Grandstream Networks, Inc.

GWN7000

Enterprise Multi-WAN Gigabit VPN Router

User Manual

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http://www.grandstream.com/support

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GWN7000 firmware contains third-party open source software. Grandstream Open source licenses can be downloaded from Grandstream web site from here

CAUTION

Changes or modifications to this product not expressly approved by Grandstream, or operation of this product in any way other than as detailed by this guide, could void your manufacturer warranty.

WARNING

Please do not use a different power adaptor with devices as it may cause damage to the products and void the manufacturer warranty.

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DOCUMENT PURPOSE

This document describes how to configure the GWN7000 to manage wired and wireless networks via an intuitive WebGUI. The intended audiences of this document are network administrators. Please visit http://www.grandstream.com/support to download the latest "GWN7000 User Manual".

This guide covers following topics:

- Product Overview
- Installation
- Getting Started
- Router Configuration
- Routing
- Setting up a Wireless Network
- Clients Configuration
- VPN
- Firewall
- Captive Portal
- Voucher
- Bandwidth Rules
- Website Blocking
- Maintenance and Troubleshooting
- Upgrading and Provisioning
- Experiencing the GWN7000 Enterprise Router

CHANGE LOG

This section documents significant changes from previous versions of the GWN7000 user manuals. Only major new features or major document updates are listed here. Minor updates for corrections or editing are not documented here.

Firmware Version 1.0.9.6

- No major change.

Firmware Version 1.0.9.5

- Added support for TLS 1.2.

Firmware Version 1.0.9.4

- Updated the Email/Notification configuration page. [Email/Notification]
- Updated the Mesh Configuration page. [Mesh Network]
- Added configuration support of External Captive Portal Support as Linkyfi, Purple, and Universal Platform. [External Splash Page]
- Enhanced Wi-Fi Service by adding configurable options of [Beacon Interval], [DTIM Period], and [Multicast to Unicast].
- Enhanced Bandwidth Rules by adding option to limit bandwidth Per-Client. [Range Constraint]
- Added support of ARP Proxy. [ARP Proxy]
- Enhanced Client Information. [CLIENTS CONFIGURATION]
- Enhanced Captive Portal features. [Failsafe Mode] [Enable Daily Limit] [Force to Follow]

Firmware Version 1.0.6.32

- Important security fix applied.

Firmware Version 1.0.6.28

- Added support for static DHCP binding. [Static DHCP]
- Added date time display on Overview Page. [Overview Page]
- Added Support for custom port mapping in port mirroring. [Switch]
- Added support for policy routing. [Policy Routing]
- Split Network Group configuration into VLAN and SSID. [LAN][SSIDs]
- Added ability to select wan ports on static routes. [Static Routes]
- Added Support for Mesh Network. [Mesh Network]
- Added support for scheduling feature. [Schedule]
- Improved Schedule settings. [Schedule]

- Enhanced QoS features (ACC). [QoS]
- Added support for Vouchers feature. [Vouchers]
- Added possibility to print/delete multiple vouchers. [Vouchers]
- Added expiration period to vouchers. [Vouchers]
- Added support for Transfer AP. [Transfer AP]
- Added support for new methods of authentication in captive portal. [CAPTIVE PORTAL]
- Added support for post/pre-authentication rules on captive portal. [CAPTIVE PORTAL]
- Added option to select from which interface issue the ping/traceroute utilities. [Ping/Traceroute]
- Added option to notify admin if the wan port is down.
- Added support for IPsec VPN tunnels. [IPSec VPN Tunnel]
- Added Support for MTU configuration on WAN ports. [MTU]
- Added Support for sequential Upgrade [Sequential Upgrade]
- Added support for GRE Tunnels. [Tunnel]
- Added PPP Keep Alive option for PPTP VPN Server. [PPP Keep-Alive Interval]
- Added option to set MTU/MRU for PPTP VPN Server. [MTU] [MRU]
- Added “Flush Connection Reload” option under Firewall settings. [Flush Connection Reload]
- Added support for more syslog levels configuration. [Syslog]
- Added option to set NET port as WAN port [NET Port]
- Added support for additional WAN ports. [Additional WAN Port]
- Added DNS rebind attack protection. [Rebind Protection]

Firmware Version 1.0.4.23

- Added support for enable/disable MPPE in both PPTP server and client. [MPPE]

Firmware Version 1.0.4.20

- Added support for Additional Routed Subnets. [Additional IPv4 Addresses][Destination IP]
- Added support for Timed Client Disconnect and Enhanced Client Blocking. [Clients Access]
- Added support for Client Bridge (GWN76xx Access Point is required for this feature.). [Client Bridge]
- Added support for OpenApp ID for Deep Packet Inspection. [DPI]
- Added support for Syslog Server. [Logserver]
- Added support for PPTP Server. [PPTP CONFIGURATION]
- Added support for Smart Queue QoS. [QoS]
- Added support for Configurable web UI access port.[Web WAN Access][Web HTTP Access][Web HTTPS Port]
- Added support for E-mail notifications. [Email/Notification]

Firmware Version 1.0.2.75

- Added support for Captive Portal [CAPTIVE PORTAL]
- Added support for Bandwidth Rules [BANDWIDTH RULES]

- Added support for Select Band per SSID [SSID Band]
- Added support for selectively enable 802.11b/g/n [Mode]
- Added option to enable/disable support for 802.11b devices [Allow Legacy Device(802.11b)]
- Added support for custom wireless power [Custom Wireless Power(dBm)]
- Added support for AP location using blinking LED [Access Point Location]
- Added support for limit client count per SSID. [SSIDs]
- Added support for better roaming decision [SSIDs]
- Added support for LEDs schedule [LED]
- Added support for Wi-Fi schedule [SSIDs]
- Added option to enable/disable DHCP option 66 & 43 override [Allow DHCP options 66 and 43 override]

Firmware Version 1.0.2.71

- This is the initial version.

WELCOME

Thank you for purchasing Grandstream GWN7000 Enterprise Multi-WAN Gigabit VPN Router.

The GWN7000 is a powerful enterprise-grade multi-WAN Gigabit VPN router. Ideal for the enterprise, small-to-medium business, retail, education, hospitality and medical markets, the GWN7000 supports comprehensive Wi-Fi network management software and VPN solutions that can be shared across one or many different physical locations. It features high-performance routing and switching power and a hardware-accelerated VPN client/server for secure inter-office connectivity. To maximize network reliability, the GWN7000 supports traffic load balancing and failover. The GWN7000 features an integrated controller and automated provisioning master that can setup and manage up to 300+ in-network GWN series Wi-Fi Access Points. This can be easily operated through the product's intuitive web browser user interface, which also offers a central panel to monitor and control the entire network.

⚠ **Caution:**

Changes or modifications to this product not expressly approved by Grandstream, or operation of this product in any way other than as detailed by this User Manual, could void your manufacturer warranty.

⚠ **Warning:**

Please do not use a different power adaptor with the GWN7000 as it may cause damage to the products and void the manufacturer warranty.

PRODUCT OVERVIEW

Technical Specifications

Table 1: GWN7000 Technical Specifications

Network Interfaces	• 2 x autosensing 10/100/1000 WAN Ports • 1 x autosensing 10/100/1000 NET port configurable as LAN, WAN or VoIP port • 4 x autosensing 10/100/1000 LAN Ports
WAN	• DHCP Client • Static IP • PPPoE • Load balance & failover • Rule based routing
LAN	• DHCP server • DNS Cache • Multiple zones • VLAN tagging
Auxiliary Ports	• 2 x USB 3.0 ports • 1 x Reset Pinhole
Routing Performance	• Up to 1 million packets/second with 64-byte packet size
USB	• Printer sharing • File sharing
Network Protocols	• IPv4, IPv6, 802.1Q, 802.1p
VPN	• Protocols: PPTP, L2TP/IPSec, OpenVPN® • Client, Server or pass through
LED	• 8 green-color LEDs for device tracking and status indication
Mounting	• Indoor wall mount • Desktop
QoS	• VLAN, ToS, supports multiple traffic classes, filter by port, IP address, DSCP, and policing.
Firewall	• NAT, DMZ, Port Forwarding, SPI, UPnP

Auto Provisioning Capability	• Embedded provisioning controller to manage up to 300+ GWN series Wi-Fi Access Points
Management	• Web, CLI
Power	• 802.3at PoE (To power the unit via LAN1 port) • Included Power Supply: 12V/2A • Max power consumption: 16W
Environmental	• Operation: 0°C to 50°C • Storage: -10°C to 60°C • Humidity: 10% to 90% Non-condensing
Physical	• Unit Dimensions: 200 x 136 x 37mm; Unit Weight: 570g • Entire Package Dimensions: 324 x 163.5 x 54mm, Entire Package Weight: 930g
Package Content	• GWN7000 Enterprise Router • 12V/2A Power Adapter • Quick Installation Guide • GPL License
Compliance	• FCC, CE, RCM, IC

INSTALLATION

Before deploying and configuring the GWN7000, the device needs to be properly powered up and connected to the network. This section describes detailed information on installation, connection and warranty policy of the GWN7000.

Equipment Packaging

Table 2: GWN7000 Equipment Packaging

Main Case	Yes (1)
Power adaptor	Yes (1)
Quick Installation Guide	Yes (1)
GPL License	Yes (1)

Connect your GWN7000

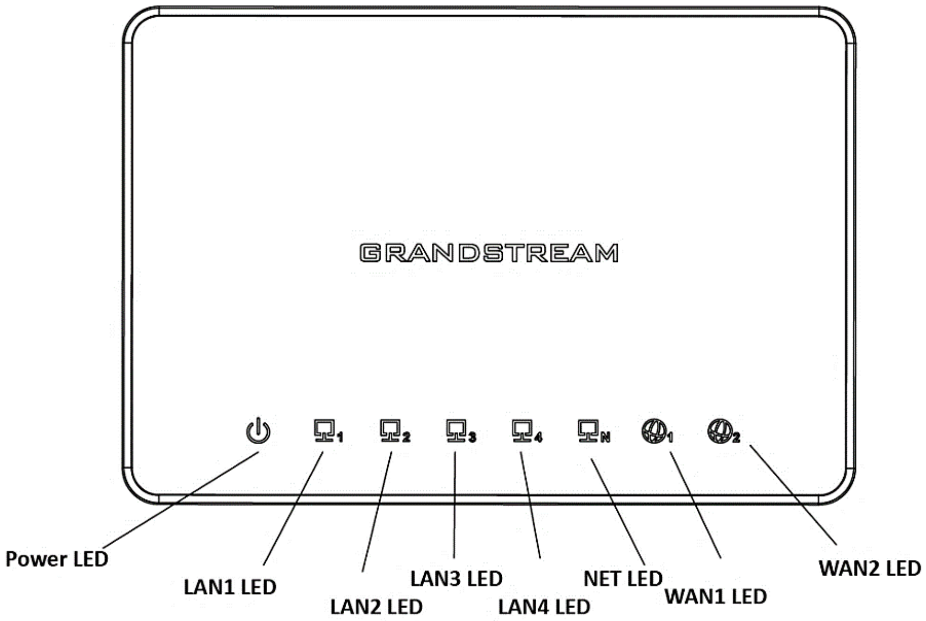


Figure 1: GWN7000 Front View

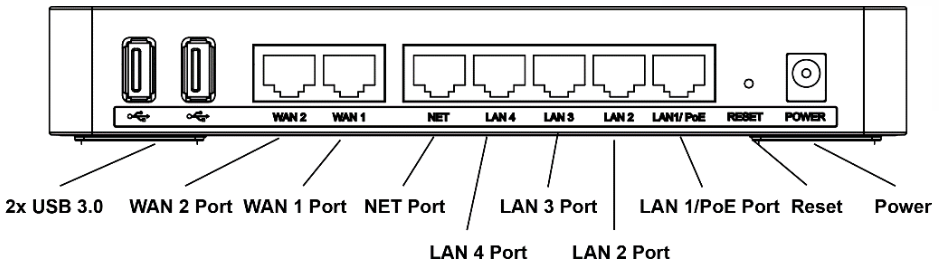


Figure 2: GWN7000 Back View

To set up the GWN7000, follow the steps below:

1. Connect one end of an RJ-45 Ethernet cable into the WAN1 or/and WAN2 port(s) of the GWN7000.
2. Connect the other end of the Ethernet cable(s) into a DSL modem or router(s) as an uplink to ISP.
3. Connect the 12V DC power adapter into the power jack on the back of the GWN7000. Insert the main plug of the power adapter into a surge-protected power outlet.
4. Wait for the GWN7000 to boot up and connect to internet/network. In the front of the GWN7000 the Power LED will be in solid green, and the WAN LED will flash in green indicating data transmission.
5. Connect one of the LAN ports to your computer, the associated LED ports will flash in green.
6. (Optional) Connect LAN port(s) to your LAN, including GWN76XX access points and other devices, the associated LED port(s) will flash in green.

Safety Compliances

The GWN7000 Enterprise Router complies with FCC/CE and various safety standards. The GWN7000 power adapter is compliant with the UL standard. Use the universal power adapter provided with the GWN7000 package only. The manufacturer’s warranty does not cover damages to the device caused by unsupported power adapters.

Warranty

If the GWN7000 Enterprise Router was purchased from a reseller, please contact the company where the device was purchased for replacement, repair or refund. If the device was purchased directly from Grandstream, contact our Technical Support Team for an RMA (Return Materials Authorization) number before the product is returned. Grandstream reserves the right to remedy warranty policy without prior notification.

GETTING STARTED

The GWN7000 Enterprise Router provides an intuitive web GUI configuration interface for easy management to give users access to all the configurations and options for the GWN7000's setup.

This section provides step-by-step instructions on how to read LED indicators and use Web GUI interface of the GWN7000.

LED Indicators

The front panel of the GWN7000 has LED indicators for power and interfaces activities, the table below describes the LED indicators status.

Table 3: LED Indicators

LED	Status	Indication
POWER	OFF	GWN7000 is powered off or abnormal power supply.
	Solid green	GWN7000 is powered on correctly.
WAN (1,2)	Flashing green	GWN7000 is connected as a client to another network and data is transferring.
	Solid green	GWN7000 is connected as a client to another network and there is no activity.
LAN (1,2,3,4,5)	Flashing green	A device is connected to the corresponding LAN port and data is transferring.
	Solid green	A device is connected to the corresponding LAN port and there is no activity.

Use the WEB GUI

Access WEB GUI

The GWN7000 embedded Web server responds to HTTPS GET/POST requests. Embedded HTML pages allow users to configure the device through a Web browser such as Microsoft IE, Mozilla Firefox, Google Chrome.

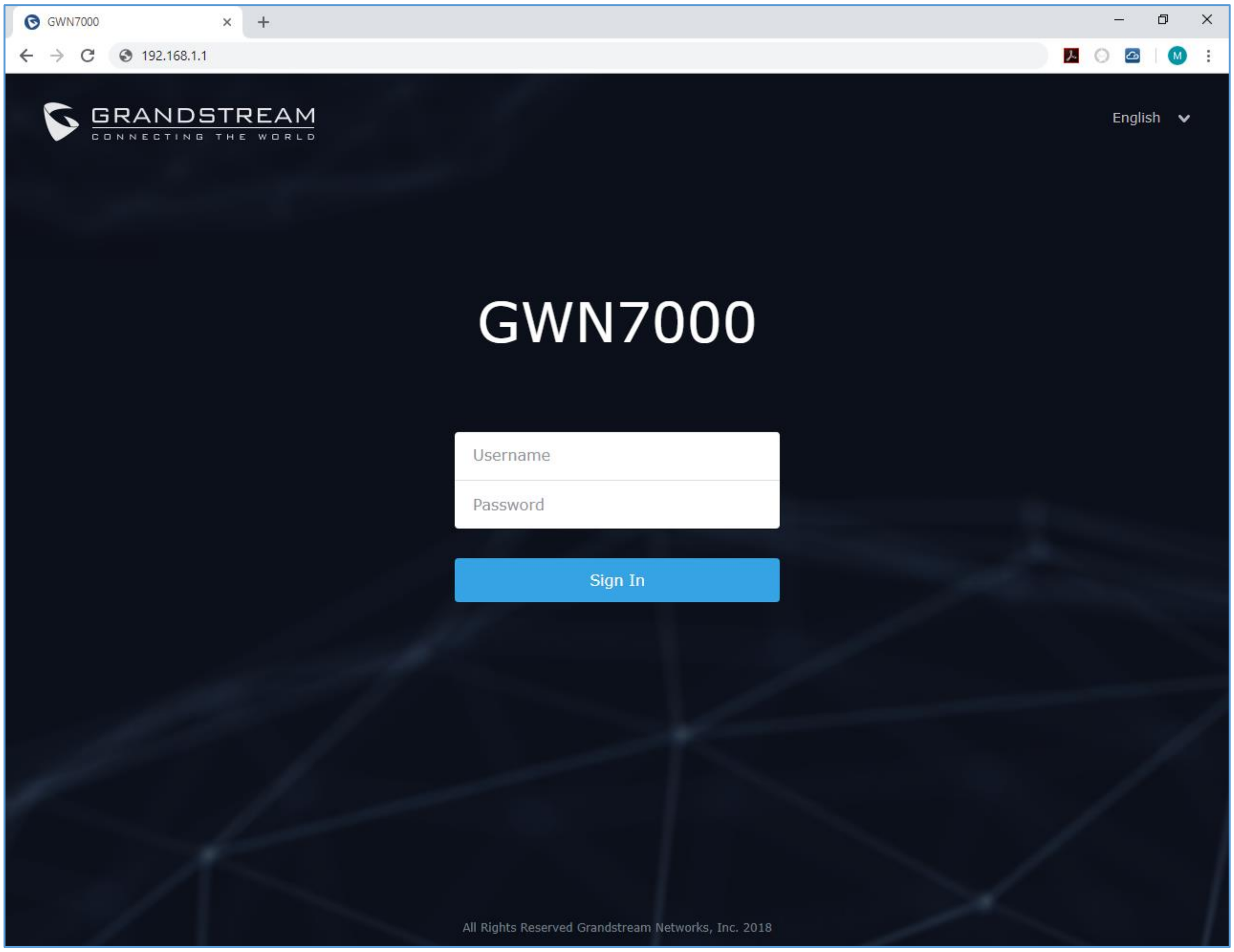


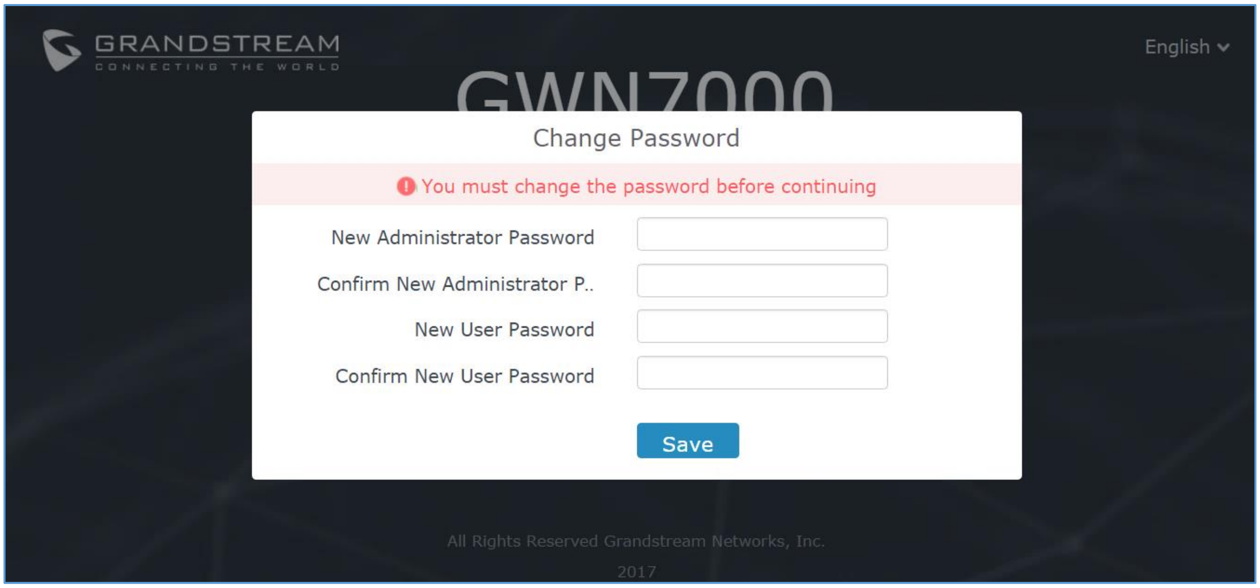
Figure 3: GWN7000 Web GUI Login Page

To access the Web GUI:

1. Connect a computer to a LAN Port of the GWN7000.
2. Ensure the device is properly powered up, and the Power, LAN port LEDs light up in green.
3. Open a Web browser on the computer and enter the web GUI URL in the following format: https://192.168.1.1 (Default IP address).
4. Enter the administrator's login and password to access the Web Configuration Menu. The default administrator's username and password are "admin" and "admin".

Note: At first boot or after factory reset, users will be asked to change the default administrator and user passwords before accessing GWN7000 web interface.

The password field is case sensitive with a maximum length of 32 characters. Using strong password including letters, digits and special characters is recommended for security purposes.



Change Password

You must change the password before continuing

New Administrator Password

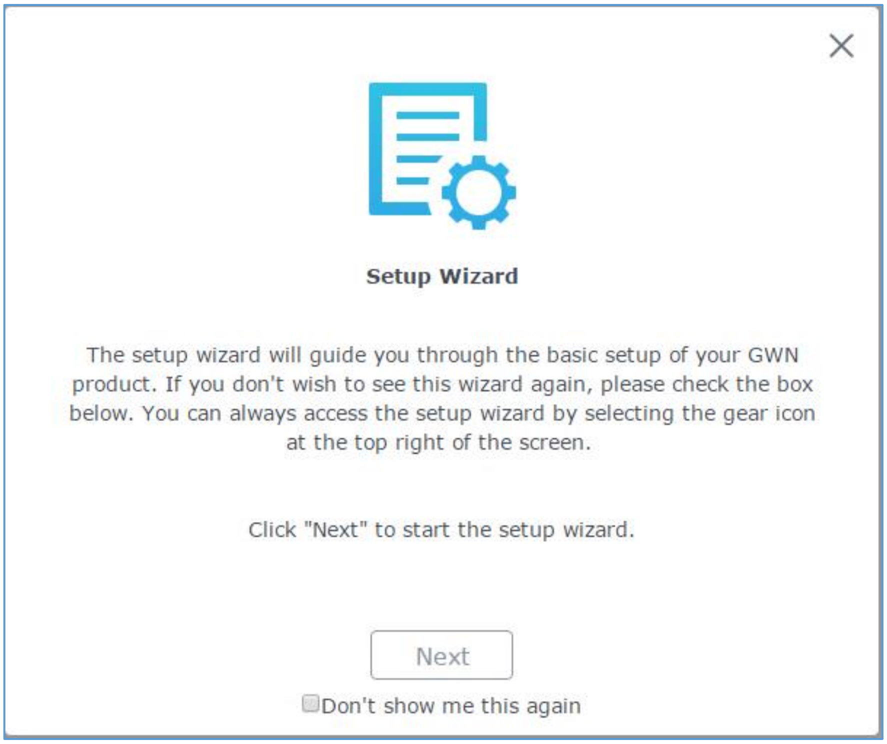
Confirm New Administrator P..

New User Password

Confirm New User Password

Figure 4: Change Password on first boot

At first login, a Setup Wizard tool will pop up to help going through the configuration setup, or exit to configure manually. Setup Wizard can be accessed anytime by clicking on ⓘ while on the web interface.



Setup Wizard

The setup wizard will guide you through the basic setup of your GWN product. If you don't wish to see this wizard again, please check the box below. You can always access the setup wizard by selecting the gear icon at the top right of the screen.

Click "Next" to start the setup wizard.

Figure 5: Setup Wizard

WEB GUI Languages

Currently the GWN7000 series web GUI supports ***English*** and ***Simplified Chinese.***

To change default language, select the displayed language at the upper right of the web GUI either before or after logging in.

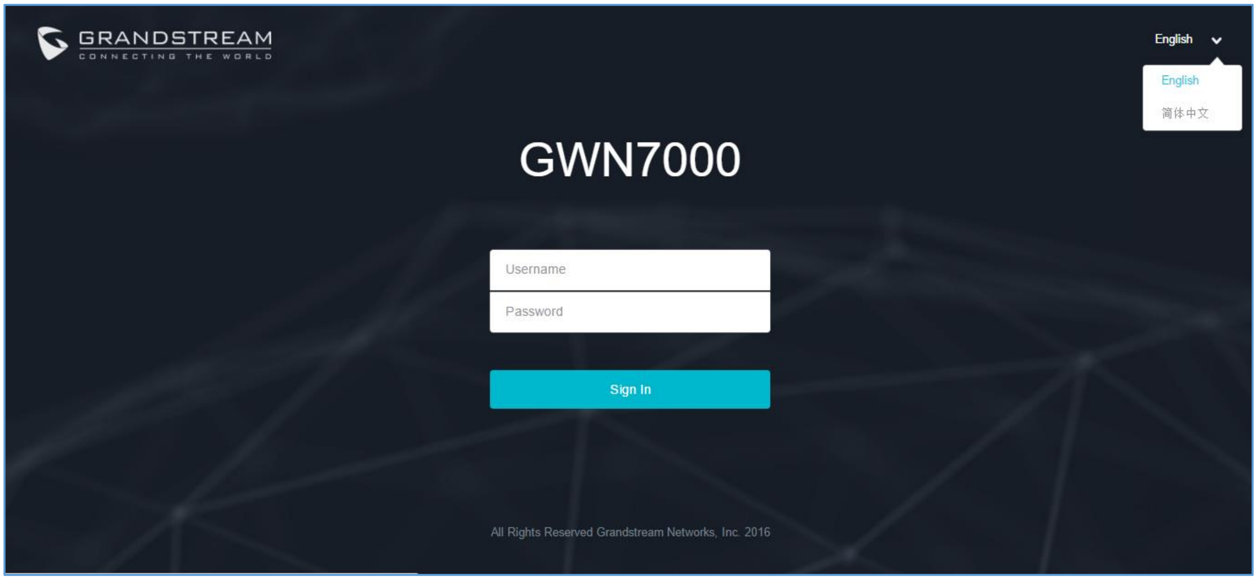


Figure 6: GWN7000 Web GUI Language

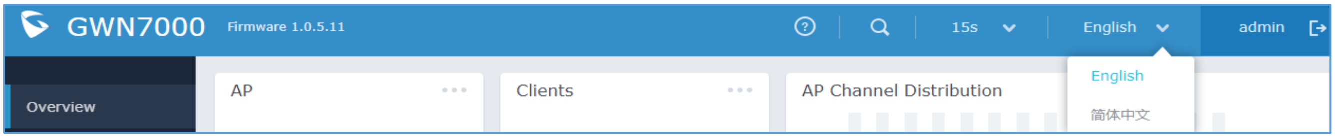


Figure 7: GWN7000 Web GUI Language

WEB GUI Configuration

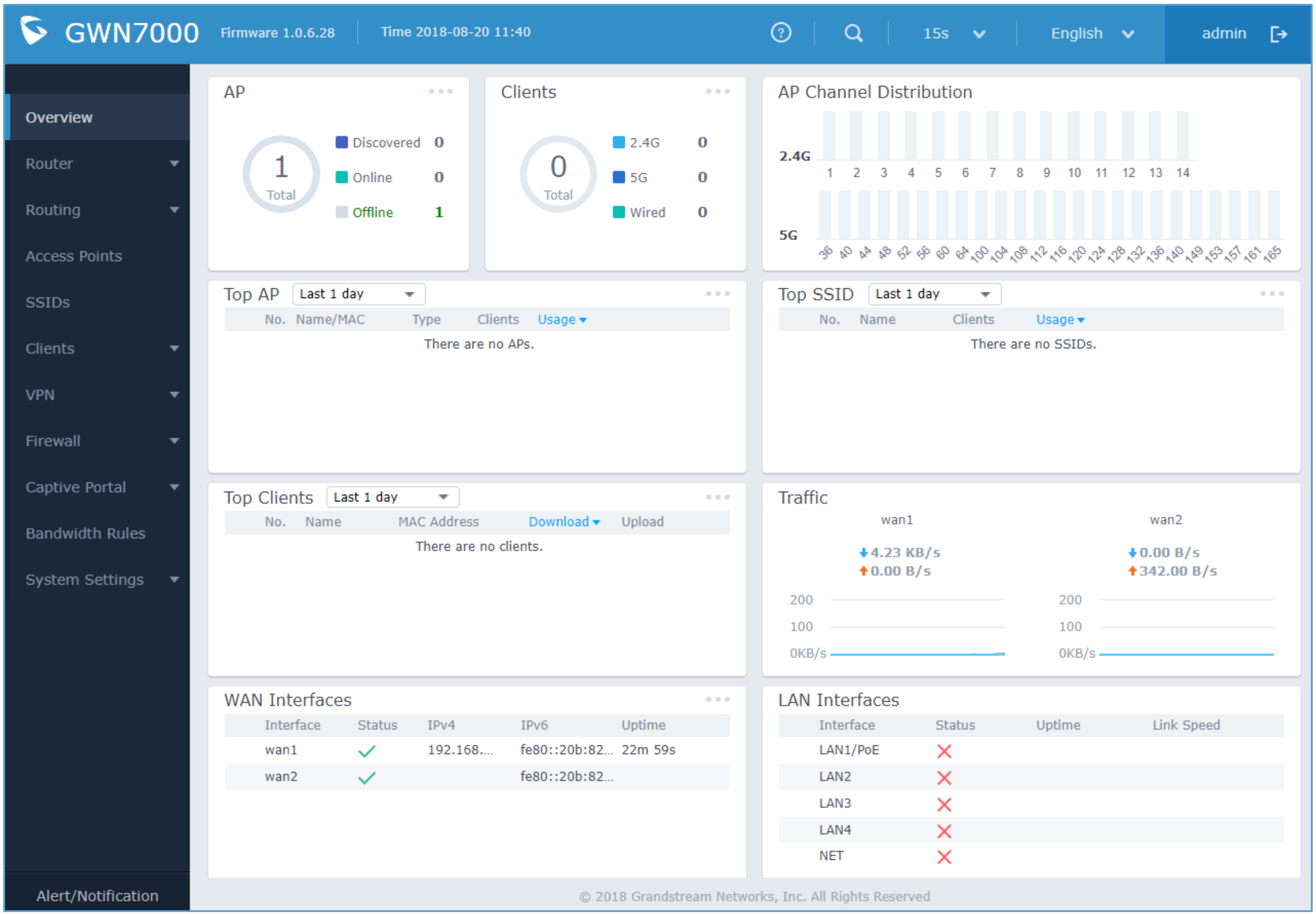
GWN7000 web GUI includes 8 main sections to configure and manage the router and check connection status.

- **Overview:** Provides an overall view of the GWN7000's information presented in a Dashboard style for easy monitoring.
- **Router:** Displays device's status and used to configure ports settings such as IP configuration for WAN ports, load balancing, failover, static routes, switch port mirroring, QoS and DDNS.
- **Routing:** Gives the admin the possibility to configure static routing and policy-based routing.
- **Access Points:** To add, pair and manage discovered access points.
- **SSIDs:** To add and manage wireless network SSIDs using paired access points via VLANs.

- **Clients**: Shows and manages the list of the clients connected to LAN ports of the GWN7000 and wireless clients connected via GWN76xx access points.
- **VPN:** Configures OpenVPN® Client/Server, PPTP, IPSec and L2TP/IPSec client tunnels.
- **Firewall:** Basic and advanced Firewall configuration to securely manage router's incoming/outgoing traffic.
- **Captive Portal:** Configuration settings for the captive portal feature.
- **Bandwidth Rules:** Configures the bandwidths rules that allows users to limit bandwidth utilization per SSID or client (MAC address or IP address).
- **System Settings:** For Maintenance and debugging features, as well as generating certificates and file sharing.

Overview Page

Overview is the first page shown after successful login to the GWN7000's Web Interface. It provides an overall view of the GWN7000's information presented in a Dashboard style for easy monitoring.



GWN7000 Firmware 1.0.6.28 Time 2018-08-20 11:40

15s English admin

AP

1 Total

Discovered 0
Online 0
Offline 1

Clients

0 Total

2.4G 0
5G 0
Wired 0

AP Channel Distribution

Top AP Last 1 day

No.	Name/MAC	Type	Clients	Usage

There are no APs.

Top SSID Last 1 day

No.	Name	Clients	Usage

There are no SSIDs.

Top Clients Last 1 day

No.	Name	MAC Address	Download	Upload

There are no clients.

Traffic

wan1
↓4.23 KB/s
↑0.00 B/s

wan2
↓0.00 B/s
↑342.00 B/s

WAN Interfaces

Interface	Status	IPv4	IPv6	Uptime
wan1	✓	192.168....	fe80::20b:82...	22m 59s
wan2	✓		fe80::20b:82...	

LAN Interfaces

Interface	Status	Uptime	Link Speed
LAN1/PoE	✗		
LAN2	✗		
LAN3	✗		
LAN4	✗		
NET	✗		

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Figure 8: Overview Page

It is used to show the status of the GWN7000 for different items, please refer to the following table for each item:

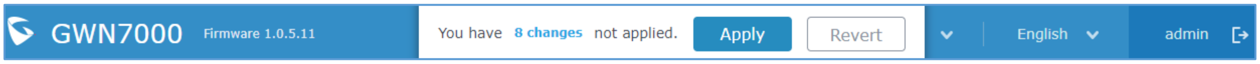
Table 4: Overview

AP	Shows the number of Access Points that are Discovered, Paired (Online) and Offline. Click on ••• to go to Access Points' page for basic and advanced configuration options for the APs
Clients	Shows the total number of connected clients, and a count for clients connected to each Channel. Click on ••• to go to Clients page for more options.
AP Channel Distribution	Shows the Channel used for all APs that are paired with this Access Point.
Top AP	Shows the Top APs list, assort the list by number of clients connected to each AP or data usage combining upload and download. Click on ••• to go to Access Points page for basic and advanced configuration options for the APs.
Top SSID	Shows the Top SSIDs list, assort the list by number of clients connected to each SSID or data usage combining upload and download. Click on ••• to go to SSID page for more options.
Top Clients	Shows the Top Clients list, assort the list of clients by their upload or download. Click on ••• to go to Clients page for more options.
Traffic	Shows the sent/received traffic data speeds on both WAN ports.
WAN Interfaces	Shows the status of the wan interfaces (IP, Uptime, status …etc).
LAN Interfaces	Displays the status of the LAN interfaces, which includes also the NET port. This will display the connection status, the uptime, and the link speeds.

