5G Industrial Router

user manual

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Document Classification: General	Model: ar520

1. Product instruction manual

The ar520 5G industrial grade router is mainly applied to data transmission services for industrial users, supporting transparent data transmission, image transmission, equipment monitoring and wireless router internet access.

Using industrial-grade 32-bit high-speed dual-core 880MHz processor, ar520 can process protocols and a large amount of data at high speed. ar520 can be paired with a variety of 5G industrial modules in order to provide mobile networks such as SA,NSA, LTE, and so on. Provides 10/100M/1000M Ethernet port and two serial ports, which can be docked to a variety of terminal equipment. Support WEB configuration and remote configuration mode, easy and simple management.

1.1 Product appearance

1.2 Interface Description

Interface		
Ethernet interface		2* 10/100/1000Mbps Fast Ethernet interfaces, WAN/LAN adaptive (2 LAN in 5G mode)
PIN	Industrial Serial Interface	RS232/RS485 x 2 industrial terminals RS232 signal: TXD, RXD, GND RS485 signal: A, B
SIM card holder		Drawer card holder x 1
Antenna connectors		SMA external rotating bore: 5G network: SMA x 4
reset button		1

LED Lights Description

LED	SYS System Operation Indicator: Blinks once a second to indicate normal system operation Fast flash indicates that the firmware is being upgraded, or the reset button is being pressed to reset
	NET extranet connection indicator: When in 5G mode, fast blinking indicates that 5G is in dialing mode Long on, indicates WAN port internet access success Long off, indicates WAN port failed to connect to the Internet
	SIG 5G signal strength indicator: When 5G is above 90% signal strength, the SIG light will be on for a long time. When 5G is at 45% - 90% signal strength, the SIG light flashes once a second. SIG light blinks fast when 5G is below 45% signal strength.
	5G mode signal indicator: Lights up when the resident network is 5G Blinks once a second when the resident network is 4G. Turns off when the station fails

2. Equipment connection

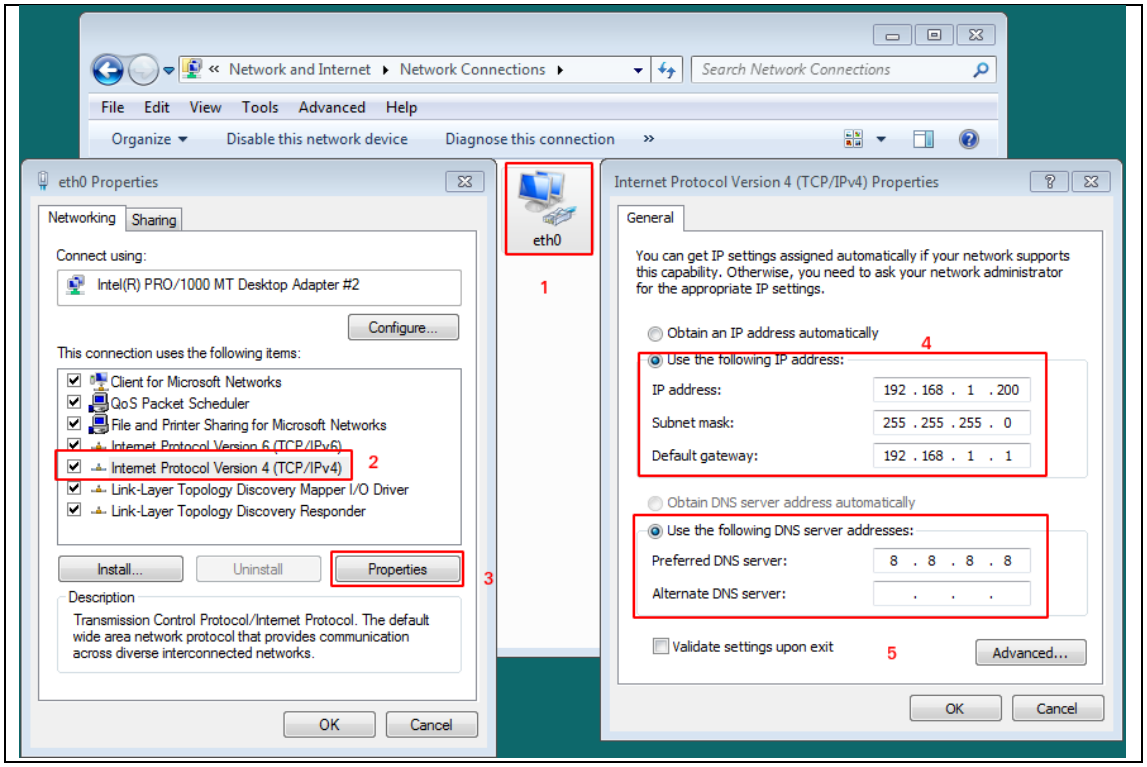
2.1 Connecting equipment

You can connect your computer to the router by following these steps.

2.1.1 Setting the computer's IP address

Before accessing the web setup page, it is recommended that you set your computer to "Obtain an IP address automatically" and "Obtain a DNS server address automatically", so that the router will assign an IP address automatically. If you need to assign a static IP address to your computer, you need to set the IP address of your computer to the same subnet as the IP address of the router's LAN port (the default IP address of the router's LAN port is 192.168.1.1 with a subnet mask of 255.255.255.0).

"Control Panel" - "Network and Internet" - "Network connections":



2.1.2 Verify that the computer is connected to the router

After your computer shows that it has successfully obtained an IP address, please use the Ping command to confirm whether the connection between your computer and the router is successful.

For example, in Windows 7 environment, execute the Ping command: Ping 192.168.1.1

