours or "m"-minutes.
- If you disable DHCP, subnet devices need to set the correct static IP and gateway to connect to the internet via W650.

3.3.4. DHCP Server IPv6

Settings of LAN port for IPv6.

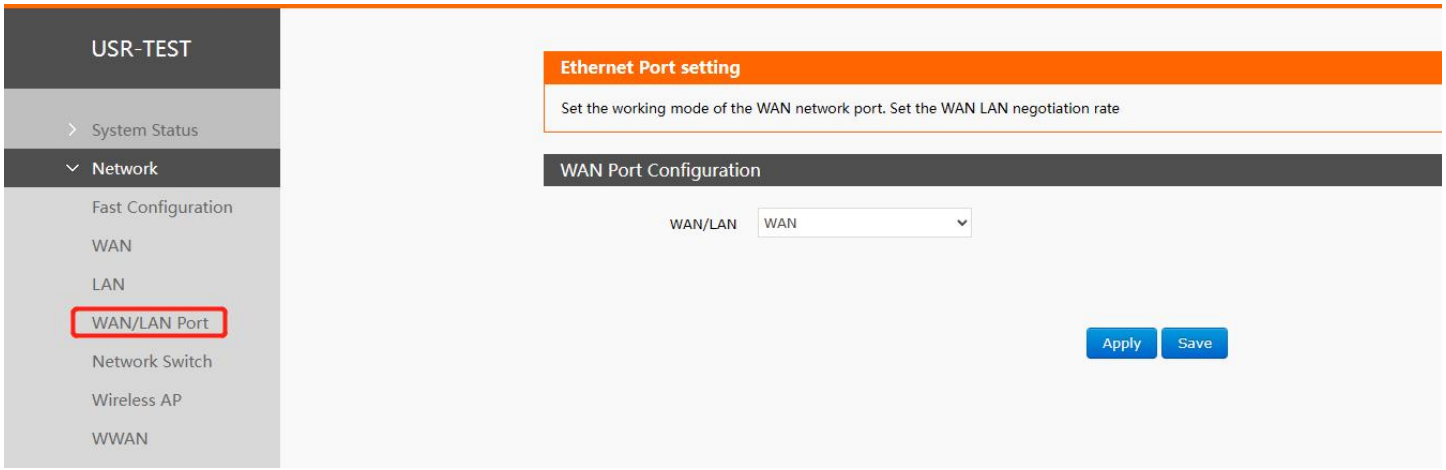


Name	Description	Default Value
Router Advertisement	Disable: Disable Router Advertisements. Server Mode: Send RA broadcast messages through the wireless client itself. Relay Mode: Relay DHCPv6 RA data to terminals. Hybrid Mode: Use both stateless and stateful configuration.	Disable
DHCP IPv6 Service	Disable: Disable DHCPv6 service. Server Mode: Use the wireless client itself as a DHCPv6 server. Relay Mode: Relay the DHCPv6 server to the cellular network interface. Hybrid Mode: Use both stateless and stateful configuration.	Disable
NDP Proxy	Disable: Disable NDP proxy service. Relay Mode: Relay NDP (Neighbor Discovery Protocol) packets to the cellular network interface. Hybrid Mode: Allows devices to use both NDP proxy and standard NDP.	Disable
Broadcast DNS Server	Once configured, broadcasts the configured IPv6 DNS server address.	Empty
Broadcast DNS Domain	Sets the DNS suffix search list sent to terminals, generally use default.	Empty

3.4. WAN/LAN port switching

The port1 WAN/LAN can be switched via the web interface. The WAN port can be configured as a LAN port,

thus providing an additional LAN port for use.



3.5. Network switch (Network priority)

In this interface, users can choose network priority. The default is to use the WAN port network first.

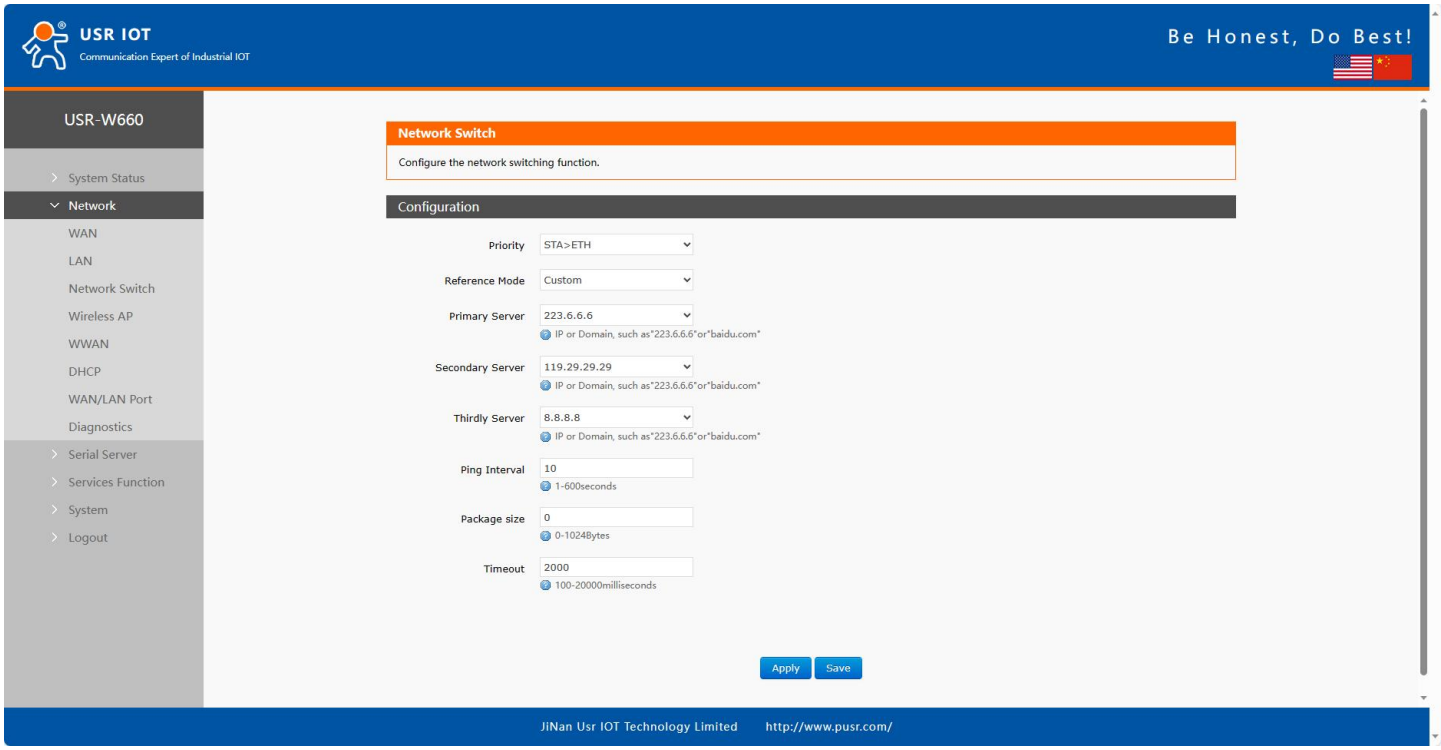


Figure 18. Network Switch settings

Table 2. Network switching configuration

Items	Description	Default
Priority	Wired>Wireless: Prioritize using wired network, Wireless>Wired: Prioritize using wireless network, Disable: Disable the network switching function and use the current Internet access method to access the Internet.	Wired>Wireless
Reference Mode	Custom: Determine network status based on custom reference address,	Custom

	Gateway: Refer to the gateway to determine network status	
Primary Server	IP/domain name can be set	223.6.6.6
Secondary Server	IP/domain name can be set	119.29.29.29
Third Server	IP/domain name can be set	8.8.8.8
Ping Interval	Link detection interval: configurable, range: 1-600s	10s
Package Size	Ping packet size: configurable, range: 0-1024 bytes	0
Timeout	Ping timeout: configurable, range: 100-20000ms	2000ms

Note:

■Configure network priority detection rules, enabled by default, default network switching order: wired network first;

■Set up 3 groups of IP addresses (you can also set domain names) for detecting the networking status, and perform ping packets in sequence. If the ping is successful, it will be judged that the network is normal and no further operations will be performed;

■If none of the three sets of detection rules can be pinged, perform network switching and continue ping packet detection;

■If neither the wired network nor the wireless network can be pinged, it is judged that the wireless client cannot connect to the external network.

3.6. Wireless AP

USR-W650 supports 2.4G and 5.8G dual-band WIFI, supports modification configuration of SSID, password, channel, etc.;

Dual-band WIFI APs can be turned on at the same time, or one of the APs can be turned off;

Can support 16 clients connecting at the same time;

3.6.1. Wi-Fi settings of 2.4 & 5.8G

Users can set Wi-Fi related information on this page.

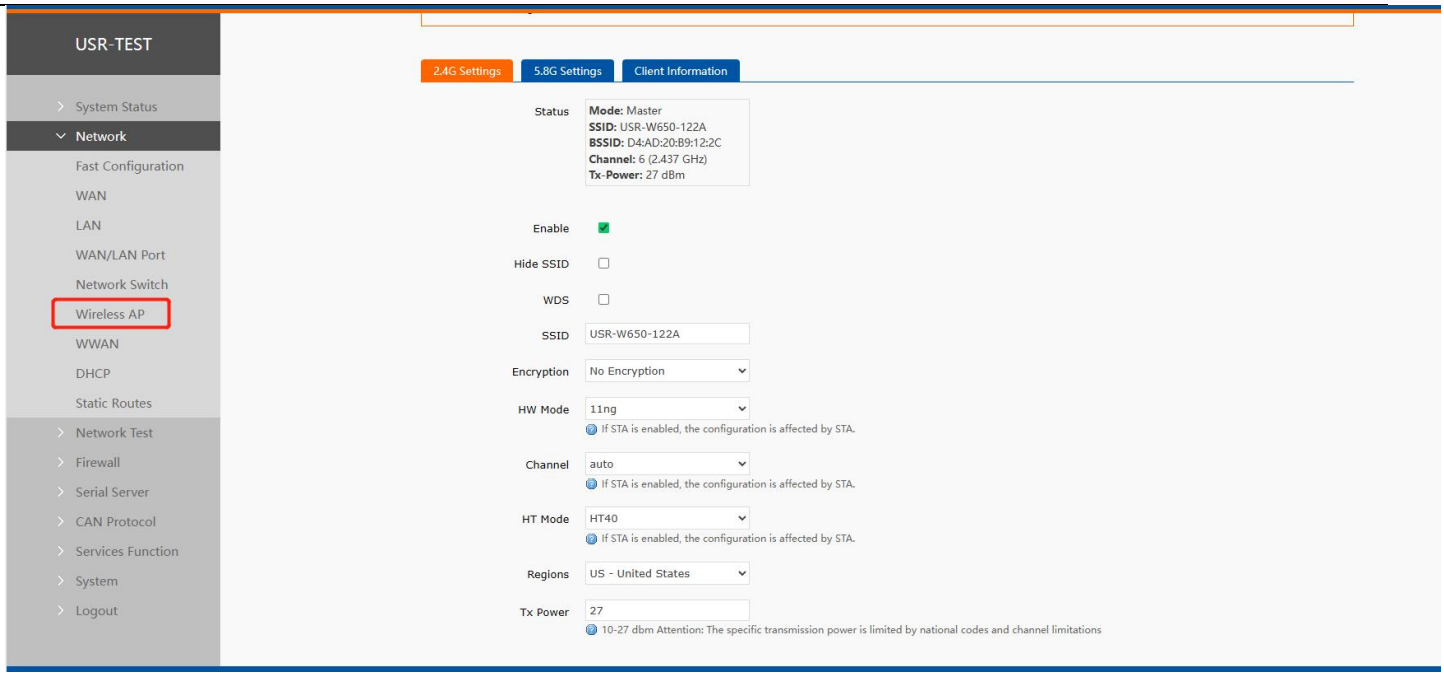


Figure 19. Wi-Fi settings

Table 3. Wi-Fi settings

Items	Description	Default
Enable	To choose whether to enable the Wi-Fi function.	Enable
Hide SSID	To choose whether to hide the SSID. If the SSID is hidden, the user cannot search for the Wi-Fi name on the mobile phone or PC. Users can connect to Wi-Fi by manually entering the SSID.	Disable
SSID	Wi-Fi name, users can modify as needed.	USR-W650-xxxx/_5.8G
Encryption	To choose Wi-Fi encryption method.	Mixed-psk
Key	The password of Wi-Fi.	www.pusr.com
HW Mode	To choose Wi-Fi standard.	11ng
Channel	To choose Wi-Fi channel.	auto
HT Mode	To choose high throughput.	HT40
Regions	This option is for 5.8G Wi-Fi.	00-World
Tx Power	1-27dbm	27dbm

3.6.2. Client information

On this page, the users can view the device information connected to the USR-G816 through Wi-Fi.

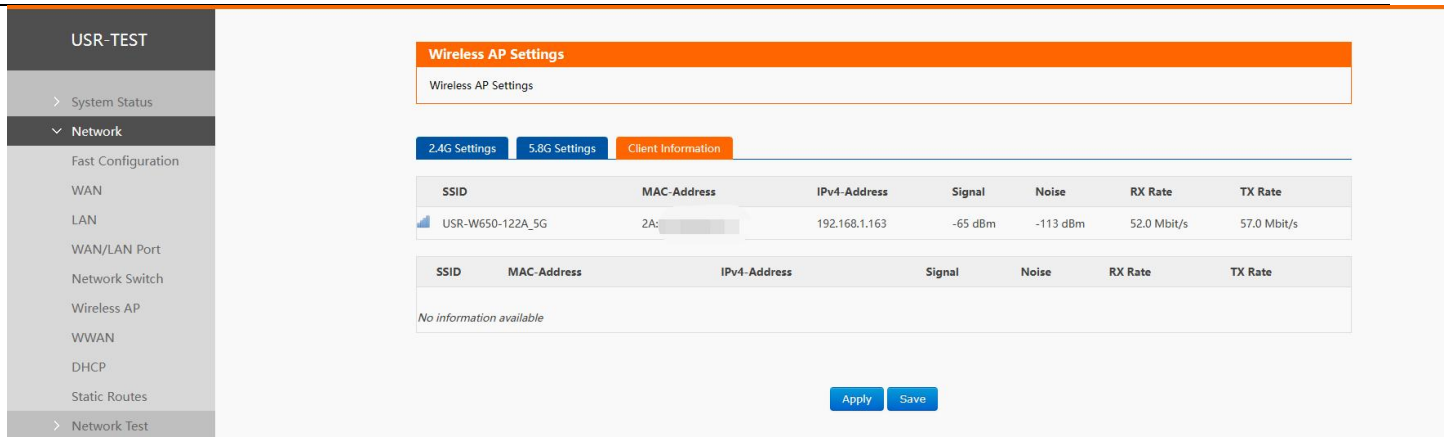


Figure 20. Client Information

3.7. WWAN settings (STA mode)

2.4G or 5.8G wifi client function can be turned on.

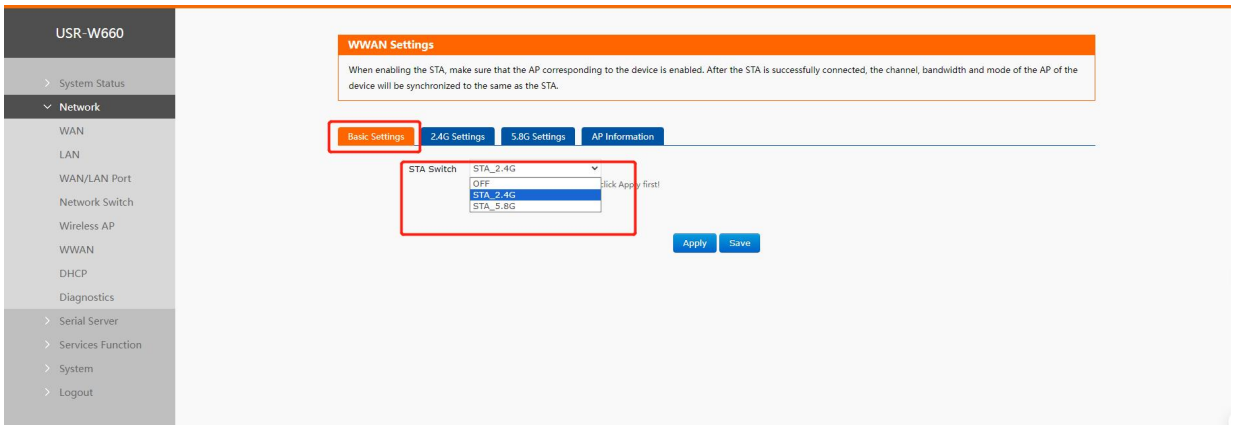


Figure 21. Wi-Fi Client Settings

3.7.1. 2.4G/5.8G STA configuration

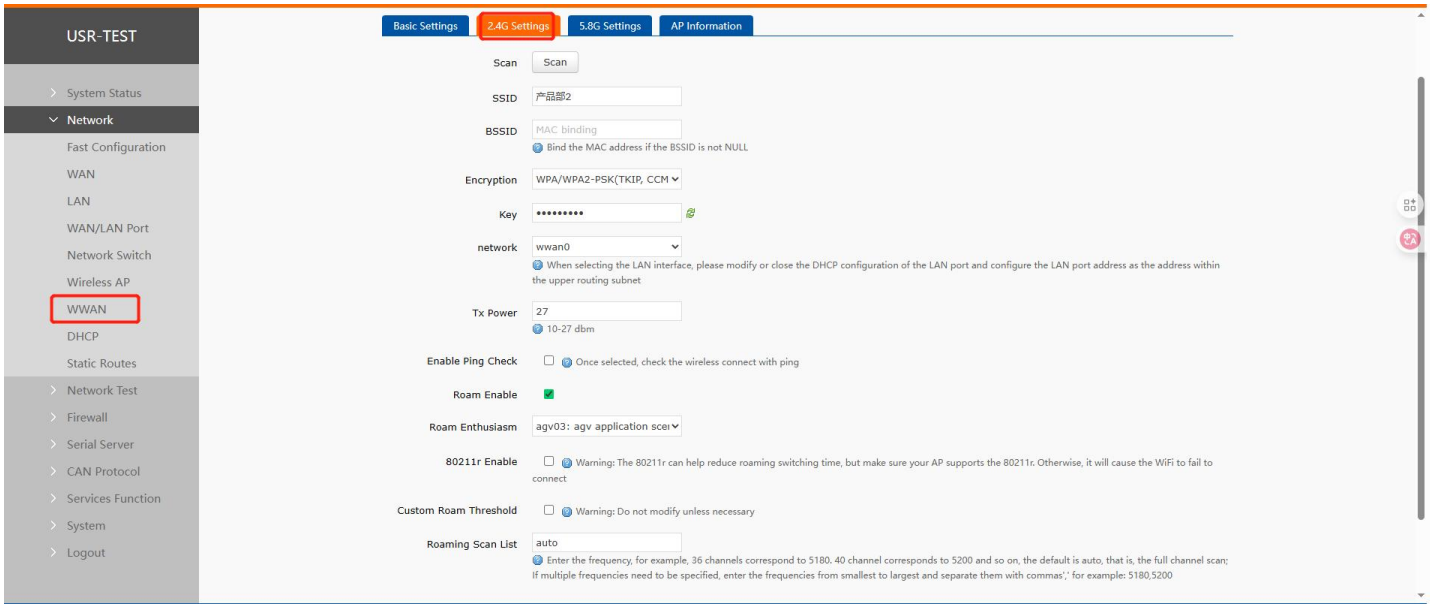


Figure 22. STA Settings

Table 4. Detail parameters of STA settings

Name	Description	Default Value
Scan	Click to scan for available 2.4GHz/5.8GHz Wi-Fi hotspots.	None
Wi-Fi Name (SSID)	The SSID of the AP to connect to.	WIFI-STA
BSSID	MAC address binding. Binds to a specific AP's MAC address.	None
Encryption Method	Select according to the target AP's encryption. Options: None, WPA/WPA2-PSK(TKIP,CCMP)	None
Network	wwan1: Repeater mode. lan: Bridge mode.	wwan1
Transmit Power	Sets transmit power from 10 to 27 dBm.	2.4G STA default: 27 5.8G STA default: 21
Enable Ping Detection	STA keep-alive mechanism. Restarts the Wi-Fi radio after 3 consecutive ping failures. Note: In LAN bridge mode, the ping IP must be in the same subnet as the LAN IP, and the gateway address cannot be set.	Unchecked
Roaming Enable	Only available for 5.8GHz configuration. Enables or disables roaming functionality.	Checked
Roaming Aggressiveness	Supports 5 modes: agv01, agv02, agv03, cpe01, cpe02, tailored for different scenarios focusing on switch time, packet loss rate, or highest responsiveness in weak signal areas (-80dBm or less).	agv03
802.11r Enable	802.11r helps reduce roaming switch time. Note: Ensure the target AP supports 802.11r, otherwise Wi-Fi may fail to connect.	Unchecked
Custom Roaming Threshold Enable	It is advised not to modify this setting arbitrarily.	Unchecked
Roaming Threshold	Valid when Custom Roaming Threshold is enabled. Range: -90 to -50 dBm. Takes effect upon saving.	-55
Roaming Scan List	Scans Wi-Fi channels to select the optimal channel. Can be set to auto (full channel scan) or fixed channels.	auto
WDS	Effective when "Network" is set to "lan". Enabling this feature requires the corresponding AP's WDS function to be enabled.	Unchecked

Name	Description	Default Value
Force Update LAN IP Address	Effective when "Network" is set to "lan". If checked, the LAN interface will restart upon successful STA connection.	Unchecked
Reference Address	Specified Address: Allows setting a specific address for ping detection.	Specified Address
Ping Address	Can be set as an IP or domain name. If ping detection is enabled, this field cannot be empty.	Empty

Note:

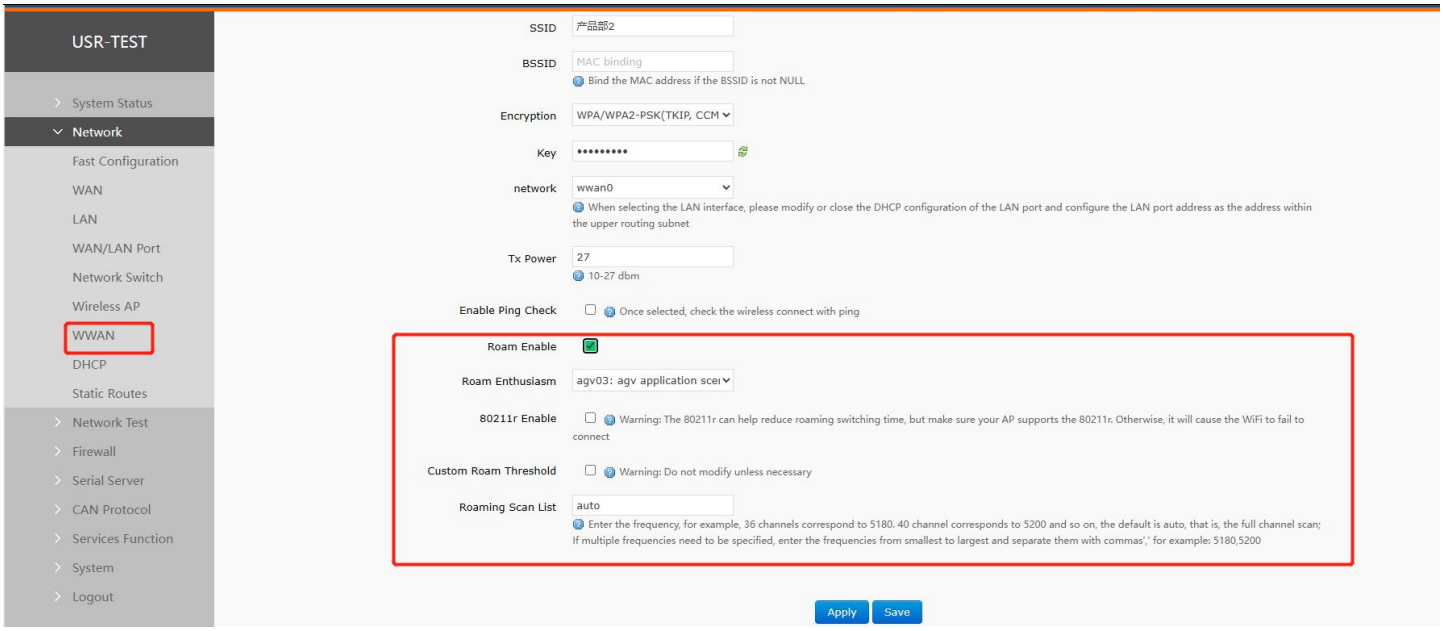
- If you need to set the static IP of STA after turning on STA, please go to Network-WAN to set it;
- If you set up a bridge to the LAN port, you need to turn off DHCP on the br-lan interface, and set the LAN port address to the same network segment as the AP to be connected;
- Only one of 2.4G and 5.8G STA can be enabled.

3.7.2. Fast Roaming

The wireless client roaming function is enabled by default. It is recommended to adjust the roaming aggressiveness strategy according to the actual application scenario. During movement, the wireless client will automatically perform channel scanning and AP switching, with an average network switch time below 100ms. If custom roaming is required, roaming performance can be optimized by adjusting the Roaming Threshold and Roaming Scan List:

The roaming threshold should be set flexibly based on the on-site environment. Lower the threshold when APs are far apart, and increase it when they are close. Judgment can be based on real-time signal strength from the AP or client.

The roaming scan list defaults to Auto mode (full channel scan). If the on-site channel layout is fixed, setting it to fixed channel scan is recommended. Fewer scanned channels lead to faster roaming switching, further improving roaming efficiency.



3.7.3. AP information

If the USR-W650 connect to upper-level Wi-Fi successfully, the information will be displayed in this page.

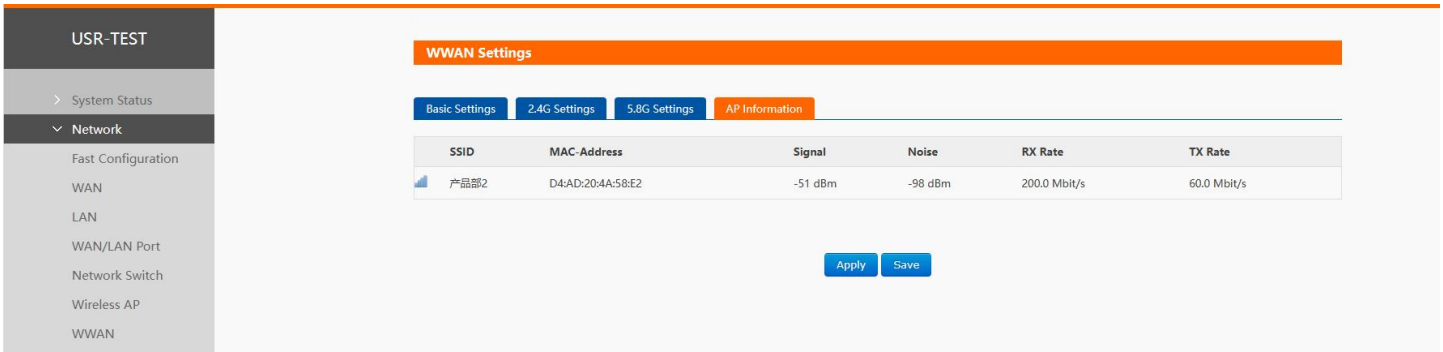


Figure 23. AP Information

3.8. DHCP function

Static address assignment: Set at Network-DHCP. This feature is an extension of the LAN interface DHCP settings and is used to assign fixed IP addresses and host identities to DHCP clients.

Use “Add” to add new lease entries. MAC-address can be used to identify a host, IPv4-address can be used to assign an address, and hostname can be used to assign an identity.

Note: Up to 100 rules can be added.