Note that Overview page in addition to other tabs can be updated each 15s, 1min, 2min, 5min or Never by clicking ⌄ in the upper bar menu (Default is 15s).

Save and Apply Changes

When clicking on "Save" button after configuring or changing any option on the web GUI pages. A message mentioning the number of changes will appear on the upper menu.

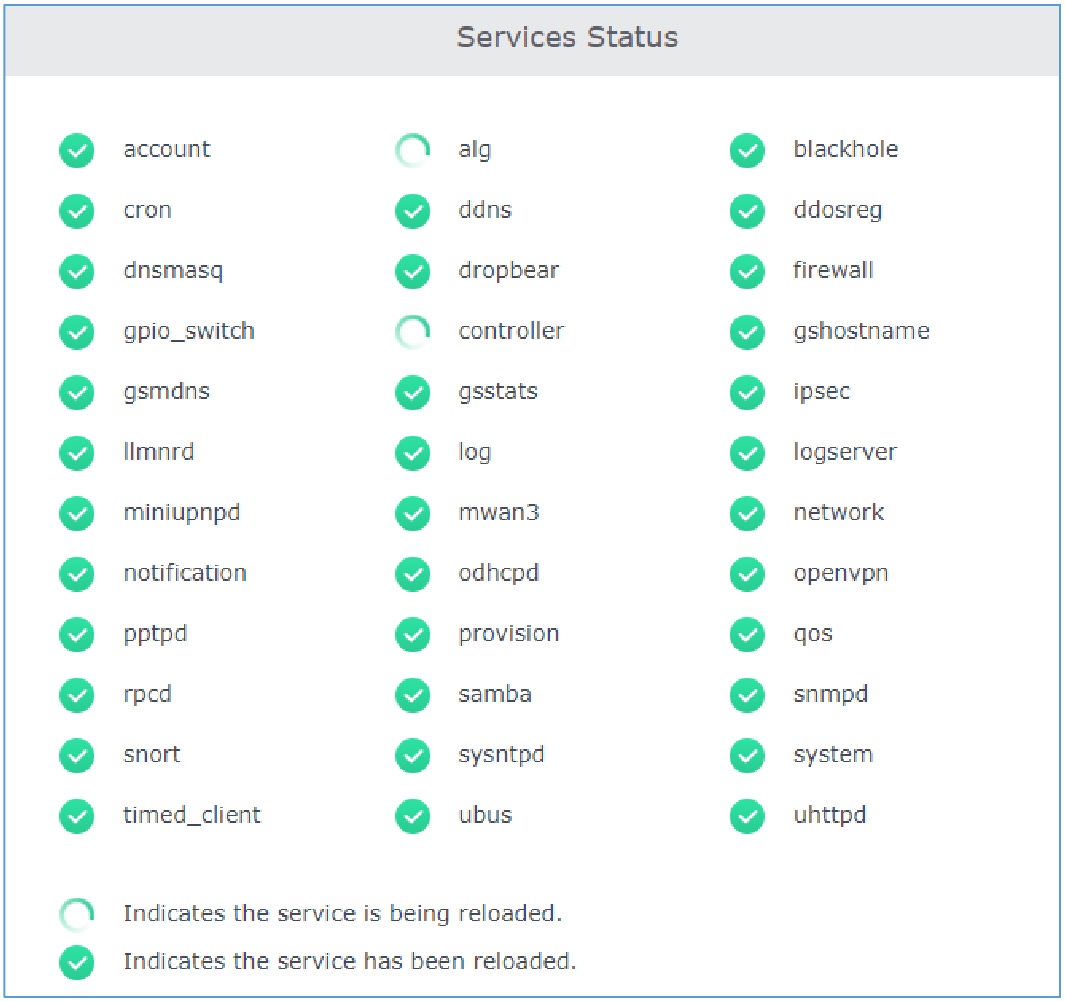


You have 8 changes not applied.

Figure 9: Apply Changes

Click on Apply button to apply changes, or Revert to undo the changes.

The router will reload all necessary services in order to for the changes to take effect.



Services Status

✓ account	○ alg	✓ blackhole
✓ cron	✓ ddns	✓ ddosreg
✓ dnsmasq	✓ dropbear	✓ firewall
✓ gpio_switch	○ controller	✓ gshostname
✓ gsmdns	✓ gsstats	✓ ipsec
✓ llmnrd	✓ log	✓ logserver
✓ miniupnpd	✓ mwan3	✓ network
✓ notification	✓ odhcpd	✓ openvpn
✓ pptpd	✓ provision	✓ qos
✓ rpcd	✓ samba	✓ snmpd
✓ snort	✓ sysntpd	✓ system
✓ timed_client	✓ ubus	✓ uhttpd

○ Indicates the service is being reloaded.

✓ Indicates the service has been reloaded.

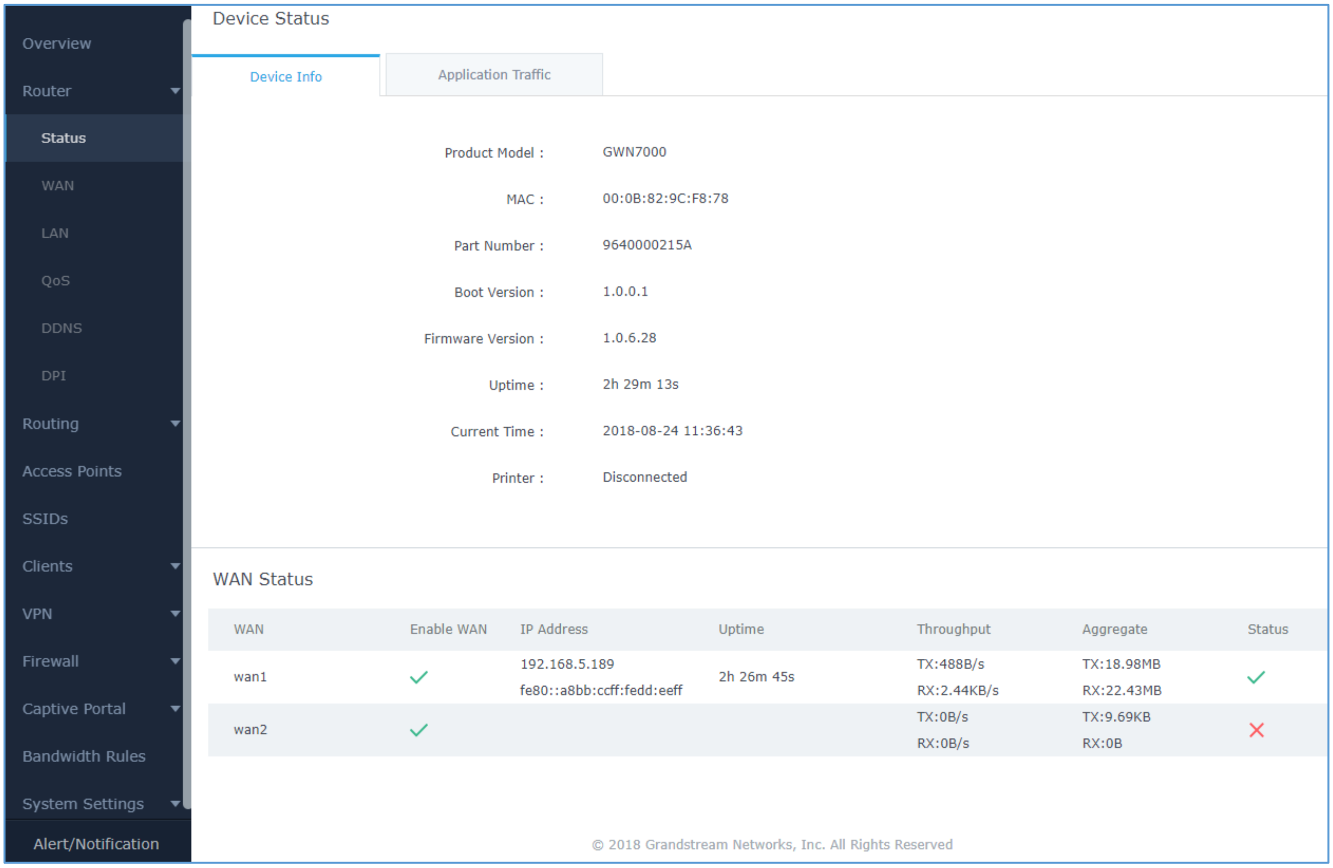
ROUTER CONFIGURATION

This section includes configuration pages for network WAN ports, LAN ports, QoS, DDNS, DPI and shows also the router status.

Status

Status page displays **Device Status** to check MAC address, Part Number, Firmware related information and Uptime for the GWN7000; and **WAN Status** showing general information about WAN Ports such as uptime, current throughput, aggregate usage, and IP address and also the application traffic.

Router's Status page can be accessed from **Web GUI → Router → Status**.



Device Status

Product Model : GWN7000

MAC : 00:0B:82:9C:F8:78

Part Number : 9640000215A

Boot Version : 1.0.0.1

Firmware Version : 1.0.6.28

Uptime : 2h 29m 13s

Current Time : 2018-08-24 11:36:43

Printer : Disconnected

WAN Status

WAN	Enable WAN	IP Address	Uptime	Throughput	Aggregate	Status
wan1	✓	192.168.5.189 fe80::a8bb:ccff:fedd:eeff	2h 26m 45s	TX:488B/s RX:2.44KB/s	TX:18.98MB RX:22.43MB	✓
wan2	✓			TX:0B/s RX:0B/s	TX:9.69KB RX:0B	✗

Figure 10: Router's Status

Note: Once DPI is enabled under Router feature. Users will be able to see their application traffics under **Application Traffic** section.

Router Configuration

Connect to GWN7000's Web GUI from a computer connected to a LAN port and go to **Router→WAN** page for Port configuration.

WAN Ports Settings

The GWN7000 has 2 WAN ports configured as DHCP clients by default. Each port can be connected with DSL modem or routers. WAN ports support also setting static IPv4/IPv6 addresses and configure PPPoE for each WAN port. Please refer to the following table for basic network configuration parameters on WAN ports for GWN7000.

Table 5: GWN7000 WEB GUI→Router→WAN→WAN Port (1,2)

Enabled	Choose whether to enable or disable the WAN port.
Name	Specify the port name.
WAN Address Type	Select "DHCP", "Static" or "PPPoE" mode on the WAN interfaces of GWN7000. The default setting is "DHCP". • **DHCP** When selected, it will act as a DHCP client and acquire an IPv4 address automatically from the DHCP server. • **Static** When selected, the user should set a static IPv4 address, IPv4 Subnet Mask, IPv4 Gateway and adding **Additional IPv4 Addresses** as well to communicate with the web interface, SSH, or other services running on the device. • **PPPoE** When selected, the user should set the PPPoE account and password, PPPoE Keep alive interval and Inter-Key Timeout (in seconds).
Preferred IPv4 DNS	Enter the preferred DNS server address (IPv4 address). If Preferred DNS is set, GWN7000 will use it in priority.
Alternate IPv4 DNS	Enter the Alternate DNS server address (IPv4 address). If Preferred DNS is set, GWN7000 will use it in when the Preferred DNS fails.
Tracking IP	Configures the tracking IP(s). ICMP packets are being used to track the IP(s) address(es). When the tracking fails, the GWN7000 will use the secondary WAN port as failover. Default IP used is 8.8.8.8.
MTU	Configures the maximum transmission unit allowed on the wan port. The valid range is 64-9000 Bytes, and the default value is 1500.

Native IPv6	Used to enable assigning IPv6 address to GWN7000. Once checked users will be able to configure following fields: "IPv6 Address Assignment", "Preferred IPv6 DNS", "Alternate IPv6 DNS" and "IPv6 Relay to LAN".
IPv6 Address Assignment	This option is appearing when enabling "Native IPv6" option. Select "Auto" to get an IPv6 address from DHCP server or "Static" to configure manually an IPv6 address. If set to Static, the following fields should be configured: • **IPv6 Address/Prefix Length** Used to set an IPv6 address/Prefix length when using Static IPv6 option Example: *fec0:470:28:5b2::1/64* • **IPv6 Gateway** Used to define the Gateway's IPv6 address. • **IPv6 Prefix/IPv6 Prefix Length** Enter the IPv6 prefix and IPv6 prefix length. Example: *::1/64*
Preferred IPv6 DNS	This option appears only when "Native IPv6" option is enabled. It is used to set a preferred DNS server address (IPv6 address). If Preferred DNS is set, GWN7000 will use it in priority.
Alternate IPv6 DNS	This option appears only when "Native IPv6" option is enabled. It is used to set an Alternate DNS server address (IPv6 address). If Preferred DNS is set, GWN7000 will use it in when the Preferred DNS fails.
IPv6 Relay to LAN	This option appears only when "Native IPv6" option is enabled. When enabled the GWN7000 will relay IPv6 address to LAN clients
VLAN Tagging	Used to enable VLAN tagging. If set to "0" the VLAN tagging will be disabled, otherwise set a VLAN value between 2 and 4093. Default is 0.

Additional WAN Port

Users have the ability to create virtual wan interfaces that would be mapped with a specific physical wan port (either WAN1 or 2 or NET port when configured as WAN port) and use VLAN tags for each additional wan port.

Note: There is a limit of 15 wan ports to be supported including physical and logical wan ports.
Go under "**Router → WAN→ Additional WAN Port**" to add a logical wan port and the attach it to a physical interface. As for the configuration parameters please refer to ***Table 5: GWN7000 WEB GUI→Router→WAN→WAN Port (1,2).***

NET Port

This page allows for the configuration of NET port, which can be used either as LAN port or WAN port. Below are the available options to configure the NET port.

Table 6: NET Port

Enable LAN1 (NET Port)	Enable the NET port as a normal LAN port.
Enable WAN (Net Port)	Enable the NET port as a WAN port, and set the required configuration as WAN1 and 2. See ***Table 5: GWN7000 WEB GUI→Router→WAN→WAN Port (1,2)***

Tunnel

Tunnel page is used to set IPv6 tunnels on WAN ports via IPv6 tunnel brokers service providers, this serves the purpose of transferring IPv6 packets over IPv4 Network. It supports creating 6in4, 6rd, AICCU and GRE tunnels. Please refer to below tables for each tunnel type.

Table 7: 6In4 Tunnels

WAN Interface	Choose the WAN port on which to setup the 6in4 tunnel.
MTU	Set the Maximum Transmission Unit value. The valid range is 64-9000. Default value is 1500.
6in4 IPv4 Peer Address	Enter the IPv4 tunnel endpoint at the tunnel's provider.
6in4 Tunnel Endpoint IPv6 Address	Enter the local IPv6 address delegated to the tunnel endpoint. Example: 2001:db8:2222::2/64
6in4 Routed Prefix	Set the routable prefix given by the tunnel provider to allow LAN clients to get addresses from that prefix.
Tunnel ID	Specifies the tunnel's ID.
Username	Set the username used to login into the tunnel broker.
Password	Set the password (used for endpoint update).
Update Key	Set the update key, it overrides the password used for endpoint update.

Table 8: 6rd Tunnels

WAN Interface	Choose the WAN port on which to setup the 6rd tunnel.
MTU	Set the Maximum Transmission Unit value. The valid range is 64-9000 and default value is 1500.

6rd IPv4 Peer Address	Enter the IPv4 Peer address.
6rd IPv6 Address Prefix	Specifies the IPv6 prefix given by the provider. Example: 2001:B000::/32
IPv6 Prefix Length	Specifies the IPv6 prefix length (Value between 1 and 128). Example: 32
IPv4 Prefix Length	Specifies the prefix length of the IPv4 transport address. (Value between 1 and 32).

Table 9: AICCU Tunnels

WAN Interface	Choose the WAN port on which to setup the aiccu tunnel.
Username	Enter the Username (Provided by signing up with SixXS Tunnel Broker)
Password	Enter the Username’s password

Table 10: GRE Tunnels

WAN Interface	Specifies the WAN interface to bind the tunnel to.
Name	Set a name for the tunnel connection.
Enabled	Enabled/Disable the tunnel connection.
GRE Peer IP Address	Specifies the tunnel destination address (public IP).
GRE Tunnel IP Address	Specify the local GRE tunnel interface. (ex: 10.1.1.2)
GRE Tunnel Netmask	Set the Tunnel interface netmask. (ex: 255.255.255.0)
MTU	Configures the maximum transmission unit. The valid range is 64-9000 and the default is 1500.
Subnet	Set the destination subnet that is reachable though GRE tunnel.
IP Masquerading	Enable/Disable IP masquerading. Users could configure this option under the “General” tab of **Firewall → Advanced** as well.
Tunnel Input Key	Specifies the key that would be added to the incoming packets.
Tunnel Output Key	Specifies the key that would be added to the outgoing packets.

Global Settings

This section specifies operating mode for multi-WAN that will be used for enabling/disabling Failover and Load Balancing on WAN ports and using MAC override address.
The following table shows the configuration parameters for global WAN settings

Table 11: GWN7000 WEB GUI→Router→Port→Global Settings

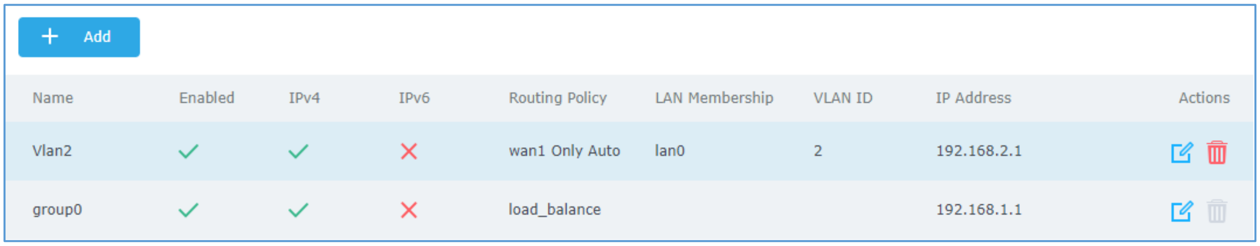
Local Routing Policy	Specifies the routing policy that would be applied on locally generated traffic from the GWN7000 router. See *[Policy Routing]* section.
MAC Override Address	This option is used to override the MAC address of the GWN7000 Router. MAC Address octets (in hex) are separated by ":" in English input condition. The characters here must be lowercase. **Note:** Reboot the router to take effect.

Switch Configuration

LAN

GWN7000 supports creating up to 16 different LAN groups separated as VLANs with the possibility to add and pair GWN76xx Access Points to each LAN which is mapped to an SSID by VLAN tagging.

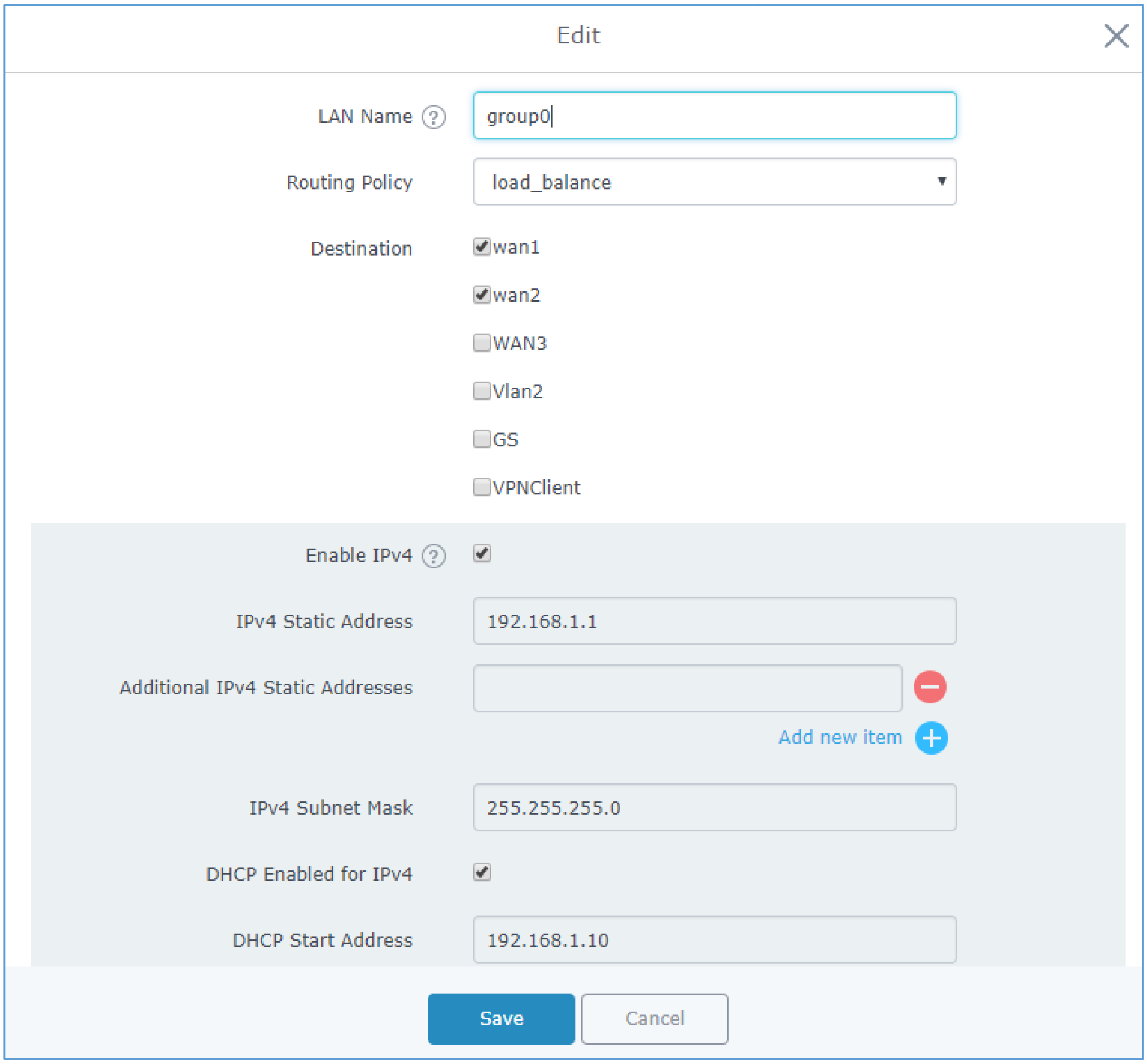
To access LAN configuration page, log in to the GWN7000 WebGUI and go to **Router → LAN.**



Name	Enabled	IPv4	IPv6	Routing Policy	LAN Membership	VLAN ID	IP Address	Actions
Vlan2	✓	✓	✗	wan1 Only Auto	lan0	2	192.168.2.1	✎ 🗑
group0	✓	✓	✗	load_balance			192.168.1.1	✎ 🗑

Figure 11: LAN Groups

The GWN7000 will have a default group named group0, click on ✎ to edit it, or click on **"Add"** to add a new LAN subnet.



Edit

LAN Name: group0

Routing Policy: load_balance

Destination:
- ☑ wan1
- ☑ wan2
- □ WAN3
- □ Vlan2
- □ GS
- □ VPNClient

Enable IPv4: ☑

IPv4 Static Address: 192.168.1.1

Additional IPv4 Static Addresses:

IPv4 Subnet Mask: 255.255.255.0

DHCP Enabled for IPv4: ☑

DHCP Start Address: 192.168.1.10

Figure 12: Add/Edit a LAN Group

Following table gives description for the parameters available to configure LAN groups:

Table 12: LAN Group Options

LAN Name	Specifies the name for the LAN group.
Enabled	Check to activate the newly created LAN group.
Routing Policy	Select which routing to use for this LAN network. See *Policy Routing* section for more details.
Destination	If enabled, choose which groups you want to forward, if not, you can manually configure the forward rules under firewall settings.
LAN Membership	Configure the LAN port membership. If choose lan1 (NET Port), please make sure you have enabled lan1 under **Router→ WAN→ NET port** Tab.

VLAN	Check to enable VLAN. This field is appearing only when having more than one LAN subnet.
VLAN ID	Set a VLAN ID. Valid range is between 2 and 4093.
Enable IPv4	Check to enable IPv4 addressing for this LAN.
Ipv4 Static Address	Set a static Ipv4 address for the LAN subnet when enabling Ipv4.
Additional IPv4 Static Address	Set an additional static Ipv4 address for the LAN subnet when enabling IPv4.
Ipv4 Subnet Mask	Set the Subnet Mask.
DHCP Enabled for Ipv4	Check to enable DHCP using Ipv4. This will allow clients connected to this LAN subnet to get Ipv4 addresses automatically from GWN7000 acting as DHCP server.
DHCP Start Address	Set the starting Ipv4 address for this LAN's clients.
DHCP End Address	Set the ending Ipv4 address for this LAN's clients
DHCP Lease Time	Set the lease time for DHCP clients, the value can be defined in hours, minutes, or as "infinite". Default lease time is "12h".
DHCP Options	Set the DHCP options. Click on ⊕ to add another option, and ⊖ to delete an option. **Example: 44,192.168.2.50** *for DHCP option 44 and 192.168.2.50 is the WINS server's address.* Please refer to the following link for DHCP options syntax: https://wiki.openwrt.org/doc/howto/dhcp.dnsmasq
DHCP Gateway	Defines the IP address of the DHCP gateway.
DHCP Preferred DNS	Set the preferred DNS Servers via DHCP.
DHCP Alternate DNS	Set the alternate DNS Servers via DHCP.
DHCPv4 Relay Enabled	Enable this option, if you want the GWN7000 relays the DHCP requests from clients to another DHCP server(s). Once checked, click ⊕ to add another DHCPv4 Relay Target, and ⊖ to delete a DHCPv4 Relay Target.
Enable IPv6	Check to enable IPv6 addressing for this LAN subnet.
IPv6 Relay from WAN	Check to allow GWN7000 to relay IPv6 DHCP request from LAN's clients to WAN port.
DHCP Enabled for IPv6	Check weather to enable IPv6 DHCP server for this LAN.
IPv6 Prefix for Assignment	Set the prefix value to be assigned to the LAN. Valid range is between 1 to 64. Example: 64 will assign /64 prefixes.
IPv6 Subnet Hint	Set the subnet mask value.

IPv6 Uplink	Select the WAN port.

Static DHCP

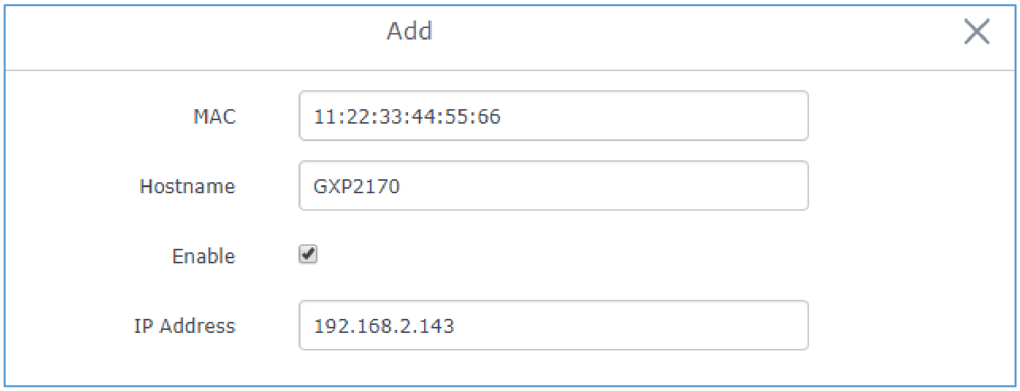
Users can use the feature in order to set static DHCP binding to certain clients, to whom you do not want the IP address to change.

In order to configure Static DHCP, please follow below steps:

1- Go under the menu **"Router → LAN → Static DHCP"**.

2- Click + Add button to create a new entry.

3- Enter the name of the device, along with its MAC address and IP address.

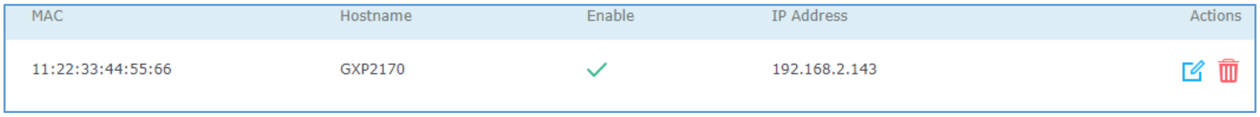


Add ×

MAC	11:22:33:44:55:66
Hostname	GXP2170
Enable	☑
IP Address	192.168.2.143

Figure 13 : DHCP Binding

4- Press Save and Apply to submit the changes.



MAC	Hostname	Enable	IP Address	Actions
11:22:33:44:55:66	GXP2170	✓	192.168.2.143	✎ 🗑

Figure 14: Static DHCP Devices List

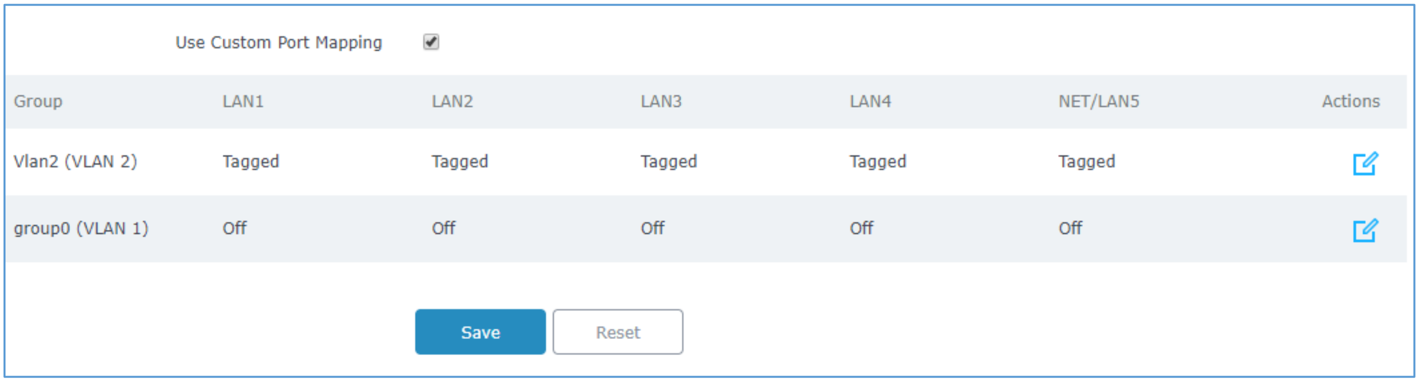
Switch

Under switch configuration menu, admin users can enable port mirroring and the GWN7000 will send a copy of all network packets seen on one LAN port to another port, where the packet can be analyzed. Refer to the below table for the available fields to configure.

Also, users can have flexibility in configuring the mapping for each LAN port to have 802.1q VLAN tags included or excluded from Ethernet frames sent out by the port, in case the tag is needed users can simply enable it by editing the option custom port mapping.

Table 13: Port Mirroring

Enable Outgoing Mirroring	Check to enable outgoing mirroring for a LAN port. Default is "Disabled"
Enable Incoming Mirroring	Check to enable incoming mirroring for a LAN port. Default is "Disabled"
Mirroring Port	Select which LAN port that will be mirroring traffic. Default is "Disabled"
Mirrored Port	Select which LAN port that will act as mirrored port. Default is "Disabled"
Use Custom Port Mapping	Use this option in order to enable VLAN tagging on the ports or disable it or block the port from participating in the selected VLAN, click on ✎ button to change the settings. Three options are available for each port: • **Tagged:** the port will participate on the VLAN and will tag the outgoing frames with the 802.1q VLAN id. • **Untagged:** The port will participate on the VLAN but will not tag outgoing frames. • **Off:** The port will not participate on the VLAN.



Use Custom Port Mapping ☑

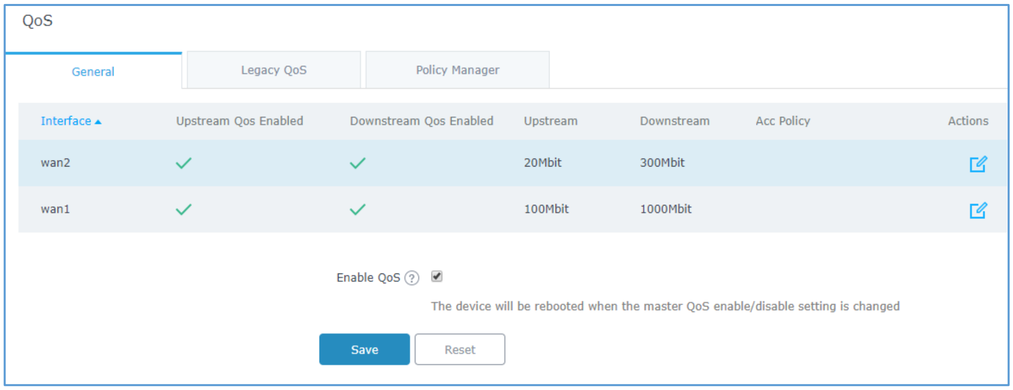
Group	LAN1	LAN2	LAN3	LAN4	NET/LAN5	Actions
Vlan2 (VLAN 2)	Tagged	Tagged	Tagged	Tagged	Tagged	✎
group0 (VLAN 1)	Off	Off	Off	Off	Off	✎

Figure 15 : Custom Port VLAN Mapping

QoS

The GWN7000 offers the possibility to enable and configure QoS on WAN interfaces, this will help to manage in more depth the network traffic to define priority and classify different services and protocols in an efficient manner.