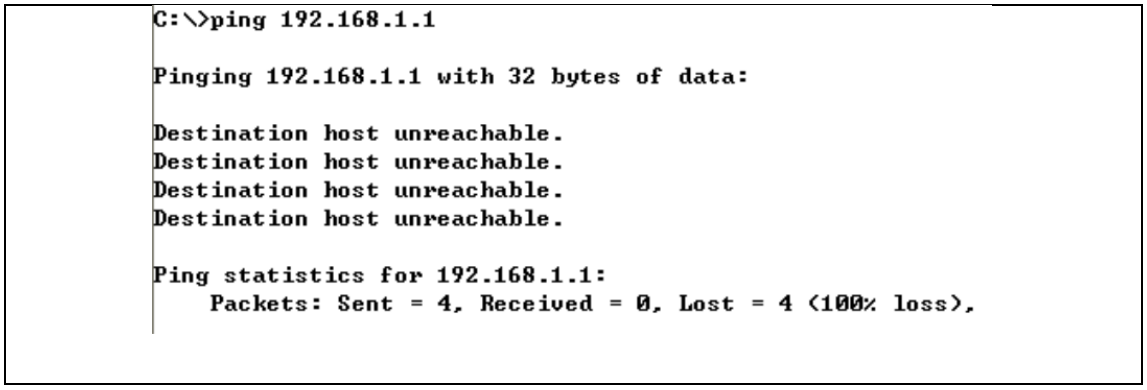
If the screen displays the following, it means that your computer has successfully established a connection with the router.

```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

The ping command displays Figure 1

If the screen displays as follows, the connection between the computer and the

router has failed.



The ping command displays Figure 2

When the connection fails, please do the following checks:

1. Hardware connection: The indicator light corresponding to the LAN port connected to the cable on the router panel and the NIC light on the computer must be on. If they are not lit, it means the network cable is not in good contact.

2. Configuration of computer TCP/IP attributes: If the LAN management IP address of the router is 192.168.1.1, then the IP address of the computer must be any one of the free addresses in 192.168.1.2-192.168.1.254, i.e., the IP address of the computer must be in the same IP subnet as that of the LAN port of the router.

2.2 Logging on to the Router

Next you will log in to the router web setup page.

Type "http://192.168.1.1" in the address bar of your web browser and enter your login username and password in the popup box. If you enter 192.168.1.1, you will be redirected to the wrong url, you can directly write the router login url, 192.168.1.1/index.asp.

The first time you log in, please enter the default username: **admin** and password: **admin**.

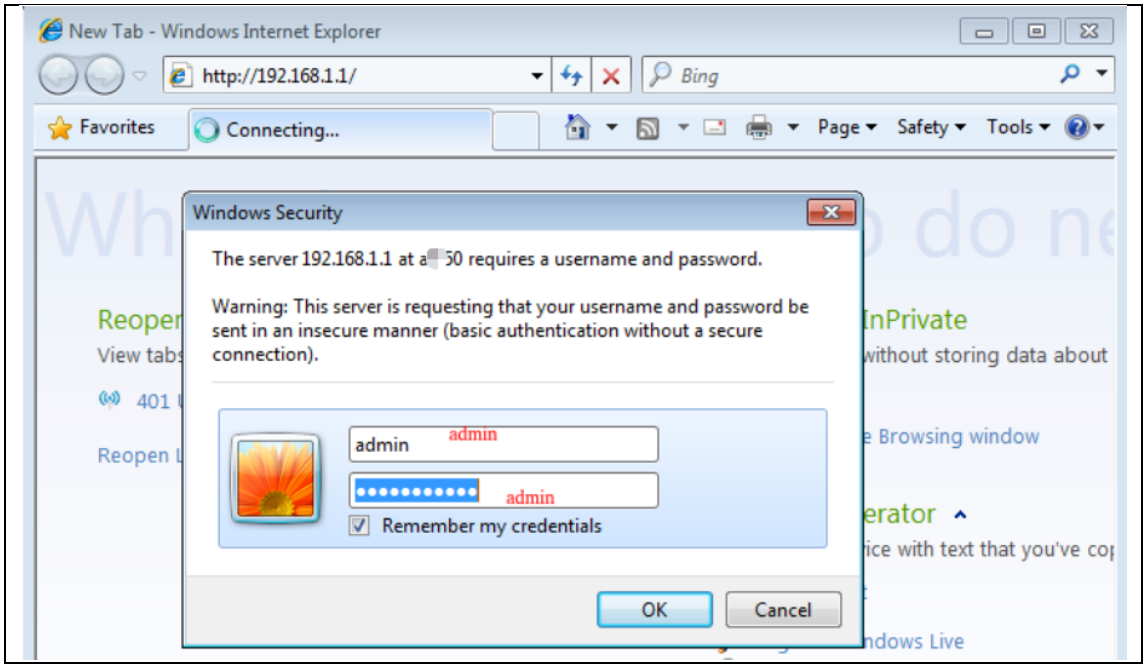
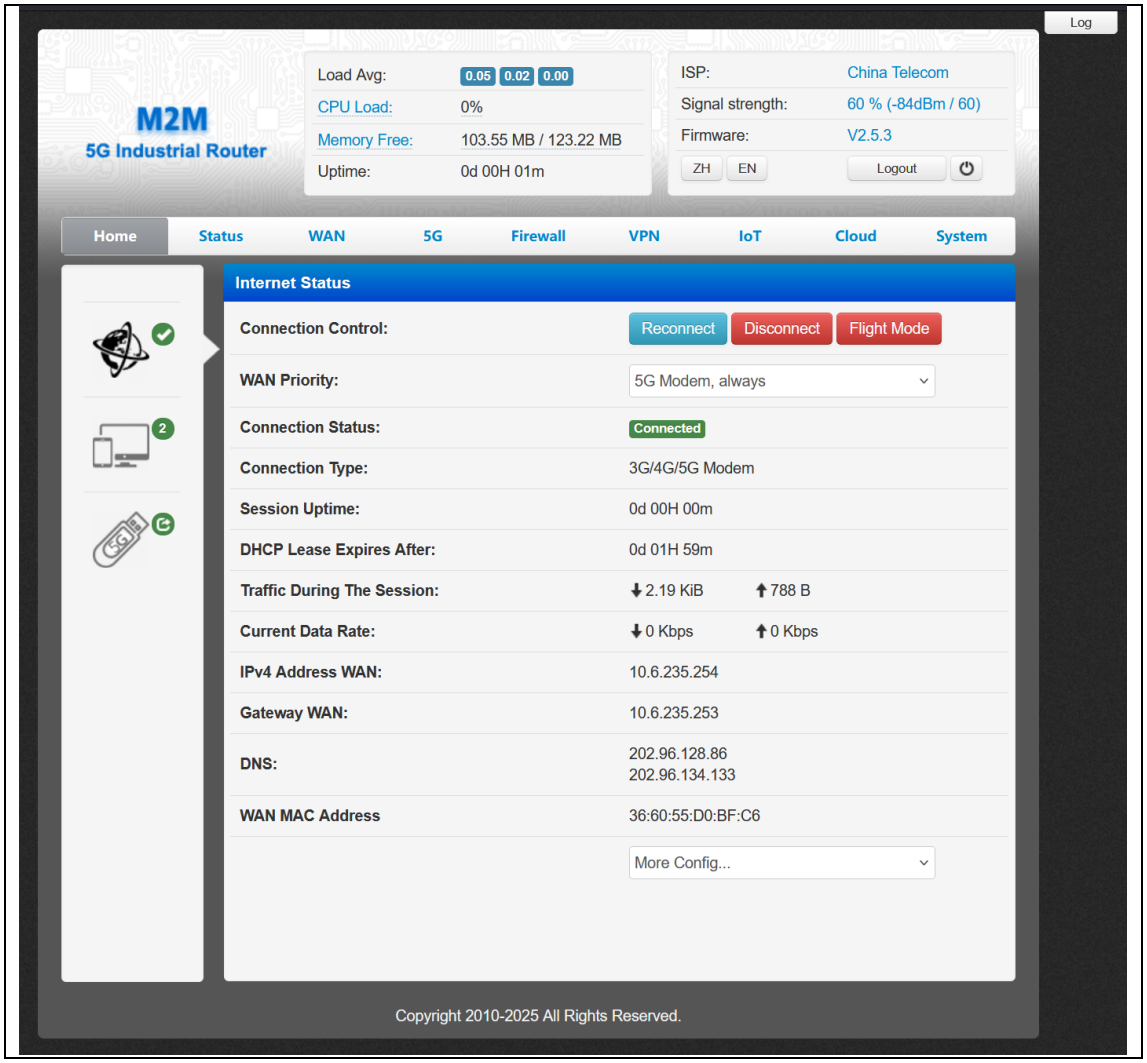


Figure 2.2 Login pop-up box

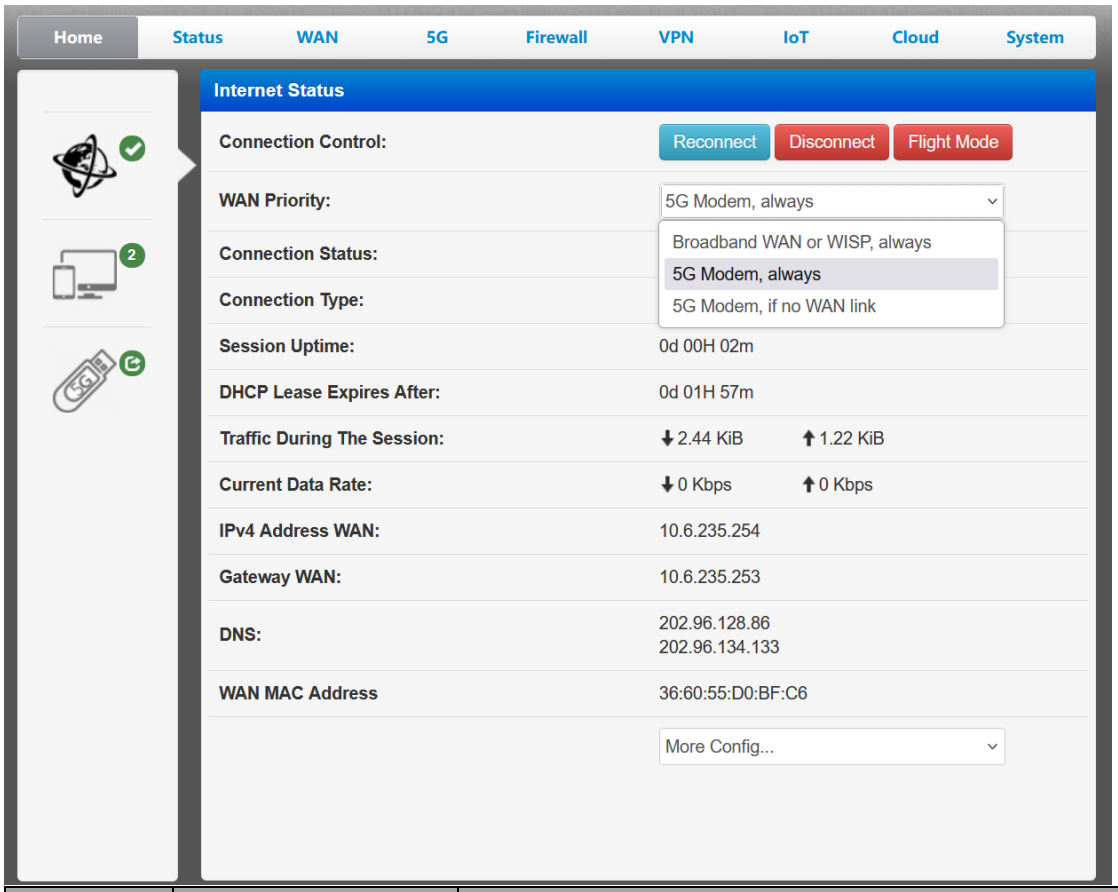
2.3 Logging into the router WEB management



3.Home

Basic information displays the device's uptime, network operator, signal strength, firmware version, and other details.

3.1.1 WAN Status and WAN Priority Settings

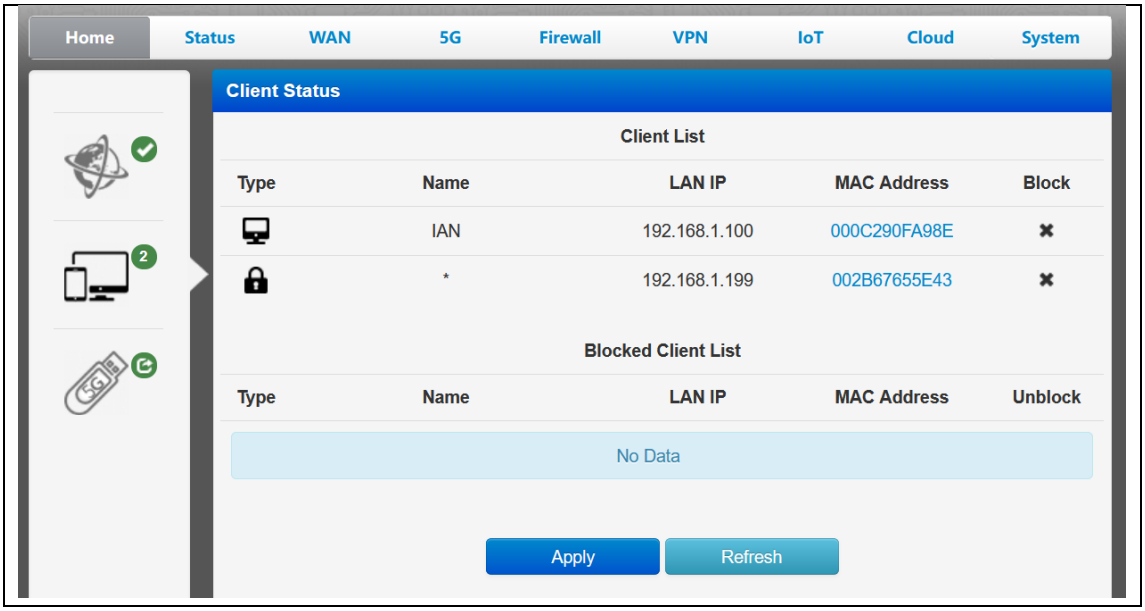


<table>
<tr><th>Left</th><th>Right</th><th>Description</th></tr>
<tr><td rowspan="6">WAN Status</td><td>WAN Status</td><td>Connection Control Manually control "Connect" or "Disconnect" on the WAN side. If manually disconnected, the router will not automatically reconnect.</td></tr>