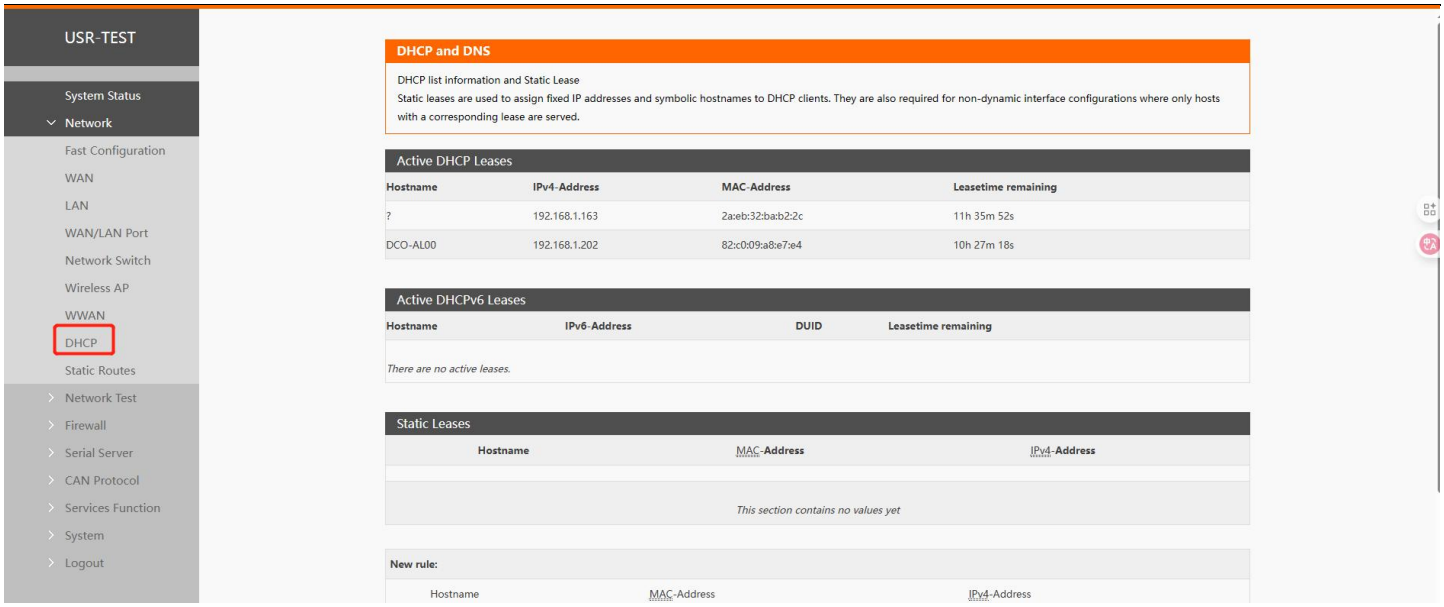
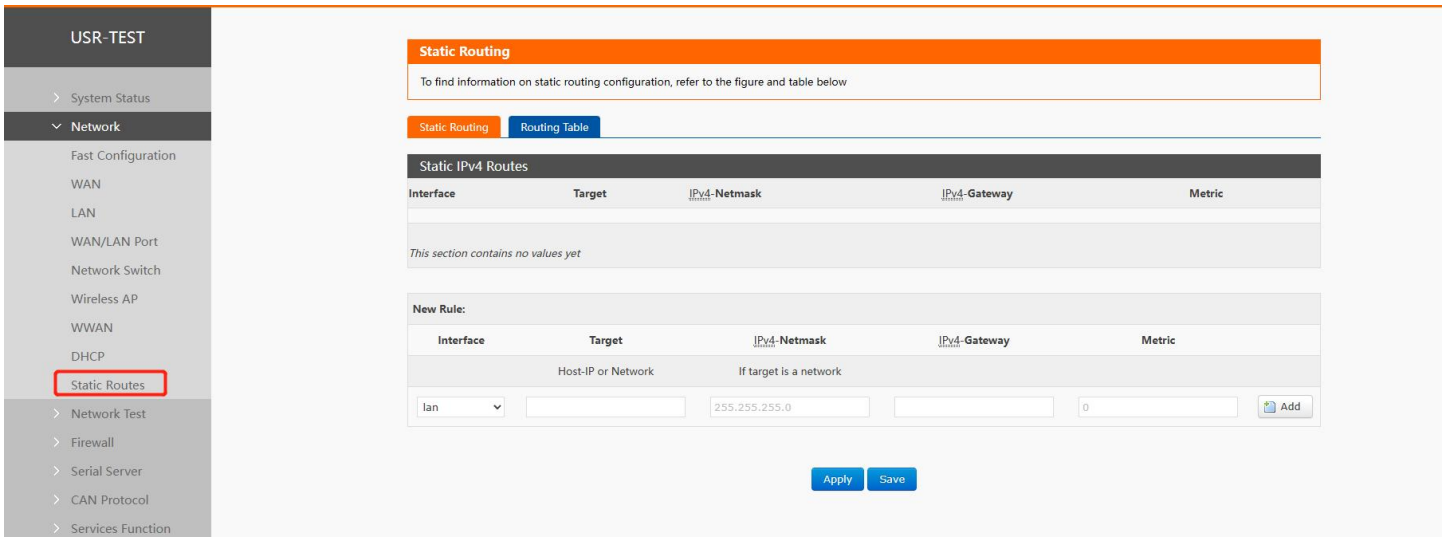


Figure 24. DHCP Settings

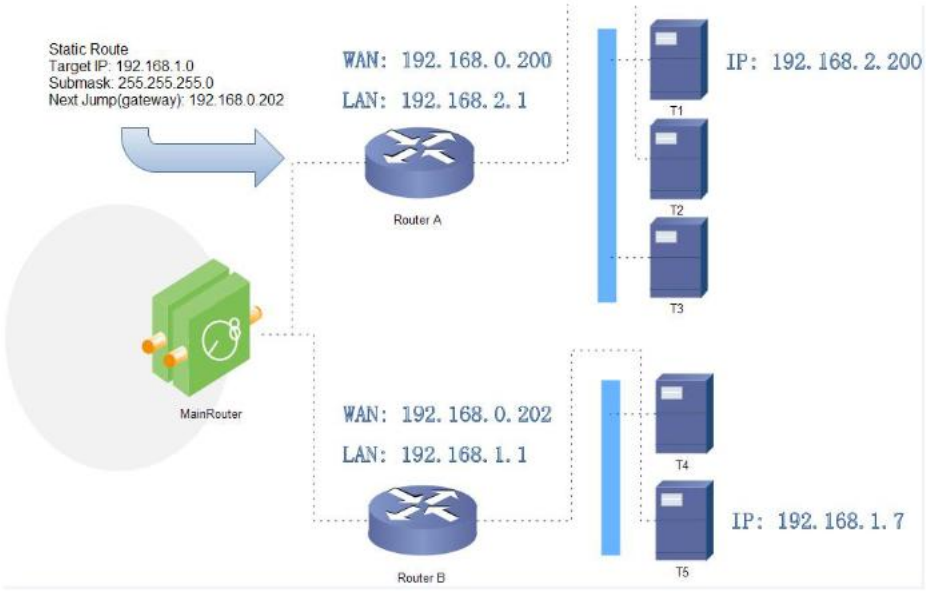
3.9. Static routing

Static routing describes routing rules for data packets on the Ethernet. It has several parameters. By default, up to 20 static routes can be added.



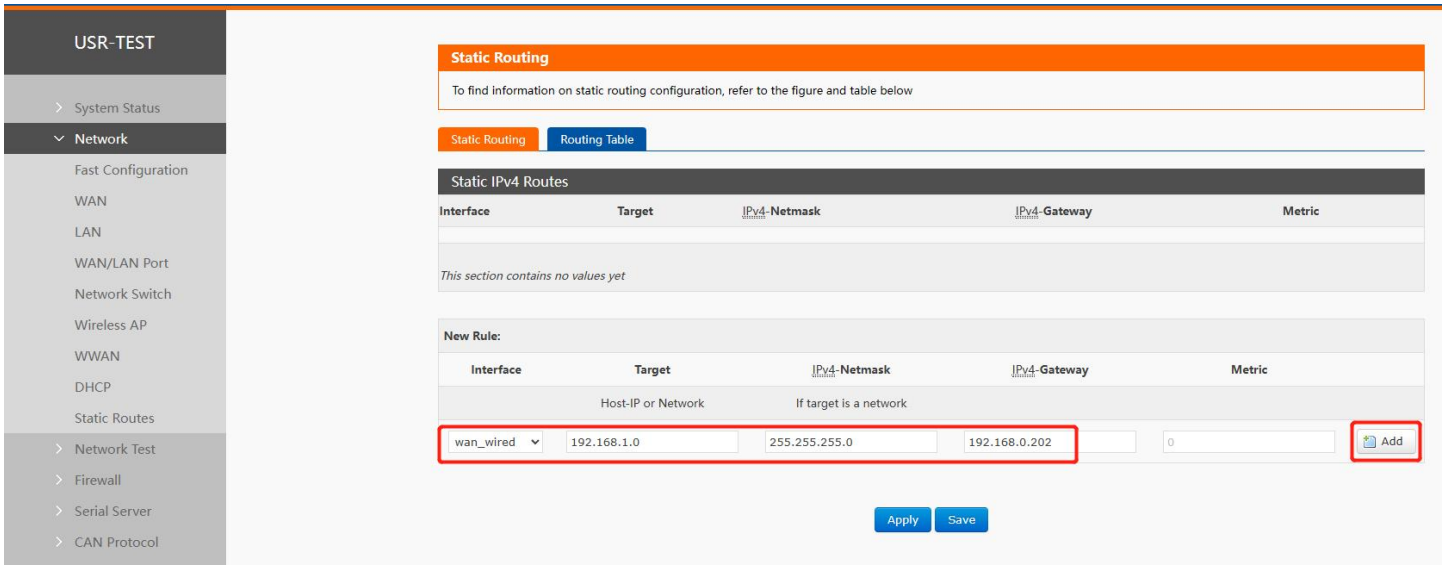
Name	Description	Default Value
Interface	lan, wan_wired, WWAN1	lan
Target Address	The address or address range of the destination to be accessed.	Empty
Net mask	The subnet mask of the destination network.	Empty
Gateway (Next Hop)	The address to forward to.	Empty
Metric	Number of packet hops.	Empty

Test Example: Test environment with two peer routers A and B, as shown in the diagram.



Router A and B WAN ports are both connected to the 192.168.0.0 network. Router A's LAN subnet is 192.168.2.0, and Router B's LAN subnet is 192.168.1.0.

Now, to create a route on Router A so that access to 192.168.1.x addresses is automatically forwarded to Router B.



4. Network Test

4.1. Network diagnostics

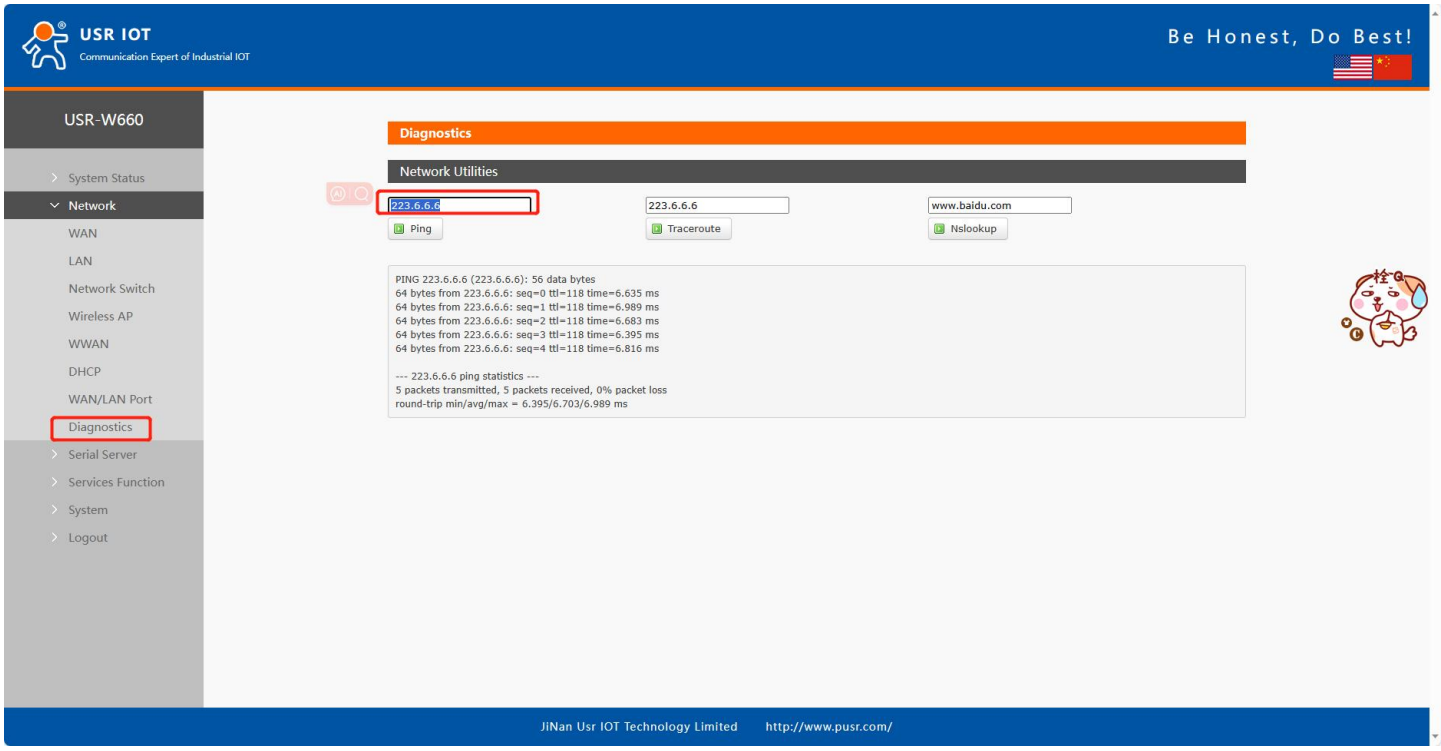


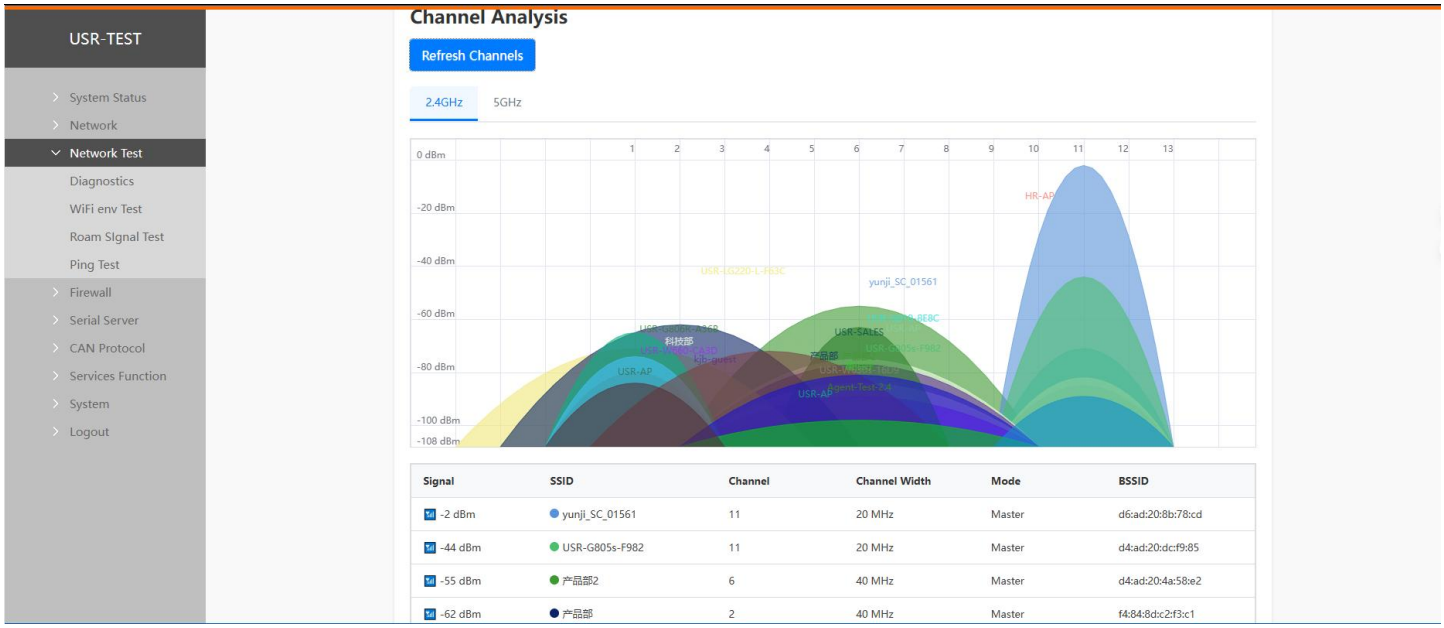
Figure 25. Network Diagnose

Note:

- Online diagnostic functions, including Ping tool, routing analysis tool, and DNS viewing tool;
- Ping is a Ping tool that can perform a ping test on a specific address directly on the wireless client;
- Traceroute is a route analysis tool that can obtain the routing path passed when accessing an address;
- Nslookup is a DNS viewing tool that can resolve domain names into IP addresses.

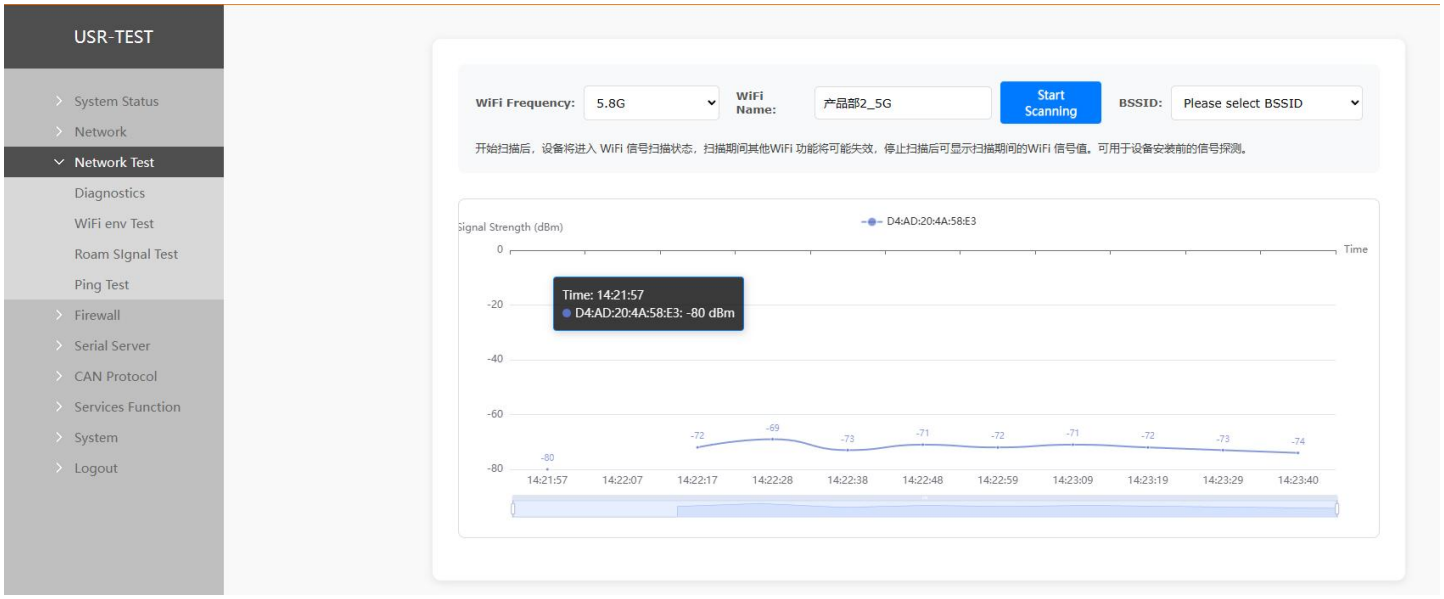
4.2. WiFi env survey

Used for on-site Wi-Fi environment monitoring. Supports signal scanning for 2.4GHz and 5.8GHz bands. The scan results are displayed as shown below, including: Signal Strength, SSID, Channel, Channel Width, Mode, BSSID. The top section displays a graphical chart with the X-axis representing channels and the Y-axis representing signal strength. The bottom section displays a list of Wi-Fi signals.



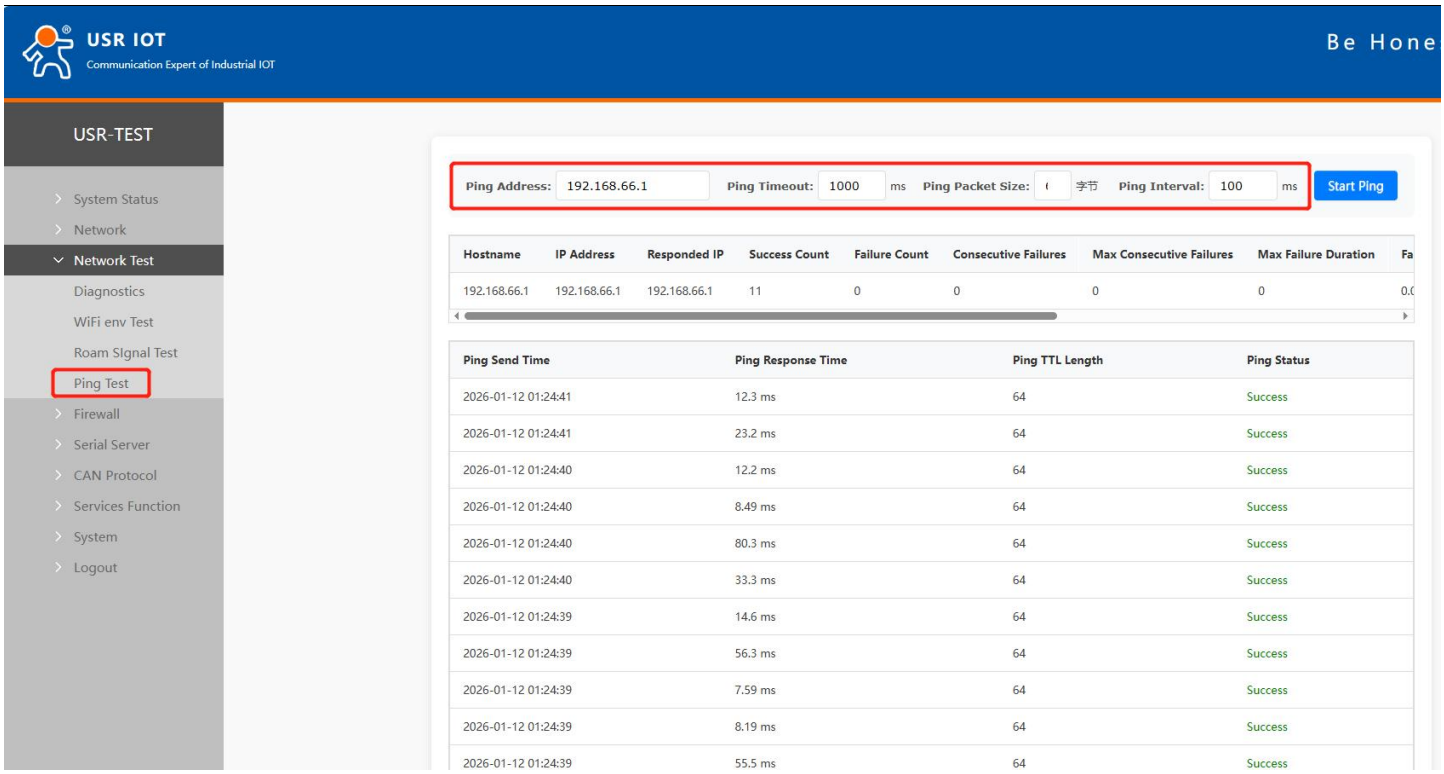
4.3. Roaming signal survey

For motion scenarios, assists users in signal detection before deploying AP and STA devices, facilitating more reasonable device placement. Select the frequency band, enter the AP name, and start scanning. The device will enter Wi-Fi signal scanning mode. Other Wi-Fi functions may be unavailable during scanning. After stopping the scan, the Wi-Fi signal values during the scan period will be displayed.



4.4. Ping detection

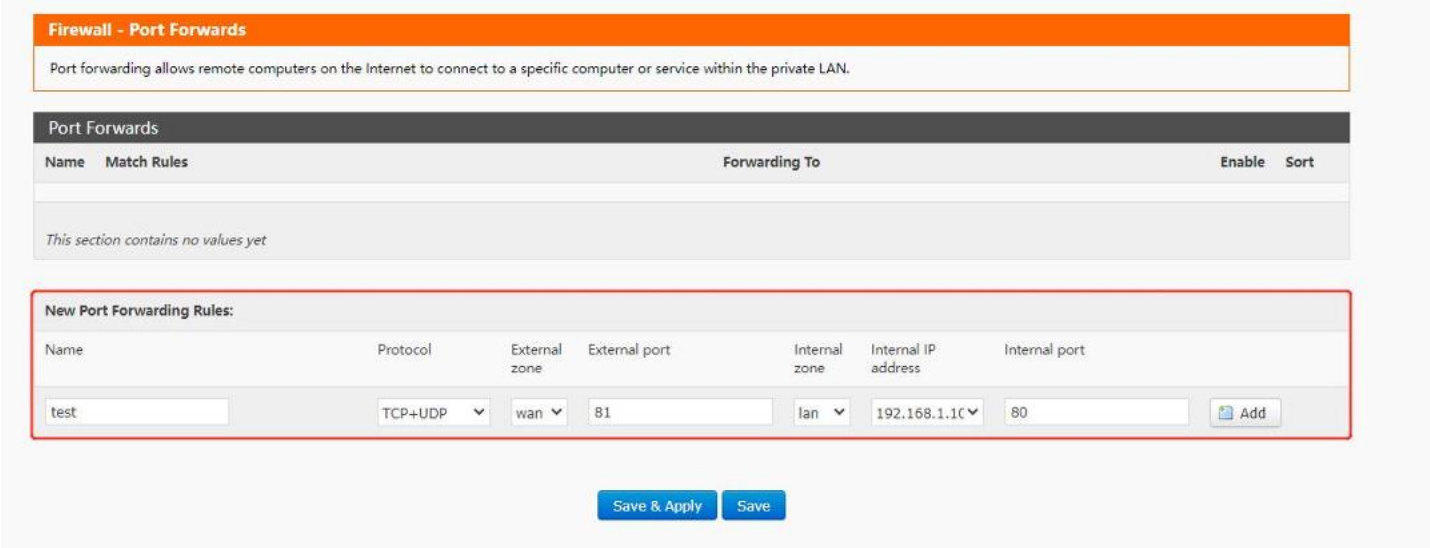
Ping detection function quickly diagnoses network connectivity, latency, and stability by sending packets to a target address and measuring their round-trip time.