Also, the GWN provides the capabilities to configure advanced QoS features such as Active Congestion Control (ACC) in order to avoid bottleneck on the network, especially when using VoIP.



Interface ▲	Upstream Qos Enabled	Downstream Qos Enabled	Upstream	Downstream	Acc Policy	Actions
wan2	✓	✓	20Mbit	300Mbit		✎
wan1	✓	✓	100Mbit	1000Mbit		✎

Enable QoS ⓘ ☑

The device will be rebooted when the master QoS enable/disable setting is changed

Figure 16: QoS

To activate QoS, check “**Enable QoS**” option. Three tabs are available for configuration:

- **General**: Download and upload bandwidth speeds settings on each WAN interface as well as setting the smart queue parameters which will allow to select the queuing mode on each wan interface. The smart queue is an integrated network system that performs better per-packet/per flow network scheduling, reduces the buffer bloat and keeps latency at acceptable levels. The users can from this menu select which QoS mode to use on each WAN interface (either ACC, SQM or Legacy QoS).

- **Legacy QoS**: Legacy QoS allows creating Traffic Classes to prioritize traffic for specific resources on the network by controlling transmission/upload rate. Note that different classes can be created and assigned as Traffic filters by respecting following conditions:
  - ✓ The total of Upstream bandwidth values of each created class should not exceed the upstream bandwidth value configured in **General**.
  - ✓ The remaining bandwidth will be lent to the next priority level of class.
  - ✓ All filter options are summed together.
  - ✓ While Upstream QoS is dealing with traffic transmission, Policer is controlling the incoming traffic. Thus, allowing to create rules to specific targets to set priority and received traffic rate, giving the GWN the ability to drop the exceeding traffic when reaching the max rate.

- **Policy Manager:** On this menu the user can configure multiple QoS policies in order to apply them on the WAN interface when selecting QoS type as ACC (Adaptive Congestion Control), this feature combines the power of the original legacy class based QoS, while adding true ingress shaping, and reducing the configuration difficulty. Traditional QoS systems rely on the actual bandwidth provided by the ISP to remain constant, they also require you to set the link rate below what the ISP provisions your link, which leaves the link underutilized. The ACC QoS solves this problem. The ACC QoS also features the anti-buffer bloat and flow fairness of the Smart Queue QoS. Beyond that, the new QoS allows for defining classes so that flows that are latency sensitive and/or need a minimum amount of bandwidth can be placed int, this is extremely useful for VoIP traffic.

Refer to the following tables for each tab option:

Table 14: General Settings

Up/Down Stream QoS Enabled	Check to enable upstream and downstream bandwidth speeds for the selected WAN interface.
Upstream	Set the Upstream value to specify the upload bandwidth for selected interface, the value should end with Mbit. Note that the set value will affect and limit the bandwidth values on created classes on **QoS Upstream**. Examples: *500Mbit* *100Kbit*
Downstream	Set the Downstream value to specify the download bandwidth speed for selected interface, the value should end with “Mbit”, “Kbit” or with no unit if the set value is referring to “bit” unit. Examples: *1000Mbit* *100Kbit*
Type	Select which QoS method to apply on select WAN interface: • **SQM:** Smart queue management queueing mode will be applied to the interface along with the option to select Qdisc and Manager values. • **ACC:** Select this option in order to use active congestion control QoS mode on the interface then select which policy to apply, users should create policies under “**Router→QoS→Policy Manager**”. • **Legacy:** Select this option in order to use legacy classifying and filter QoS mode, users need to configure the related DSCP marking and bandwidth limitations under the menu “**Router→QoS→Legacy QoS**”.

Qdisc	Select which Queuing discipline method to use for QoS: • **fq_codel** (Fair Queue with Controlled Delay) • **Cake**
Manager	Choose the type of the smart queue management: □ If fq_codel queuing discipline method is selected. • **simple**: Three-tier prioritization system. • **simplest**: HTB (Hierarchical Token Bucket) shaper with a single fq_codel queuing discipline. • **simplest_tbf**: TBF (Token Bucket Filter) shaper with a single fq_codel queuing discipline. □ If cake queuing discipline method is selected. • **layer_cake**: Three-tier prioritization system with cake as a replacement for HTB rate limiting. • **Piece_of_cake**: Single queue with cake as a replacement for HTB rate limiting.
Link-layer Adaptation	Select the link-layer type for the WAN connection. This can be used to compensate for the link-layer overhead of certain types of WAN connections. • **None** (default). • **Ethernet** (should be selected for VDSL connections). • **ATM** (should be selected for ADSL connections).
Overhead	If the link-layer is set to something other than "none", then the link-layer overhead setting can be used to specify how many bytes of overhead there are. Defaults are 8 for Ethernet, and 44 for ATM.
Advanced Qdisc Options	Check this option in order to show advanced Qdisc options to be used.
Squash DSCP on ingress	Select whether to squash or not the DSCP on ingress packets. By default, this option is disabled.
Ignore DSCP on ingress	Select whether to ignore DSCP on ingress packets or not. By default, this option is disabled.
ECN Status on Inbound packets	Select whether to set or not ECN status on inbound packets.
ECN Status on outbound packets	Select whether to set or not ECN status on bound packets.

ACC Policy	Select from the drop-down list the acc policy to apply, policies can be managed from the Policy Manager tab. This field appears only when **Type** is set to “**acc”**.
Use Active Congestion Controller	This Option must be enabled when using ACC (Adaptive Congestion Control) QoS type under the selected wan interface. This field appears only when **Type** is set to “**acc”**.
Use Custom ping target	Enter the IPv4 address of the target where the router will send ICM echo messages to track the health of the link (RTT measurements…etc). This field appears only when **Type** is set to “**acc”**.
Target ping time limit (ms)	Value that indicates the congestion on the ISP link, this is automatically calculated on the back end of the router, but users can override it. This field appears only when **Type** is set to “**acc”**.

Table 15: Legacy QoS Settings

Traffic Class	
Name	Define a name for the traffic class.
Priority	Set the priority of the traffic class, the lower the value, the highest the priority. Valid range is between 1 and 64.
Interface	Select the WAN interface from which the traffic will be classified, make sure to enable the desired interface it from in order to appear.
Upstream	Set Upstream bandwidth value. The value should end with “Mbit”, “Kbit”. Note that the sum of created classes should have upstream bandwidth speeds lower than the Upstream bandwidth value configured on **QoS Basic**. Examples: *100Mbit* *100Kbit*
Traffic Filter	
Class	Select a class from created traffic classes using drop-down menu.
Name	Define a Name for the traffic filter rule.
DSCP	Choose the Differentiated Services Code Point (DSCP) value from drop-down list. Default is 0.
IP Source Address	Specify the Source IP address from which the traffic filter rule will be applied.
IP Destination Address	Specify the Destination IP address to which the traffic filter rule will be applied.
TCP Source Port	Specify the TCP Source port from which the traffic filter rule will be applied.
TCP Destination Port	Specify the TCP Source port to which the traffic filter rule will be applied.

UDP Source Port	Specify the UDP Source port from which the traffic filter rule will be applied.
UDP Destination Port	Specify the UDP Source port to which the traffic filter rule will be applied.
Group Source	Choose the LAN group of the specified Source IP address. If no Source IP address has been defined, the rule will be applied to all members of that LAN group.
Policer	
Name	Define a Name for the Policer rule.
Interface	Select an interface from which the traffic will be policed, make sure to enable the desired interface from *General QoS* in order to appear.
Priority	Set the priority of the traffic class, the lower the value, the highest the priority. Valid range is between 1 and 64.
Rate	Set a Rate value for download bandwidth when applying policer rule.
DSCP	Choose the Differentiated Services Code Point (DSCP) value from drop-down list. Default is 0.
IP Source Address	Specify the Source IP address from which the policer rule will be applied.
IP Destination Address	Specify the Destination IP address to which the policer rule will be applied.
TCP Source Port	Specify the TCP Source port from which the policer rule will be applied.
TCP Destination Port	Specify the TCP Source port to which the policer rule will be applied.
UDP Source Port	Specify the UDP Source port from which the policer rule will be applied.
UDP Destination Port	Specify the UDP Source port to which the policer rule will be applied.
Group Source	Choose the LAN group of the specified Source IP address. If no Source IP address has been defined, the rule will be applied to all members of that LAN group.

Table 16: QoS Policy Manager (acc)

General	
Name	Define a name for the traffic policy which can be then select on general tab settings if settings the QoS type for a wan interface to acc (adaptive congestion control).
Upload/Download → Policy Class	
Name	Set a name for the traffic class.
Bandwidth share %	Configure the bandwidth share percentage for this class of traffic, the acc mechanism will dynamically borrow bandwidth from other classes if one class needs more, thus using efficiently the available bandwidth.

Set minimum bandwidth	Enable this option to set the Minimum bandwidth for this traffic class.
Min bandwidth	Configure the minimum bandwidth reserved for this traffic class in Mbps or Kbps.
Set maximum bandwidth	Enable this option to set the Maximum bandwidth for this traffic class.
Max bandwidth	Configure the maximum bandwidth allowed for this traffic class in Mbps or Kbps.
Minimize RTT (Only for Download Class)	Enable this option in order to minimize traffic latency/delay → Useful for VoIP.
Upload/Download → Policy Rule	
Name	Enter a name for the traffic rule ➔ rules are used to put a traffic into a class.
Enabled	Used to enable/disable the traffic rule.
Protocol	Select the protocol for the traffic rule (TCP, UDP, TCP/UDP or ICMP).
Src IP	Set the source IP of the traffic to be matched.
Src Port	Set the source port number of the traffic to be matched.
Dest IP	Set the destination IP of the traffic to be matched.
Dest Port	Set the destination port number of the traffic to be matched.
Min Pkt Size	Configures the minimum packet size of the traffic that will be matched.
Max Pkt Size	Configures the minimum packet size of the traffic that will be matched.
Class	Select from the drop-down list the class where this traffic will be put, thus making all necessary bandwidth reservations for this traffic in respect of the configurations set under the class settings.

DDNS

DDNS allows accessing GWN7000 via domain name instead of IP address, the GWN7000 supports following DDNS providers:

- Dyndns.org
- Changeip.com
- Zoneedit.com
- Freedns.afraid.org
- He.Net
- Dnsomatic.Com
- No-ip.pl
- Myonlineportal.net
- No-ip.com

Before configuring DDNS settings on the GWN7000, make sure first to create and confirm the DDNS account via supported providers.

Following steps illustrates how to configure the DDNS settings on your GWN7000:

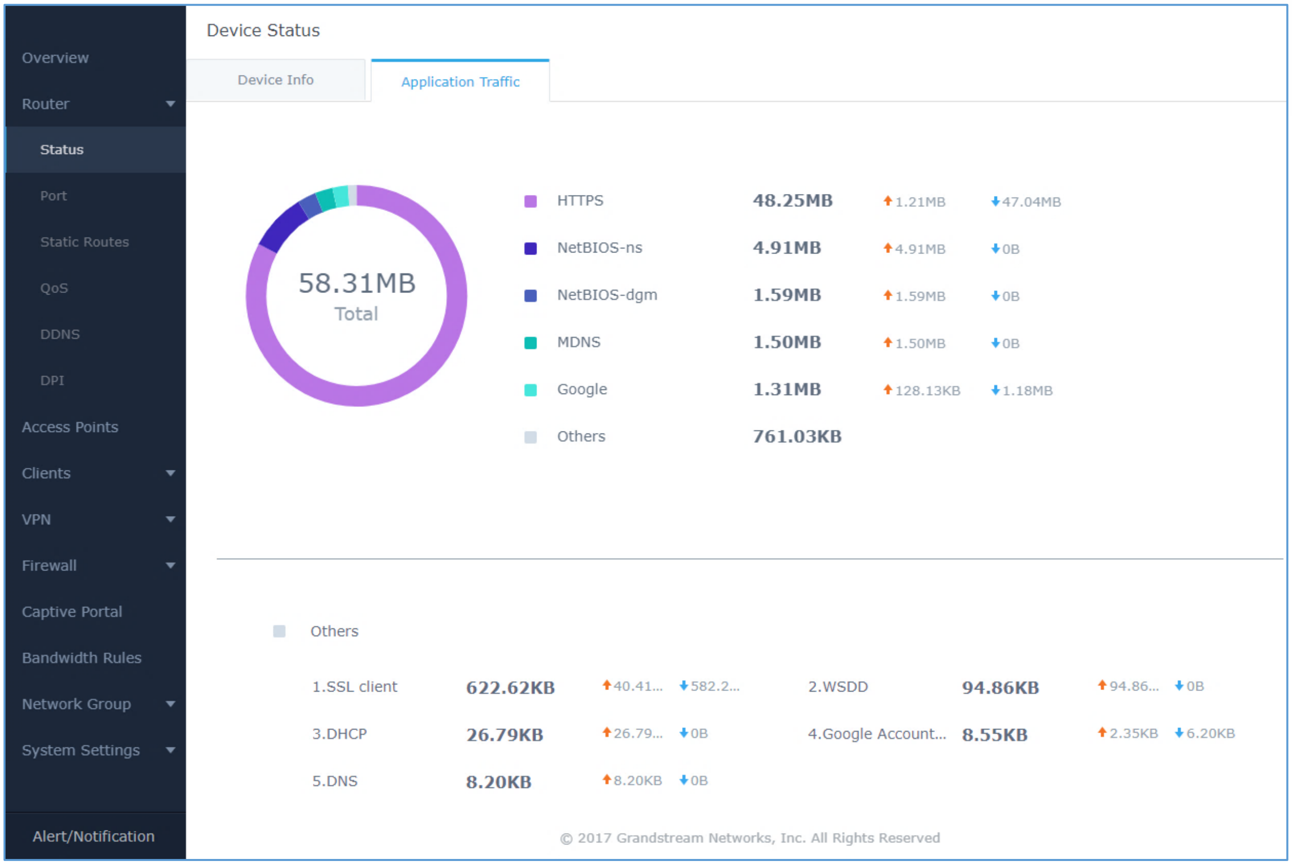
1. Access to GWN7000 web GUI, and navigate to **Router→DDNS**, and enable **DDNS** service.
2. Fill in the domain name created with DDNS provider under **Domain Name** field.
3. Enter your account username and password under **Username** and **Password** fields.
4. Specify the WAN interface to which DDNS is applied under **Network interface** field.
5. (Optional) For advanced configuration, it is also possible log to Syslog and modify the values of refreshing fields so to check periodically the updated IP address.

DPI

DPI stands for Deep Packet Inspection which is an option that allows the GWN7000 to analyze the core of the packet to collect and report information at the Application-layer, such as traffic volume of an application used by the host.

Snort OpenApp ID allows the System Administrator to view the internet traffic of users. The GUI displays traffic data in a human-readable format, such as 'Streaming MP4 & Netflix - 31% of total traffic usage.' The data is accompanied by a graph.

GWN7000 is using Snort for packet inspection and displays traffic status under **Status→Application Traffic** as shown on the figure below.



Device Status

58.31MB Total

HTTPS	48.25MB	↑1.21MB	↓47.04MB
NetBIOS-ns	4.91MB	↑4.91MB	↓0B
NetBIOS-dgm	1.59MB	↑1.59MB	↓0B
MDNS	1.50MB	↑1.50MB	↓0B
Google	1.31MB	↑128.13KB	↓1.18MB
Others	761.03KB		

Others

1.SSL client	622.62KB	↑40.41...	↓582.2...	2.WSDD	94.86KB	↑94.86...	↓0B
3.DHCP	26.79KB	↑26.79...	↓0B	4.Google Account...	8.55KB	↑2.35KB	↓6.20KB
5.DNS	8.20KB	↑8.20KB	↓0B				

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Figure 17: DPI Status

The following table contains the description of the DPI configuration settings.

Table 17: DPI Settings

Enable Application Tracking	Enables the application tracking. By default, it’s disabled.
Interface	Select the interface on which the application tracking will be performed. By default, it’s WAN Port 1.

Note: A reboot is required after enabling Depp packet inspection in order for the feature to take effect.

ROUTING

Static Routes

GWN7000 supports setting manually static IPv4 and IPv6 routes as well as displaying routing table entries.

Static routes configuration page can be accessed from GWN7000 WebGUI→**Router→Static Routes:**
Three tabs are available:

- **Routes** to view routing table entries.
- **IPv4** to create, edit or delete static IPv4 static routes.
- **IPv6** to create, edit or delete static IPv6 static routes.

Following actions are available in both **IPv4** and **IPv6** tabs:

- To add a new static route, click on ⊕ Add
- To edit a static route, click on ✎
- To delete a static route, click on 🗑

Refer to the following tables when editing or creating IPv4/IPv6 static routes:

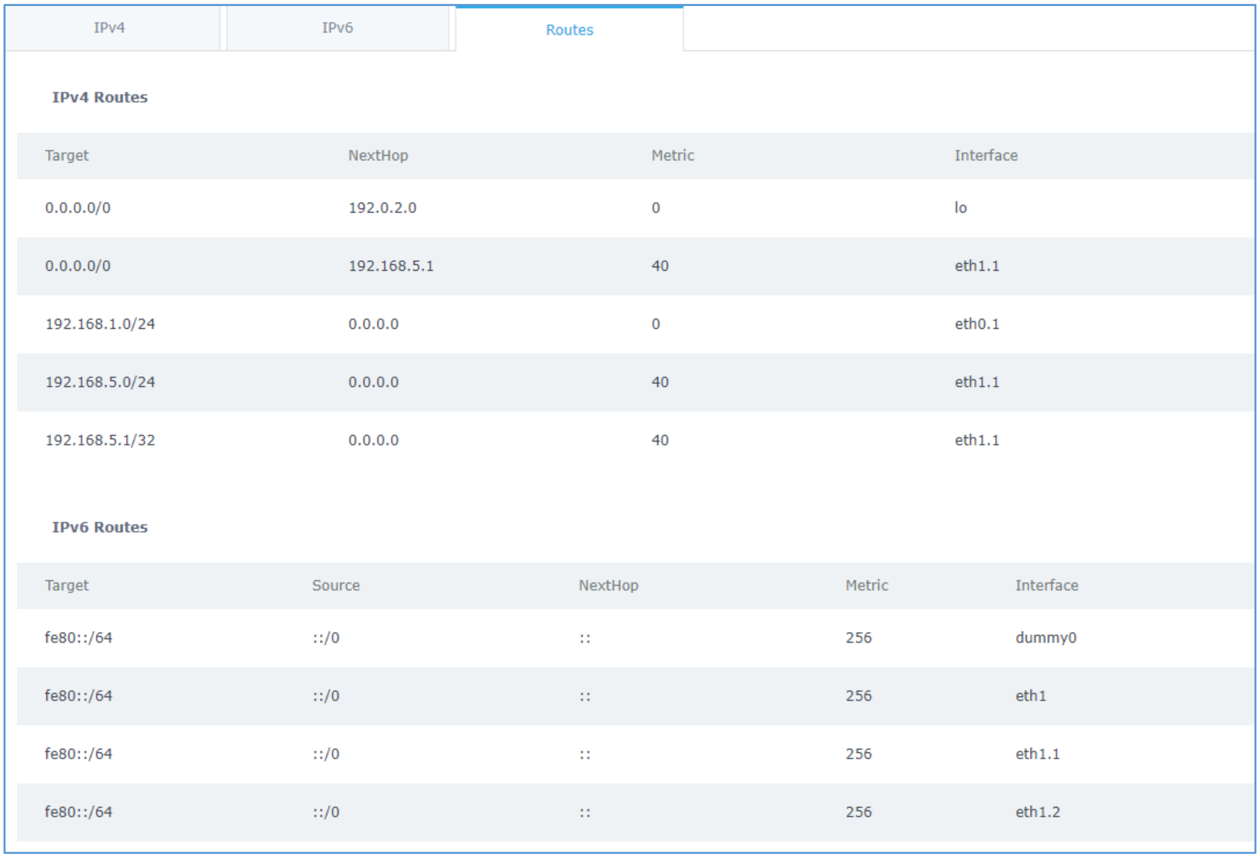
Table 18: IPv4 Static Routes

Name	Enter the Name of the static route to be configured.
Enabled	Select whether to enable or disable this static route.
Interface	Choose the LAN network or WAN port, which will be using this static route.
Target Network/Host	Enter the Network/Host IP address on which to route the traffic to. Example: 192.168.5.0
Netmask	Enter the Network/Host Netmask. Example: 255.255.255.0
NextHop	Enter the NextHop IP address. Example: 192.168.5.1.
Metric	Set the metric value. The valid range is 0-255. Default value is 0.

Table 19: IPv6 Static Routes

Name	Enter the Name of the static route to be configured.
Enable	Select whether to enable or disable this static route.
Interface	Choose the LAN network or WAN port, which will be using this static route.
Target Network/Host	Enter the Network/Host IP address on which to route the traffic to. 2001:db8:3c4d:4::/64
NextHop	Enter the Gateway's IP address. fec0:470:28:5b2::1/64
Metric	Set the metric value. The valid range is 0-255. Default value is 1.

To check the routing table of the router, go under the Routes tab which displays all routes learned by the router.



IPv4 Routes

Target	NextHop	Metric	Interface
0.0.0.0/0	192.0.2.0	0	lo
0.0.0.0/0	192.168.5.1	40	eth1.1
192.168.1.0/24	0.0.0.0	0	eth0.1
192.168.5.0/24	0.0.0.0	40	eth1.1
192.168.5.1/32	0.0.0.0	40	eth1.1

IPv6 Routes

Target	Source	NextHop	Metric	Interface
fe80::/64	::/0	::	256	dummy0
fe80::/64	::/0	::	256	eth1
fe80::/64	::/0	::	256	eth1.1
fe80::/64	::/0	::	256	eth1.2

Figure 18: Routes

Policy Routing

Feature Overview

The Policy-based Routing feature allows a network administrator to make advanced routing decisions for traffic passing through the router. This feature allows for high granularity control over policies that dictate what WAN port, and even VPN tunnel, traffic should use. Traffic controlled this way can be balanced across multiple WANs or VPNs or to have complex failover designs.

Locally generated traffic can be globally routed via the policy selected under the menu "**Router → WAN → Global Settings**" in order to dictate to the router either to use failover or load-balancing for locally generated packets.

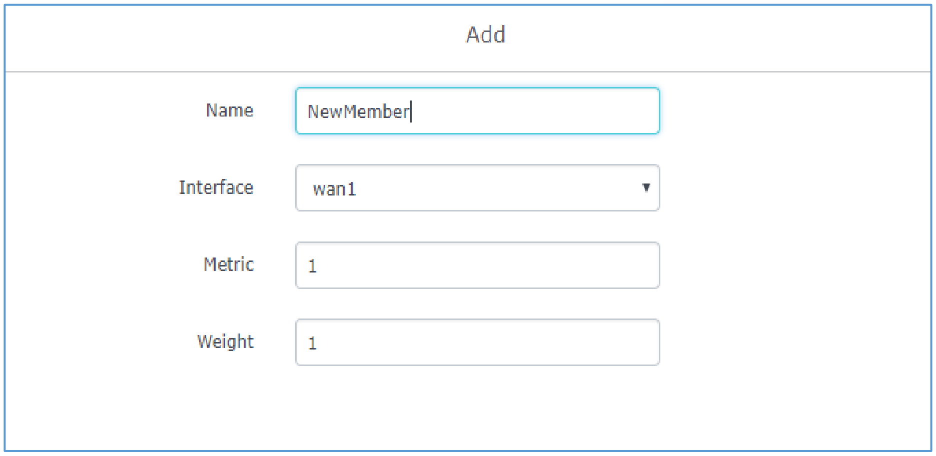
Creating/Configuring Routing Policies

The basic flow for traffic handled by policy-based routing in GWN7000 is as follows:

- Traffic matched with a specific iptables rule is marked to be used with a Policy.
- The policy contains a list of members that can be used by the policy.
- These members point to a specific interface and define a metric or weight assigned to them which can be used for determining load balancing and failover behavior.
- The interface can be any outgoing interface (WAN or VPN) and must be assigned a metric.
- The router then handles the routing of matched traffic to the appropriate routing tables for each member interface for that Policy.

In order to properly implement this feature, the old per-zone and per-wan routing table design has been removed and reworked to only use the main table. In addition, the Inter-group Traffic Forwarding is being removed in favor of *automatically* creating more configurable Firewall Forwarding rules.
In order to configure a new routing policy, first users need to create members under the menu **Routing → Policy Routing → Members**.

Click on + Add button to create a new member, and configure its related metric and weight:



Add

Name	NewMember
Interface	wan1 ▾
Metric	1
Weight	1

Figure 19: Create a New Member

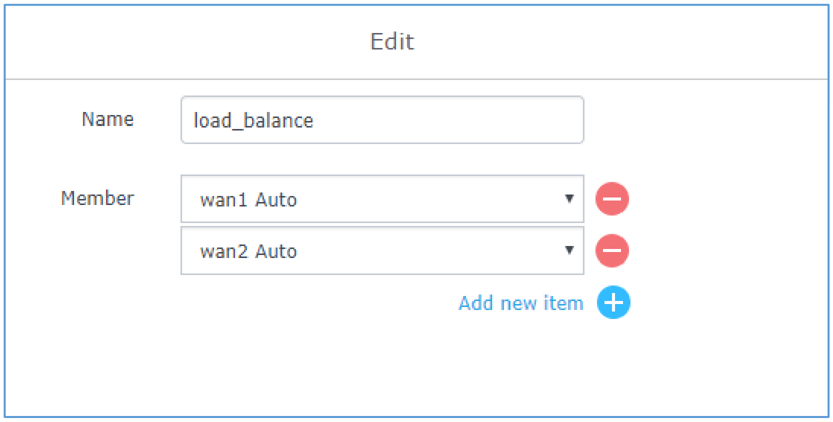
Table 20: Create Policy Members

Name	Enter the Name for the member.
Interface	Select the interface to which the member points.
Metric	Enter the value of the metric related to the member (default is 1).
Weight	Enter the weight that will be attributed to the member, in case load balancing is used, this will indicate how much traffic will be routed via this member through the specified interface. Default value is 1.

Note: By default, GWN7000 router will generate automatically members for each *created/configured* WAN interface and VPN client tunnel interface.

After this, users need to create policies which lists the members that will be used by each policy from the menu **Routing → Policy Routing → Policy**.

Click on + Add button in order to create a new routing policy then choose the members that would be listed (included) on the policy.



Edit

Name: load_balance

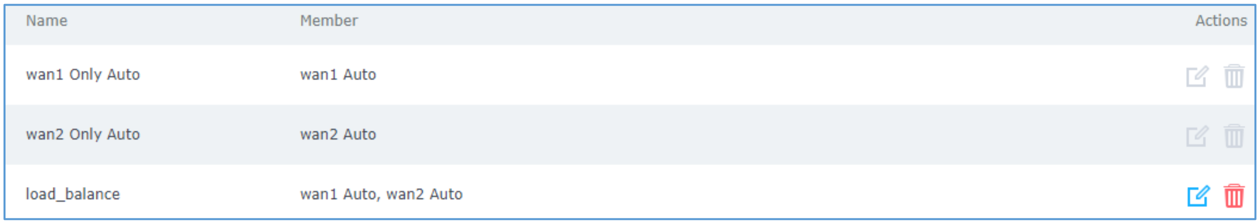
Member: wan1 Auto, wan2 Auto

Figure 20: Create New Routing Policy

Give a name to the policy, then click on ⊕ to add a new member to the list of members included on the policy.

If two members have the same metric, then the policy will do load balancing through the interfaces while taking into account the configured weight on each member to determine how much traffic can be sent through each interface. Otherwise the member with lower metric will have priority.

Click on **Save** and **Apply** changes to save the policy and it will be displayed along the other policies on the routers.



Name	Member	Actions
wan1 Only Auto	wan1 Auto	
wan2 Only Auto	wan2 Auto	
load_balance	wan1 Auto, wan2 Auto	

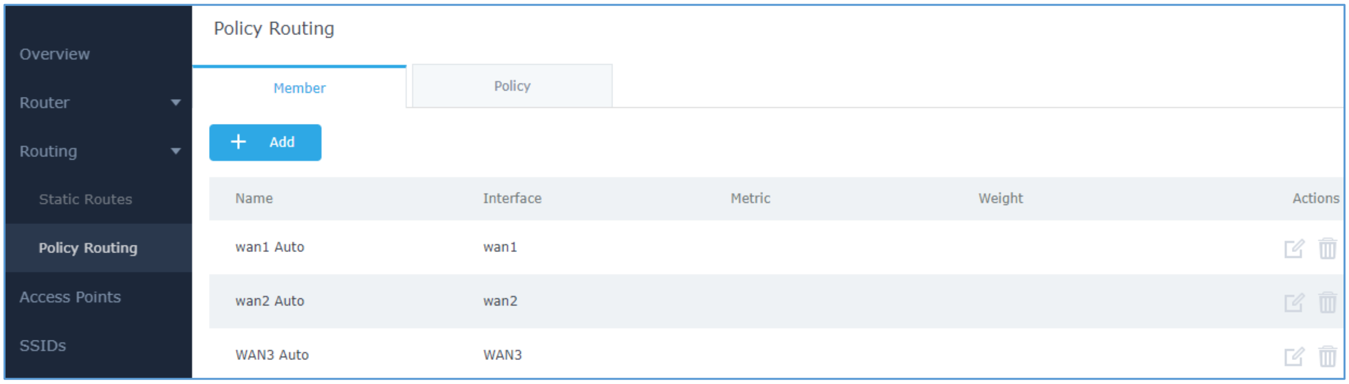
Note: when configuring a new LAN subnet (VLAN) or VPN client, the router will automatically generate a routing policy in order to allow traffic from the LAN or VPN network to/via the select wan interface. Along the automatically created routing policy, the GWN7000 router will create the corresponding firewall rule which will allow for traffic to pass from the LAN subnet to the WAN ports while respecting the created policy, users can check these rules under the menu **“Firewall → Traffic Rules → Forward”.**

Using Routing Policies

In order to illustrate how policy-based routing can be used, let’s imagine an SMB who has a GWN7000 router running their network with two WAN (WAN1 and WAN2) ports for normal data traffic and a third WAN port (NET port used as wan) for VoIP service since this link has QoS support. The administrator wants to send normal data traffic through WAN 1 and WAN 2 in a load balanced way and the VoIP traffic via WAN 3 traffic.

We consider that the administrator has already configured the three wan ports and their IP and running which can be under the “**Router → Status**” page.

As explained above, the GWN7000 router will automatically generate members for the three wan ports under “**Routing → Policy Routing → Members**”

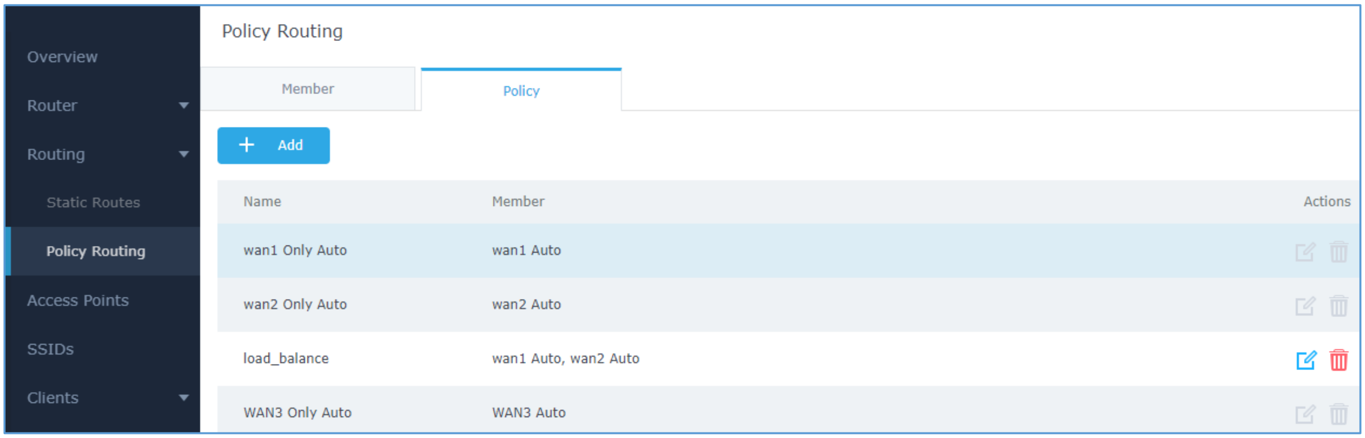


Name	Interface	Metric	Weight	Actions
wan1 Auto	wan1			
wan2 Auto	wan2			
WAN3 Auto	WAN3			

Figure 21: Members list

Users can set different weights for WAN1 and WAN2 in order to set how the router will distribute the data traffic over the two WAN ports.

Next the we will see that the router will have already created automatically the load balancing policy and WAN3 only auto policy under Policy tab as shown on the following figure.