<tr><td>WAN Priority</td><td>WAN Priority Select the router's internet mode:<table><tr><td>Wired WAN or WISP (Always)</td><td>Wired broadband or wireless relay mode.</td></tr><tr><td>5G Modem (Always)</td><td>5G internet mode.</td></tr><tr><td>5G Modem (When no external network is connected)</td><td>5G internet mode.</td></tr></table></td></tr>
<tr><td>Internet Status</td><td>Indicates whether connected to an external network</td></tr>
<tr><td>Connection Type</td><td>Current internet access method</td></tr>
<tr><td>External Connection Duration</td><td>Total duration of uninterrupted external network connection</td></tr>
<tr><td>Remaining Lease Time</td><td>Lease time of the IP address assigned to the router by the external network. (Note: IP lease durations vary in 5G networks, but this does not affect the router's actual</td></tr>
</table>

		online duration, which is determined by "External Connection Time".)
	External Connection Traffic	Total downstream and upstream traffic on the current WAN interface
	Current Connection Speed	Current downstream and upstream speeds of the WAN interface.
	WAN IPv4 Address	WAN interface's IPv4 address
	WAN Gateway Address	WAN interface's gateway address
	DNS	DNS information obtained by WAN
	MAC	MAC address information of the physical interface corresponding to the WAN port. in 5G Internet access mode, this MAC is the MAC address of the 5G module.

3.1.2 Client List Information

Displays the number of client accesses and the method

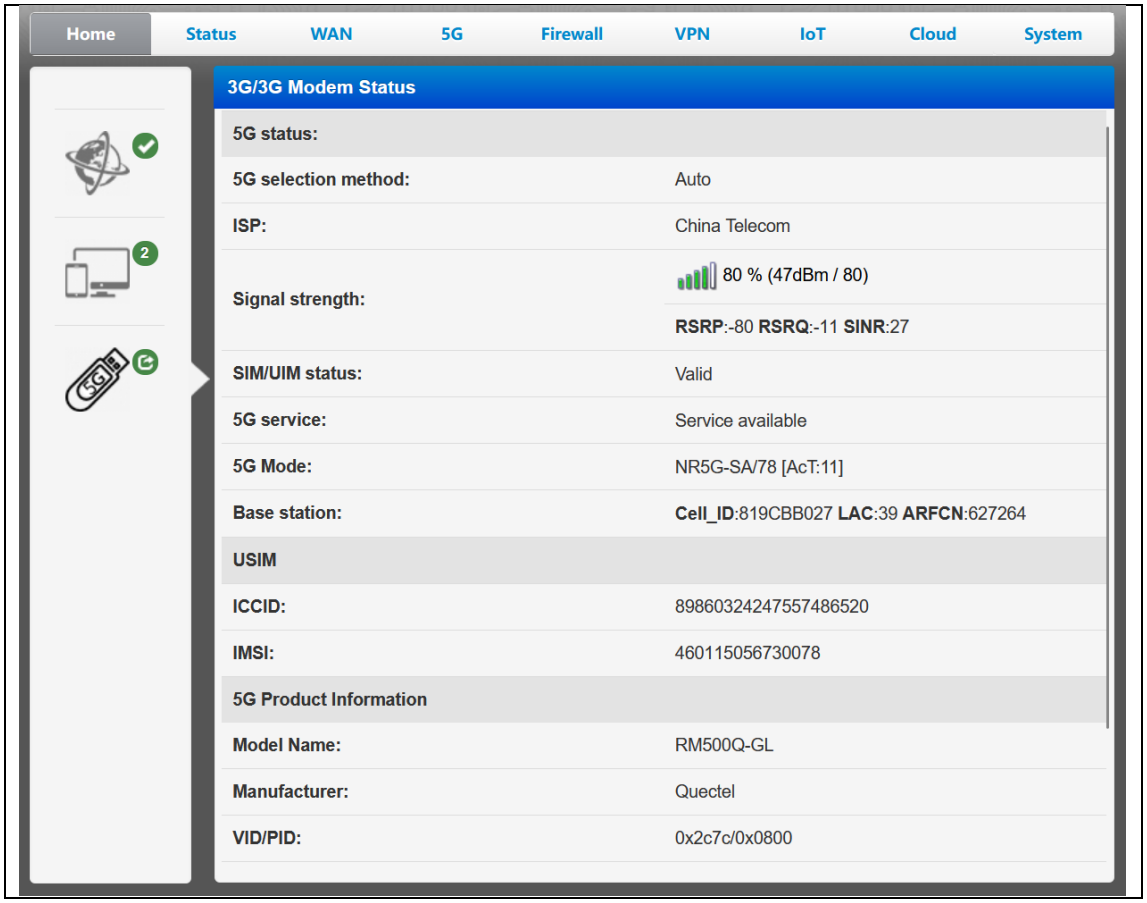


The item descriptions are listed in the following table:

Item	Description
Connected Devices	Currently connected devices on the router
Blocked devices	You can click the "X" sign on the "Block" button of "Connected Devices" to quickly block the selected devices from accessing the external network.

3.1.3 5G module status

Displays 5G module Status information: operator, signal strength, network type, SIM card and module IMEI.



The item descriptions are listed in the following table:

Item	Description
5G Network Status	
5G State of the Network	Auto Matching: The router automatically matches the carrier information of the SIM card used. Insert SIM card to dial up the Internet automatically Manual setup: Manual setup is required when VPDN private network card; Operators not in the auto-matching list need to be setup manually. If the SIM card cannot be recognized automatically, you can contact R&D to add matching information.
