Bivocom®

Industrial Cellular Edge Gateway TG452 Series User Guide

Copyright

Trademark

Disclaimer

Product specifications and information in this document are subject to change without any notice, and BIVOCOM reserves the right to improve and change this user guide at any time. Users should take full responsibility for their application of products, and Xiamen Bivocom Technologies Co., Ltd. disclaims all warranties and liability for the accurateness, completeness of the information published.

Global Technical &Sales Support

Xiamen Bivocom Technologies Co., Ltd.
Addr: Unit 1402, No. C07 Building, 3rd Software Park, Xiamen, China 361000
Tel.: +86-592-6090 133
Fax: +86-592-6211727
Email: support@bivocom.com
sales@bivocom.com
www.bivocom.com

About This Guide

Thank you for choosing Bivocom Industrial Cellular Edge Gateway TG452 Series.

Please thoroughly read this user guide before you configure and install the device.

This manual is compatible with below models

Model	Description
TG452-LF	Industrial Edge Gateway with 4G/LTE Cat 4 Cat 6
TG452-W	Industrial Edge Gateway with 3G

Table of Contents

1. Introduction

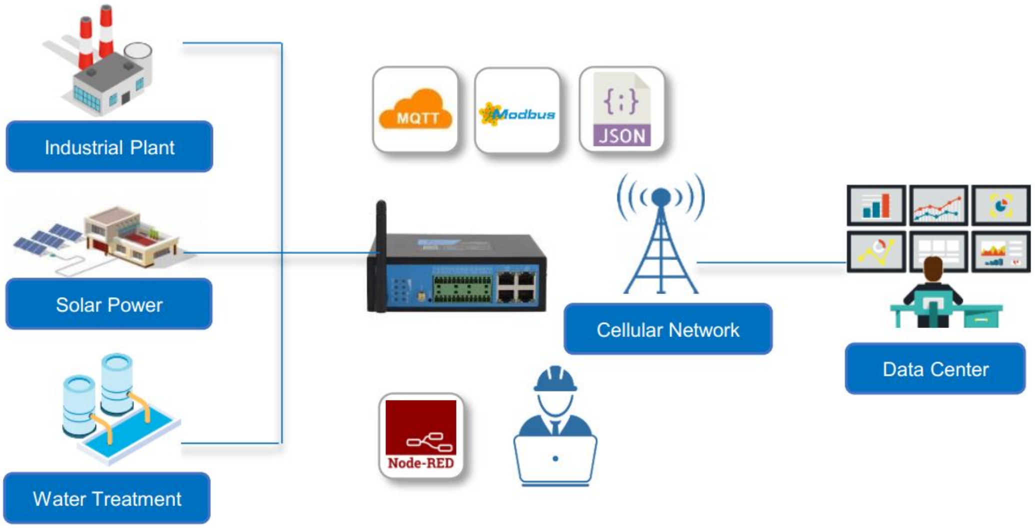
1.1 Overview

TG452 Industrial cellular Edge Gateways are designed for connecting diverse types of field sensors and equipment to cloud via LTE/3G cellular network, which is suitable for IIoT and M2M applications that require secure and rugged LTE connectivity in harsh environment, such as water&waste water, gas&oil, industry 4.0, smart city, vending machines, etc.

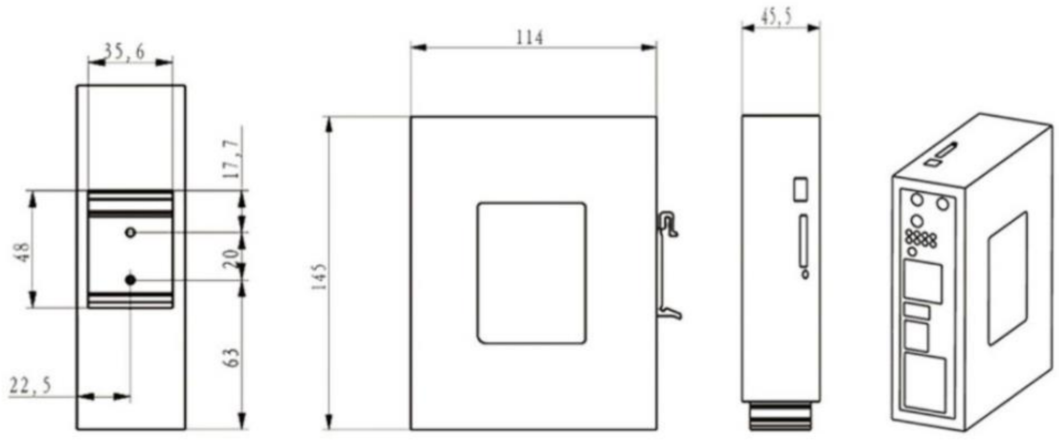
With rich interfaces, includes Ethernet ports, RS232/RS485, digital inputs, analog inputs, relay outputs, CAN, power output, GPS, WIFI, etc., The TG452 Edge Gateways allow users to integrate legacy systems with modern sensors. With high-performance 32-bit ARM-based CPU, Modbus RTU/TCP, MQTT, TCP/IP, and customized protocols, as well as up to 1G flash and 32G micro SD local data storage, enables users to collect, store and process data at IoT edge network.

1.2 Applications

TG452 Series Edge Gateways utilizes cellular network to connect your edge devices and controller devices to your center for remote monitoring and control.
Typical application as below.



1.3 Dimensions



1.4 Physical Characteristics

Physical Characteristics	
Housing	Metal, IP30
Dimensions	145 x 114 x 45mm (5.71 x 4.49 x 1.77in), Antenna and other accessories not included
Weight	TG452: 630g (1.39lbs), without accessories.

2. Getting Started

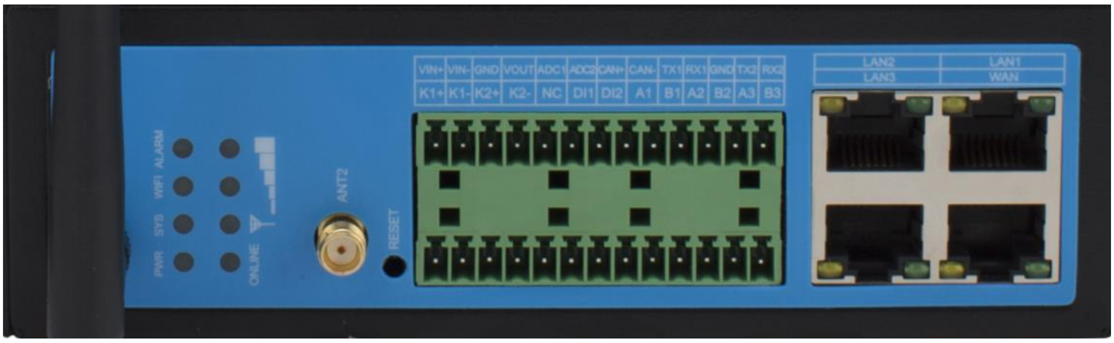
2.1 Package Checklist

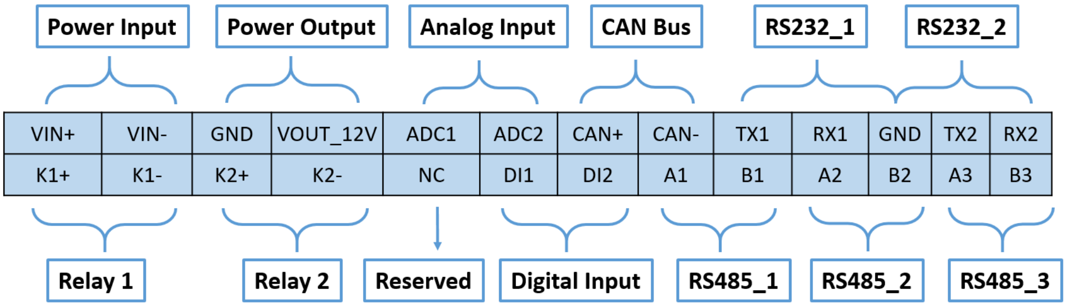
The following components are included in your TG452 package.
Check the list before installation. If you find anything missing, Please feel free to contact Bivocom.

1 x TG452 Gateway
1 x Power Adapter (DC 12V/1.5A, EU/US/UK/AU plug optio)
2 x Mag-mount Cellular Antenna (SMA Male, 1 meter, 5dBi)
1 x RS232 Cable (DB9 Female, 1 meter)
1 x Ethernet Cable (1 meter)
2 x 13-Pin Terminal Block
1 x DIN-rail mount
1 x Quick Start Guide (Printed)*

2.2 Installation

Hardware interfaces instruction:


VIN+ VIN- GND VOUT ADC1 ADC2 CAN+ CAN- TX1 RX1 GND TX2 RX2
K1+ K1- K2+ K2- NC DI1 DI2 A1 B1 A2 B2 A3 B3
LAN2
LAN3
LAN1
WAN
ALARM
WIFI
SYS
PWR
ONLINE
ANT2
RESET



VIN+	VIN-	GND	VOUT_12V	ADC1	ADC2	CAN+	CAN-	TX1	RX1	GND	TX2	RX2
K1+	K1-	K2+	K2-	NC	DI1	DI2	A1	B1	A2	B2	A3	B3

2.2.1 SIM/UIM Card

TG452 supports normal SIM/UIM only, so if you're using a Micro SIM or Nano SIM card, you may need to use a Micro SIM or Nano SIM to Normal SIM adapter.
Make sure your router is powered off, then use a needle object(such as a pen) to push the button near the SIM/UIM card holder, it will flick out immediately. Put the SIM/UIM card to card holder with chipset upside, insert it to router and make sure it's tightly matched.

Warning: Never install SIM/UIM card when router is powered on.

2.2.2 Interfaces connection

TG452 support a RS232_1 serial port as console port, which can be used for firmware upgrade, system log checking, debug, etc.
TG452 include 2 RS232 (RS232_1, RS232_2), and 3 RS485 (RS485_1, RS485_2, RS485_3), 1x CAN (optional), 2x DI, 2x ADC (12 bit AD, support 4~20mA current or 0-5V voltage signal input), 2x Relay, 1x power supply.

TG452 designed with industrial terminal block interface, and the cable in this package with ends of female connector and stripping cable, the signal of console cable is defined as below,

RS232 Cable(with DB9 female connector and stripping cable)

Color of cable	Corresponding DB9-Female Pin No.	Corresponding Pin No. of Router (Pin 1 closes to power jack, Pin 5 closes to ethernet port)
Blue	2（RX）	1(TX)
Brown	3（TX）	2(RX)
Black	5（GND）	3(GND)

RS485 Cable (RS485_1, RS485_2)

Color of cable	TG452 Router
Red	4(A)
Black	5(B)

Relay Interface (Relay1, Relay2)

Relay Feature	Control the external switch
load capacity	Maximun Voltage switch: 30VDC/220VAC Maximun Current switch: 5A

DI Interface (DI1, DI2)

DI Feature	Detect the slave device status
Input Range	Logic 0: wet contact 0-3VDC, or dry contact close. Logic 1: wet contact 5-30VDC, or dry contact open.

ADC Interface (ADC1, ADC2)

ADC Feature	acquire the slave device analog input
Input Range	4~20mA Current input, or 0-5V Voltage input.

2.2.3 Power Supply

We suggest you use Bivocom standard power adapter (1.5A/12VDC). If you have to use your own power supply, make sure the power range is 5-35VDC and it is stable enough(Ripple shall be less than 300mV, and Instantaneous voltage shall not larger than 35V), meanwhile, power shall over 4W.

2.2.4 Cellular Antenna

Screw the SMA male antenna to TG452(SMA female port), make sure it is screwed tightly to ensure the strength of signal.

2.3 LED Indicators

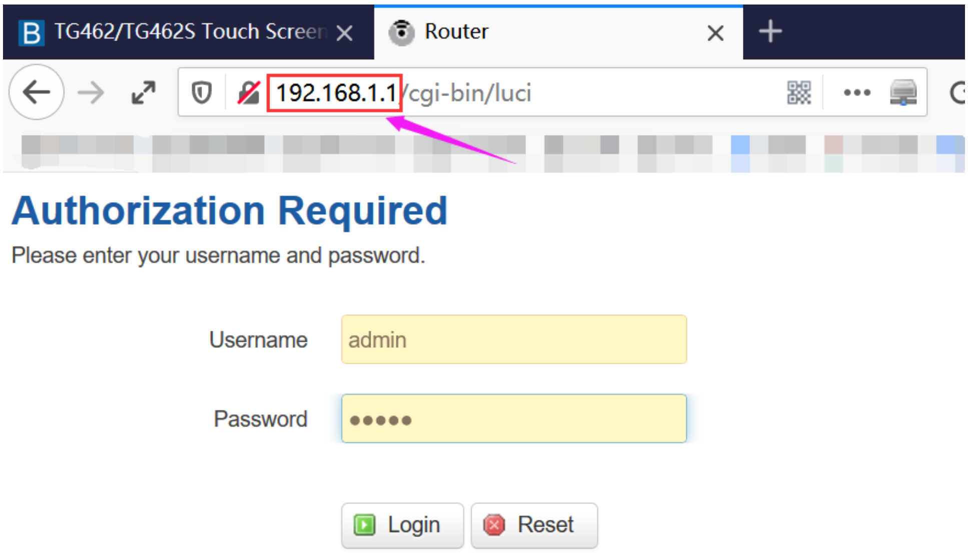
TG452 Series Gateway provides 8 LED indicators, as following.

Indicator	Status	Content
Power	On	Powered On
	Off	Powered Off
Signal Strength	1 Lights	Signal weak
	2 Lights	Signal Middium
	3 Lights	Signal Strong
System	Blink	System works perfect
	Off	System doesn’t work
Online	On	Router accesses to Internet
	Off	Router doesn’t access to Internet
Wifi	On	Wifi enabled
	Off	Wifi disabled
WAN	On	WAN is connected
	Off	WAN is not connected
LAN	Blink	LAN works
	Off	LAN is not connected

3. Configuration and Management

Use an Ethernet cable to connect the LAN port of TG452 to your laptop, or use your laptop or mobile phone to connect to WIFI hotspot ‘Bivocom’ of TG452, login with password: admin123, normally your laptop will get an IP address from TG452 DHCP as 192.168.1.xx, otherwise please manually configure your laptop IP to 192.168.1.100.

Open browser, enter 192.168.1.1 to enter into to login page, enter username: admin, and password: admin, to go to configuration page.



Authorization Required

Please enter your username and password.

Username: admin

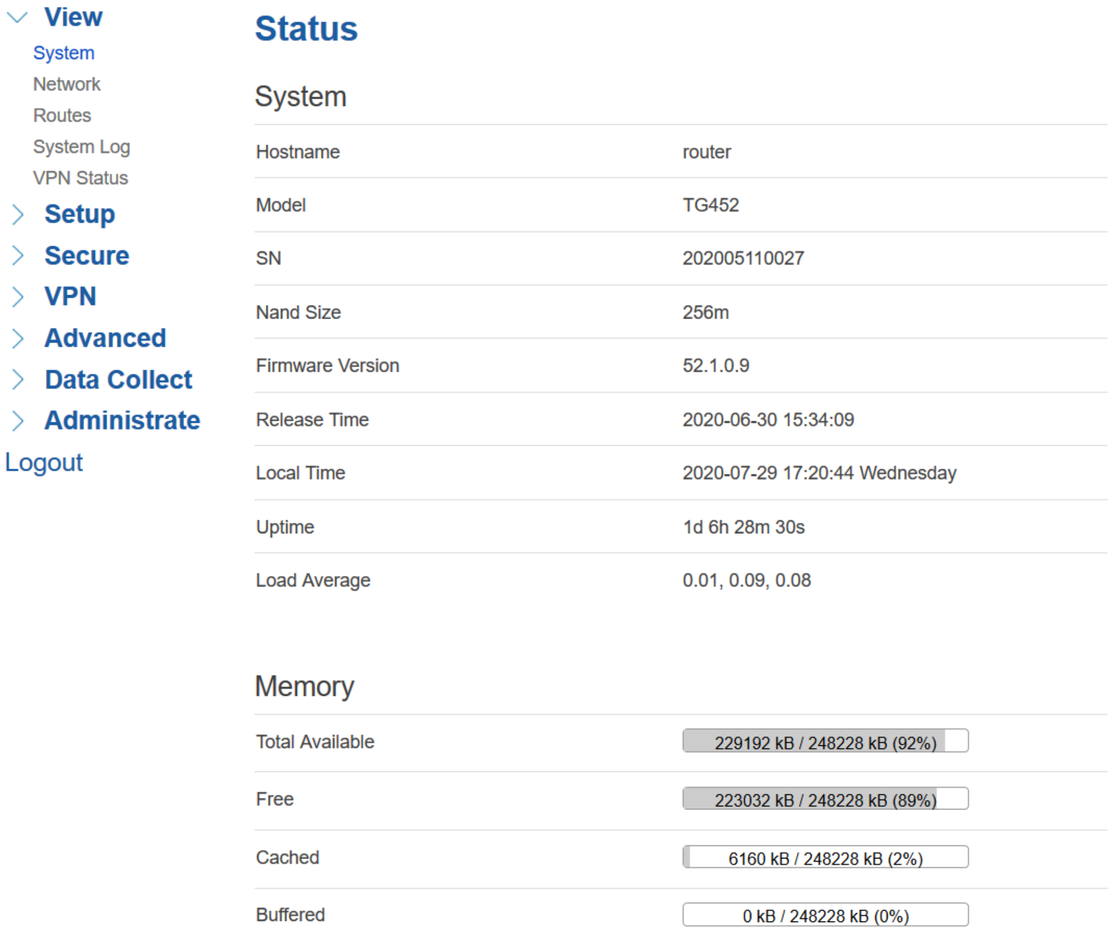
Password: ●●●●●

3.1 View

To check the following system information.