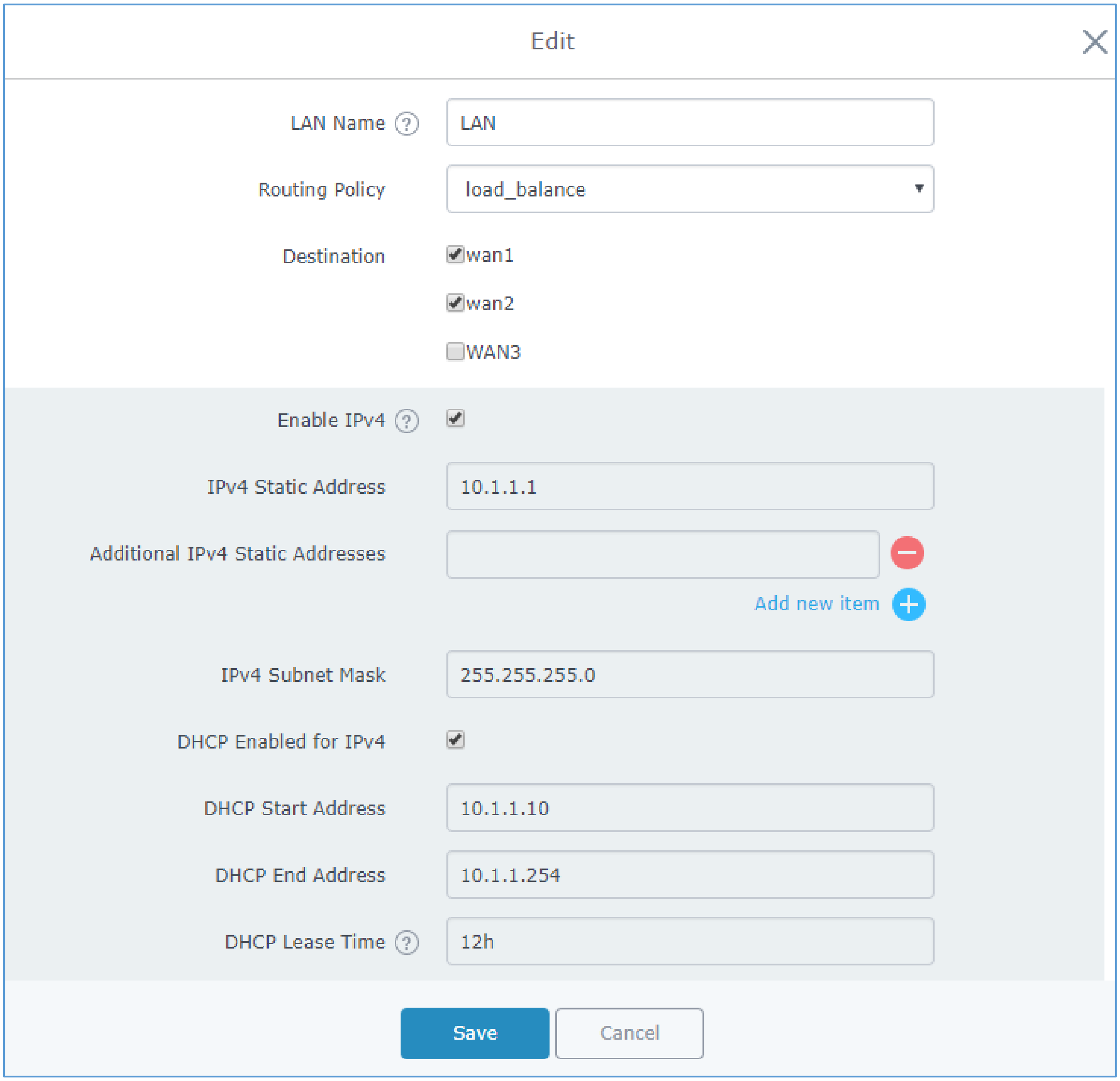


Name	Member	Actions
wan1 Only Auto	wan1 Auto	
wan2 Only Auto	wan2 Auto	
load_balance	wan1 Auto, wan2 Auto	
WAN3 Only Auto	WAN3 Auto	

Figure 22: Policies List

The next step would be to assign the routing policy in order to send normal data traffic in a load-balanced way over wan1 and wan2 and send the traffic for VoIP over wan3.

For the network group LAN data traffic, users need to navigate to **Router → LAN** and edit the created network group then assign load balance routing policy and select wan1 and wan2 port as destinations.



Edit

LAN Name: LAN

Routing Policy: load_balance

Destination: ☑wan1 ☑wan2 □WAN3

Enable IPv4: ☑

IPv4 Static Address: 10.1.1.1

Additional IPv4 Static Addresses:

Add new item

IPv4 Subnet Mask: 255.255.255.0

DHCP Enabled for IPv4: ☑

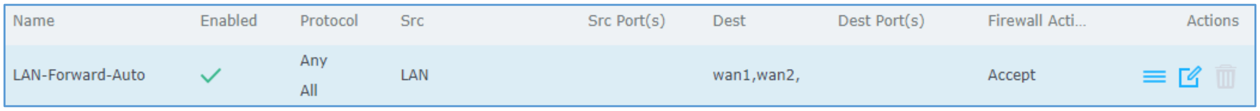
DHCP Start Address: 10.1.1.10

DHCP End Address: 10.1.1.254

DHCP Lease Time: 12h

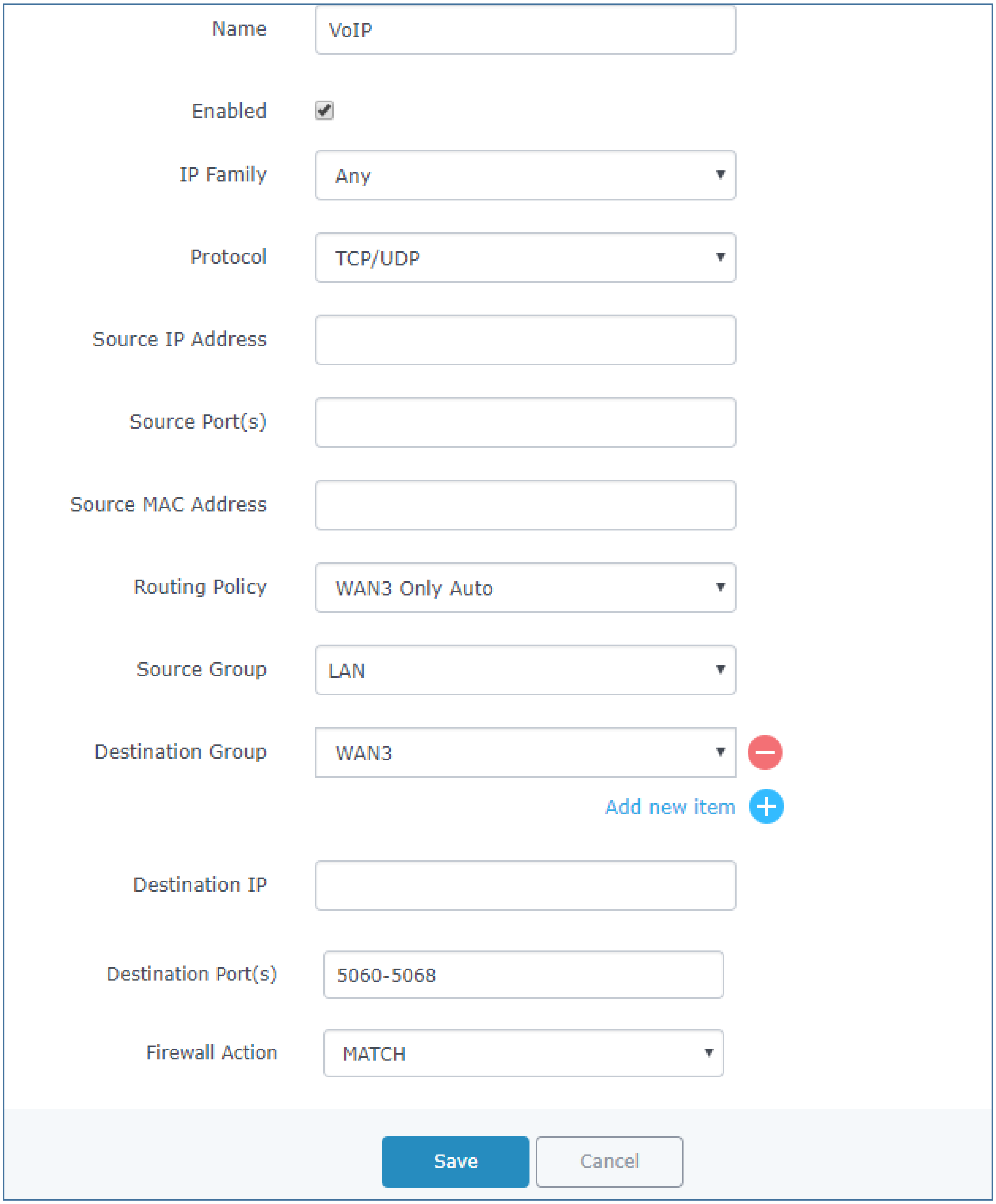
Figure 23: LAN Routing Policy

This will generate the firewall forward rule automatically to allow traffic to pass from LAN to WAN while respecting the load balance policy.



Name	Enabled	Protocol	Src	Src Port(s)	Dest	Dest Port(s)	Firewall Acti...	Actions
LAN-Forward-Auto	✓	Any All	LAN		wan1,wan2,		Accept	

For the VoIP traffic and in order to route it via the WAN3, users need to go under “**Firewall → Traffic Rules → Forward**” and add a new rule as follow.



Name	VoIP
Enabled	☑
IP Family	Any ▾
Protocol	TCP/UDP ▾
Source IP Address	
Source Port(s)	
Source MAC Address	
Routing Policy	WAN3 Only Auto ▾
Source Group	LAN ▾
Destination Group	WAN3 ▾
Destination IP	
Destination Port(s)	5060-5068
Firewall Action	MATCH ▾

Figure 24: Configuring Firewall Rule using Route Policy

This way the VoIP traffic which uses the TCP or UDP ports 5060 through 5068 will be routed over WAN3.

SETTING UP A WIRELESS NETWORK

The GWN7000 Enterprise Router provides the user with the capability to create a wireless network by adding multiple GWN76xx series access points, with connectivity over the most common wireless standards (802.11b/g/n) operating in both 2.4GHz and 5GHz range.

The GWN7000 integrates multiple layers of security including the IEEE 802.1x port-based authentication protocol, Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA and WPA2) and firewall and VPN tunnels.

This chapter will introduce how to discover, add the GWN76xx access points, create and manage Wi-Fi Networks.

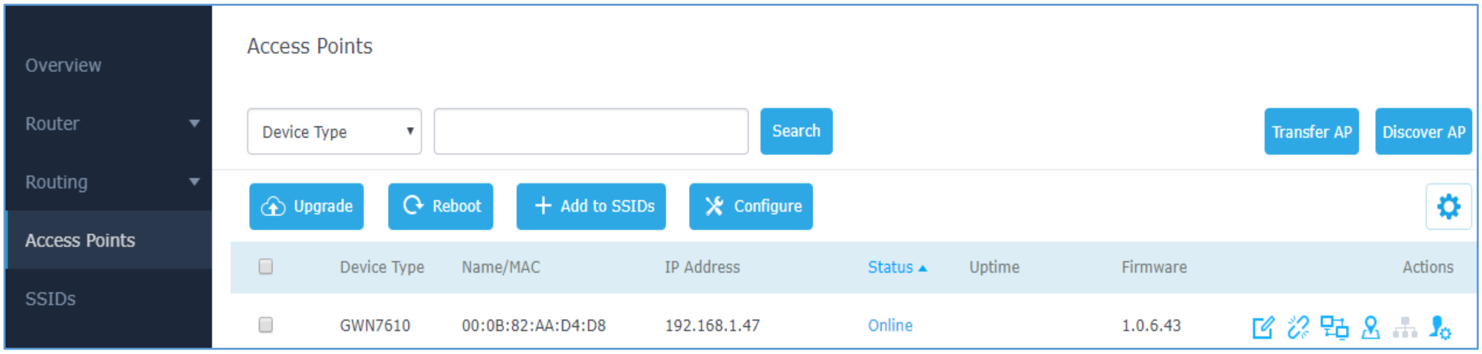
For more details about Grandstream GWN76xx Access points, refer to
http://www.grandstream.com/products/networking-solutions/wifi-access-points

Discover and Pair GWN76xx Access Points

The GWN76xx are powerful access points, which are fully compatible with the GWN7000 and can be added with one click, provisioned and managed in an easy and intuitive way. Once a GWN76xx is successfully connected and has an IP from the GWN7000 router, user can then pair it to the GWN7000 and associate it with an SSID.

To Pair a GWN76xx access point connected as LAN client to the GWN7000, follow the below steps:

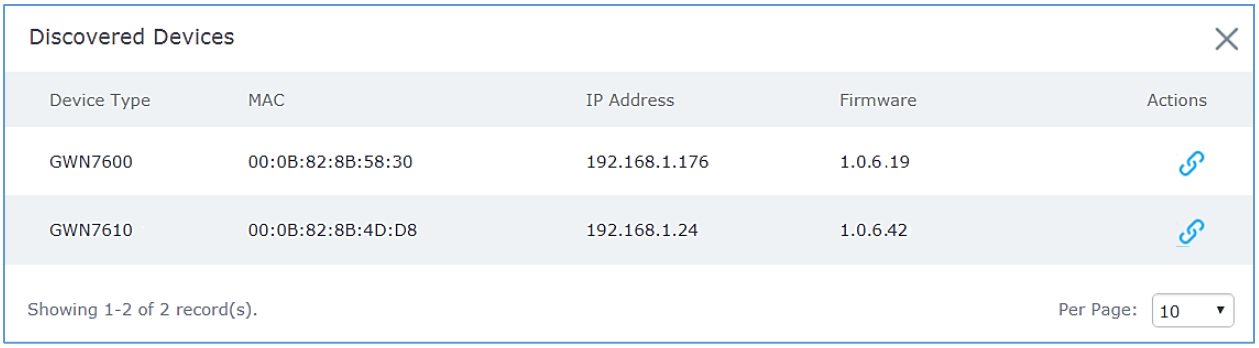
1. Connect to the GWN7000 Web GUI and go to **Access Points.**



□	Device Type	Name/MAC	IP Address	Status ▲	Uptime	Firmware	Actions
□	GWN7610	00:0B:82:AA:D4:D8	192.168.1.47	Online		1.0.6.43	

Figure 25: Discover AP

2. Click on Discover AP to discover access points within GWN7000's LAN Network, the following page will appear.



Discovered Devices

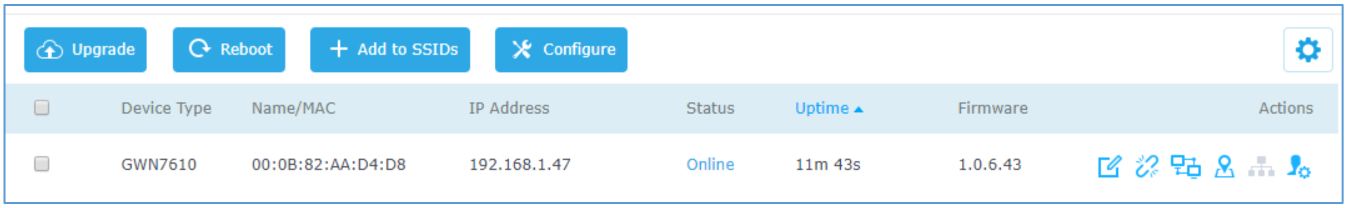
Device Type	MAC	IP Address	Firmware	Actions
GWN7600	00:0B:82:8B:58:30	192.168.1.176	1.0.6.19	🔗
GWN7610	00:0B:82:8B:4D:D8	192.168.1.24	1.0.6.42	🔗

Showing 1-2 of 2 record(s).

Figure 26: Discovered Devices

3. Click on Pair 🔗 under Actions, to pair the discovered Access Point with the GWN7000.

4. The paired GWN76xx will appear Online, Click on to unpair it.



□	Device Type	Name/MAC	IP Address	Status	Uptime ▲	Firmware	Actions
□	GWN7610	00:0B:82:AA:D4:D8	192.168.1.47	Online	11m 43s	1.0.6.43	

Figure 27: GWN7610 online

5. Click on ✎ next to paired access point to check device configuration for its status, users connected to it and configuration, or select multiple GWN76xx APs from the same model, and click on Configure to apply same configuration on selected units.

6. Click on to configure client bridge on the selected access point. For more details about the client bridge feature, please refer to ***Client Bridge***.

Refer to below table for Device Configuration tabs.

Table 21: Device Configuration

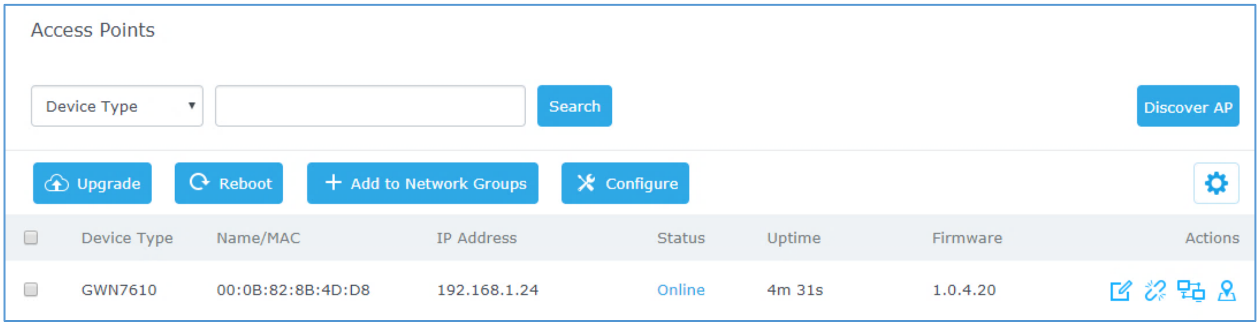
Status	Shows the device's status information such as Firmware version, IP Address, Link Speed, Uptime, and Users count via different Radio channels.
Clients	Shows the Clients connected to the GWN76xx access point.
Configuration	• **Device Name:** Set GWN76xx's name to identify it along with its MAC address. • **Fixed IP:** Used to set a static IP for the GWN76xx, if checked, the following needs to be configured:

	-IPv4 Address: Enter the IPv4 address to be set as static for the device *-IPv4 Subnet Mask:* Enter the Subnet Mask. *-IPv4 Gateway:* Enter the Network Gateway's IPv4 Address. *-Preferred IPv4 DNS:* Enter the Primary IPv4 DNS. *-Alternate IPv4 DNS*: Enter the Alternate IPv4 DNS. • **Frequency:** Set the GWN76xx's frequency, it can be either 2.4GHz, 5GHz or Dual-band. • **Enable Band Steering:** When Frequency is set to Dual-Band, check this option to enable Band Steering on the Access Point, this will help redirecting clients to a radio band accordingly for efficient use and to benefit from the maximum throughput supported by the client. • **Mode:** Choose the mode for the frequency band, 802.11n/g/b for 2.4Ghz and 802.11ac for 5Ghz. • **Channel Width:** Choose the Channel Width, note that wide channel will give better speed/throughput, and narrow channel will have less interference. 20Mhz is suggested in very high-density environment. • **40MHz Channel Location:** Configure the 40MHz channel location when using 20MHz/40MHz in Channel Width, it can be set it to be "Secondary Below Primary", "Primary Below Secondary" or "Auto". • **Channel:** Select "Auto" or a specific channel. Default is "Auto". Note that the proposed channels depend on **Country** Settings under **System Settings–>Maintenance**. • **Enable Short Guard Interval:** Check to activate this option to half the guard interval (from 800ns to 400ns) ensuring that distinct transmissions do not interfere with one another, this will help increasing throughput. • **Active Spatial Streams:** Choose active spatial stream. Available options: "Auto", "1 stream", "2 streams" and "3 streams" (For GWN7610). • **Radio Power:** Set the Radio Power depending on desired cell size to be broadcasted, three options are available: "Low", "Medium" or "High". Default is "High".

	• **Allow Legacy Device(802.11b):** This feature appears when "Mode" option is set to "802.11g" or "802.11n", it allows legacy devices not supporting "802.11g/n" mode to connect using the "802.11b" mode. • **Custom Wireless Power(dBm):** allows users to set a custom wireless power for both 5GHz/2.4GHz band, the value of this field must be between 1 and 31.

Access Point Location

GWN7000 router has an interesting feature to help users to locate different access points using blinking LED, to do so go under the access points page then click on button as shown on the below figure and the corresponding LED will start blinking its LEDs. This can help ease locating the Access points on a multi-deployment site.



Access Points

Device Type ▾ | Search | Discover AP

Upgrade | Reboot | + Add to Network Groups | Configure

☐	Device Type	Name/MAC	IP Address	Status	Uptime	Firmware	Actions
☐	GWN7610	00:0B:82:8B:4D:D8	192.168.1.24	Online	4m 31s	1.0.4.20	

Figure 28: Locating Access Points

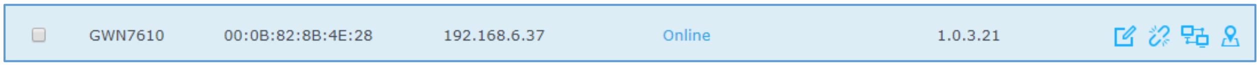
Note: If a GWN76xx is not being paired, or the pair icon is grey color, make sure that it is not being paired with another GWN7000 Router or GWN.Cloud or GWN76xx Access Point acting as Master Controller, if yes, it needs to be unpaired first, or reset to factory default settings to make it available for pairing; or delete it from GWN.Cloud paired Access Points if the unit is paired to GWN.Cloud.

Client Bridge

The Client Bridge feature allows an access point to be configured as a client for bridging wired only clients wirelessly to the network. When an access point is configured in this way, it will share the WiFi connection to the LAN ports transparently. This is not to be confused with a mesh setup. The client will not accept wireless clients in this mode.

Once LAN network has a Client Bridge Support enabled, the AP adopted in this LAN network can be turned in to Bridge Client mode by click the Bridge button ⧉.

Please be noted that once an AP it turned into Client Bridge mode, it cannot be controlled by a Master anymore, and a factory reset is required to turn it back into normal AP mode.



□	GWN7610	00:0B:82:8B:4E:28	192.168.6.37	Online	1.0.3.21

Figure 29: Client Bridge

Important Notes:

- The access point that will be operating on bridge mode, must be set with a fixed IP address before activating the bridge mode on the access point.
- Users must enable client bridge support option under LAN or SSID WiFi settings in order to have it fully functional. See ***[Client Bridge Support]***

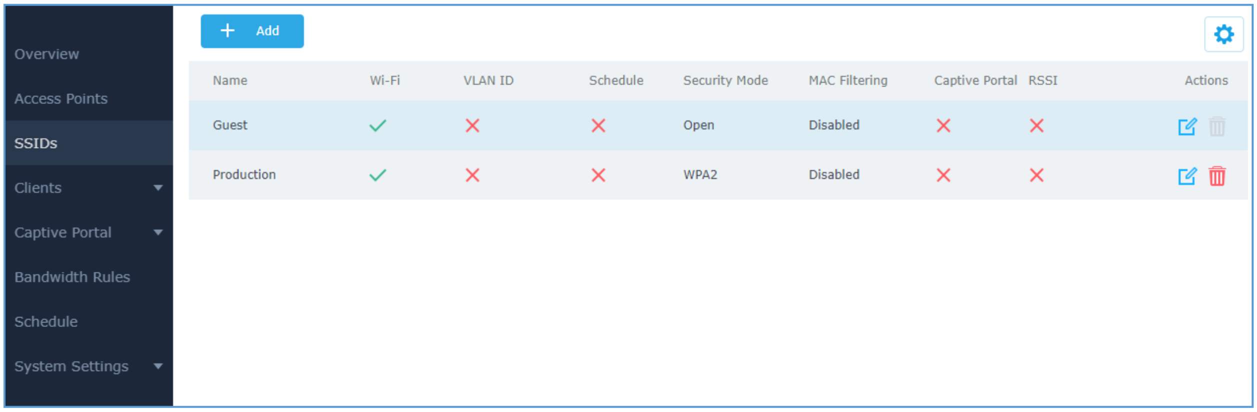
Transfer AP

Users can easily transfer the AP from local master to the *Cloud based Controller* account by clicking on [Transfer AP]. When you already have Network/WIFI configurations on your cloud account, using this feature will let you choose existing Network/SSID to adopt your local AP. **Note:** Local configurations will not be transferred. For more details, please refer to **GWN.Cloud User Guide**.

SSIDs

When using GWN7000 as Master Access Point, users have the ability to create different SSIDs and adding GWN76XX Slave Access Points to each SSID depending on the needs of the customer.

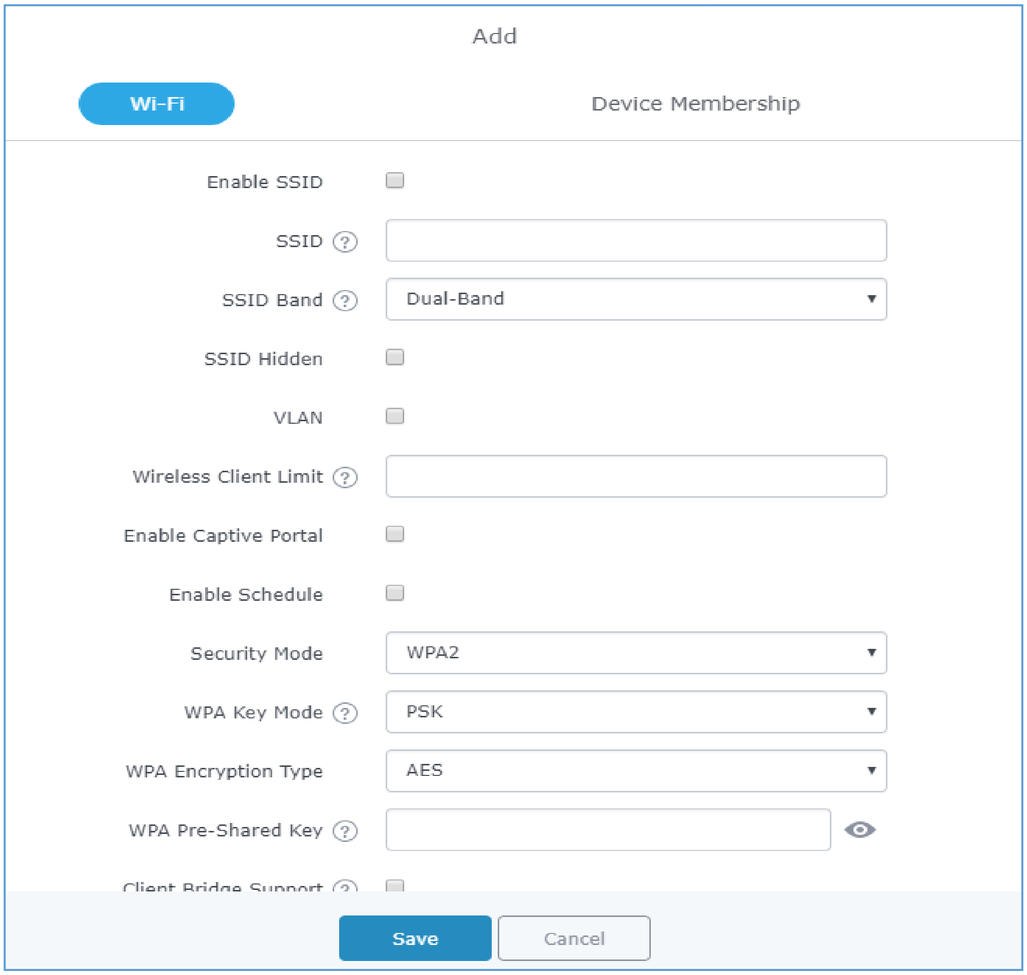
Log in as Master to the GWN7000 WebGUI and go to **SSIDs.**



Name	Wi-Fi	VLAN ID	Schedule	Security Mode	MAC Filtering	Captive Portal	RSSI	Actions
Guest	✓	✗	✗	Open	Disabled	✗	✗	
Production	✓	✗	✗	WPA2	Disabled	✗	✗	

Figure 30: SSID

The GWN7000 can support the management of up to 16 SSIDs, click on [⊕ Add] to add a new SSID.



Add

Wi-Fi | Device Membership

Enable SSID □

SSID ⓘ

SSID Band ⓘ Dual-Band ▾

SSID Hidden □

VLAN □

Wireless Client Limit ⓘ

Enable Captive Portal □

Enable Schedule □

Security Mode WPA2 ▾

WPA Key Mode ⓘ PSK ▾

WPA Encryption Type AES ▾

WPA Pre-Shared Key ⓘ

Client Bridge Support ⓘ □

Save | Cancel

Figure 31: Add a new SSID

When editing or adding a new SSID, users will have two tabs to configure:

- **Wi-Fi:** Please refer to the below table for Wi-Fi tab options

Table 22: Wi-Fi

Field	Description
Enable SSID	Check to enable Wi-Fi for the SSID.
SSID	Set or modify the SSID name.
SSID Band	Select the Wi-Fi band the GWN will use, three options are available: • **Dual-Band** • **2.4GHz** • **5Ghz**
SSID Hidden	Select to hide SSID. SSID will not be visible when scanning for Wi-Fi, to connect a device to hidden SSID, users need to specify SSID name and authentication password manually.

VLAN	Enter the VLAN ID corresponding to the SSID.
Wireless Client Limit	Configure the limit for wireless client. If there's an SSID per-radio on a SSID, each SSID will have the same limit. So, setting a limit of 50 will limit each SSID to 50 users independently. If set to 0 the limit is disabled.
Enable Captive Portal	Click on the checkbox to enable the captive portal feature.
Captive Portal Policy	Select the captive portal policy already created on the "*CAPTIVE PORTAL*" web page to be used in the created SSID.
Enable Schedule	Check the box and choose a schedule to apply for the selected SSID.
Security Mode	Set the security mode for encryption, 5 options are available: • **WEP 64-bit:** Using a static WEP key. The characters can only be 0-9 or A-F with a length of 10, or printable ASCII characters with a length of 5. • **WEP 128-bit:** Using a static WEP key. The characters can only be 0-9 or A-F with a length of 26, or printable ASCII characters with a length of 13. • **WPA/WPA2:** Using "PSK" or "802.1x" as WPA Key Mode, with "AES" or "AES/TKIP" Encryption Type. • **WPA2:** Using "PSK" or "802.1x" as WPA Key Mode, with "AES" or "AES/TKIP" Encryption Type. Recommended configuration for authentication. • **Open:** No password is required. Users will be connected without authentication. Not recommended for security reasons.
WEP Key	Enter the password key for WEP protection mode.
WPA Key Mode	Two modes are available: • **PSK:** Use a pre-shared key to authenticate to the Wi-Fi. • **802.1X:** Use a RADIUS server to authenticate to the Wi-Fi.
WPA Encryption Type	Two modes are available: • **AES:** This method changes dynamically the encryption keys making them nearly impossible to circumvent. • **AES/TKIP:** use both Temporal Key Integrity Protocol and Advanced Encryption Standard for encryption, this provides the most reliable security.
WPA Pre – Shared Key	Set the access key for the clients, and the input range should be: 8-63 ASCII characters or 8-64 hex characters.

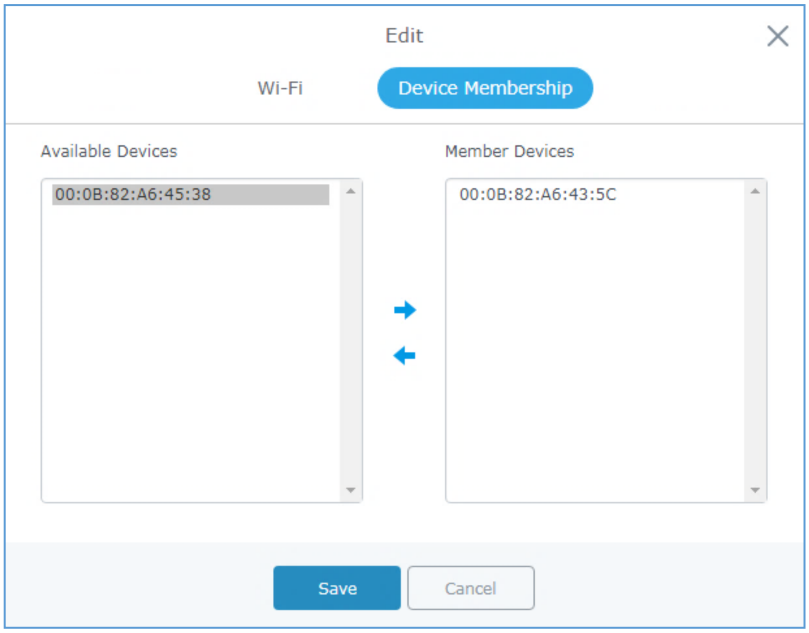
Client Bridge Support	Configures the client bridge support to allow the access point to be configured as a client for bridging wired only clients wirelessly to the network. When an access point is configured in this way, it will share the WiFi connection to the LAN ports transparently. Once a SSID has a Client Bridge Support enabled, the AP adopted in this SSID can be turned in to Bridge Client mode by click the Bridge button.
RADIUS Sever Address	Configures RADIUS authentication server address.
RADIUS Server Port	Configures RADIUS Server Listening port. Default is: 1812.
RADIUS Server Secret	Enter the secret password for client authentication with RADIUS server.
RADIUS Accounting Server	Configures the address for the RADIUS accounting server.
RADIUS Accounting Server Port	Configures RADIUS accounting server listening port (defaults to 1813).
RADIUS Accounting Server Secret	Enter the secret password for client authentication with RADIUS accounting server.
Client Time Policy	Select a time policy to be applied to all clients connected to this SSID.
Use MAC Filtering	Choose Blacklist/Whitelist to specify MAC addresses to be excluded/included from connecting to the zone's Wi-Fi. Default is Disabled.
Enable Dynamic VLAN (beta)	When enabled, clients will be assigned IP address from corresponding VLAN configured on the RADIUS user profile. *This field is available only when "WPA Key Mode" is set to "802.1x".*
Client Isolation	Client isolation feature blocks any TCP/IP connection between connected clients to GWN76XX's Wi-Fi access point. Client isolation can be helpful to increase security for Guest networks/Public Wi-Fi. Three modes are available: • **Internet Mode:** Wireless clients will be allowed to access only the internet services and they cannot access any of the management services, either on the router nor the access points GWN76XX. • **Gateway MAC Mode:** Wireless clients can only communicate with the gateway, the communication between clients is blocked and they cannot access any of the management services on the GWN76XX access points.