5G Operators	Recognize which operator is based on the SIM card information, currently supports nearly 500 operators around the world.
Signal Strength	Percentage of signal strength in the current environment in which the 5G module is being used, making it easy to analyze the 5G signal in the current environment.
SIM/UIM Status	Is the SIM card valid. If it is not valid, it may not have good contact and can be re-inserted. Currently, there are several kinds of status as below: 1. Valid: SIM card can dial up to the Internet. 2. PIN code: If the SIM card has a PIN code, you need to add the PIN code in the 5G settings for dialing.
5G Services	Whether the service is valid or not, there are several statuses as follows: Service available: The registered network is successful and you can access

	the Internet. Restricted service: Mostly SIM is in arrears. Power-saving mode and hibernate mode: Generally 5G module is not compatible with current SIM card.
5G Network Type	Current network models and injection bands
USIM Card Information	
ICCID	Integrated Circuit Card Identification Number (solidified in the SIM card of the cell phone) ICCID is the unique identification number of the IC card, which consists of a total of 20 digits.
IMSI	International Mobile SubscriberIdentification Number
5G Module Information	
Model Name	Read directly from 5G module
Manufacturer	Read directly from 5G module
VID/PID	5G vid,pid information
IMEI	International Mobile Equipment Identity，IMEI
Modem Type	Driver type of the 5G module, i.e., the router is compatible with the driver of this module

Functional Description

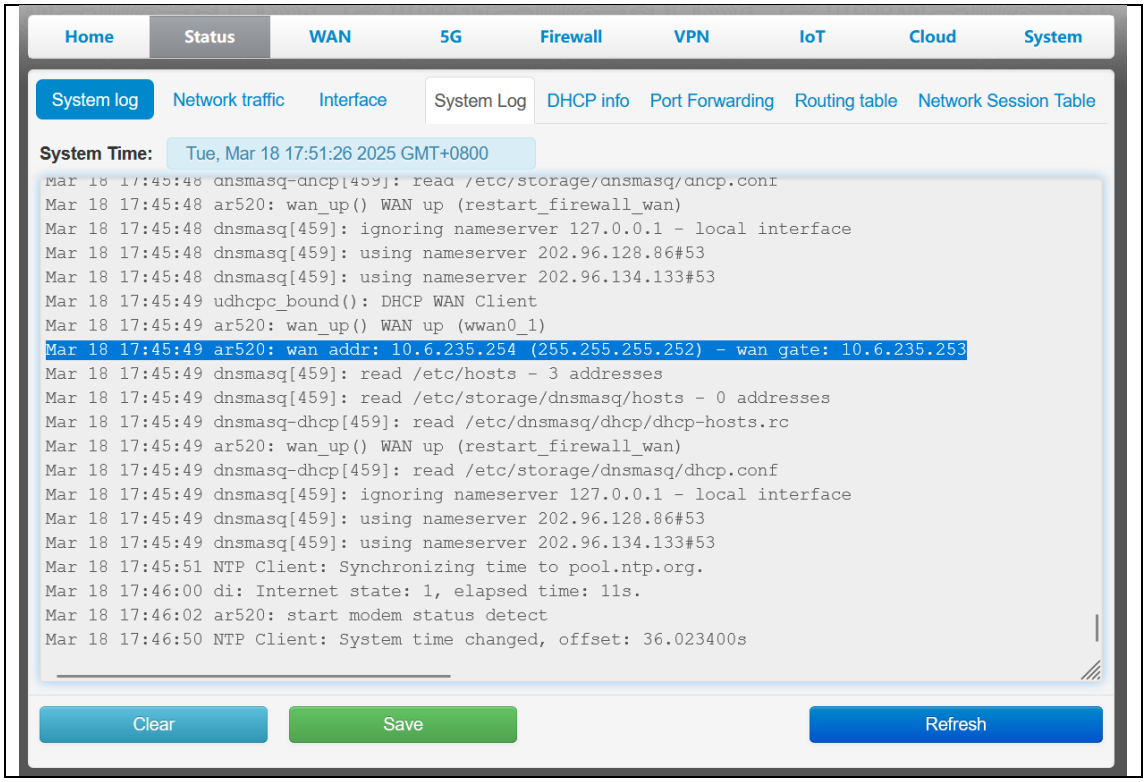
Note:

A SIM card has an ICCID and an IMSI inside. The ICCID is the card's identification and the IMSI is the subscriber's identification. ICCID is only used to distinguish the SIM card, not for authentication to access the network. IMSI, on the other hand, goes to the operator's server for authentication when accessing the network. ICCID can be forged, you can use a blank multi-number card, write IMSI and KI, as long as it is cracked IMSI and KI, you can access to the network, and ICCID can be any 20 digits.