3.1.1 System

Display system related information.



Status

System

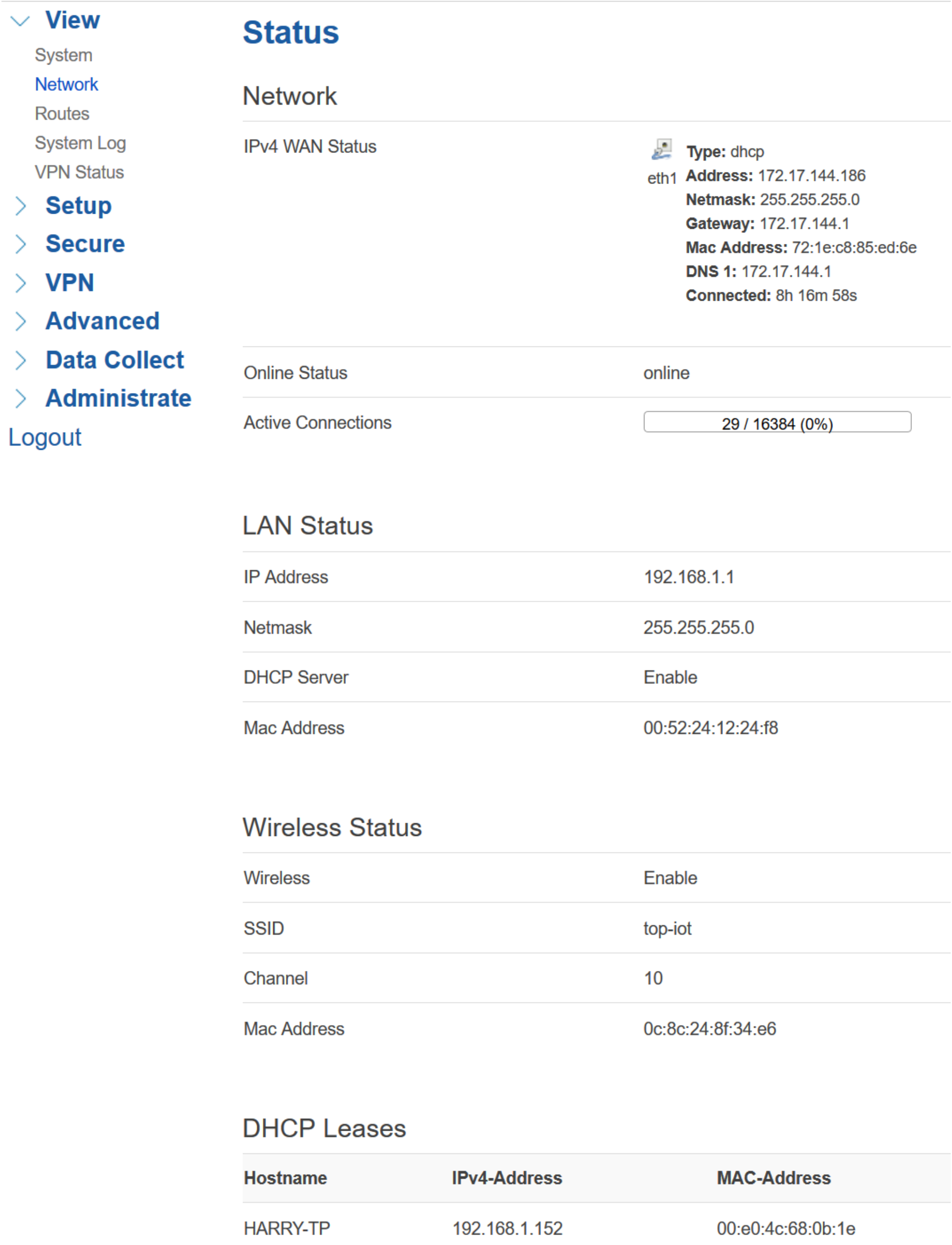
Hostname	router
Model	TG452
SN	202005110027
Nand Size	256m
Firmware Version	52.1.0.9
Release Time	2020-06-30 15:34:09
Local Time	2020-07-29 17:20:44 Wednesday
Uptime	1d 6h 28m 30s
Load Average	0.01, 0.09, 0.08

Memory

Total Available	229192 kB / 248228 kB (92%)
Free	223032 kB / 248228 kB (89%)
Cached	6160 kB / 248228 kB (2%)
Buffered	0 kB / 248228 kB (0%)

3.1.2 Network

Display WAN, LAN, WiFi, DHCP network information.



Status

Network

IPv4 WAN Status	eth1 **Type:** dhcp **Address:** 172.17.144.186 **Netmask:** 255.255.255.0 **Gateway:** 172.17.144.1 **Mac Address:** 72:1e:c8:85:ed:6e **DNS 1:** 172.17.144.1 **Connected:** 8h 16m 58s
Online Status	online
Active Connections	29 / 16384 (0%)

LAN Status

IP Address	192.168.1.1
Netmask	255.255.255.0
DHCP Server	Enable
Mac Address	00:52:24:12:24:f8

Wireless Status

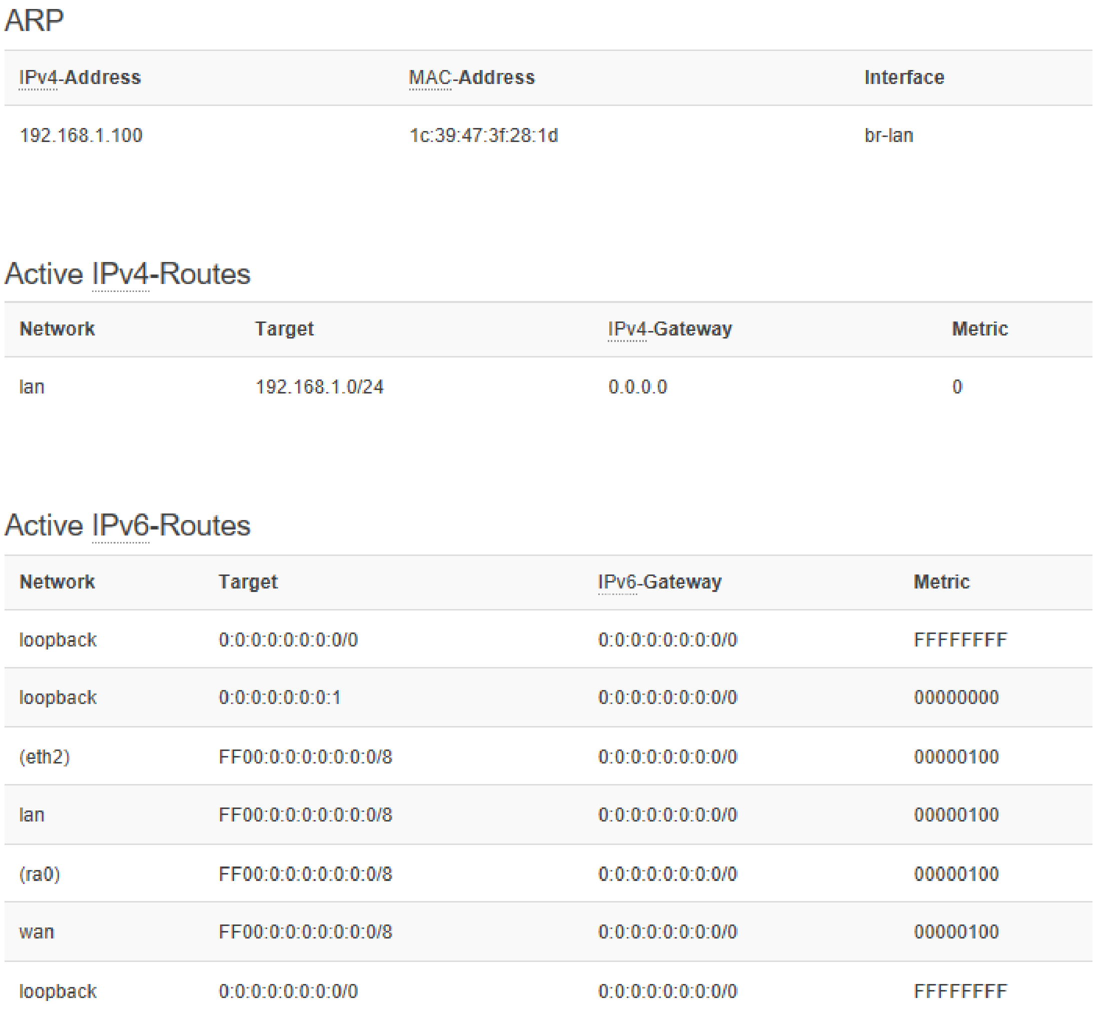
Wireless	Enable
SSID	top-iot
Channel	10
Mac Address	0c:8c:24:8f:34:e6

DHCP Leases

Hostname	IPv4-Address	MAC-Address
HARRY-TP	192.168.1.152	00:e0:4c:68:0b:1e

3.1.3 Routing Tables

Display routing tables.



ARP

IPv4-Address	MAC-Address	Interface
192.168.1.100	1c:39:47:3f:28:1d	br-lan

Active IPv4-Routes

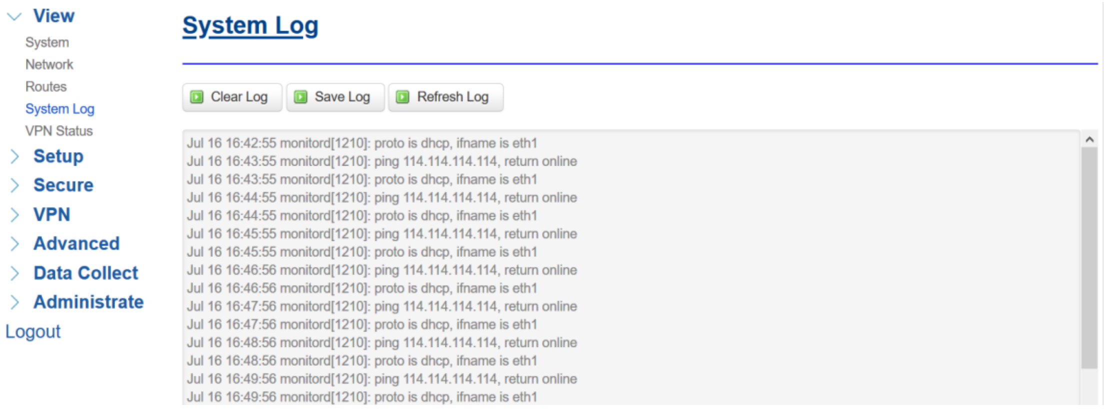
Network	Target	IPv4-Gateway	Metric
lan	192.168.1.0/24	0.0.0.0	0

Active IPv6-Routes

Network	Target	IPv6-Gateway	Metric
loopback	0:0:0:0:0:0:0:0/0	0:0:0:0:0:0:0:0/0	FFFFFFFF
loopback	0:0:0:0:0:0:0:1	0:0:0:0:0:0:0:0/0	00000000
(eth2)	FF00:0:0:0:0:0:0:0/8	0:0:0:0:0:0:0:0/0	00000100
lan	FF00:0:0:0:0:0:0:0/8	0:0:0:0:0:0:0:0/0	00000100
(ra0)	FF00:0:0:0:0:0:0:0/8	0:0:0:0:0:0:0:0/0	00000100
wan	FF00:0:0:0:0:0:0:0/8	0:0:0:0:0:0:0:0/0	00000100
loopback	0:0:0:0:0:0:0:0/0	0:0:0:0:0:0:0:0/0	FFFFFFFF

3.1.4 System Log

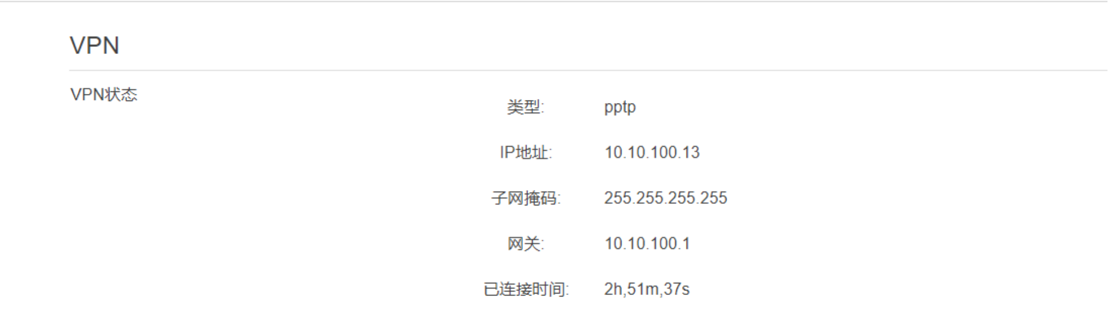
Display system log.



```
Jul 16 16:42:55 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:43:55 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:43:55 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:44:55 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:44:55 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:45:55 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:45:55 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:46:56 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:46:56 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:47:56 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:47:56 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:48:56 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:48:56 monitord[1210]: proto is dhcp, ifname is eth1
Jul 16 16:49:56 monitord[1210]: ping 114.114.114.114, return online
Jul 16 16:49:56 monitord[1210]: proto is dhcp, ifname is eth1
```

3.1.5 VPN Status

Display VPN status.



VPN

VPN状态

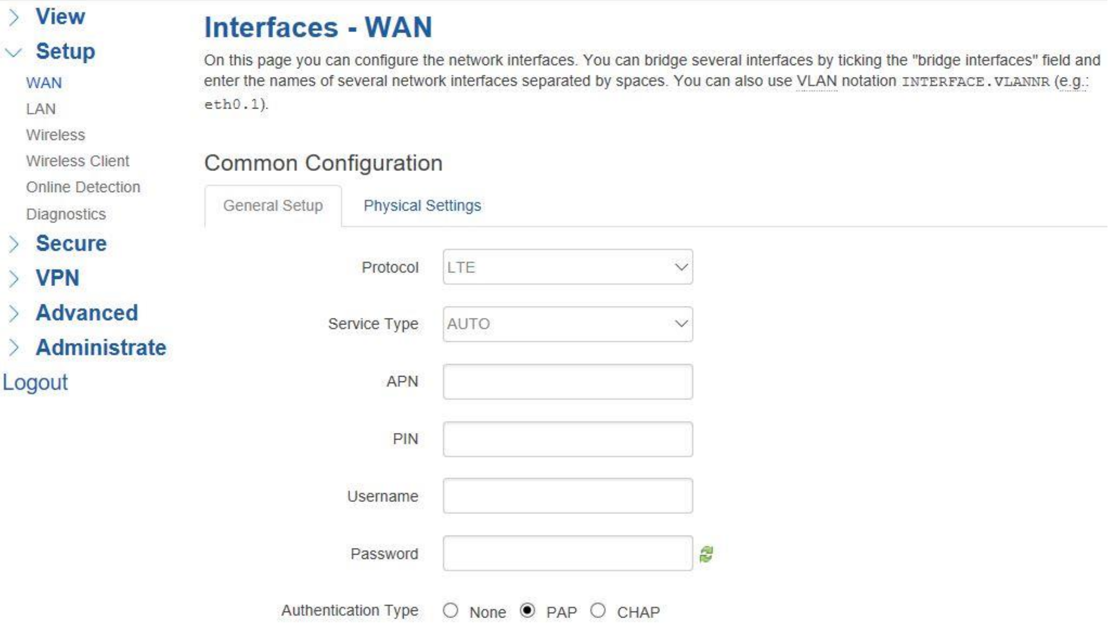
类型:	pptp
IP地址:	10.10.100.13
子网掩码:	255.255.255.255
网关:	10.10.100.1
已连接时间:	2h,51m,37s

3.2 Setup

Main menu of this page includes, WAN, LAN, Wireless, Online Detection, Diagnostics.

3.2.1 WAN

WAN supports DHCP/Static IP/PPPoE/3G/LTE connection mode.
Choose the mode you need, then click ‘Switch Connection Mode’ and configure the related parameters, then you can connect to the internet.



Interfaces - WAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation `INTERFACE.VLANNR` (e.g.: `eth0.1`).

Common Configuration

Protocol	LTE
Service Type	AUTO
APN	
PIN	
Username	
Password	
Authentication Type	○ None ● PAP ○ CHAP

1) Server Type

Type of network, the default value is AUTO, you can keep it or choose your own preference.

2) APN

Different carrier might have different APN, please ask your carrier if you have no idea of what your APN is.

3) PIN

PIN code of SIM card, please use it carefully, or the SIM card may be locked.

4) PAP/CHAP Username

Only for private network SIM card, if you're using public network SIM card, just keep it as null.

5) PAP/CHAP Password

Only for private network SIM card, if you're using public network SIM card, just keep it as null.

6) Call Center No.

When you're using SIM card, different carrier may have different call center Number, please ask your carrier for this info if you have questions.