5. Firewall

5.1. Port forward

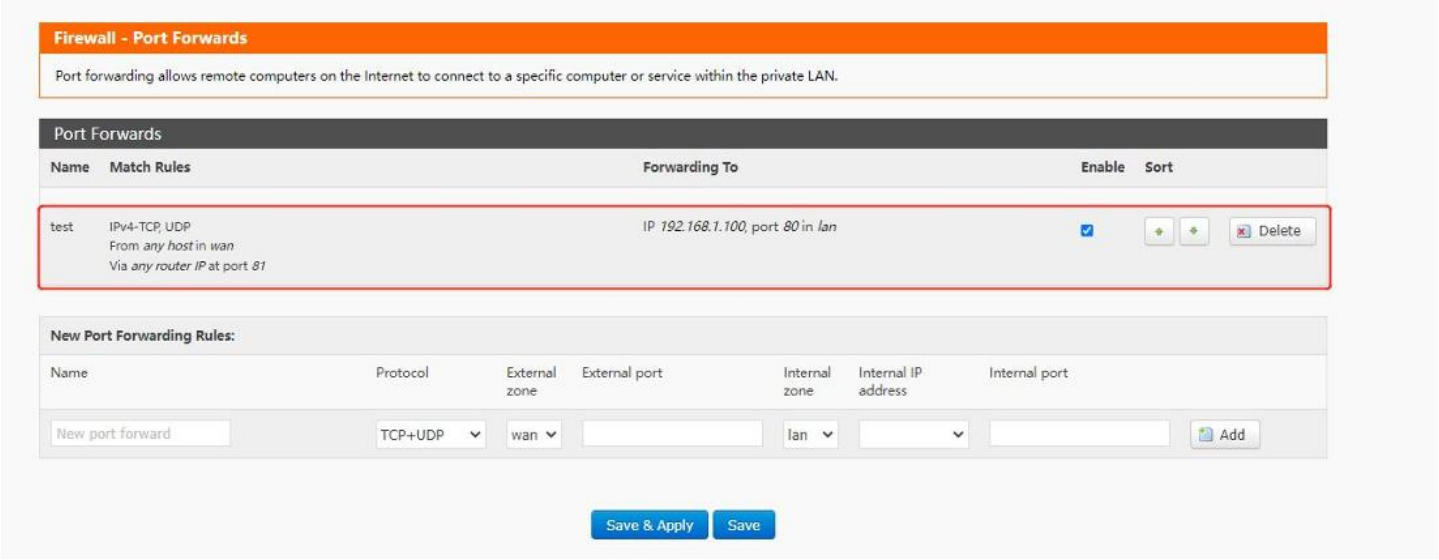
Port forwarding rules can map a specific port of the WAN interface to a intranet host.



- Up to 100 port forwarding rules can be added.
- After setting up a forwarding rule, click the "Add" button on the right. The rule will then appear in the rule list.
- Click the "Apply" button at the bottom right to make the settings take effect.
- Example: 192.168.2.1:80 is the router's own web server. To access a device within the LAN from the external network, a mapping from WAN to LAN needs to be set. For example, set the external port to 81,

the internal IP to 192.168.2.1, and the internal port to 80.

- When accessing port 81 from the WAN port, the request will be redirected to 192.168.2.1:80.

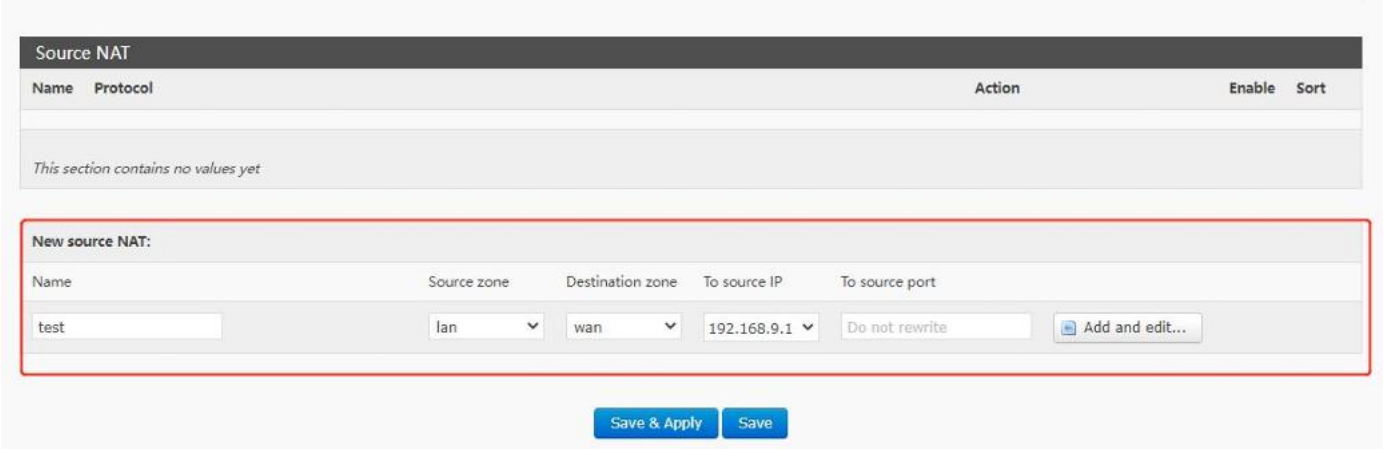


Item	Description	Default
Name	Name of this rule	Null
Protocol	TCP+UDP/TCP/UDP	TCP+UDP
External zone	Including wired wan、4G、VPN	wan
External port	Can be a port or port range, like: 8000-9000 When the external port and internal port are empty, it is DMZ function.	Null
Internal zone	LAN network	lan
Internal IP address	LAN IP address of the router	Null
Internal port	Can be a port or port range, like: 8000-9000 When the external port and internal port are empty, it is DMZ function.	Null

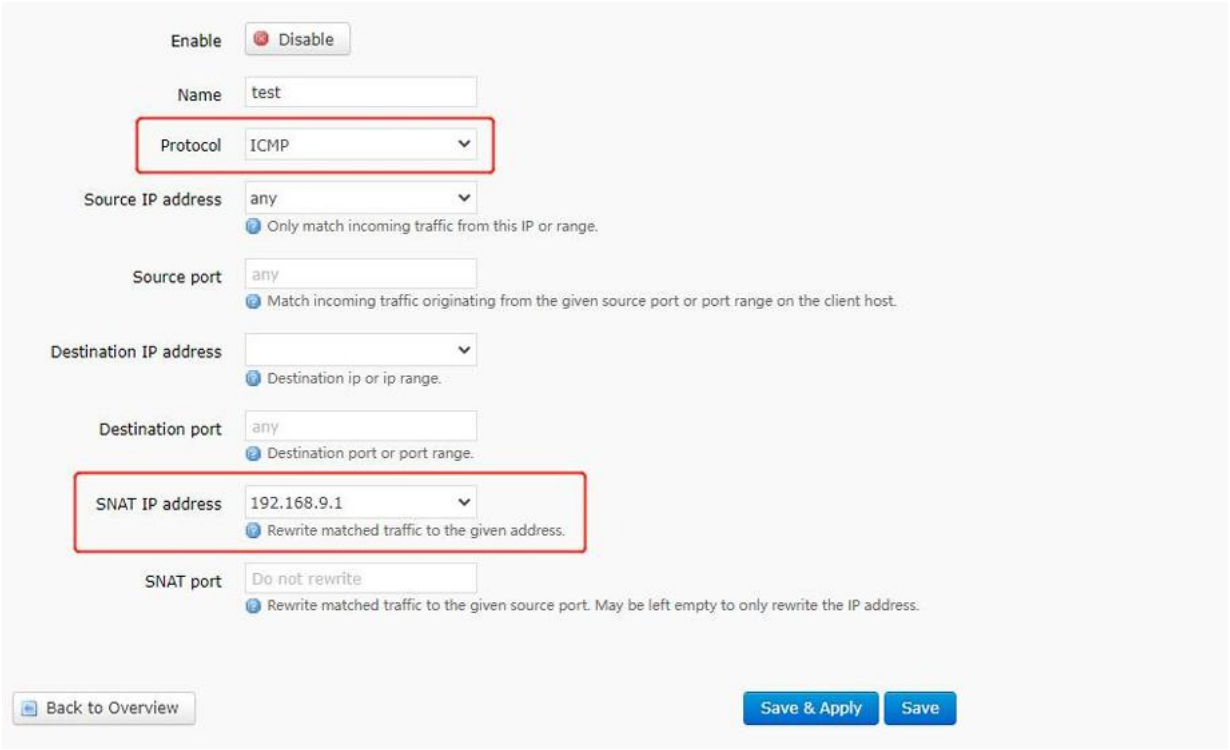
5.2. Traffic rules

Source NAT is a special form of packet masquerading that changes the source address of data packets leaving the router device.

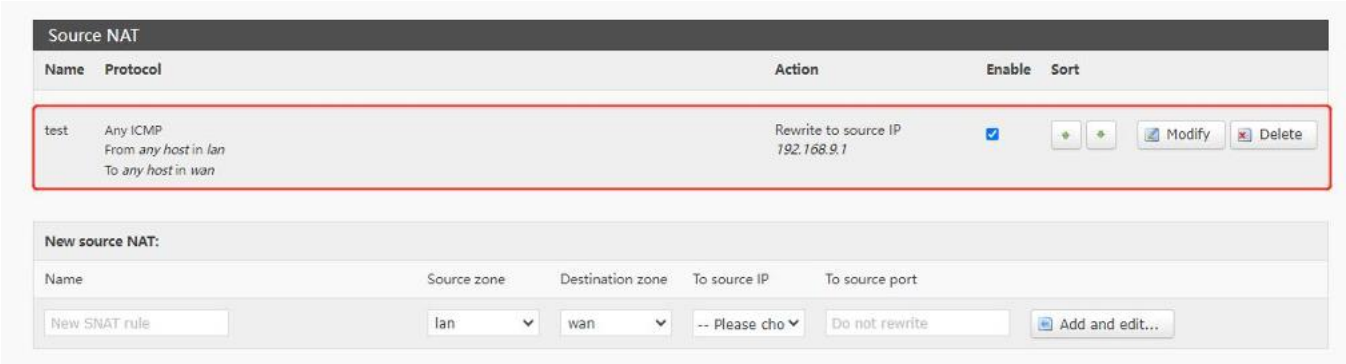
1. create a source NAT rule



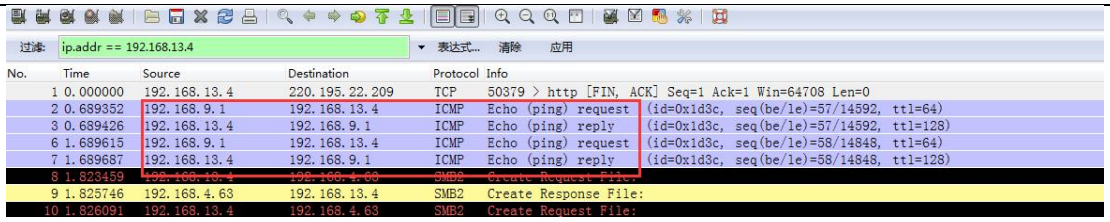
2. Edit the rules



3. Default to enable all the source IP address and destination IP address. Click **Save&Apply**.



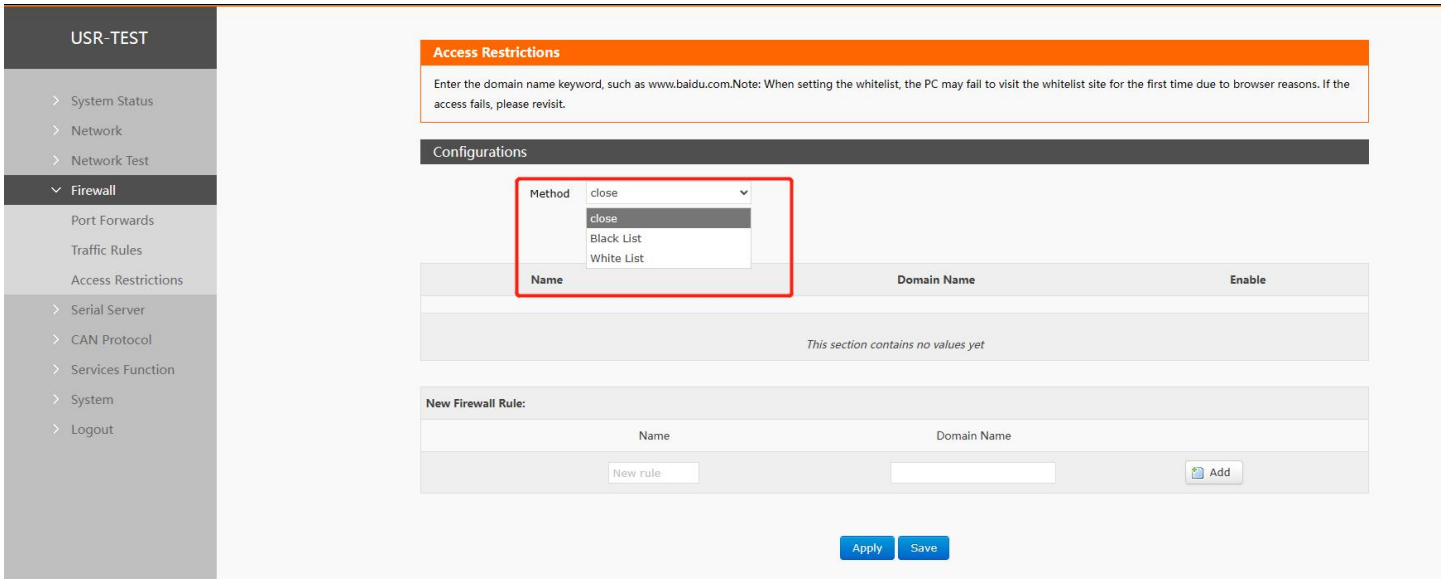
We have changed the source IP address that left the router to 192.168.9.1. When we use the device connected to the router (IP:192.168.1.114) to ping the PC connected to the same switch as the router (IP:192.168.13.4), the source IP address of the ICMP packet to 192.168.13.4 is 192.168.9.1, not 192.168.1.114.



Item	Description	Default
Enable	/	Enable
Name	Name of this rule	/
Protocol	TCP+UDP/TCP/UDP/ICMP	TCP+UDP
Source IP address	Source IP address or IP range to match this rule, like: 192.168.1.100 or 192.168.1.100-192.168.1.200 Any means match all the source IP addresses.	Any
Source port	Source port or port range to match this rule, like 9999 or 8888-9999. Null means match all the source ports.	Null
Destination IP address	Destination IP address or IP range to match this rule, like 192.168.2.100 or 192.168.2.100-192.168.2.200 Null means match all the destination addresses.	Null
Destination port	Destination port to or port range to match this rule, like 9999 or 8888-9999. Null means match all the destination ports.	Null
SNAT IP address	Change the source IP of the matched traffic to this address	Custom
SNAT port	Change the source port of the matched traffic to this port, null means use the original source port	Null

5.3. Access restrictions

Access Restrictions allow restricting access to specified domain names, supporting blacklists and whitelists. When Blacklist is selected, devices connected to the router cannot access domains on the blacklist but can access others normally. When Whitelist is selected, devices can only access domains on the whitelist; all other domains are blocked. Both blacklist and whitelist support multiple entries. This function is disabled by default.



5.3.1. Domain Black list

First, select "Blacklist" in the Mode option. Click "Add", enter the rule name and the correct domain name, then click "Save". The rule takes effect immediately. Devices connected to the router will be unable to access that domain. If Blacklist is selected but no rules are added, the blacklist is empty by default, meaning all domains are accessible. As shown in the figure, all domains except Baidu can be accessed normally.

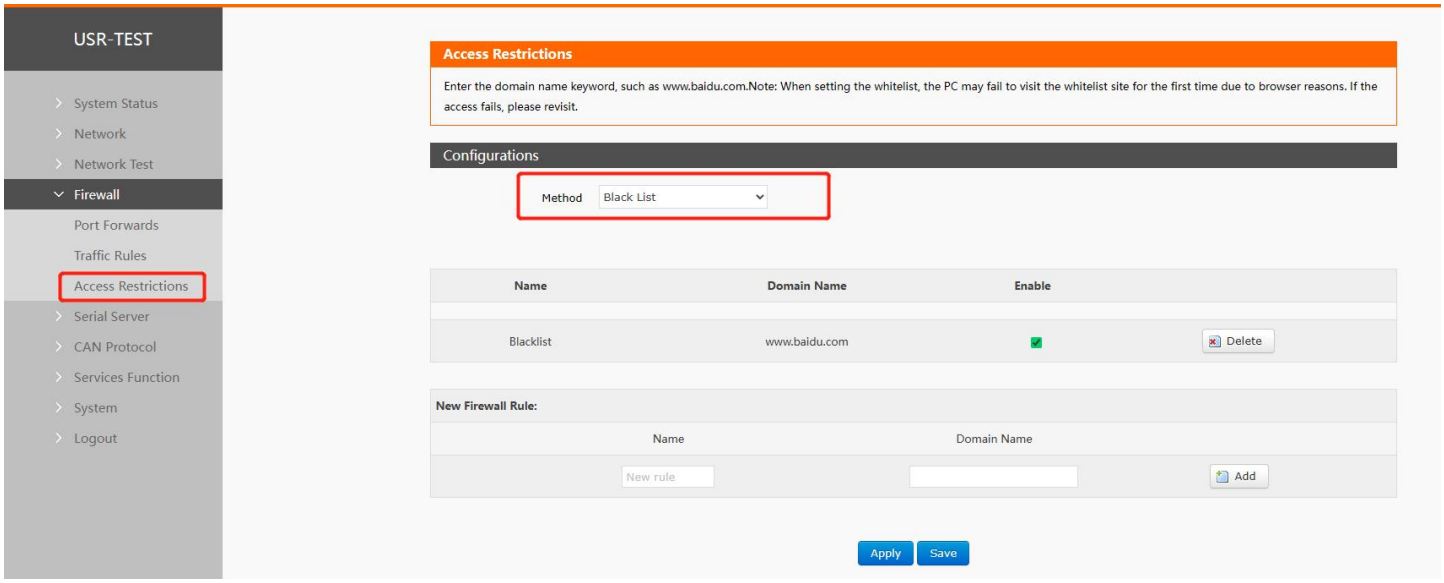


Figure 26. Domain black list

5.3.2. Domain White list

First, select "Whitelist" in the Mode option. Click "Add", enter the rule name and the correct domain name, then click "Save". The rule takes effect immediately. Devices connected to the router can only access domains in the rule; all other domains are blocked. If Whitelist is selected but no rules are added, the whitelist is empty by default, meaning no domains are accessible. As shown in the figure, the device can access Baidu.

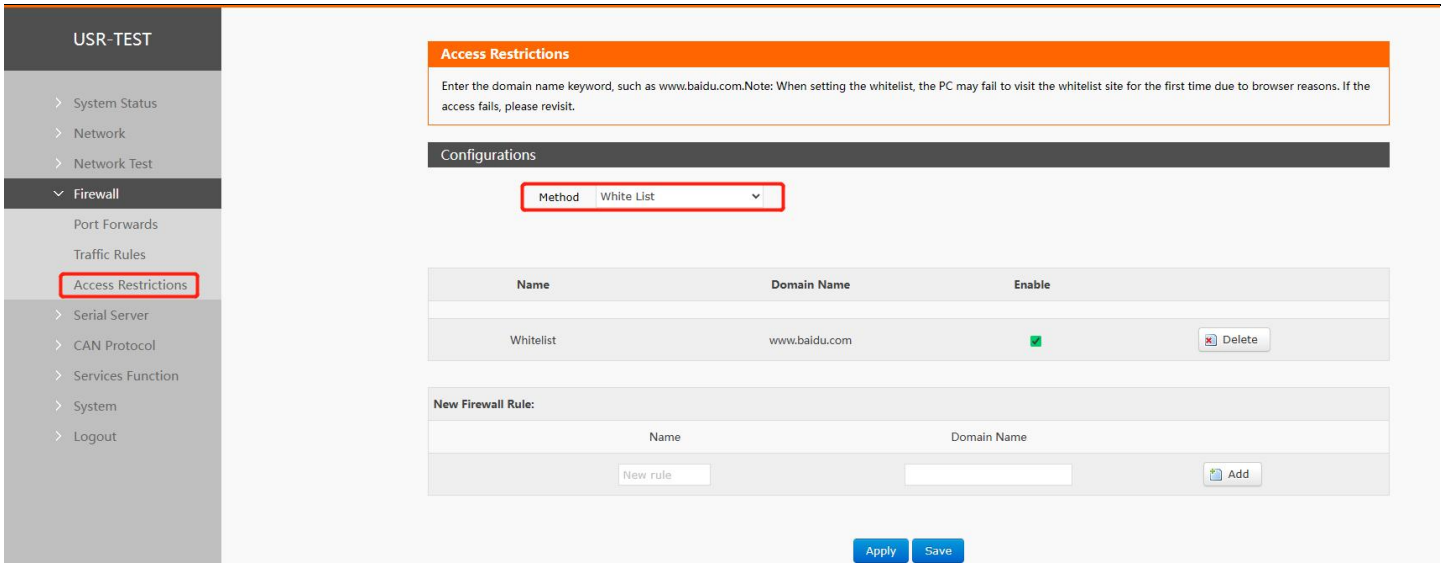


Figure 27. Domain White list

6. Serial device server function

USR-W650 is equipped with RS232/RS485, supports TCP, UDP, MODBUS, MQTT, HTTPD and other network protocols, and supports heartbeat packets, registration packets, AT command and other special functions.

6.1. Serial port settings

In this interface, you can set the baud rate, data bits and other parameters of the serial port.

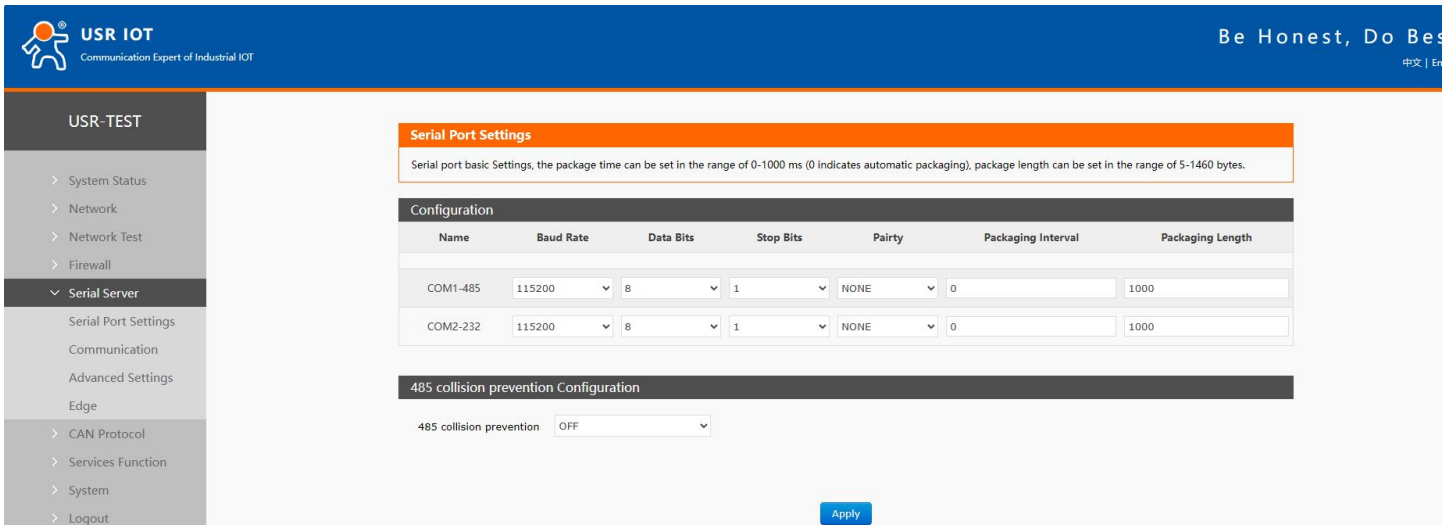


Figure 28. Serial port parameters

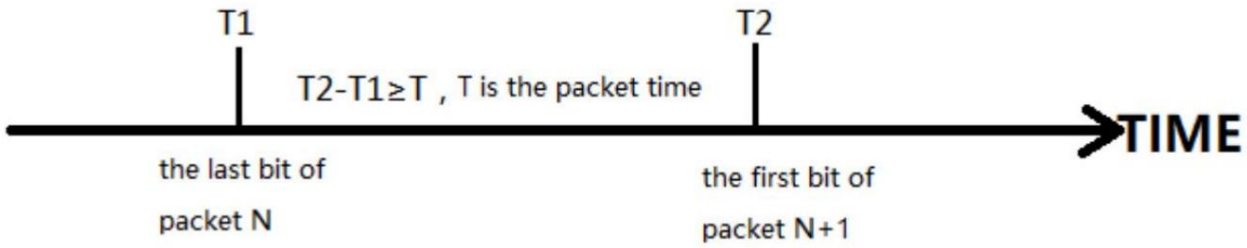
Table 5. Detail parameters of serial port

Items	Description	Default
Baud Rate	To set the baud rate of RS232 or RS485, you can set: 1200/2400/4800/9600/19200/38400/57600/115200/230400 Note: Only RS485 supports 230400	115200

Data Bits	Range: 7,8	8
Stop Bits	Range:1,2	1
Parity	Range: NONE/ODD/EVEN	None
Packaging Interval	Unit: ms, Range: 10-60000ms	50
Packaging Length	Unit: Bytes Range: 5-1500 Bytes	1000
485 collision prevention	When enabled, a time can be set from 0-255 ms	OFF

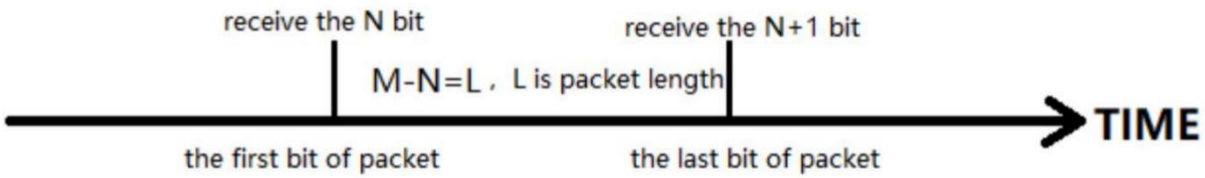
6.1.1. Time triggered mode

When W650 receives data from UART, it will continuously check the interval between two adjacent bytes. If the interval is greater than or equal to a certain "time threshold", then it is considered that a frame has ended, otherwise data will be received until it is greater than or equal to the packing length (default is 1000 bytes). USR-W650 will send this frame of data to the network as a packet. The "time threshold" here is the packaging interval. The settable range is 10ms~3000ms. Factory default 50ms.



6.1.2. Length trigger mode

When W650 receives data from UART, it will continuously check the number of bytes received. A frame is considered complete if the number of bytes received reaches a certain "length threshold". USR-W650 sends this frame data to the network as a TCP or UDP packet. The "length threshold" here is the packaging length. The settable range is 5~1460 bytes. Factory default 1000.



6.2. Communication settings (TCP/UDP socket)

In this interface you can set the parameters of DTU.