	- **Radio Mode:** Wireless clients can access to the internet services, GWN7xxx router and the access points GWN76XX but they cannot communicate with each other.
Client Isolation	Client isolation feature blocks any TCP/IP connection between connected clients to GWN76XX's Wi-Fi access point. Client isolation can be helpful to increase security for Guest networks/Public Wi-Fi. Three modes are available: - **Internet Mode:** Wireless clients will be allowed to access only the internet services and they cannot access any of the management services, either on the router nor the access points GWN76XX. - **Gateway MAC Mode:** Wireless clients can only communicate with the gateway, the communication between clients is blocked and they cannot access any of the management services on the GWN76XX access points. - **Radio Mode:** Wireless clients can access to the internet services, GWN7xxx router and the access points GWN76XX but they cannot communicate with each other.
Gateway MAC Address	This field is required when using **Client Isolation** set to **Gateway MAC**, so users will not lose access to the Network (usually Internet). Type in the default LAN Gateway's MAC address (router's MAC address for instance) in hexadecimal separated by "**:**". Example: 00:0B:82:8B:4D:D8
Enable Minimum RSSI	Check to enable RSSI function, this will lead the AP to disconnect users below the configured threshold in **Minimum RSSI (dBm).**
Minimum RSSI (dBm)	Enter the minimum RSSI value in dBm. If the signal value is lower than the configured minimum value, the client will be disconnected. The input range is from "-94" or "-1".
Beacon Interval	Configures interval between beacon transmissions/broadcasts. The Beacon signals help to keep the network synchronized and provide main information about the network such as SSID, Timestamp… - **Using High Beacon Interval:** AP will be sending beacon broadcast less frequently.

	This will help to get better throughput, thus better speed/performance. It also helps to save WiFi clients energy consumption. • **Using Low Beacon Interval:** AP will be sending beacon broadcast more frequently. This can help in environments with weak signal areas; sending more frequently beacons will increase chances to be received by WiFi clients with weak signal. **Notes:** 1. When AP enables several SSIDs with different interval values, the max value will take effect. 2. When AP enables less than 3 SSIDs, the interval value which will be effective are the values from 40 to 500. 3. When AP enables more than 2 but less than 9 SSIDs, the interval value which will be effective are the values from 100 to 500. 4. When AP enables more than 8 SSIDs, the interval value which will be effective are the values from 200 to 500. 5. Mesh feature will take up a share when it is enabled. Default value is 100ms. Valid range: 40 – 500 ms.
DTIM Period	Configures the frequency of DTIM (Delivery Traffic Indication Message) transmission per each beacon broadcast. Clients will check the AP for buffered data at every configured DTIM Period. You may set a high value for power saving consideration. Default value is 1, meaning that AP will have DTIM broadcast every beacon. If set to 10, AP will have DTIM broadcast every 10 beacons. Valid range: 1 – 10.
Multicast to Unicast	Once selected, AP will convert multicast streams into unicast streams over the wireless link. Which helps to enhance the quality and reliability of video/audio stream and preserve the bandwidth available to the non-video/audio clients.
Enable Voice Enterprise	Check to enable/disable Voice Enterprise. The roaming time will be reduced once enable voice enterprise. • The 802.11k standard helps clients to speed up the search for nearby APs that are available as roaming targets by creating an optimized list of channels.

	When the signal strength of the current AP weakens, your device will scan for target APs from this list. • When your client device roams from one AP to another on the same network, 802.11r uses a feature called Fast Basic Service Set Transition (FT) to authenticate more quickly. FT works with both pre-shared key (PSK) and 802.1X authentication methods. • 802.11v allows client devices to exchange information about the network topology, including information about the RF environment, making each client network aware, facilitating overall improvement of the wireless network. **Note:** 11R is required for enterprise audio feature, 11V and 11K are optional. *This field is available only when "Security Mode" is set to "WPA/WPA2" or "WPA2".*
Enable 11R	Check to enable 802.11r
Enable 11K	Check to enable 802.11k
Enable 11V	Check to enable 802.11v
ARP Proxy	This option will enable GWN AP to answer the ARP requests from its LAN for its connected WiFi clients. This is mainly to reduce the airtime consumed by ARP Packets

- **Device Membership**: Used to add or remove paired access points to the SSID.



Available Devices

00:0B:82:A6:45:38

Member Devices

00:0B:82:A6:43:5C

Figure 32: Device Membership

Click on ➡ to add the GWN7600/GWN7600LR to the SSID or click on ⬅ to remove it.

Mesh Network

In Mesh Network, wireless connection is established between multiple Aps, which is used to passthrough data traffic rather than client association. Each AP will evaluate the performance of wireless channel based on several factors and choose one or multiple appropriate APs to setup connection.

In a mesh network, access points are categorized to two types:

- **CAP (Central Access Point):** this is an access point that has an uplink connection to the wired network.
- **RE (Range Extender):** This is an access point that participate on the mesh network topology and has a wireless uplink connection to the central network.

In order to deploy mesh access points (RE), users/installers can follow below steps:

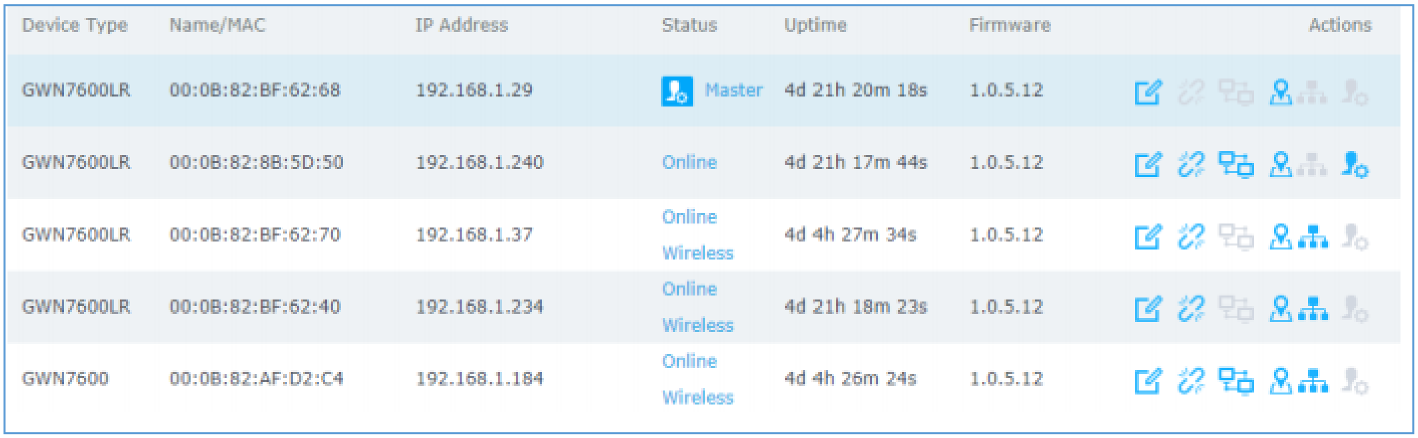
1. Make sure to have the master and CAP access points already deployed (sometimes the CAP access points can be the master controller of the network).
2. Next, we need to pair the RE access points to the master. This can be done in two ways:
   A. Connect all REs to the same wired LAN as the master then perform the normal process of discovery/pairing process, and after successfully pairing the APs they can be deployed on the field.

   B. REs can also be discovered wirelessly when powered via PSU or PoE Injector, and admin can configure them after discovery. This requires that the REs must be within the range of the Master or CAP Slave's signals coverage.

   Note: If there are other GWN APs broadcasting in the same field with different subnet, RE may be wirelessly connected to those networks and cannot be discovered and paired by your Master. Therefore, it is recommended to use the first method of wired pairing and then deploy those REs.

3. After that all slave access points have been deployed and paired to the master, you can directly manage them to operate the mesh network. Mesh service configuration is the same as transitional GWN WLAN.

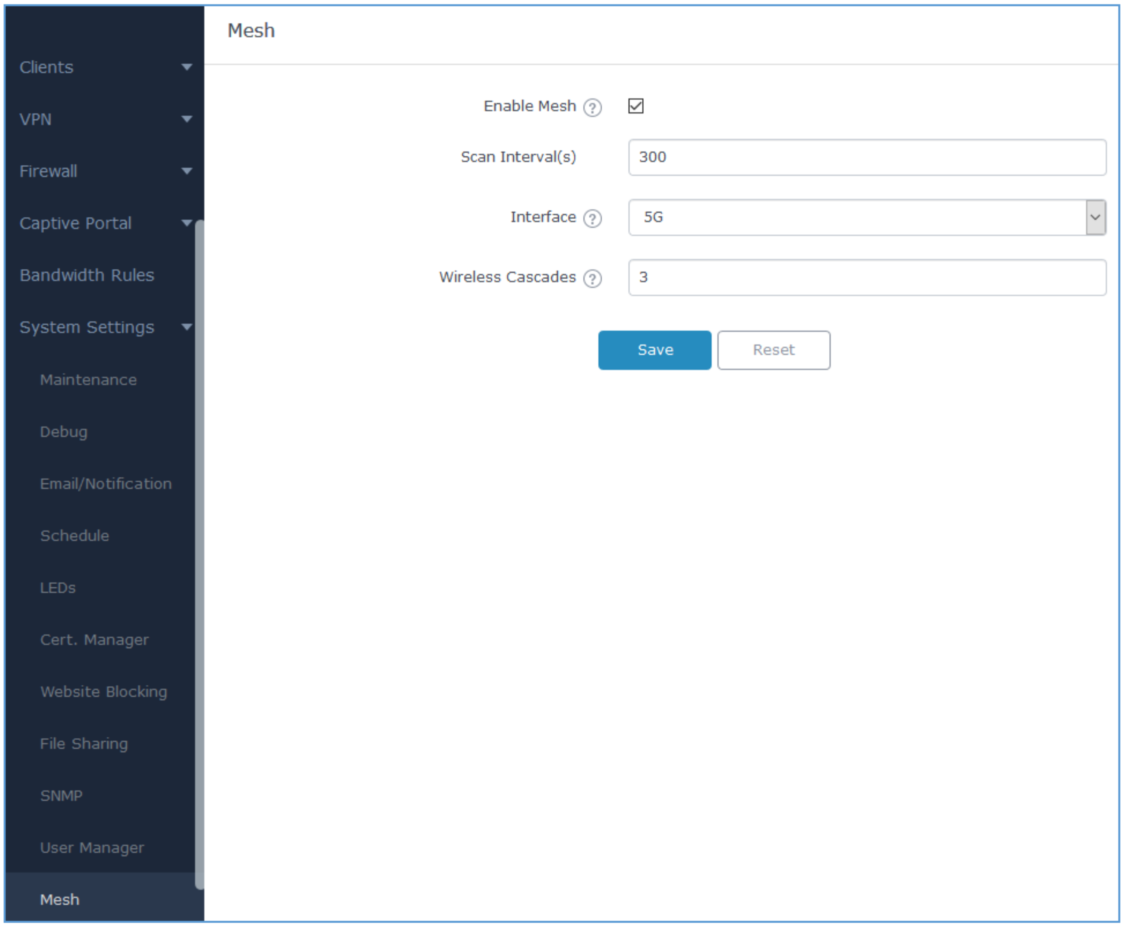
4. Log into the master page, and under Access Points page you can see the information, for example the AP in the "**Online Wireless**" state **is the RE** (Range Extender) with a wireless uplink to the CAP. The APs showing "**Online**" state are either a wired **master** or **CAP**.



Device Type	Name/MAC	IP Address	Status	Uptime	Firmware	Actions
GWN7600LR	00:0B:82:BF:62:68	192.168.1.29	Master	4d 21h 20m 18s	1.0.5.12	
GWN7600LR	00:0B:82:8B:5D:50	192.168.1.240	Online	4d 21h 17m 44s	1.0.5.12	
GWN7600LR	00:0B:82:BF:62:70	192.168.1.37	Online Wireless	4d 4h 27m 34s	1.0.5.12	
GWN7600LR	00:0B:82:BF:62:40	192.168.1.234	Online Wireless	4d 21h 18m 23s	1.0.5.12	
GWN7600	00:0B:82:AF:D2:C4	192.168.1.184	Online Wireless	4d 4h 26m 24s	1.0.5.12	

Figure 33: Access Points Status

For Global mesh network settings, navigate to the menu **"System Settings → Mesh"** for setting up the following parameters described below:



Mesh

Enable Mesh ☑

Scan Interval(s) 300

Interface 5G

Wireless Cascades 3

Figure 34: Mesh Settings

Filed	Description
Enable Mesh	When checked the Mesh feature will be activated.
Scan Interval	Interval in seconds to scan for available Mesh neighbors. Must be less than or equal to 300 seconds.
Interface	Select either 2.4GHz or 5GHz band.
Wireless cascades	Define how many AP can be cascaded wirelessly with the AP. The minimum value is 1 and maximum value is 3.

The following table describes the Mesh configuration settings.

Table 23: Wi-Fi

For more detailed information about GWN Mesh network feature, you may refer to the following technical document: Mesh Network Guide.

Upgrading Access Points

Single Access Point upgrade

If you want to upgrade a single access point, users need to select the AP then simply click on the Upgrade button to launch the upgrade process, the AP will use the same parameters configured for the router under the menu **System Settings → Maintenance → Upgrade.**

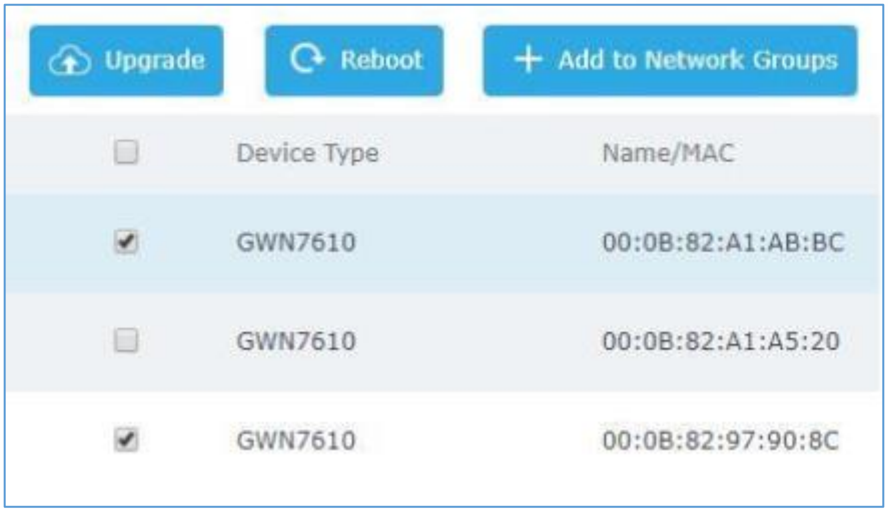
Otherwise, is users want to upgrade many devices at the same time, make sure to select all desired access points, then press the Upgrade button, the router will give the option to choose between upgrading all access points at once which will result in all the devices downloading the firmware at the same time and consuming bandwidth or making sequential upgrade which is the recommended option described below.

Sequential Upgrade

If you choose multiple slave devices to upgrade their firmware, two options are available: “All-at-Once” and “Sequential”. “All-at-Once” will use the default method, all checked slaves will upgrade their firmware at the same time, while using “Sequential” upgrade method, the slaves will upgrade their firmware one by one in order to:

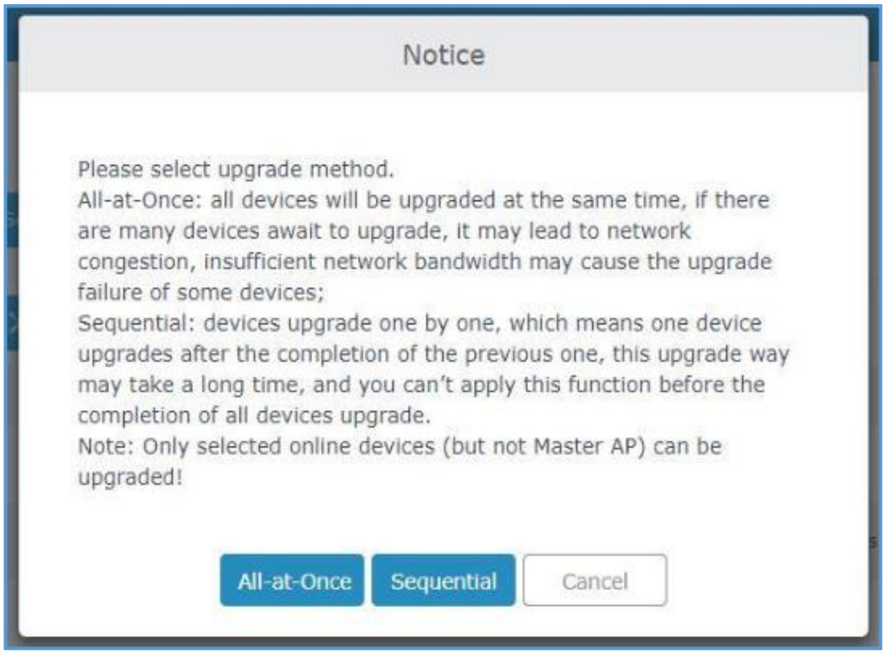
- Avoid entire Wi-Fi service interruption by full system firmware upgrade.

- Reduce network bandwidth consumption caused by firmware downloading.



□	Device Type	Name/MAC
☑	GWN7610	00:0B:82:A1:AB:BC
□	GWN7610	00:0B:82:A1:A5:20
☑	GWN7610	00:0B:82:97:90:8C

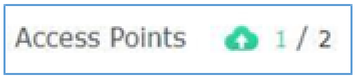
Figure 35: Sequential Upgrade - Choosing Multiple Devices



Notice

Please select upgrade method.
All-at-Once: all devices will be upgraded at the same time, if there are many devices await to upgrade, it may lead to network congestion, insufficient network bandwidth may cause the upgrade failure of some devices;
Sequential: devices upgrade one by one, which means one device upgrades after the completion of the previous one, this upgrade way may take a long time, and you can't apply this function before the completion of all devices upgrade.
Note: Only selected online devices (but not Master AP) can be upgraded!

Figure 36: All-at-Once and Sequential Upgrade

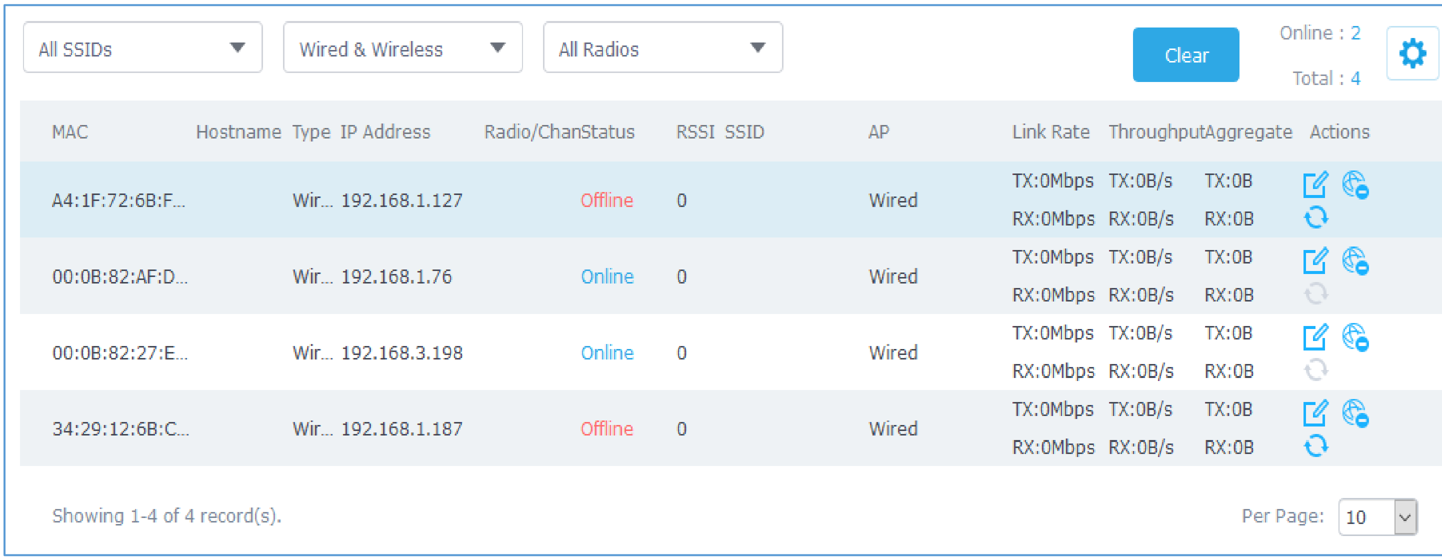
Once you choose sequential upgrade, the following icon  will update you about the number of upgraded slaves out of the selected slaves.

CLIENTS CONFIGURATION

Clients

Connected clients to different LAN subnets can be shown and managed from a single interface.
Clients list can be accessed from GWN7000's **Web GUI→Clients** to perform different actions to wired and wireless clients.

GWN7000 Enterprise Router with its DHCP server enabled on LAN ports level, will assign automatically an IP address to the devices connected to its LAN ports like a computer or GWN76xx access points and to wireless clients connected to paired GWN76xx access points.



MAC	Hostname	Type	IP Address	Radio/Chan	Status	RSSI	SSID	AP	Link Rate	Throughput	Aggregate	Actions
A4:1F:72:6B:F...		Wir...	192.168.1.127		Offline	0		Wired	TX:0Mbps RX:0Mbps	TX:0B/s RX:0B/s	TX:0B RX:0B	
00:0B:82:AF:D...		Wir...	192.168.1.76		Online	0		Wired	TX:0Mbps RX:0Mbps	TX:0B/s RX:0B/s	TX:0B RX:0B	
00:0B:82:27:E...		Wir...	192.168.3.198		Online	0		Wired	TX:0Mbps RX:0Mbps	TX:0B/s RX:0B/s	TX:0B RX:0B	
34:29:12:6B:C...		Wir...	192.168.1.187		Offline	0		Wired	TX:0Mbps RX:0Mbps	TX:0B/s RX:0B/s	TX:0B RX:0B	

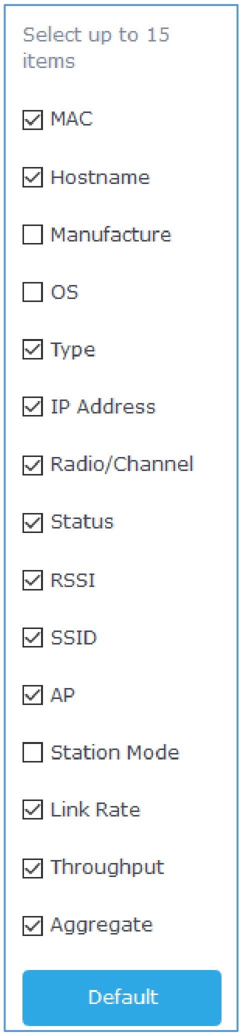
Showing 1-4 of 4 record(s).

Per Page: 10

Figure 37: Clients

- Click on ✎ under Actions to check client's status and modify basic settings such Device's Name.
- Click on ⊘ to block a client's MAC address from connecting to the zone's SSID.
- Click on ⟳ to release Wi-Fi offline client IP lease.

Users can press ⚙ button to customize items to display on the page. Following items are supported:



Select up to 15 items

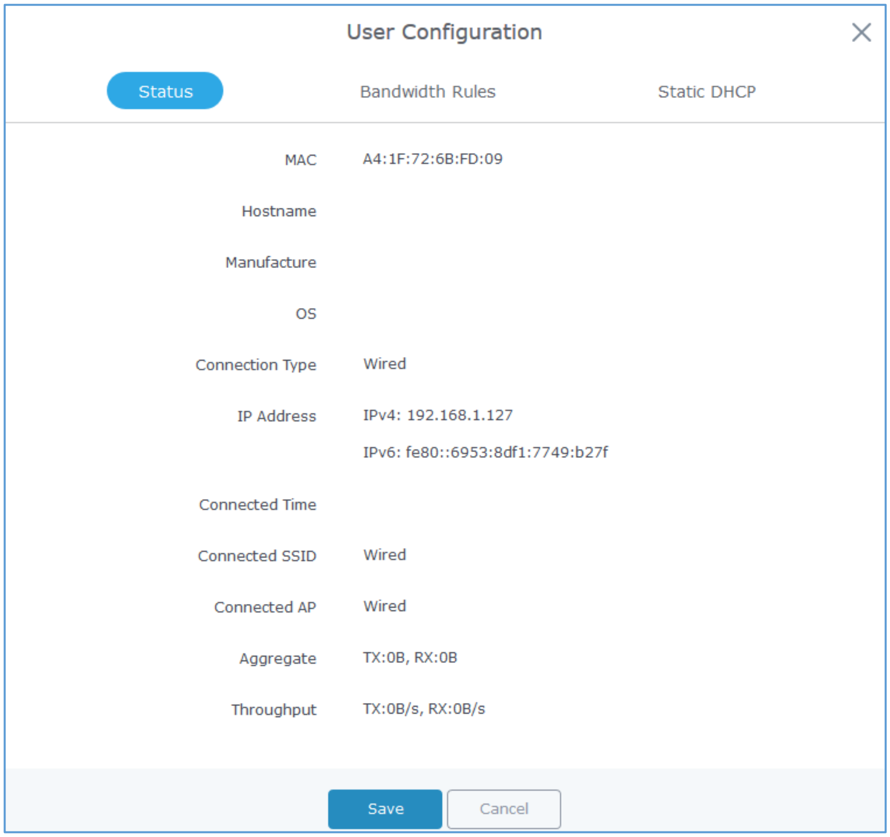
☑ MAC
☑ Hostname
□ Manufacture
□ OS
☑ Type
☑ IP Address
☑ Radio/Channel
☑ Status
☑ RSSI
☑ SSID
☑ AP
□ Station Mode
☑ Link Rate
☑ Throughput
☑ Aggregate

Figure 38: Clients - Select Items

Note: One of the enhancements on this section starting from 1.0.9.4 is the Link Rate that shows the client negotiated speed.

Status

Used to check user's basic information such as MAC address, IP address, which Network group does it belong to, and to which access point if it is a wireless client, as well as Throughput and Aggregate usage.

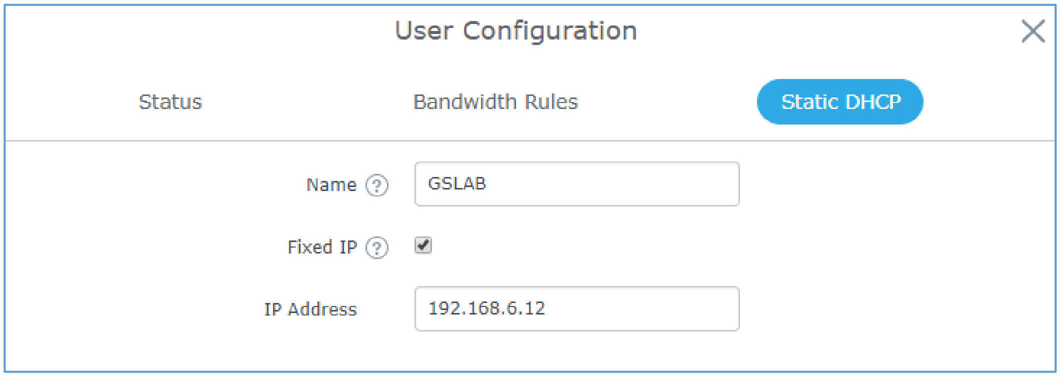

User Configuration

MAC	A4:1F:72:6B:FD:09
Hostname	
Manufacture	
OS	
Connection Type	Wired
IP Address	IPv4: 192.168.1.127 IPv6: fe80::6953:8df1:7749:b27f
Connected Time	
Connected SSID	Wired
Connected AP	Wired
Aggregate	TX:0B, RX:0B
Throughput	TX:0B/s, RX:0B/s

Figure 39: Client's Status

Edit IP and Name

Configuration tab allowing to set a name for a client and set a static IP.


User Configuration

Name	GSLAB
Fixed IP	☑
IP Address	192.168.6.12

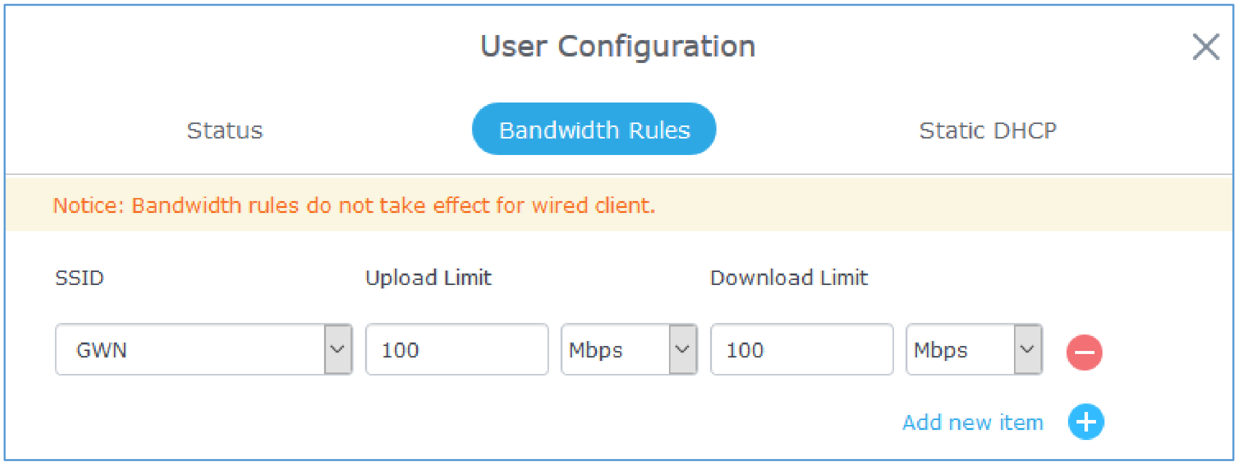
Figure 40: Client's Configuration

Bandwidth Rules

As mentioned on the ***BANDWIDTH RULES*** section, users can set bandwidth rules for upstream and downstream links per SSID, or per Client. For Clients users can set bandwidth rules by navigating to the menu **Client→Edit→Bandwidth Rules** then click add new item.

Note: Bandwidth rules apply for wireless clients **ONLY**.

The following figure shows the settings:



User Configuration

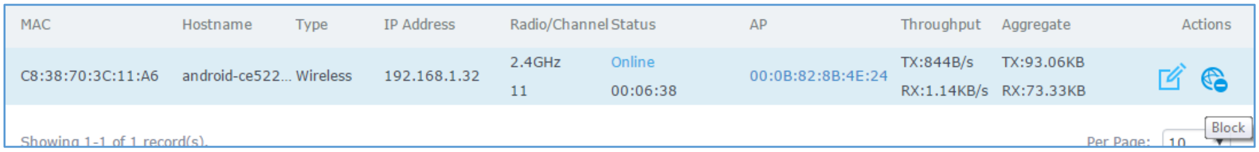
Notice: Bandwidth rules do not take effect for wired client.

SSID	Upload Limit		Download Limit	
GWN	100	Mbps	100	Mbps

Figure 41: Client Bandwidth Rules

Block a Client

To block a client, click on 🚫 under actions, this will add automatically the blocked client to *Banned Client MAC* list under **Router→Port→Global Settings.**

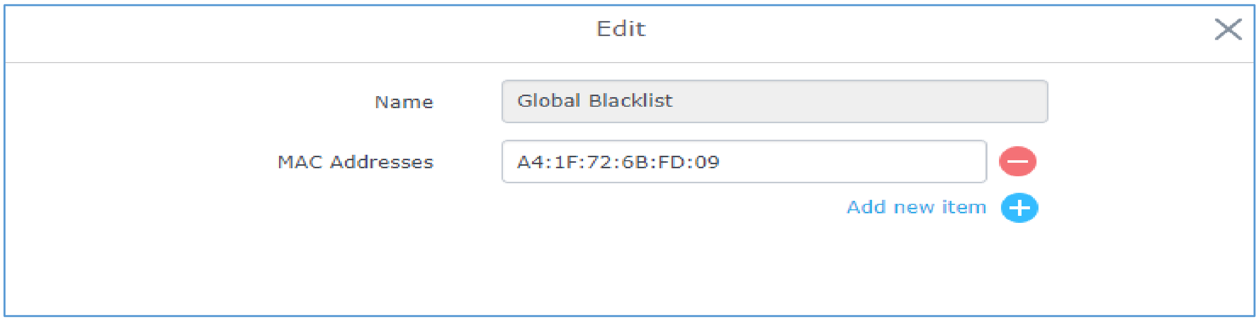


MAC	Hostname	Type	IP Address	Radio/Channel	Status	AP	Throughput	Aggregate	Actions
C8:38:70:3C:11:A6	android-ce522...	Wireless	192.168.1.32	2.4GHz 11	Online 00:06:38	00:0B:82:8B:4E:24	TX:844B/s RX:1.14KB/s	TX:93.06KB RX:73.33KB	

Showing 1-1 of 1 record(s).

Figure 42: Block a Client

To unban a client, go to **Router→Clients→Client Access.** The banned client will be to "Global Blacklist"; you will need to click on "Edit" then Click on ⊖ to remove it from the banned list**.**



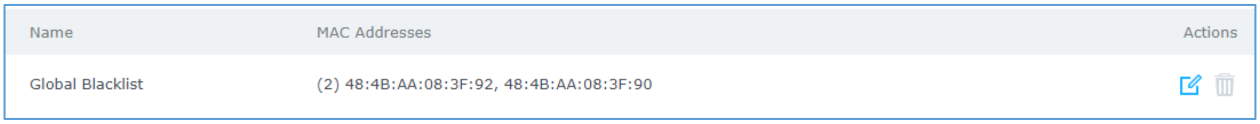
Edit

Name	Global Blacklist
MAC Addresses	A4:1F:72:6B:FD:09

Figure 43: Unban Client

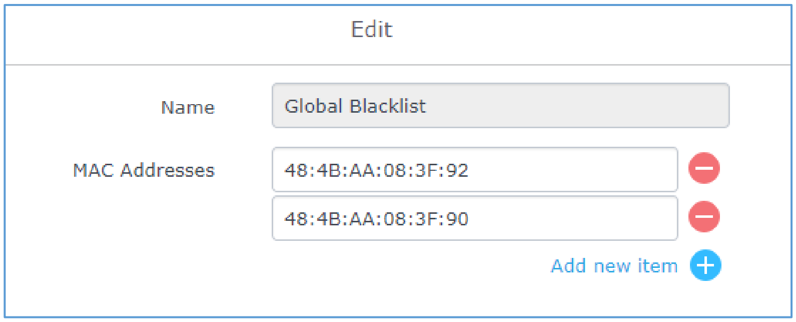
Clients Access

From this menu, users can manage in global and way the blacklist of clients that will be blocked from accessing the WiFi network, click on Client Access to add or remove MAC addresses of client from global blacklist.