7) Authentication Type

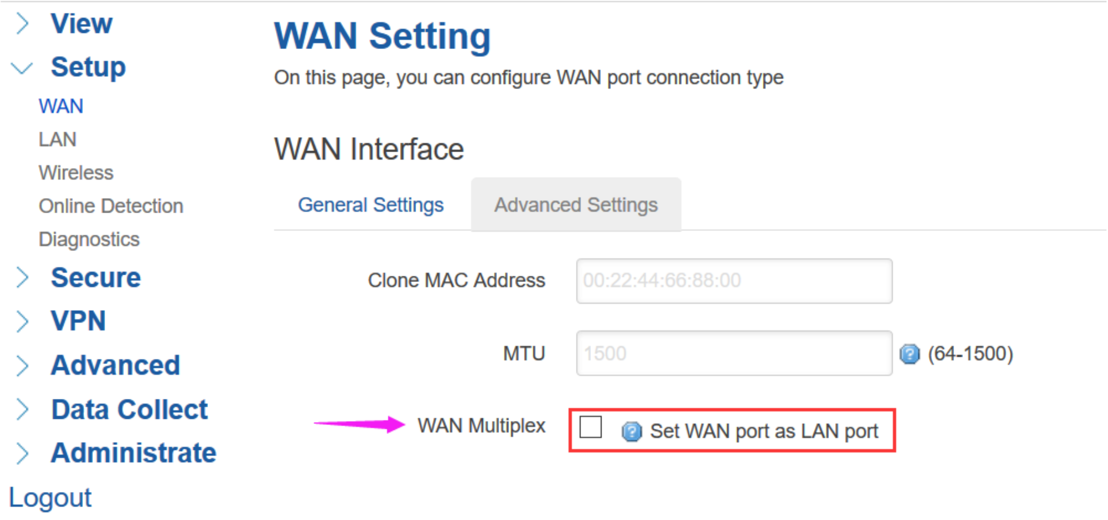
If there have username and password, you need to choose authentication type.

- PAP, Plaintext Authentication
- CHAP, Handshake authentication

You need to choose the authentication type according to carrier's network, or you may fail to dial up.

8) WAN Used As LAN

When you use 4G/3G/2G cellular network to access internet, you can change the WAN to act as a LAN port.



WAN Setting

On this page, you can configure WAN port connection type

WAN Interface

Clone MAC Address: 00:22:44:66:88:00

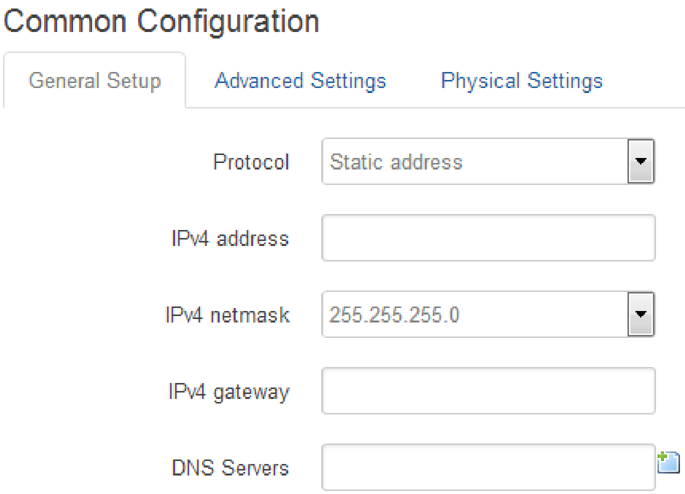
MTU: 1500 (64-1500)

WAN Multiplex: □ Set WAN port as LAN port

3.2.2 LAN

Menu of LAN are mainly for configuring IP address of router, enabling DHCP server, and assign the IP address.

The meaning of the parameters are as follows.



Common Configuration

Protocol: Static address

IPv4 address:

IPv4 netmask: 255.255.255.0

IPv4 gateway:

DNS Servers:

1) IPv4 Address

To configure IP address of LAN port.

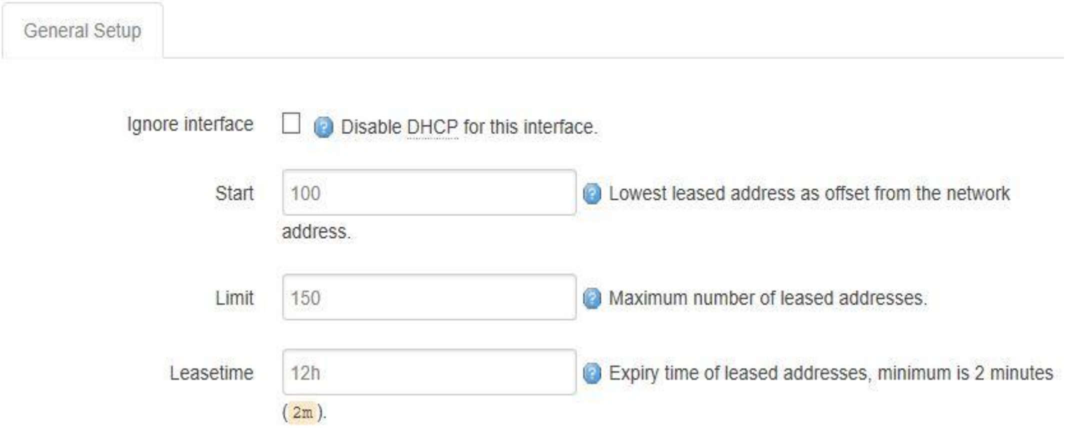
2) IPv4 Netmask

The netmask of LAN port IP address.

3) IPv4 Gateway

Specify the next-hop routing gateway.

4) DHCP Settings



Ignore interface □ Disable DHCP for this interface.

Start 100 Lowest leased address as offset from the network address.

Limit 150 Maximum number of leased addresses.

Leasetime 12h Expiry time of leased addresses, minimum is 2 minutes (2m).

- **Disable DHCP**

Click to disable DHCP server.

- **Start**

Assign the IP address of DHCP server. For example, 100 means IP address starts from 192.168.1.100.

- **Limit**

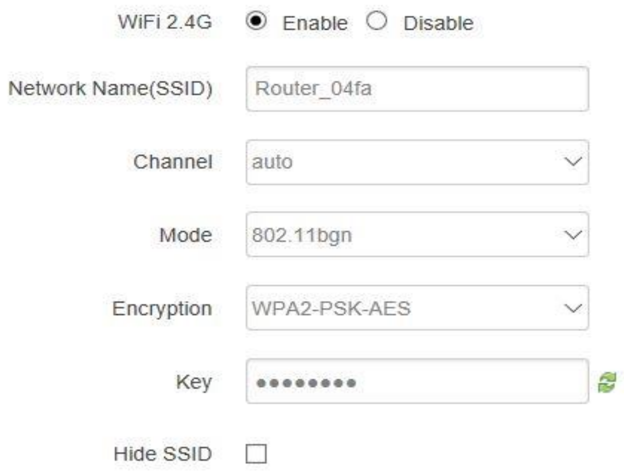
Assignable number of IP address, to ensure numbers of IP address of start and limit not exceed 250.

- **Lease time**

Time of assigning the IP address.

3.2.3 Wireless (Option)

Menu of wireless are mainly for configuring the SSID, work mode, password, etc.
Note, WiFi is not be included in standard TG452, please ask Bivocom representative when place the order.



WiFi 2.4G	● Enable ○ Disable
Network Name(SSID)	Router_04fa
Channel	auto
Mode	802.11bgn
Encryption	WPA2-PSK-AES
Key	••••••••
Hide SSID	□

1) WIFI 2.4G

Click ‘Enable’, to enable the WIFI function.

2) Network Name（SSID）

WIFI network name.

3) Channel

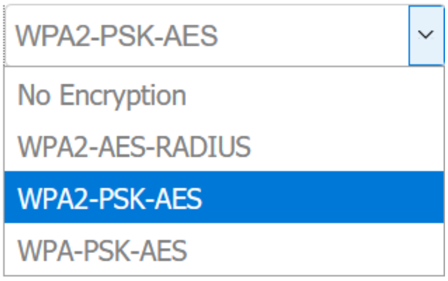
Support 1-13 channels, default value is auto, channel can be changed automatically.

4) Mode

Support 802.11b, 802.11g, 802.11bgn.
802.11b up to 11Mbps, 802.11g up to 54Mbps and 802.11n up to 300Mbps.

5) Encryption

You can only choose below types if the mode is set as 802.11b or 802.11g.



WPA2-PSK-AES

- No Encryption
- WPA2-AES-RADIUS
- WPA2-PSK-AES
- WPA-PSK-AES

6) Key

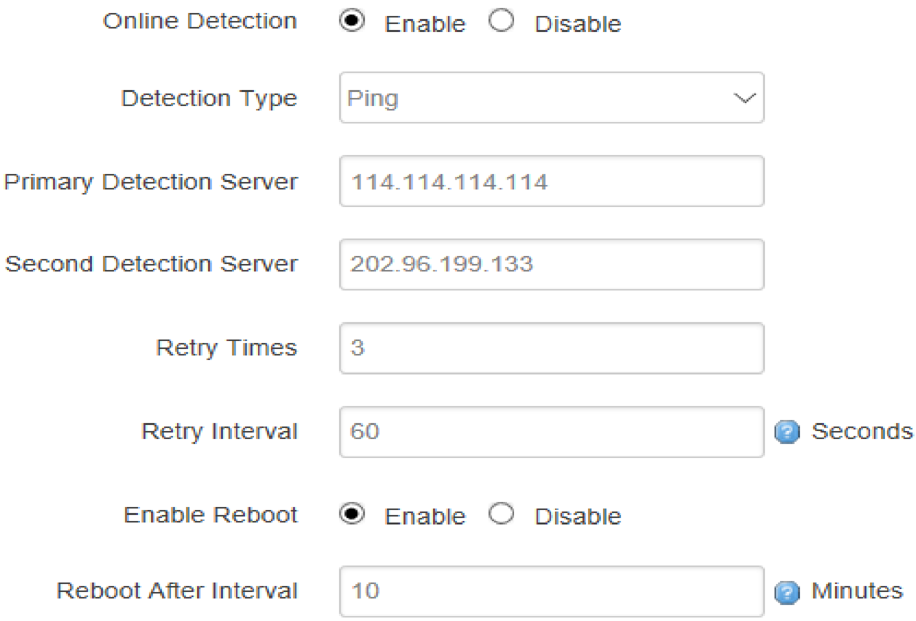
Password of sharing the WIFI, user need to enter it to access the internet. The minimum length of password is 8 bytes.

7) Hide SSID

When Hide SSID enabled, SSID is invisible, and user need to enter the SSID to share the WIFI.

3.2.4 Online Detection

Online detection will auto check the internet connection status of the router, if there has issue of connection, router will auto reconnect. If it fails to reconnect after times of trial, router will reboot, to ensure getting online.
The meaning of the parameters are as follows.



Online Detection	● Enable ○ Disable	
Detection Type	Ping	
Primary Detection Server	114.114.114.114	
Second Detection Server	202.96.199.133	
Retry Times	3	
Retry Interval	60	Seconds
Enable Reboot	● Enable ○ Disable	
Reboot After Interval	10	Minutes

1) Detection Type

There are 3 types: ping, traceroute and DNS.

- **Ping**

Router will ping an IP address or DNS, if works, that means router is online.

- **Traceroute**

Traceroute will trace routing path, if achieves the target address, that means router is online.

- **DNS**

DNS will analytic a domain, if it works, that means router is online.

Note: the default setting is Ping, which is highly recommended, as traceroute will cost dataflow of SIM card, while DNS is faster, but as it has cache, it may shows the router is online even it is offline.

2) Primary Detection Server

It can be an IP address or a Domain Name.

3) Second Detection Server

If primary detection server fails, then router will auto switch to second detection server.

4) Retry Times

You can set up retry time in case detection fails.

5) Retry Interval

The interval time between 2 detection.

6) Enable Reboot

Click enable, and router will reboot within the time set if it fails to reconnect.

7) Reboot After Interval

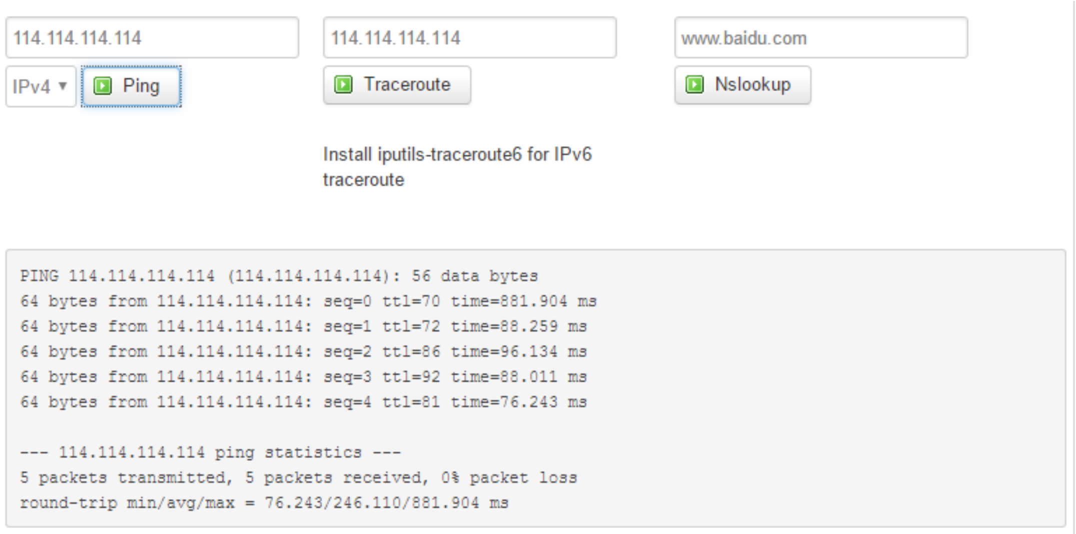
You can specify the time for offline, to reboot the router.

3.2.5 Diagnostics

There are 3 types of diagnostics: ping, traceroute and nslookup
Parameter of ping and traceroute can be a Domain Name or an IP address, used for checking if router is online or not. While nslookup is to analytic domain.

1) Ping

Click ping, then you can check if there is response from an IP address, as bellow.



114.114.114.114

114.114.114.114

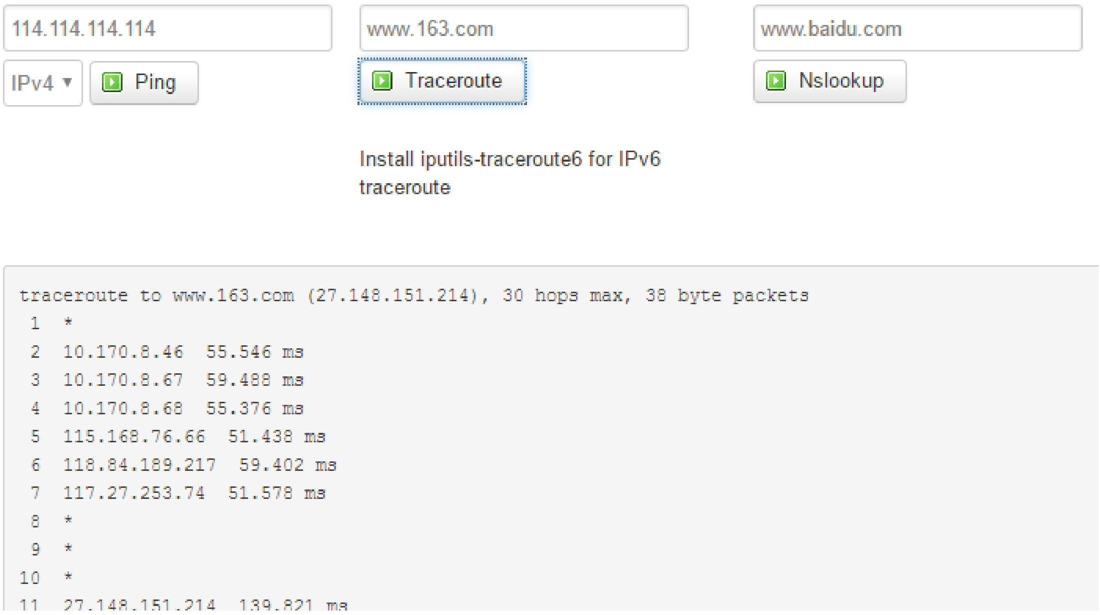
www.baidu.com

Install iputils-traceroute6 for IPv6 traceroute

```
PING 114.114.114.114 (114.114.114.114): 56 data bytes
64 bytes from 114.114.114.114: seq=0 ttl=70 time=881.904 ms
64 bytes from 114.114.114.114: seq=1 ttl=72 time=88.259 ms
64 bytes from 114.114.114.114: seq=2 ttl=86 time=96.134 ms
64 bytes from 114.114.114.114: seq=3 ttl=92 time=88.011 ms
64 bytes from 114.114.114.114: seq=4 ttl=81 time=76.243 ms

--- 114.114.114.114 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 76.243/246.110/881.904 ms
```

2) Traceroute

Click traceroute, then you can see similar reponse as below.



