纵横智控

INTELLIGENT CONTROL

ZHL493x Series-Application Manual

Router-series

Version: v1.1.0

Date: 2021-03-16

Status: official document

Update history

version	date	Change description
V1.1.0	2021-03-16	Initial

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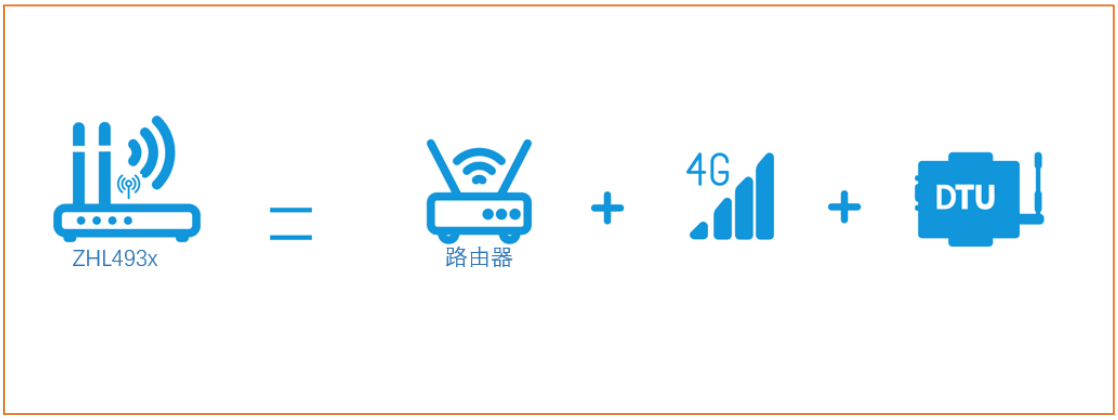
1 Product overview

1.1 Product introduction

ZHL493x is a series of 4G industrial "routers" with multiple network ports. It supports wired WAN port, LAN port, wireless WLAN, and 4G network access. With routing Internet access and remote control as the core function, it is a highly easy-to-use industrial Internet of Things wireless router .

The product uses a high-performance 32-bit communication processor and industrial wireless module, with an embedded real-time operating system as the software support platform, can provide Internet services, and supports 1 dry (wet) node detection, 1 relay output, and 1 relay output. RS485 serial port transparent transmission, supports TCP, MQTT, JSON and other remote protocols. It is an industrial Internet of Things router integrating router + 4G + DTU. It can be widely used in the M2M industry in the Internet of Things industry chain, such as self-service terminal industry, transportation, Industrial automation, environmental protection, petrochemical and other fields. Users can easily and quickly integrate into their own systems.



1.2 Appearance description

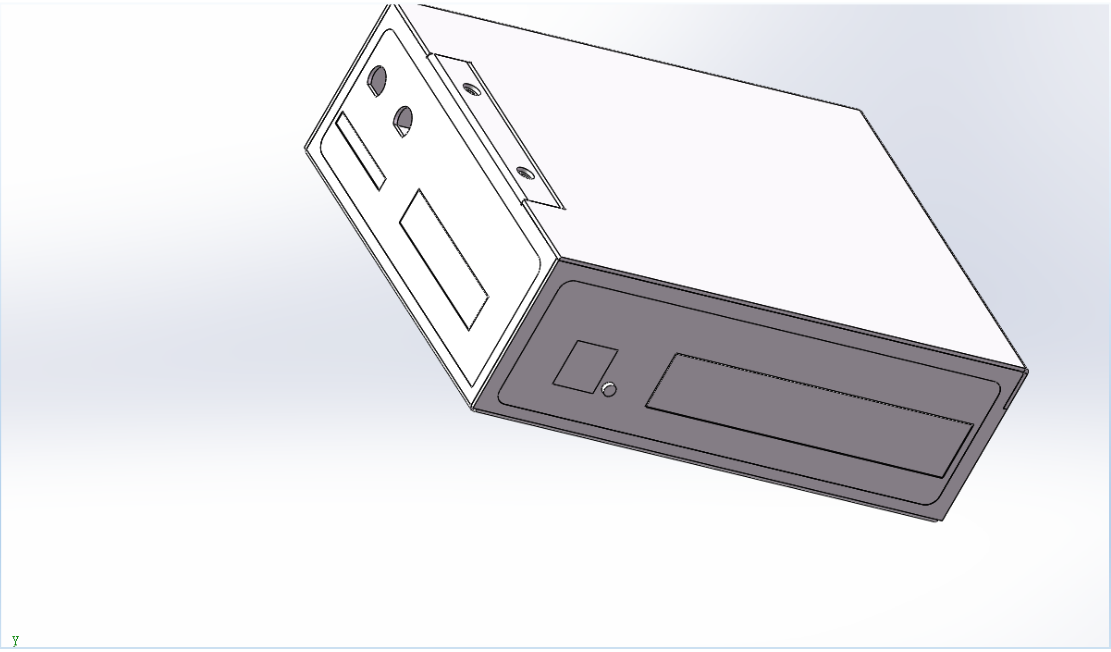


Fig. Appearance of the device

Table. Interface description

Serial number	name	Description
1	DC power terminal	DC 9-36V; 5.08 pitch terminal block A,
2	RS485	B line; 5.08 pitch terminal block DO,
3	DO	COM; 5.08 pitch terminal block
4	DI	DI, COM; 5.08 pitch terminal block
5	SIM card slot	Standard drawer type user card interface, support 1.8V/3V SIM card SMA antenna
6	4G full frequency antenna	interface (outer screw and inner hole)
7	WIFI antenna	SMA antenna interface (outer screw inner hole)
8	Reload button	Reset button
9	WAN port	10/100mbpsT(X) RJ-45 Ethernet port*1
10	LAN port (1-4)	10/100mbpsT(X) RJ-45 Ethernet port*4

Table. Indicator light description

Serial number	name	Description
1	Power light	Hardware indicator, long on after power on
2	Device status light	After the device is connected to the network normally, the frequency flashes
3	DO indicator	The relay is closed and the light is on
4	DI indicator	Dry node: short-circuit light; wet node: high level light
5	WAN	Flashes after connecting to the WAN network
6	WIFI	Flashes after the Wi-Fi network is turned on normally
7	4G_MODE	The 4G module is turned on normally-on
8	4G_NET	Slow flashing (200ms high/1800ms low) Slow flashing in network search
		state (1800ms high/200ms low) Fast flashing in standby state (125ms
		high/125ms low) Data transmission mode

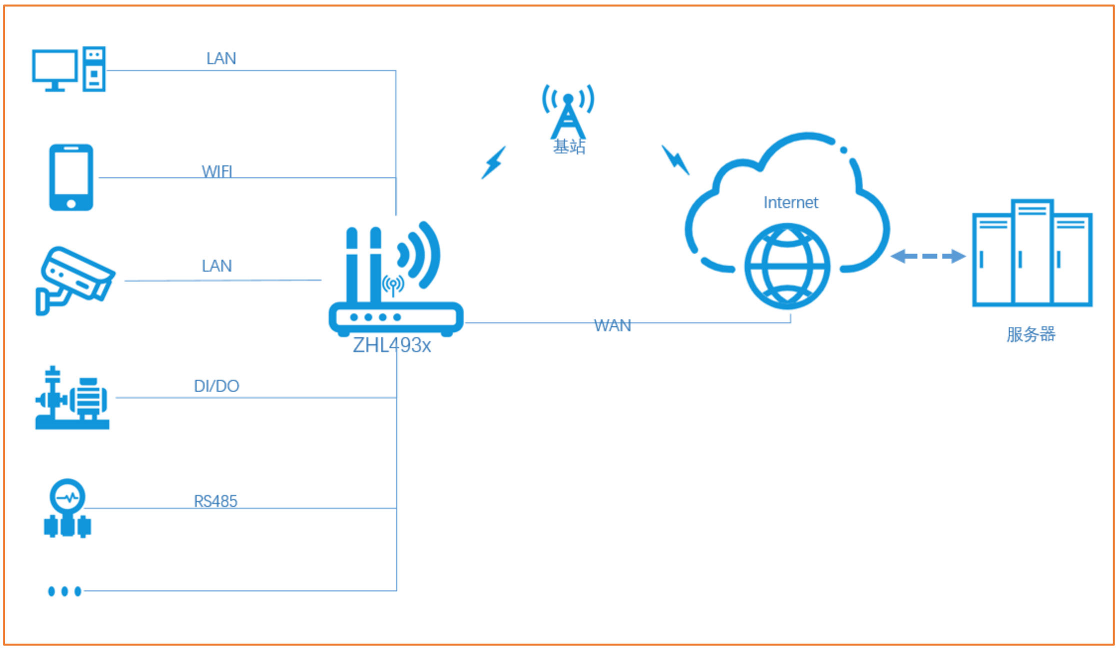
1.3 Product features

- Adopt high-performance 32-bit communication processor, high-performance industrial wireless module
- Support 4 wired LAN ports, 1 wired WAN port, both support 10/100Mbps rate
- Support 1 WLAN wireless local area network
- Support 4G communication network
- Support transparent transmission from serial port, LAN to network
- Support dry (wet) node detection, relay output
- Support WEB page configuration, remote login management equipment
- Support parameter backup, firmware upgrade function
- Support NTP network time synchronization
- Support one-key restore to factory settings
- Support timing restart, WatchCat detection restart function
- Support network diagnosis, firewall
- Support Qos, load balancing settings
- Support one remote server connection, one local server connection

- Support DI, DO active reporting, serial port timing heartbeat function
- Using high-strength metal shell, easy to install by snapping
- Wide voltage input (DC 9~36V)
- Support LED light status monitoring
- WDT watchdog design to ensure the stable operation of the system
- Adopt a complete anti-drop mechanism to ensure that the data terminal is always online

1.4 Networking mode

Common network topology diagrams are as follows:



1.5 Technical parameters

table. Technical Parameters

4G specifications		
System/band standard	LTE-FDD	B1/B3/B5/B8/(B28)
	LTE-TDD	B38/B39/B40/B41
	WCDMA	B1/B8
	TD-SCDMA	B34/B39
	CDMA	BC0
	EVDO	BC0
	GSM	900/1800
	LTE-FDD	Max 150Mbps(DL)/50Mbps(UL)
	LTE-TDD	Max 130Mbps(DL)/35Mbps(UL)
	LTE	Max 10Mbps(DL)/5Mbps(UL) Max
	DC-HSPA+	42Mbps(DL)/5.76Mbps(UL) Max
	TD-SCDMA	4.2Mbps(DL)/2.2Mbps (UL)

specifications	WCDMA	Max 384kbps(DL)/384kbps(UL) Max
	EDEG	236.8kbps(DL)/236.8kbps(UL) Max
	GPRS	85.6kbps(DL)/85.6kbps(UL) Max
	EVDO RevA	3.1Mbps(DL)/1.8Mbps(UL) Max
	CDMA1x	153.6kbps(DL)/153.6kbps(UL)
Transmit power	GSM850/900	33±2dBm
	GSM1800/1900	30±2dBm
	CDMA/EVDO	23 ～30dBm
	WCDMA/HSPA	23+1/-3dBm
	TD-SCDMA	23+1/-3dBm
	LTE-TDD	23±2.7dBm
	LTE-FDD	23±2.7dBm
WIFI specifications		
Wireless standard	Support IEEE802.11b/g/n standard, 2.412GHz-2.484GHz	
Theoretical bandwidth	IEEE802.11b: 1, 2, 5.5, 11Mbps IEEE802.11g: 6,9,12,18,24,36,48,54Mbps IEEE802.11n: MCS0 — MCS7@HT20 MCS0— MCS7@HT40	
Secure encryption	Support WEP, WPA, WPA2 and other encryption	
Transmit power	methods IEEE802.11b: 16dBm IEEE802.11g: 16dBm IEEE802.11n: 18dBm	
Receiving sensitivity	HT40 MCS7: -70dBm@10 %PER(MCS7) HT20 MCS7: -73dBm@10 %PER(MCS7) 54M: -77dBm@10 %PER 11M: -89dBm@8 %PER	
Interface specifications		
WAN port	1 10/100mbpsT(X) Ethernet port, adaptive MDI/MDIX 4	
LAN port	10/100mbpsT(X) Ethernet ports, adaptive MDI/MDIX	
RS485	standard	A, B
	Baud rate	2400-921600
	Data bit	8, 7
	Stop bit	1, 2
	Check Digit	No parity, even parity, odd parity
DI	Default dry node-check on and off (DI, COM), wet node, please consult customer service standards	
DO		NO (long open), COM
	AC	250V-3A
	DC	30V-3A
	Mechanical durability	10ˆ7
	Electrical durability	10ˆ5
SIM card	Standard drawer type user card interface, support 1.8V/3V SIM card 2 standard	
antenna	SMA antenna interface (outer screw and inner hole)	
button	By long pressing this button, the parameter configuration of the router can be restored to the factory value	

Hardware specifications	
powered by	DC: 9-36V
Working current	≈150mA(12V)
Operating temperature	-20 ℃～70℃
storage temperature	-40 ℃～125℃
Working humidity	5% ～95%RH (no condensation)
Storage humidity	1% ～95%RH (no condensation)
Equipment size	159.5*115.5*27.6 mm(L*W*H) (without buckle)

2 Basic functions

2.1 Web configuration page

When using ZHL493x, connect to the LAN port of the router through a PC, or connect to the router WIFI wireless. The user configures and manages the router by accessing the internal web page. The default parameters are as follows:

Table. Default parameters

parameter	default setting
LAN-IP address	192.168.10.1
log-in name	root
login password	password
Wireless name SSID	IOTRouter-OPT
Wireless password	12345678

Prepare the configuration according to the following connection instructions:

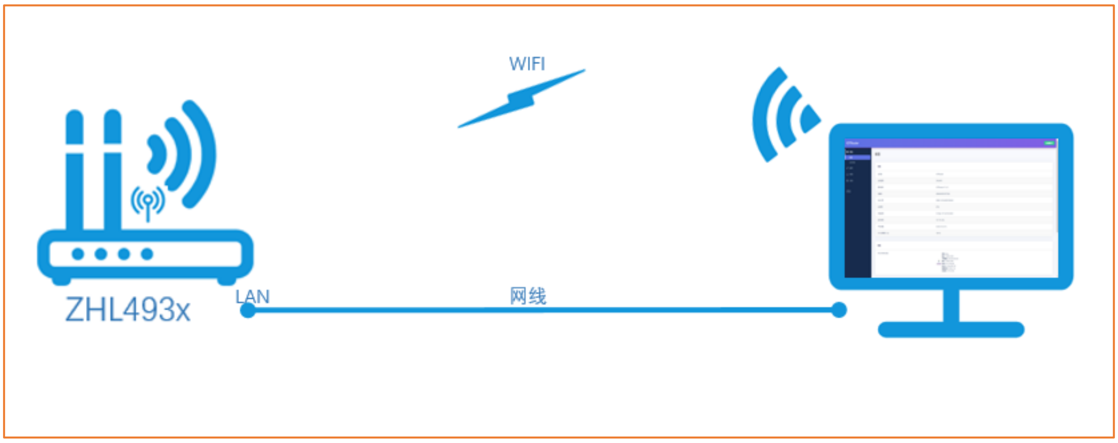
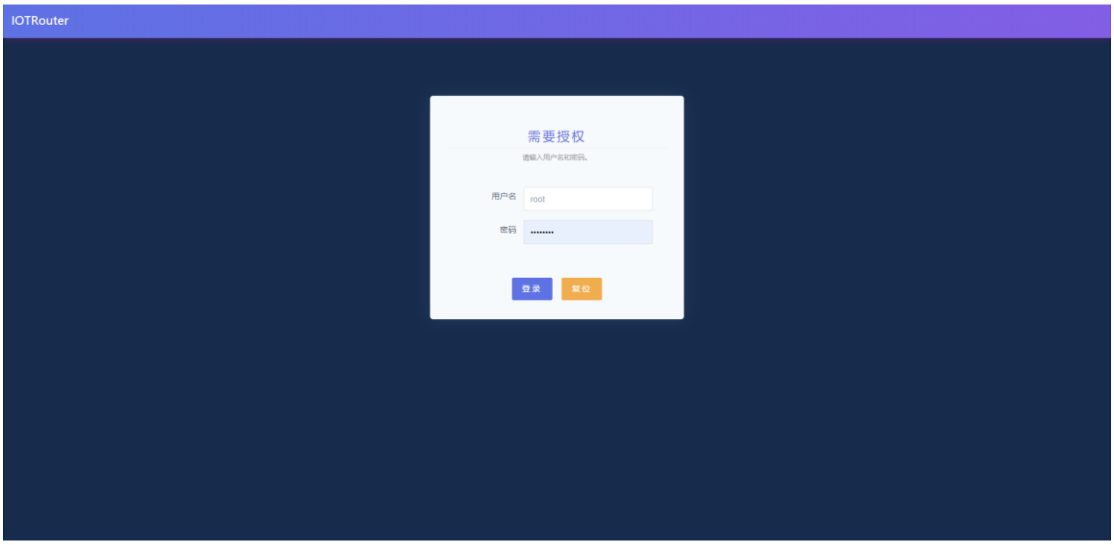


Figure. Device configuration connection diagram

2.1.1 Log in to the configuration page

When the router is correctly connected, open the browser (Google Chrome is recommended), and enter the device IP in the address bar: 192.168.10.1 and press Enter. When logging in for the first time, fill in the default user name and password, and then click Confirm to log in. The management page of ZHL493x will appear on the webpage.



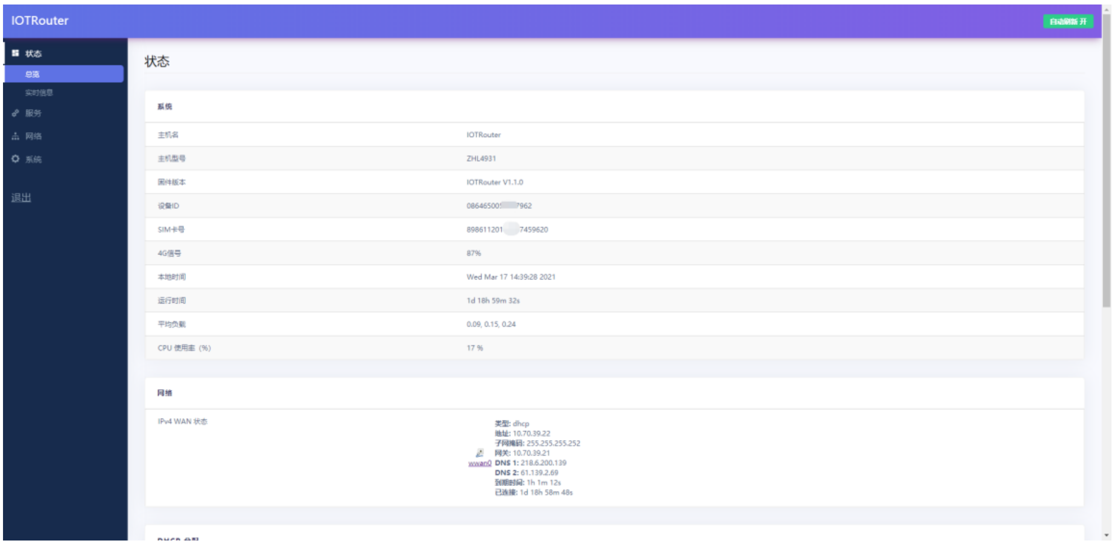
需要授权

请输入用户名和密码。

用户名: root

密码: ••••••••

The status bar can display the basic information of the device: device model, firmware version, device ID, 4G card number and signal, etc. If it does not appear, please refresh the web page and try again.