Name	MAC Addresses	Actions
Global Blacklist	(2) 48:4B:AA:08:3F:92, 48:4B:AA:08:3F:90	

Figure 44: Global Blacklist



Edit

Name: Global Blacklist

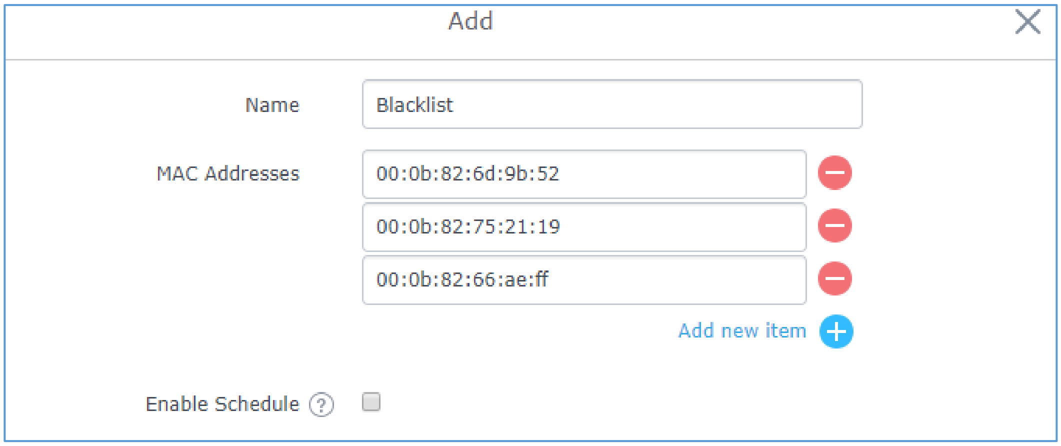
MAC Addresses: 48:4B:AA:08:3F:92

48:4B:AA:08:3F:90

Figure 45: Managing the Global Blacklist

A second option is to add custom access lists that will be used as matching mechanism for MAC address filtering option under SSIDs to allow (whitelist) or disallow (blacklist) clients access to the WiFi network.

Click on + Add in order to create new access list, then fill it with all MAC addresses to be matched and assign to it a schedule. Once this is done, this access list can be used under SSID WiFi settings to filter clients either using whitelist or blacklist mode.



Add

Name: Blacklist

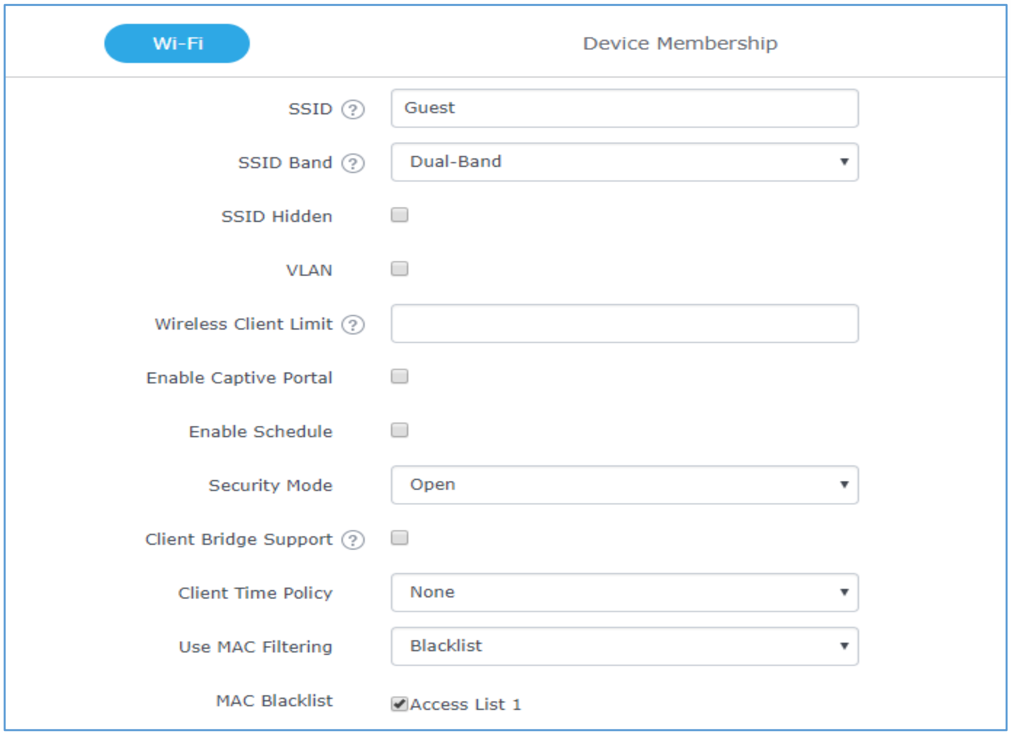
MAC Addresses: 00:0b:82:6d:9b:52

00:0b:82:75:21:19

00:0b:82:66:ae:ff

Enable Schedule ☐

Figure 46: Adding a MAC Access List



SSID: Guest

SSID Band: Dual-Band

SSID Hidden: □

VLAN: □

Wireless Client Limit:

Enable Captive Portal: □

Enable Schedule: □

Security Mode: Open

Client Bridge Support: □

Client Time Policy: None

Use MAC Filtering: Blacklist

MAC Blacklist: ☑ Access List 1

Figure 47: Blacklist Access List

Time Policy

The timed client disconnect feature allows the system administrator to set a fixed time for which clients should be allowed to connect to the access point, after which the client will no longer be allowed to connect for a user configurable cool-down period. The configuration is based on a policy where the administrator can set the amount of time for which clients are allowed to connect to the WiFi and reconnect type and value after which they will be allowed to connect back after they have been disconnected.

In order to create a new policy, go under **Clients→Time Policy** and add new one, then the following parameters:

Table 24: Time Policy Parameters

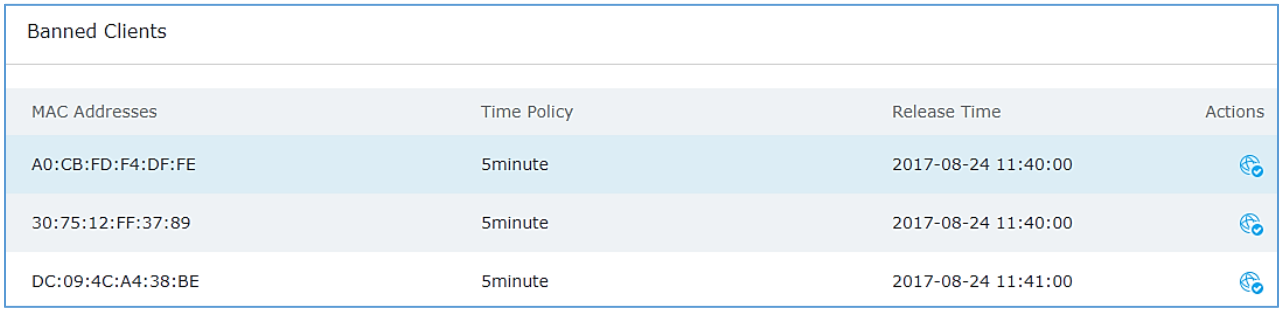
Option	Description
Name	Enter the name of the policy
Enabled	Check the box to enable the policy
Limit Client Connection Time	Sets amount of time a client may be connected.
Client Reconnect Timeout Type	Select the method with which we will reset a client's connection timer, so they may reconnect again. Options are: • Reset Daily. • Reset Weekly.

	• Reset Hourly. • Timed Reset.
Client Reconnect Timeout	If ‘Timed Reset’ is selected, this is the period for which the client will have to wait before reconnecting.
Hour of the Day	If Reset Daily is selected, this is the hour the reset will be applied.
Day of the Week	If Reset Weekly is selected, this is the day the reset will be applied.
Hour of the Week	If Reset Weekly is selected, this is the hour the reset will be applied.
Reset Hour	If Reset Weekly or Reset Daily is select, this is the hour and day the reset will be applied.

Note: Time tracking shall be accounted for on a per-policy basis, such that a client connected to any SSID assigned the time tracking policy will accrue a common counter, regardless of which SSID they are connected to (as long as those SSIDs all share the same time tracking policy).

Banned Clients

Click on Banned Clients to view the list of the clients that have been banned after time disconnect feature has taken effect, these clients will not be allowed to connect back until timeout reset or you can unblock a client by clicking on the icon 🌐 .



Banned Clients

MAC Addresses	Time Policy	Release Time	Actions
A0:CB:FD:F4:DF:FE	5minute	2017-08-24 11:40:00	🌐
30:75:12:FF:37:89	5minute	2017-08-24 11:40:00	🌐
DC:09:4C:A4:38:BE	5minute	2017-08-24 11:41:00	🌐

Figure 48: Ban/Unban Client

VPN (VIRTUAL PRIVATE NETWORK)

Overview

VPN allows the GWN7000 to be connected to a remote VPN server using PPTP, IPSec, L2TP/IPSec and OpenVPN® protocols, or configure an OpenVPN® server and generate certificates and keys for clients, VPN page can be accessed from the GWN7000 Web GUI→**VPN**.

OpenVPN® Server Configuration

To use the GWN7000 as an OpenVPN® server, you will need to start creating user account, OpenVPN® server certificates and client certificates. Before generating server/client certificates, it is requested to generate first the Certificate Authority (CA), which will help to issue server/clients certificates.

GWN7000 certificates can be managed from WebGUI→**System Settings→Cert. Manager**.

Generate Self-Issued Certificate Authority (CA)

A certificate authority (CA) is a trusted entity that issues electronic documents that verify a digital entity's identity on the Internet. The electronic documents (a.k.a. digital certificates) are an essential part of secure communication and play an important part in the public key infrastructure (PKI).

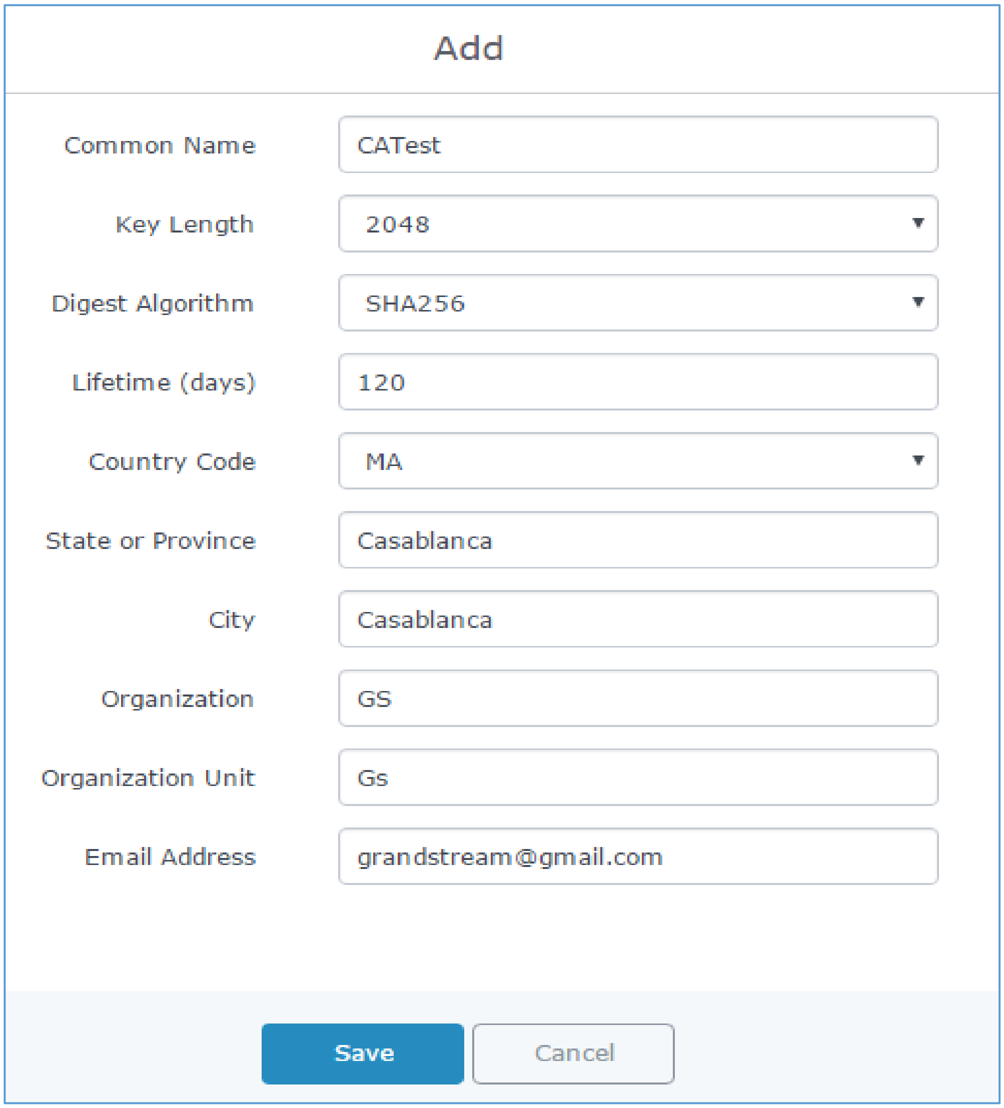
To create a Certification Authority (CA), follow below steps:

1. Navigate to "**System Settings→Cert. Manager→CAs**" on the GWN7000 web GUI.

2. Click on + Add button. A popup window will appear.

3. Enter the CA values including CN, Key Length, and Digest algorithm… depending on your needs.

   Refer to below figure showing an example of configuration and below table showing all available options with their respective description.



Add

Common Name	CATest
Key Length	2048
Digest Algorithm	SHA256
Lifetime (days)	120
Country Code	MA
State or Province	Casablanca
City	Casablanca
Organization	GS
Organization Unit	Gs
Email Address	grandstream@gmail.com

Figure 49: Create CA Certificate

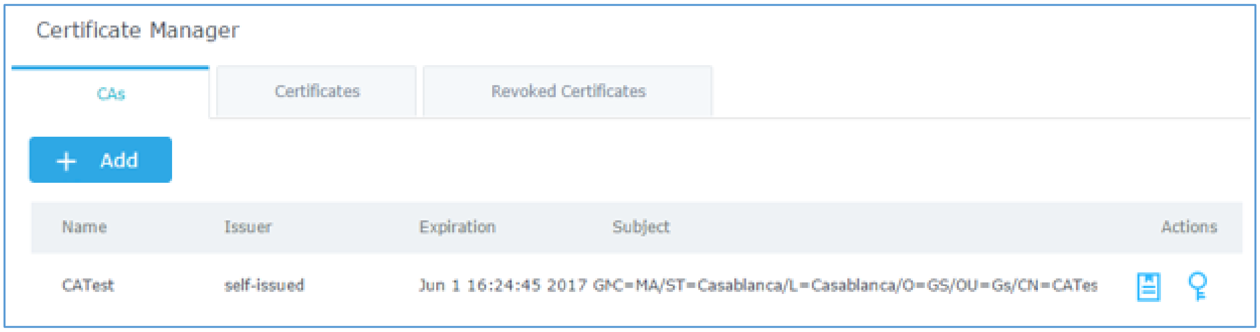
Table 25: CA Certificate

Field	Description
Common Name	Enter the common name for the CA. It could be any name to identify this certificate. Example: “CATest”.
Key Length	Choose the key length for generating the CA certificate. Following values are available: • **1024**: 1024-bit keys are no longer sufficient to protect against attacks. • **2048**: 2048-bit keys are a good minimum. (Recommended).

	- **4096**: 4096-bit keys are accepted by nearly all RSA systems. Using 4096-bit keys will dramatically increase generation time, TLS handshake delays, and CPU usage for TLS operations.
Digest Algorithm	Choose the digest algorithm: - **SHA1:** This digest algorithm provides a 160-bit fingerprint output based on arbitrary length input. - **SHA-256:** This digest algorithm generates an almost-unique, fixed size 256-bit (32-byte) hash. Hash is a one-way function – it cannot be decrypted back.
Lifetime (days)	Enter the validity date for the CA certificate in days. In our example, set to “120”.
Country Code	Select a country code from the dropdown list. Example: “MA”.
State or Province	Enter a state name or province. Example: “Casablanca”.
City	Enter a city name. Example: “Casablanca”.
Organization	Enter the organization name. Example: “GS”.
Organization Unit	Enter the organization unit name. Example: “Gs”.
Email Address	Enter an email address. Example: “grandstream@gmail.com”

4. Click on Save button after completing all the fields for the CA certificate.

5. Click on 🗎 button to export the CA to local computer. The CA file has extension “.crt”.


Certificate Manager

Name	Issuer	Expiration	Subject	Actions
CATest	self-issued	Jun 1 16:24:45 2017 G	C=MA/ST=Casablanca/L=Casablanca/O=GS/OU=Gs/CN=CATes	

Figure 50: CA Certificate

Generate Server/Client Certificates

Create both server and client certificates for encrypted communication between clients and GWN7000 acting as an OpenVPN® server.

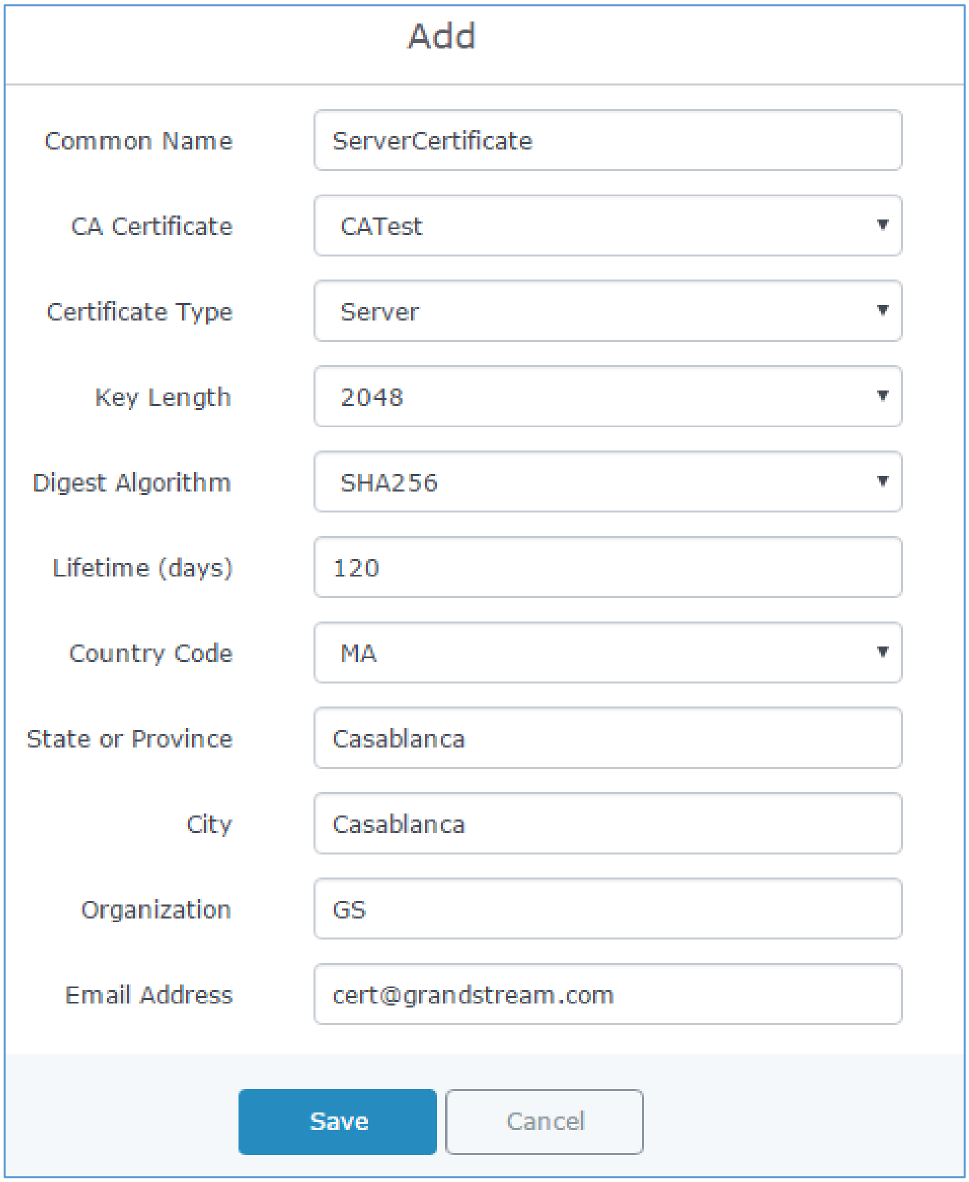
Creating Server Certificate

To create server certificate, follow below steps:

1. Navigate to "**System Settings→Cert. Manager→Certificates**".

2. Click on **+ Add** button. A popup window will appear.

   Refer to below figure showing an example of configuration and below table showing all available options with their respective description.



Add

Common Name: ServerCertificate

CA Certificate: CATest

Certificate Type: Server

Key Length: 2048

Digest Algorithm: SHA256

Lifetime (days): 120

Country Code: MA

State or Province: Casablanca

City: Casablanca

Organization: GS

Email Address: cert@grandstream.com

Figure 51: Generate Server Certificates

Table 26: Server Certificate

Field	Description
Common Name	Enter the common name for the server certificate. It could be any name to identify this certificate. Example: “ServerCertificate”.
CA Certificate	Select CA certificate previously generated from the drop-down list. Example: “CATest”.

Certificate Type	Choose the certificate type from the drop-down list. It can be either a client or a server certificate. Choose "Server" to generate server certificate.
Key Length	Choose the key length for generating the server certificate. Following values are available: • **1024**: 1024-bit keys are no longer sufficient to protect against attacks. Not recommended. • **2048**: 2048-bit keys are a good minimum. Recommended. • **4096**: 4096-bit keys are accepted by nearly all RSA systems. Using 4096-bit keys will dramatically increase generation time, TLS handshake delays, and CPU usage for TLS operations.
Digest Algorithm	Choose the digest algorithm: • **SHA1:** This digest algorithm provides a 160-bit fingerprint output based on arbitrary length input. • **SHA-256:** This digest algorithm generates an almost-unique, fixed size 256-bit (32-byte) hash. Hash is a one-way function – it cannot be decrypted back
Lifetime (days)	Enter the validity date for the server certificate in days. In our example, set to "120".
Country Code	Select a country code from the dropdown list. Example: "MA".
State or Province	Enter a state name or province. Example: "Casablanca".
City	Enter a city name. Example: "Casablanca".
Organization	Enter the organization name. Example: "GS".
Email Address	Enter an email address. Example: "Cert@grandstream.com".

3. Click on Save button after completing all the fields for the server certificate.

Click on button to export the server certificate file in ".crt" format.

Click on button to export the server key file in ". key" format.

Click on button to revoke the server certificate if no longer needed.

Notes:

- The server certificates (.crt and .key) will be used by the GWN7000 when acting as a server.
- The server certificates (.crt and .key) can be exported and used on another OpenVPN® server.

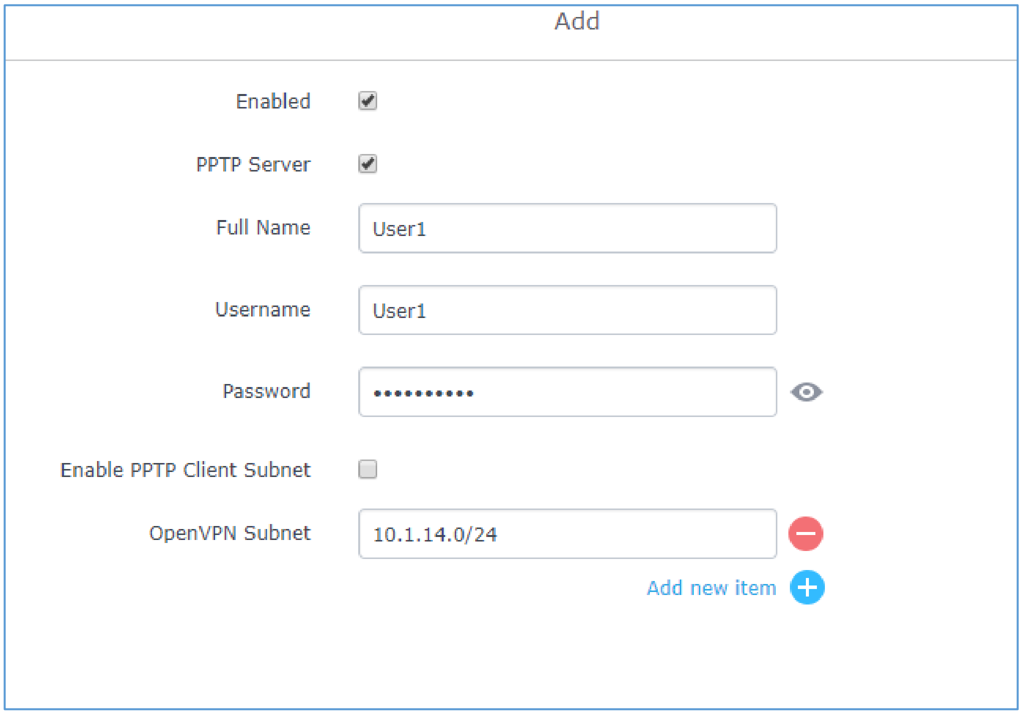
Creating Client Certificate

To create client certificate, follow below steps:

1- Create Users

a. Navigate to "**System Settings→User Manager**".

b. Click on + Add button. The following window will pop up.



Add

Enabled	☑
PPTP Server	☑
Full Name	User1
Username	User1
Password	•••••••••••
Enable PPTP Client Subnet	☐
OpenVPN Subnet	10.1.14.0/24

Figure 52: User Management

c. Enter User information based on below descriptions.

Field	Description
Enabled	Check to enable the user.
PPTP Server	Enable this option when using the account for PPTP client connection.
Full Name	Choose full name to identify the users.
Username	Choose username to distinguish client's certificate.
Password	Enter user password for each username.
Enable PPTP Client Subnet	Enable this option to configure the remote subnet reachable through the PPTP client.
Client Subnet	Enter the Subnet that exists behind the connected PPTP client.
OpenVPN Subnet	Used to indicate which networks are located behind the remote device when the user account is used by an OpenVPN client router to establish a site-to-site VPN.

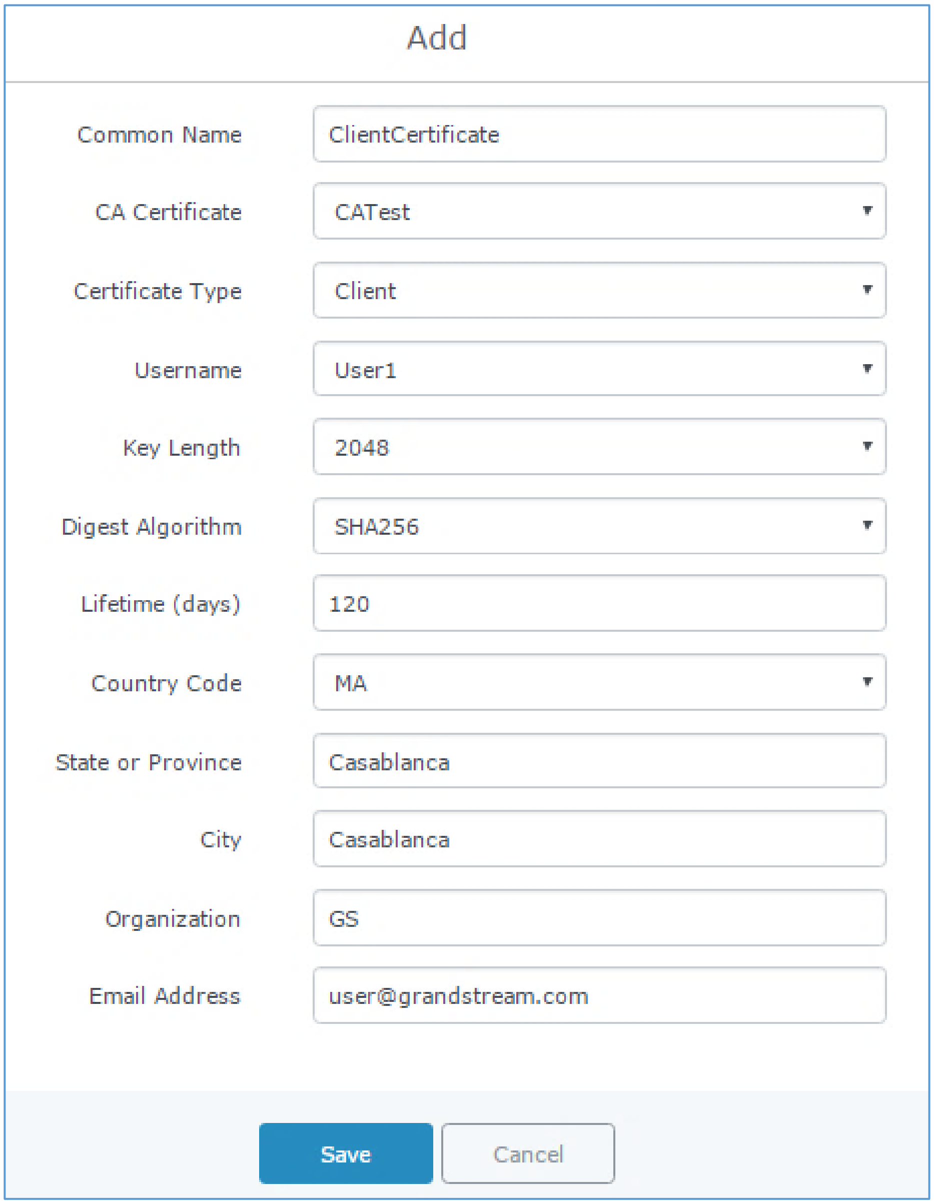
d. Repeat above steps for each user.

2- Create Client Certificate

a. Navigate under "**System Settings→Cert. Manager→Certificates**".

b. Click on + Add button. The following window will pop up.

c. Enter client certificate information based on below descriptions.



Add

Common Name	ClientCertificate
CA Certificate	CATest
Certificate Type	Client
Username	User1
Key Length	2048
Digest Algorithm	SHA256
Lifetime (days)	120
Country Code	MA
State or Province	Casablanca
City	Casablanca
Organization	GS
Email Address	user@grandstream.com

Figure 53: Client Certificate

Table 27: Client Certificate

Field	Description
Common Name	Enter the common name for the client certificate. It could be any name to identify this certificate. Example: “ClientCertificate”.
CA Certificate	Select the generated CA certificate from the drop-down list.
Certificate Type	Choose the certificate type from the drop-down list. It can be either a client or server certificate.
Username	Select created user to generate his certificate.

Key Length	Choose the key length for generating the client certificate. Following values are available: • **1024**: 1024-bit keys are no longer sufficient to protect against attacks. Not recommended. • **2048**: 2048-bit keys are a good minimum. Recommended. • **4096**: 4096-bit keys are accepted by nearly all RSA systems. Using 4096-bit keys will dramatically increase generation time, TLS handshake delays, and CPU usage for TLS operations.
Digest Algorithm	Choose the digest algorithm: • **SHA1:** This digest algorithm provides a 160-bit fingerprint output based on arbitrary length input. • **SHA-256:** This digest algorithm generates an almost-unique, fixed size 256-bit (32-byte) hash. Hash is a one-way function – it cannot be decrypted back
Lifetime (days)	Enter the validity date for the client certificate in days. Example: "120".
Country Code	Select a country code from the dropdown list. Example: "MA".
State or Province	Enter a state name or province. Example: "Casablanca".
City	Enter a city name. Example: "Casablanca".
Organization	Enter the organization name. Example: "GS".
Email Address	Enter an email address. Example: "user@grandstream.com".

d. Click on Save after completing all the fields for the client certificate.

e. Click on 📄 to export the client certificate file in ".crt" format.

f. Click on 🔑 to export the client key file in ".key" format.

Click on to revoke the client certificate if no longer needed.

The client certificates (“.crt” and “.key”) will be used by clients connected to the GWN7000 in order to establish TLS handshake.