114.114.114.114

www.163.com

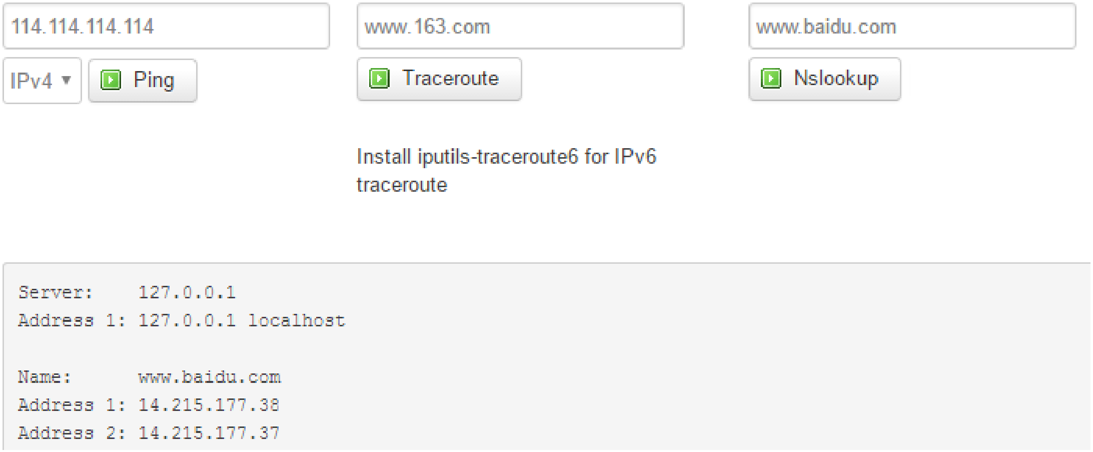
www.baidu.com

Install iputils-traceroute6 for IPv6 traceroute

```
traceroute to www.163.com (27.148.151.214), 30 hops max, 38 byte packets
 1  *
 2  10.170.8.46  55.546 ms
 3  10.170.8.67  59.488 ms
 4  10.170.8.68  55.376 ms
 5  115.168.76.66  51.438 ms
 6  118.84.189.217  59.402 ms
 7  117.27.253.74  51.578 ms
 8  *
 9  *
10  *
11  27.148.151.214  139.821 ms
```

3) Nslookup

Click nslookup, then you can see similar reponse as below.



114.114.114.114

IPv4 ▾ Ping

www.163.com

Traceroute

Install iputils-traceroute6 for IPv6 traceroute

www.baidu.com

Nslookup

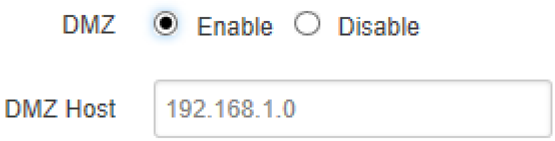
```
Server:    127.0.0.1
Address 1: 127.0.0.1 localhost

Name:      www.baidu.com
Address 1: 14.215.177.38
Address 2: 14.215.177.37
```

3.3 Security

Menu of Security are for configuring the firewall, to ensure the security of accessing to internet, and implement the port forwarding, access control, data packet filtering, and other functions.

3.3.1 DMZ Host

DMZ can forward the port of WAN to a host of LAN; all packet from WAN will be forwarded to specified host of LAN.



DMZ ● Enable ○ Disable

DMZ Host 192.168.1.0

1) DMZ

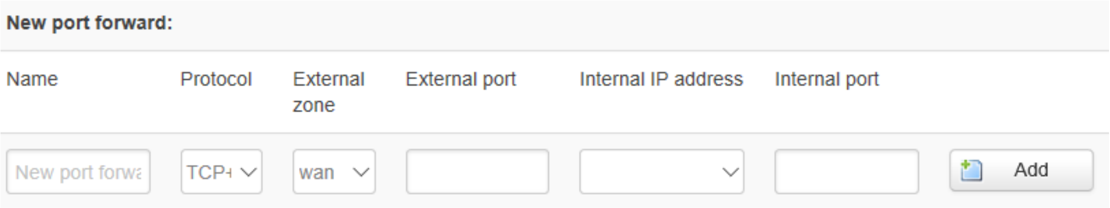
You can enable or disable the DMZ.

2) DMZ Host

An IP address of a host of LAN you want to map.

3.2.2 Port Forwarding

Comparing with DMZ, Port Forwarding is for more precise control, user can forward the data packet of a port to a host of LAN, to forward different port to different host.



New port forward:

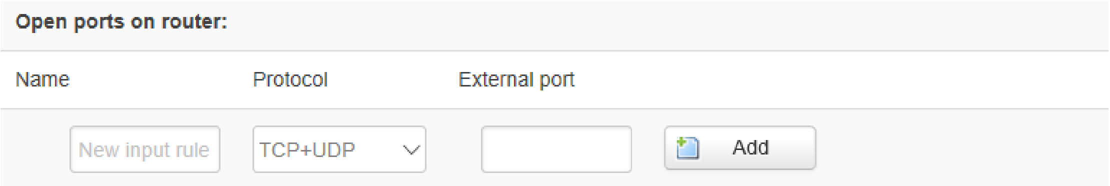
Name	Protocol	External zone	External port	Internal IP address	Internal port	
New port forwa	TCP+	wan				Add

1) Name
You can name the rule you created.
2) Protocol
You can choose TCP, UDP, or TCP/UDP.
3) External Port
Destination port before port forwarding.
4) Internal IP Address
The Host IP address to forward.
5) Internal Port
The destination port after port forwarding. Normally, external port and internal port are the same, but also can be different.

After configured above-mentioned, click ‘Add’, then a new rule will be added, and click ‘Save & Apply’, to have the rule take effect.

3.3.3 Traffic Rules

Traffic rules is used for opening some router ports, such as remote access the configuration page of router, you can open port 80; for remote SSH connection, you can open port 22.



Open ports on router:

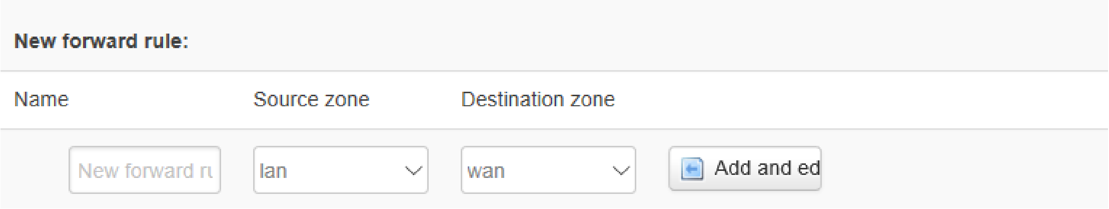
Name	Protocol	External port	
New input rule	TCP+UDP		Add

1) Name
You can name the rule yourself.
2) Protocol
Choose the protocol of you want to forward can be TCP, UDP, or TCP/UDP.

3) External Port

Choose the port you want to open.

In addition, traffic rule can be used for creating some access control rules, it can be from LAN to WAN, or WAN to LAN.



New forward rule:

Name	Source zone	Destination zone	
New forward ru	lan	wan	Add and ed

1) Name

You can name the rule yourself.

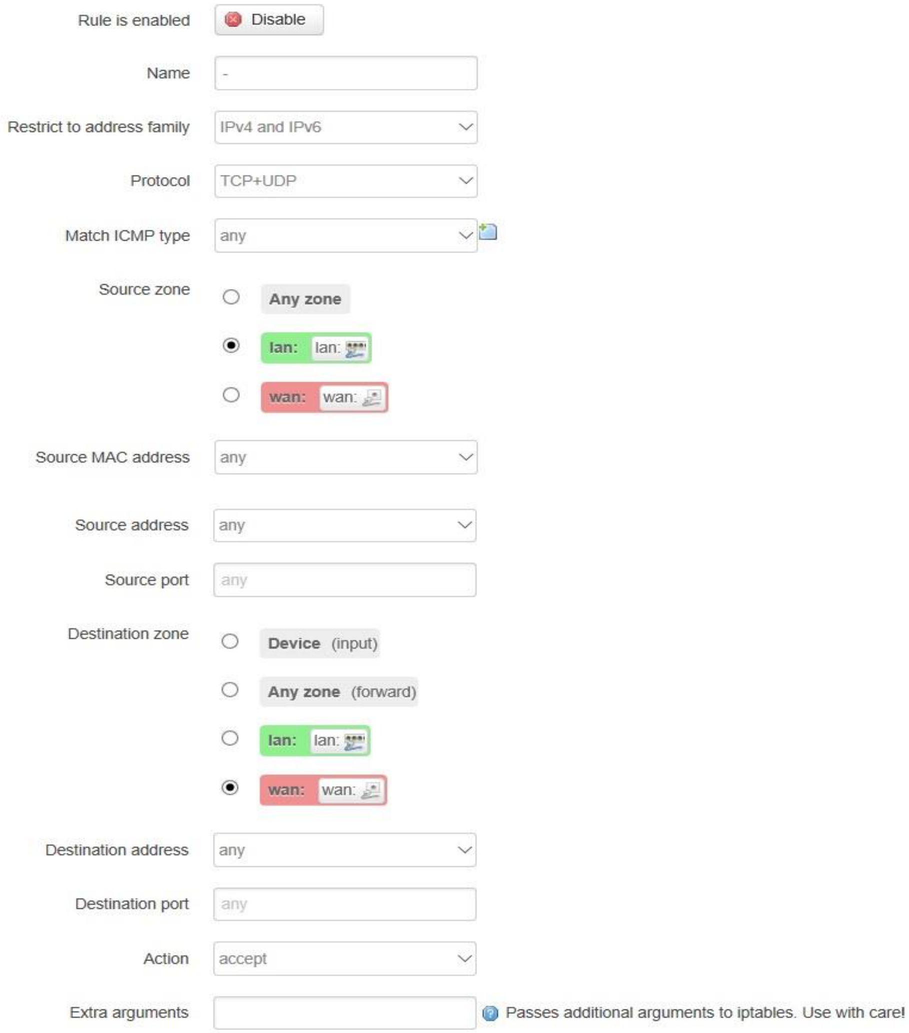
2) Source Zone

You can choose where to start the data packet.

3) Destination Zone

You can choose where to forward the data packet.

Click ‘Add and Edit’, then you can get more detailed matching condition.



Rule is enabled	Disable
Name	-
Restrict to address family	IPv4 and IPv6
Protocol	TCP+UDP
Match ICMP type	any
Source zone	○ Any zone ● lan: lan: ○ wan: wan:
Source MAC address	any
Source address	any
Source port	any
Destination zone	○ Device (input) ○ Any zone (forward) ○ lan: lan: ● wan: wan:
Destination address	any
Destination port	any
Action	accept
Extra arguments	Passes additional arguments to iptables. Use with care!

1) Restrict to Address Family

You can choose IPv4, IPv6, or Pv4/IPv6.

2) Protocol

To choose the protocol you want for access control, it can TCP, UDP or TCP/UDP.

3) Source MAC Address

To choose the source MAC address of data packet.

4) Source Address

To choose the source IP address of data packet.

5) Source Port

To choose the source port of data packet.

6) Destination Address

To choose the destination IP address of data packet.

7) Destination Port

To choose the destination port of data packet.

8) Action

If the above-mentioned conditions matched, then you can choose below actions.

- **Accept**

Allow data packet to go through.

- **Drop**

Drop data packet

- **Reject**

Drop data packet, and return an unachievable data packet.

- **Don't Track**

No action.

3.3.4 Custom Settings

Users can also customize some firewall rules themselves, as those rules is consist of iptable, we suggest users that are familiar with iptables command to do this. When you add rules, please add them at the bottom of existing rules, and don't delete them.

3.4 VPN

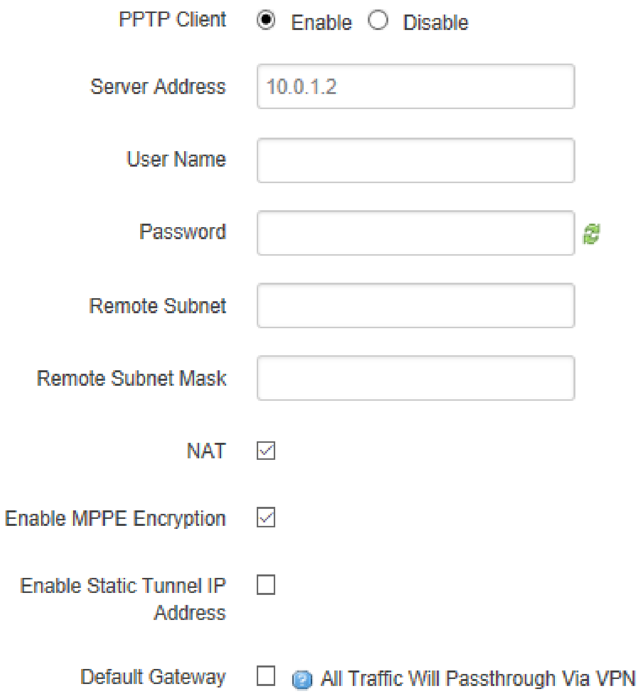
VPN is used to establish a virtual private channel, and all the data in this channel will be encrypted to ensure that data security during transmission.

TG452 support VPN: PPTP, L2TP, OpenVPN and IPSec. PPTP/L2TP are layer 2 VPN, and OpenVPN is VPN based on SSL, while IPSec layer 3 VPN. PPTP/L2TP are more convenient to use, while OpenVPN and IPSec is more complex, as they need complex certification management, meanwhile, they offer more secured encrypted data.

3.4.1 PPTP

You can configure either PPTP client or PPTP server, but not both of them at the same time, as that may cause uncertain issues.

1) PPTP Client



PPTP Client	● Enable ○ Disable
Server Address	10.0.1.2
User Name	
Password	
Remote Subnet	
Remote Subnet Mask	
NAT	☑
Enable MPPE Encryption	☑
Enable Static Tunnel IP Address	□
Default Gateway	□ All Traffic Will Passthrough Via VPN

1. **PPTP Client**

You can enable or disable PPTP client.

2. **Server Address**

To enter the IP address or Domain Name of PPTP server.

3. **User Name and Password**

To enter the user name and password provided by server.

4. **Remote Subnet**

To enter the remote subnet, for example, if LAN of PPTP server is 192.168.2.1, then you can enter remote subnet 192.168.2.0.

5. **Remote Subnet Mark**

To enter the remote subnet mask, normally it is 255.255.255.0.

6. **NAT**

If click NAT, all packets come from ppp0, and the source IP of the packets will be replaced as IP of ppp0.

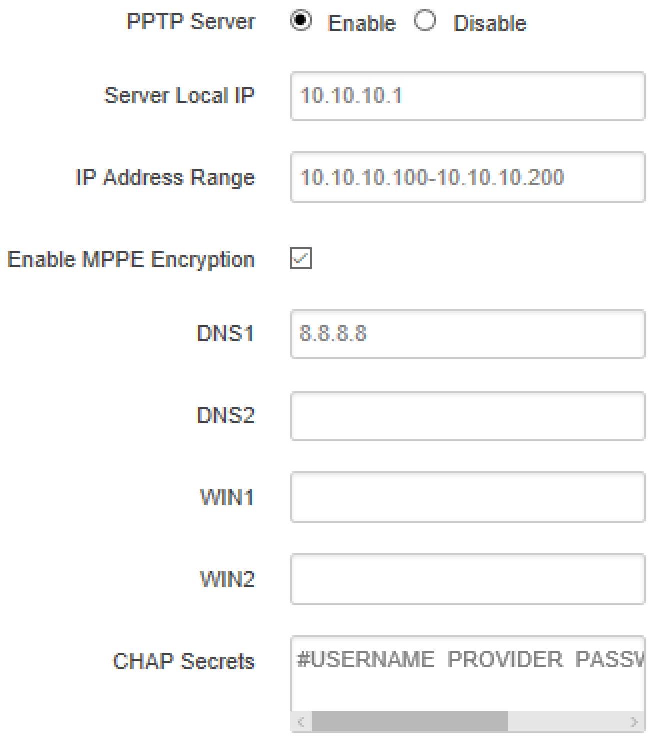
7. **Enable MPPE Encryption.**

You can enable MPPE encryption here.

8. **Default Gateway**

Click Default Gateway, then a default route will be established under ppp0, and all the data will go through this route.

2) PPTP Server



PPTP Server	● Enable ○ Disable
Server Local IP	10.10.10.1
IP Address Range	10.10.10.100-10.10.10.200
Enable MPPE Encryption	☑
DNS1	8.8.8.8
DNS2	
WIN1	
WIN2	
CHAP Secrets	#USERNAME PROVIDER PASSV

1. PPTP Server

You can enable or disable PPTP server.

2. Server Local IP

To enter the server local IP address.

3. IP Address Range

Type the range of assigned IP address.

4. Enable MPPE Encryption.

You can enable MPPE encryption here.

5. DNS1/DNS2

To enter the assigned DNS address.

6. WIN1/WIN2

To enter the WIN address.

7. CHAP Secrets

To create an username and password under CHAP Secrets, format as below,

Username<space>*<space>password<space>*

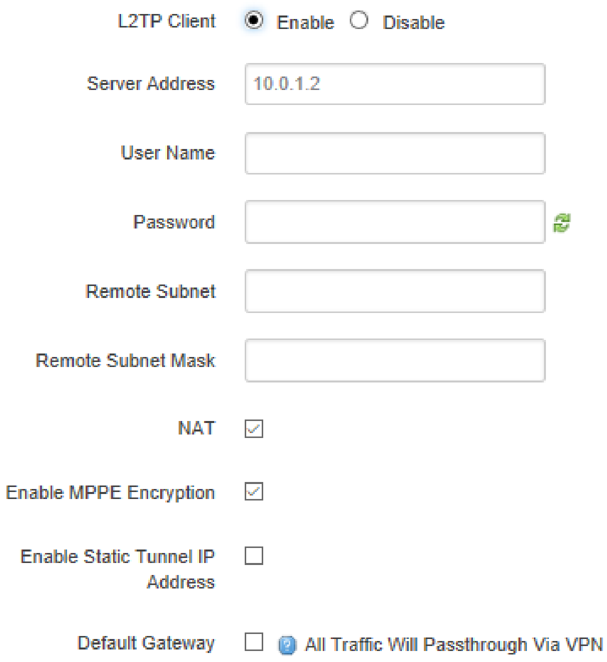
For example, if you want to create a username: test, password: test, it is as below,

Test * testing *

3.4.2 L2TP

You can also configure either L2TP client or L2TP server, but not both of them at the same time, as that may cause uncertain issues.