状态

系统

主机名	IOTRouter
主机型号	ZHL4931
固件版本	IOTRouter V1.1.0
设备ID	086465005[redacted]7962
SIM卡号	898611201[redacted]7459620
4G信号	87%
本地时间	Wed Mar 17 14:39:28 2021
运行时间	1d 18h 59m 32s
平均负载	0.09, 0.15, 0.24
CPU 使用率 (%)	17 %

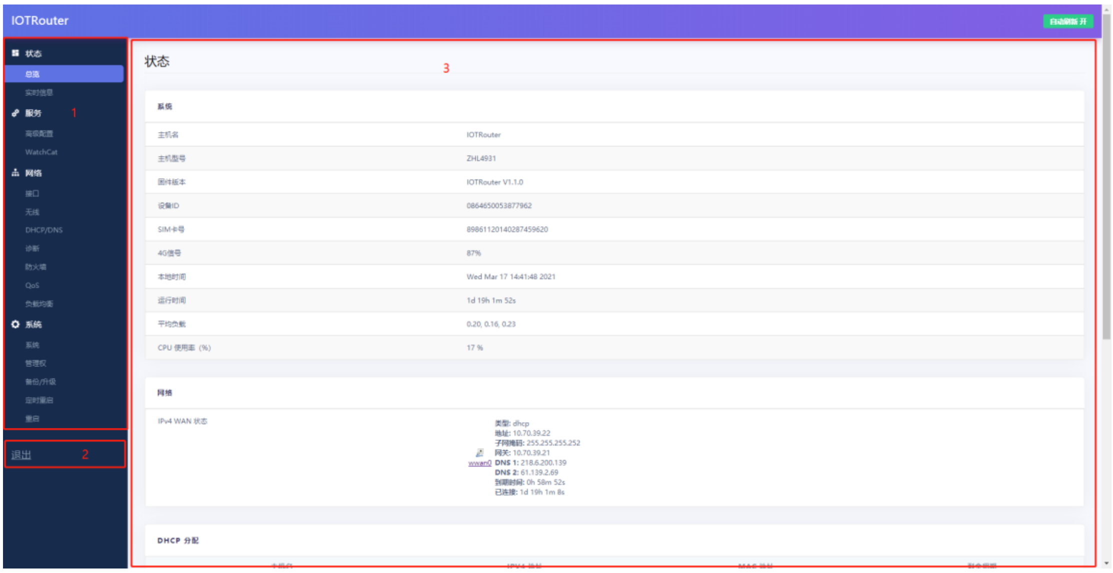
网络

IPv4 WAN 状态

wwan0
类型: dhcp
地址: 10.70.39.22
子网掩码: 255.255.255.252
网关: 10.70.39.21
DNS 1: 218.6.200.139
DNS 2: 61.139.2.69
到期时间: 1h 1m 12s
已连接: 1d 18h 58m 48s

DHCP 分配

2.1.2 Page layout



状态

系统

主机名	IOTRouter
主机型号	ZHL4931
固件版本	IOTRouter V1.1.0
设备ID	0864650053877962
SIM卡号	89861120140287459620
4G信号	87%
本地时间	Wed Mar 17 14:41:48 2021
运行时间	1d 19h 1m 52s
平均负载	0.20, 0.16, 0.23
CPU 使用率 (%)	17 %

网络

IPv4 WAN 状态

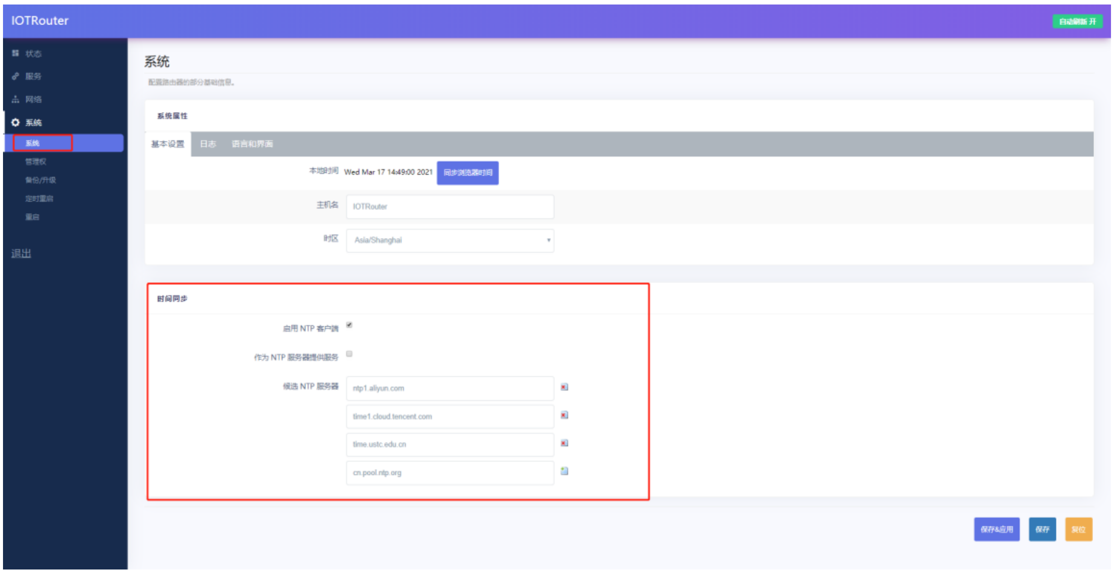
wwan0
类型: dhcp
地址: 10.70.39.22
子网掩码: 255.255.255.252
网关: 10.70.39.21
DNS 1: 218.6.200.139
DNS 2: 61.139.2.69
到期时间: 0h 58m 52s
已连接: 1d 19h 1m 8s

DHCP 分配

① Configure the status bar, including equipment status information, advanced services, network information, and system management information. ② Exit button, you can exit to the login interface.

③ Details page, when you click the configuration status bar item, the details page can be displayed.

2.2 NTP time synchronization



系统

配置路由器的部分基础信息。

系统属性

本地时间 Wed Mar 17 14:49:00 2021

主机名 IOTRouter

时区 Asia/Shanghai

时间同步

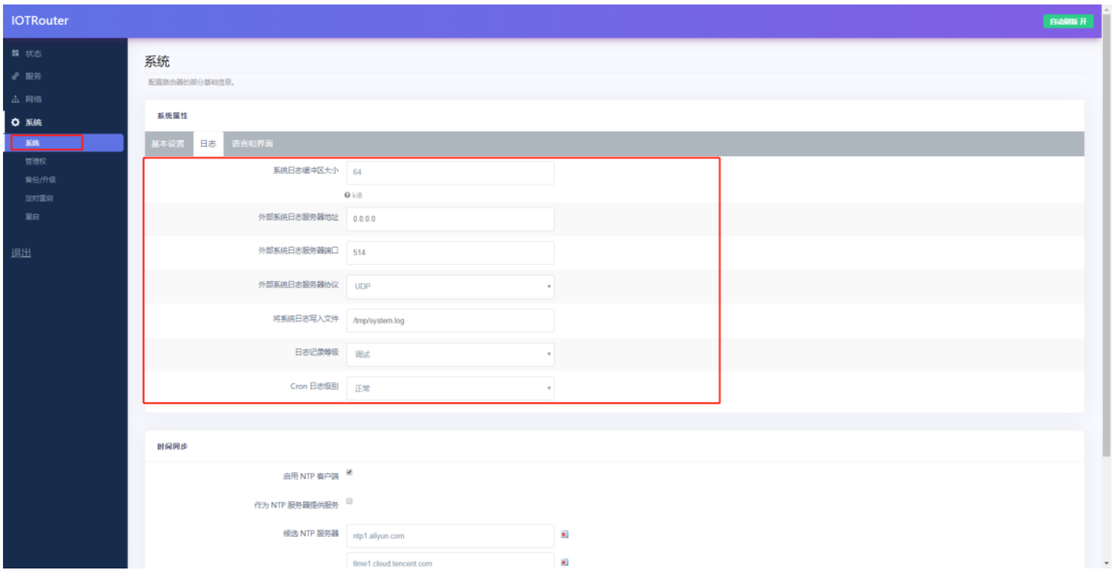
启用 NTP 客户端 ☑

作为 NTP 服务器提供服务 □

候选 NTP 服务器
ntp1.aliyun.com
time1.cloud.tencent.com
time.ustc.edu.cn
cn.pool.ntp.org

- The router can perform network NTP time calibration, and the NTP client function is enabled by default. NTP server can be set.

2.3 Log



系统

配置路由器的部分基础信息。

系统属性

系统日志缓冲区大小: 64 (kiB)

外部系统日志服务器地址: 0.0.0.0

外部系统日志服务器端口: 514

外部系统日志服务器协议: UDP

将系统日志写入文件: /tmp/system.log

日志记录等级: 调试

Cron 日志级别: 正常

时间同步

启用 NTP 客户端: ☑

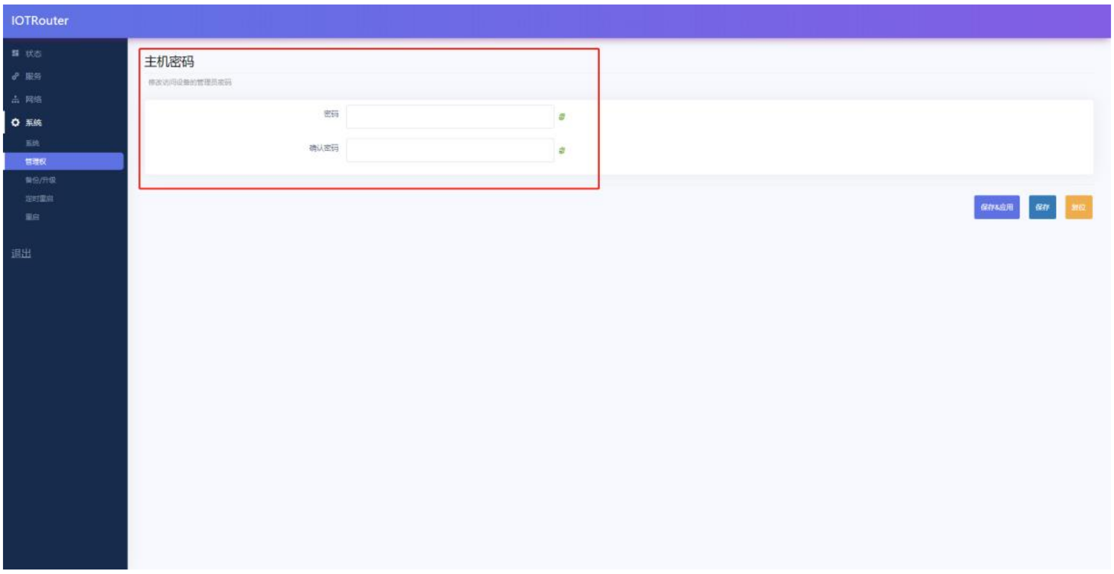
作为 NTP 服务器提供服务: □

候选 NTP 服务器: ntp1.aliyun.com

time1.cloud.tencent.com

- External system log server address: the IP or domain name of the remote log server. When the IP is 0.0.0.0, the remote log is not enabled.
- External system log server port: the connection port of the remote log server.
- External system log server protocol: support TCP, UDP.
- Log level: Support debugging, information, attention, warning, error, critical, warning, emergency, a total of 8 levels; debugging in order is the lowest, and the emergency is the highest.

2.4 Administrator password



主机密码

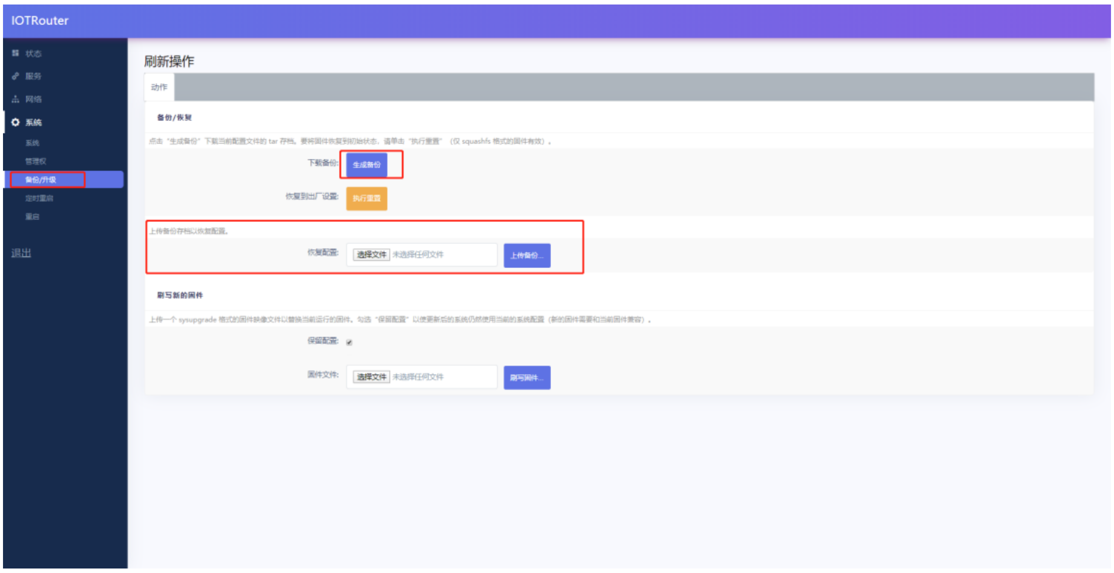
修改访问设备的管理员密码

密码:

确认密码:

- It is recommended to change the administrator password after logging in for the first time and remember the password. The password verification is required for subsequent login pages.

2.5 Parameter backup and upload



点击 "生成备份" 下载当前配置文件的 tar 存档。要将固件恢复到初始状态，请单击 "执行重置" （仅 squashfs 格式的固件有效）。

上传备份存档以恢复配置。

上传一个 sysupgrade 格式的固件映像文件以替换当前运行的固件。勾选 "保留配置" 以使更新后的系统仍然使用当前的系统配置（新的固件需要和当前固件兼容）。

- Click the Generate Backup button, the system configuration parameters will be downloaded in the file format (xxx.tar.gz).
- Upload the backup, select the downloaded (xxx.tar.gz) configuration file and click upload, the backup configuration parameters will take effect and be saved.

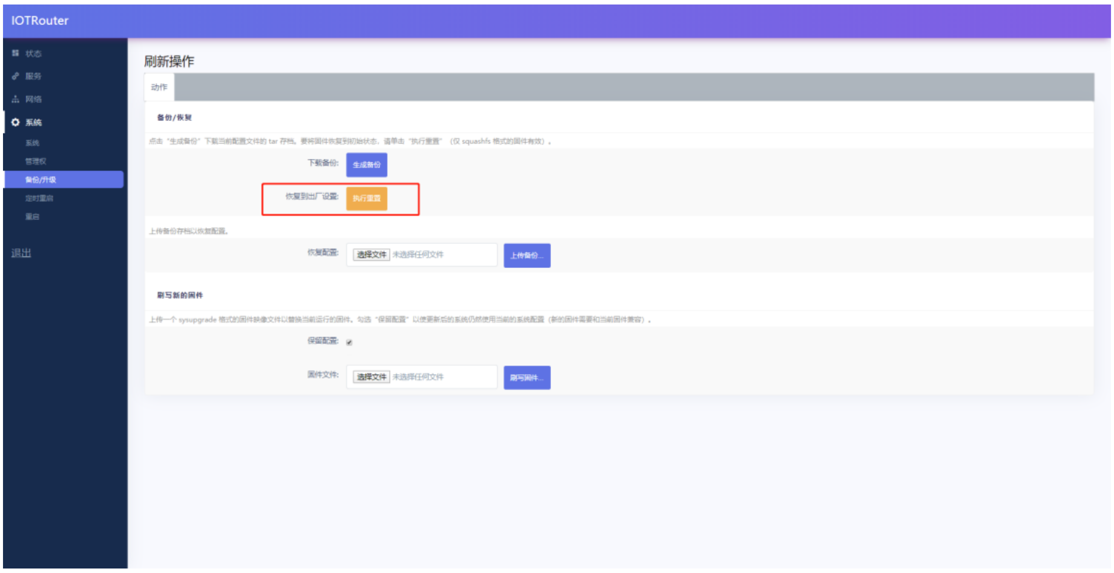
Note: The firmware restoration configuration is limited to the firmware of the same version. Because the parameters of different versions of firmware may be different, users can only restore the configuration under the same firmware version. Otherwise, the function will fail or the equipment will be abnormal.

2.6 Factory reset

The device can be restored to the factory in two ways (factory default parameters please refer to 2.1 chapter) ：

① By long pressing (about 10 seconds) the Reload button of the device, the router can be restored to the factory parameters.

②It can be reset through the recovery reset button on the webpage.