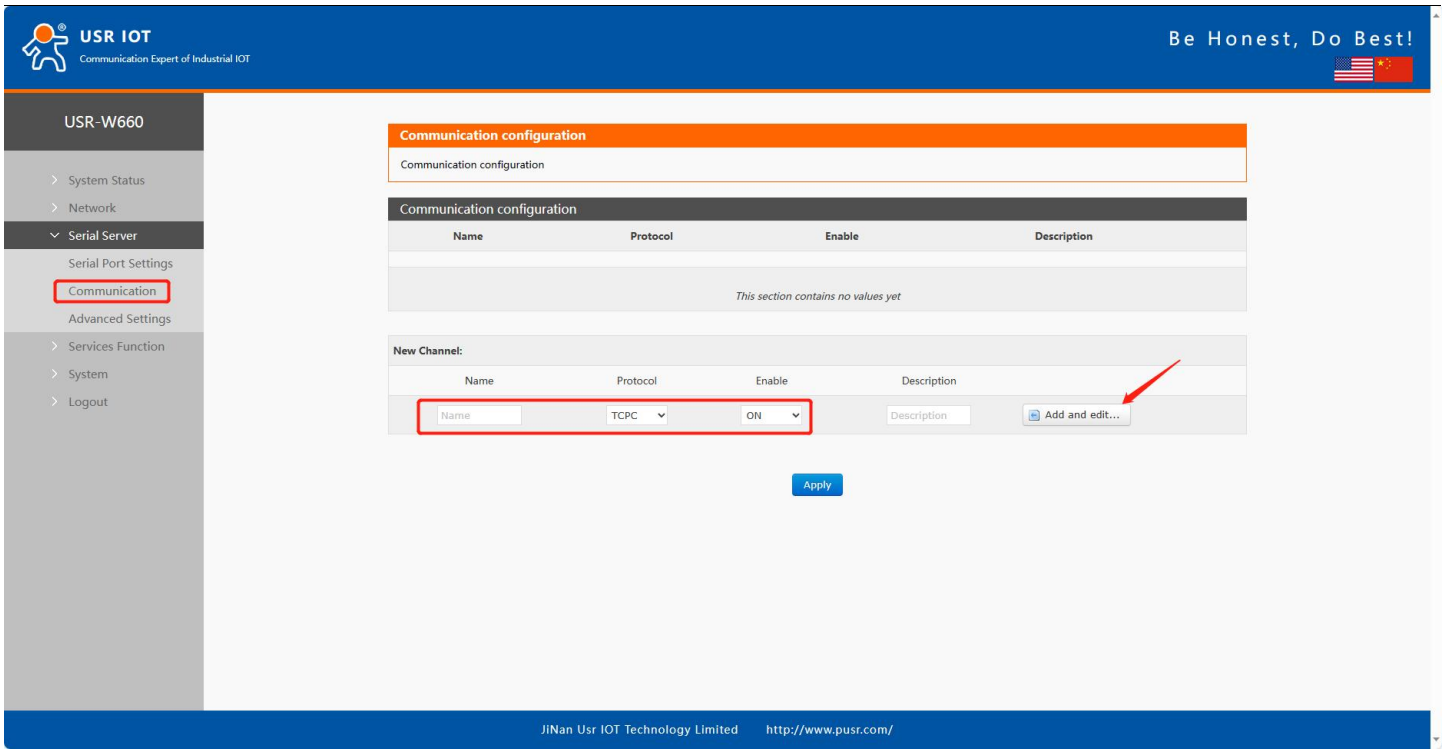


Figure 29. DTU settings

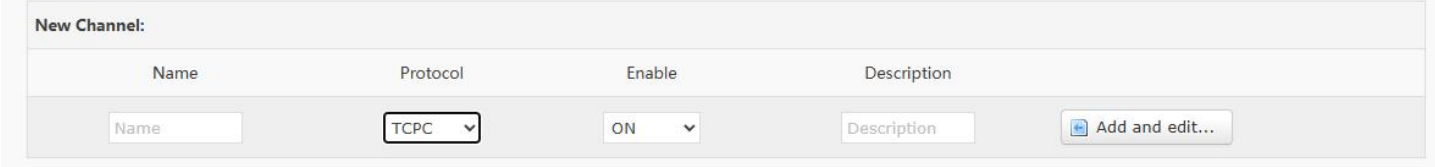
Table 6. Detail parameters of DTU

Items	Description	Default
Name	Set the name of this link.	Null
Protocol	Select the network protocol, you can choose: TCPC/TCPS/UDPC/UDPS/HTTPD/MQTT/AWS/ALI.	TCPC
Enable	Whether to enable this link, ON (enable)/OFF (disable).	Enable
Description	Set notes for this link.	Null

Illustrate:

- Depending on the selection of each protocol, the "Add and Edit" interface will be different accordingly;
- Up to 6 links can be set up.

6.2.1. TCPC Mode(TCP Client)



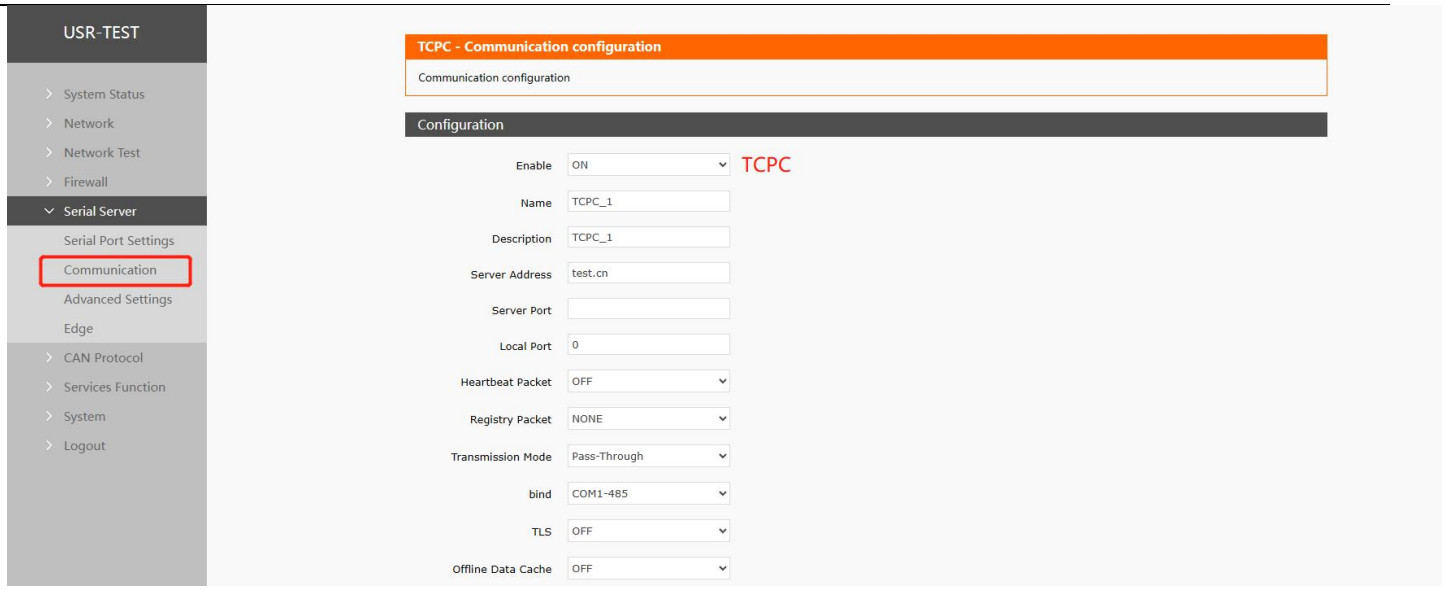


Figure 30. TCP Client

Table 7. Detail parameters of TCP client

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	TCPC_X
Description	Set the remark information of this link.	TCPC_X
Server Address	IP or domain name of server.	test.cn
Server Port	Listening port of server.	None
Local Port	Port of W650.	0
Heartbeat Packet	Set whether to enable the heartbeat packet function, ON (enable)/OFF (disable).	OFF
Heartbeat packet type	HEX: hexadecimal type, ASCII: character type.	HEX
Heartbeat packet data	Heartbeat packet data content.	None
Heartbeat packet time	The time interval for sending heartbeat packets, unit: seconds.	60
Registration Packet	NONE: turn off the registration packet, Custom: Users can define the content of the registration package themselves, MAC: Use the MAC of the WAN port of the device as the content of the registration packet.	None
Registration packet type	Custom registration packet type, HEX: hexadecimal type, ASCII: character type.	HEX
Registration packet	Registration packet data content.	None

data		
Registry Packet Contained In	Send a registration packet when connecting to the server, Add the registration packet to the front of each data packet sent to the server.	Sent once when connecting
Transmission Mode	Pass- Through: transparent transmission mode, Modbus RTU: Modbus RTU and Modbus TCP transfer. Edge: Enable edge computing	Pass- Through
Host Polling	ON: Multiple host polling mode. OFF: Modbus RTU/TCP protocol conversion mode.	OFF
Polling Timeout	Unit: ms Range: 10-6000 ms	200
Modbus Timeout Response	ON: Enable Modbus Timeout Response. OFF: Disable Modbus Timeout Response.	OFF
Bind	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485
TLS	The version can be TLS1.0 or TLS1.2.	OFF
TLS Authentication	NO AUTH: No certificate verification is required. Server: Only the server certificate is verified. BOTH: Both client and server certificates need to be validated.	NO AUTH
Offline Data Cache	ON: Offline data will be cached and sent when get online again. OFF: Offline data will be not cached.	OFF
Data Overflow handling	Discard old Data: Store the latest data. Discard New Data: When the storage space is used up, no new data will be stored.	Discard old Data
Caching Method	Length Limit/Package Quantity Limit	Length Limit

Illustrate:

- Supports TLS encrypted transmission and offline data caching functions.

6.2.2. TCPS Mode(TCP Server)

Enable TCPS mode.

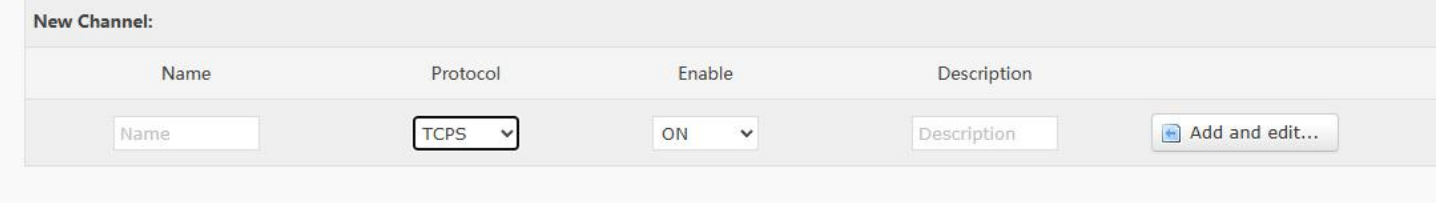


Figure 31. TCP server

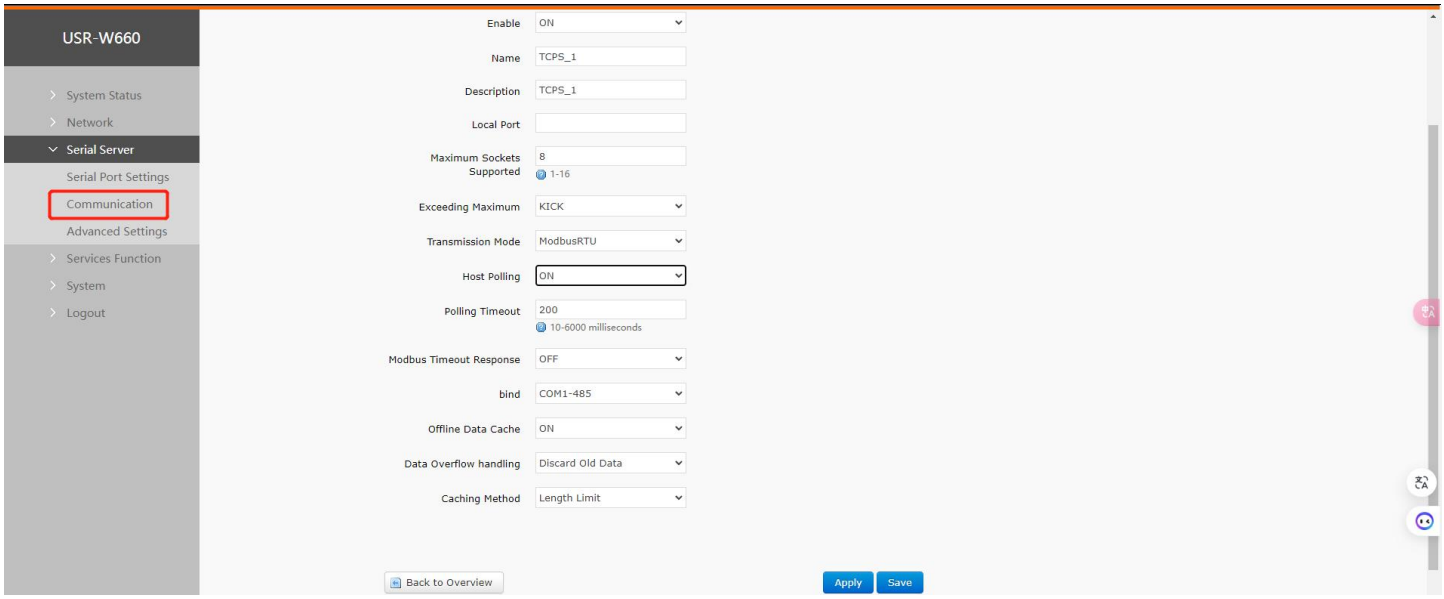


Figure 32. TCP server parameters settings page

Table 8. Detail parameters of TCP server

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	TCPS_X
Description	Set the remark information of this link.	TCPS_X
Local Port	Port of W650.	0
Maximum Sockets Supported	Range:1~16	8
Exceeding Maximum	Kick: Kick the older client connection. Keep: Keep the older client connection.	KICK
Transmission Mode	Pass- Through: transparent transmission mode, Edge: Modbus RTU and Modbus TCP transfer.	Pass- Through
Host Polling	ON: Multiple host polling mode. OFF: Modbus RTU/TCP protocol conversion mode.	OFF
Polling Timeout	Unit: ms Range: 10-6000 ms	200
Modbus Timeout Response	ON: Enable Modbus Timeout Response. OFF: Disable Modbus Timeout Response.	OFF
Bind	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485
Offline Data Cache	ON: Offline data will be cached and sent when get online again. OFF: Offline data will be not cached.	OFF
Data Overflow	Discard old Data: Store the latest data.	Discard old Data

handling	Discard New Data: When the storage space is used up, no new data will be stored.	
Caching Method	Length Limit: Package Quantity Limit:	Length Limit

Note:

- Up to 16 clients can connect to this TCP Server simultaneously. A 17th client connection will fail.

6.2.3. UDPC Mode(UDP Client Mode)

Select UDPC mode.

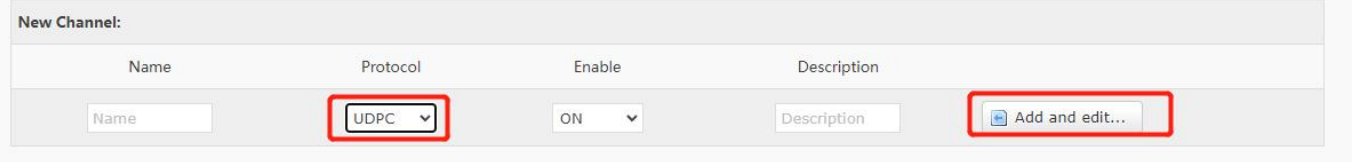


Figure 33. Serial port parameters

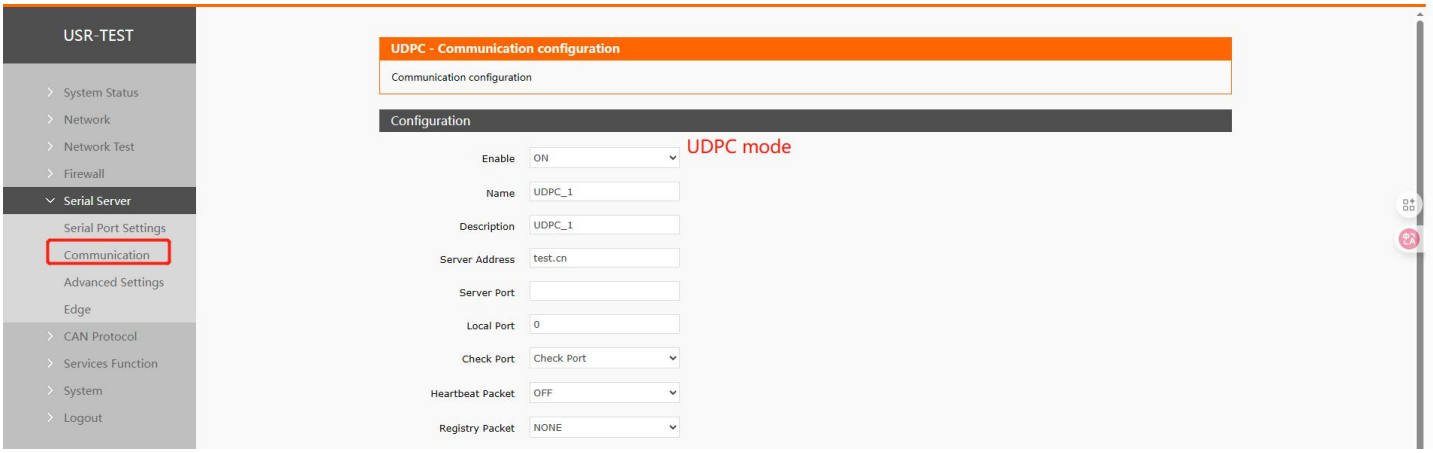


Figure 34. UDPC parameters

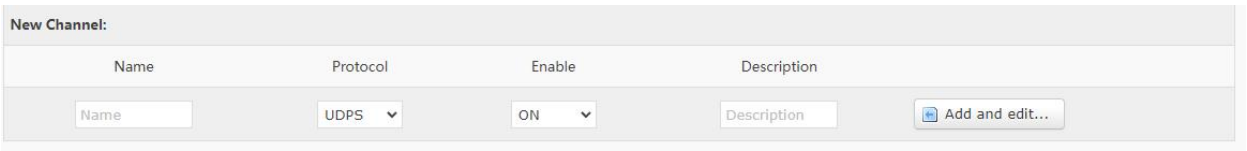
Table 9. Detail parameters of UDPC

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	UDPC_X
Description	Set the remark information of this link.	UDPC_X
Server Address	IP or domain name of server.	test.cn
Local Port	Port of W650.	0
Check Port	Check port / Not check port	Check Port
Heartbeat Packet	Set whether to enable the heartbeat packet function, ON	OFF

	(enable)/OFF (disable).	
Heartbeat packet type	HEX: hexadecimal type, ASCII: character type.	HEX
Heartbeat packet data	Heartbeat packet data content.	None
Heartbeat packet time	The time interval for sending heartbeat packets, unit: seconds.	60
Registration Packet	NONE: turn off the registration packet, Custom: Users can define the content of the registration package themselves, MAC: Use the MAC of the WAN port of the device as the content of the registration packet.	None
Registration packet type	Custom registration packet type, HEX: hexadecimal type, ASCII: character type.	HEX
Registration packet data	Registration packet data content.	None
Registry Packet Contained In	Send a registration packet when connecting to the server, Add the registration packet to the front of each data packet sent to the server.	After connection
Transmission Mode	Pass- Through: transparent transmission mode, Modbus RTU: Modbus RTU and Modbus TCP transfer.	Pass- Through
Bind	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485

6.2.4. UDPS Mode(UDP Server)

Select UDPS mode.



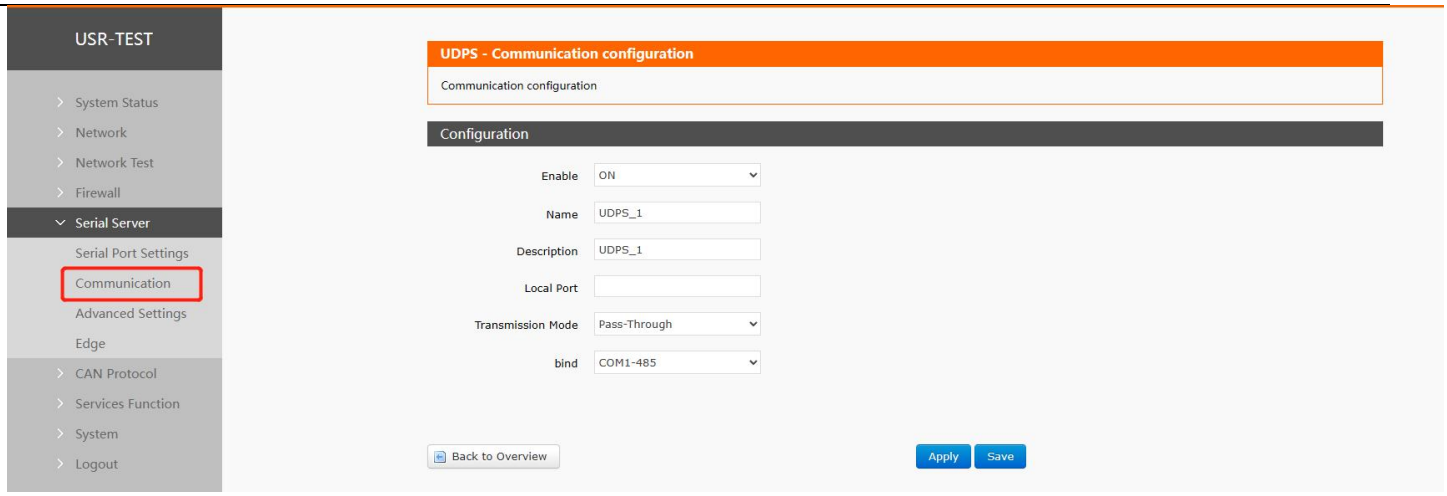


Figure 35. UDPS settings

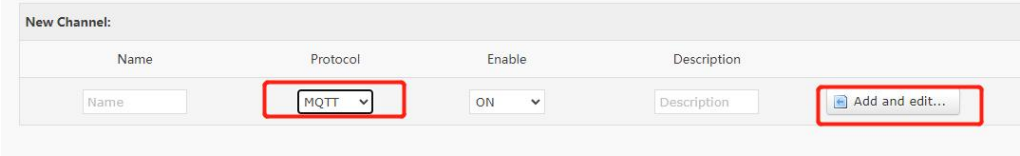
Table 10. Detail parameters of UDPS

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	UDPS_X
Description	Set the remark information of this link.	UDPS_X
Local Port	Port of W650.	None
Transmission Mode	Pass- Through: transparent transmission mode, Modbus RTU: Modbus RTU and Modbus TCP transfer.	Pass- Through
Bind	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485

6.2.5. MQTT Mode

6.2.5.1. Basic settings of MQTT

Select MQTT mode.



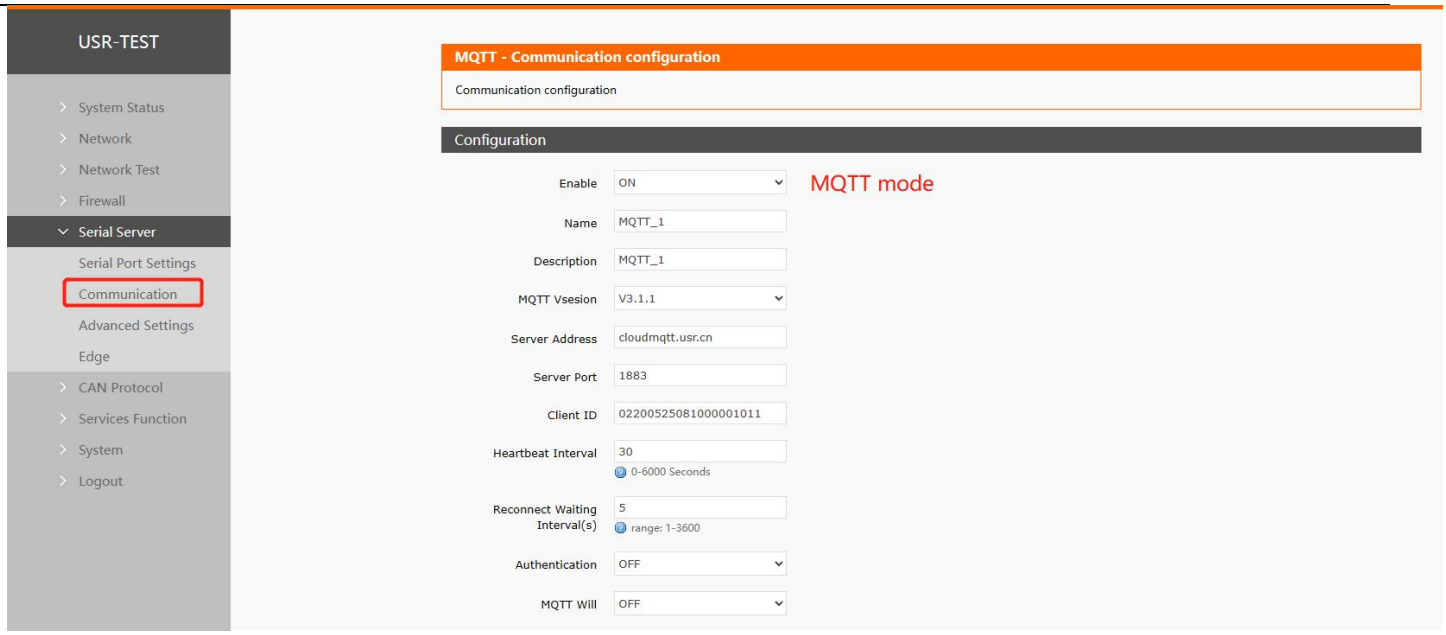


Figure 36. MQTT settings

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	MQTT_X
Description	Set the remark information of this link.	MQTT_X
MQTT Version	3.1.1 or 3.1	3.1.1
Server Address	IP or domain name of server.	cloudmqtt.usr.cn
Server Port	Listening port of server.	1883
Client ID	To distinguish different clients.	02200523082400002901
Heartbeat Interval	MQTT protocol heartbeat time, unit: seconds. Unit: Second, Range: 0~6000	30
Reconnect Detection Interval	The next reconnection interval after MQTT disconnection. Unit: Second, Range: 1~3600	5
Authentication	If the server requires username and password authentication, it needs to be turned on. ON: Enable authentication. OFF: Disable authentication.	OFF
MQTT Will	MQTT connection flag. When the network is disconnected abnormally, the server will publish this will message to other clients that subscribe to this will topic. ON: Enable MQTT Will. OFF : Disable MQTT Will.	OFF
Topic	Topic of MQTT Will.	None
Will Content	The content of MQTT will.	None
QOS	Set the QOS of the will, which can be set: 0 at most once 1at least 1 time	0

	Accurate once	
KeepMsg	Whether to turn on the last message retention function ON: turn on. OFF: turn off.	OFF
TLS	The version can be TLS1.0 or TLS1.2.	OFF
TLS Authentication	NO AUTH: No certificate verification is required. Server: Only the server certificate is verified. BOTH: Both client and server certificates need to be validated.	NO AUTH
Offline Data Cache	ON: Offline data will be cached and sent when get online again. OFF: Offline data will be not cached.	OFF
Data Overflow handling	Discard old Data: Store the latest data. Discard New Data: When the storage space is used up, no new data will be stored.	Discard old Data
Caching Method	Length Limit: Caching data by byte length Package Quantity Limit: Caching data according to the number of data packets	Length Limit
Transmission Mode	Pass-through: transparent transmission mode Edge: enable edge computing	

6.2.5.2. Subscribe/Publish Topic

The topic adding function is mainly used to add publishing or subscribing topics. Configuration parameters include basic parameters such as name, TOPIC, QOS , and whether to retain messages. The function of serial port association is to associate the topic with a certain serial port. When publishing, the original data of the serial port will be used as the payload of this topic. When receiving the subscription message, the payload of the subscribed topic will be sent to the serial port as the original data.

Note: Up to 16 topic rules can be set.