1) L2TP Client



L2TP Client	● Enable ○ Disable
Server Address	10.0.1.2
User Name	
Password	
Remote Subnet	
Remote Subnet Mask	
NAT	☑
Enable MPPE Encryption	☑
Enable Static Tunnel IP Address	□
Default Gateway	□ All Traffic Will Passthrough Via VPN

1. L2TP Client

You can enable or disable L2TP client.

2. Server Address

To enter the IP address or Domain Name of L2TP server.

3. User Name and Password

To enter the user name and password provided by server.

4. Remote Subnet

To enter the remote subnet, for example, if LAN of L2TP server is 192.168.2.1, then you can enter remote subnet 192.168.2.0.

5. Remote Subnet Mark

To enter the remote subnet mask, normally it is 255.255.255.0.

6. NAT

If click NAT, all packets come from ppp0, and the source IP of the packets will be replaced as IP of ppp0.

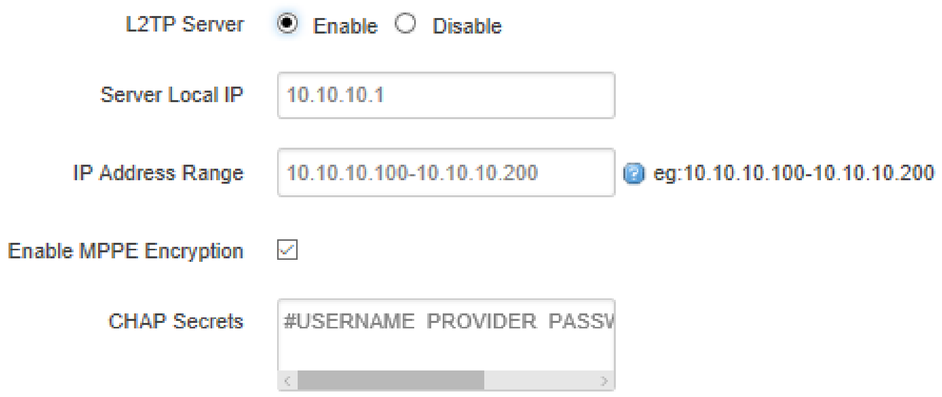
7. Enable MPPE Encryption.

You can enable MPPE encryption here.

8. Default Gateway

Click Default Gateway, then a default route will be established under ppp0, and all the data will go through this route.

2) L2TP Server



L2TP Server ● Enable ○ Disable

Server Local IP 10.10.10.1

IP Address Range 10.10.10.100-10.10.10.200 eg:10.10.10.100-10.10.10.200

Enable MPPE Encryption ☑

CHAP Secrets #USERNAME PROVIDER PASSW

1. L2TP Server

You can enable or disable L2TP server.

2. Server Local IP

To enter the server local IP address.

3. IP Address Range

Type the range of assigned IP address.

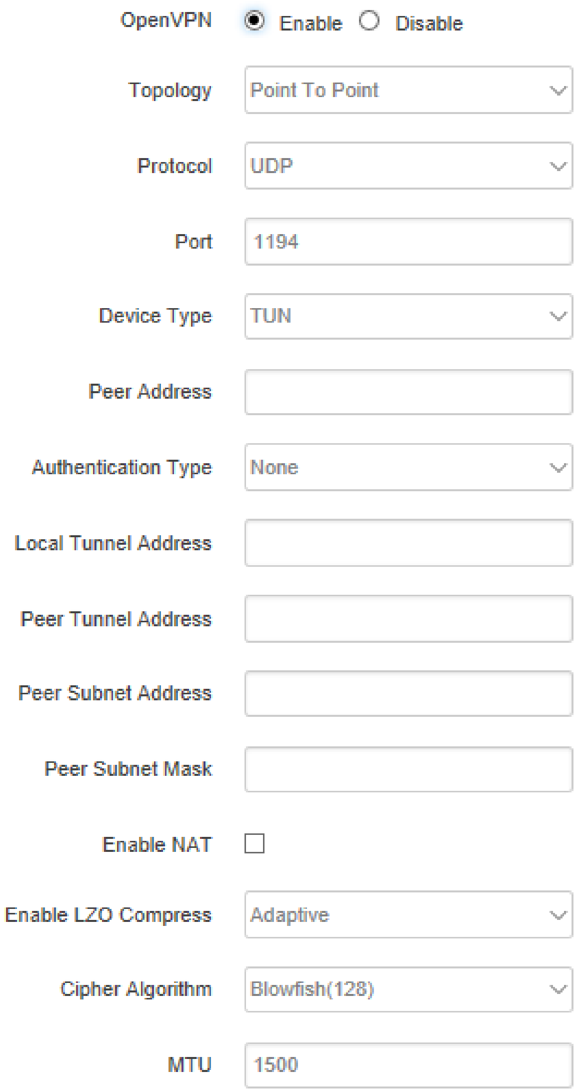
4. Enable MPPE Encryption.

You can enable MPPE encryption here.

5. CHAP Secrets

To create an username and password under CHAP Secrets, format as below,
Username<space>*<space>password<space>*
For example, if you want to create a username: test, password: test, it is as below,
Test * test *

3.4.3 OpenVPN



OpenVPN	● Enable ○ Disable
Topology	Point To Point
Protocol	UDP
Port	1194
Device Type	TUN
Peer Address	
Authentication Type	None
Local Tunnel Address	
Peer Tunnel Address	
Peer Subnet Address	
Peer Subnet Mask	
Enable NAT	□
Enable LZO Compress	Adaptive
Cipher Algorithm	Blowfish(128)
MTU	1500

1) OpenVPN

You can enable or disable OpenVPN.

2) Topology

Choose the topology, it can be point to point or subnet

Note: For point to point, a tunnel will be established between 2 devices.

While for subnet, multi devices will be connected to one server.

3) Role

When topology is subnet, you need to choose you want it be a server or client.

4) Protocol

Choose the protocol, it can be UDP or TCP, default is UDP.

5) Port

Enter the port you want to assign to OpenVPN, default port is 1194.

6) Device Type

Choose device type, there are 2 types to choose, TUN and TAP. TUN is layer 3 data encapsulation, while TAP is layer 2 data encapsulation.

7) OpenVPN Server

When you choose server in 角色, you need to enter an IP address or domain name of server.

8) Authentication Type

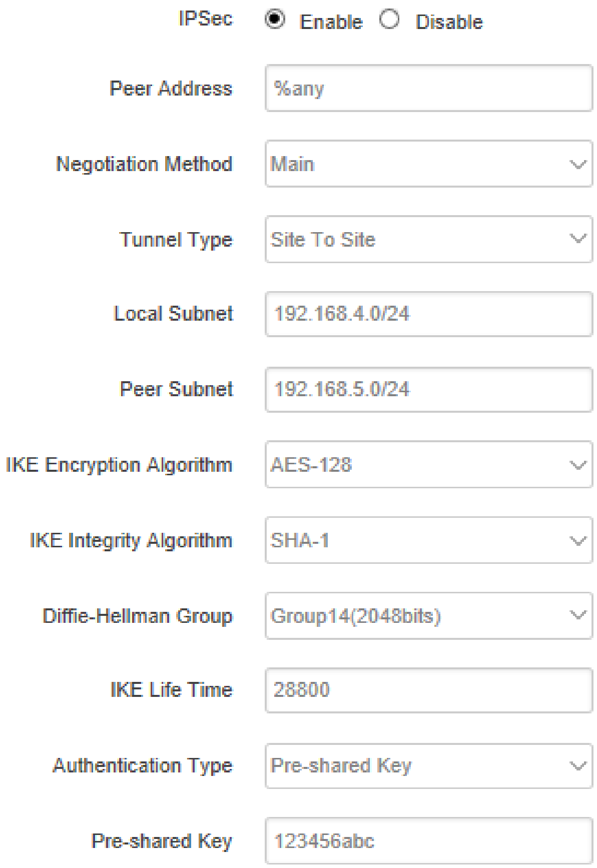
If topology is subnet, authentication type is certification. If it is point to point, you can choose none, certificate or static secret.

9) TLS Role

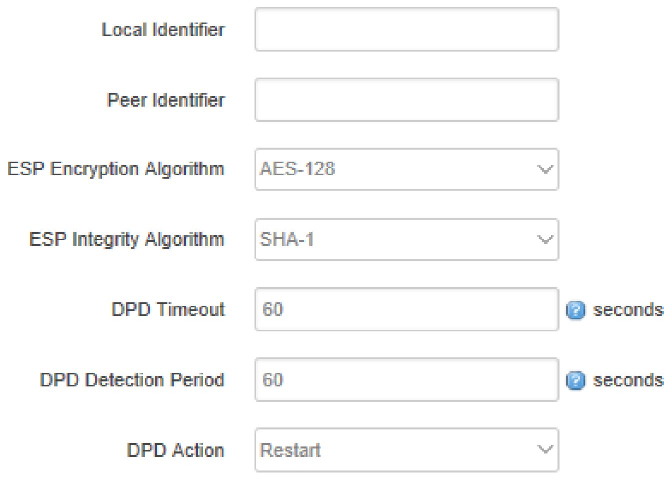
When topology is point to point, and authentication type is certification, you need to choose if it is server or client.

3.4.4 IPSec

On IPSEC page, system will display the IPSEC connection and status.



IPSec	● Enable ○ Disable
Peer Address	%any
Negotiation Method	Main
Tunnel Type	Site To Site
Local Subnet	192.168.4.0/24
Peer Subnet	192.168.5.0/24
IKE Encryption Algorithm	AES-128
IKE Integrity Algorithm	SHA-1
Diffie-Hellman Group	Group14(2048bits)
IKE Life Time	28800
Authentication Type	Pre-shared Key
Pre-shared Key	123456abc



Local Identifier

Peer Identifier

ESP Encryption Algorithm: AES-128

ESP Integrity Algorithm: SHA-1

DPD Timeout: 60 seconds

DPD Detection Period: 60 seconds

DPD Action: Restart

1) Peer Address

To enter peer IP address or Domain Name, if choose as a server, you don't need to enter it.

2) Negotiation Method

You can choose 'Main' or 'Aggressive'.

3) Tunnel Type

You can choose 'Site to Site, 'Site to Host', 'Host to Host', 'Host to Site'.

4) Local Subnet

Local subnet and mask, like 192.168.10.0/24.

5) Peer Subnet

Peer subnet and mask, like 192.168.20.0/24.

6) IKE Encryption Algorithm

IKE phase encryption method

7) IKE Lifetime

To set up IKE lifttime.

8) Local Identifier

Local identifier of channel, can be an IP address or domain name.

9) Peer Identifier

Peer identifier of channel, can be an IP address or domain name.

10) ESP Encryption Algorithm

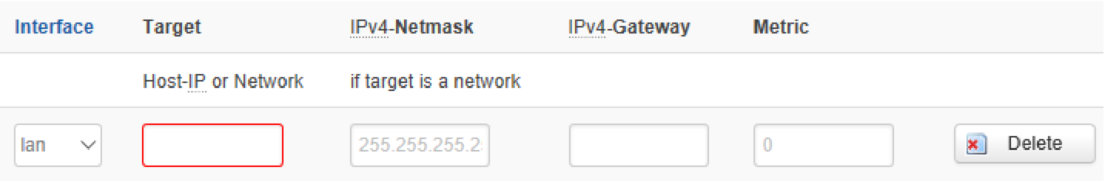
The encryption method of ESP.

3.5 Advanced

You can set up some advanced functions here.

3.5.1 Static Routing

Static routing is used to add a routing table entry.



Interface	Target	IPv4-Netmask	IPv4-Gateway	Metric	
	Host-IP or Network	if target is a network			
lan		255.255.255.2		0	Delete

Interface: To choose which interface you want to add routing.

Target: Can be a host IP, or subnet.

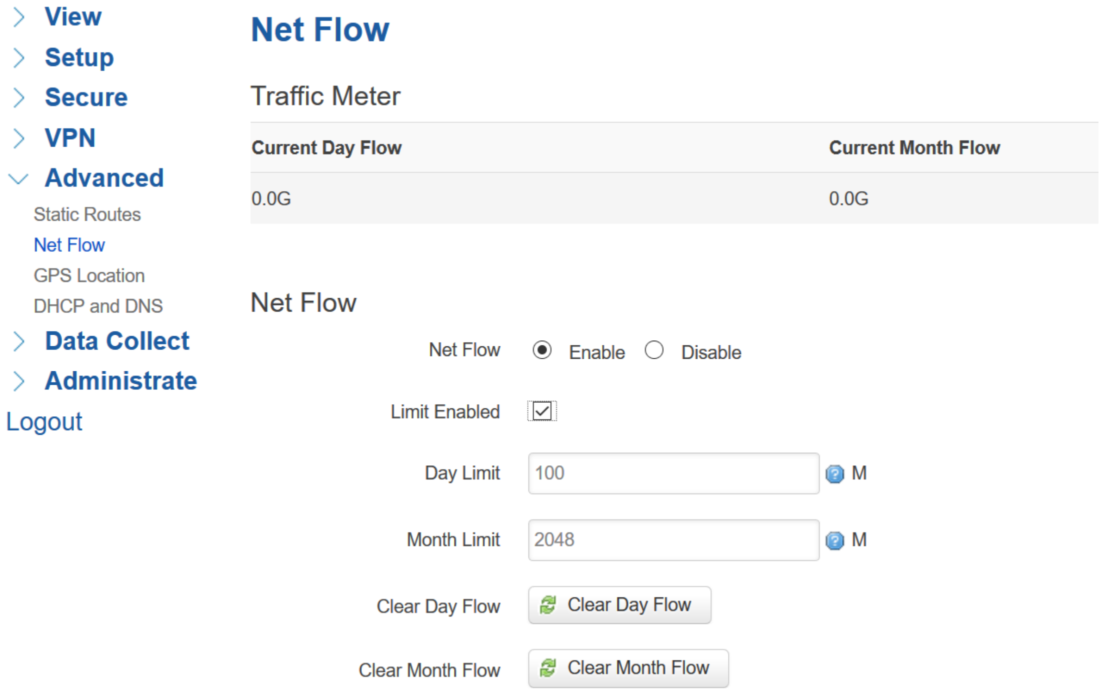
IPv4 Netmask: The netmask of subnet, if the target is host, the netmask shall be 255.255.255.255.

IPv4 Gateway: The address of next-hop gateway address.

Note: this address shall be achievable, or you'll fail to add static routing.

3.5.2 Net Flow

The traffic meter function of TG452 is for traffic statistics from WAN port, meanwhile, it has traffic overflow alarm function. Even if the router is powered off, the traffic statistics will be saved, and when you power on the router, the traffic will be counted based on your last time traffic.



Net Flow

Traffic Meter

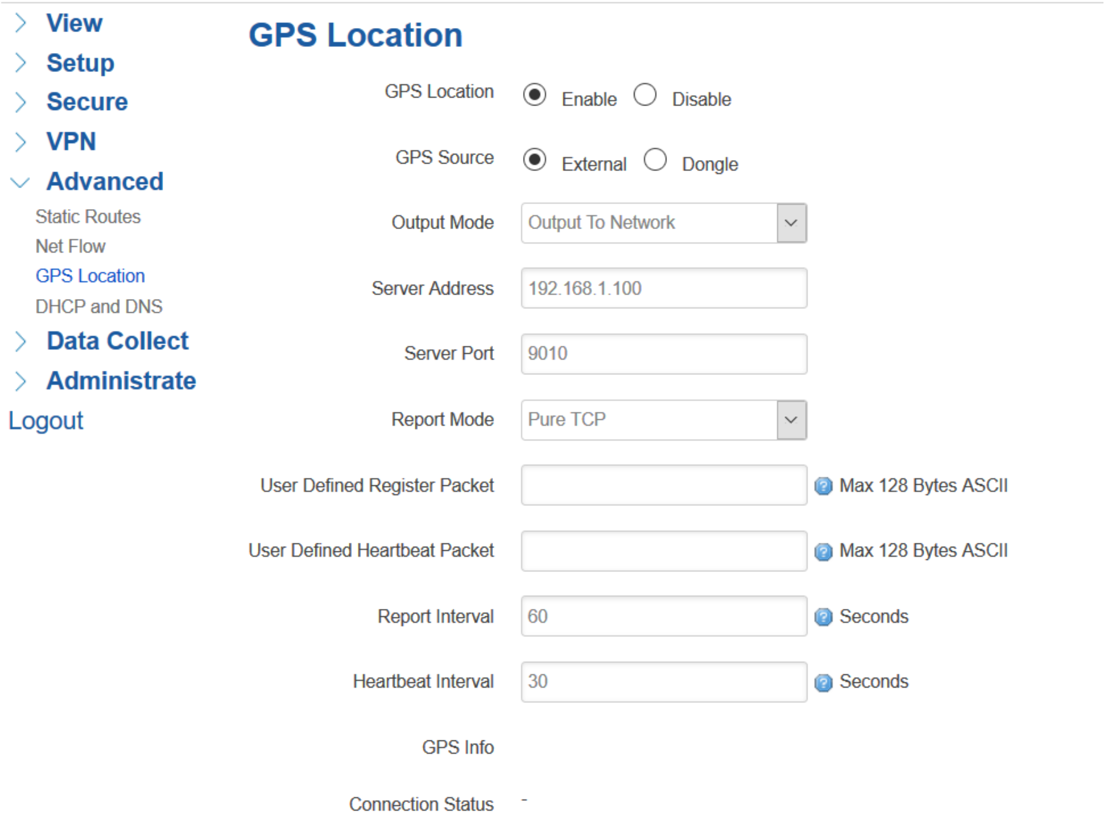
Current Day Flow	Current Month Flow
0.0G	0.0G

Net Flow

Net Flow	● Enable ○ Disable
Limit Enabled	☑
Day Limit	100 M
Month Limit	2048 M
Clear Day Flow	Clear Day Flow
Clear Month Flow	Clear Month Flow

3.5.3 GPS Location

GPS location will report GPRMV information regularly, saying longitude and latitude information. And this function is used for accurate location of outdoor open area.