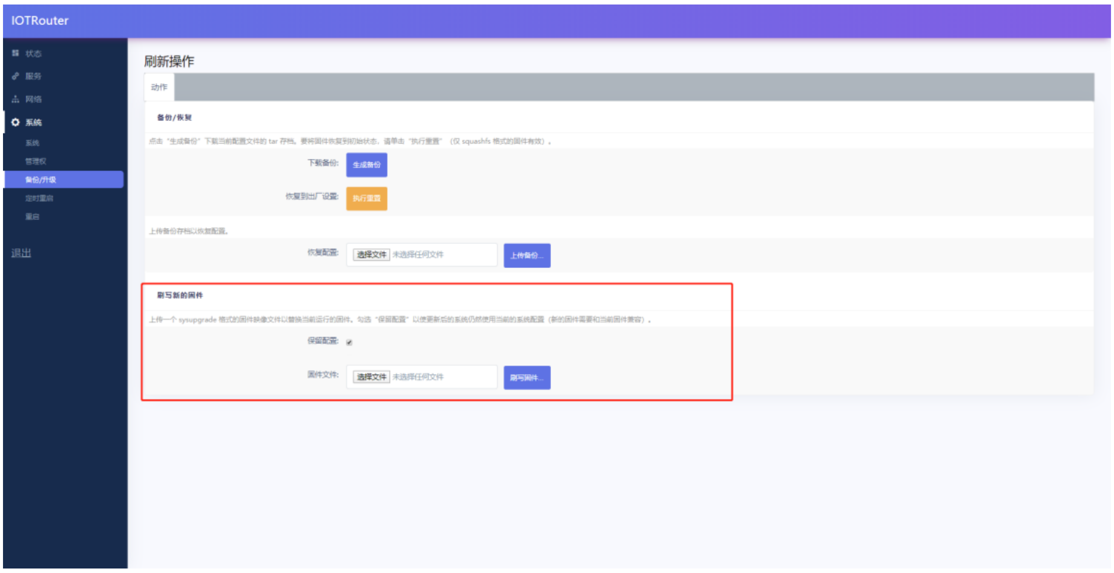


点击 "生成备份" 下载当前配置文件的 tar 存档。要将固件恢复到初始状态，请单击 "执行重置" （仅 squashfs 格式的固件有效）。

上传备份存档以恢复配置。

上传一个 sysupgrade 格式的固件映像文件以替换当前运行的固件。勾选 "保留配置" 以使更新后的系统仍然使用当前的系统配置（新的固件需要和当前固件兼容）。

2.7 Firmware upgrade



刷新操作

备份/恢复

点击 "生成备份" 下载当前配置文件的 tar 存档。要将固件恢复到初始状态，请单击 "执行重置" （仅 squashfs 格式的固件有效）。

下载备份: 生成备份

恢复到出厂设置: 执行重置

上传备份存档以恢复配置。

恢复配置: 选择文件 未选择任何文件 上传备份...

刷写新的固件

上传一个 sysupgrade 格式的固件映像文件以替换当前运行的固件。勾选 "保留配置" 以使更新后的系统仍然使用当前的系统配置（新的固件需要和当前固件兼容）。

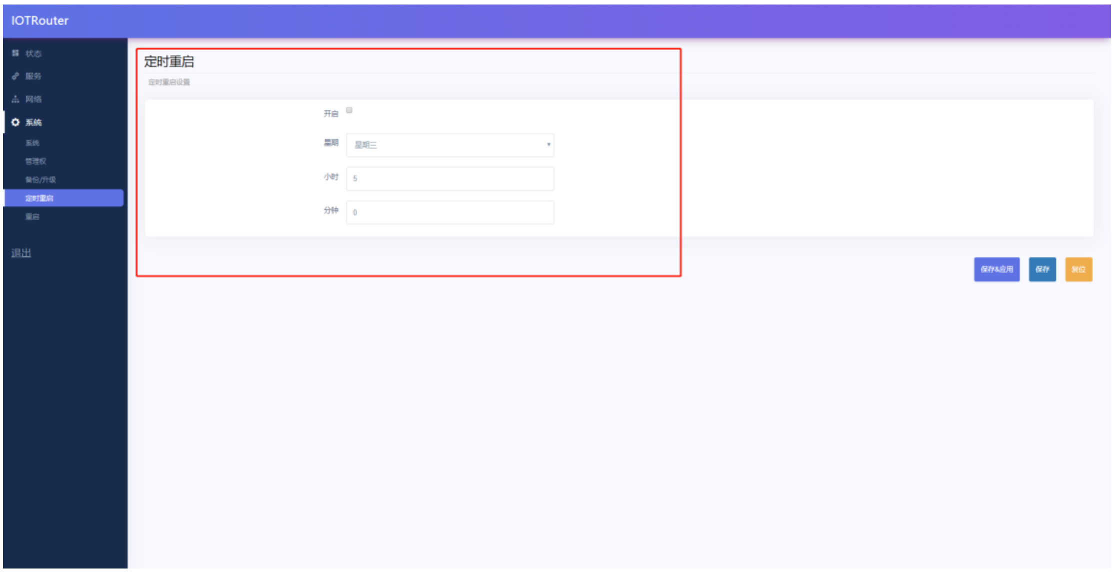
保留配置: ☑

固件文件: 选择文件 未选择任何文件 刷写固件...

- Keep the configuration, that is, keep the current device configuration information. After the upgrade, run the device according to the current configuration parameters.
- After the firmware file is uploaded, click Execute, and it will take a while to refresh the web page. The equipment here must not be powered off. After the upgrade is complete, you can view the current version on the overview page.

Note: Please use the official firmware for the upgrade, otherwise it may cause the device to be abnormal.

2.8 Restart/Timed Restart



定时重启

定时重启设置

开启 □

星期 星期三

小时 5

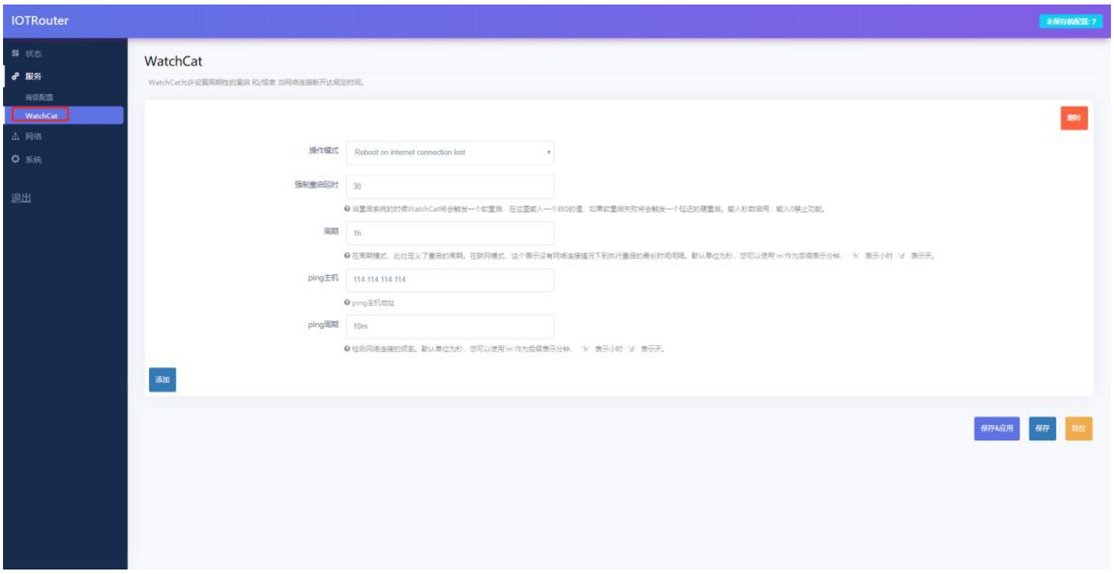
分钟 0

- The device can perform a soft restart operation in a weekly/daily cycle. It is not turned on by default.

2.9 WatchCat

WatchCat allows you to set periodic restarts, or restart when the network connection is disconnected for a specified period of time.

This function is very practical when the network is abnormal.



WatchCat

WatchCat允许设置周期性的重启 和/或者 当网络连接断开达规定时间。

操作模式: Reboot on internet connection lost

强制重启延时: 30

当重启系统的时候WatchCat将会触发一个软重启，在这里输入一个非0的值，如果软重启失败将会触发一个延迟的硬重启。输入秒数启用，输入0禁止功能。

周期: 1h

在周期模式，此处定义了重启的周期。在联网模式，这个表示没有网络连接情况下到执行重启的最长时间间隔。默认单位为秒，您可以使用'm'作为后缀表示分钟，'h' 表示小时 'd' 表示天。

ping主机: 114.114.114.114

ping主机地址

ping周期: 10m

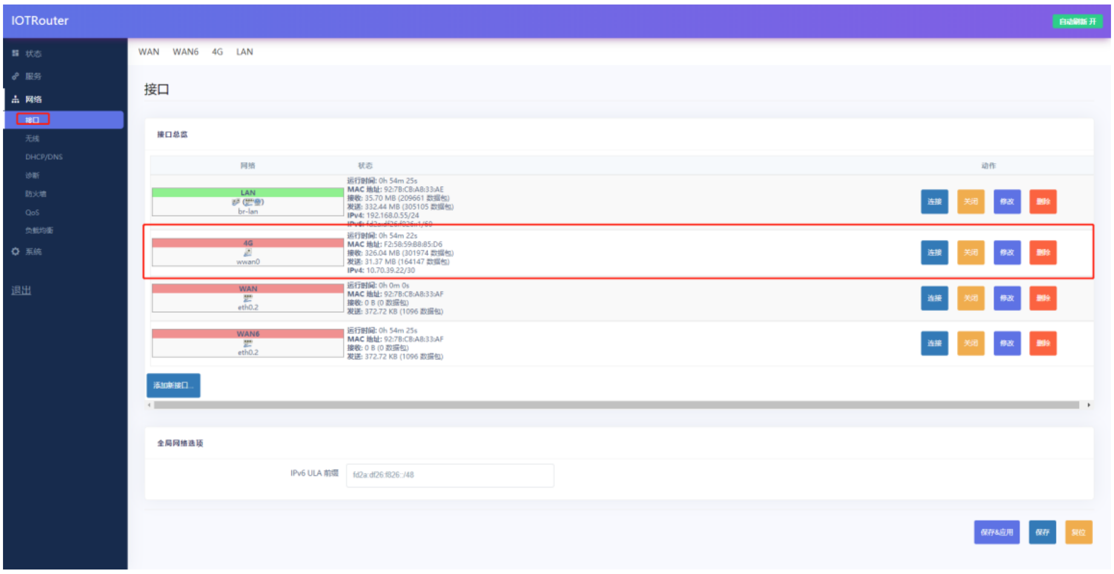
检测网络连接的频率。默认单位为秒，您可以使用'm'作为后缀表示分钟，'h' 表示小时 'd' 表示天。

- It is turned on by default. When the device is disconnected for more than 1 hour, the device will restart.

3 Network function

3.1 4G interface

This router supports one 4G/3G/2G communication module interface to access the external network. 4G dialing is turned on by default number.



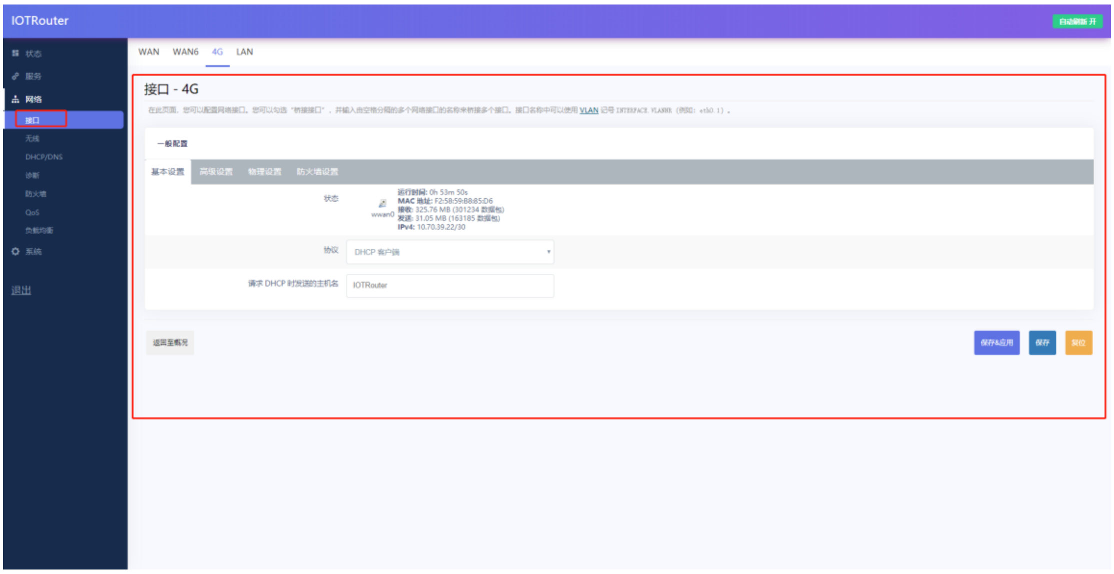
接口

接口总览

网络	状态	动作
LAN (桥接) br-lan	运行时间: 0h 54m 25s MAC 地址: 92:78:CB:A8:33:AE 接收: 35.70 MB (209661 数据包) 发送: 332.44 MB (305105 数据包) IPv4: 192.168.0.55/24 IPv6: fd2a:df26:f826::1/60	连接 关闭 修改 删除
4G wwan0	运行时间: 0h 54m 22s MAC 地址: F2:58:59:B8:85:D6 接收: 326.04 MB (301974 数据包) 发送: 31.37 MB (164147 数据包) IPv4: 10.70.39.22/30	连接 关闭 修改 删除
WAN eth0.2	运行时间: 0h 0m 0s MAC 地址: 92:78:CB:A8:33:AF 接收: 0 B (0 数据包) 发送: 372.72 KB (1096 数据包)	连接 关闭 修改 删除
WAN6 eth0.2	运行时间: 0h 54m 25s MAC 地址: 92:78:CB:A8:33:AF 接收: 0 B (0 数据包) 发送: 372.72 KB (1096 数据包)	连接 关闭 修改 删除

全局网络选项

IPv6 ULA 前缀: fd2a:df26:f826::/48



接口 - 4G

在此页面，您可以配置网络接口。您可以勾选"桥接接口"，并输入由空格分隔的多个网络接口的名称来桥接多个接口。接口名称中可以使用 VLAN 记号 INTERFACE.VLANNR（例如：eth0.1）。

一般配置

状态: wwan0
运行时间: 0h 53m 50s
MAC 地址: F2:58:59:B8:85:D6
接收: 325.76 MB (301234 数据包)
发送: 31.05 MB (163185 数据包)
IPv4: 10.70.39.22/30

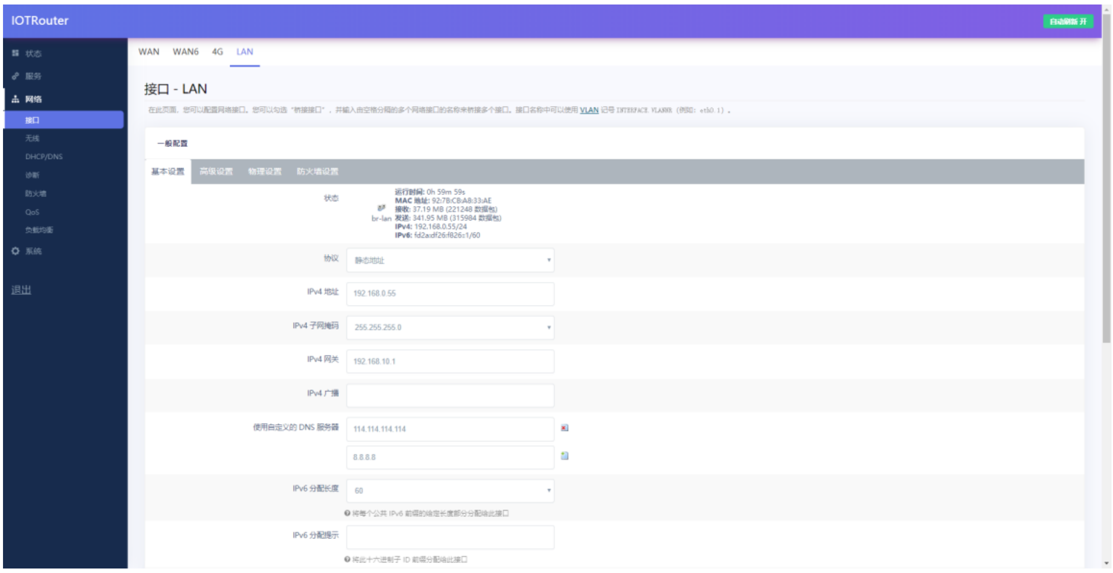
协议: DHCP 客户端

请求 DHCP 时发送的主机名: IOTRouter

- When the 4G dial-up is successful, a dynamic IP address will be obtained. If the IP address is not obtained, the dialing fails, you can click Close first, and then reconnect or restart the device.
- The configuration information of the 4G interface, the user does not need to modify and keep the default.

3.2 LAN interface

The LAN port is a local area network. There are 4 wired LAN ports, namely LAN1--LAN4. The LAN supports static addresses and DHCP clients dynamically obtain IP.



接口 - LAN

在此页面，您可以配置网络接口。您可以勾选"桥接接口"，并输入由空格分隔的多个网络接口的名称来桥接多个接口。接口名称中可以使用 VLAN 记号 INTERFACE.VLANNR（例如：eth0.1）。

一般配置

状态 br-lan
运行时间: 0h 59m 59s
MAC 地址: 92:7B:CB:A8:33:AE
接收: 37.19 MB (221248 数据包)
发送: 341.95 MB (315984 数据包)
IPv4: 192.168.0.55/24
IPv6: fd2a:df26:f826::1/60

协议: 静态地址

IPv4 地址: 192.168.0.55

IPv4 子网掩码: 255.255.255.0

IPv4 网关: 192.168.10.1

IPv4 广播:

使用自定义的 DNS 服务器: 114.114.114.114
8.8.8.8

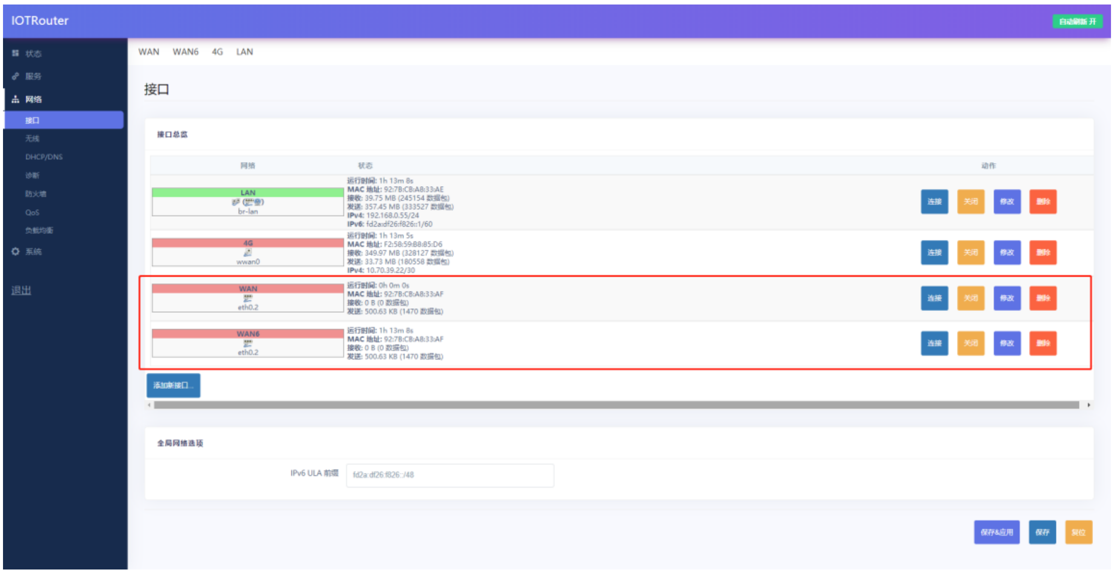
IPv6 分配长度: 60
将每个公共 IPv6 前缀的给定长度部分分配给此接口

IPv6 分配提示:
将此十六进制子 ID 前缀分配给此接口

- The default static IP: 192.168.10.1, mask: 255.255.255.0. This address can be modified. Remember the IP after modification.
- The WIFI port (WLAN port) has been bridged to the LAN port.
- The DHCP server function is enabled by default. All devices connected to the router's LAN port can automatically obtain an IP address.
- Please do not change the physical settings at will. If the device webpage cannot be logged in, the factory settings can be restored.