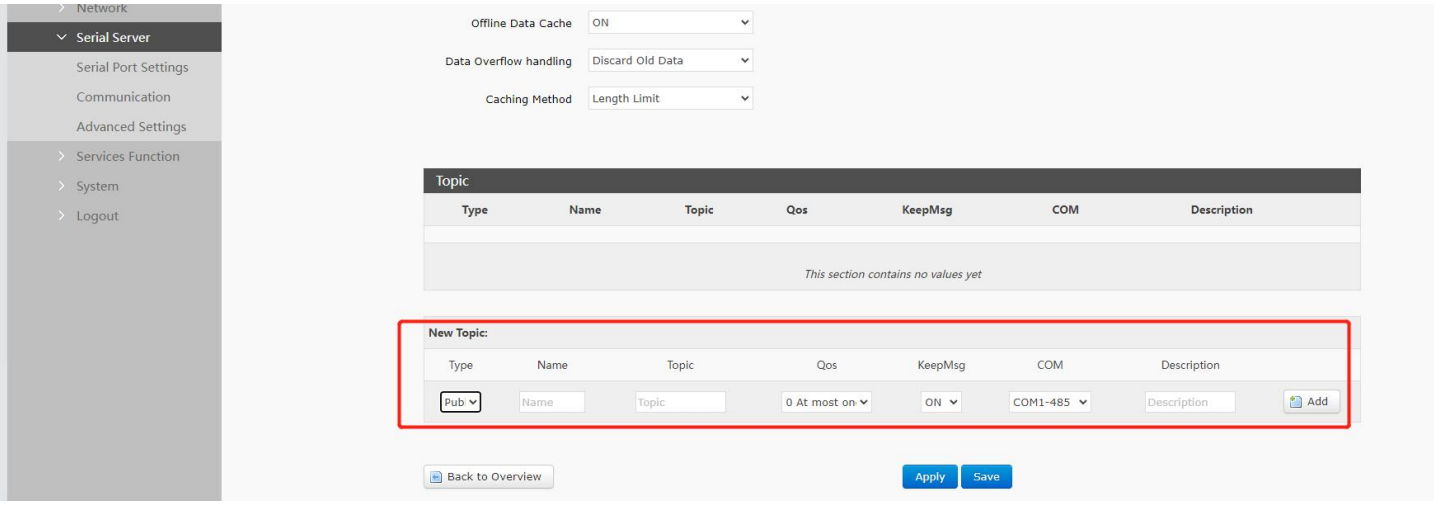


Figure 37. MQTT topic settings

Table 11. Detail parameters of MQTT

Name	Function description	Default value
Type	Topic type: optional publish/subscribe	publish
Name	The name of the topic	NULL
Topic	Topic: topic content	NULL
QoS	Topic message quality, configurable: 0 at most once at least 1 time Accurate once	0
KeepMsg	Set whether to retain the message, ON (retain)/OFF (not retain)	ON
COM	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485

6.2.5.3. AWS Connection

Connect to AWS via MQTT.

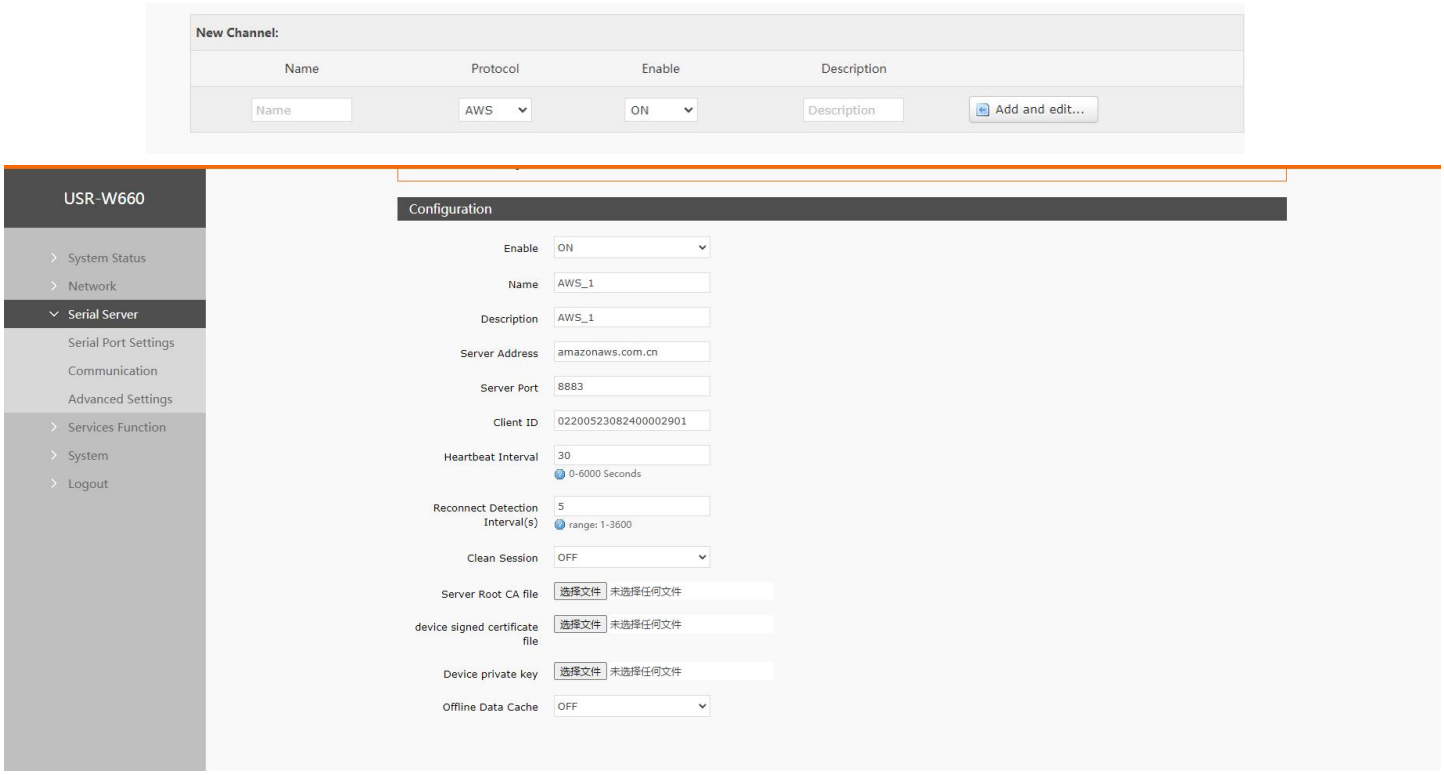


Figure 38. AWS settings

Table 12. Detail parameter of AWS

Items	Description	Default

Enable	Whether this link is enabled. ON (enabled) / OFF (disabled)	ON
Name	Set the name of this link.	AWS_X
Description	Set the remark information of this link.	AWS_X
Server Address	IP or domain name of server.	amazonaws.com.cn
Server Port	Listening port of server.	8883
Client ID	To distinguish different clients.	02200523082400002901
Heartbeat Interval	MQTT protocol heartbeat time, unit: seconds. Unit: Second, Range: 0~6000	30
Reconnect Detection Interval(s)	The next reconnection interval after MQTT disconnection. Unit: Second, Range: 1~3600	5
Clean Session	MQTT protocol connection flag, used to control the survival time of the session state OFF: disable ON: enable	OFF
Server Root CA file	Upload server CA certificate file	NULL
Device signed certificate file	Upload device signed certificate file	NULL
Device private key	Upload device private key file	NULL
Offline Data Cache	ON: Offline data will be cached and sent when get online again. OFF: Offline data will be not cached.	OFF
Data Overflow handling	Discard old Data: Store the latest data. Discard New Data: When the storage space is used up, no new data will be stored.	Discard old Data
Caching Method	Length Limit/Package Quantity Limit	Length Limit

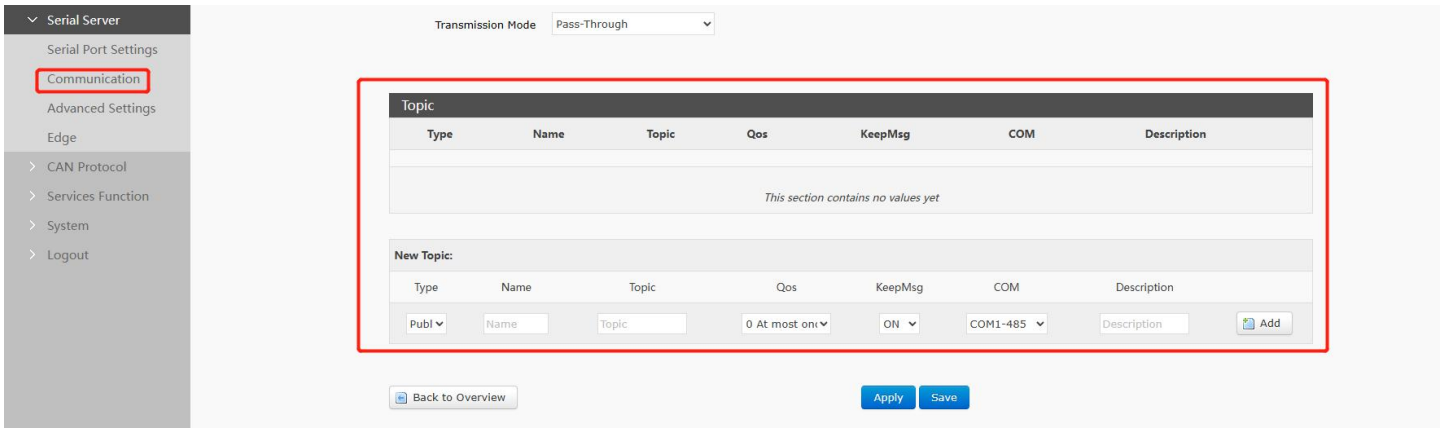


Figure 39. AWS topic settings

Note: Up to 16 topic rules can be set.

Name	Function description	Default value
Type	Topic type: optional publish/subscribe	publish

Name	The name of the topic	NULL
Topic	Topic: topic content	NULL
QoS	Topic message quality, configurable: 0 at most once at least 1 time Accurate once	0
KeepMsg	Set whether to retain the message, ON (retain)/OFF (not retain)	ON
COM	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485

6.2.6. HTTPD Mode(HTTP client)

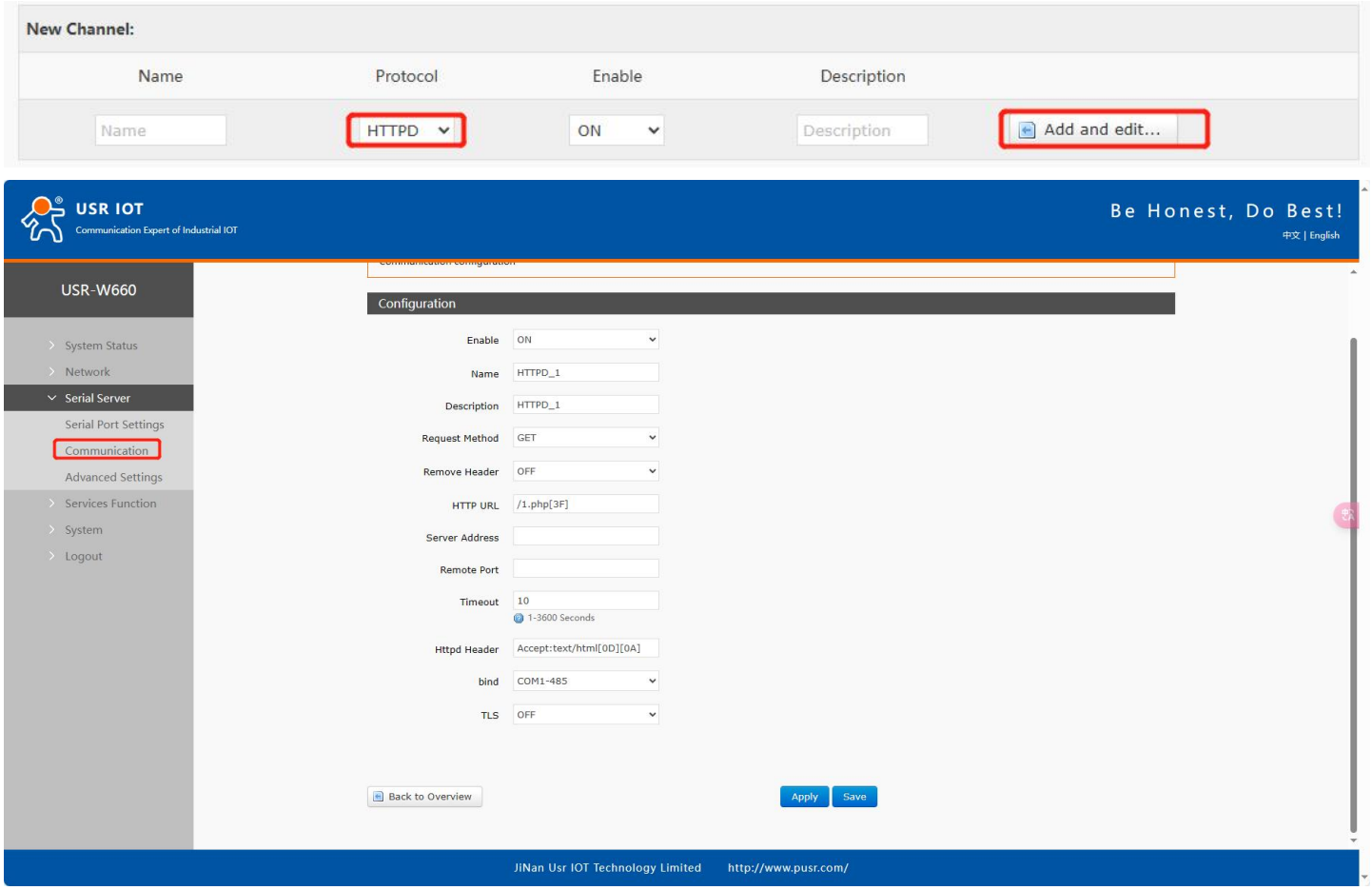


Figure 40. HTTP client settings

Items	Description	Default
Enable	Whether this link is enabled, ON (enabled)/OFF (disabled).	ON
Name	Set the name of this link.	HTTPD_X
Description	Set the remark information of this link.	HTTPD_X
Request method	GET/POST	GET

Remove Header	ON: Set to filter HTTP headers of data packet OFF: Set not to filter HTTP headers of data packet	OFF
HTTP URL	Add the URLs that need to be accessed	/1.php[3F]
Server Address	IP or domain name of server.	NULL
Remote Port	Listening port of server.	NULL
Timeout	If the server does not actively disconnect within the timeout period, this end needs to wait for the disconnection time	10s
Httpd Header	Set HTTP headers of data packet	Accept:text/html[0D][0A]
bind	COM1-485: Data is transmitted by RS485 only. COM2-232: Data is transmitted by RS485 only. COM1+COM2： Data is transmitted by RS485 and RS232 both.	COM1-485
TLS	The version can be TLS1.0 or TLS1.2.	OFF
TLS Authentication	NO AUTH: No certificate verification is required. Server: Only the server certificate is verified. BOTH: Both client and server certificates need to be validated.	NO AUTH

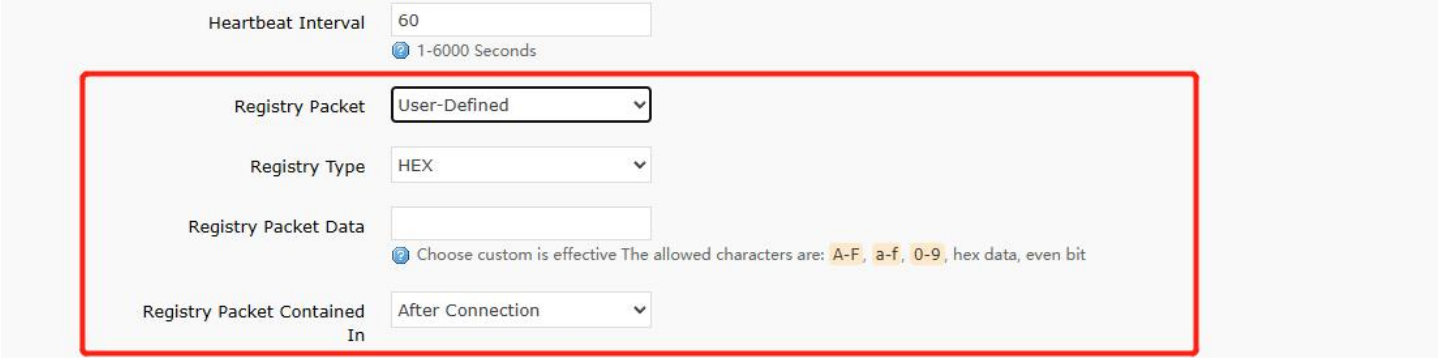
6.2.7. Heartbeat / Registration package

6.2.7.1. Registration Packet Description

Registration Packet: It is used to enable the server to identify the source device of the data or as a password to obtain server function authorization. The registration packet can be sent when the device establishes a connection with the server or can be spliced at the beginning of each data packet as part of a data packet. The data in the registration packet can be MAC or custom registration data. Explanation:

Selecting MAC means using the WAN port MAC address as the content of the registration packet.

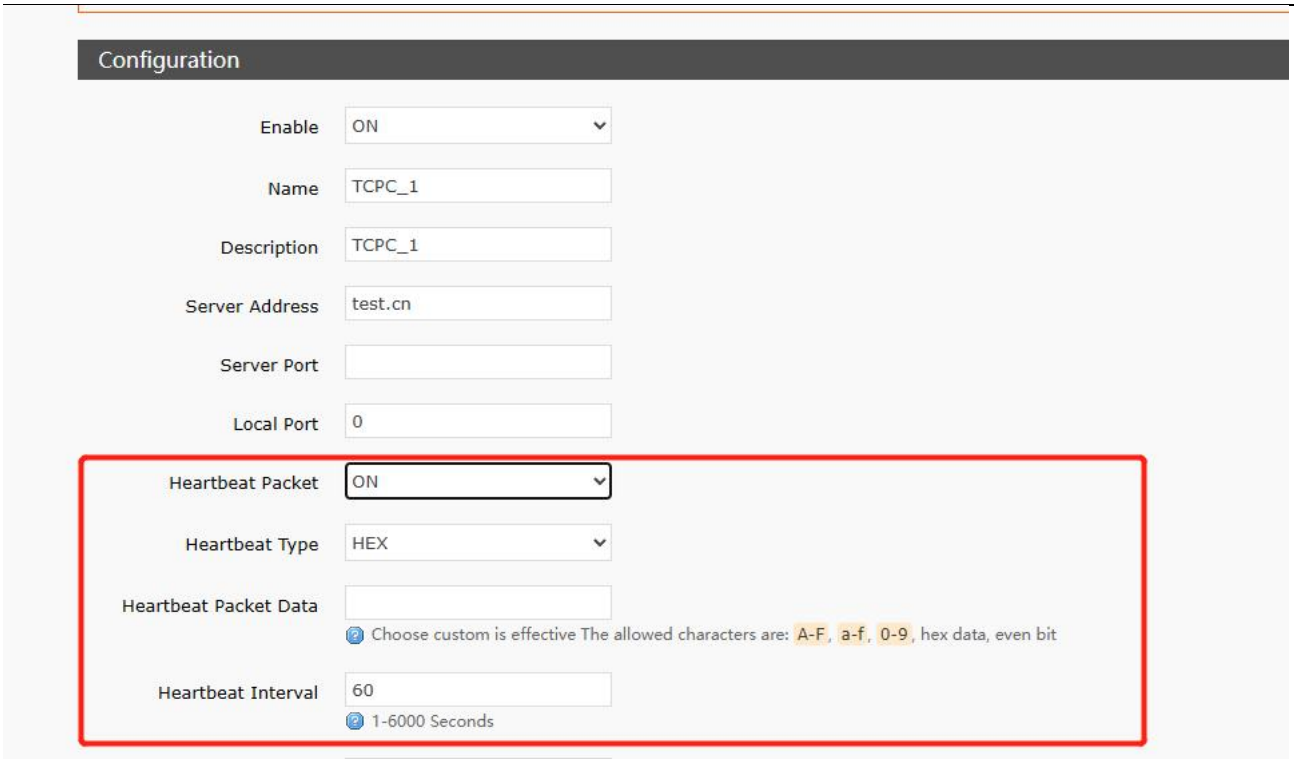
- This function is only available when the link is set to tcpc or udpc mode.



6.2.7.2. Network Heartbeat Packet Description

Network Heartbeat Packet: It is sent to the network end, primarily to inform the server of the online status of terminal W650, in order to maintain a long connection with the server. Explanation:

- This function is only available when the link is set to tcpc or udpc mode.



6.3. Advanced settings

Network AT, serial heartbeat packets, and no data operation can be configured.

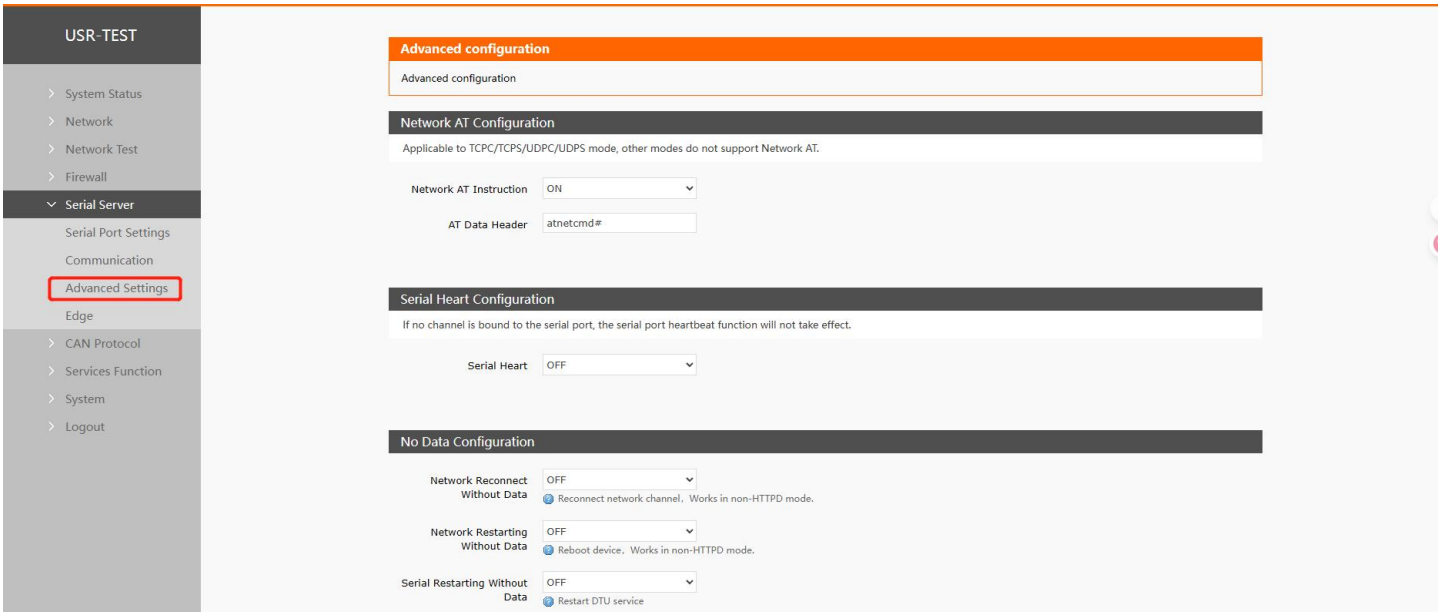


Figure 41.

Items	Description	Default
Network AT Instruction	Whether to enable network AT commands. ON: enabled / OFF: disabled	ON
AT Data Header	Password for network AT commands	atnetcmd#
Serial Heart	ON: enable sending heartbeat packets to the serial port OFF: disable sending heartbeat packets to the serial port	OFF

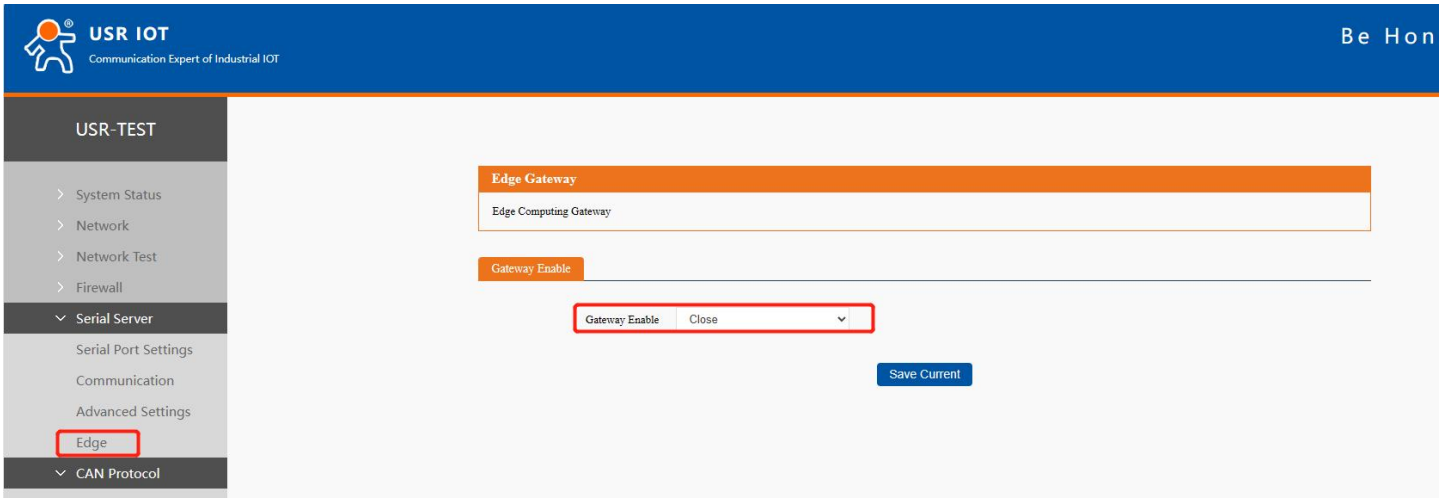
Heartbeat Type	HEX: hexadecimal type ASCII: character type Refer to section 8.2.7.2 for heartbeat packet details	HEX
User-Defined Packet	Content of the heartbeat packet	NULL
Heartbeat Interval	Interval at which heartbeat packets are sent, in seconds	60
Serial Binding	COM1-485: use 485 channel for data communication COM2-232: use 232 channel for data communication COM1+COM2: use RS232 or RS485 channel for data transmission	COM1+COM2
Network Reconnect Without Data	Trigger reconnection if no data is received from each channel within the set time. Applicable to non-HTTP protocols, see details below for specifics	OFF
Reconnect Detection Interval(s)	Set time interval, in seconds	3600
Network Restarting Without Data	Trigger device restart if no data is received from all channels within the set time. Applicable to non-HTTP protocols, see details below for specifics	OFF
Restart Detection Interval(s)	Set time interval, in seconds	36000
Serial Restarting Without Data	Trigger device restart if no data is received from all channels within the set time. Applicable to non-HTTP protocols, see details below for specifics	OFF
Restart Detection Interval(s)	Set time interval, in seconds	3600
Effective serial port	COM1-485/COM2-232/COM1+COM2	COM1-485

6.4. Edge Computing

Edge gateway functions include data acquisition, data calculation, data reporting, and data read/write.

Data acquisition mainly involves Modbus RTU polling. Protocol conversion supports conversion to Modbus TCP and JSON formats. Data active reporting can configure custom JSON templates for platform integration. In the edge computing gateway function, the gateway device acts as the initiator of polling, autonomously and periodically reading, parsing, and calculating user-preset data information from terminal devices. Simultaneously, the gateway device can selectively report data according to user-preset reporting logic, completing data collection tasks without active participation from remote servers, greatly improving cloud server resource utilization and allowing more devices to be managed.

Edge gateway needs to be enabled before use.