GPS Location

GPS Location ● Enable ○ Disable

GPS Source ● External ○ Dongle

Output Mode: Output To Network

Server Address: 192.168.1.100

Server Port: 9010

Report Mode: Pure TCP

User Defined Register Packet: Max 128 Bytes ASCII

User Defined Heartbeat Packet: Max 128 Bytes ASCII

Report Interval: 60 Seconds

Heartbeat Interval: 30 Seconds

GPS Info

Connection Status -

Server Address: The IP address of server that you want the router to report the location, which is based on TCP connection.
Server Port: The port of server.
Report Interval: The interval time for auto report of router location, default value is 60 seconds.

3.5.4 DHCP and DNS

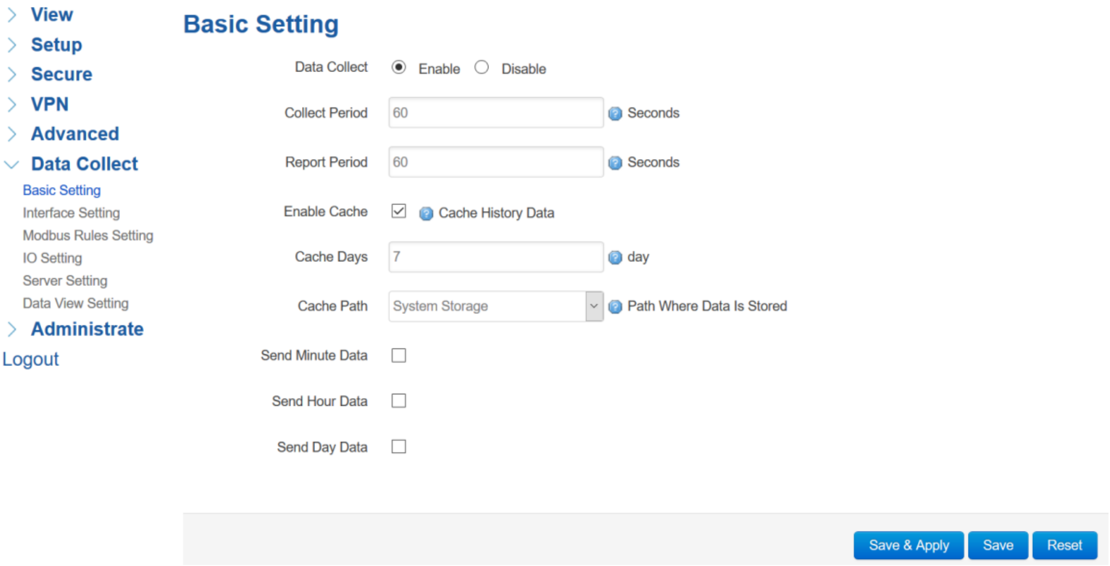
General DHCP and DNS settings base on Dnsmasq tool on TG452. Please refer to Dnsmasq for more information.

3.6 Data Collect

Data Collect settings is for TG452 acquiring data from slave devices in serial ports, Ethernet ports, IO ports, with Modbus protocol and other customized protocols.
Also support customize data display on LCD (only for TG452S).

3.6.1 Basic Setting

Enable or Disable the data collect feature, setting the data acquire and report period and other related options.



Basic Setting

Data Collect ● Enable ○ Disable

Collect Period 60 Seconds

Report Period 60 Seconds

Enable Cache ☑ Cache History Data

Cache Days 7 day

Cache Path System Storage Path Where Data Is Stored

Send Minute Data □

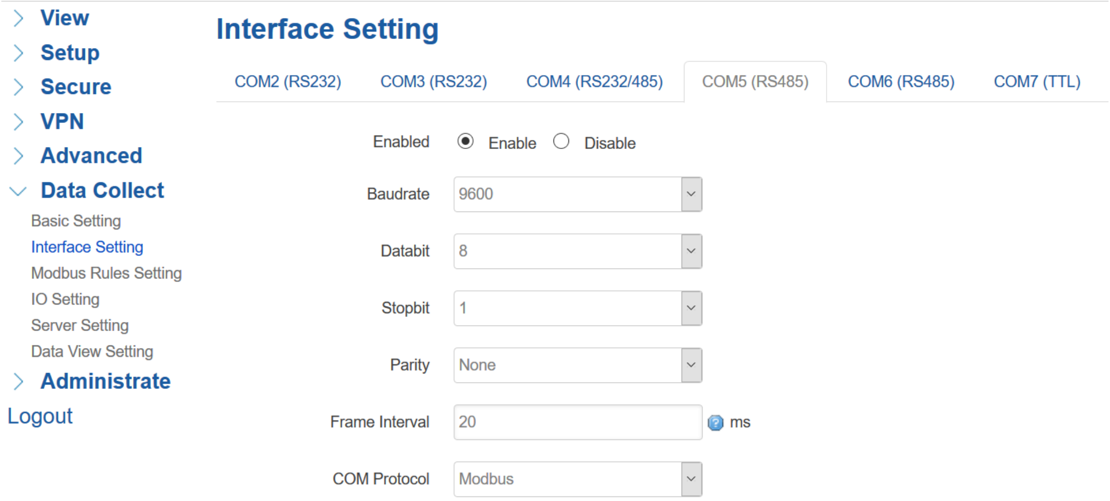
Send Hour Data □

Send Day Data □

1) Data Collect: Enable or Disable data collect feature.
2) Collect Period: Set the period of data acquire from slave devices.
3) Report Period: Set the Period of data report to server.
4) Enable Cache: Enable or Disable history data cache feature.
5) Related data cache setting if enable the cache feature.

3.6.2 Interface Setting

Switch the hardware interfaces for data acquisition from kinds of slave devices. Including Serial ports (COM2~COM7), Modbus TCP base on Ethernet LAN, I2C ports.



Interface Setting

Enabled ● Enable ○ Disable

Baudrate 9600

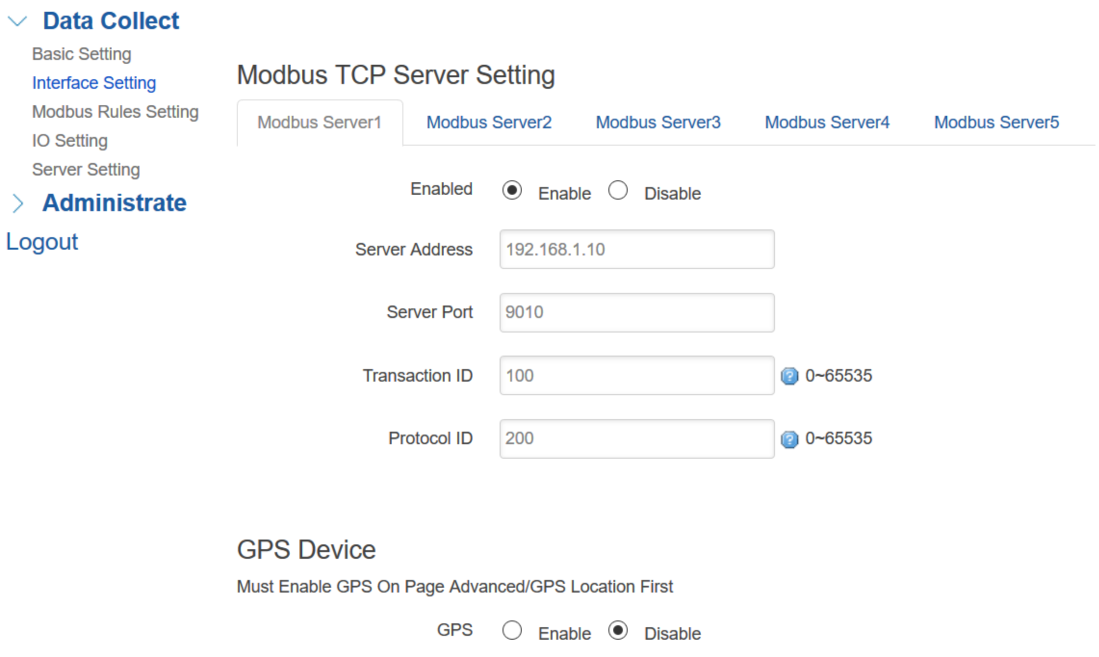
Databit 8

Stopbit 1

Parity None

Frame Interval 20 ms

COM Protocol Modbus



Modbus TCP Server Setting

Enabled ● Enable ○ Disable

Server Address 192.168.1.10

Server Port 9010

Transaction ID 100 0~65535

Protocol ID 200 0~65535

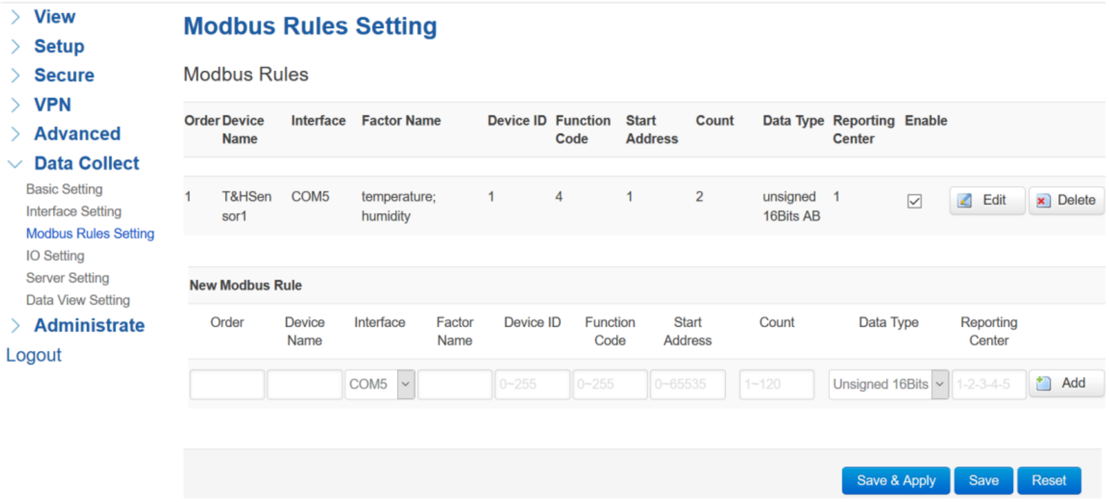
GPS Device

Must Enable GPS On Page Advanced/GPS Location First

GPS ○ Enable ● Disable

3.6.3 Modbus Rules Setting

Modbus Rules Setting is for TG452 as a Modbus master to acquire data from slave devices base on Modbus protocol. You can configure unlimited Modbus rules on it. TG452 provide the options of definable factor name, device ID, function code, register address and count register number, please following the slave device datasheet to get those information.



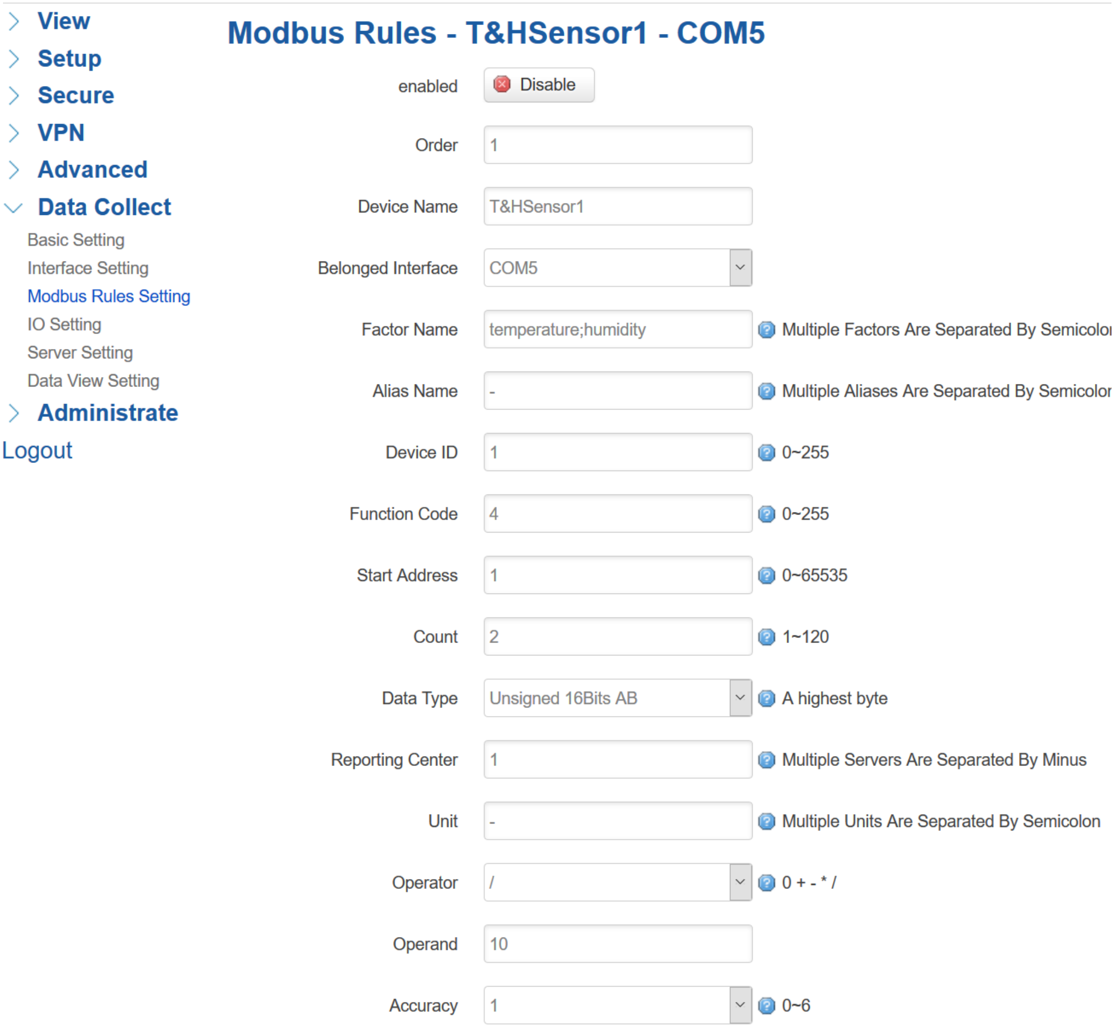
Modbus Rules Setting

Modbus Rules

Order	Device Name	Interface	Factor Name	Device ID	Function Code	Start Address	Count	Data Type	Reporting Center	Enable
1	T&HSensor1	COM5	temperature; humidity	1	4	1	2	unsigned 16Bits AB	1	☑

New Modbus Rule

Order	Device Name	Interface	Factor Name	Device ID	Function Code	Start Address	Count	Data Type	Reporting Center
		COM5		0~255	0~255	0~65535	1~120	Unsigned 16Bits	1-2-3-4-5



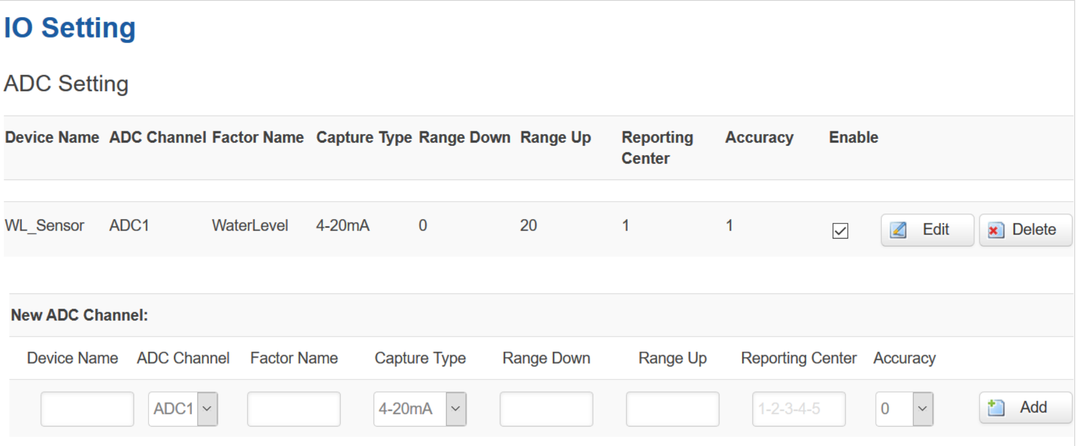
Modbus Rules - T&HSensor1 - COM5

enabled	Disable	
Order	1	
Device Name	T&HSensor1	
Belonged Interface	COM5	
Factor Name	temperature;humidity	Multiple Factors Are Separated By Semicolo
Alias Name	-	Multiple Aliases Are Separated By Semicolo
Device ID	1	0~255
Function Code	4	0~255
Start Address	1	0~65535
Count	2	1~120
Data Type	Unsigned 16Bits AB	A highest byte
Reporting Center	1	Multiple Servers Are Separated By Minus
Unit	-	Multiple Units Are Separated By Semicolon
Operator	/	0 + - * /
Operand	10	
Accuracy	1	0~6

3.6.4 IO Setting

IO Setting menu is for setting ADC ports, DI ports, and Relay ports.