3.2 system status

3.2.1 System Log

Mainly displays the device network registration information and processes, which is the basis for analyzing device network abnormalities.



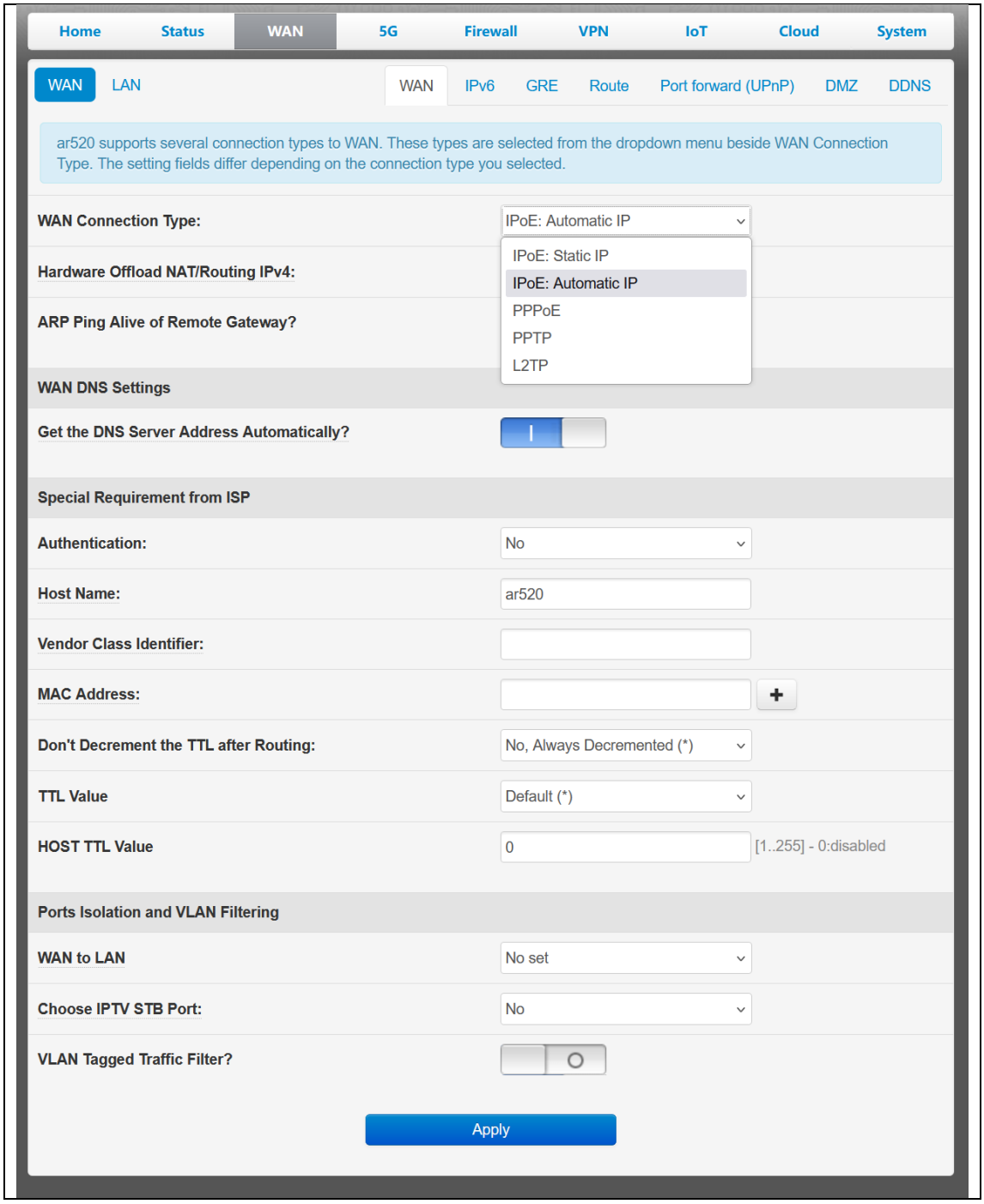
The item descriptions are listed in the following table:

Item	Description
System Time	The current time of the system
Clear	Clicking on it will clear the log information.
Save	You can save the log information in "syslog.txt" and download it locally.
Refresh	Refresh log

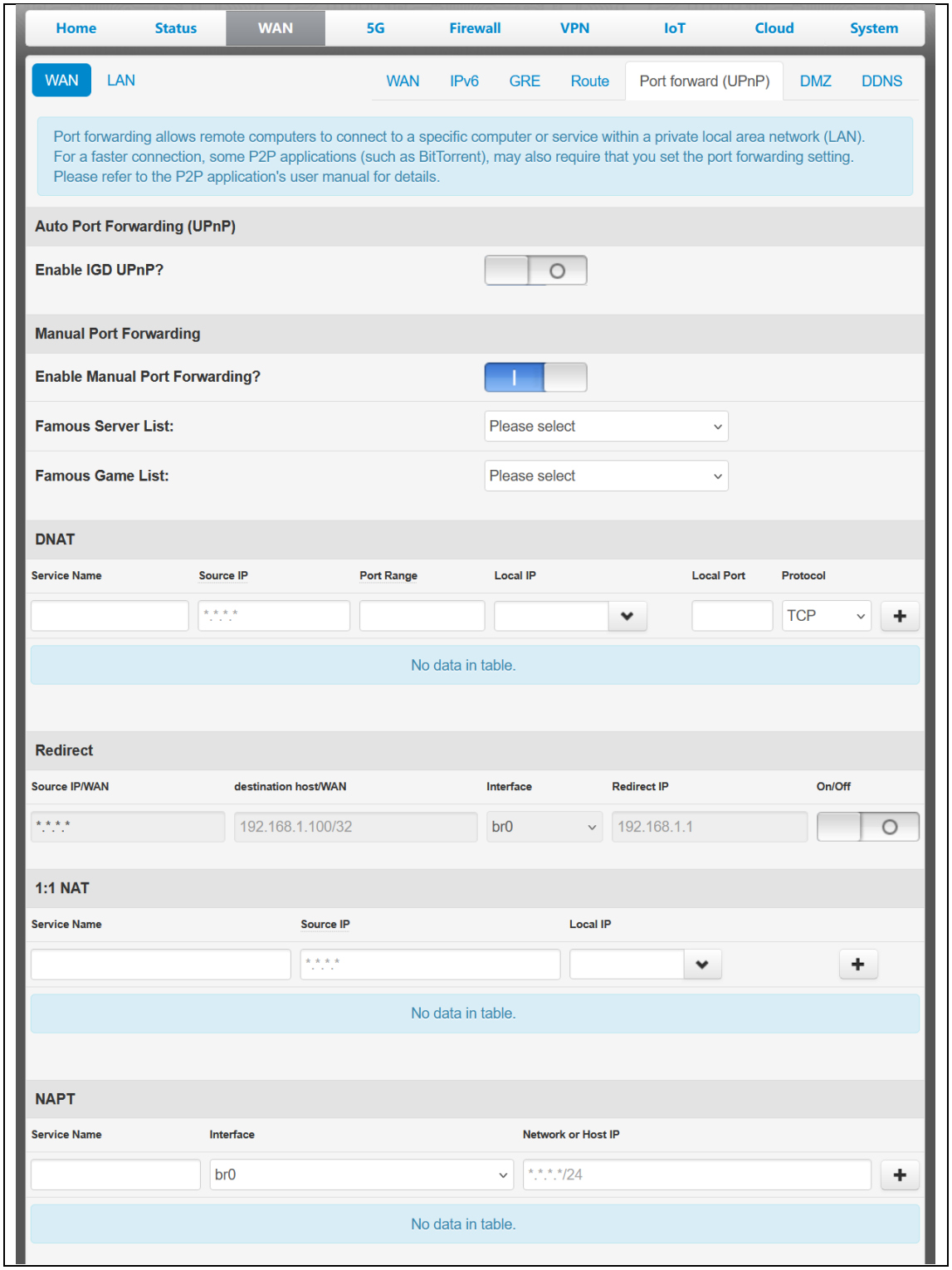
3.3 network setup

3.3.1 WAN Settings

Configure the wired Internet access of the router, the main Internet access methods are "IPoE:Dynamic IP", "PPPoE" and "IPoE:Static IP". These are the main internet access methods except for 5G internet access.


Home
Status
WAN
5G
Firewall
VPN
IoT
Cloud
System
WAN
LAN
WAN
IPv6
GRE
Route
Port forward (UPnP)
DMZ
DDNS
ar520 supports several connection types to WAN. These types are selected from the dropdown menu beside WAN Connection Type. The setting fields differ depending on the connection type you selected.
WAN Connection Type:
IPoE: Automatic IP
IPoE: Static IP
IPoE: Automatic IP
PPPoE
PPTP
L2TP
Hardware Offload NAT/Routing IPv4:
ARP Ping Alive of Remote Gateway?
WAN DNS Settings
Get the DNS Server Address Automatically?
Special Requirement from ISP
Authentication:
No
Host Name:
ar520
Vendor Class Identifier:
MAC Address:
Don't Decrement the TTL after Routing:
No, Always Decremented (*)
TTL Value
Default (*)
HOST TTL Value
0
[1..255] - 0:disabled
Ports Isolation and VLAN Filtering
WAN to LAN
No set
Choose IPTV STB Port:
No
VLAN Tagged Traffic Filter?
Apply

3.3.2 port forwarding

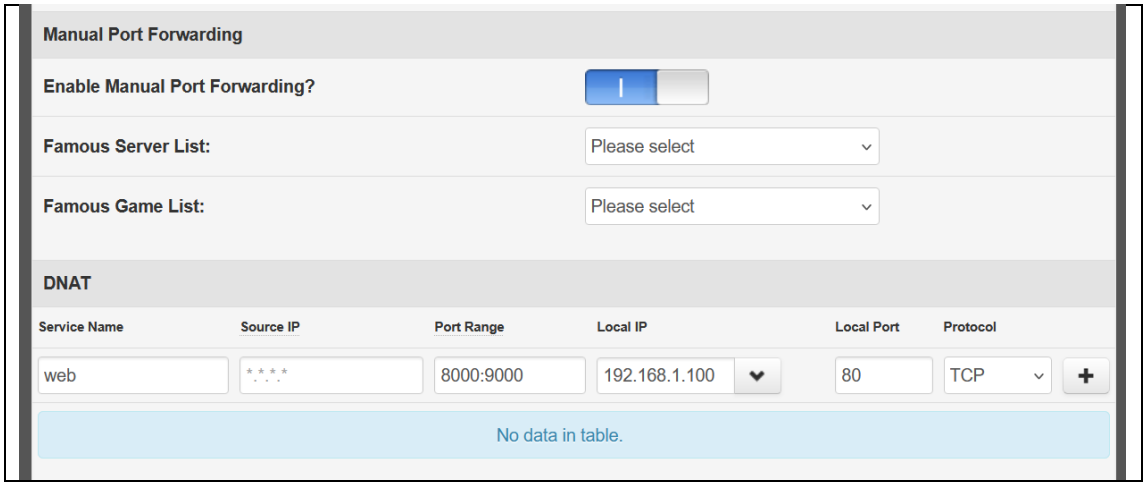


The item descriptions are listed in the following table:

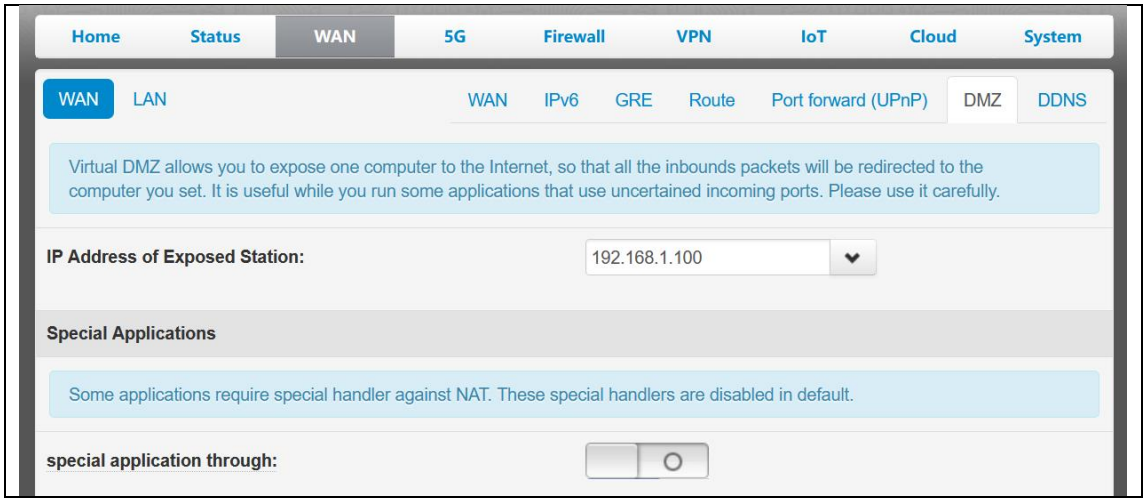
Item	Description
Enable IGD UPnP	Some gaming or real-time communication applications will be

	aborted if they have a common IP address and use the same port. Since they need to use a unique port for each session, turn on the "IGD UPnP" feature to automatically create NAT forwarding for these applications. In engineering scenarios, it is usually enough to turn it off.
Manual port mapping	