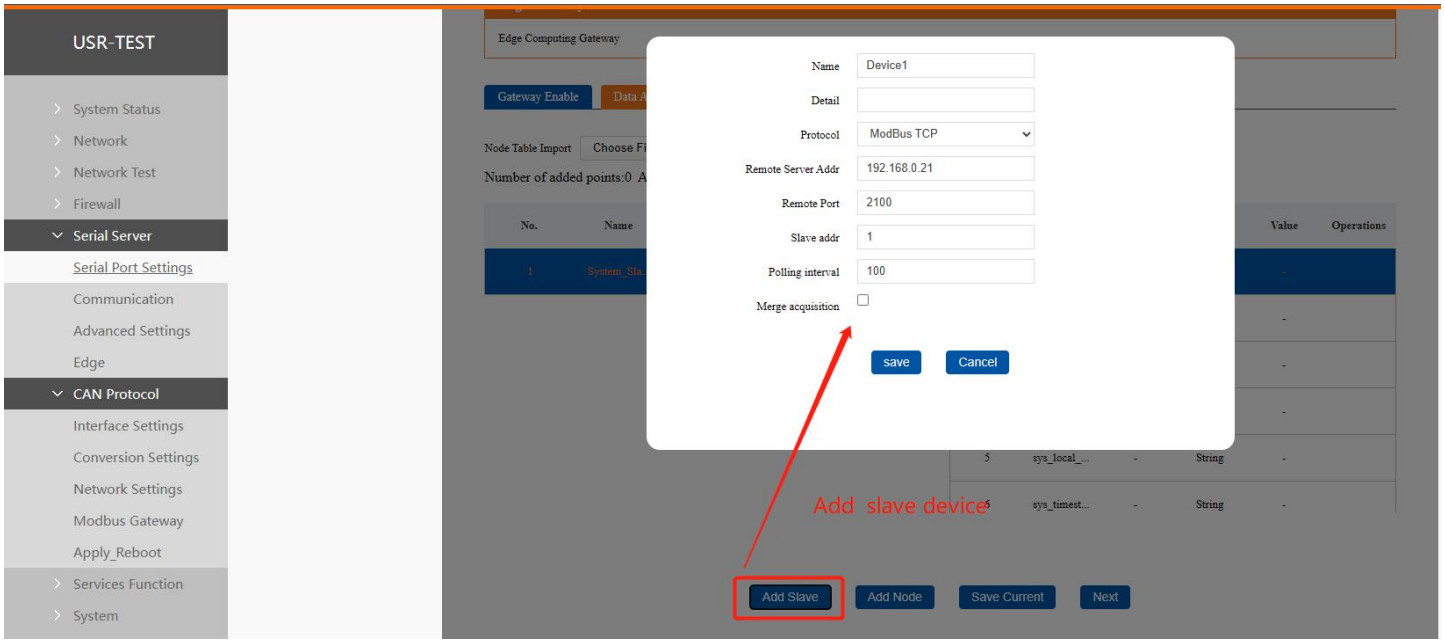
6.4.1. Data Acquisition

This function refers to the USR-W650 acting as a master, actively sending polling commands, periodically obtaining point data from serial port or network port devices, and saving it to the device's virtual register. The premise for implementing the device's edge collection function is that the customer has pre-configured the slave device address and point register information of the device to be collected in the device. Slave and point information is added to the device in the form of a point list. The total number of slave points supports up to 1000, supporting collection points, system points, and calculation points (results of calculations between multiple points).

Protocols supported for edge parsing include Modbus RTU, DL/T645-2007 electricity meter, and Modbus TCP.

Supports import/export of collection point files.

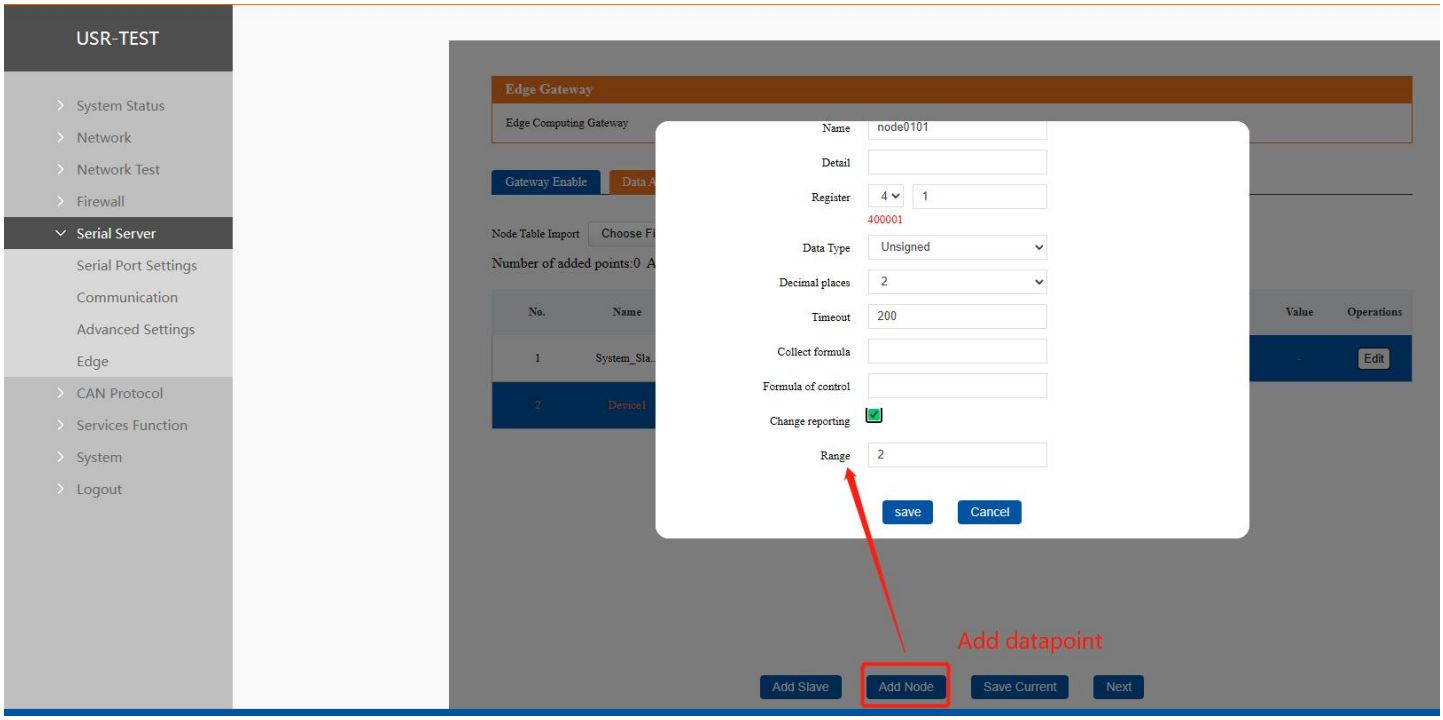
6.4.1.1. Add slave device



Item	Description	Default Value
Device Name	Name string used in the gateway to manage this slave.	Device1
Details	Slave description information.	None
Protocol	Collection protocol: Modbus RTU, Modbus TCP, DLT645, Virtual.	Modbus TCP
Slave Address	Modbus address of the slave device or DL/T645 meter number.	1
Polling Interval	Time interval between the completion of the previous polling command and the execution of the next polling command. Setting to 0 uses the default minimum time interval. Range: Unit: ms	100
Merge Collection	Merge multiple consecutive data points under this slave into one collection command for data polling.	Not Enabled

6.4.1.2. Add node

Multiple points can be added under each slave, or only one point can be added. However, the total number of points under all slaves supports up to 1000.



Item	Description	Default Value

Item	Description	Default Value
Name	Unique identifier of the data point, used in JSON templates for data reporting and data query functions.	node0101
Details	Point description information.	None
Function Code	Modbus function code used when collecting the data point.	0
Register Address	Register address of the data point.	1
Data Type	Data type of the data point, indicating data length and the expected parsing method by the edge computing gateway.	Bool
Decimal Places	Number of decimal places for data reporting.	3
Timeout	Maximum wait time for response when polling this data point. Handled as query failure after timeout.	200
Change Reporting	After the data point is obtained, compare it with historical data. If it exceeds the set change range, report the data immediately.	Not selected
Change Range	Judgment range for whether data point change needs to be reported.	2
Collection Formula	Fill in calculation formula for simple addition, subtraction, multiplication, and division operations on collected data points. %s represents the actual collected data. For example, =%s+1, adds 1 to the parsed collected value before reporting. In the virtual device's calculation formula, %s represents other points. For example, virtual device value = point 1 multiplied by 2 + point 2, formula = %s*2+%s, node0101, node0102.	None
Formula of control	If the user needs to perform calculations on the data written to the Slave device, then corresponding formulas need to be added at that location.	None

6.4.1.3. Edge Computing

The calculated data after edge calculation is stored in the virtual register corresponding to the data point list. When the product actively reports or the server actively collects, the data is packaged and sent to the cloud.

W650 integrates edge computing functionality, moving data processing from the cloud down to the gateway, greatly alleviating the data processing pressure on the cloud.

Calculation Method: Edge computing supports addition, subtraction, multiplication, division, and parentheses operations.

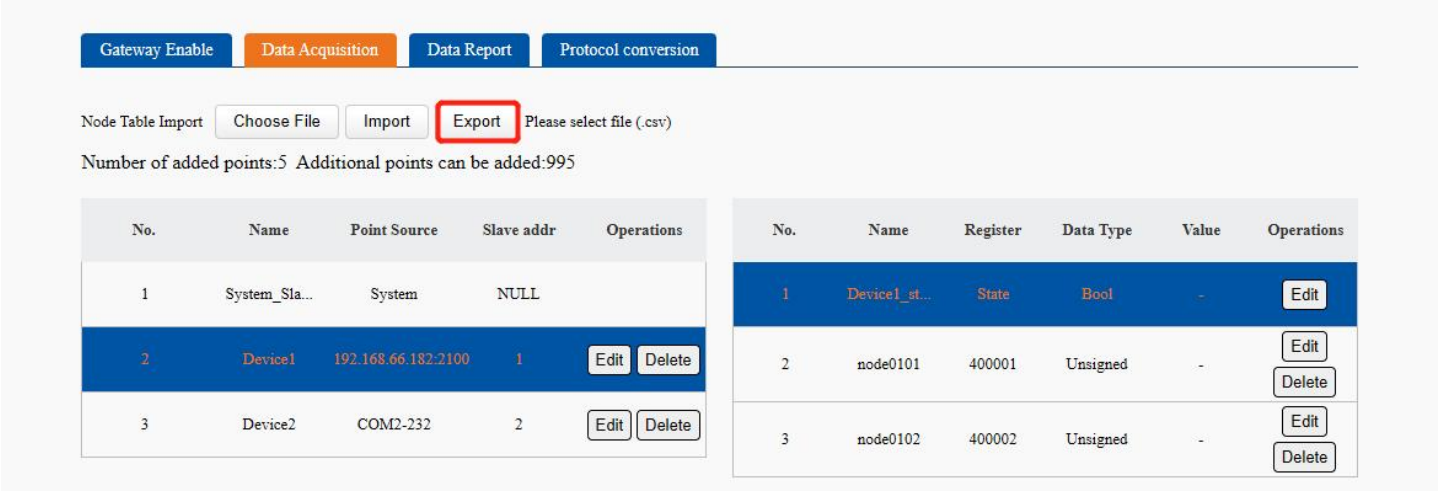
Name	Formula Example	Description	Formula Addition Location
Single Point	=(%s+10)/2	%s represents the current point value	Current point configuration interface
Multi-Point	=(%s+10)/%s , node0101 , node0102	The first %s represents data of point node0101; the second %s represents data of point node0102.	Add calculation formula when adding a new point under the virtual slave.

Note: In multi-point calculation formulas, up to 20 points can be calculated simultaneously.

6.4.1.4. Configuration exporting

In cases requiring configuration of a large number of data points, the default data collection configuration can be exported in .csv file format, edited in bulk using software like Office, and then imported into the device to achieve rapid configuration.

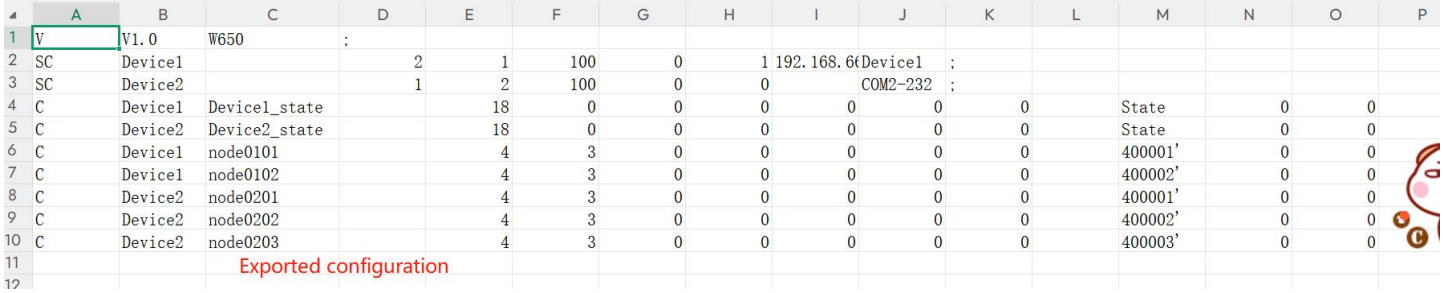
Similarly, if a customer needs to configure the same point parameters for multiple devices, they can also export the point configuration file to quickly configure points for multiple devices.



In the exported file,

SC: the configuration of slave device.

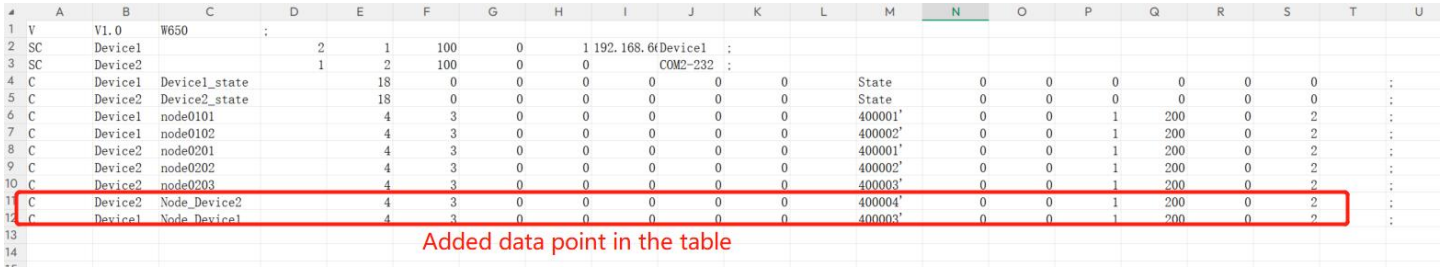
C: the configuration of data point.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	V	V1.0	W650	;												
2	SC	Device1		2	1	100	0	1	192.168.6(	Device1	;					
3	SC	Device2		1	2	100	0	0		COM2-232	;					
4	C	Device1	Device1_state		18	0	0	0	0	0	0		State	0	0	
5	C	Device2	Device2_state		18	0	0	0	0	0	0		State	0	0	
6	C	Device1	node0101		4	3	0	0	0	0	0		400001'	0	0	
7	C	Device1	node0102		4	3	0	0	0	0	0		400002'	0	0	
8	C	Device2	node0201		4	3	0	0	0	0	0		400001'	0	0	
9	C	Device2	node0202		4	3	0	0	0	0	0		400002'	0	0	
10	C	Device2	node0203		4	3	0	0	0	0	0		400003'	0	0	
11			Exported configuration													
12																

Figure 42. Exported configuration

6.4.1.5. Editing the exported configuration



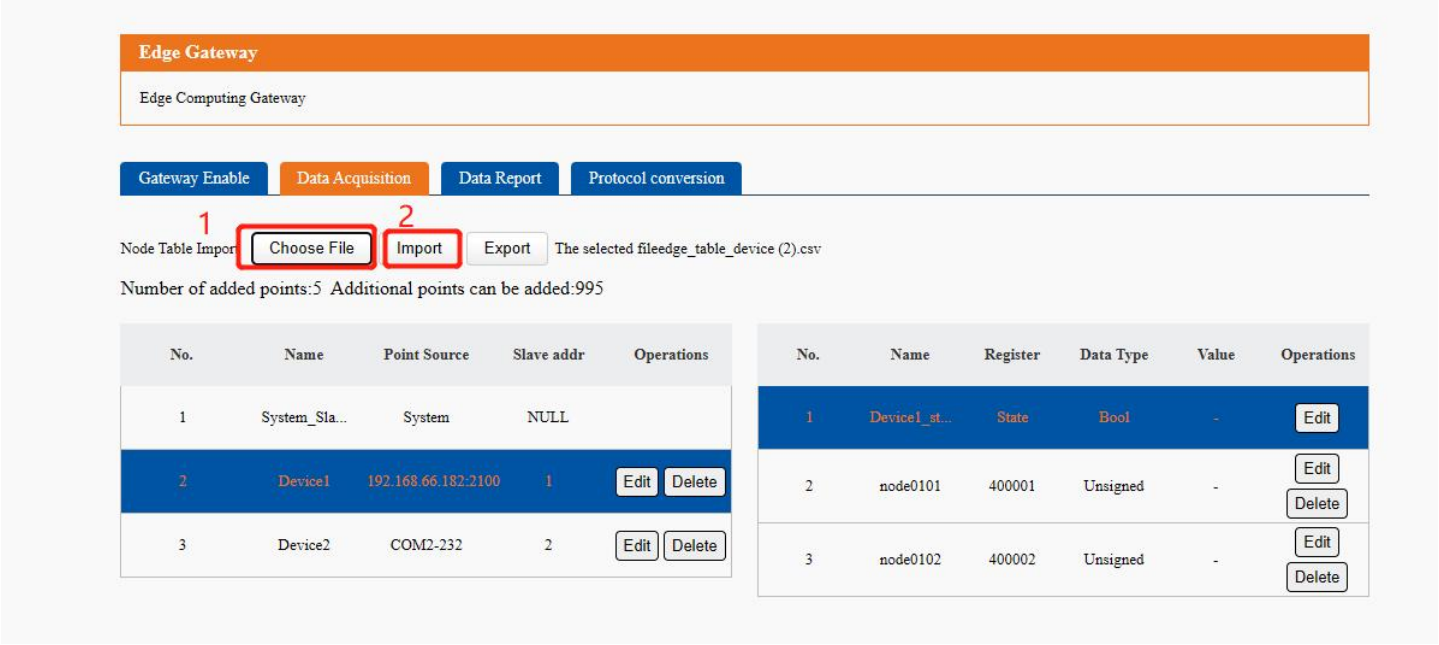
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	V	V1.0	W650	;																	
2	SC	Device1		2	1	100	0	1	192.168.6	Device1	;										
3	SC	Device2		1	2	100	0	0		COM2-232	;										
4	C	Device1	Device1_state		18	0	0	0	0	0	0		State	0	0	0	0	0	0		;
5	C	Device2	Device2_state		18	0	0	0	0	0	0		State	0	0	0	0	0	0		;
6	C	Device1	node0101		4	3	0	0	0	0	0		400001'	0	0	1	200	0	2		;
7	C	Device1	node0102		4	3	0	0	0	0	0		400002'	0	0	1	200	0	2		;
8	C	Device2	node0201		4	3	0	0	0	0	0		400001'	0	0	1	200	0	2		;
9	C	Device2	node0202		4	3	0	0	0	0	0		400002'	0	0	1	200	0	2		;
10	C	Device2	node0203		4	3	0	0	0	0	0		400003'	0	0	1	200	0	2		;
11	C	Device2	Node_Device2		4	3	0	0	0	0	0		400004'	0	0	1	200	0	2		;
12	C	Device1	Node_Device1		4	3	0	0	0	0	0		400003'	0	0	1	200	0	2		;
13																					
14																					

Added data point in the table

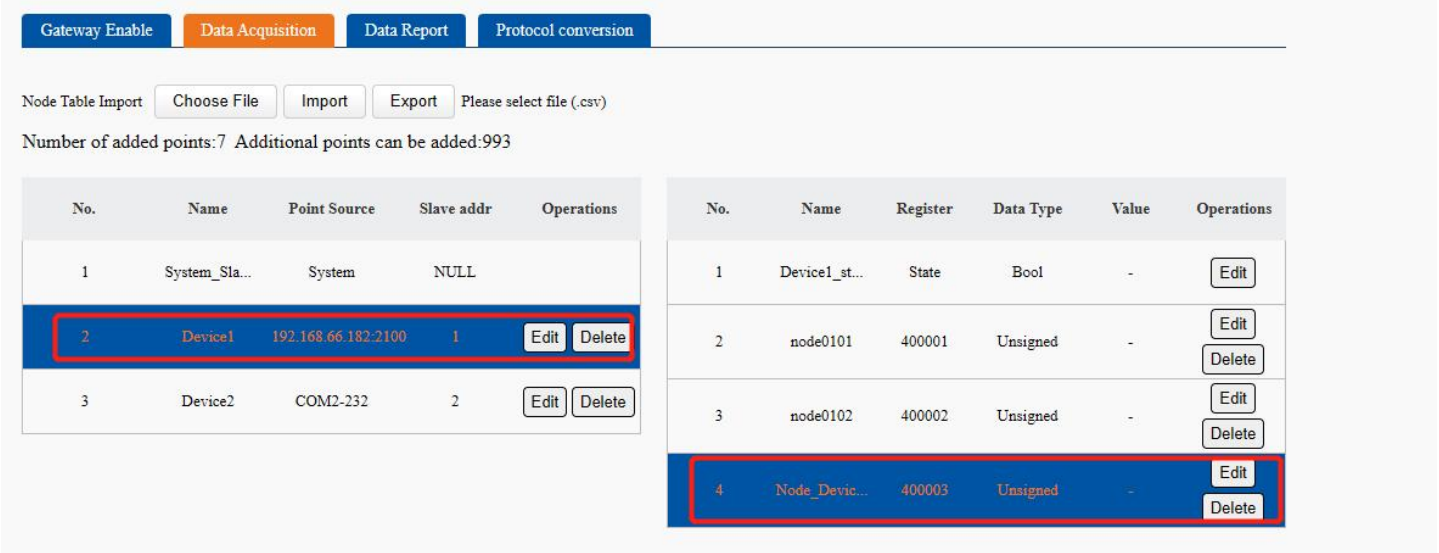
6.4.1.6. Configuration importing

1. Choose the file just edit in above step

2. Import the file



3. Check the added data point, and it added successfully.



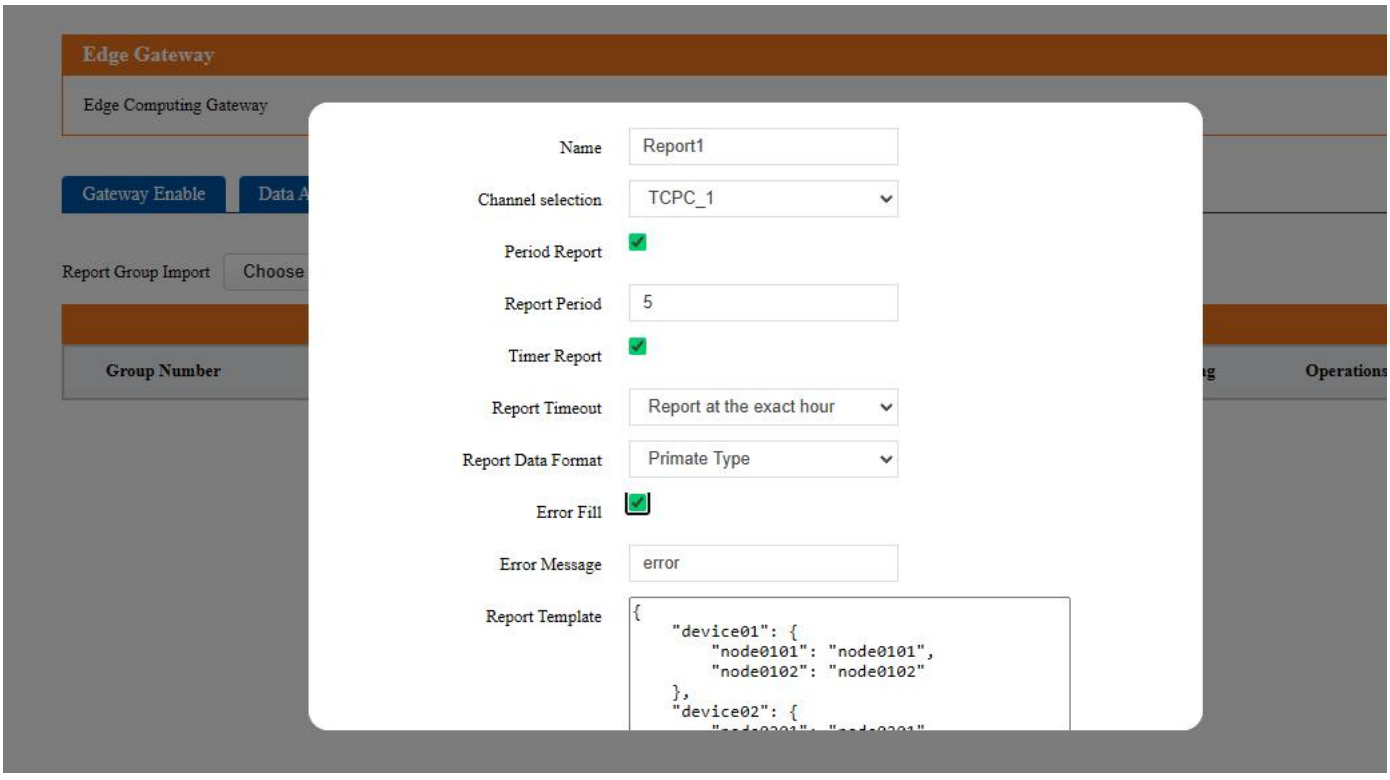
6.4.2. Data report

Edge-collected data is stored in the device's virtual registers. Through the active reporting function, this data can be transmitted to the customer's server platform without requiring the server to issue collection commands. Edge reporting requires the customer to define reporting conditions and data templates. The device will transmit data to the customer's server based on the preset reporting conditions. Meanwhile, the server can also utilize this reporting channel to issue relevant collection commands to the device to obtain desired data.

6.4.2.1. Data reporting

After selecting the reporting channel, corresponding parameters must be configured on the relevant interface to ensure normal access to the remote server.

Edge reporting supports three reporting conditions: periodic reporting, change-based reporting, and scheduled reporting. The reporting channel can be TCP, UDP, MQTT, HTTP, AWS, ALI, or a combination created via grouping. Groups can be flexibly created. Each group can select an independent link, reporting conditions, and reporting template. Groups operate independently of each other. A maximum of 20 groups can be created, with a maximum report data template size of 8KB per group.



- Period Report: Actively reports data at regular intervals. The reporting period is configurable.
- Change-Based Reporting: Data is reported immediately when the absolute difference between newly collected data and old data for a data point is greater than or equal to the set change threshold. The change threshold is configurable. This function is in the data point setting page.
- Timer report:

Report at the exact hour: Starts at 0:00, reports every hour.

Report at the exact quarter: Starts at 0:00, reports every 15 minutes.

Report at the exact minute: Starts at 0:00, reports every 1 minute.

Report at the fixed time: Can select a fixed time each day for reporting, e.g., 12:05.

- Error Fill: If data point collection fails, the 'value' in the data template is replaced with this fill content for reporting, e.g., {"temperature": "error"}.
- Quote Enclosed: By default, reported data point values are numeric types, e.g., {"temperature": 30, "humidity": 40}. If the server requires string type data, check this option. Reported data will then become {"temperature": "30", "humidity": "40"}.

6.4.2.2. JSON Template

The data reporting function uploads point data to the server in JSON format. Customers can customize the JSON template according to server requirements to ensure the uploaded data format meets the server's parsing requirements. The actual names of data points can be defined within the JSON template. However, note the following when configuring the JSON template:

1. The default JSON template format is:

{"device01": {"node0101": "node0101", "node0102": "node0102"}, "device02": {"node0201": "node0201", "node0202": "node0202"}, "time": "sys_local_time"};

2. The Key is user-defined data and can be set to the actual physical name of the data point. It is not modified during data reporting.

3. The Value is a string type and must be filled with the data point name. During data reporting, the actual collected value corresponding to the point name is substituted.

4. Example:

Edge points node0101 and node0102 have collected values of 30 and 20, respectively.

Points node0201 and node0202 have collected values of 50 and 60, respectively.

time is the local time.