1) ADC ports setting



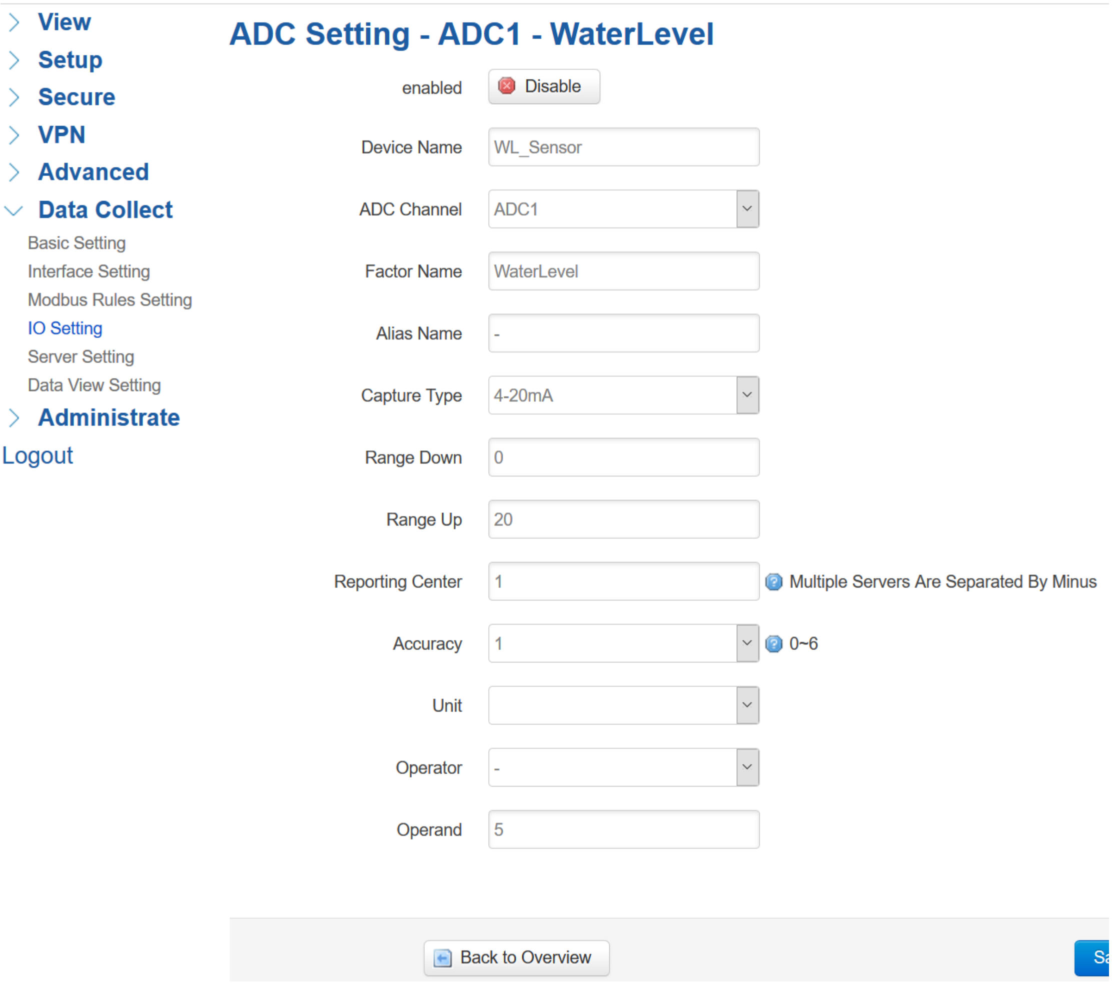
IO Setting

ADC Setting

Device Name	ADC Channel	Factor Name	Capture Type	Range Down	Range Up	Reporting Center	Accuracy	Enable		
WL_Sensor	ADC1	WaterLevel	4-20mA	0	20	1	1	☑	Edit	Delete

New ADC Channel:

Device Name	ADC Channel	Factor Name	Capture Type	Range Down	Range Up	Reporting Center	Accuracy	
	ADC1		4-20mA			1-2-3-4-5	0	Add



- View
- Setup
- Secure
- VPN
- Advanced
- Data Collect
  - Basic Setting
  - Interface Setting
  - Modbus Rules Setting
  - IO Setting
  - Server Setting
  - Data View Setting
- Administrate

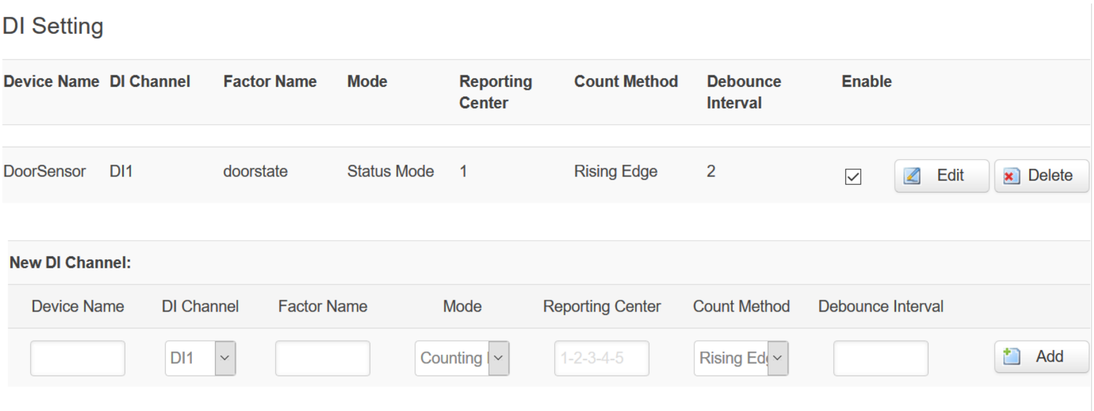
Logout

ADC Setting - ADC1 - WaterLevel

enabled	Disable	
Device Name	WL_Sensor	
ADC Channel	ADC1	
Factor Name	WaterLevel	
Alias Name	-	
Capture Type	4-20mA	
Range Down	0	
Range Up	20	
Reporting Center	1	Multiple Servers Are Separated By Minus
Accuracy	1	0~6
Unit		
Operator	-	
Operand	5	

Back to Overview   Sa

2) DI ports setting

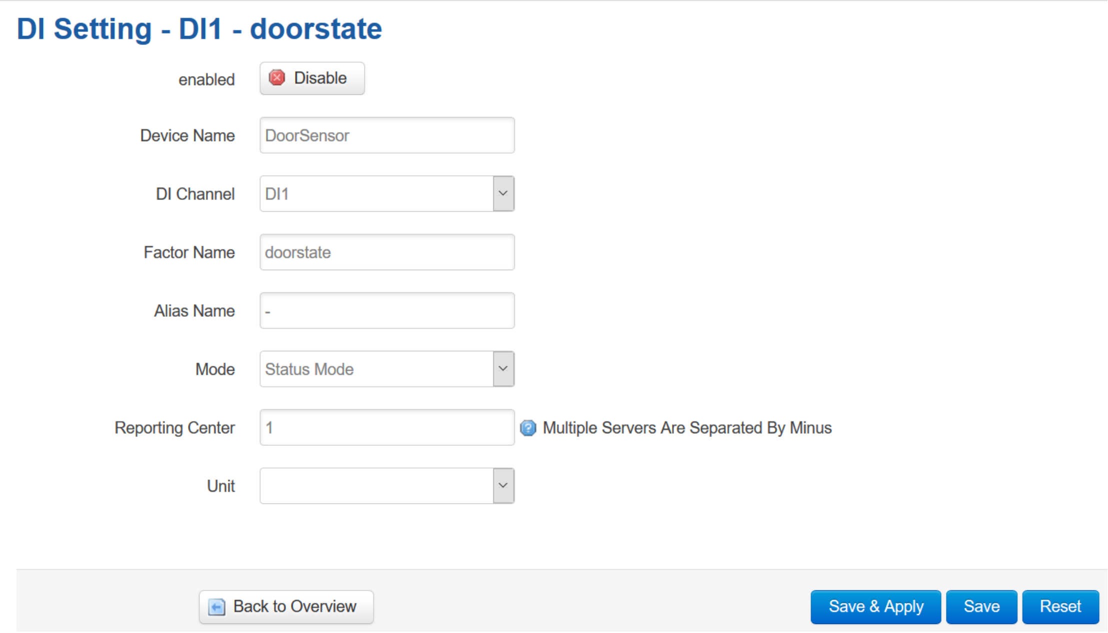


DI Setting

Device Name	DI Channel	Factor Name	Mode	Reporting Center	Count Method	Debounce Interval	Enable		
DoorSensor	DI1	doorstate	Status Mode	1	Rising Edge	2	☑	Edit	Delete

New DI Channel:

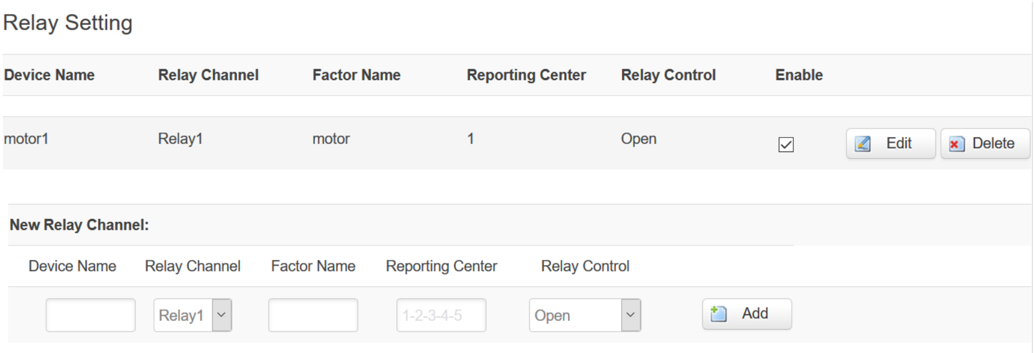
Device Name	DI Channel	Factor Name	Mode	Reporting Center	Count Method	Debounce Interval	
	DI1		Counting	1-2-3-4-5	Rising Ed		Add



DI Setting - DI1 - doorstate

enabled	Disable
Device Name	DoorSensor
DI Channel	DI1
Factor Name	doorstate
Alias Name	-
Mode	Status Mode
Reporting Center	1 — Multiple Servers Are Separated By Minus
Unit	

3) Relay Setting

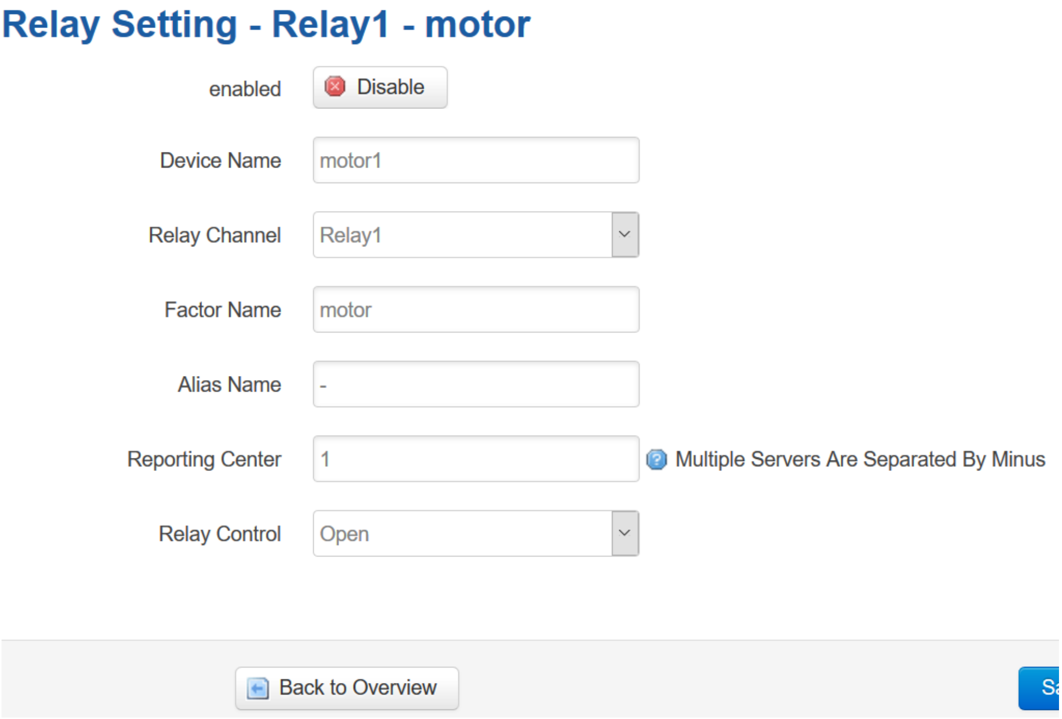


Relay Setting

Device Name	Relay Channel	Factor Name	Reporting Center	Relay Control	Enable		
motor1	Relay1	motor	1	Open	☑	Edit	Delete

New Relay Channel:

Device Name	Relay Channel	Factor Name	Reporting Center	Relay Control	
	Relay1		1-2-3-4-5	Open	Add

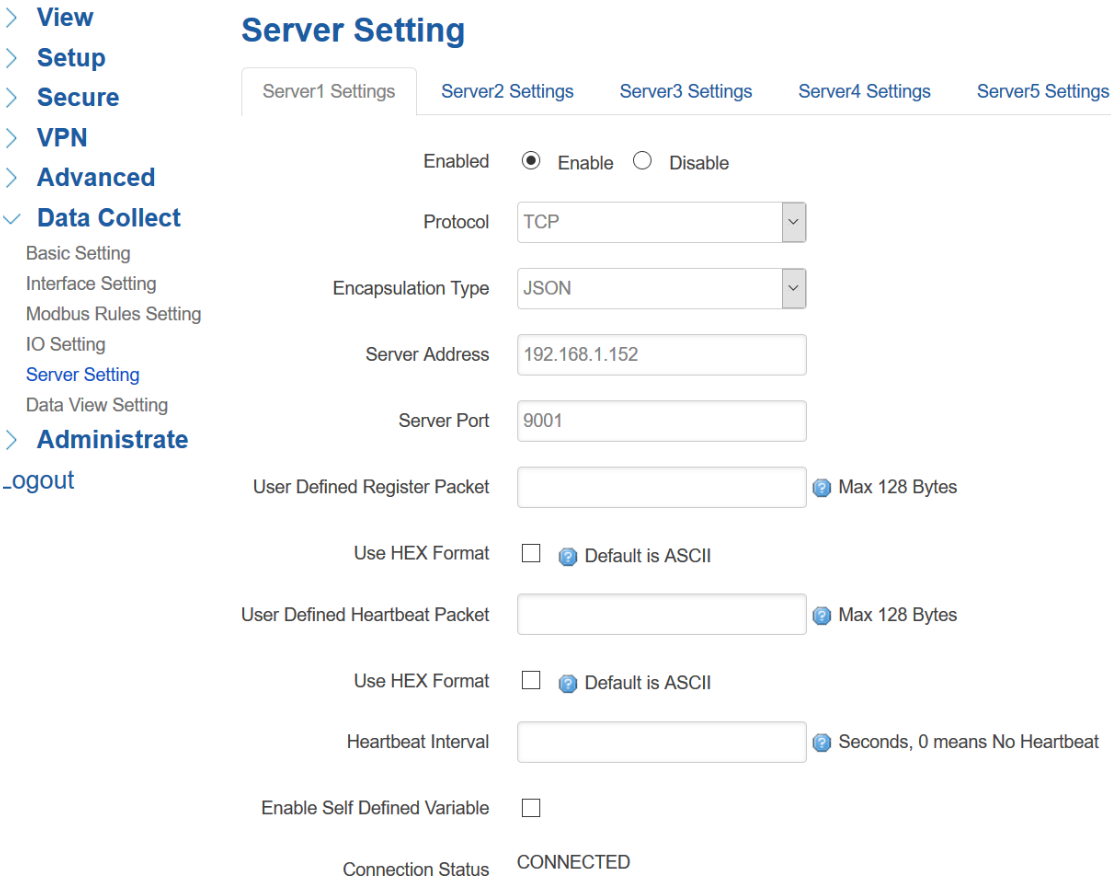


Relay Setting - Relay1 - motor

enabled	Disable
Device Name	motor1
Relay Channel	Relay1
Factor Name	motor
Alias Name	-
Reporting Center	1 — Multiple Servers Are Separated By Minus
Relay Control	Open

3.6.5 Server Setting

Server setting menu allows user set the data center address with multiple protocols, the standard TG452 support TCP, UDP, HTTP, MQTT, and Modbus TCP. For the data format, TG452 support different Encapsulation type, include “Transparent”, “Json”, and “HJ212” (special for some Environment SCADA). Also TG452 accept customize specific protocols for your data center.