3.3 WAN interface

The device supports one wired WAN interface, and the WAN interface is an access WAN interface.



接口

接口总览

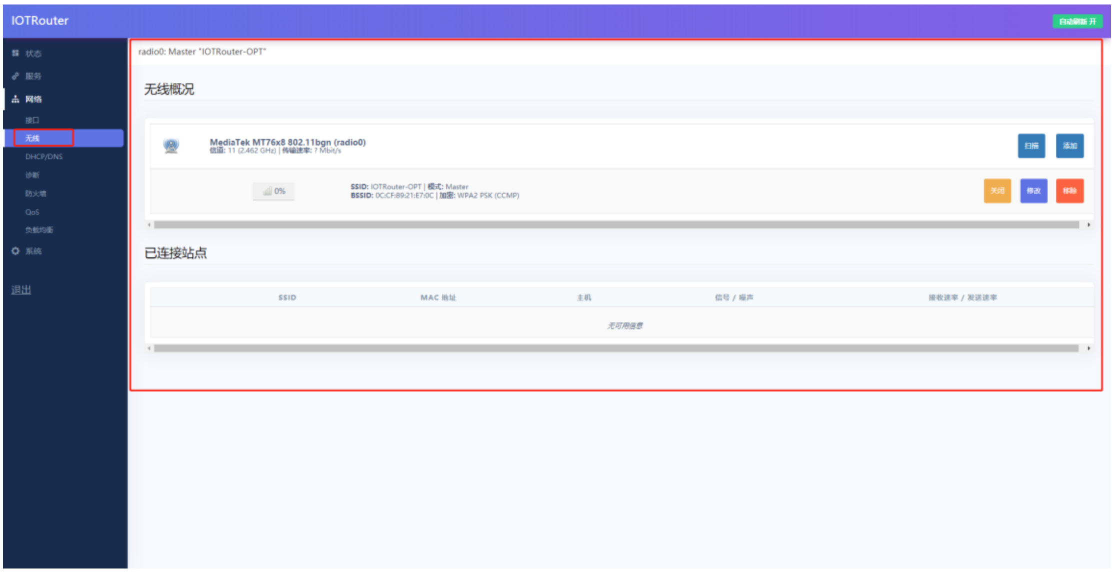
网络	状态	动作
LAN (桥接) br-lan	运行时间: 1h 13m 8s MAC 地址: 92:7B:CB:A8:33:AE 接收: 39.75 MB (245154 数据包) 发送: 357.45 MB (333527 数据包) IPv4: 192.168.0.55/24 IPv6: fd2a:df26:f826::1/60	连接 关闭 修改 删除
4G wwan0	运行时间: 1h 13m 5s MAC 地址: F2:58:59:B8:85:D6 接收: 349.97 MB (328127 数据包) 发送: 33.73 MB (180558 数据包) IPv4: 10.70.39.22/30	连接 关闭 修改 删除
WAN eth0.2	运行时间: 0h 0m 0s MAC 地址: 92:7B:CB:A8:33:AF 接收: 0 B (0 数据包) 发送: 500.63 KB (1470 数据包)	连接 关闭 修改 删除
WAN6 eth0.2	运行时间: 1h 13m 8s MAC 地址: 92:7B:CB:A8:33:AF 接收: 0 B (0 数据包) 发送: 500.63 KB (1470 数据包)	连接 关闭 修改 删除

全局网络选项

IPv6 ULA 前缀: fd2a:df26:f826::/48

3.4 WIFI interface

The router turns on the AP function by default. It can provide wireless hotspot access for other WIFI devices.



radio0: Master "IOTRouter-OPT"

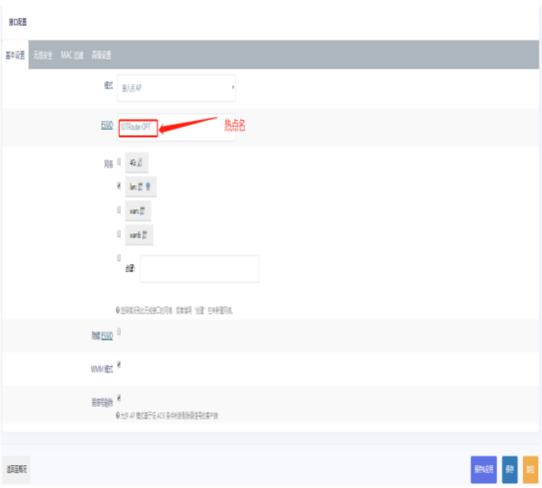
无线概况

MediaTek MT76x8 802.11bgn (radio0)
信道: 11 (2.462 GHz) | 传输速率: ? Mbit/s

0%　SSID: IOTRouter-OPT | 模式: Master
BSSID: 0C:CF:89:21:E7:0C | 加密: WPA2 PSK (CCMP)

已连接站点

SSID	MAC 地址	主机	信号 / 噪声	接收速率 / 发送速率
无可用信息				



模式: 接入点 AP

ESSID: IOTRouter-OPT

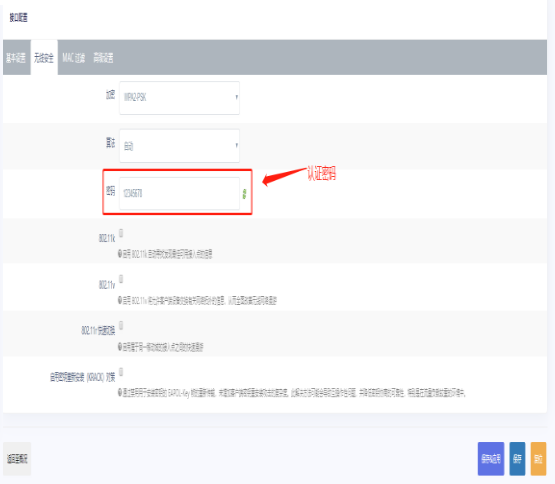
网络: ☐ 4G　☑ lan　☐ wan　☐ wan6　☐ 创建:

选择指派到此无线接口的网络。或者填写 "创建" 栏来新建网络。

隐藏 ESSID ☐

WMM 模式 ☑

禁用弱信号 ☑



加密: WPA2-PSK

算法: 自动

密码: 12345678

802.11k ☐

启用 802.11k 自动寻找周围最佳可用接入点的信息

802.11v ☐

启用 802.11v 将允许客户端设备交换有关网络拓扑的信息，从而全面改善无线网络漫游

802.11r 快速切换 ☐

启用属于同一移动域的接入点之间的快速漫游

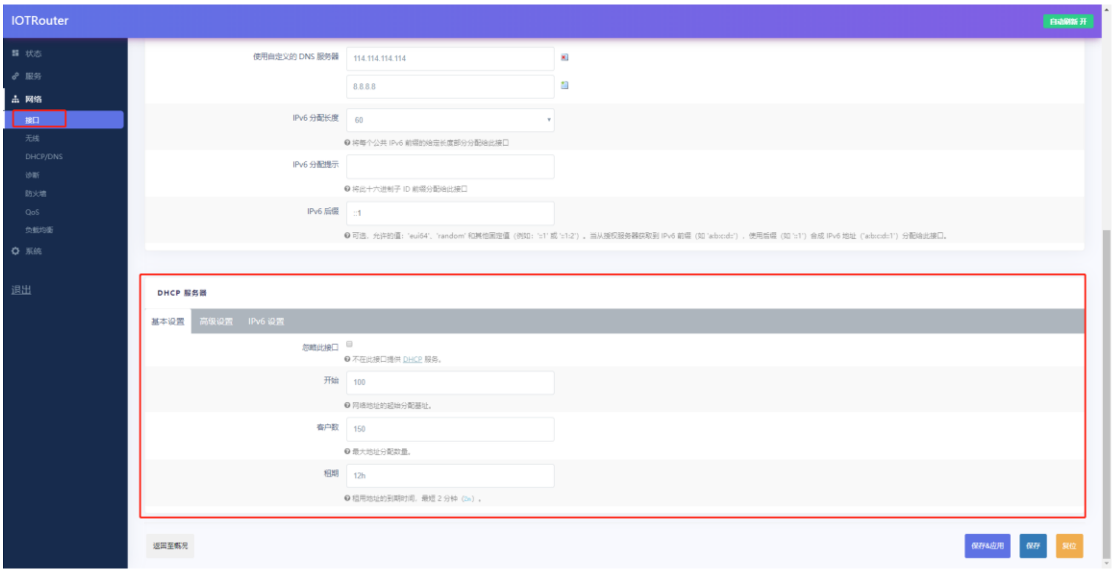
启用密钥重新安装 (KRACK) 对策 ☐

通过禁用用于安装密钥的 EAPOL-Key 帧的重新传输，来增加客户端密钥重新安装攻击的复杂度。此解决方法可能会导致互操作性问题，并降低密钥协商的可靠性，特别是在流量负载较重的环境中。

- The router default WIFI name: IOTRouter-OPT password: 12345678.
- This WIFI local area network and wired LAN port are the same VLAN, which is equivalent to exchange access in a network.
- The maximum coverage of WIFI is 100m in an open area. The specific coverage is closely related to the environment.

3.5 DHCP/DNS

The DHCP Server function of LAN port and WIFI is enabled by default (optionally disabled) , All connected network devices can be To obtain an IP address automatically. The IP address pool can be set freely.



使用自定义的 DNS 服务器: 114.114.114.114, 8.8.8.8

IPv6 分配长度: 60
将每个公共 IPv6 前缀的给定长度部分分配给此接口

IPv6 分配提示:
将此十六进制子 ID 前缀分配给此接口

IPv6 后缀: ::1
可选。允许的值：'eui64'、'random' 和其他固定值（例如：'::1' 或 '::1:2'）。当从授权服务器获取到 IPv6 前缀（如 'a:b:c:d::'），使用后缀（如 '::1'）合成 IPv6 地址（'a:b:c:d::1'）分配给此接口。

DHCP 服务器

忽略此接口 □
不在此接口提供 DHCP 服务。

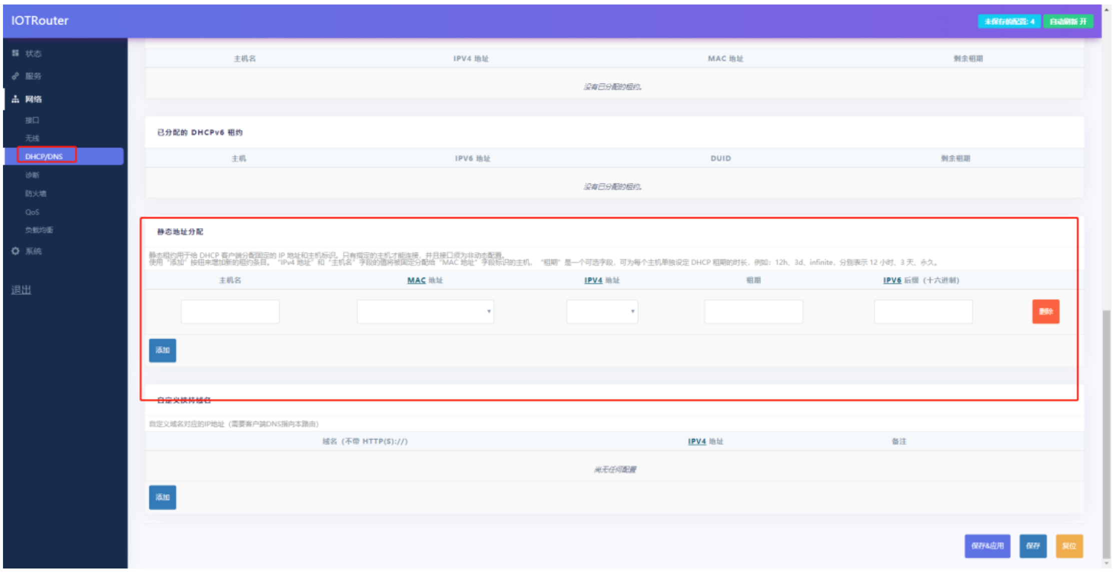
开始: 100
网络地址的起始分配基址。

客户数: 150
最大地址分配数量。

租期: 12h
租用地址的到期时间，最短 2 分钟（2m）。

- DHCP pool, the default allocation range is from 192.168.10.100 ~ 192.168.10.250. The default lease period is 12h (hours), and the minimum can be set to 2m (minutes).
- The lease period cannot be configured in combination of hours and minutes. For example, the setting of 5h10m will not take effect, and the LAN port and WIFI will not be available. Numbers with decimal points cannot be set, only integer settings, such as 1.5h, 10.5m, such settings will not take effect.

Static address allocation: used to allocate fixed IP addresses and host identifiers to DHCP clients. Only the designated host can connect, and the interface must be non-dynamic configuration. Use Add to add new lease entries. Use MAC-address to identify the host, IPv4-address to assign addresses, and host name to assign identifiers.



主机名	IPV4 地址	MAC 地址	剩余租期
没有已分配的租约。			

已分配的 DHCPv6 租约

主机	IPV6 地址	DUID	剩余租期
没有已分配的租约。			

静态地址分配

静态租约用于给 DHCP 客户端分配固定的 IP 地址和主机标识。只有指定的主机才能连接，并且接口须为非动态配置。
使用"添加"按钮来增加新的租约条目。"IPv4 地址"和"主机名"字段的值将被固定分配给"MAC 地址"字段标识的主机。"租期"是一个可选字段，可为每个主机单独设定 DHCP 租期的时长，例如：12h、3d、infinite，分别表示 12 小时、3 天、永久。

主机名	MAC 地址	IPV4 地址	租期	IPV6 后缀（十六进制）

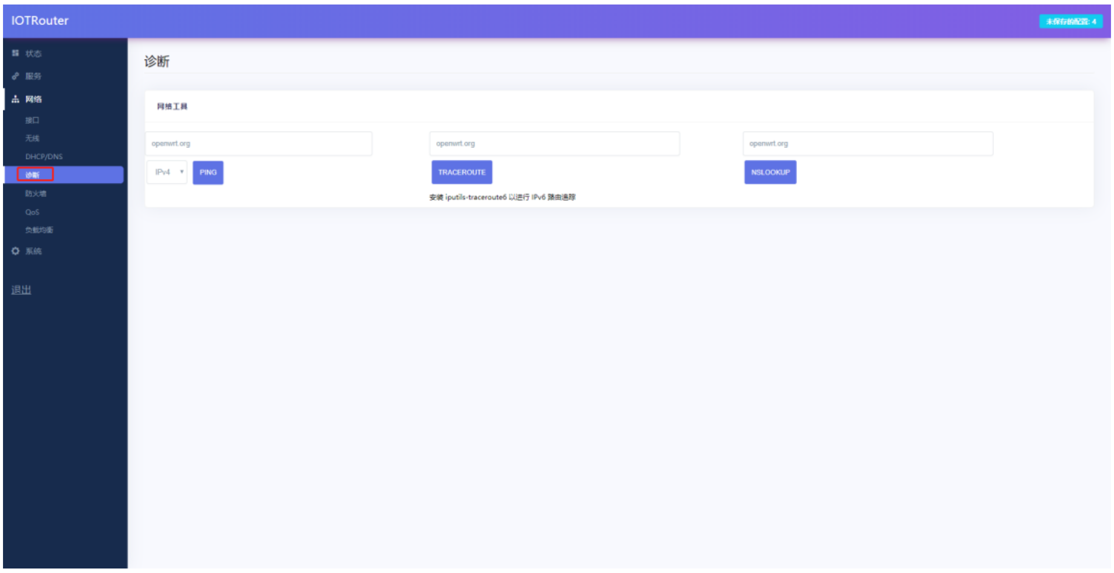
自定义挟持域名

自定义域名对应的IP地址（需要客户端DNS指向本路由）

域名（不带 HTTP(S)://）	IPV4 地址	备注
尚无任何配置		

3.6 Network diagnosis

The device provides online diagnostic functions to facilitate network analysis by users, provided that the device is normally connected to the network.



诊断

网络工具

openwrt.org

openwrt.org

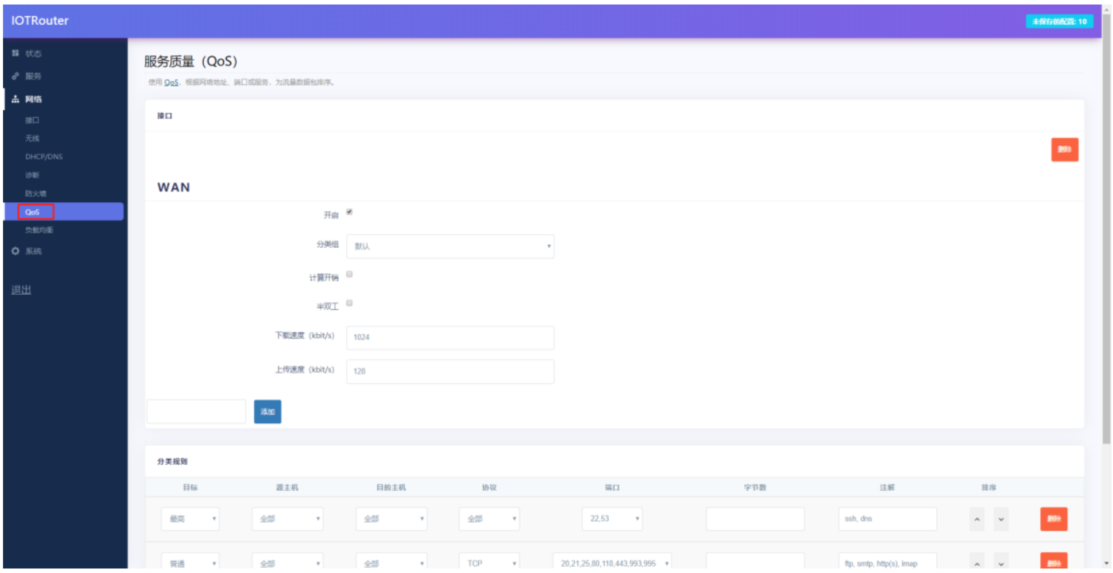
openwrt.org

安装 iputils-traceroute6 以进行 IPv6 路由追踪

- The Ping tool can directly perform a ping test on a specific address on the router side.
- Traceroute is a routing analysis tool that can obtain the routing path through when accessing an address.
- Nslookup is a DNS viewing tool that can resolve domain names to IP addresses.