Notes:

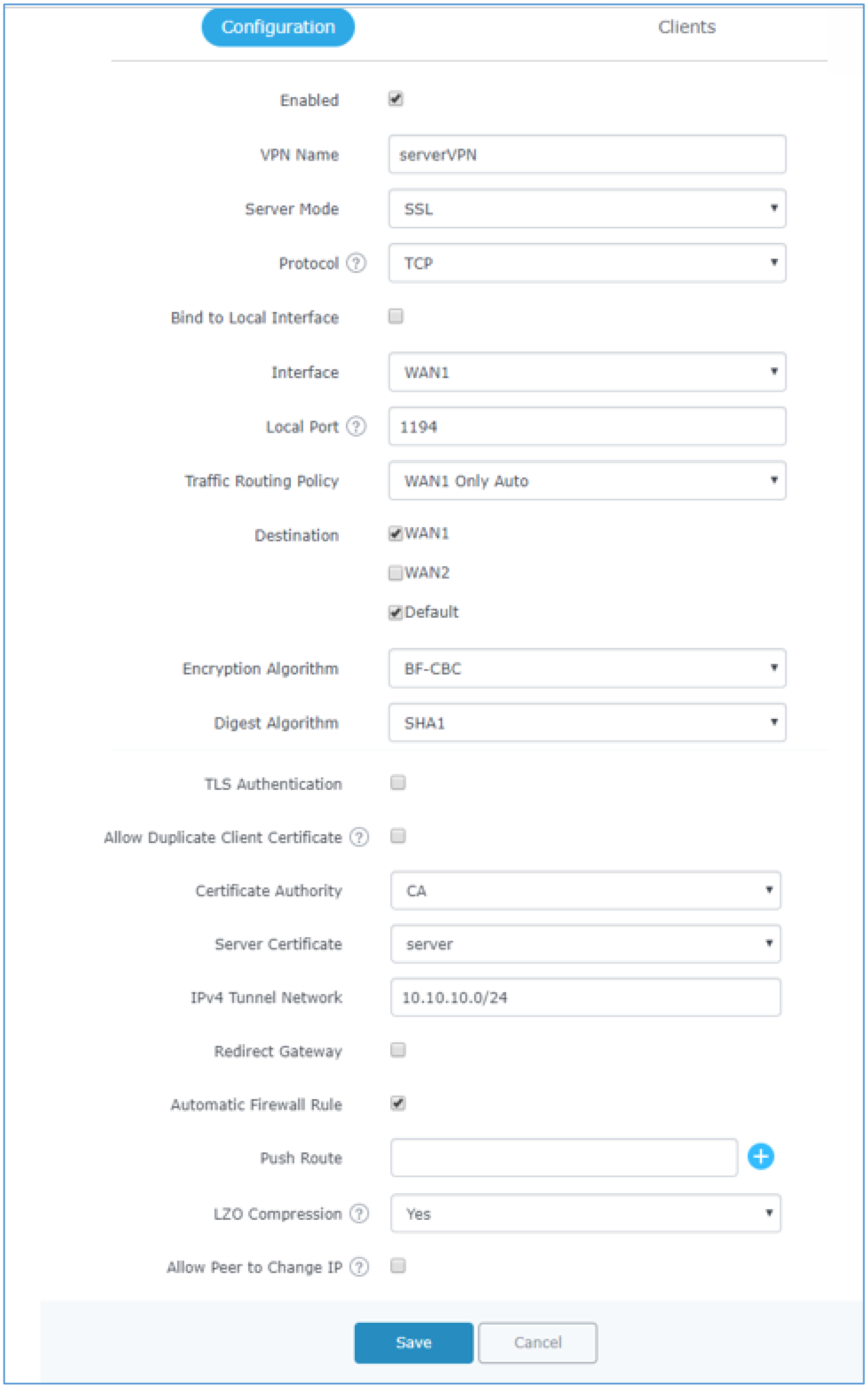
- Client certificates generated from the GWN7000 need to be uploaded to the clients.
- For security improvement, each client needs to have his own username and certificate, this way even if a user is compromised, other users will not be affected.

Create OpenVPN® Server

Once client and server certificates are successfully created, you can create a new server, so that clients can be connected to it, by navigating under “VPN→OpenVPN®→Server”.

To create a new VPN server, follow below steps:

1. Click on + Add and the following window will pop up.



Enabled	☑
VPN Name	serverVPN
Server Mode	SSL
Protocol ⓘ	TCP
Bind to Local Interface	□
Interface	WAN1
Local Port ⓘ	1194
Traffic Routing Policy	WAN1 Only Auto
Destination	☑ WAN1 □ WAN2 ☑ Default
Encryption Algorithm	BF-CBC
Digest Algorithm	SHA1
TLS Authentication	□
Allow Duplicate Client Certificate ⓘ	□
Certificate Authority	CA
Server Certificate	server
IPv4 Tunnel Network	10.10.10.0/24
Redirect Gateway	□
Automatic Firewall Rule	☑
Push Route	
LZO Compression ⓘ	Yes
Allow Peer to Change IP ⓘ	□

Figure 54: Create OpenVPN® Server

Table 28: OpenVPN® Server

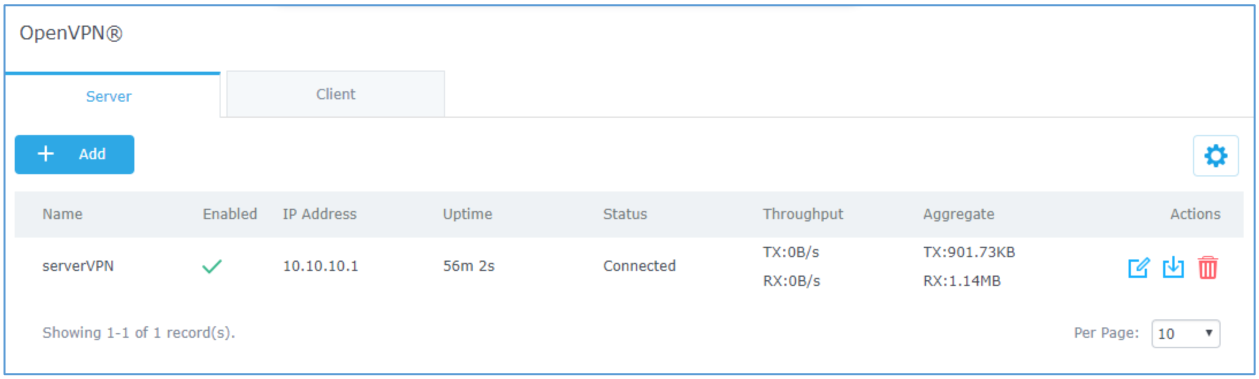
Field	Description
Enable	Click on the checkbox to enable the OpenVPN® server feature.
VPN Name	Enter a name for the OpenVPN® server.
Server Mode	Choose the server mode the OpenVPN® server will operate with. 4 modes are available: • **PSK:** Used to establish a point-to-point OpenVPN® configuration. A VPN tunnel will be created with a server endpoint of a specified IP and a client endpoint of specified IP. Encrypted communication between client and server will occur over UDP port 1194, the default OpenVPN® port. • **SSL:** Authentication is made using certificates only (no user/pass authentication). Each user has a unique client configuration that includes their personal certificate and key. This is useful if clients should not be prompted to enter a username and password, but it is less secure as it relies only on something the user has (TLS key and certificate). • **User Auth:** Authentication is made using only CA, user and password, no certificates. Useful if the clients should not have individual certificates. Less secure as it relies on a shared TLS key plus only something the user knows (Username/password). • **SSL + User Auth:** Requires both certificate and username / password. Each user has a unique client configuration that includes their personal certificate and key. Most secure as there are multiple factors of authentication (TLS Key and Certificate that the user has, and the username/password they know).
Protocol	Choose the Transport protocol from the dropdown list, either TCP or UDP. The default protocol is UDP.
Bind to Local Interface	Select the interface used to connect the GWN7000 to the uplink, either WAN1, WAN2, LAN or All.

Local Port	Configure the listening port for OpenVPN® server. The default value is 1194.
Traffic Routing Policy	Select which routing policy to assign to the traffic from this VPN network. See **Policy Routing** section in the GWN7000 usermanual.
Destination	Choose to which destination group or WAN to allow traffic from the VPN, this will generate automatically a forwarding rule under the menu **Firewall → Traffic Rules → Forward.**
Encryption Algorithm	Choose the encryption algorithm from the dropdown list to encrypt data so that the receiver can decrypt it using same algorithm.
Digest Algorithm	Choose digest algorithm from the dropdown list, which will uniquely identify the data to provide data integrity and ensure that the receiver has an unmodified data from the one sent by the original host.
TLS Authentication	This option uses a static Pre-Shared Key (PSK) that must be generated in advance and shared among all peers. This feature adds extra protection to the TLS channel by requiring that incoming packets have a valid signature generated using the PSK key.
TLS Pre-Shared Key	Enter the generated TLS Pre-Shared Key when using TLS Authentication.
Certificate Authority	Select a generated CA from the dropdown list.
Server Certificate	Select a generated Server Certificate from the dropdown list.
IPv4 Tunnel Network	Enter the network range that the GWN7000 will be serving from to the OpenVPN® client. **Note:** The network format should be the following **10.0.10.0/16**. The mask should be at least 16 bits.
Redirect Gateway	When redirect-gateway is used, OpenVPN® clients will route DNS queries through the VPN, and the VPN server will need to handle them.
Automatic Firewall Rule	Enable automatic firewall rule.
Push Route	Specify route(s) to be pushed to all clients. Example: 10.0.0.1/8
LZO Compression	Select whether to activate LZO compression or no, if set to “Adaptive”, the server will make the decision whether this option will be enabled or no.

Allow Peer to Change IP	Allow remote change the IP and/or Port, often applicable to the situation when the remote IP address changes frequently.

2. Click Save after completing all the fields.

3. Click Apply on top of the WebGUI in order to apply changes.



OpenVPN®

Server | Client

+ Add

Name	Enabled	IP Address	Uptime	Status	Throughput	Aggregate	Actions
serverVPN	✓	10.10.10.1	56m 2s	Connected	TX:0B/s RX:0B/s	TX:901.73KB RX:1.14MB	

Showing 1-1 of 1 record(s).

Per Page: 10

Figure 55: OpenVPN®

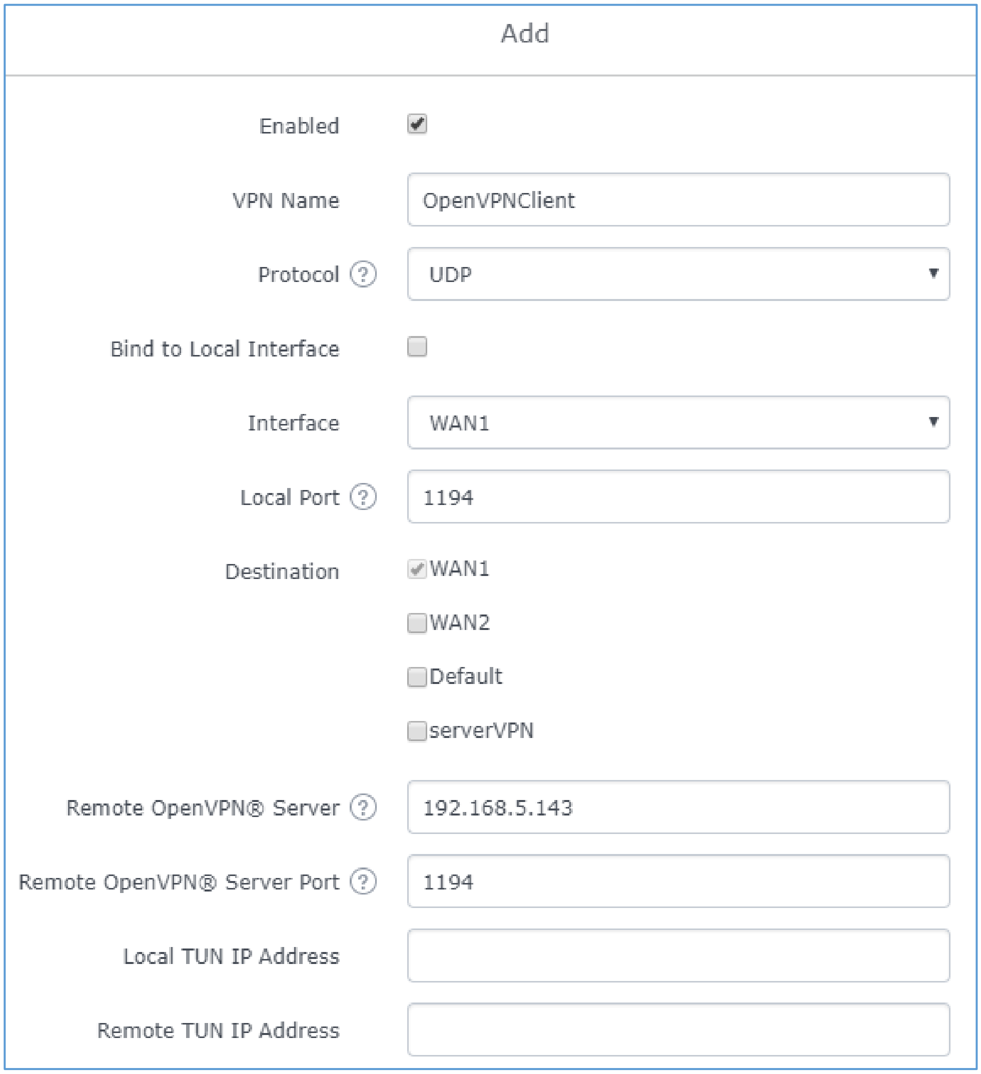
OpenVPN® Client Configuration

There are two ways to use the GWN7000 as an OpenVPN® client:

1) Upload client certificate created from an OpenVPN® server to GWN7000.
2) Create client/server certificates on GWN7000 and upload server certificate to the OpenVPN® server.

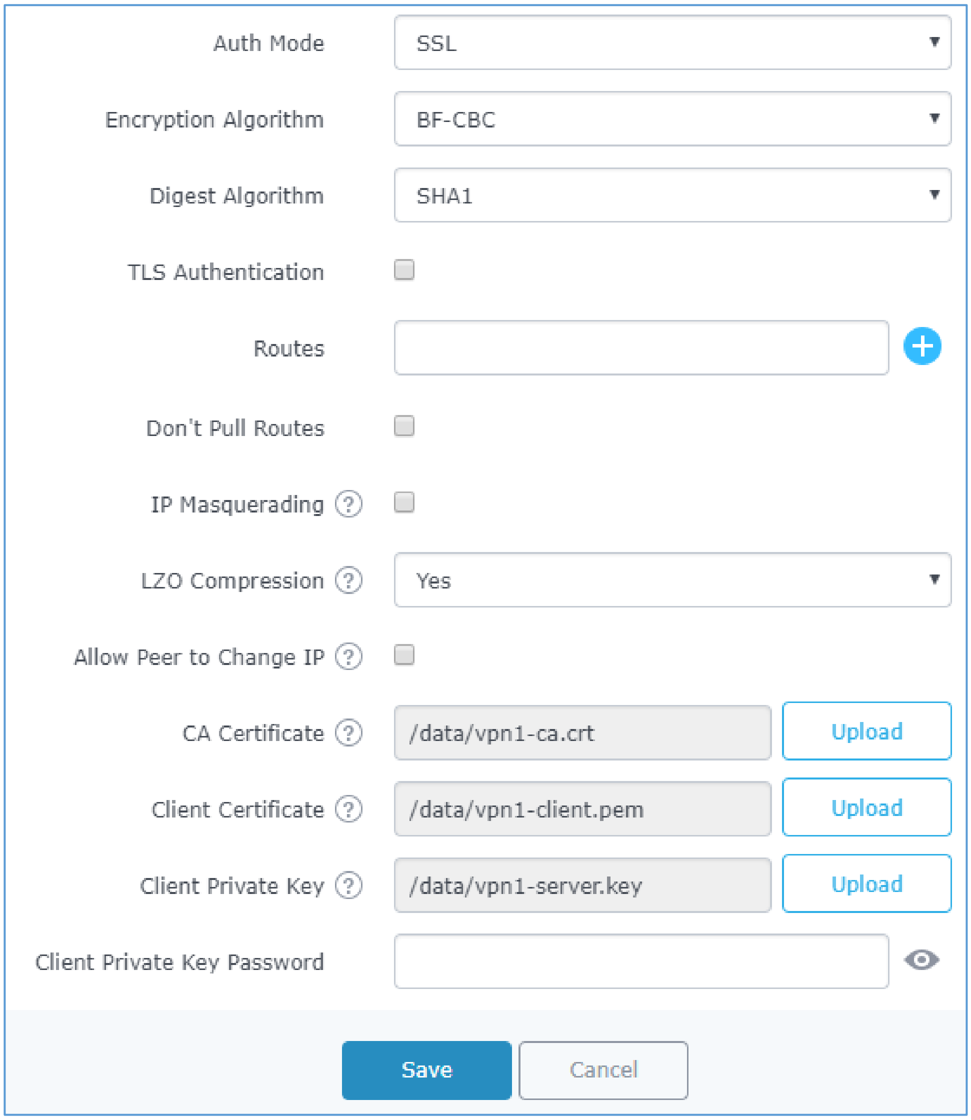
Go to "**VPN→OpenVPN®→Client**" and follow steps below:

1. Click on ⊕ Add and the following window will pop up.



Add

Enabled	☑
VPN Name	OpenVPNClient
Protocol ?	UDP ▾
Bind to Local Interface	□
Interface	WAN1 ▾
Local Port ?	1194
Destination	☑ WAN1 □ WAN2 □ Default □ serverVPN
Remote OpenVPN® Server ?	192.168.5.143
Remote OpenVPN® Server Port ?	1194
Local TUN IP Address	
Remote TUN IP Address	



Auth Mode	SSL
Encryption Algorithm	BF-CBC
Digest Algorithm	SHA1
TLS Authentication	□
Routes	
Don't Pull Routes	□
IP Masquerading	□
LZO Compression	Yes
Allow Peer to Change IP	□
CA Certificate	/data/vpn1-ca.crt
Client Certificate	/data/vpn1-client.pem
Client Private Key	/data/vpn1-server.key
Client Private Key Password	

Figure 56: OpenVPN® Client

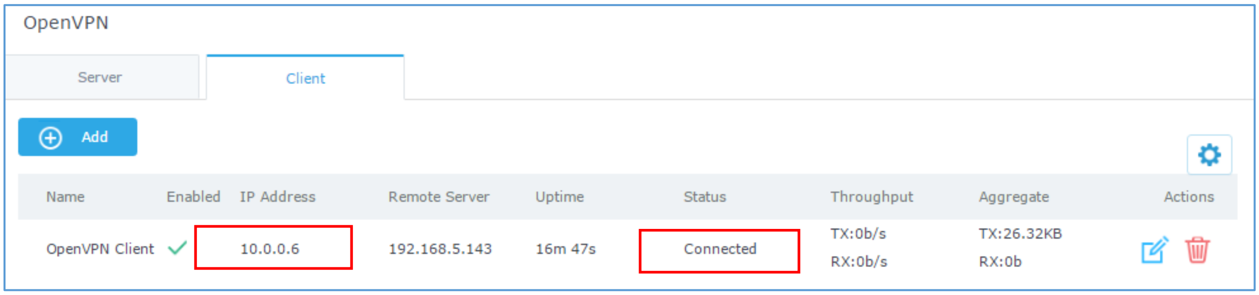
Table 29: OpenVPN® Client

Field	Description
Enable	Click on the checkbox to enable the OpenVPN® client feature.
VPN Name	Enter a name for the OpenVPN® client.
Protocol	Choose the Transport protocol from the dropdown list, either TCP or UDP. The default protocol is UDP.
Bind to Local	Select the interface used to connect the GWN7000 to the uplink, either WAN1, WAN2, LAN or All.
Interface	Select the interface used to connect the GWN7000 to the uplink, either WAN1, WAN2.
Local Port	Configure the listening port for OpenVPN® server. Default is 1194.
Destination	Choose to which destination group or WAN to allow traffic from the VPN, this will generate automatically a forwarding rule under the menu **Firewall → Traffic Rules → Forward.**
Remote OpenVPN® Server	Configure the remote OpenVPN® server IP address.
Remote OpenVPN® Server Port	Configure the remote OpenVPN® server port.
Local TUN IP address	Configures statically the local VPN tunnel IP address for the client.
Remote TUN IP address	Configures statically the local VPN tunnel IP address for the remote server.
Auth Mode	Choose the server mode the OpenVPN® server will operate with, 4 modes are available: • **PSK:** used to establish a point-to-point OpenVPN® configuration. A VPN tunnel will be created with a server endpoint of a specified IP and a client endpoint of specified IP. Encrypted communication between client and server will occur over UDP port 1194, the default OpenVPN® port. • **SSL:** Authentication is made using certificates only (no user/pass authentication). Each user has a unique client configuration that includes their personal certificate and key. This is useful if clients should not be prompted to enter a username and password, but it is less secure as it relies only on something the user has (TLS key and certificate). • **User Auth:** Authentication is made using only CA, user and password, no certificates. Useful if the clients should not have individual certificates.

	Less secure as it relies on a shared TLS key plus only something the user knows (Username/password). • **SSL + User Auth:** Requires both certificate and username / password. Each user has a unique client configuration that includes their personal certificate and key. Most secure, as there are multiple factors of authentication (TLS Key and Certificate that the user has, and the username/password they know).
Encryption Algorithm	Choose the encryption algorithm from the drop-down list, in order to encrypt data so that the receiver can decrypt it using the same algorithm.
Digest Algorithm	Choose the digest algorithm from the drop-down list, which will uniquely identify the data to provide data integrity and ensure that the receiver has an unmodified data from the one sent by the original host.
TLS Authentication	This option uses a static Pre-Shared Key (PSK) that must be generated in advance and shared among all peers. This feature adds extra protection to the TLS channel by requiring that incoming packets have a valid signature generated using the PSK key.
TLS Pre-Shared Key	Enter the generated TLS Pre-Shared Key when using TLS Authentication.
Routes	This feature allows specifying and adding custom routes.
Don’t Pull Routes	If enabled, client will ignore routes pushed by the server.
IP Masquerading	This feature is a form of network address translation (NAT) which allows internal computers with no known address outside their network, to communicate to the outside. It allows one machine to act on behalf of other machines.
LZO Compression	LZO encoding provides a very high compression ratio with good performance. LZO encoding works especially well for CHAR and VARCHAR columns that store very long character strings.
Allow Peer to Change IP	Allow remote change the IP and/or Port, often applicable to the situation when the remote IP address changes frequently.
CA Certificate	Click on “Upload” and select the “CA” certificate generated previously on this guide.
Client Certificate	Click on “Upload” and select the “Client Certificate” generated previously on this guide.

Client Private Key	Click on "Upload" and select the "Client Private Key" generated previously on this guide.
Client Private Key Password	Enter the client private key password

2. Click Save after completing all the fields.
3. Click Apply on top of the web GUI to apply changes.



OpenVPN

Name	Enabled	IP Address	Remote Server	Uptime	Status	Throughput	Aggregate	Actions
OpenVPN Client	✓	10.0.0.6	192.168.5.143	16m 47s	Connected	TX:0b/s RX:0b/s	TX:26.32KB RX:0b	

Figure 57: OpenVPN® Client

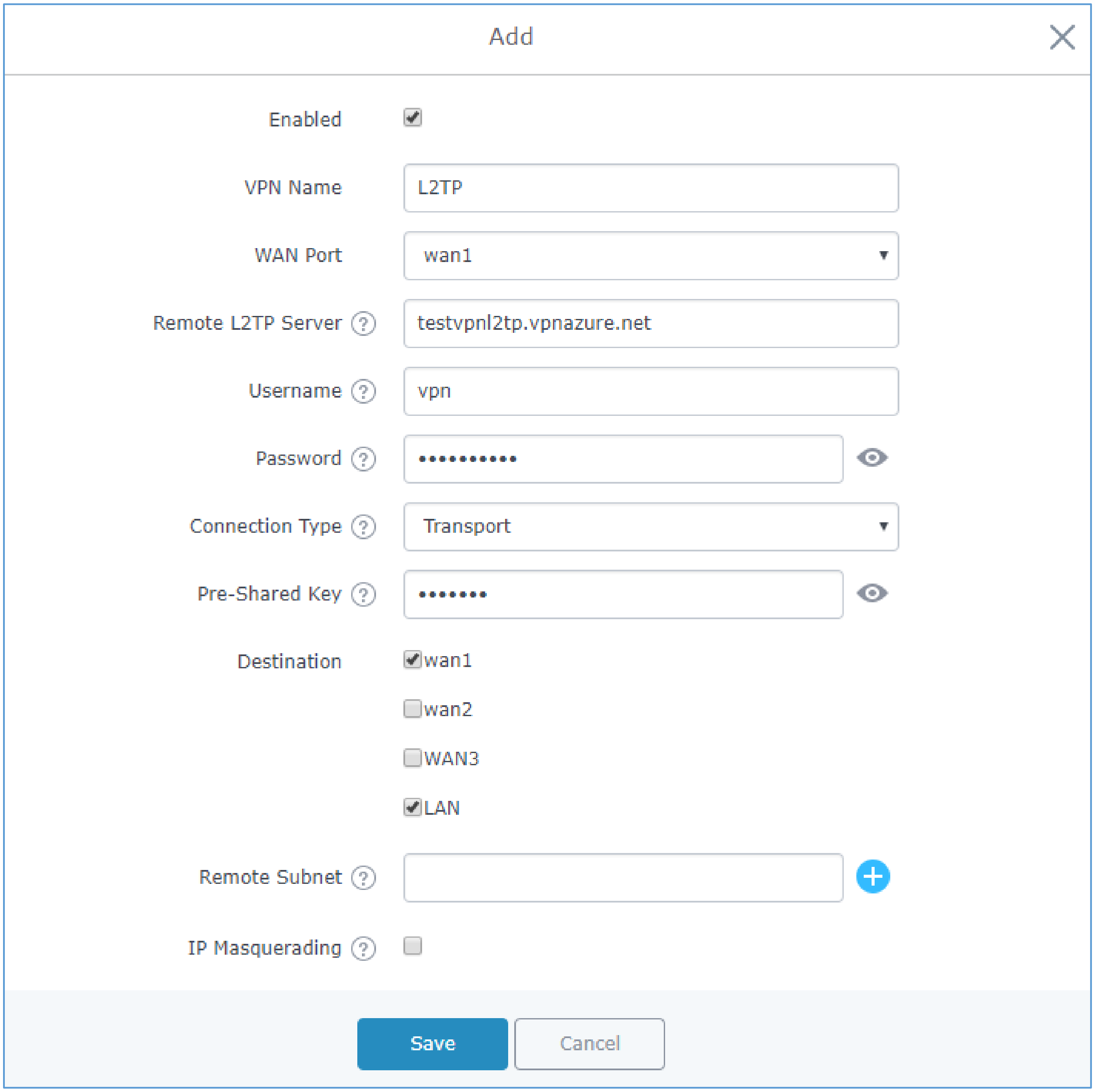
L2TP/IPSEC Configuration

Layer 2 Tunneling Protocol (L2TP) is a tunneling protocol used to support virtual private networks (VPNs) or as part of the delivery of services by ISPs. It does not provide any encryption or confidentiality by itself. Rather, it relies on an encryption protocol that it passes within the tunnel to provide privacy.

GWN7000 L2TP/IPSec Client Configuration

To configure L2TP client on the GWN7000, navigate under "**VPN→L2TP/IPSec**" and set the following:

1- Click on + Add and the following window will pop up.



Add

Enabled ☑

VPN Name: L2TP

WAN Port: wan1

Remote L2TP Server: testvpnl2tp.vpnazure.net

Username: vpn

Password: ••••••••••••

Connection Type: Transport

Pre-Shared Key: ••••••••

Destination: ☑ wan1 ☐ wan2 ☐ WAN3 ☑ LAN

Remote Subnet:

IP Masquerading ☐

Figure 58: L2TP Client Configuration

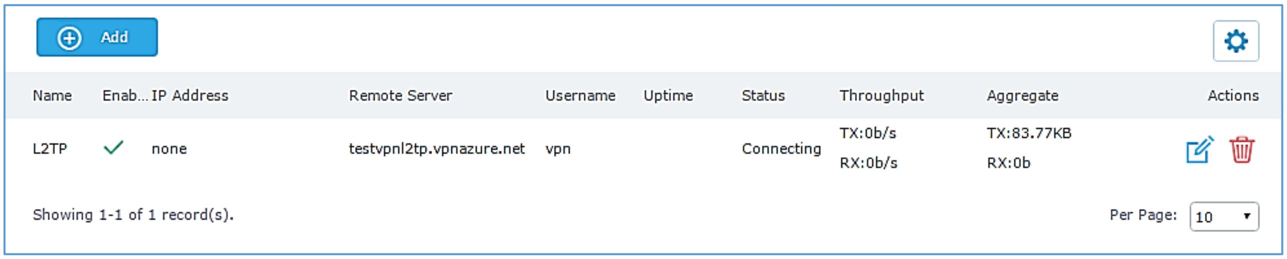
Table 30: L2TP Configuration

Field	Description
Enable	Click on the checkbox in order to enable the L2TP client feature.
VPN Name	Enter a name for the L2TP client.
WAN Port	Select which WAN port is connected to the uplink, either WAN1 or WAN2.
Remote L2TP Server	Enter the IP/Domain of the remote L2TP Server.

Username	Enter the Username for authentication against the VPN Server.
Password	Enter the Password for authentication against the VPN Server.
Connection Type	Select either Transport mode or Tunnel mode: • **Transport mode** is commonly used between end stations or between an end station and a gateway, if the gateway is being treated as a host. • **Tunnel mode** is used between gateways, or at an end station to a gateway, the gateway acting as a proxy for the hosts behind it.
Pre-Shared Key	Enter the L2TP pre-shared key.
Remote Subnet	Configures the remote subnet for the VPN. The format should be "IP/Mask" where IP could be either IPv4 or IPv6 and mask is a number between 1 and 32. For example: 192.168.5.0/24
IP Masquerading	This feature is a form of network address translation (NAT) which allows internal computers with no known address outside their network, to communicate to the outside. It allows one machine to act on behalf of other machines.
Masq Source	This option allows the user to configure the local subnets that needs to be masqueraded.
Use DNS from Server	Enable this option to retrieve DNS from the VPN server.
Keepalive	Specifies the keepalive failure value "n". if ppp doesn't receive LCP response from "n" LCP echo-request frames, then the connection to the peer will be terminated. If this option is set LCP echo-request will be sent to the peer for every 5 sec by default.
Use Built-in IPv6 management	Enable the IPv6 management for the VPN.
Connection retries	Configures the number of attempts to reconnect the L2TP client, if this number is exceeded, the client will be disconnected from the L2TP/IP Server.

2- Click Save after completing all the fields.

3- Click Apply on top of the web GUI to apply changes.



Name	Enab...	IP Address	Remote Server	Username	Uptime	Status	Throughput	Aggregate	Actions
L2TP	✓	none	testvpnl2tp.vpnazure.net	vpn		Connecting	TX:0b/s RX:0b/s	TX:83.77KB RX:0b	

Showing 1-1 of 1 record(s).

Per Page: 10

Figure 59: L2TP Client

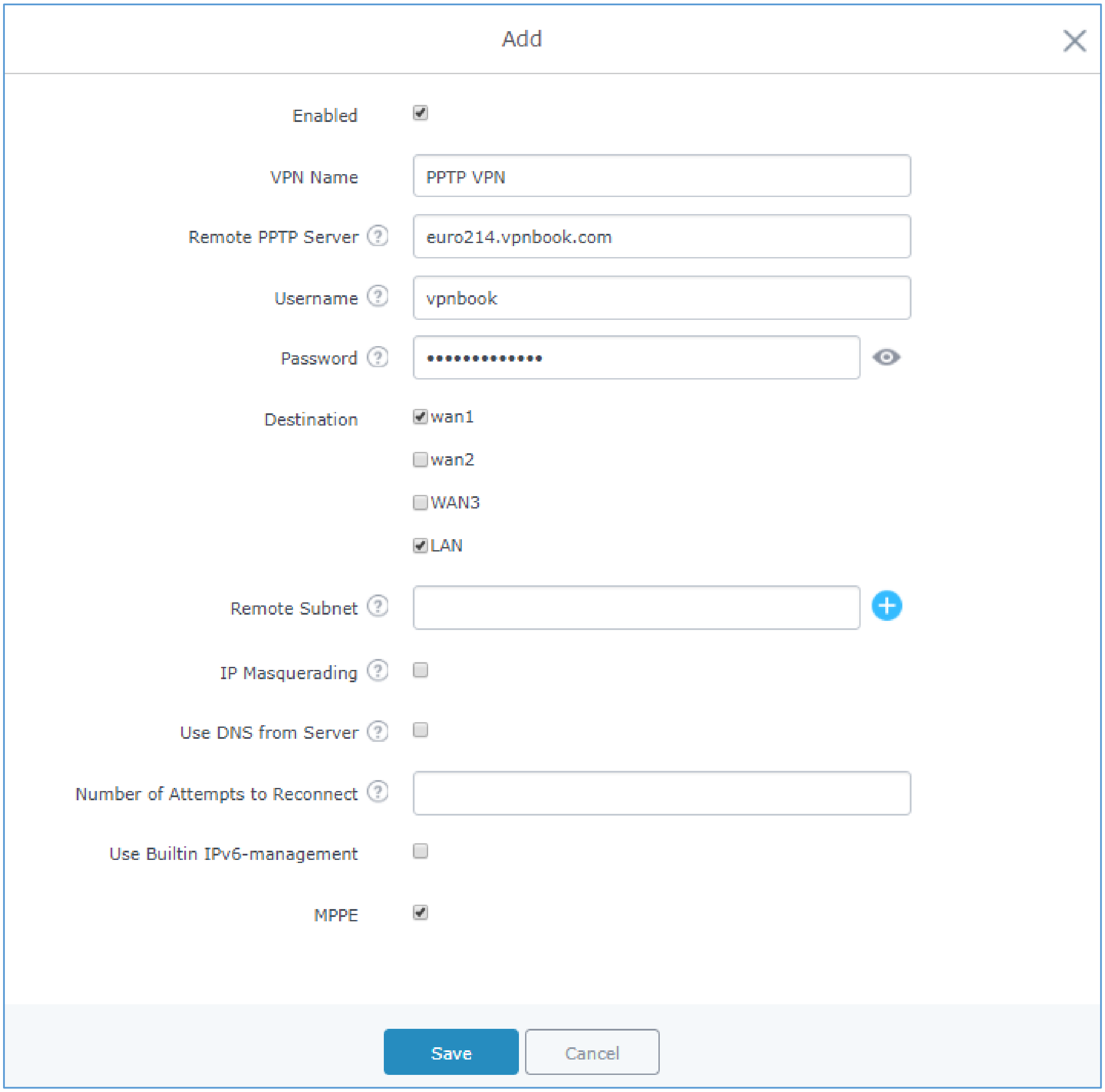
PPTP CONFIGURATION

A data-link layer protocol for wide area networks (WANs) based on the Point-to-Point Protocol (PPP) and developed by Microsoft that enables network traffic to be encapsulated and routed over an unsecured public network such as the Internet. Point-to-Point Tunneling Protocol (PPTP) allows the creation of virtual private networks (VPNs), which tunnel TCP/IP traffic through the Internet.