Common Agreements	Mapping rules for some common protocols, when selected, the table below will automatically generate the appropriate settings.
Service Name	Give a name to the current mapping rule
Source IP Address	The IP address for accessing the intranet from outside, usually written as " *. *. *. *", which indicates an arbitrary external address
Port Range	Port range: a) Specify the port, e.g. [95]. b) Specify the port range, e.g. [103 : 315] or [> 100] or [< 65535]
Intranet IP Address	IP address of the internal server
Local Port	Port of a service on the internal server
Protocol	TCP/UDP protocol, or other IP layer protocols
"+" sign to add	After configuring the above information, click the "+" sign to add to the list, you can add up to 64 rules.
redirects	
Source IP Address/Network	Extranet host or network
Destination Address/Network	Intranet host or network
Interface	Router interface
Redirect Address	Modify the source address of incoming traffic from an external network to an internal host to this "recustomized address".

Example: Forward all incoming traffic on ports 8000 to 9000 from any address on the external network to service 80 at 192.168.1.100 on the internal network.



3.3.3 DMZ

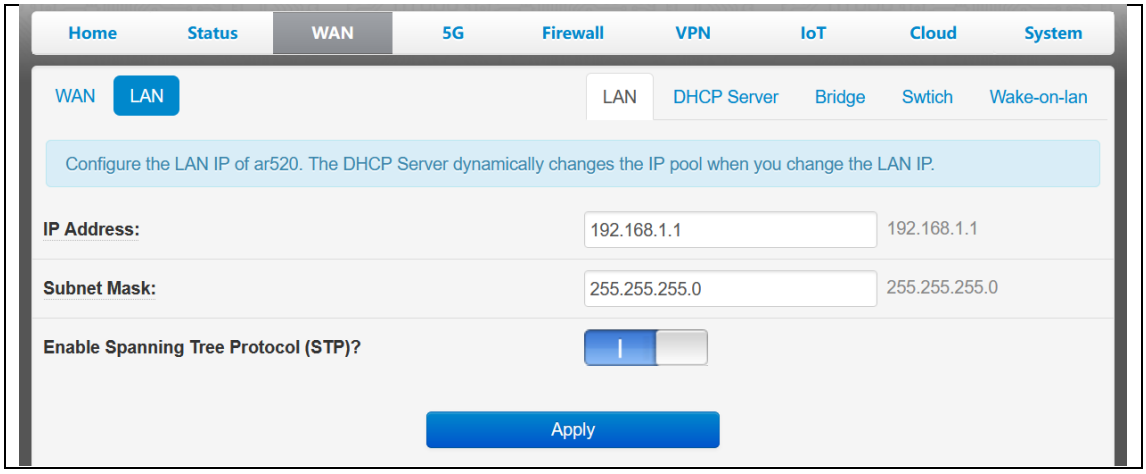


6.1.4 DMZ

The item descriptions are listed in the following table:

Item	Description
Intranet host IP address	Maps all ports of this host to the external network. DMZ has a lower priority than "Port Mapping".
Special Application Settings	
Special Application	The bottom layer is the port of the corresponding application

3.3.4 LAN Settings



The item descriptions are listed in the following table:

Item	Description

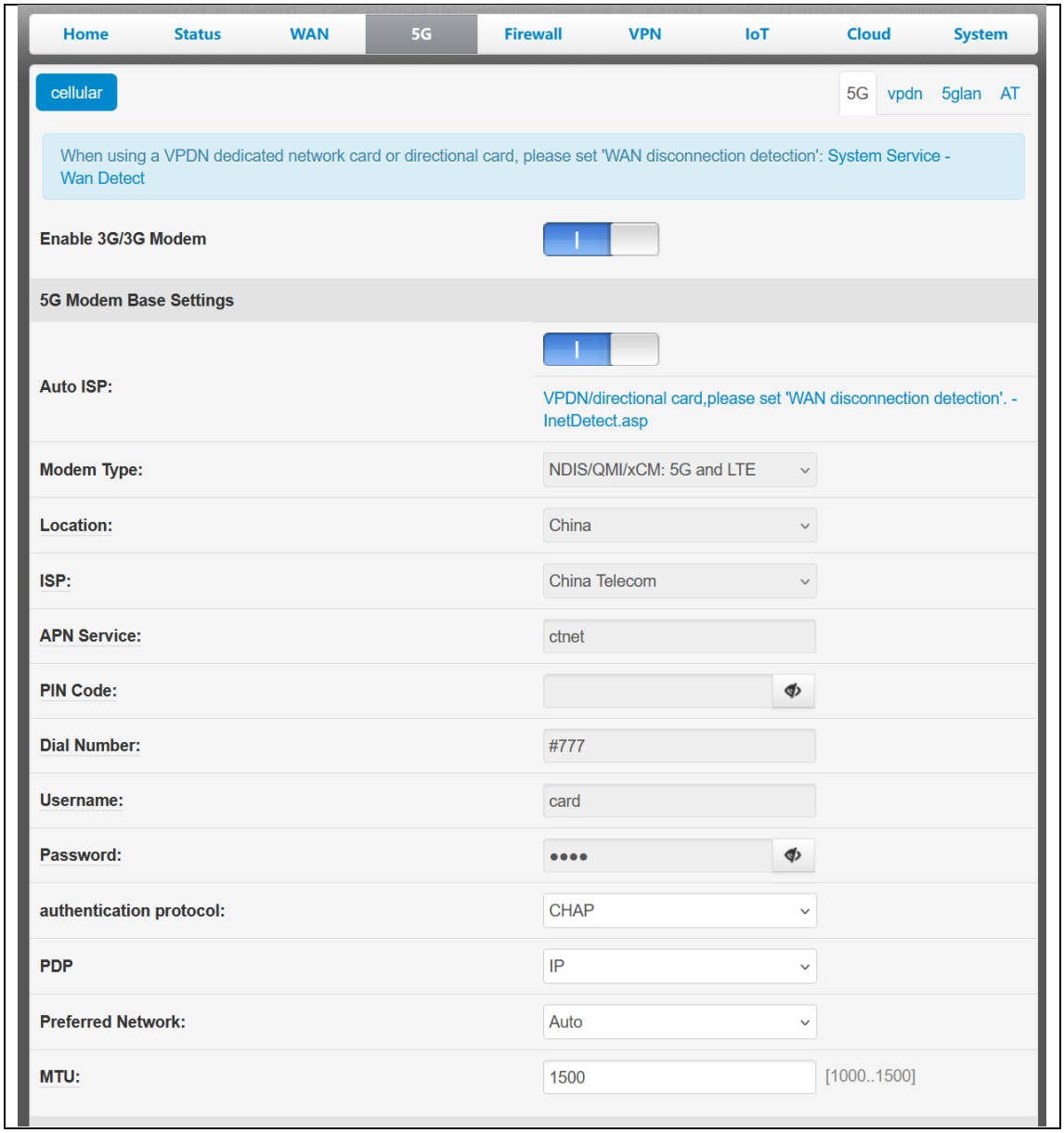
IP Address	Modify the IP address of the router so that the network segment is different.
Subnet Mask	Modify the subnet size of the network segment, usually use 255.255.255.0 to keep it the same
Spanning Tree Protocol	Enable by default

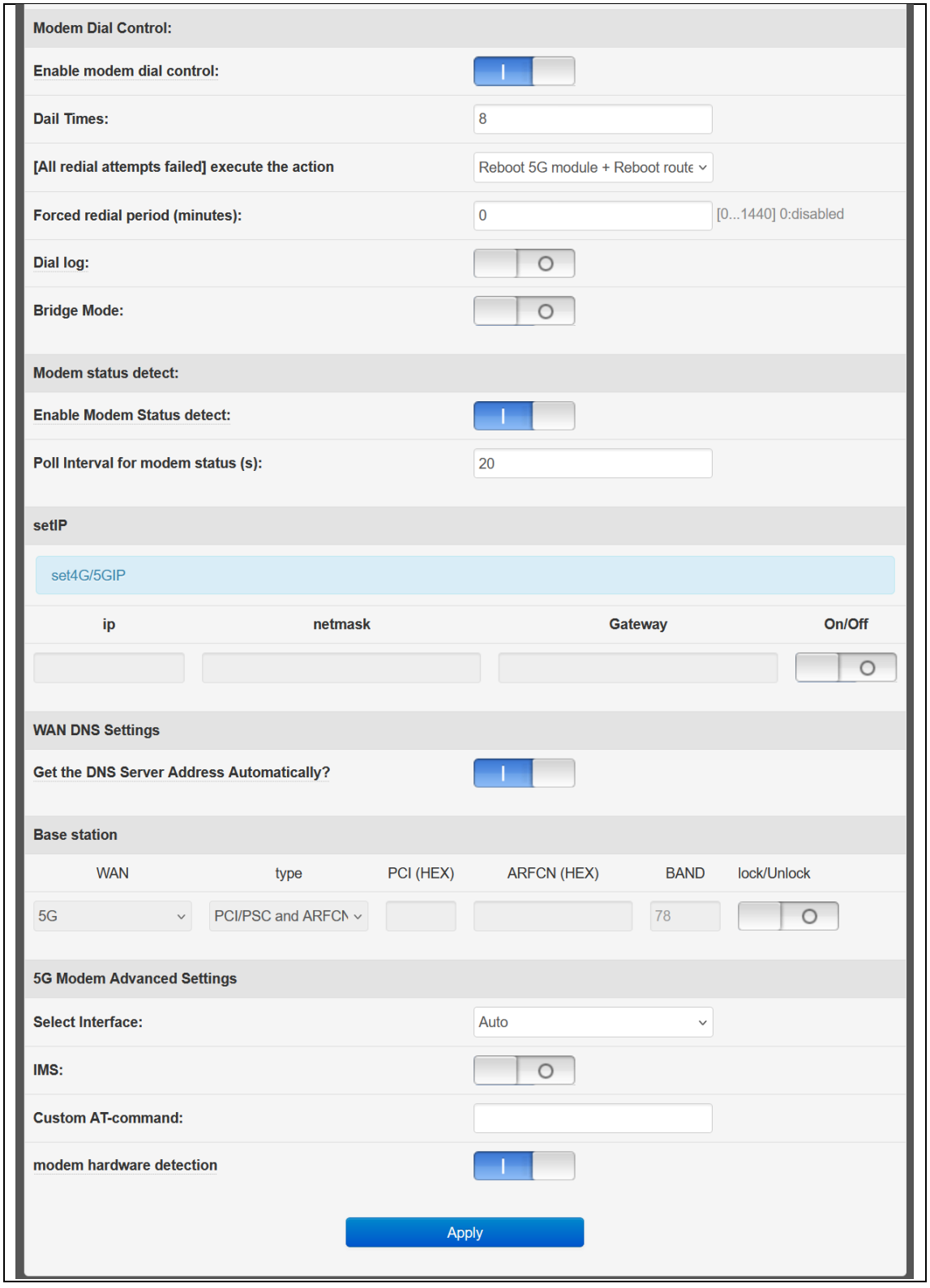
After modifying the IP of the LAN port, you will be prompted to synchronize the DHCP settings, which must be synchronized, otherwise, when the IP and gateway obtained by the device on the internal network are not in the same network segment, the hosts on the internal network will not be able to access the external network.