3.7 QOS service quality

You can use the QOS function to sort traffic data packets according to network addresses, ports, or services. In certain scenarios, the upstream and downstream speeds of traffic can be increased.



服务质量（QoS）

使用 QoS，根据网络地址、端口或服务，为流量数据包排序。

接口

WAN

开启 ☑

分类组 默认

计算开销 □

半双工 □

下载速度（kbit/s） 1024

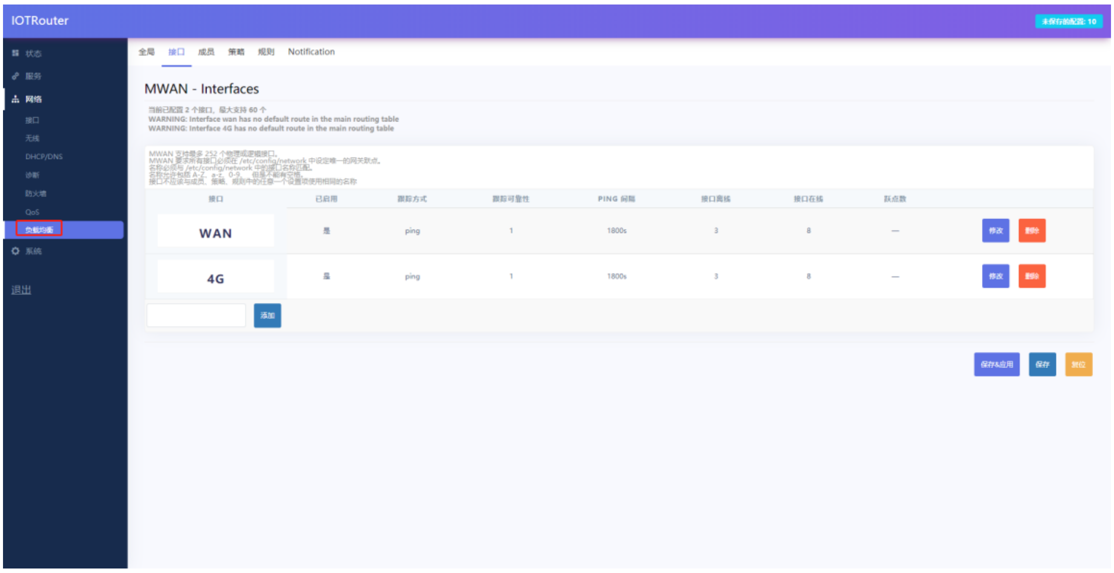
上传速度（kbit/s） 128

分类规则

目标	源主机	目的主机	协议	端口	字节数	注解	排序
最高	全部	全部	全部	22,53		ssh, dns	
普通	全部	全部	TCP	20,21,25,80,110,443,993,995		ftp, smtp, http(s), imap	

3.8 Load balancing

At present, the WAN port of the device and the 4G interface are divided into a VLAN. This function can group members according to "policies" and tell MWAN how to allocate traffic using this strategy in "rules". Members with a lower metric will be used first. . Members with the same metric load balance the traffic. Members with a higher proportion of load balancing members will be allocated more traffic.



MWAN - Interfaces

当前已配置 2 个接口，最大支持 60 个
WARNING: Interface wan has no default route in the main routing table
WARNING: Interface 4G has no default route in the main routing table

MWAN 支持最多 252 个物理或逻辑接口。
MWAN 要求所有接口必须在 /etc/config/network 中设定唯一的网关跃点。
名称必须与 /etc/config/network 中的接口名称匹配。
名称允许包括 A-Z、a-z、0-9、_ 但是不能有空格。
接口不应该与成员、策略、规则中的任意一个设置项使用相同的名称

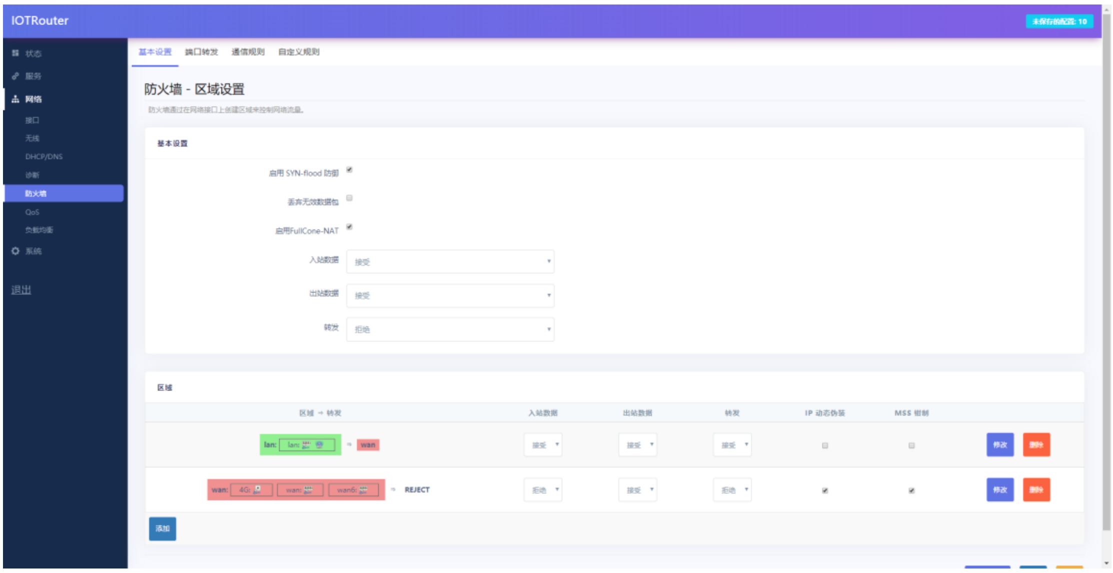
接口	已启用	跟踪方式	跟踪可靠性	PING 间隔	接口离线	接口在线	跃点数
WAN	是	ping	1	1800s	3	8	—
4G	是	ping	1	1800s	3	8	—

- This item does not need to be set by the user, please keep the factory default configuration.

3.9 Firewall

3.9.1 Basic settings

The firewall function is enabled by default, as shown in the figure, there are two firewall rules by default



防火墙 - 区域设置

防火墙通过在网络接口上创建区域来控制网络流量。

基本设置

启用 SYN-flood 防御 ☑
丢弃无效数据包 □
启用FullCone-NAT ☑
入站数据 接受
出站数据 接受
转发 拒绝

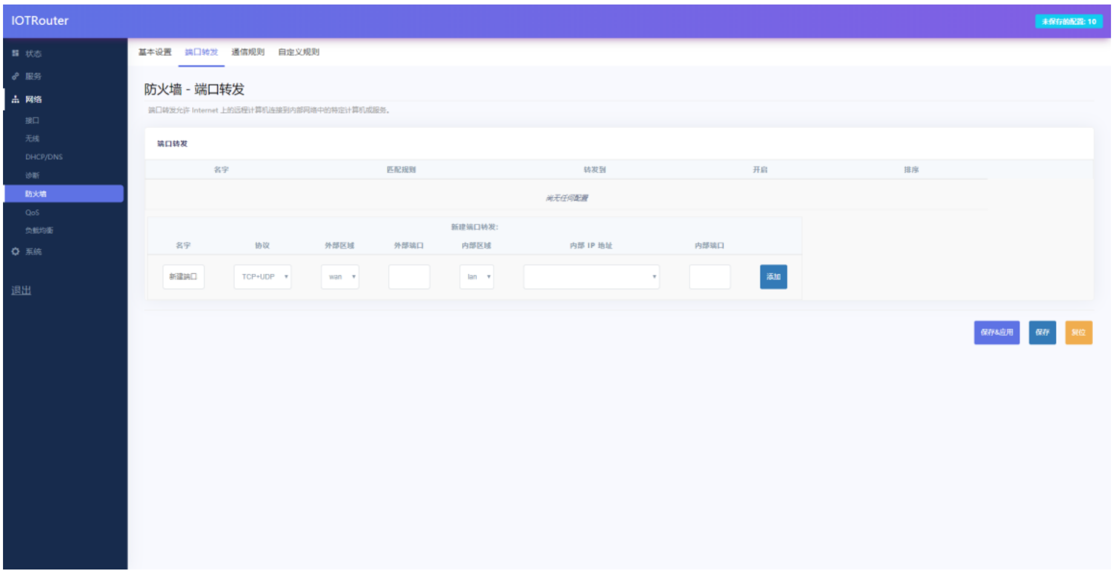
区域

区域 ⇒ 转发	入站数据	出站数据	转发	IP 动态伪装	MSS 钳制
lan: lan: ⇒ wan	接受	接受	接受	□	□
wan: 4G: wan: wan6: ⇒ REJECT	拒绝	接受	拒绝	☑	☑

- Inbound: IP packets that visit this router, that is, the packets received by the router.
- Outbound: Packets sent by the router.
- Forwarding: Forwarding between router interfaces.
- IP dynamic camouflage: It is valid for the VLAN interface of the external network, that is, the WAN port and the 4G interface. Start IP masquerading when accessing the external network.
- MSS clamp: limit the size of the message MSS, generally 1460.

3.9.2 Port forwarding

Port forwarding realization function: directly forward to a specific port of the LAN port when accessing the specific port of the device through the WAN port, so as to realize the mapping of a designated port of the WAN port address to a host in the intranet.



防火墙 - 端口转发

端口转发允许 Internet 上的远程计算机连接到内部网络中的特定计算机或服务。

端口转发

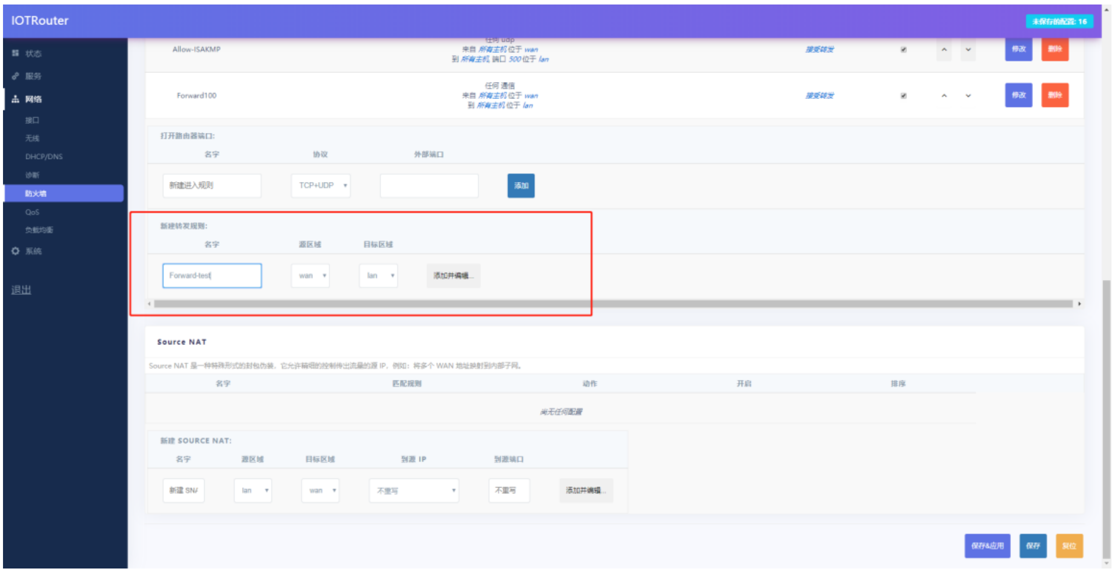
名字	匹配规则	转发到	开启	排序
尚无任何配置				

新建端口转发:

名字	协议	外部区域	外部端口	内部区域	内部 IP 地址	内部端口
新建端口	TCP+UDP	wan		lan		

3.9.3 Communication Rules

Communication rules can selectively filter specific Internet data types and block Internet access requests. These communication rules enhance the security of the network, which is what we often call the IP black and white list.



Allow-ISAKMP	任何 udp 来自 所有主机 位于 wan 到 所有主机 端口 500 位于 lan	接受转发	☑	
Forward100	任何 通信 来自 所有主机 位于 wan 到 所有主机 位于 lan	接受转发	☑	

打开路由器端口:

名字	协议	外部端口
新建进入规则	TCP+UDP	

新建转发规则:

名字	源区域	目标区域
Forward-test	wan	lan

Source NAT

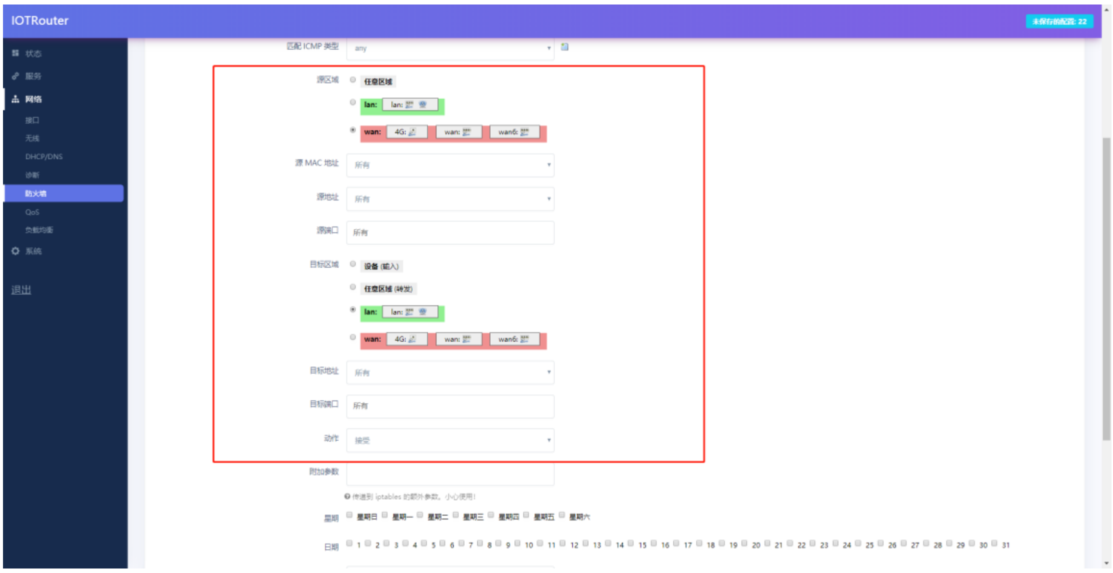
Source NAT 是一种特殊形式的封包伪装，它允许精细的控制传出流量的源 IP，例如：将多个 WAN 地址映射到内部子网。

名字	匹配规则	动作	开启	排序
尚无任何配置				

新建 SOURCE NAT:

名字	源区域	目标区域	到源 IP	到源端口
新建 SN/	lan	wan	不重写	不重写

Control the sending and receiving addresses by setting the source and destination addresses. Data flow control achieved through action settings. Allow and deny IP flow direction.



匹配 ICMP 类型: any

源区域: ○ 任意区域 ○ lan: lan: ● wan: 4G: wan: wan6:

源 MAC 地址: 所有

源地址: 所有

源端口: 所有

目标区域: ○ 设备 (输入) ○ 任意区域 (转发) ● lan: lan: ○ wan: 4G: wan: wan6:

目标地址: 所有

目标端口: 所有

动作: 接受

附加参数:

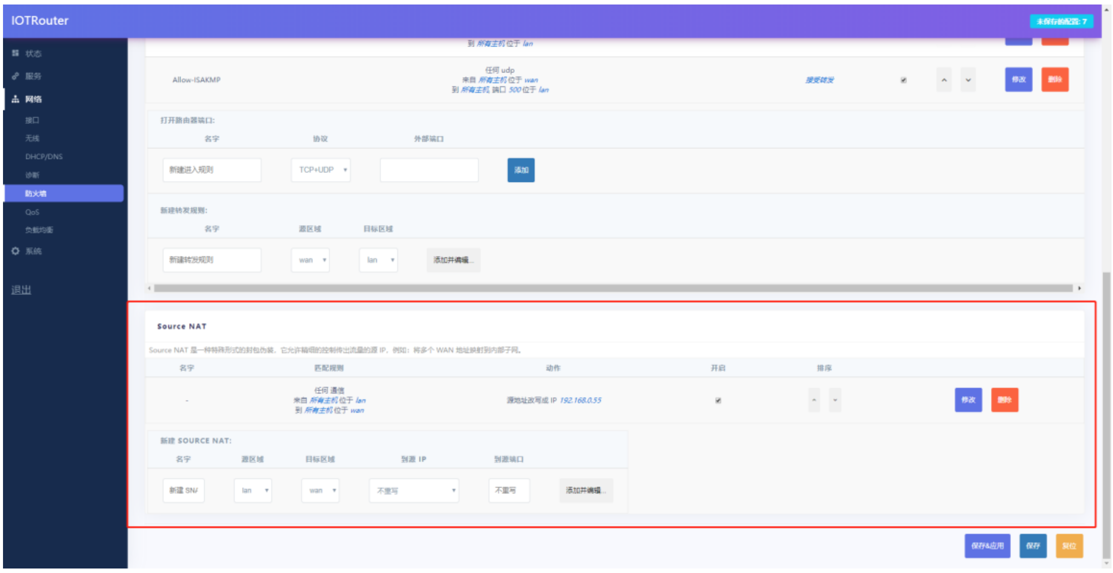
传递到 iptables 的额外参数。小心使用!

星期: □ 星期日 □ 星期一 □ 星期二 □ 星期三 □ 星期四 □ 星期五 □ 星期六

日期: □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 □ 11 □ 12 □ 13 □ 14 □ 15 □ 16 □ 17 □ 18 □ 19 □ 20 □ 21 □ 22 □ 23 □ 24 □ 25 □ 26 □ 27 □ 28 □ 29 □ 30 □ 31

3.9.4 Source NAT

Source NAT is a special form of packet masquerading, which changes the source address of the data packet leaving the router. When using it, first turn off the dynamic masquerading of the IP of the wan port.