JSON template set as:

{"device01": {"node0101": "node0101", "node0102": "node0102"}, "device02": {"node0201": "node0201", "node0202": "node0202"}, "time": "sys_local_time"};

Actual reported data format: {"device01": {"node0101": "30", "node0102": "20"}, "device02": {"node0201": "50", "node0202": "60"}, "time": "2025-03-05,22:32:41"};

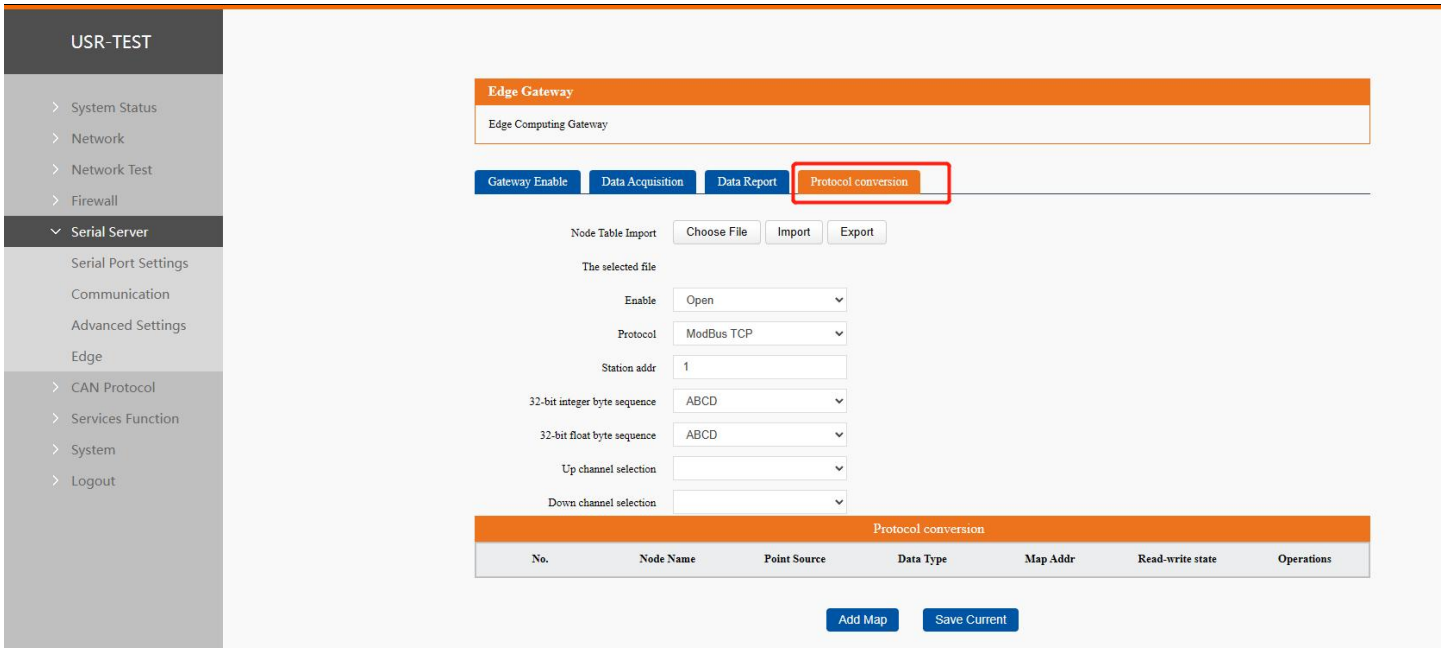
In addition to data points, the JSON template can include specific identifiers, such as product firmware version, SN, MAC, etc. These can be used as unique device identifiers or recognition information. Add the relevant identifier name directly in the 'value' position of the JSON template. The device will substitute the corresponding data for that identifier during reporting. For example, to report a timestamp, set the JSON template to {"time": "sys_unix_time"}, the device would report {"time": "1681985788"}.

Identifier	Meaning	Report Content Example
sys_ver	Product Model	W650
sys_fw_ver	Product Firmware Version	V1.0.06.000000.0000
sys_sn	SN	02700122093000012356
sys_mac	MAC	D4AD20474662
sys_local_time	Local Time	2023-07-07,09:30:18
sys_utc_time	UTC Time (0 timezone)	2023-07-07T01:07:44Z
sys_timestamp	Timestamp	1681985788
sys_timestamp_ms	Millisecond Timestamp	1766477477000

Note: System point names are listed in the point table. More system point names can be obtained in the System_Slave slave.

6.4.3. Protocol conversion

The protocol conversion function primarily allows the server to issue query and set commands through the link channel, directly obtaining or modifying point data. It can run simultaneously with the active reporting function. This function must be enabled. After setting the communication protocol method for point reading/writing, the cloud can obtain and modify/control point data according to the established communication protocol.



- Channel Selection: Up to 6 communication links can be established. Only single-channel communication is supported for this function. If the MQTT channel is selected, separate subscription and publishing topics for reading/writing must be configured.
- Read/Write Method: Supports Modbus TCP and JSON. JSON has a fixed protocol format.

When sending query command from the server should in specific format. The query/control Json contents are the following format:

{"rw_prot": {"Ver": "protocol version","dir": "transmission direction","id": "id","r_data": [{"name": "name of data points"],"w_data": [{"name": "name of data points","value": "data"}]}

Key-value	Description
rw_prot	Protocol header
ver	Protocol version, fixed value: 1.0.1
dir	Data transmission direction In query/control command, the option should be down. Means transmit data from network to serial device, “down” must be lowercase.
id	User defined parameter. The id is same in query/control and response data. Sometimes, the query/control data is high frequency, the response data may be disordered. The program in network can confirm the relevant response data by the id.
r_data	The data load for querying data
w_data	The data load for controlling data
name	The name of data points
value	Means the data need to be sent to the data points. In query data, this key-value can be ignored.

The response data contents are the following format:

{"rw_prot": {"Ver": "protocol version","dir": "transmission direction","id": "id","r_data": [{"name": "name of data points","value": "data","err": "error code"}],"w_data": [{"name": "name of data points","value": "data","err": "error code"}]}

Key-value	Description
rw_prot	Protocol header
ver	Protocol version,fixed value: 1.0.1
dir	Data transmission direction In response data, the option should be up. Means transmit data from serial device to network, “up” must be lowercase.
id	User defined parameter. The id is same in query/control and response data. Sometimes, the query/control data is high frequency, the response data may be disordered. The program in network can confirm the relevant response data by the id.
r_data	The data load for querying data
w_data	The data load for controlling data
name	The name of data points.
value	The valid data of the data points
err	Error code, 0: The command can be operated by the USR-N720-ETH, 1: The command can’t be operated by the USR-N720-ETH.

To read the value of node0101 and the Humidity, we can send data like the following:

```
{"rw_prot":
  {"Ver": "1.0.1",
   "dir": "down",
   "id": "12345",
   "r_data": [{"name": "temperature"},{"name":"Humidity"}]
  }
}
```

To write the value of node0101 and the Humidity, we can send data like the following:

```
{"rw_prot":
  {"Ver": "1.0.1",
   "dir": "down",
   "id": "12345",
```

"w_data": [{"name": "node0101","value":"15"},{"name":"Humidity","value":"52"}]

}

}

There are 3 response data for the unoperated command:

- The USR-W650 responses no data to the command,
- The USR-W650 will response data conforming to the error protocol if the ver/dir/id is not right,
- The USR-W650 will response data conforming to the error protocol if the contents of r_data and w_data are both wrong,
- The USR-W650 will response data of the right one if only one of the r_data and w_data is wrong.

The error protocol format is the following:

{"rw_prot": {"Ver": "1.0.1","dir": "up","err":"1"}

Tips:

1. If the query command is incorrect, the value of the read command reply is empty, and the value of the write command reply is the historical data value.

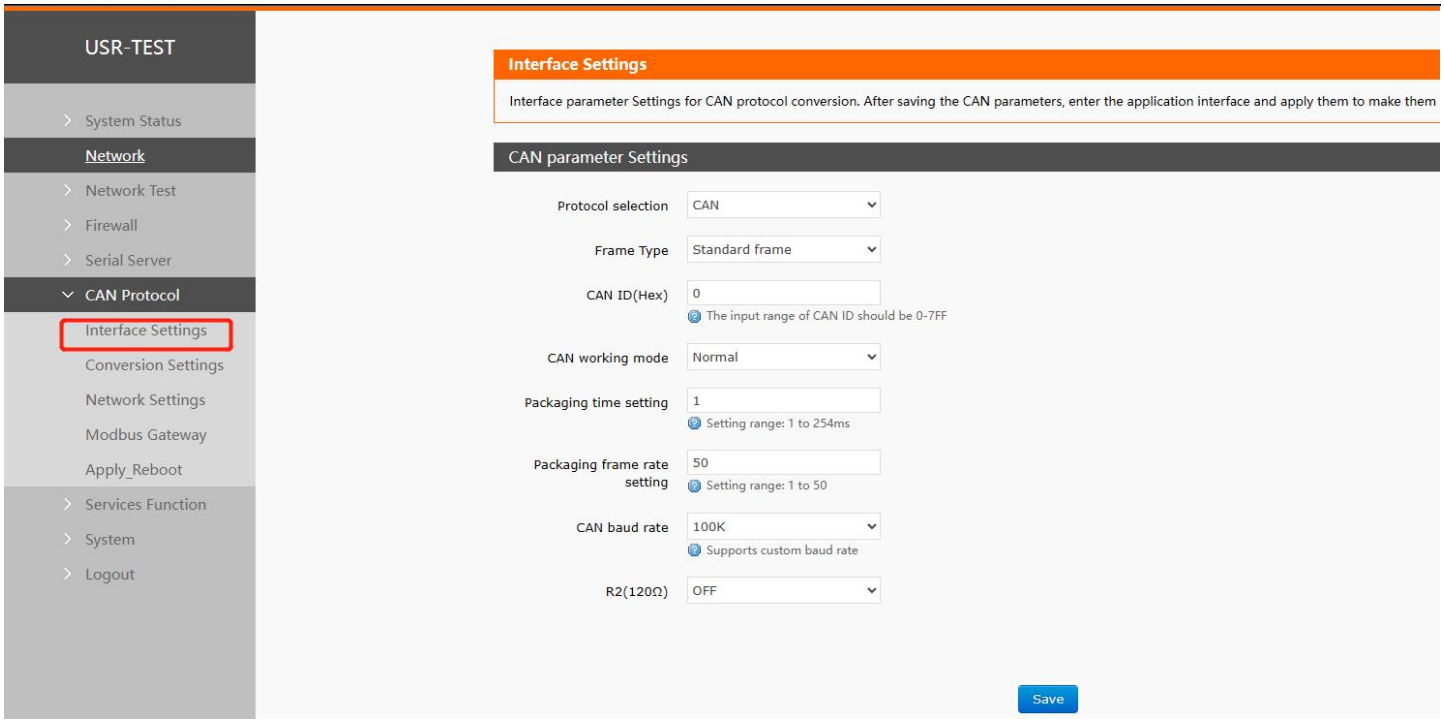
2. The maximum read and write operation is 127 data points at the same time.

7. CAN Gateway

This function easily connects terminal devices to the CAN-BUS. Features one CAN port converting to WiFi/Ethernet, enabling flexible transmission. Supports five data conversion modes: transparent conversion, transparent conversion with ID, standard protocol conversion, Modbus conversion, and custom frame conversion. Supports the CANFD protocol and is compatible with standard CAN2.0A/2.0B protocols. Supports CANFD to Modbus RTU/TCP conversion, can act as both master and slave stations. One device serves multiple roles, not only a CAN data converter but also a CAN to Modbus gateway.

7.1. Basic settings

Basic CAN parameter settings.

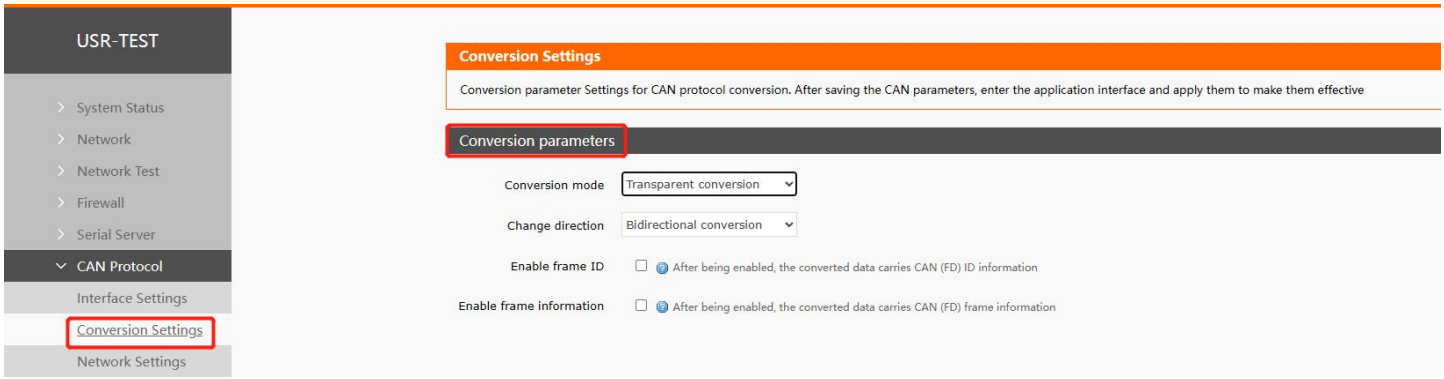


Item	Description	Default Value
Protocol	CAN: the converter forwards data as CAN messages CAN FD:data is forwarded as CANFD messages	CAN
Frame Type	Standard / Extended frame	Standard frame
CAN ID	Hex format, Standard frame: 0 - 7FF Extended frame: 0~1FFFFFFF	0
CAN working mode	Normal: Can normally receive and transmit data. Just listen:CAN port operates in monitor mode, does not respond. Loop: Sent data is received by the device itself and also transmitted onto the CAN bus, but data cannot be sent into the module. Mainly used for testing.	Normal
Packaging time	Unit: ms Range: 1-254	1
Packaging length	Unit: frame Range: 1-50	50
CAN baud rate	5Kbps~1000Kbps(Only for can protocol), supports custom baud rate	100K
CANFD	OFF: Baud rate of the data domain is unavailable	OFF

Item	Description	Default Value
Acceleration	ON: Baud rate of the data domain is available	
Baud rate type	Conventional baud rate:common baud rates recommended by CIA can be set directly via the web page Custom baud rate: use the baud rate calculator to compute the desired baud rate value	Conventional baud rate
Baud rate of the arbitration domain	Range: 5Kbps~1000Kbps	100K
Baud rate of the data domain	Range: 100kbps~5Mbps Data Phase baud rate takes effect only after enabling CANFD acceleration.	100K
R2(120Ω)	Internal 120Ω resistor; can be set to connect the 120Ω resistor into the CAN-bus.	OFF

7.2. Conversion Settings

7.2.1. Conversion parameters



Note:

(1) **Conversion Mode:** Supports **Transparent Conversion**, **Transparent Conversion with ID**, **Standard Protocol Conversion**, **Modbus Protocol Conversion**, **and Custom Header/Trailer Conversion**. Each mode has different conversion rules, enabling mutual conversion between serial frame information and CAN(FD) frame information.

(2) **Conversion Direction:** By selecting the conversion direction, interference from unwanted data on either bus side can be excluded. Three options:

* Bidirectional: Converter converts network data to CAN bus and CAN bus data to the network.

* Network to CAN Only: Only converts network data to CAN bus, not CAN bus data to the network.

* CAN to Network Only: Only converts CAN bus data to the network, not network data to CAN bus.

(3) **Enable Frame ID**: Effective only in Transparent Conversion. When checked, the converter adds the CAN(FD) message's Frame ID before the serial frame data, after the frame information (if enabled). Unchecked: does not convert the CAN(FD) Frame ID.

(4) **Enable Frame Information**: Effective only in Transparent Conversion. When checked, the converter adds the CAN(FD) message's frame information as the first byte of the serial frame. Unchecked: does not convert CAN(FD) frame information.

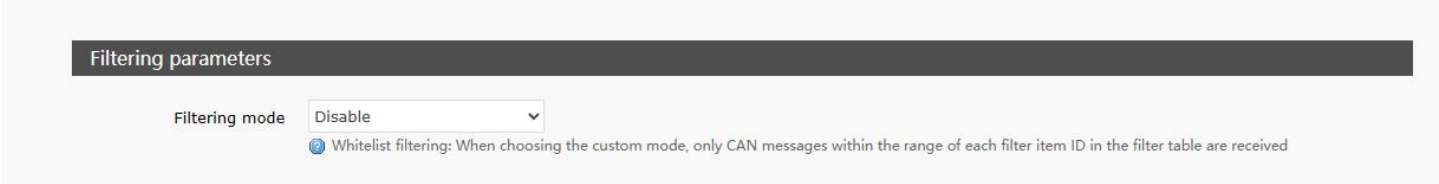
(5) **Transparent with ID Length**: Effective only in Transparent with ID Conversion. When converting serial data to CAN(FD) message, defines the length (in bytes) of the Frame ID starting byte within the serial frame. For Standard Frames, 1~2 bytes can be filled (corresponding to ID1, ID2 of the CAN(FD) message). For Extended Frames, 1~4 bytes can be filled (corresponding to ID1, ID2, ID3, ID4). Standard Frame ID is 11 bits, Extended Frame ID is 29 bits.

(6) **Transparent with ID Position**: Effective only in Transparent with ID Conversion. When converting serial data to CAN(FD) message, defines the offset position (in bytes) of the Frame ID starting byte within the serial frame.

(7) **Custom Header**: Effective only in Custom Header/Trailer Conversion. User-defined serial frame header. Length: 1 byte.

(8) **Custom Trailer**: Effective only in Custom Header/Trailer Conversion. User-defined serial frame trailer. Length: 1 byte.

7.2.2. Filtering parameters

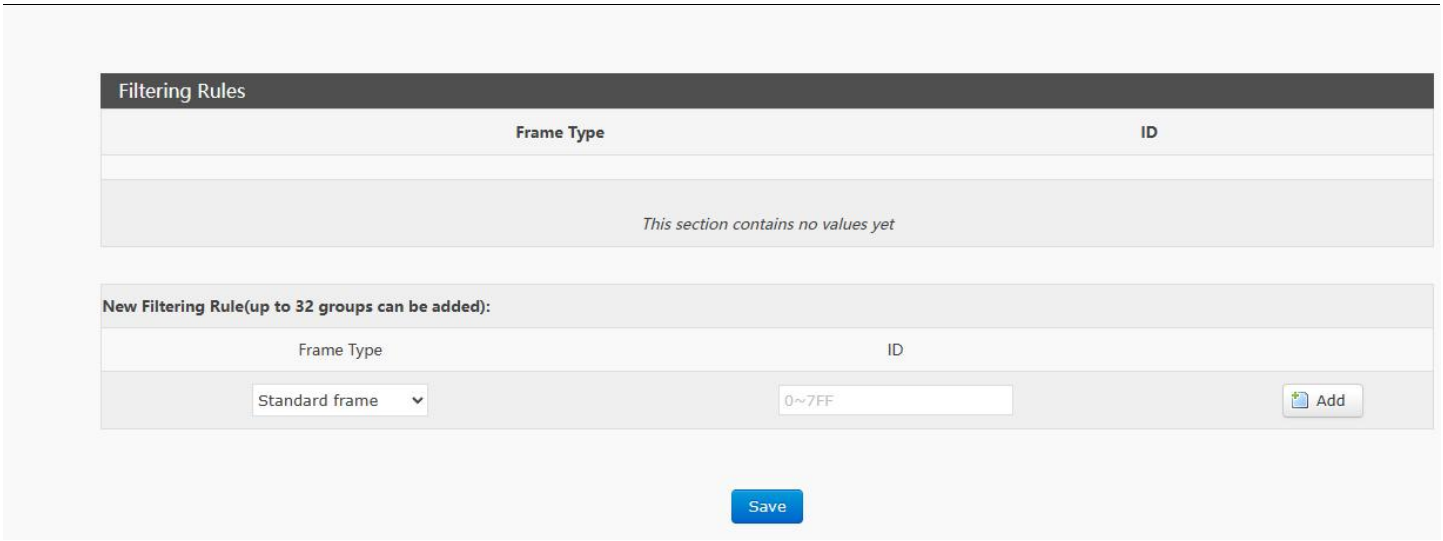


(1) **Filter ID Function**: Filters CAN bus data, selectively receiving messages. This minimizes network load to the greatest extent.

(2) **Filtering Mode**: Three types: Receive Extended Frames Only, Receive Standard Frames Only, Custom.

7.2.3. Filtering Rules

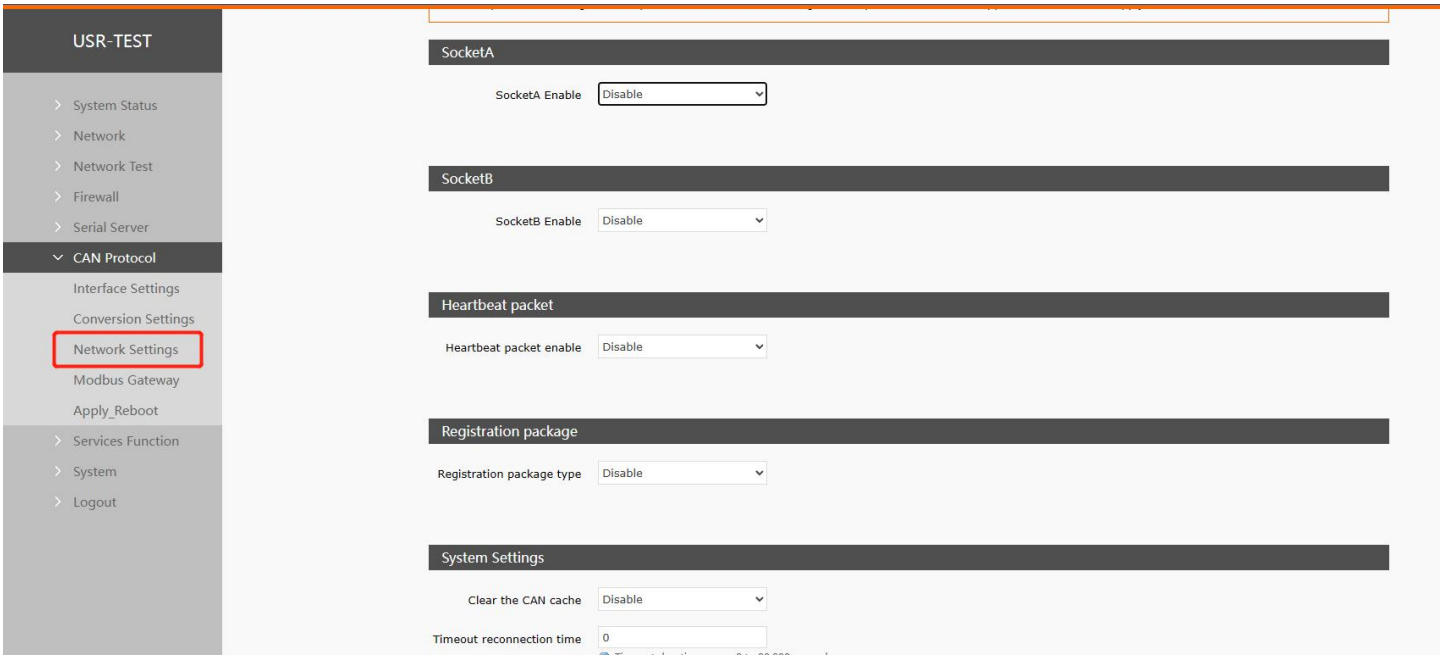
In Custom filtering mode, users can add IDs they want to receive. Up to 32 groups can be set.



Add filter rule, input the ID to receive. Each group can choose Extended Frame or Standard Frame. Standard Frame range: 0~7FF, Extended Frame range: 0~1FFFFFFF.

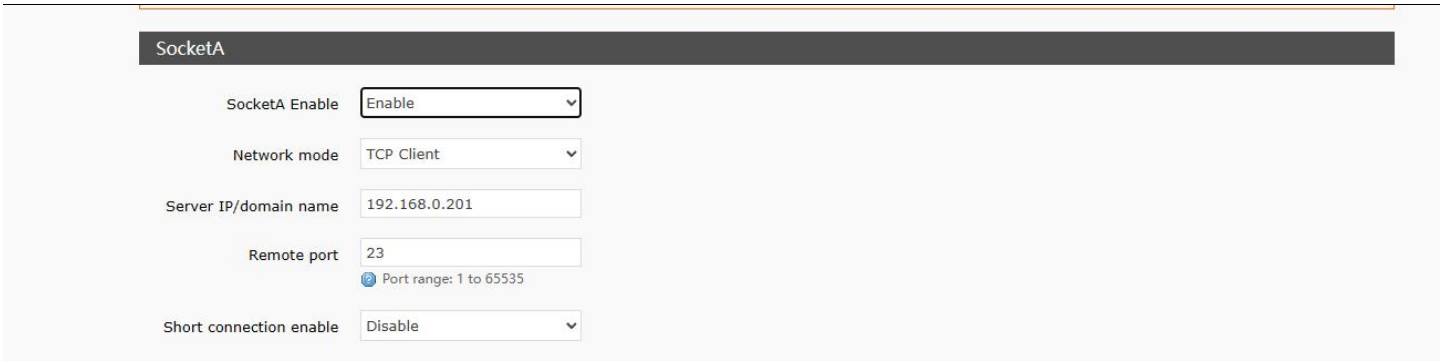
7.3. Network Settings

W650 CAN function supports simultaneous use of two Sockets, operating modes: TCP Client, UDP Client.



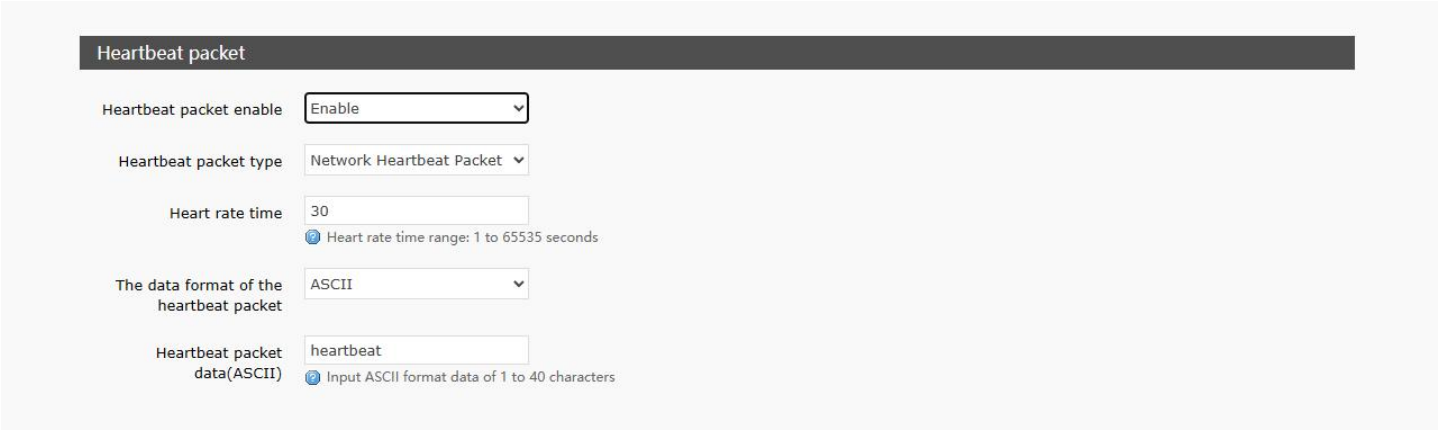
7.3.1. Socket settings

USR-W650 support 2 mode: TCP client and UDP client. Users can achieve data communication between the W650 and the server by setting parameters.



7.3.2. Heartbeat packet

The client sends a heartbeat packet to the server or CAN device. Only one type is effective at a time.



Note:

- Network Heartbeat: When there is no data from the network side, sends periodically to the network server to maintain the connection. Supports HEX and ASCII formats.
- CAN Heartbeat: Can serve as a fixed query command, sent to CAN via heartbeat. Content must comply with CAN format. CAN frame format, frame type, and frame ID are configurable.

7.3.3. Registration package

The registration packet can be configured to send upon connection or prepend to each data packet, or both can be effective. 'Send upon connection' refers to sending when a TCP connection is established or UDP communication is initiated. 'Prepend to data packet' means adding the registration packet data to the front of each data packet sent. Registration packet data can be the MAC address or custom data, with custom registration data up to 40 bytes maximum.