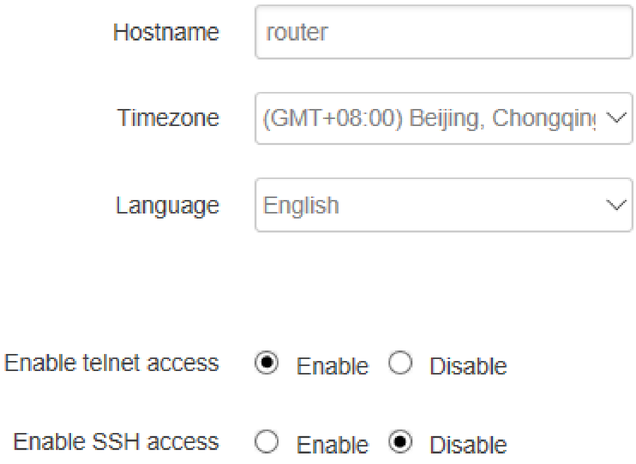


Server Setting

Enabled	● Enable ○ Disable
Protocol	TCP
Encapsulation Type	JSON
Server Address	192.168.1.152
Server Port	9001
User Defined Register Packet	Max 128 Bytes
Use HEX Format	□ Default is ASCII
User Defined Heartbeat Packet	Max 128 Bytes
Use HEX Format	□ Default is ASCII
Heartbeat Interval	Seconds, 0 means No Heartbeat
Enable Self Defined Variable	□
Connection Status	CONNECTED

3.7 Administrate

3.7.1 System



Hostname: router

Timezone: (GMT+08:00) Beijing, Chongqin

Language: English

Enable telnet access ● Enable ○ Disable

Enable SSH access ○ Enable ● Disable

1) Host Name

The host name of router, default name is router.

2) Time Zone

Set up the time zone of system, default time zone is GMT8.

3) Language

Change the language of configuration interface, default language is English.

4) Enable Telnet Access

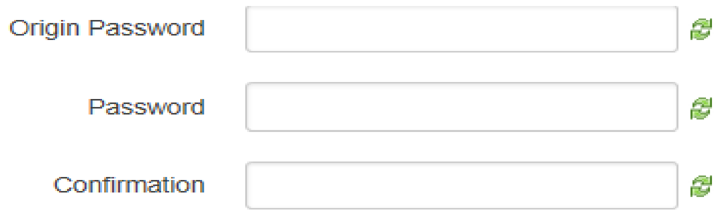
To enable the telnet server, the default function is enable.

5) Enable SSH Access

To enable the SSH server, the default function is disable.

3.7.2 Password

To revise the password of router.



Origin Password

Password

Confirmation

1) Origin Password

You’ll be required to enter your origin password before your revise your new password.

2) Password

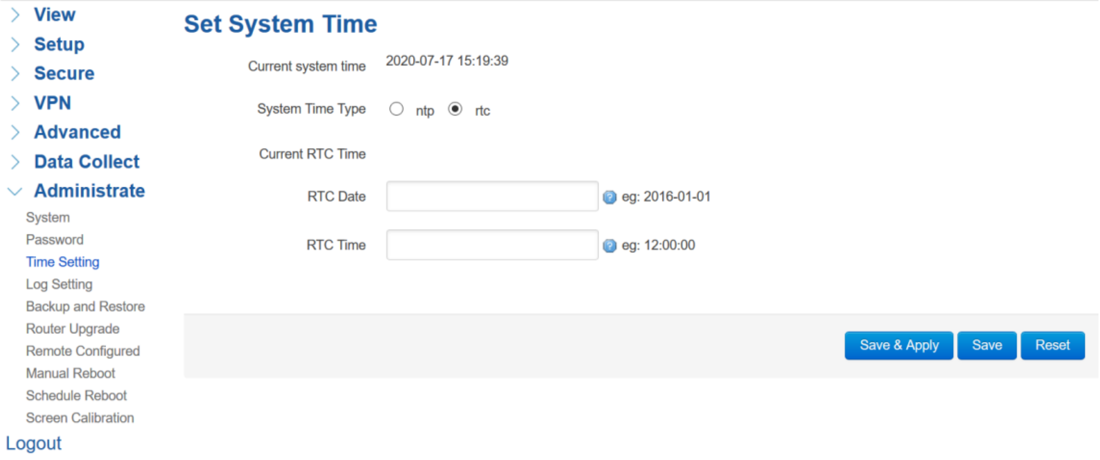
Type the new password you want to change.

3) Confirmation

Type the new password again to confirm it.
If the new password and confirmation password you type is different, then it fails to revise the password. After password revised, router will return to login page, then you can enter your username and password.

3.7.3 Time Setting

System time type includes RTC (Real Time Clock) and NTP (Network Time Protocol). RTC will save time even router is powered off, while for NTP, router will connect to NTP server which requires internet connection, time won’t be saved once powered off. But NTP will be more accurate than RTC, and you may need to adjust the time manual if it is not accurate.



Set System Time

Current system time 2020-07-17 15:19:39

System Time Type ○ ntp ● rtc

Current RTC Time

RTC Date eg: 2016-01-01

RTC Time eg: 12:00:00

1) Current System Time

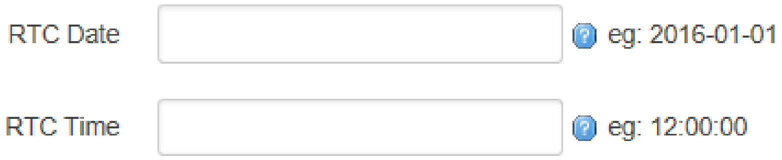
Display the time of router.

2) System Time Type

It includes NTP and RTC mentioned above, and different type has different configuration parameters

- **RTC**

You can update data and time yourself.



RTC Date ☐ eg: 2016-01-01

RTC Time ☐ eg: 12:00:00

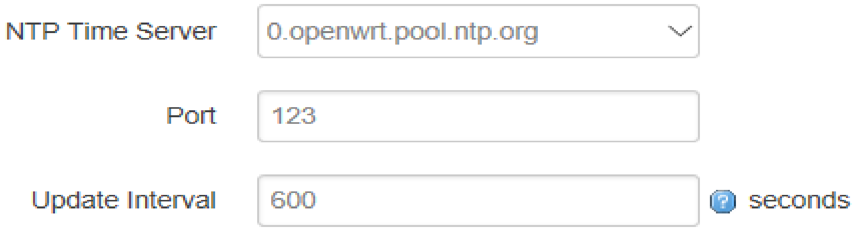
RTC Data

Format must be: 20xx-xx-xx (Year-Month-Day), or you will fail to update it.

RTC Time

Format must be xx: xx: xx (Hour-Min-Second), or you will fail to update it.

- **NTP**



NTP Time Server: 0.openwrt.pool.ntp.org

Port: 123

Update Interval: 600 seconds

NTP Time Server

You can select the NTP time server through drop-down menu, or you can customize it yourself.

Port

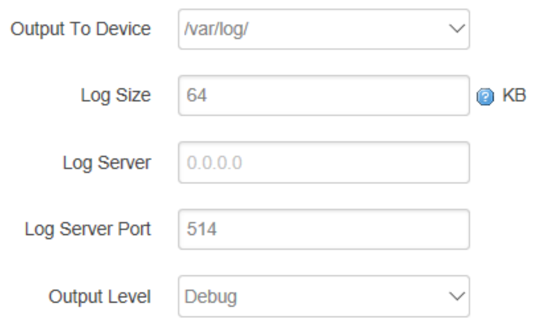
NTP time server port, default port is 123.

Update Interval

How long to sync the time with NTP server, default time is 600 seconds.

3.7.4 Log Settings

Log settings is for configuring the output parameters of system log.



Output To Device	/var/log/
Log Size	64 KB
Log Server	0.0.0.0
Log Server Port	514
Output Level	Debug

1) Output to Device

You can output the log to serial port, or specified file path, or external storage device, and the default path is:/var/log/

2) Log Size

Set up the size of log, default value is 64KB.

3) Log Server

Set up the IP address of log server.

4) Log Server Port

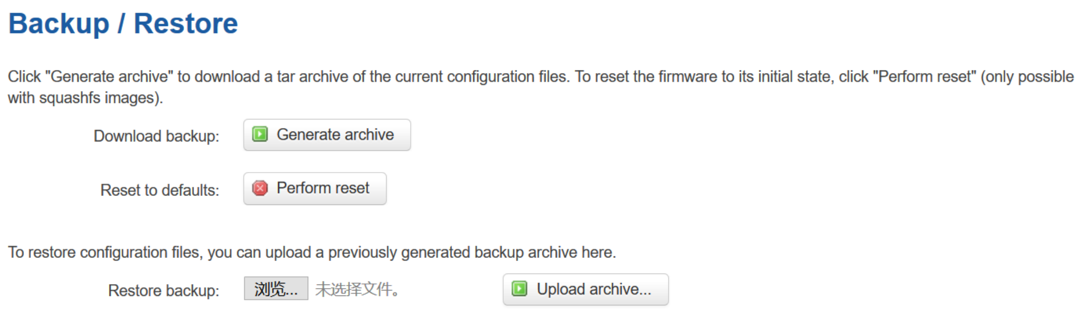
Set up the port of log server, default value is 514

5) Output Level

There are several levels supported, including ‘Debug’, ’Info’, ‘Notice’, ‘Warning’, ‘Error’, and level increased in sequence, the higher level, the less output log.

3.7.5 Backup and Reset

User can either backup the configuration of router, or reset to factory defaults.



Backup / Restore

Click "Generate archive" to download a tar archive of the current configuration files. To reset the firmware to its initial state, click "Perform reset" (only possible with squashfs images).

To restore configuration files, you can upload a previously generated backup archive here.

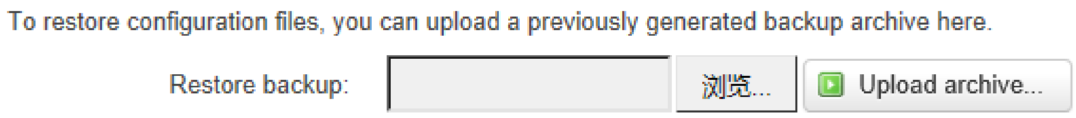
1) Download Backup

Click to generate a configuration file in format of “backup-router-2016-**-**.tar.gz”.

2) Reset to Default

Click ‘Perform Reset’, and a pop-up confirmation box with ‘Really Reset All Changes’ will display, then click ‘OK’ to reset to factory defaults.

3) Restore Backup

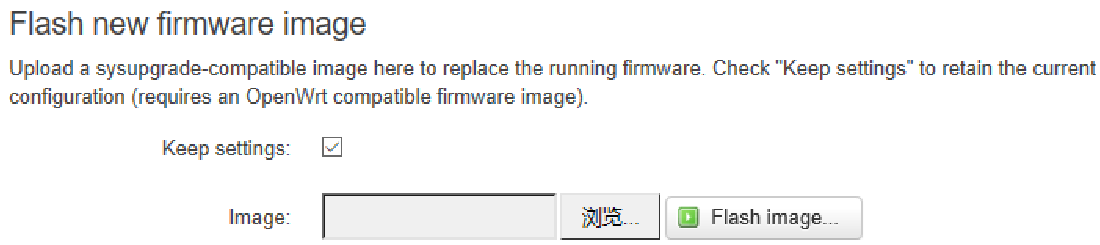


To restore configuration files, you can upload a previously generated backup archive here.

After reset to default, you can also upload the saved configuration file to router, to recover the previous configuration. Click ‘upload archive’, select and upload the backup configuration file, and a pop-up confirmation box with ‘Really Restore’ will display, then click ‘OK’, to recover the configuration.

3.7.6 Firmware Upgrade

Before you upgrade the firmware for router, make sure the firmware you’re planning to upload is correct. If errors occurs, use serial port and connect the Ethernet cable, upgrade the firmware through u-boot.



Flash new firmware image

Upload a sysupgrade-compatible image here to replace the running firmware. Check "Keep settings" to retain the current configuration (requires an OpenWrt compatible firmware image).

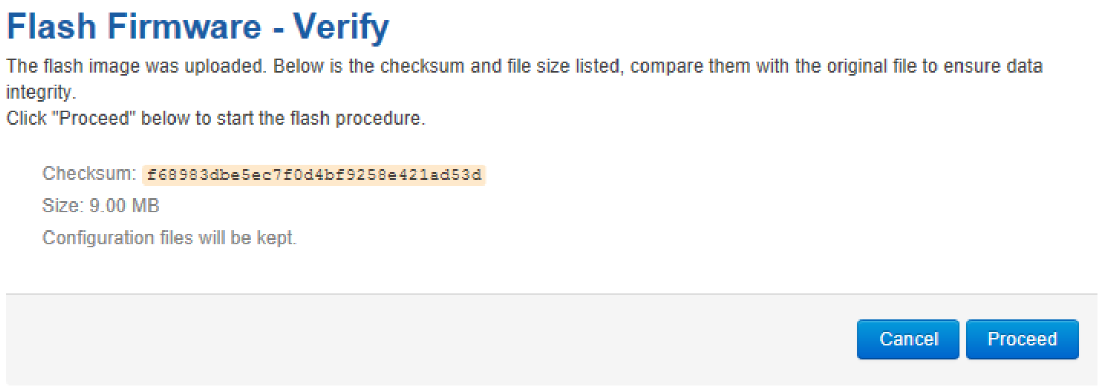
Keep settings: ☑

1) **Keep Settings**

Click it, and system configuration will not be changed after firmware upgrade.

2) **Choose and Upload Firmware Image**

Click ‘browse’ and select the firmware, then click ‘Flash Image’, and firmware will be upload to router. Then you’ll go to below page.



Flash Firmware - Verify

The flash image was uploaded. Below is the checksum and file size listed, compare them with the original file to ensure data integrity.
Click "Proceed" below to start the flash procedure.

Checksum: `f68983dbe5ec7f0d4bf9258e421ad53d`

Size: 9.00 MB

Configuration files will be kept.

- **Checksum**

MD5 checksum value of firmware.

- **Size**

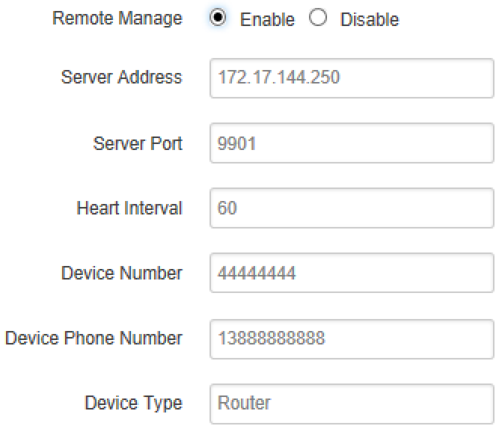
The size of firmware.

- **Proceed**

Click ‘proceed’ to start the firmware upgrade, or click ‘cancel’ to stop the firmware upgrade.

3.7.7 Remote Management

Remote Management feature allows TG452 **work with Bivocom Device Management Platform** for remote management, like firmware upgrade, configuration change, etc.
You can configure the IP address and port of remote DMP server, device number and phone number of router, etc., as below.



Remote Manage	● Enable ○ Disable
Server Address	172.17.144.250
Server Port	9901
Heart Interval	60
Device Number	44444444
Device Phone Number	13888888888
Device Type	Router

1) Remote Manage

You can enable or disable this function to choose if you want to remote manage the router or not.

2) Server Address

Type the specified login server address you want to remote mange the router, it can be either an IP address or Domain Name.

3) Server Port

The specified login server port.

4) Heartbeat Interval

The heartbeat time interval (Unit: second)

5) Device Number

Device ID of router.

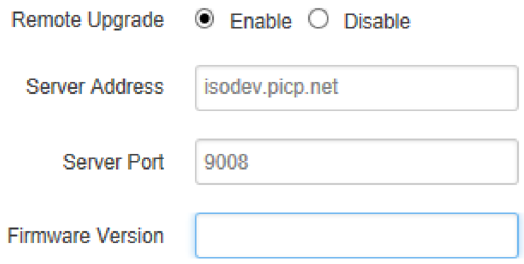
6) Device Phone Number

The phone number of SIM card insert in router.

7) Device Type

Type of the device, default is router.

You can also remote upgrade the firmware for router, as below.



Remote Upgrade ● Enable ○ Disable

Server Address: isodev.picp.net

Server Port: 9008

Firmware Version:

8) Remote Upgrade

Click ‘Enable’ to enable remote firmware upgrade function.

9) Server Address

Type the server IP address or Domain Name for remote upgrade.

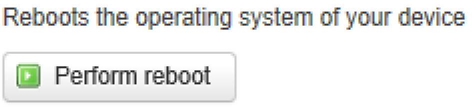
10) Server Port

Type the server port for remote upgrade.

11) Firmware Version

Type the firmware version that you want to upgrade remotely.

3.7.8 Manual Reboot

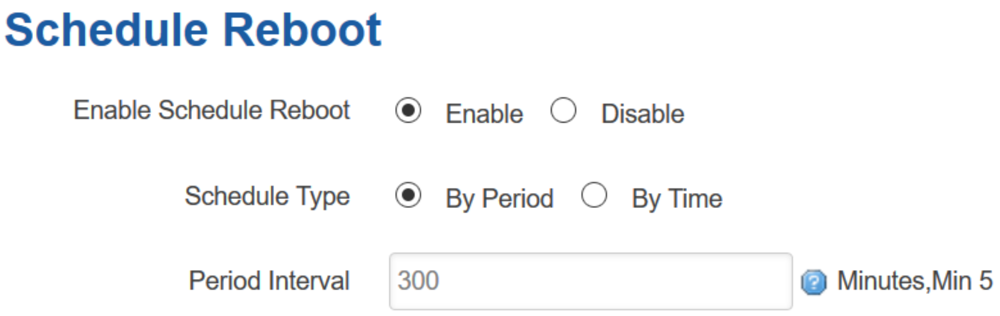


Reboots the operating system of your device

Click ‘Perform Reboot’, and a pop-up confirmation box with ‘Really Reboot’ will display, then click ‘OK’ to reboot the router.

3.7.9 Schedule Reboot

Schedule Reboot allows user configure the period or dedicate time for device reboot.



Schedule Reboot

Enable Schedule Reboot ● Enable ○ Disable

Schedule Type ● By Period ○ By Time

Period Interval 300 Minutes,Min 5