到 所有主机 位于 lan

Allow-ISAKMP | 任何 udp
来自 所有主机 位于 wan
到 所有主机 端口 500 位于 lan | 接受转发 | ☑

打开路由器端口:

名字	协议	外部端口
新建进入规则	TCP+UDP	

新建转发规则:

名字	源区域	目标区域
新建转发规则	wan	lan

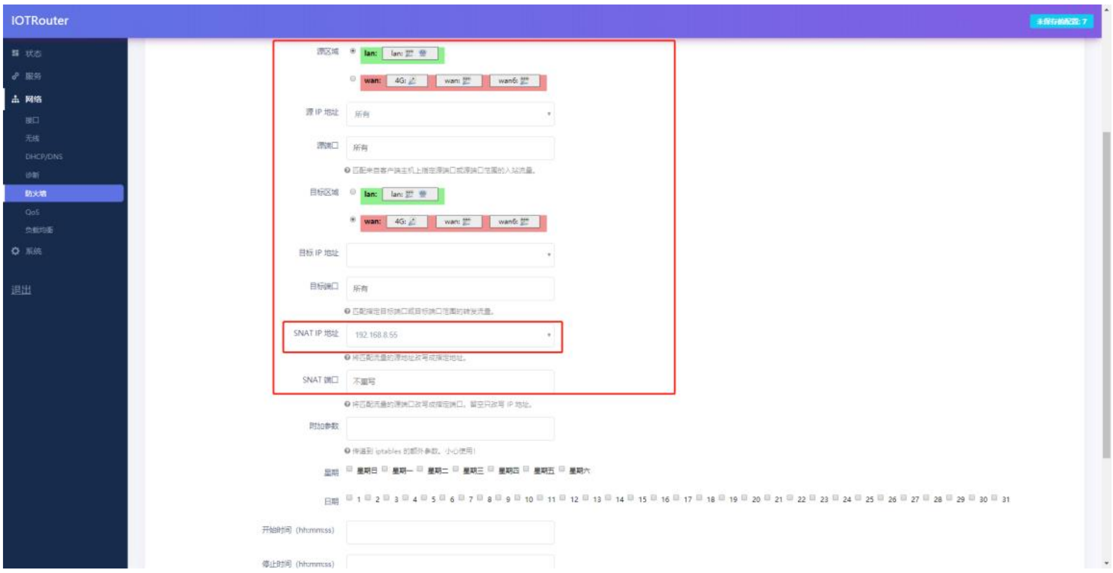
Source NAT

Source NAT 是一种特殊形式的封包伪装。它允许精细的控制传出流量的源 IP，例如：将多个 WAN 地址映射到内部子网。

名字	匹配规则	动作	开启	排序
-	任何 通信 来自 所有主机 位于 lan 到 所有主机 位于 wan	源地址改写成 IP 192.168.0.55	☑	

新建 SOURCE NAT:

名字	源区域	目标区域	到源 IP	到源端口
新建 SN/	lan	wan	不重写	不重写



源区域 ● lan: lan ○ wan: 4G: wan: wan6:

源 IP 地址: 所有

源端口: 所有

匹配来自客户端主机上指定源端口或源端口范围的入站流量。

目标区域 ○ lan: lan ● wan: 4G: wan: wan6:

目标 IP 地址:

目标端口: 所有

匹配指定目标端口或目标端口范围的转发流量。

SNAT IP 地址: 192.168.8.55

将匹配流量的源地址改写成指定地址。

SNAT 端口: 不重写

将匹配流量的源端口改写成指定端口。留空只改写 IP 地址。

附加参数:

传递到 iptables 的额外参数。小心使用！

星期 □ 星期日 □ 星期一 □ 星期二 □ 星期三 □ 星期四 □ 星期五 □ 星期六

日期 □ 1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 □ 11 □ 12 □ 13 □ 14 □ 15 □ 16 □ 17 □ 18 □ 19 □ 20 □ 21 □ 22 □ 23 □ 24 □ 25 □ 26 □ 27 □ 28 □ 29 □ 30 □ 31

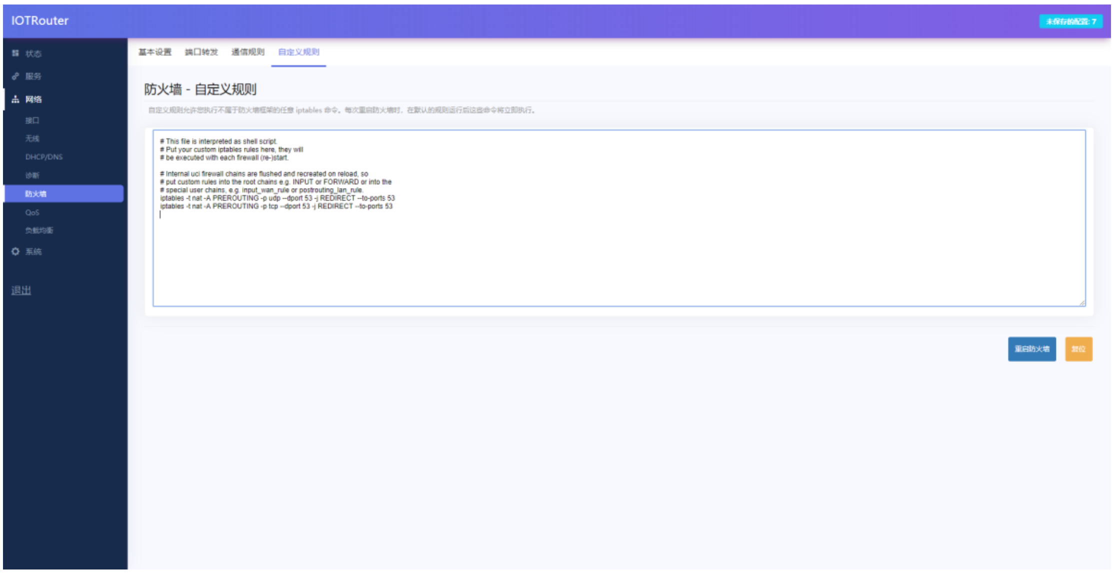
开始时间 (hh:mm:ss)

停止时间 (hh:mm:ss)

- As shown in the figure, set the IP address of the leaving router to 192.168.8.55. After other devices receive the router's data packet, the source address will be disguised as the set address instead of the IP of the device itself.

3.9.5 Custom rules

Currently, only Iptables commands are supported. If necessary, you can refer to the relevant instructions of linux Iptables. Non-professionals operate with caution.



防火墙 - 自定义规则

自定义规则允许您执行不属于防火墙框架的任意 iptables 命令。每次重启防火墙时，在默认的规则运行后这些命令将立即执行。

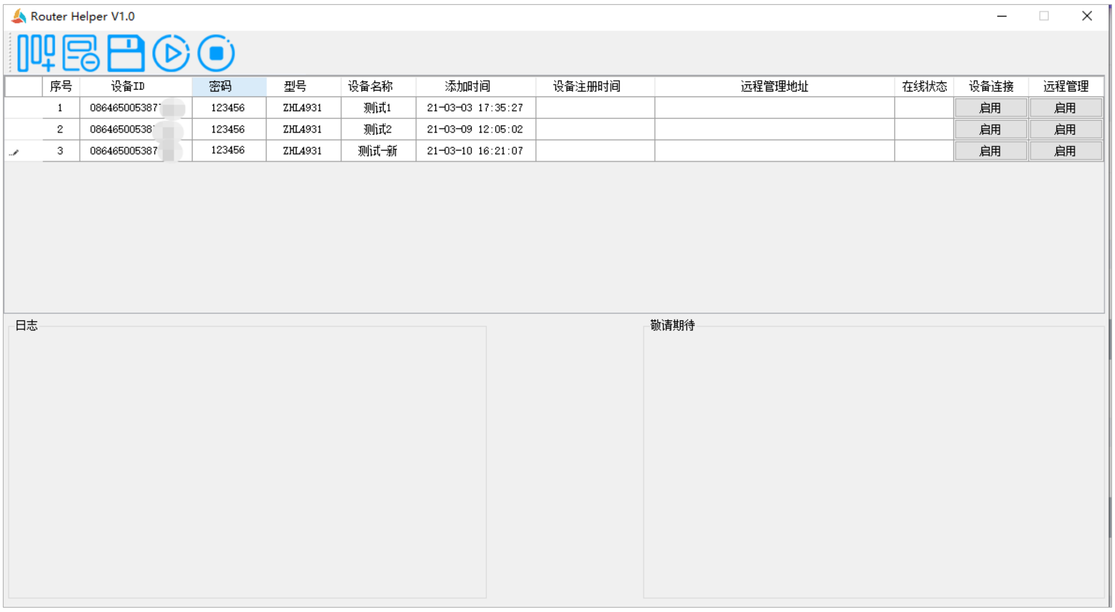
```
# This file is interpreted as shell script.
# Put your custom iptables rules here, they will
# be executed with each firewall (re-)start.

# Internal uci firewall chains are flushed and recreated on reload, so
# put custom rules into the root chains e.g. INPUT or FORWARD or into the
# special user chains, e.g. input_wan_rule or postrouting_lan_rule.
iptables -t nat -A PREROUTING -p udp --dport 53 -j REDIRECT --to-ports 53
iptables -t nat -A PREROUTING -p tcp --dport 53 -j REDIRECT --to-ports 53
```

4 Advanced features

4.1 Remote management

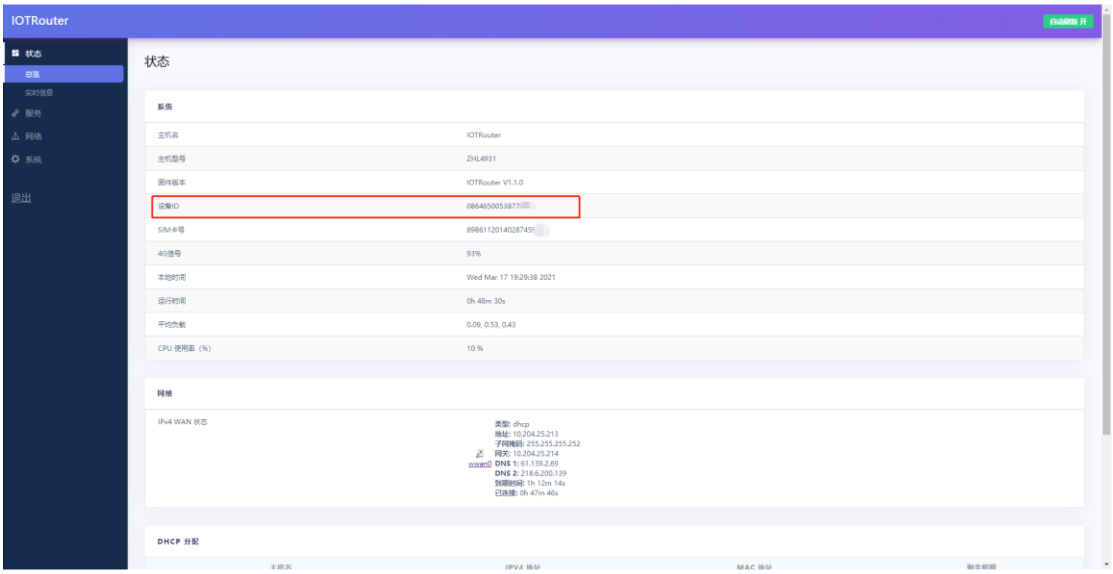
The equipment provides remote configuration management function. After the equipment is deployed on site, the equipment can be configured and managed remotely only after the equipment is connected to the Internet. Remote management requires the following preparations:

① Router remote management assistant: Router Helper (download website: https://www.iotrouter.com/product/)



	序号	设备ID	密码	型号	设备名称	添加时间	设备注册时间	远程管理地址	在线状态	设备连接	远程管理
	1	086465005387[redacted]	123456	ZHL4931	测试1	21-03-03 17:35:27				启用	启用
	2	08646500538[redacted]	123456	ZHL4931	测试2	21-03-09 12:05:02				启用	启用
	3	086465005387[redacted]	123456	ZHL4931	测试-新	21-03-10 16:21:07				启用	启用

② Device ID



状态

系统

主机名	IOTRouter
主机型号	ZHL4931
固件版本	IOTRouter V1.1.0
设备ID	0864650053877[redacted]
SIM卡号	898611201402874[redacted]
4G信号	93%
本地时间	Wed Mar 17 19:29:38 2021
运行时间	0h 48m 30s
平均负载	0.09, 0.53, 0.43
CPU 使用率（%）	10 %

网络

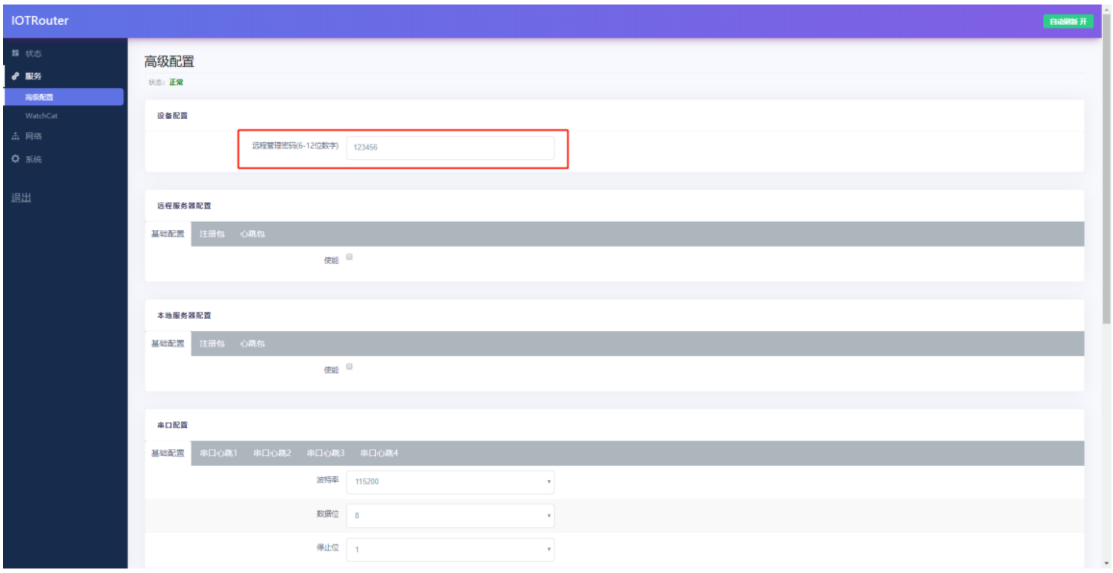
IPv4 WAN 状态

wwan0
类型: dhcp
地址: 10.204.25.213
子网掩码: 255.255.255.252
网关: 10.204.25.214
DNS 1: 61.139.2.69
DNS 2: 218.6.200.139
到期时间: 1h 12m 14s
已连接: 0h 47m 46s

DHCP 分配

主机名	IPV4 地址	MAC 地址	剩余租期

③Remote management password



IOTRouter

高级配置

状态： 正常

设备配置

远程管理密码(6-12位数字) 123456

远程服务器配置

基础配置 注册包 心跳包

使能 □

本地服务器配置

基础配置 注册包 心跳包

使能 □

串口配置

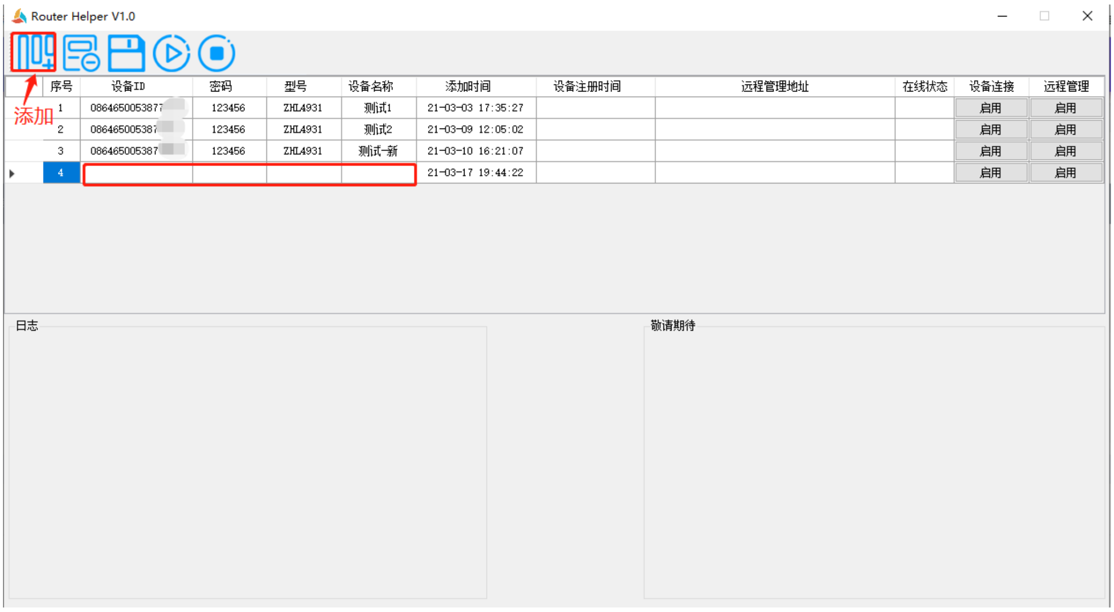
基础配置 串口心跳1 串口心跳2 串口心跳3 串口心跳4

波特率 115200

数据位 8

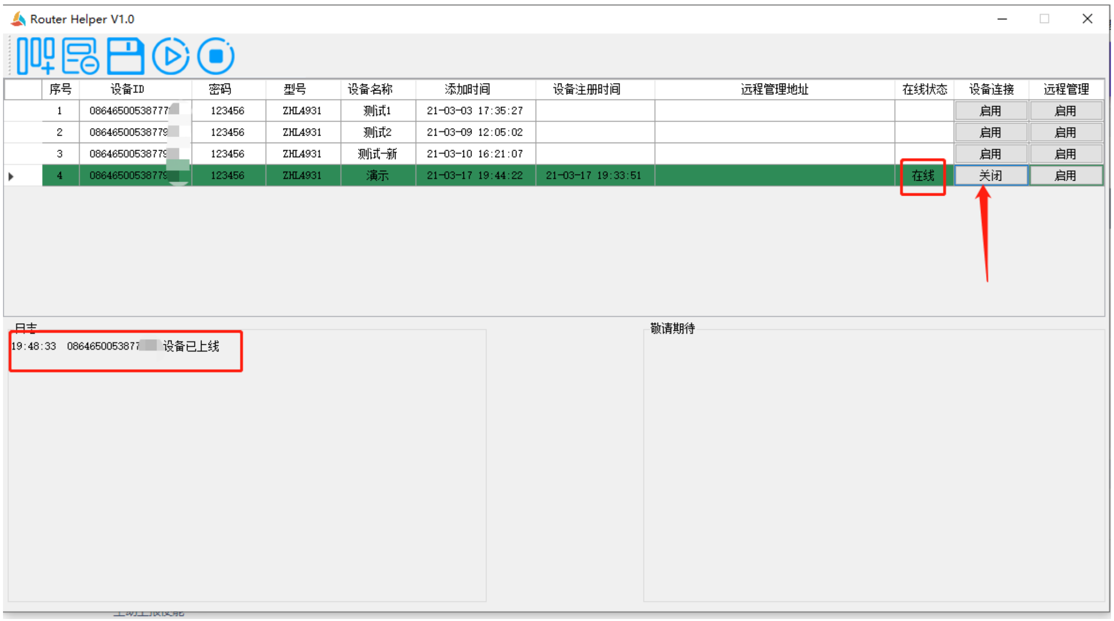
停止位 1

(1) When the preparation is completed, add the current device in the router assistant. Fill in the ID, remote management password, model and remark name corresponding to the device in sequence. Then click the device connection. If the device is online, the online status will be displayed. If it is not online, please check whether the device is normally connected to the Internet and whether the device ID and password are consistent.