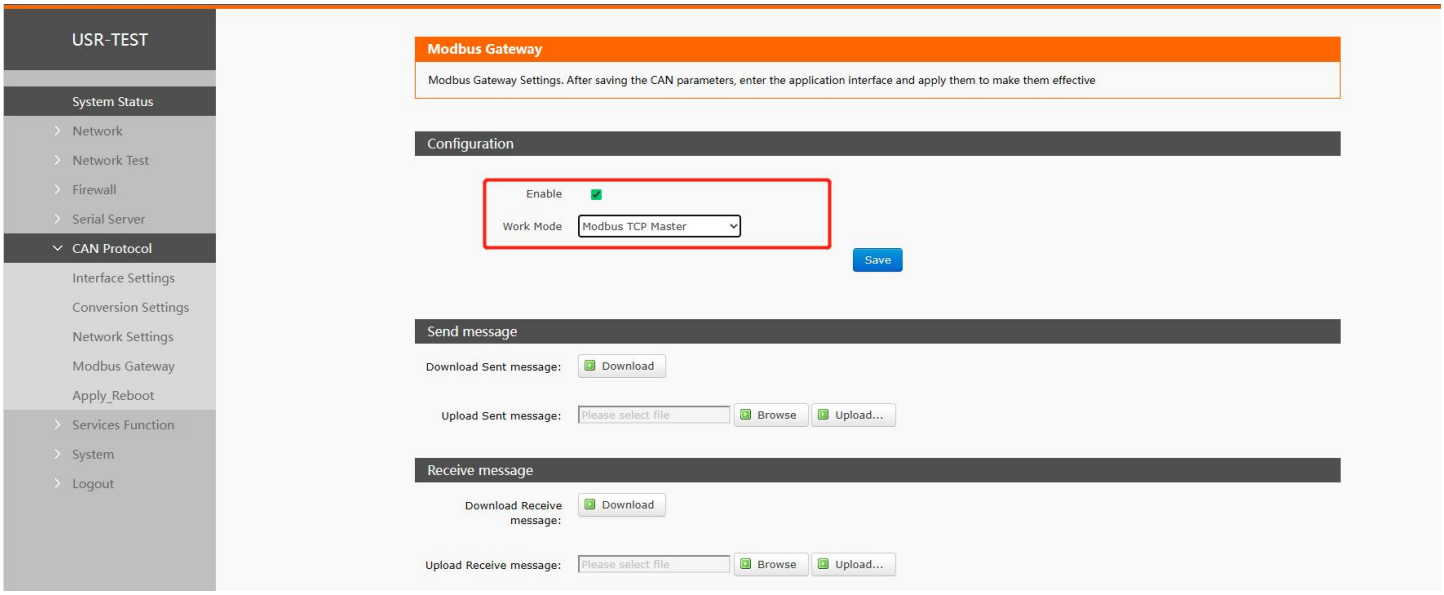
7.3.4. System Settings

Data received from the CAN port will be placed in a buffer. The CAN receive buffer holds a maximum of 200 frames. After a TCP connection is established, the CAN port buffer data can be set to be cleared or not per customer requirements. Default is not to clear. In TCP Client mode with Short Connection enabled, the clear cache function becomes invalid.

Timeout Reconnection is Used to re-establish connection if there is no data from the server side for a specified period.

7.4. Modbus Gateway

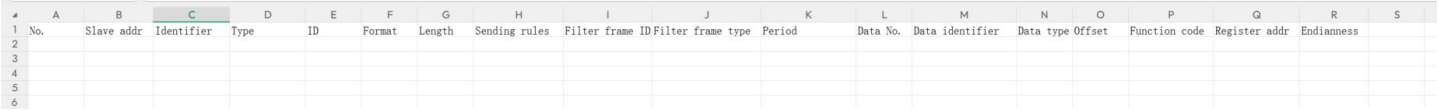
USR-W650 supports CAN to Modbus TCP, and it works as Modbus master.



7.4.1. Send massage

The USR-W650 supports the active collection of Modbus data and maps it to the corresponding positions of the CAN data frame. It then sends it in the form of a CAN frame according to the set rules. It supports a maximum of 64 transmission message configurations, where each message can add up to 32 variable data items, which are mapped to the corresponding data positions in the CAN frame.

This function requires exporting the message template, editing it, and uploading it.



No.	Slave addr	Identifier	Type	ID	Format	Length	Sending rules	Filter frame ID	Filter frame type	Period	Data No.	Data identifier	Data type	Offset	Function code	Register addr	Endianness

Item	Description	Default Value
Message ID	The sequence number of the message. It is not mapped to CAN data and is only used to distinguish messages.	1~64
Slave Address	ID of the Modbus slave device	1~255 (Only a unique slave is supported)
Message Name	The name of the transmitted message. It is not mapped to CAN data and is only used as a mnemonic.	0
Frame Type	The frame type of the transmitted message.	Standard Frame Extended Frame
Frame ID	The Frame ID of the transmitted message.	Hexadecimal (hex format): 0~0x7FF (Standard Frame) 0~0x1FFFFFFF (Extended Frame)
Frame format	Remote frame or data frame. This option is invalid when CAN type is selected as CAN FD.	1: remote frame 0: data frame
Data Length	Length of the data field in the transmitted frame. Maximum 8 bytes for CAN frames, maximum 64 bytes for CAN FD frames. Note: For CAN FD frames, this must be set to a length encodable by DLC.	0~8 (CAN) 0~8, 12, 16, 20, 24, 32, 48, 64 (CAN FD)
Transmission Rule	The mode that triggers the device to send the CAN message. - Periodic Transmission: Reports according to the set cycle time. - On-Change Transmission: Reports when any data point within this message group changes. - Single Transmission: Transmits once after connection is established. - Frame ID Triggered: Transmits upon receiving a specified Frame ID.	1: Periodic Transmission 2: On-Change Transmission 3: Single Transmission 4. Frame ID Triggered
Frame ID Triggered	Effective in Frame ID Triggered mode. Refers to the Frame ID of the CAN frame that triggers the transmission of this message.	Hexadecimal (hex format): 0~0x7FF (Standard Frame) 0~0x1FFFFFFF (Extended Frame)
Trigger Frame	Effective in Frame ID Triggered mode. Refers to the frame	Standard Frame

Item	Description	Default Value
Type	type of the CAN frame that triggers the transmission of this message.	Extended Frame
Periodic	When the transmission rule is "Periodic Transmission", this is the cycle time for transmission. When the transmission rule is "On-Change Transmission", this is the period for checking Modbus data changes. Within this period, if any data within the group changes, a transmission occurs; if there is no change, no transmission occurs. When the transmission rule is "Single Transmission", this is the wait time before the single transmission.	0~65535 ms
Variable ID	The sequence number of the variable. It is not mapped to CAN data and is only used to distinguish messages.	1~32
Variable Name	The name of the variable. It is not mapped to CAN data and is only used as a mnemonic.	Supports English letters or numbers
Data type	The size of the mapped data. - ALL: Entire frame data - BYTE: 1 byte - WORD: 2 bytes - DWORD: 4 bytes - QWORD: 8 bytes	ALL BYTE WORD DWORD QWORD
Offset	Selects which byte of the CAN message data field to start sequentially mapping Modbus register data to. When the operation size is ALL, the offset is invalid.	CAN: 0~8 CAN FD: 0~64
Register Type	Modbus register type.	03 (Holding Register) 04 (Input Register)
Register Address	The starting address of the transmitted message data in the device's or Modbus slave's registers.	0~65534
Endianness	The method of Modbus data storage.	B: Big-Endian S: Little-Endian

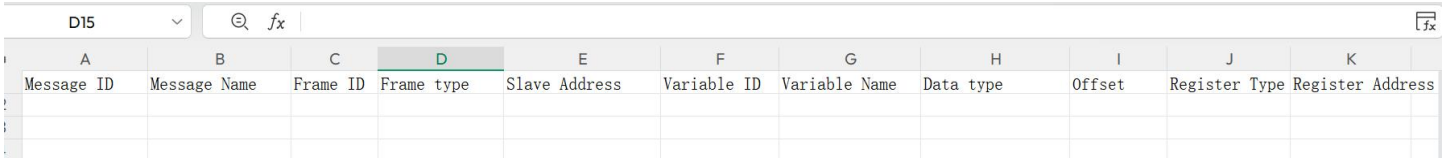
Note:

During the editing of CSV files, for each additional variable, the corresponding message needs to be filled in.

7.4.2. Receive message

By configuring the device to receive message templates, it is possible to write the data segments of CAN

messages into the registers of the Modbus slave station. Up to 64 sets of receiving message configurations can be supported, and each message can include up to 32 variable data items.



Item	Description	Default Value
Message ID	The sequence number of the message. It is not mapped to CAN data and is only used to distinguish messages.	1~64
Message Name	The name of the transmitted message. It is not mapped to CAN data and is only used as a mnemonic.	0
Frame ID	The Frame ID of the received message.	Hexadecimal (hex format): 0~0x7FF (Standard Frame) 0~0x1FFFFFFF (Extended Frame)
Frame Type	The frame type of the transmitted message.	Standard Frame Extended Frame
Slave Address	ID of the Modbus slave device	1~255 (Only a unique slave is supported)
Variable ID	The sequence number of the variable. It is not mapped to CAN data and is only used to distinguish messages.	1~32
Variable Name	The name of the variable. It is not mapped to CAN data and is only used as a mnemonic.	Supports English letters or numbers
Data type	The size of the mapped data. - ALL: Entire frame data - BYTE: 1 byte - WORD: 2 bytes - DWORD: 4 bytes - QWORD: 8 bytes	ALL BYTE WORD DWORD QWORD
Offset	Selects which byte of the CAN message data field to start sequentially mapping Modbus register data to. When the operation size is ALL, the offset is invalid.	CAN: 0~8 CAN FD: 0~64

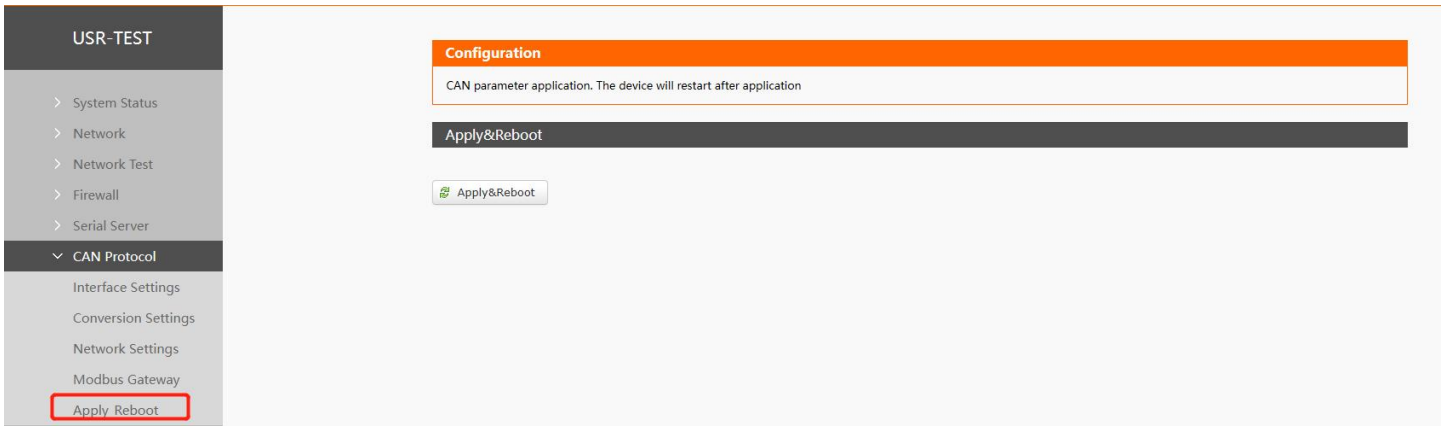
Item	Description	Default Value
Register Type	Modbus register type.	03 (Holding Register)
Register Address	The starting address of the transmitted message data in the device's or Modbus slave's registers.	0~65534

Note:

During the editing of CSV files, for each additional variable, the corresponding message needs to be filled in.

7.5. Apply & reboot

Applies CAN parameters; device will reboot after application.



8. Service function

8.1. PUSR Cloud

PUSR Cloud address: https://account.usriot.com/#/login. Using PUSR Cloud service allows wireless client devices to be monitored and controlled efficiently and uniformly managed on Someone's Cloud platform.

The USR-W650 default disables PUSR Cloud service function. The interface can be configured to report parameters such as traffic statistics, network status, and heartbeat packets. It also supports data reporting to private deployments.

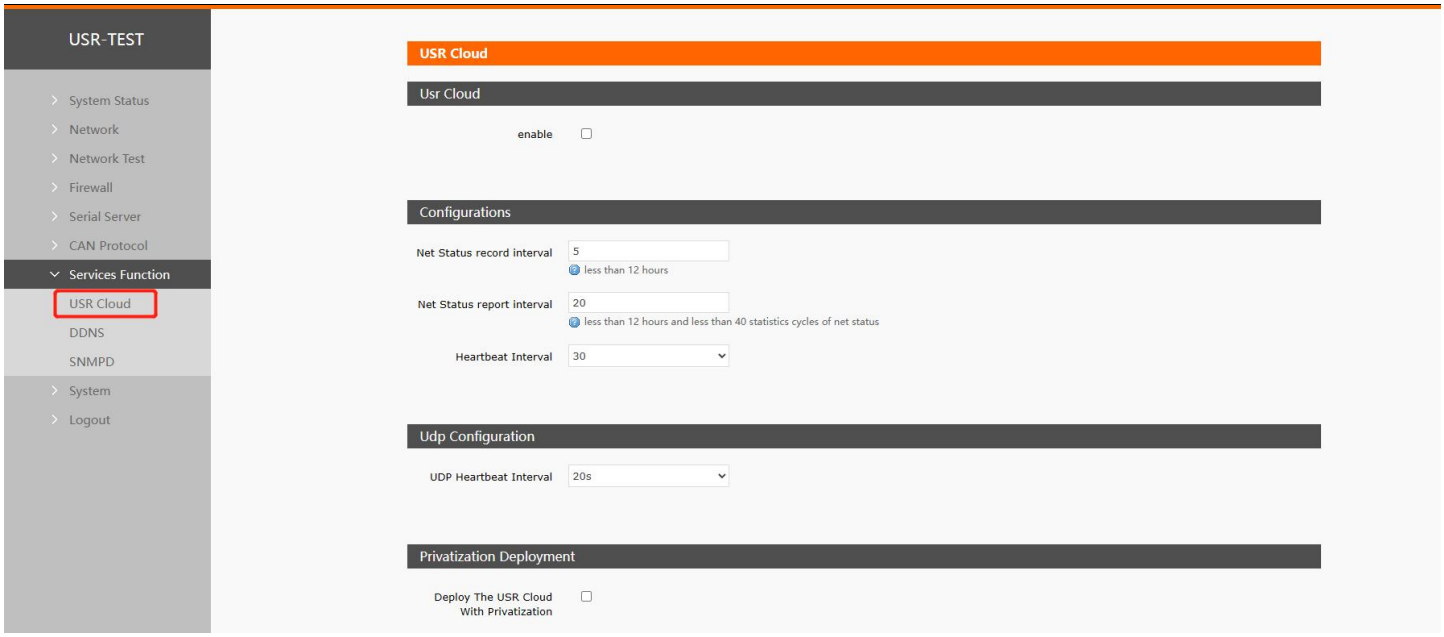


Figure 43. PUSR cloud

8.2. DDNS

DDNS (Dynamic Domain Name Server) is a service that maps a user's dynamic IP address to a fixed domain name resolution service. Each time a user connects to the network, the client program sends the dynamic IP address of the host to the server program located on the service provider's host through information transmission. The server program is responsible for providing DNS services and implementing dynamic domain name resolution.

8.2.1. Supported Services

The use of dynamic domain names falls into two scenarios. The first scenario is when the wireless client itself supports this service (check under the "Service" dropdown menu and select the corresponding DDNS service provider, here using Peanut Shell). The setup method is as follows:

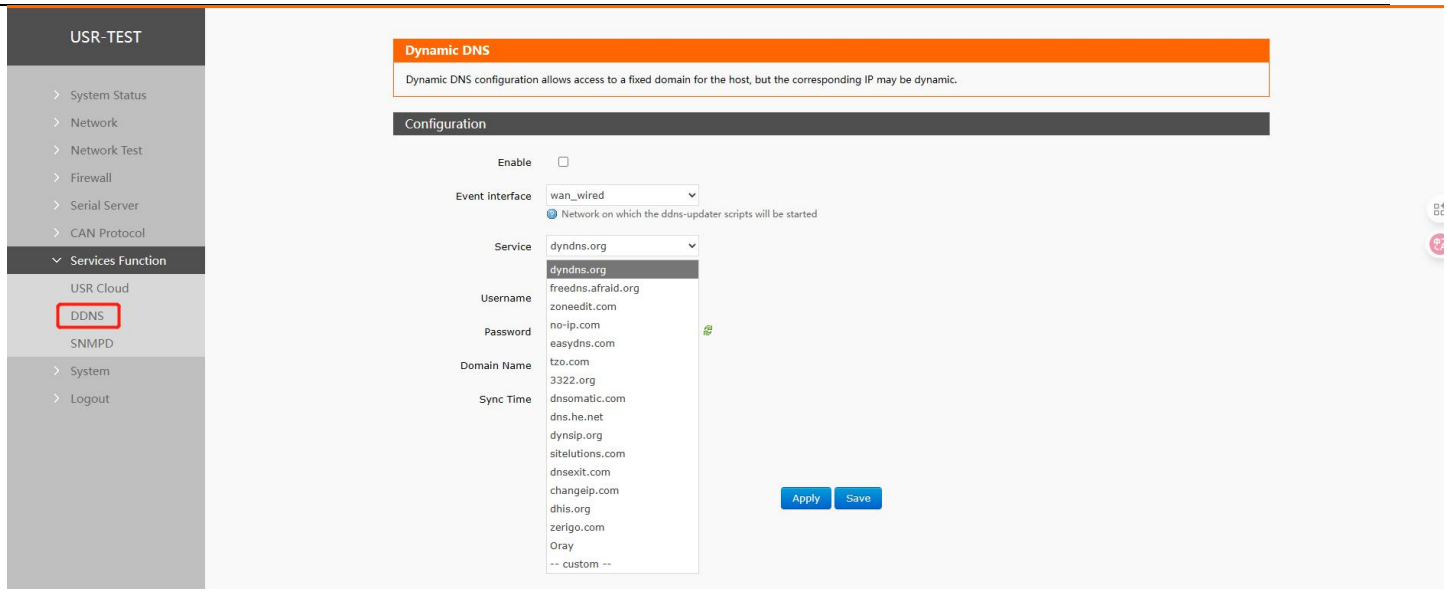


Figure 44. Dyndns Service

•DDNS function provides dynamic domain name resolution capability for wireless clients in the external network, allowing them to apply for a domain name that points to their WAN IP address.

•This feature allows remote access to wireless clients directly through domain names.

•Parameters need to be filled in as follows (using Peanut Shell as an example).

Items	Description	Default
Enable	Check to enable DDNS functionality	Not checked
Event interface	Choose which WAN port as needed	wan_wired
Service	Please fill in the DDNS service address	dyndns.org
Username	Peanut Shell account name	username
Password	Peanut Shell password	password
Domain Name	DDNS applied domain name	NULL
Sync Time	Unit: s Interval to detect IP address changes	300

8.2.2. User Defined DNS Service

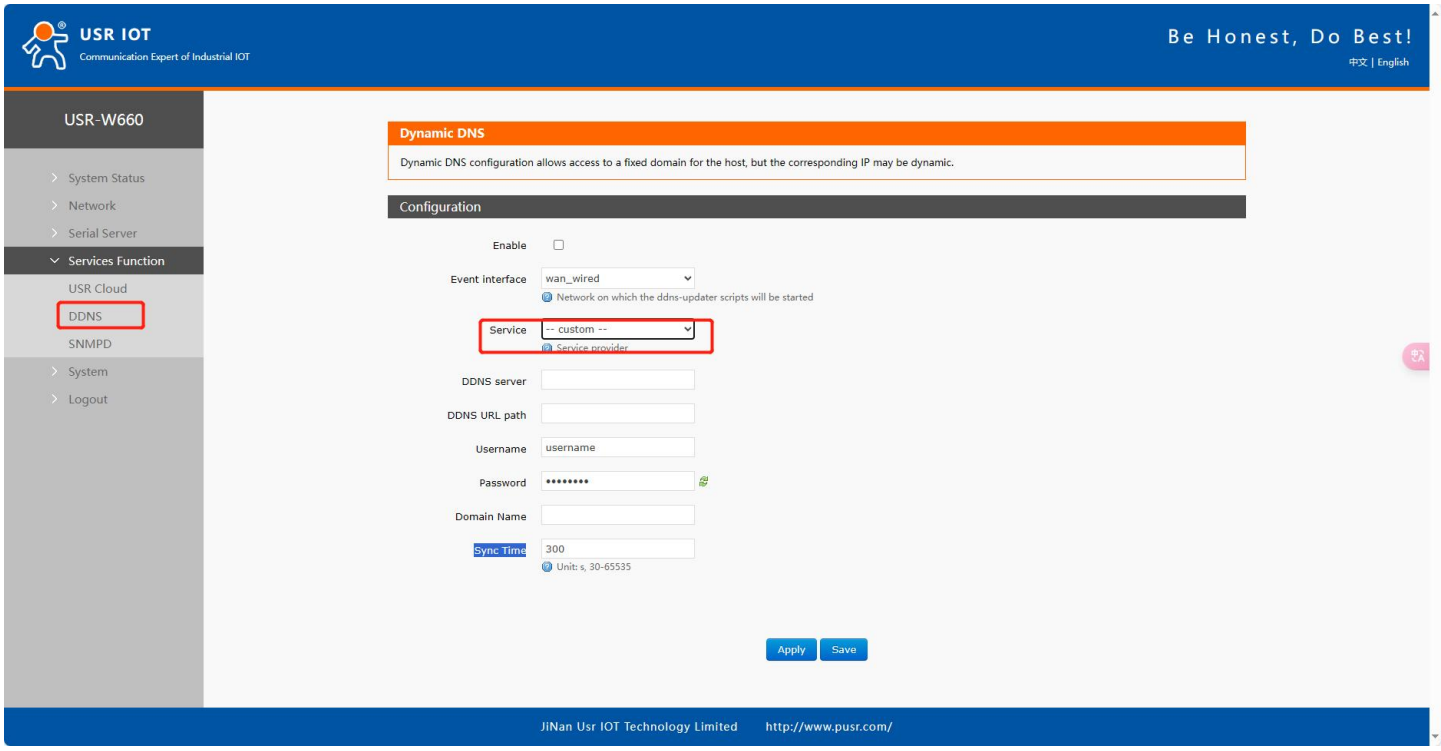


Figure 45. User defined DNS settings

Items	Description	Default
Enable	Check to enable DDNS functionality	OFF
Event interface	Choose which WAN port as needed	wan_wired
Service	Choose the corresponding server, here selecting Custom	dyndns.org
DDNS server	DDNS provider address, here fill in ddns.oray.com	NULL
DDNS URL path	Please fill in the service URL path for DDNS (here using Peanut Shell as an example, select Custom service), Peanut Shell URL is as follows: /ph/update?hostname=%h&myip=%i	NULL
Username	Peanut Shell account name	username
Password	Peanut Shell password	password
Domain Name	DDNS applied domain name	NULL
Sync Time	Unit:Second Range: 30~65535	300

Note:

✓Please strictly fill in the parameters as described in the table, including Service/URL, Registered Domain Name,

Username/Password, Interface, to ensure accuracy.

✓DDNS + Port Mapping can facilitate remote access to the wireless client's internal network.

✓If the network where the wireless client is located does not have a dedicated public IP address, this feature cannot be utilized.

8.3. SNMPD

The USR-W650 device is equipped with SNMP (Simple Network Management Protocol) service, which allows you to remotely view device information, modify device parameters, and monitor device status using the SNMP protocol. It eliminates the need to be physically present on-site for monitoring and configuring the device. This device supports SNMP versions V2C and V3.

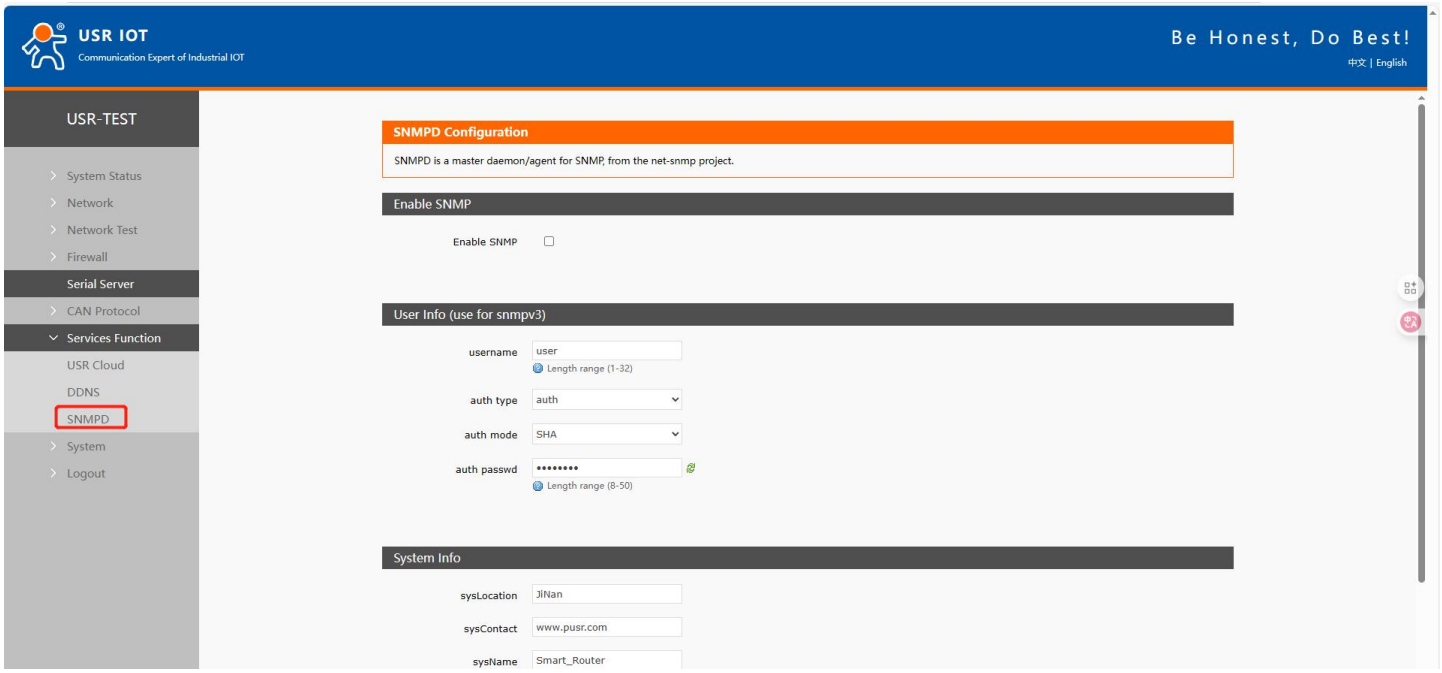


Figure 46. SNMPD settings

Items	Description	Default
Enable SNMP	Enable SNMP service by checking the box	Not checked
username	Name assigned to the SNMP user	user
auth type	Type of authentication, auth or auth_enc	auth
auth mode	Verification protocol used by the user and host to receive traps. MD5 or SHA	SHA
auth passwd	User authorization password	authpass
encryption mode	Encryption protocol type, either DES or AES	DES
encryption passwd	Encryption password used as the encryption private key	privpass
sysLocation	Location of this device	JiNan
sysContact	Person to contact for this device	www.pusr.com
sysName	Name of this device	Smart_Router

9. Contact Us

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