4. 5G settings

At present, the router integrates dialing information (MCC MNC and other information) of hundreds of carriers around the world inside the router. When the SIM card is inserted, there is usually no need for human manual operation, the router will automatically match the dialing information according to the SIM card information for automatic dialing to the Internet.

4.1 No setup required for auto-dial-in

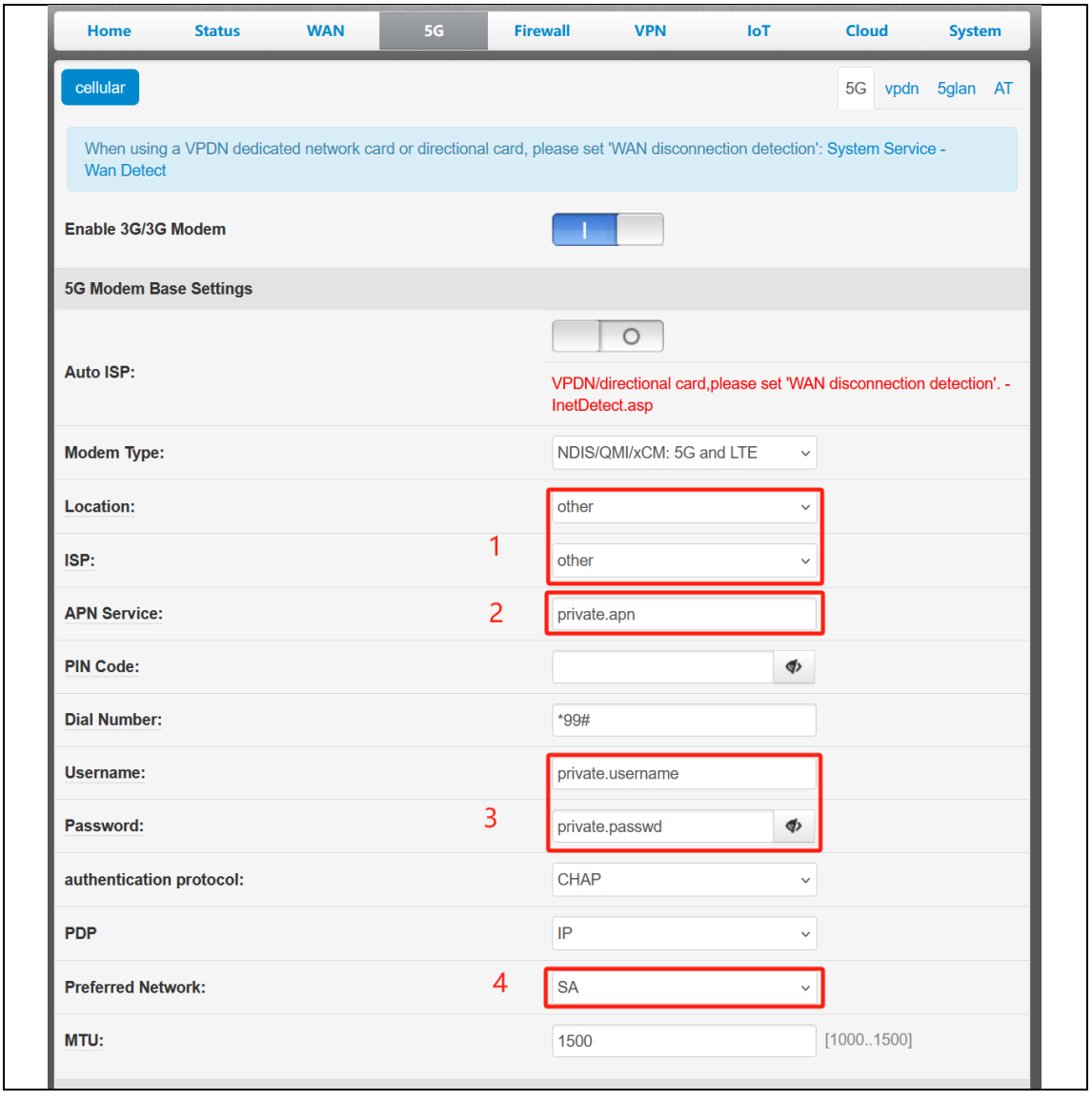



Modem Dial Control:
Enable modem dial control:
Dail Times:
8
[All redial attempts failed] execute the action
Reboot 5G module + Reboot route
Forced redial period (minutes):
0
[0...1440] 0:disabled
Dial log:
Bridge Mode:
Modem status detect:
Enable Modem Status detect:
Poll Interval for modem status (s):
20
setIP
set4G/5GIP
ip
netmask
Gateway
On/Off
WAN DNS Settings
Get the DNS Server Address Automatically?
Base station
WAN
type
PCI (HEX)
ARFCN (HEX)
BAND
lock/Unlock
5G
PCI/PSC and ARFCN
78
5G Modem Advanced Settings
Select Interface:
Auto
IMS:
Custom AT-command:
modem hardware detection
Apply

4.2 APN/VPDN

What you generally need to set up is VPDN private dial-up. For VPDN card, we need to set up the following steps:

1. Disable "Auto Match Service Provider".
2. Fill in the "APN information" of the VPDN card.
3. Fill in the "User Name" and "Password" information of the VPDN card.
4. Select the correct "Authentication Method".

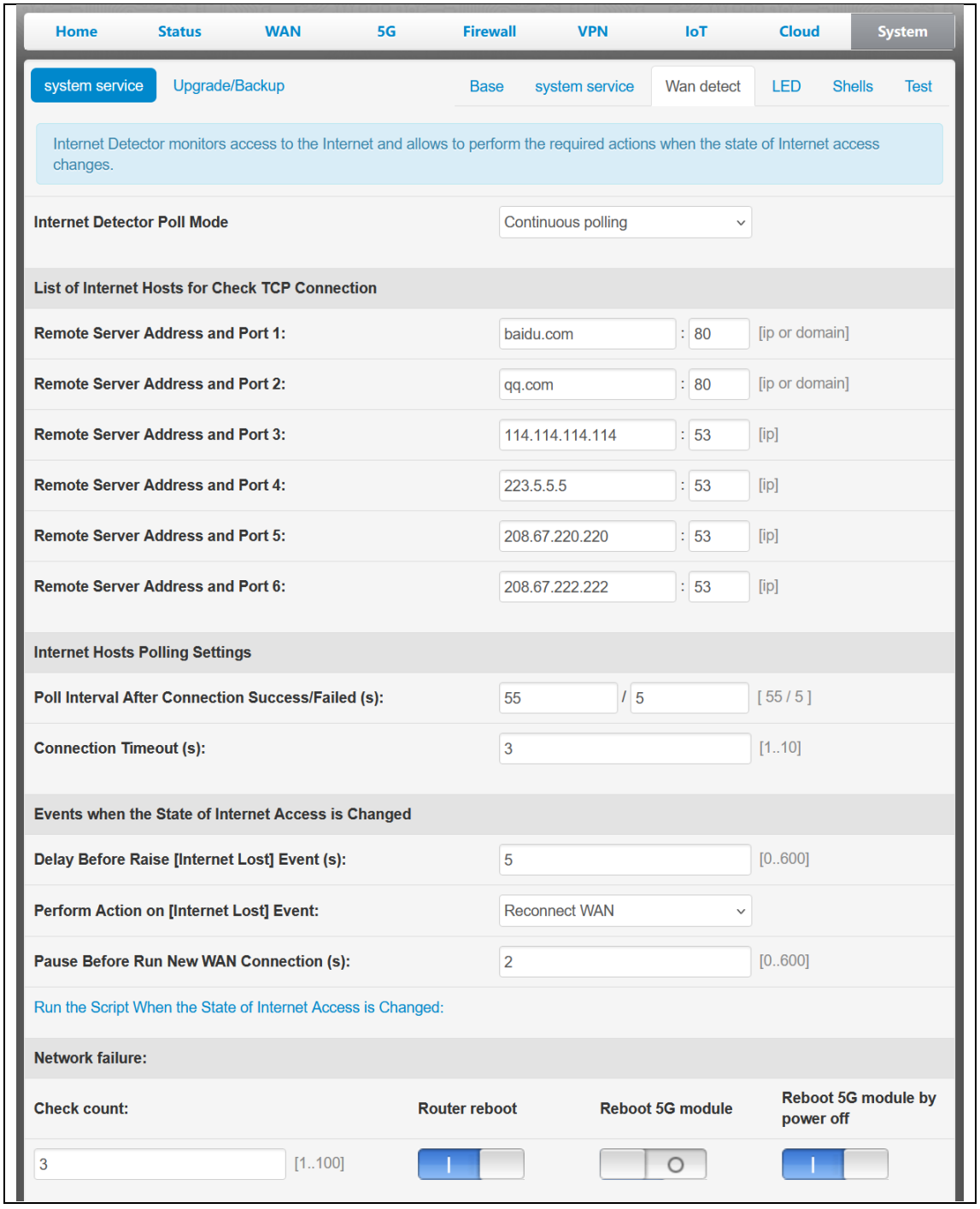


The key parameters of the APDN private network are described in the following table:

Item	Description
APN Service	The name of the access point of the VPDN private network that needs to be accessed.
Authentication	User name, key and authentication method

Account	
Preferred Network	For 5G private networks, many require locking to SA networks

4.3 Disconnection Detection Setting:



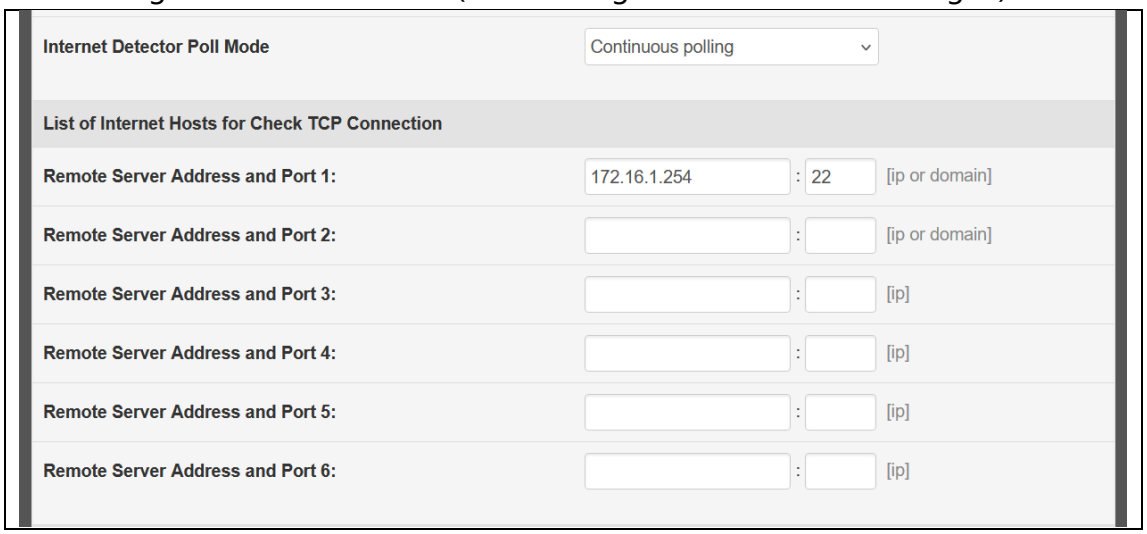
Disconnect Detection Default Configuration

Since most of the VPDN private networks can not access the public network, so for the "disconnection detection" default is to detect the IP of some servers on the public network, to turn off the "disconnection detection", otherwise, it will cause the router to repeatedly dial to reconnect the phenomenon. People think that the router Internet failure, in fact, "disconnection detection" detection of the public network network can not be caused.