Router Helper V1.0

	序号	设备ID	密码	型号	设备名称	添加时间	设备注册时间	远程管理地址	在线状态	设备连接	远程管理
	1	0864650053877[redacted]	123456	ZHL4931	测试1	21-03-03 17:35:27				启用	启用
	2	086465005387[redacted]	123456	ZHL4931	测试2	21-03-09 12:05:02				启用	启用
	3	086465005387[redacted]	123456	ZHL4931	测试-新	21-03-10 16:21:07				启用	启用
▸	4					21-03-17 19:44:22				启用	启用

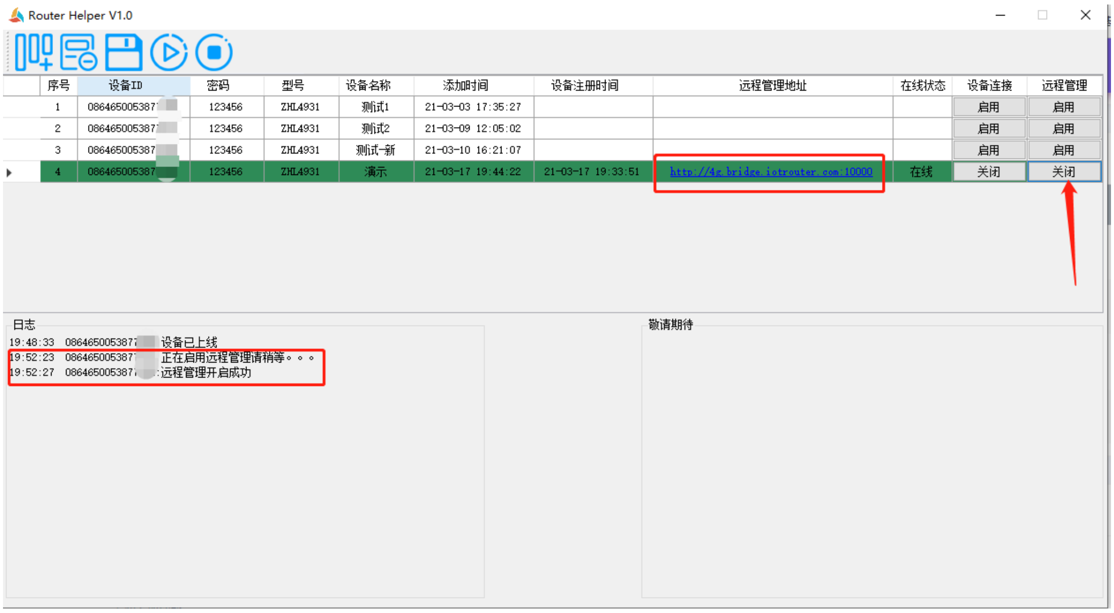


	序号	设备ID	密码	型号	设备名称	添加时间	设备注册时间	远程管理地址	在线状态	设备连接	远程管理
	1	08646500538777[redacted]	123456	ZHL4931	测试1	21-03-03 17:35:27				启用	启用
	2	0864650053877[redacted]	123456	ZHL4931	测试2	21-03-09 12:05:02				启用	启用
	3	0864650053877[redacted]	123456	ZHL4931	测试-新	21-03-10 16:21:07				启用	启用
▸	4	0864650053877[redacted]	123456	ZHL4931	演示	21-03-17 19:44:22	21-03-17 19:33:51		在线	关闭	启用

日志

```
19:48:33  0864650053877[redacted] 设备已上线
```

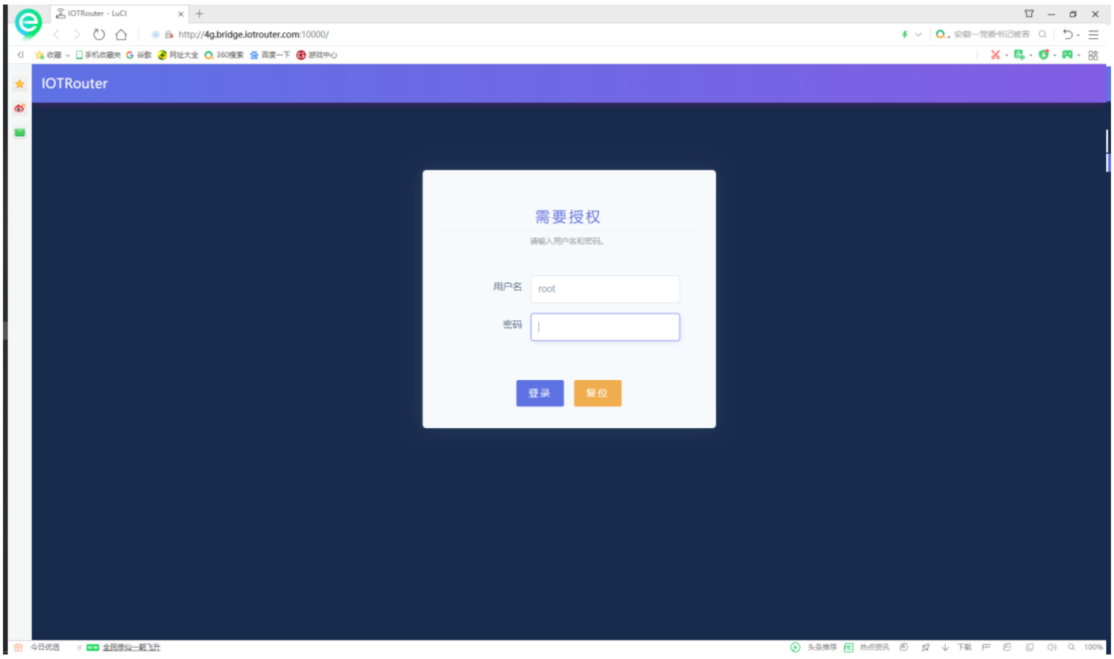
⑵When the device is online, click the remote management button at this time, and wait a while. When prompted that the remote management has been successfully turned on, the router configuration webpage will automatically pop up. This configuration webpage is the same as the webpage accessed directly by the network cable.



	序号	设备ID	密码	型号	设备名称	添加时间	设备注册时间	远程管理地址	在线状态	设备连接	远程管理
	1	086465005387[redacted]	123456	ZHL4931	测试1	21-03-03 17:35:27				启用	启用
	2	086465005387[redacted]	123456	ZHL4931	测试2	21-03-09 12:05:02				启用	启用
	3	086465005387[redacted]	123456	ZHL4931	测试-新	21-03-10 16:21:07				启用	启用
▸	4	086465005387[redacted]	123456	ZHL4931	演示	21-03-17 19:44:22	21-03-17 19:33:51	http://4g.bridge.iotrouter.com:10000	在线	关闭	关闭

日志

```
19:48:33  0864650053877[redacted] 设备已上线
19:52:23  0864650053877[redacted] 正在启用远程管理请稍等。。。
19:52:27  0864650053877[redacted]:远程管理开启成功
```



需要授权

请输入用户名和密码。

用户名 root

密码

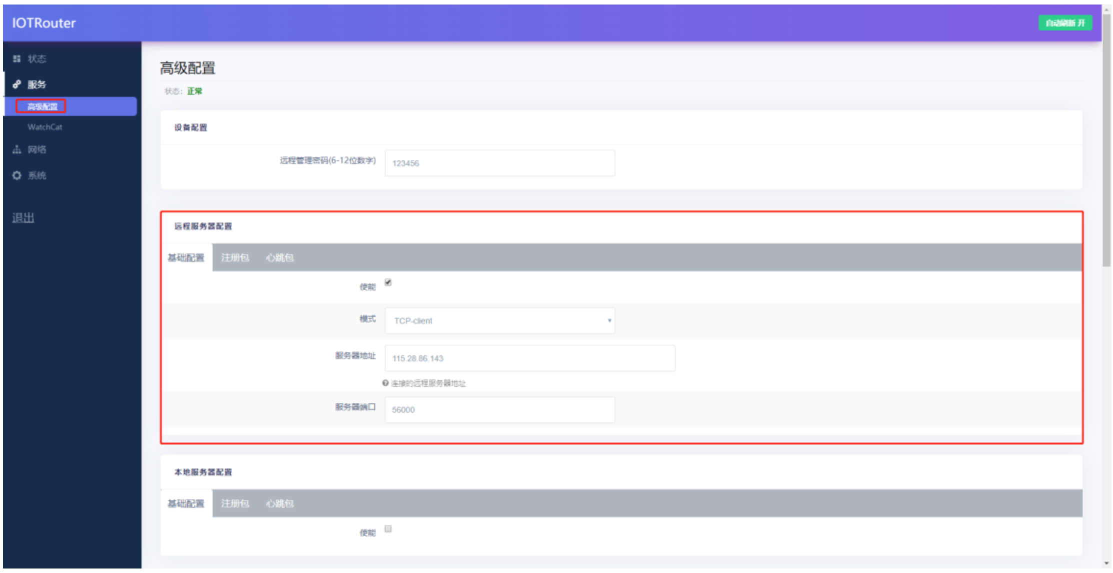
Note: In the case of poor network conditions, there may be page delays or refresh failures. At this time, please wait for a while and refresh the web page or reopen the remote management again.

4.2 Remote server connection

The device provides a user-defined remote connection, and supports TCP-Client, MQTT-Client connection to the user's remote server. Establish transparent transmission of data from serial port and LAN port to remote server, and remotely monitor and control DI and DO interfaces. So as to realize the function of DTU.

4.2.1 Basic configuration

TCP communication method:



高级配置

状态：正常

设备配置

远程管理密码(6-12位数字) 123456

远程服务器配置

使能 ☑

模式 TCP-client

服务器地址 115.28.86.143

连接的远程服务器地址

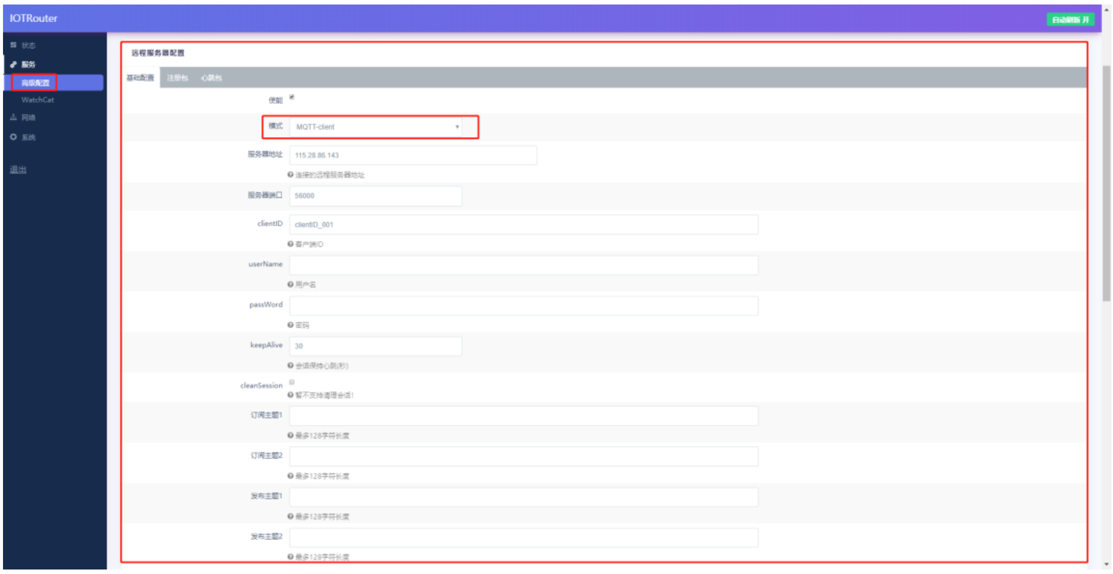
服务器端口 56000

本地服务器配置

使能 □

- Enable: Check when you need to enable the remote server function. Not enabled by default.
- Mode selection: currently supports TCP-Client and MQTT-Client connection.
- Server address: The connection address of the user's server, which supports IP or domain name. Maximum length: 64 bytes.
- Server port: the connection port of the user server.

MQTT communication method:



使能 ☑

模式 MQTT-client

服务器地址 115.28.86.143
连接的远程服务器地址

服务器端口 56000

clientID clientID_001
客户端ID

userName
用户名

passWord
密码

keepAlive 30
会话保持心跳(秒)

cleanSession □
暂不支持清理会话!

订阅主题1
最多128字符长度

订阅主题2
最多128字符长度

发布主题1
最多128字符长度

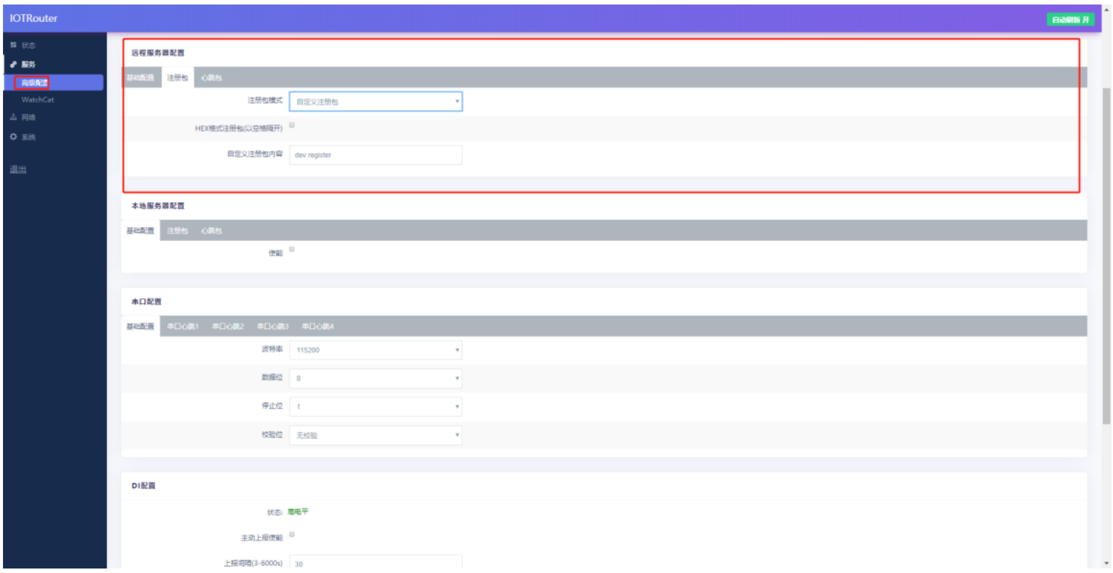
发布主题2
最多128字符长度

- clientID: The client ID connected to the MQTT server, usually generated by the server for verification.
- userName: The user name of the connected MQTT server, usually generated by the server for verification.
- password: The password of the connected MQTT server, usually generated by the server for verification.
- keepAlive: The session keeps the heartbeat, the MQTT client and server keep the heartbeat cycle, the default is 30S.
- cleanSession: Clean up the session, not currently supported.
- Subscription topic: Receive Topic address for MQTT client data, support up to two subscription addresses.
- Publish topic: Push topic address for MQTT client data, support up to two publishing addresses.

Note: When two publishing topics are set, the user agreement data of the device (see 5 User Agreement) Push by default To the first published topic. The transparent transmission data of the serial port and LAN port is pushed to the second publishing topic by default.

4.2.2 Registration package

After the device supports the connection establishment, it immediately sends a registration package content to the specified server address, so that the server can distinguish the device and verify it. Only valid for TCP-Client mode.



远程服务器配置

基础配置 注册包 心跳包

注册包模式: 自定义注册包

HEX格式注册包(以空格隔开) □

自定义注册包内容: dev register

本地服务器配置

基础配置 注册包 心跳包

使能 □

串口配置

基础配置 串口心跳1 串口心跳2 串口心跳3 串口心跳4

波特率: 115200

数据位: 8

停止位: 1

校验位: 无校验

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s): 30

- Registration package mode: Close the registration package and do not send the registration package data.

  ID registration package, the device ID is sent as the registration package data.

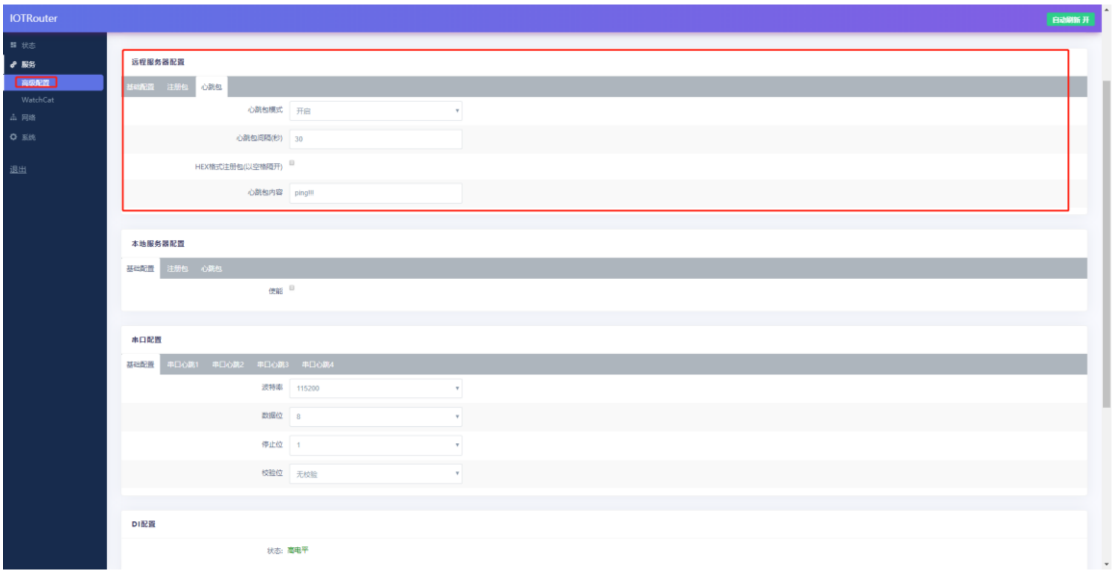
  CCID registration package, the SIM card CCID number is sent as registration package data.

  Custom registration package, users can customize the content of the registration package.

- HEX format registration package (separated by a space): For user-defined registration packages, if the user needs to enter a HEX format data package, please check this option. If it is a string type data, it does not need to be checked.
- Customized registration package content: For user-defined registration package, when you need to fill in HEX format data, please separate by spaces, for example, a 7-byte registration package: 31 42 33 1F 05 46 0D.

4.2.3 Heartbeat packet

After the device supports the connection establishment, it periodically sends heartbeat data to the specified server address to maintain the connection between the device and the server. Only valid for TCP-Client mode.



远程服务器配置

基础配置 注册包 心跳包

心跳包模式: 开启

心跳包间隔(秒): 30

HEX格式注册包(以空格隔开) □

心跳包内容: ping!!!

本地服务器配置

基础配置 注册包 心跳包

使能 □

串口配置

基础配置 串口心跳1 串口心跳2 串口心跳3 串口心跳4

波特率: 115200

数据位: 8

停止位: 1

校验位: 无校验

DI配置

状态: 高电平

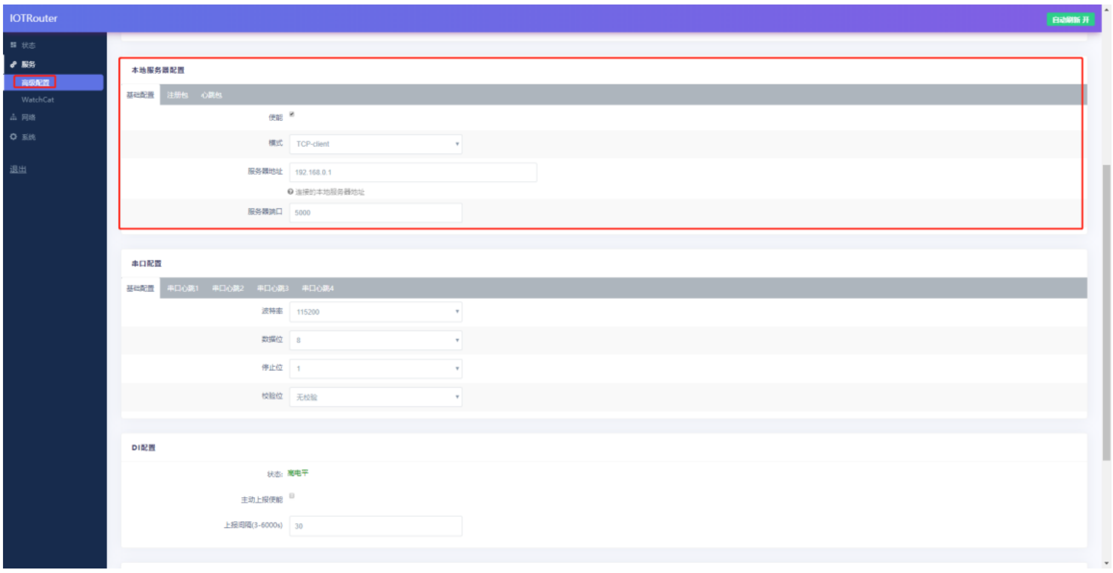
- Heartbeat packet mode: You can choose to turn this function on and off.

- Heartbeat packet interval: the sending period of the heartbeat interval, in seconds.
- HEX format heartbeat packets (separated by spaces): If the user needs to input a HEX format data packet, please check this option, if it is a string type data, it does not need to be checked.
- Heartbeat packet content: When you need to fill in HEX format data, please separate by spaces, for example, a 7-byte heartbeat packet: 31 42 33 1F 05 46 0D.

4.3 Local server connection

The device provides a user-defined local TCP connection, which can be connected to the user's local area network server through the LAN port. Thereby establishing the data transparent transmission to the remote server.

4.3.1 Basic configuration



本地服务器配置

使能 ☑

模式 TCP-client

服务器地址 192.168.0.1

连接的本地服务器地址

服务器端口 5000

串口配置

波特率 115200

数据位 8

停止位 1

校验位 无校验

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s) 30

- Enable: Check when you need to enable the function of connecting to the local server. Not enabled by default.
- Mode selection: currently only supports TCP-Client connection.
- Server address: The connection IP of the user's local server. Only IP is supported.
- Server port: the connection port of the user's local server.

4.3.2 Registration package

Please refer to section 4.2.2

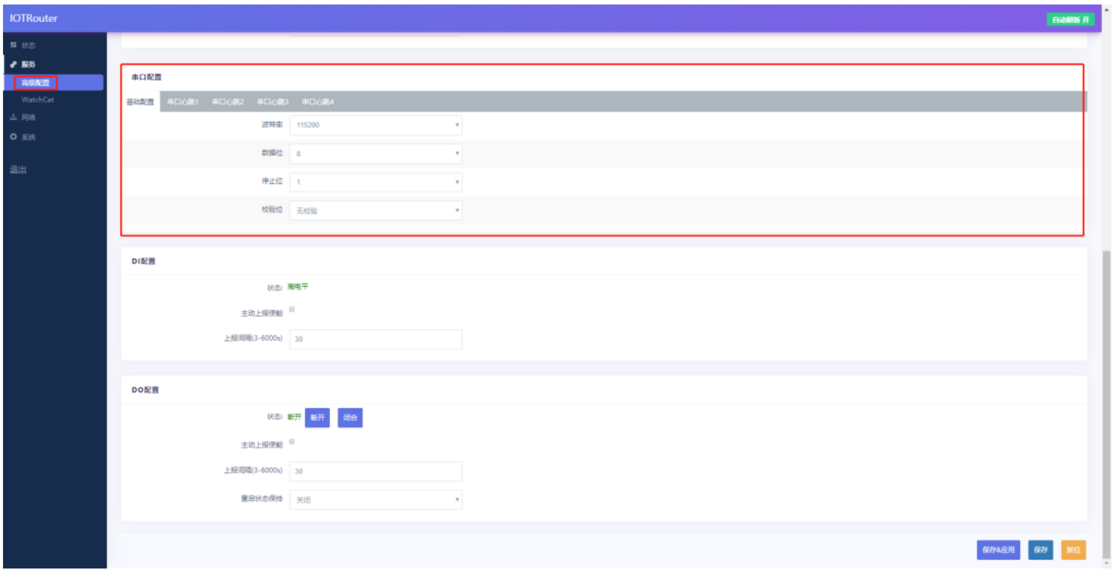
4.3.3 Heartbeat packet

Please refer to section 4.2.3

4.4 Serial port

The device comes with a RS485 interface. Used for users to connect 485 communication sensors and other equipment. Cooperate with remote server to form transparent transmission from serial port to user network, and supports 4 serial port heartbeat commands.

4.4.1 Basic configuration



串口配置

基础配置 串口心跳1 串口心跳2 串口心跳3 串口心跳4

波特率 115200

数据位 8

停止位 1

校验位 无校验

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s) 30

DO配置

状态: 断开 断开 闭合

主动上报使能 □

上报间隔(3-6000s) 30

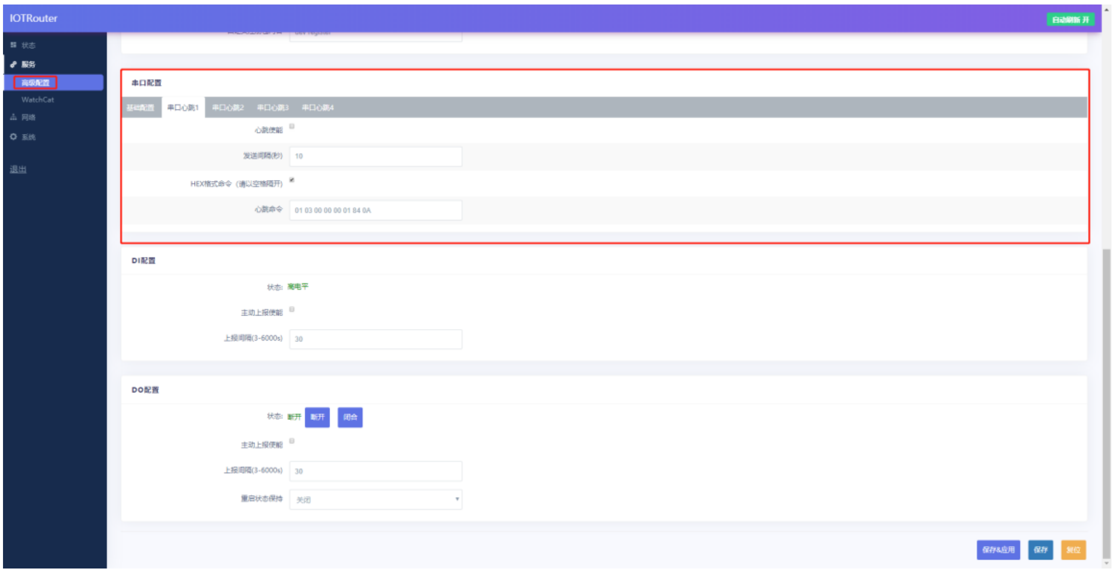
重启状态保持 关闭

table. Serial communication parameters

project	Default parameters	Parameter range
Baud rate	115200	2400-921600
Data bit	8	8, 7
Stop bit	1	1, 2
Check Digit	No verification	No parity, even parity, odd parity

4.4.2 Serial port heartbeat

The device supports heartbeat command data of up to four serial ports, which are periodically sent to the device connected to the serial port. It is convenient for the user to periodically obtain the data of the device connected to the serial port.



串口配置

心跳使能 □

发送间隔(秒) 10

HEX格式命令（请以空格隔开） ☑

心跳命令 01 03 00 00 00 01 84 0A

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s) 30

DO配置

状态: 断开

主动上报使能 □

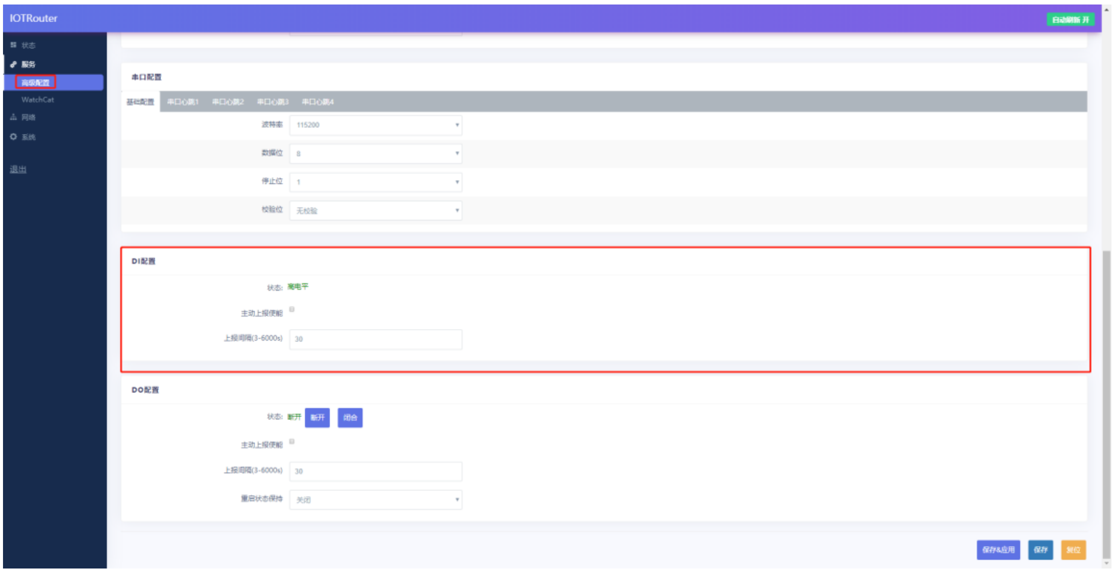
上报间隔(3-6000s) 30

重启状态保持 关闭

- Heartbeat enable: 4 heartbeat commands can be individually controlled to enable or disable. Not enabled by default.
- Sending interval: The sending interval is the time interval since the last serial port heartbeat sending. If one is configured, it is sent periodically. If four lines are configured, it is 1-4 cyclic transmission.
- HEX format commands (separated by spaces): If you need to enter a command package in HEX format, please check this option, if it is a string type data, you do not need to check it.
- Heartbeat packet content: When you need to fill in HEX format data, please separate by spaces, for example, an 8-byte heartbeat packet: 01 03 00 00 00 01 84 0A.

4.5 DI

The device supports one-way dry (wet) node detection, and the user can check the current DI input status through the configuration web page. The DI input status can also be checked through the remote server.



串口配置

波特率 115200

数据位 8

停止位 1

校验位 无校验

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s) 30

DO配置

状态: 断开

主动上报使能 □

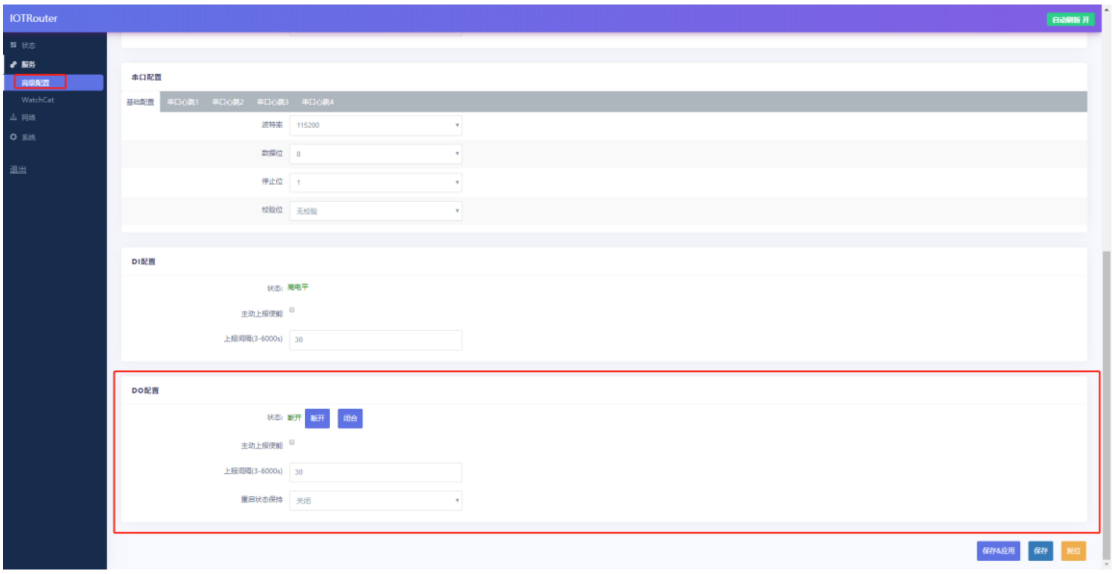
上报间隔(3-6000s) 30

重启状态保持 关闭

- Status: Display the latest DI input status in real time. Dry node: disconnect-high level; short circuit-low level
- Active reporting enable: Support actively reporting the current DI status to the remote server, and not reporting by default. See the report agreement - 5 User Agreement chapter
- Reporting interval: Periodic reporting interval, in seconds.

4.6 DO

The device supports one relay control, and the user can control the opening and closing of the relay through the configuration webpage. You can also view and control the opening and closing status of the relay through the remote server.



串口配置

波特率 115200

数据位 8

停止位 1

校验位 无校验

DI配置

状态: 高电平

主动上报使能 □

上报间隔(3-6000s) 30

DO配置

状态: 断开

主动上报使能 □

上报间隔(3-6000s) 30

重启状态保持 关闭

- Status: Display the latest DO opening and closing status in real time. And can control the opening and closing of the relay in real time.
- Active reporting enable: Support actively reporting the current DO status to the remote server, and not reporting by default. See the report agreement

  - 5 User Agreement chapter.
- Reporting interval: Periodic reporting interval, in seconds.

5 User Agreement

This agreement applies to ZHL493x Series router products, support Remote server of TCP , MQTT Two different communication Letter mode JSON Protocol interaction. When the customer uses the JSON protocol to communicate with the device, please strictly follow the format requirements in this section, otherwise the transparent transmission will be processed.

This agreement JSON The data type of all fields is string- String . Not right JSON Protocol format specification then do Go into details.

Different message types are distinguished by the "router_data" field, that is, the content of different messages "router_data" is different. Each command needs to carry the device ID field "devID". The device will verify the ID consistency after receiving the data.

5.1 DI interface

DI in JSON In the protocol interaction, according to the different function points, it is divided into the following router_data:

router_data	Data trend	description
di_query	Server -> Equipment	Request the latest status of DI
di_query_ack	Device -> Server	Reply to request the latest status of DI
di_rep	Device -> Server	The device actively reports the DI status

5.1.1 Request DI status

Request frame format:

Field	Do you have to	description
router_data	Yes	di_query
devID	Yes	Device 16-digit ID number

Response frame format:

Field	Do you have to	description
router_data	Yes	di_query_ack
devID	Yes	Device 16-digit ID number
di_state	Yes	1: high level 0: low level

Example request:

```
{
        "router_data":"di_query",
        "devID":"0864650053877001",//Need to verify the device ID is consistent
}
```

Example response:

```
{
        "router_data":"di_query_ack",
        "devID":"0864650053877001",
        "di_state":"1"
}
```

5.1.2 Active reporting of DI status

Active report frame format:

Field	Do you have to	description
router_data	Yes	di_rep
devID	Yes	Device 16-digit ID number
di_state	Yes	1: high level 0: low level

Examples of proactive reporting:

```
{
        "router_data":" di_rep",
        "devID":"0864650053877001",
        "di_state":"1"
}
```

5.2 DO interface

DO in JSON In the protocol interaction, according to the different function points, it is divided into the following router_data:

router_data	Data trend	description
do_query	Server -> Equipment	Request the latest status of DO
do_query_ack	Device -> Server	Reply to request the latest status of DO
do_conctol	Server -> Equipment	Control DO status
do_conctol_ack	Device -> Server	Control the response of DO status
do_rep	Device -> Server	The device actively reports the DO status

5.2.1 Request DO status

Request frame format:

Field	Do you have to	description
router_data	Yes	do_query
devID	Yes	Device 16-digit ID number

Response frame format:

Field	Do you have to	description
router_data	Yes	do_query_ack
devID	Yes	Device 16-digit ID number
do_state	Yes	1: closed 0: open

Example request:

```
{
        "router_data":"do_query",
        "devID":"0864650053877001",//Need to verify the device ID is consistent
}
```

Example response:

```
{
        "router_data":"do_query_ack",
        "devID":"0864650053877001",
        "do_state":"1"
}
```

5.2.2 Control DO status

Request frame format:

Field	Do you have to	description
router_data	Yes	do_conctol
devID	Yes	Device 16-digit ID number
do_state	Yes	1: closed 0: open

Response frame format:

Field	Do you have to	description
router_data	Yes	do_conctol_ack
devID	Yes	Device 16-digit ID number
do_state	Yes	1: closed 0: open

Example request:

```
{
        "router_data":"do_conctol",
        "devID":"0864650053877001",//Need to verify the device ID is consistent
        "do_state":"1"
}
```

Example response:

```
{
        "router_data":"do_ conctol_ack",
        "devID":"0864650053877001",
        "do_state":"1"
}
```

5.2.3 Active reporting of DO status

Active report frame format:

Field	Do you have to	description
router_data	Yes	do_rep
devID	Yes	Device 16-digit ID number
do_state	Yes	1: closed 0: open

Examples of proactive reporting:

```
{
        "router_data":" do_rep",
        "devID":"0864650053877001",
        "do_state":"1"
}
```

6 Contact

Company: Chengdu Zongheng Intelligent Control Technology Co., Ltd.

address: No. 599, Section 1, Huafu Avenue, Chengdu City, Sichuan Province

URL: http://www.iotrouter.com

Phone: 028-83268936