There are two ways to set "disconnection detection" when VPDN network cannot access public network:

4.3.1.Configuring the VPDN Inspection Server

In the VPDN network, configure a server as the object of "disconnection detection", for example, there is a server in the VPDN service network with IP 172.16.1.254, and it has the 22nd ssh service. Then we can configure the "Monitoring Host List" as follows (other configurations remain unchanged):



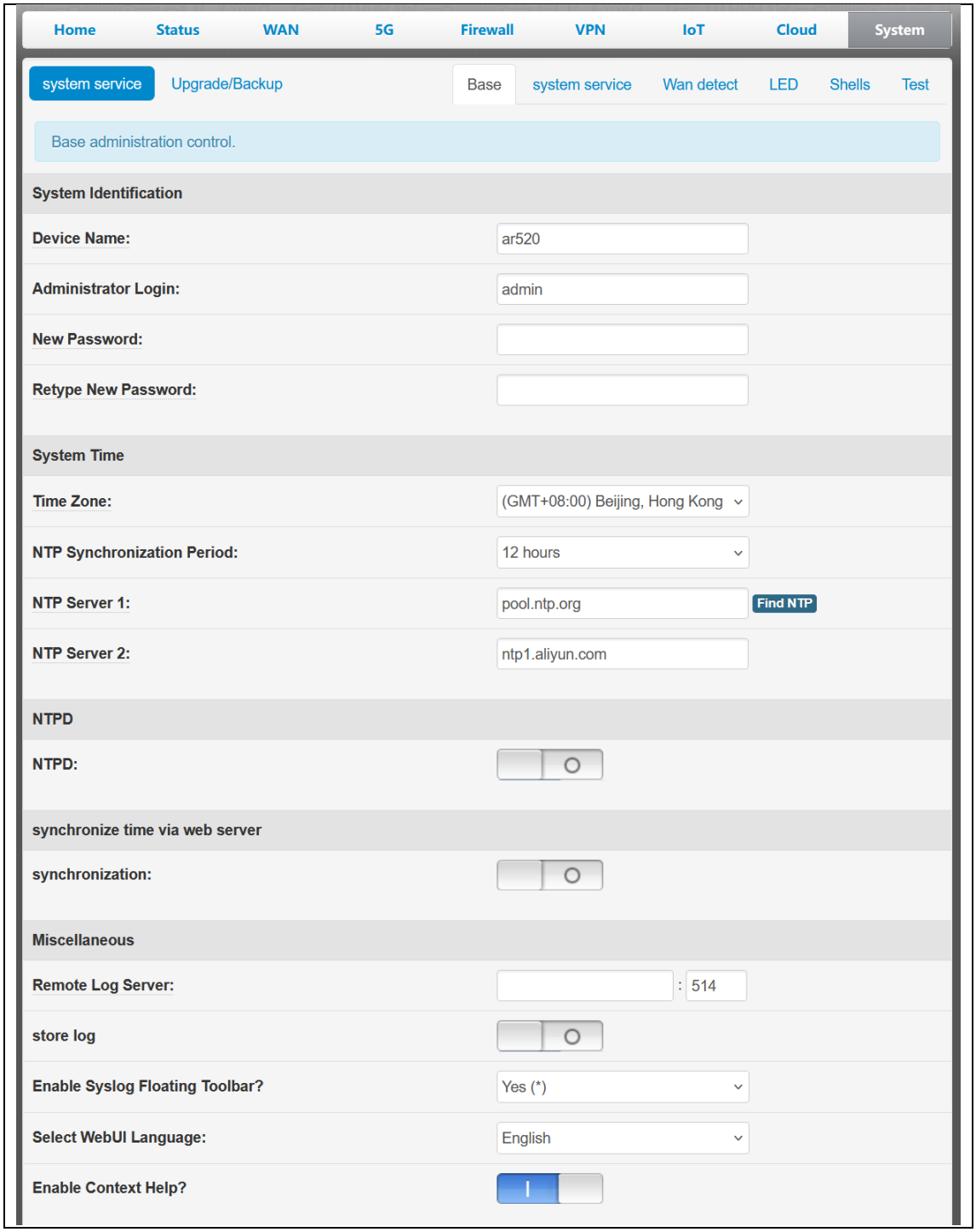
In this way, "Disconnect Detection" will detect whether the service on port 22 of 172.16.1.254 in the VPDN service network exists, and if it does not exist, it will trigger the setting of "[Network Disconnect] Event Execution Action", such as "Reconnect WAN".

5.3.2. Adjusted "Action for [Network disconnection] event"

Other configurations remain unchanged. When the policy is "no action", the router does not operate arbitrarily after the disconnection detection.

5.system management

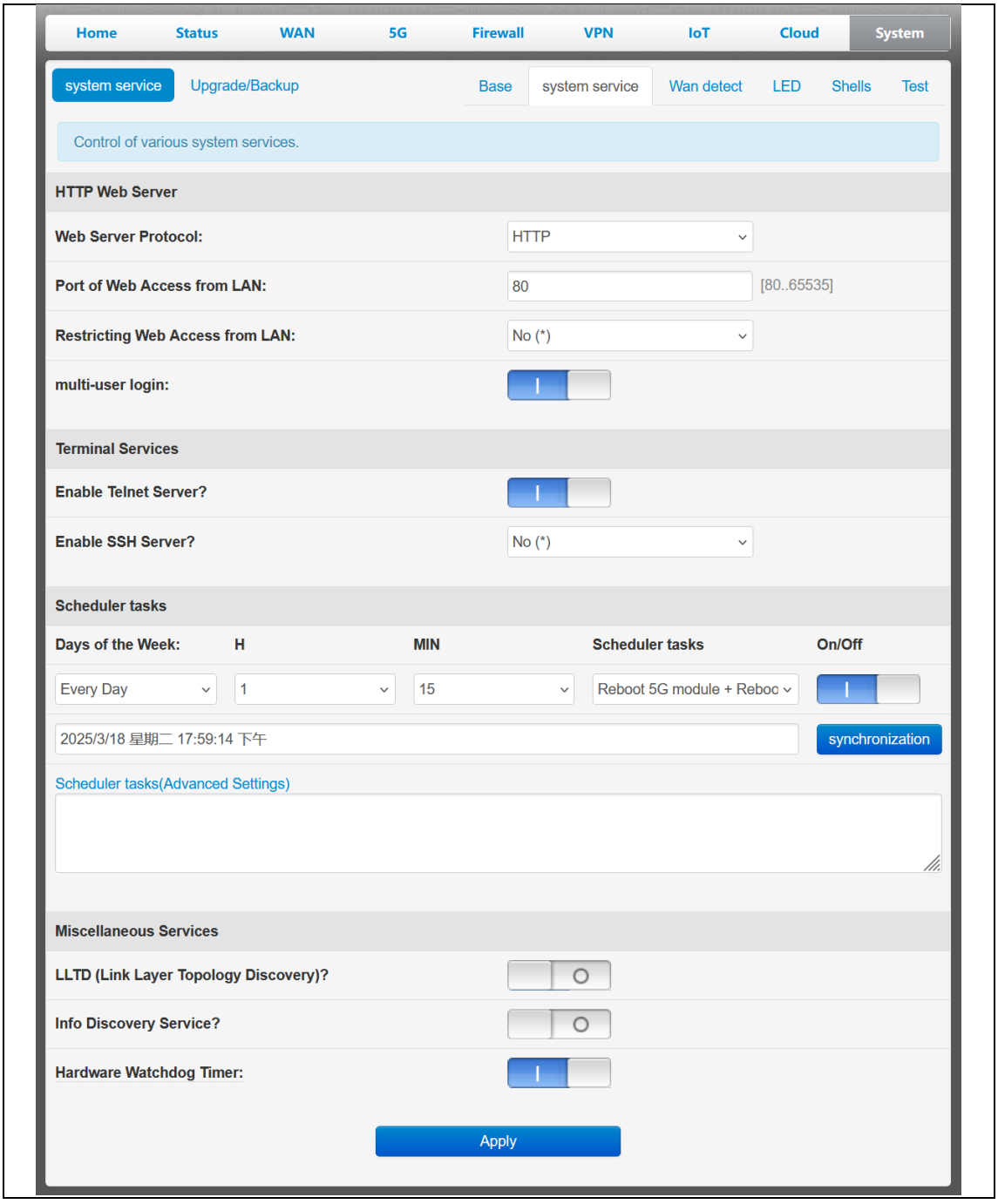
5.1 Basic settings



The key parameters are described in the following table:

Item	Description
Administrator Password	The default login account of the router is admin/admin, which can be changed here.
Local Storage Log	Enable the log saving function, the router can record the 5G dialing process, which is easy to analyze the dropped calls and redialing.
Language Settings	Switch the language display of UI

5.2 Basic system services



The key parameters are described in the following table:

Item	Description
Enabling the SSH server	Whether or not to enable SSH support for the router
Timed Tasks	Timing can be set in the configuration to turn on/off certain specific features

Caution:

Changes or modifications not expressly approved by the party responsible for compliance could void the user' s authority to operate the equipment.

Note:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

FCC Statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF Exposure Information (SAR):

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.