GWN7000 Client Configuration

To configure PPTP client on the GWN7000, navigate under “**VPN→PPTP**” and set the following:

1- Click on + Add and the following window will pop up.



Add

Enabled	☑
VPN Name	PPTP VPN
Remote PPTP Server	euro214.vpnbook.com
Username	vpnbook
Password	••••••••••••••
Destination	☑ wan1 □ wan2 □ WAN3 ☑ LAN
Remote Subnet	
IP Masquerading	□
Use DNS from Server	□
Number of Attempts to Reconnect	
Use Builtin IPv6-management	□
MPPE	☑

Figure 60: PPTP Client Configuration

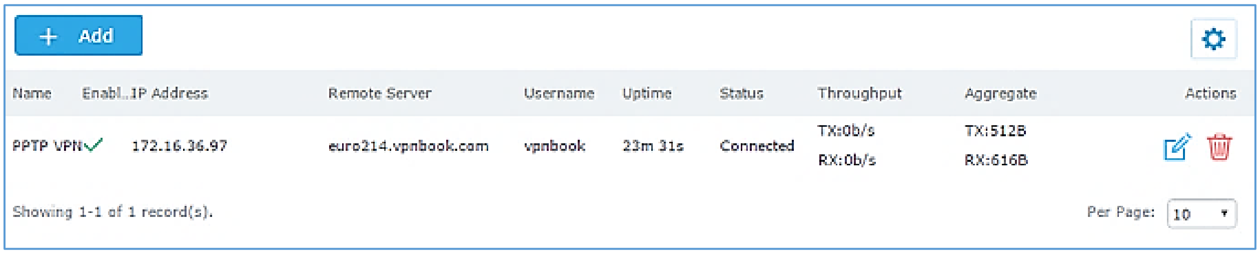
Table 31: PPTP Configuration

Field	Description
Enable	Click on the checkbox to enable the PPTP VPN client feature.
VPN Name	Enter a name for the PPTP client.
Remote PPTP Server	Enter the IP/Domain of the remote PPTP Server.
Username	Enter the Username for authentication against the VPN Server.
Password	Enter the Password for authentication against the VPN Server.

Destination	Choose to which destination group or WAN to allow traffic from the VPN, this will generate automatically a forwarding rule under the menu **Firewall → Traffic Rules → Forward.**
Remote Subnet	Configures the remote subnet for the VPN. The format should be “IP/Mask” where IP could be either IPv4 or IPv6 and mask is a number between 1 and 32. For example: 192.168.5.0/24
IP Masquerading	This feature is a form of network address translation (NAT) which allows internal computers with no known address outside their network, to communicate to the outside. It allows one machine to act on behalf of other machines.
Use DNS from Server	Enable this option to retrieve DNS from the VPN server.
Number of Attempts to Reconnect	Configures the number of attempts to reconnect the PPTP client, if this number is exceeded, the client will be disconnected from the PPTP Server.
Use Built-in IPv6 management	Enable the IPv6 management for the VPN.
MPPE	Enable / disable the MPPE for data encryption. By default, it’s disabled.

2- Click Save after completing all the fields.

3- Click Apply on top of the web UI to apply changes.



Name	Enabl..	IP Address	Remote Server	Username	Uptime	Status	Throughput	Aggregate	Actions
PPTP VPN	✓	172.16.36.97	euro214.vpnbook.com	vpnbook	23m 31s	Connected	TX:0b/s RX:0b/s	TX:512B RX:616B	

Showing 1-1 of 1 record(s).

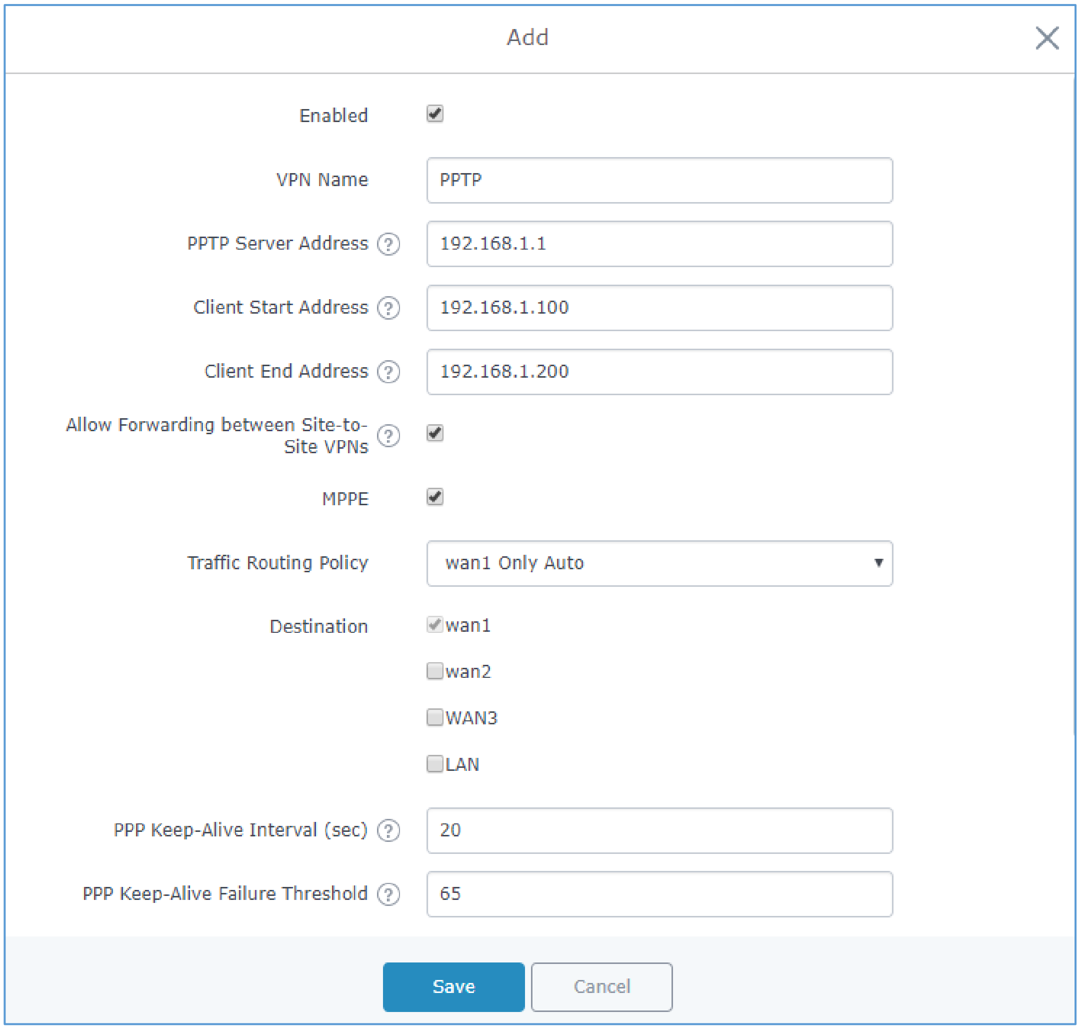
Per Page: 10

Figure 61: PPTP Client

GWN7000 PPTP Server Configuration

To configure PPTP server on the GWN7000, go to “**VPN→PPTP→Server**” and set the following:

1- Click on Add and the following window will pop up.



Add

Enabled ☑

VPN Name: PPTP

PPTP Server Address: 192.168.1.1

Client Start Address: 192.168.1.100

Client End Address: 192.168.1.200

Allow Forwarding between Site-to-Site VPNs ☑

MPPE ☑

Traffic Routing Policy: wan1 Only Auto

Destination: ☑wan1 □wan2 □WAN3 □LAN

PPP Keep-Alive Interval (sec): 20

PPP Keep-Alive Failure Threshold: 65

Figure 62: PPTP Server Configuration

Table 32: PPTP Server Configuration Parameters

Field	Description
Enable	Click on the checkbox to enable the PPTP VPN Server.
VPN Name	Enter a name for the PPTP Server.
PPTP Server Address	Configure the PPTP server local address (ex: 192.168.1.1).
Client Start Address	Configure the remote client IP start address. **Note:** this address should be in the same subnet as the end address and PPTP server address.
Client End Address	Configure the remote client IP end address. **Note:** this address should be in the same subnet as the start address and PPTP server address.

Allow Forwarding between Site-To-Site VPNs	This option allows forwarding between multiple site-to-site VPNs. i.e. if there are multiple PPTP users configured with client subnet enabled, then this option allows one PPTP client subnet to access another PPTP client subnet through the server. **Note:** for this option to work more than one PPTP users with client subnet must be enabled.
MPPE	Enable / disable the MPPE for data encryption. By default, it's disabled.
Traffic Routing Policy	Select which routing policy to assign to the traffic from this VPN network. See ***Policy Routing section***
Destination	Choose to which destination group or WAN to allow traffic from the VPN, this will generate automatically a forwarding rule under the menu **Firewall → Traffic Rules → Forward.**
PPP Keep-Alive Interval (sec)	Interval in seconds for LCP echo-request frames to be sent.
PPP Keep-Alive Failure Threshold	The PPTP server will consider a peer to be dead if N Echo-request frames aren't replied to. The connection will be then terminated. A setting of 0 disables this function.
PPP Adaptive Keep-Alive	If the PPP keepalive failure settings is enabled, then echo-request frames will only be sent if no traffic has been received from the peers since the last echo-request was sent.
Debug	Enable debug logging to syslog.
MTU	Specify the MTU, valid range (1280-1500 Bytes).
MRU	Specify the MRU, valid range (1280-1500 Bytes).

2- Click Save after completing all the fields.

3- Click Apply on top of the web GUI to apply changes.

After this step, you need to create user accounts under web GUI → **System Settings** → **User Manager** in order to connected to the configured PPTP server.

IPSec VPN Tunnel

Overview

Internet Security protocol- IPsec is mainly used to authenticate and encrypt packets of data sent over the network layer. In order to accomplish this, they use two security protocols - ESP (Encapsulation Security Payload) and AH (Authentication Header), the former provides both authentication as well as encryption whereas the latter provides only authentication for the data packets. Since both authentication and encryption are equally desirable, most of the implementations use ESP.

IPsec supports two different encryption modes, they are Tunnel (default) and the Transport mode. **Tunnel** mode is used to encrypt both payload as well as the header of an IP packet, which is considered to be more secure. **Transport** mode is used to encrypt only the payload of an IP packet, which is generally used in gateway or host implementations.

IPsec also involves IKE (Internet Key Exchange) protocol which is used to setup the Security Associations (SA). A Security Association establishes a set of shared security parameters between two network entities to provide a secure network layer communication. These security parameters may include: the cryptographic algorithm and mode, traffic encryption key and parameters for the network data to be sent over the connection. Currently there are two IKE versions available – IKEv1 and IKEv2. IKE works in two phases:

- **Phase 1:** ISAKMP operations will be performed after a secure channel is established between two network entities.
- **Phase 2:** Security Associations will be negotiated between two network entities.

IKE operates in three modes for exchanging of keying information and establishing security associations – Main, Aggressive and Quick mode.

- **Main mode:** is used to establish the phase 1 during the key exchange. It uses three two-way exchanges between the initiator and the receiver. In the first exchange, algorithms and hashes are exchanged. In the second exchange, shared keys are generated using Diffie-Hellman exchange. In the last exchange, verification of each other’s identities takes place.

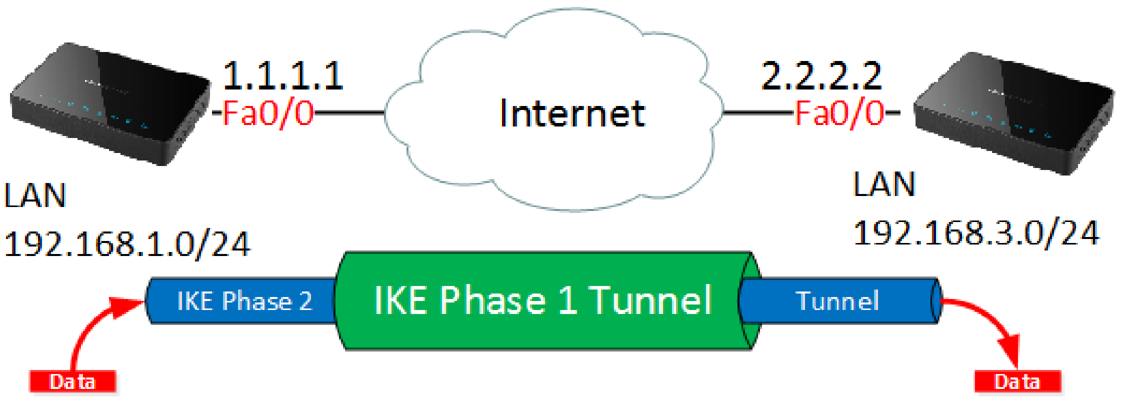
- **Aggressive mode:** provides the same service as the main mode, but it uses two exchanges instead of three. It does not provide identity protection, which makes it vulnerable to hackers. Main mode is more secure than this.

- **Quick mode:** After establishing a secure channel using either main mode or aggressive mode, quick mode can be used to negotiate general IPsec security services and to generate newly keyed material. They are always encrypted under the secure channel and uses the hash payload that is used to authenticate the rest of the packet.

Configuring GWN7000 IPSec Tunnel

In order to build an IPSec secure tunnel between two devices located on different places on the Internet, we can use the sample scenario below:

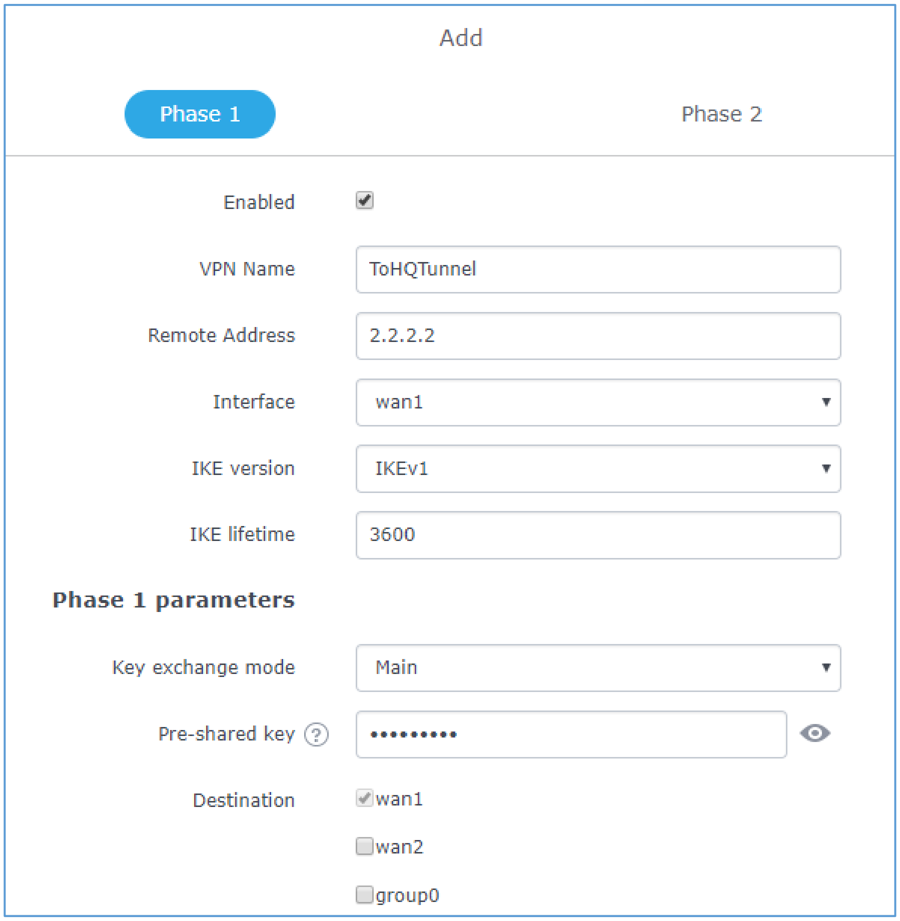
Branch office router needs to connect to Headquarters office via an IPSec tunnel, on each side we have a GWN7000 router. Users can configure the two devices as following:



The branch office router runs a LAN subnet 192.168.1.0/24 and the HQ router runs a LAN subnet 192.168.3.0, the public IP of the branch office router is 1.1.1.1 and the IP of the HQ router is 2.2.2.2.

Configuration of Branch office router:

Go under **VPN → IPSec** then click on add and fill in the following information under phase 1 tab:

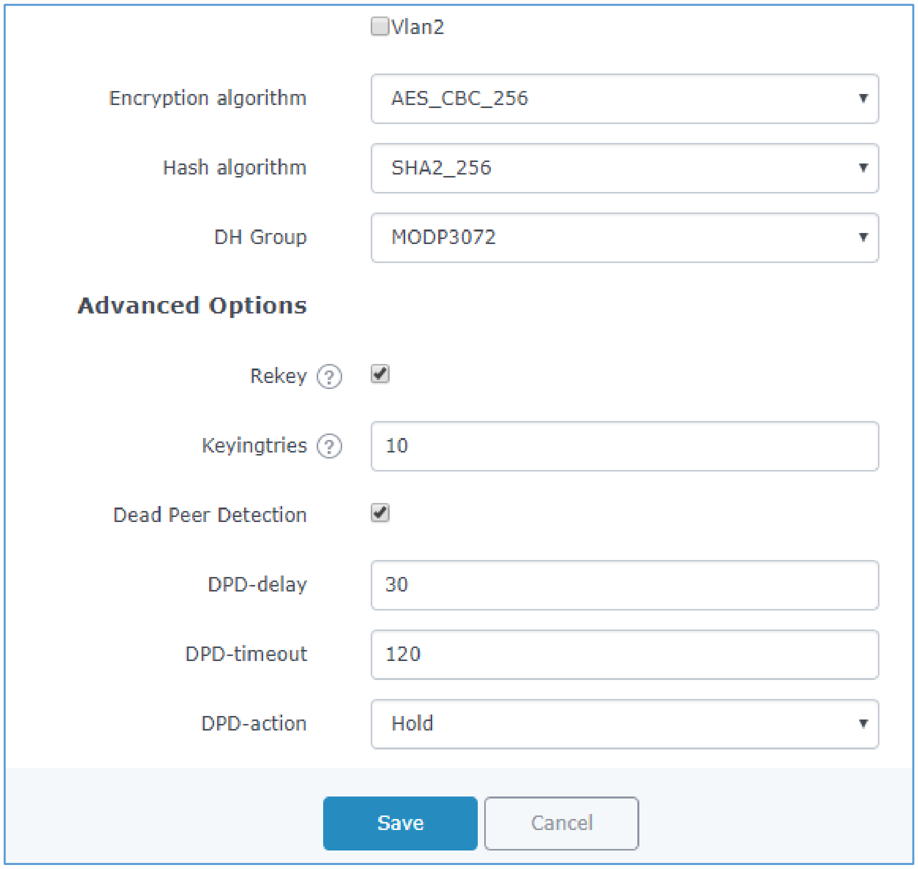


Add

Enabled	☑
VPN Name	ToHQTunnel
Remote Address	2.2.2.2
Interface	wan1
IKE version	IKEv1
IKE lifetime	3600

Phase 1 parameters

Key exchange mode	Main
Pre-shared key	•••••••••
Destination	☑wan1 ☐wan2 ☐group0



□ Vlan2

Encryption algorithm: AES_CBC_256

Hash algorithm: SHA2_256

DH Group: MODP3072

Advanced Options

Rekey ☑

Keyingtries: 10

Dead Peer Detection ☑

DPD-delay: 30

DPD-timeout: 120

DPD-action: Hold

Figure 63: Branch Office IPSec Phase 1 Configuration

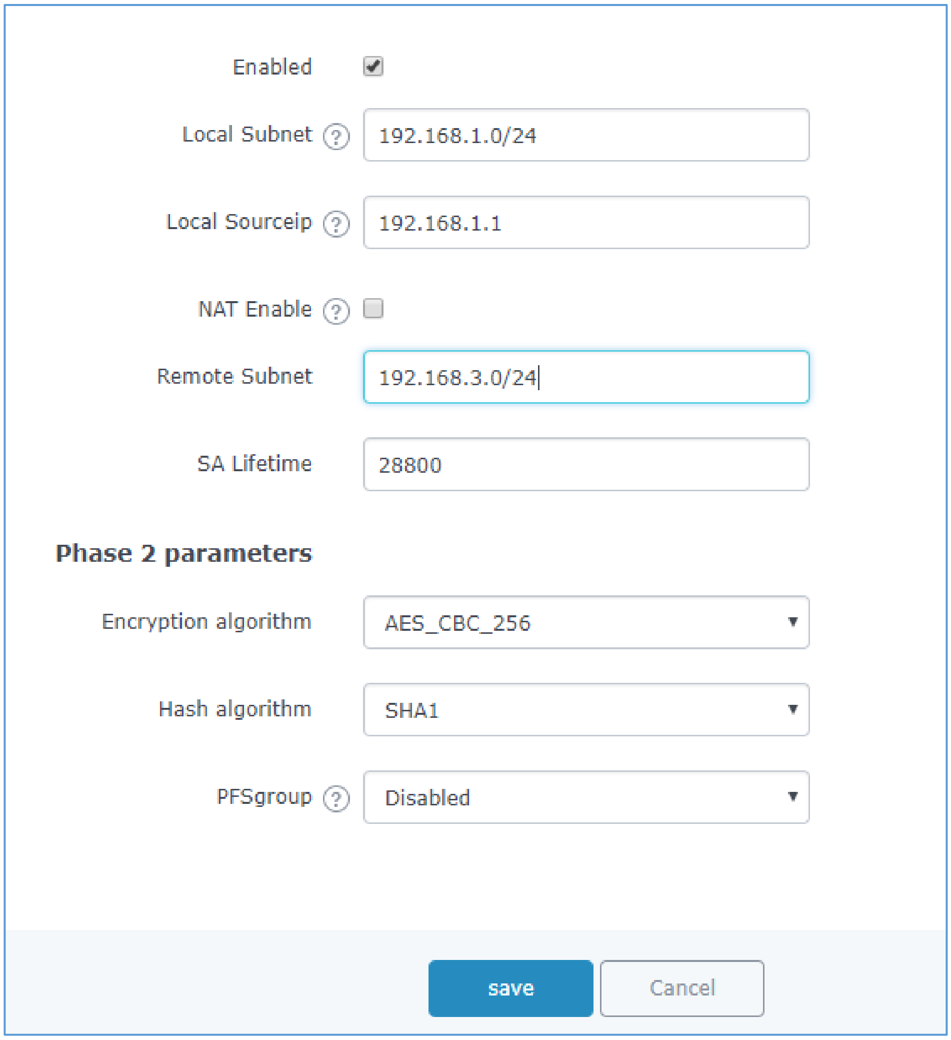
Table 33: IPSec Phase 1 Parameters

Field	Description
Enabled	Enable or Disable the IPSec tunnel.
VPN Name	VPN Connection Name.
Remote Address	Enter the IP address of the remote side of the tunnel.
Interface	Select from which interface the router will try to build the VPN connection.
IKE Version	Allows the use to choose between using IKE version 1 or 2. Default value: IKEv1
IKE Lifetime	Specifies in seconds the lifetime of the keying channel. Default: 3600 seconds.
Key Exchange mode	Select which mode to use for key exchange during the stage of channel establishment: Main mode or Aggressive mode.
Pre-Shared key	Enter the PSK password for authentication.

Destination	Choose to which destination group or WAN to allow traffic from the VPN, this will generate automatically a forwarding rule under the menu **Firewall → Traffic Rules → Forward.**
Encryption algorithm	Select the crypto to be used for data confidentiality: • AES_CBC_256 • AES_CBC_192 • AES_CBC_128 • 3DES_192
Hash algorithm	Select the hash to be used data integrity: • MD5 • SHA1 • SHA2_256 • SHA2_512 • SHA2_384
DH group	Select the Diffie Hellman group to be used for the session: • MODP1024 • MODP1536 • MODP2048 • MODP3072 • MODP4096 • MODP6144 • MODP8192 • DH19 • DH20 • DH21 • DH23 • DH24
Rekey	This allows the user to decide whether a connection should be renegotiated when it is about to expire. if disabled it is necessary to make sure the other end also agrees on it. Otherwise it is ineffective.
Keying tries	This specifies the number of attempts to be made to negotiate a connection before giving up. By default, it is set to 10 and if set to 0 the router will keep trying forever.
Dead Peer Detection	Check the option to enable/disable DPD.

DPD delay	Configures the delay for DPD keepalive packets for the specific connection.
DPD timeout	Configures the length of time it will remain idle without receiving any response from the peer.
DPD action	This provides the user with a set of actions to perform if the peer is considered to be dead. • **hold**- all routes will be put on hold • **clear**- routes and SA will be cleared. • **restart-all** SA's to the dead peer will be renegotiated.

Press Save, then go to phase2 tab in order to configure the phase 2 parameters as folllow



Enabled ☑

Local Subnet: 192.168.1.0/24

Local Sourceip: 192.168.1.1

NAT Enable ☐

Remote Subnet: 192.168.3.0/24

SA Lifetime: 28800

Phase 2 parameters

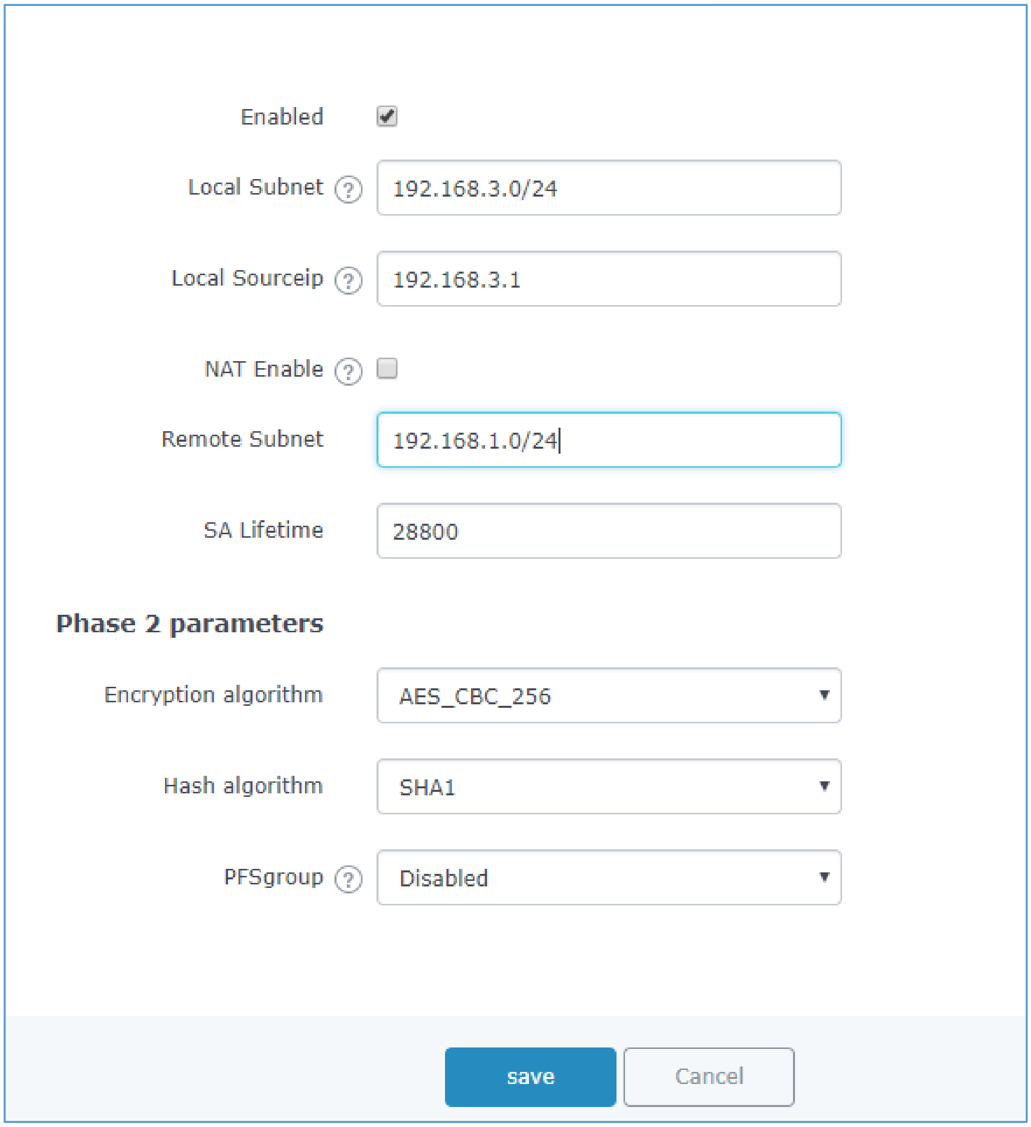
Encryption algorithm: AES_CBC_256

Hash algorithm: SHA1

PFSgroup: Disabled

Figure 64:Branch Router IPSec Phase 2 Configuration

After this is done, press save and apply the settings, then configure same settings for phase 1 on the HQ router, as for phase 2 configuration parameters they should be as following:



Enabled ☑

Local Subnet: 192.168.3.0/24

Local Sourceip: 192.168.3.1

NAT Enable □

Remote Subnet: 192.168.1.0/24

SA Lifetime: 28800

Phase 2 parameters

Encryption algorithm: AES_CBC_256

Hash algorithm: SHA1

PFSgroup: Disabled

Figure 65: HQ Router IPSec Phase 2 Configuration

Once this is done, the two routers will build the tunnel and the necessary routing information in order to route traffic through the tunnel back and from the branch office to HQ network.

For reference, the table below gives the descriptions of the parameters used for phase 2 settings:

Table 34: IPSec Phase 2 Parameters

Field	Description
Local Subnet	Configure the local subnet that will be included on the connection.
Local Source IP	Configures the source IP to be used when transmitting a packet to the other end of the connection.

NAT Enable	This option enables the user to masquerade the local LAN subnets. NAT translated subnet must be specified along with this option.
Remote Subnet	Specifies the remote subnet that can be reached through the tunnel connection.
SA lifetime	Sets the lifetime of a set of encryption/auth keys for a packet.
Encryption algorithm	Select the crypto to be used for data confidentiality: • AES_CBC_256 • AES_CBC_192 • AES_CBC_128 • 3DES_192
Hash algorithm	Select the hash to be used data integrity: • MD5 • SHA1 • SHA2_256
PFS group	Select the Diffie Hellman group to be used for the session: • MODP1024 • MODP1536 • MODP2048 • MODP3072 • MODP4096 • MODP6144 • MODP8192 • DH23 • DH24 The default value is disabled, which indicates that the router will use the option configured on DH group under phase 1.

FIREWALL

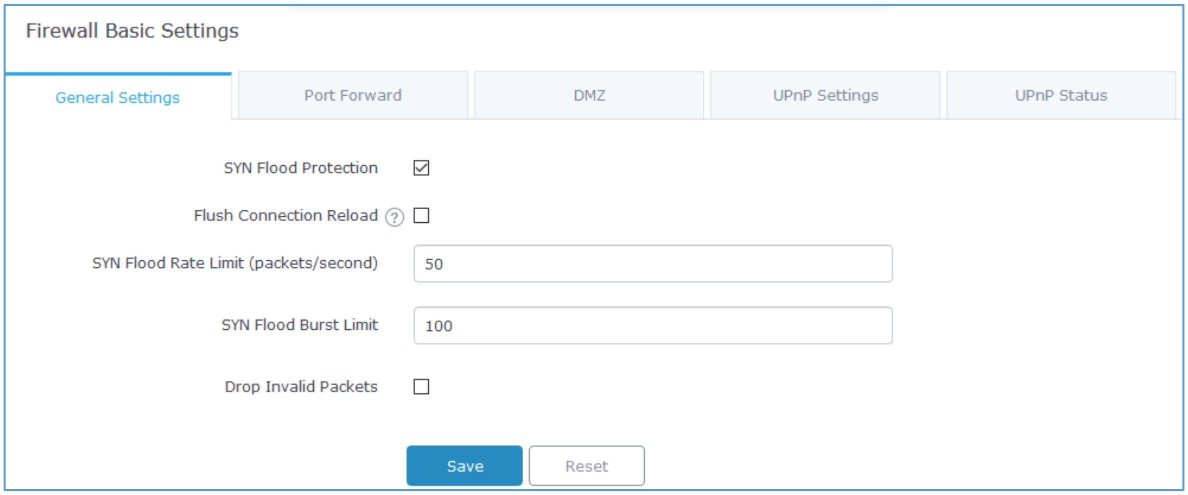
GWN7000 supports firewall feature to control incoming and outgoing traffic by restricting or rejecting specific traffic, as well as preventing attacks to the GWN7000 networks for enhanced security.
The Firewall feature includes 3 menus:

- **Basic Settings:** Used to enable SYN Flood, setup port forwarding, DMZ, inter-group traffic forwarding and UPnP.
- **Traffic Rules:** Used to control incoming/outgoing traffic in customized scheduled times, and taking actions for specified rules such as Accept; Reject and Drop.
- **Advanced:** Used to setup SNAT and DNAT.

Basic Settings

General Settings

SYN Flood Protection is used to avoid DOS attacks.
SYN Flood Protection is enabled by default on GWN7000, you can edit the "SYN Flood Rate Limit", "SYN Flood Burst Limit" and whether to drop or no the invalid packets as shown in the below screenshot



SYN Flood Protection ☑

Flush Connection Reload ? □

SYN Flood Rate Limit (packets/second): 50

SYN Flood Burst Limit: 100

Drop Invalid Packets □

Figure 66: Basic → General Settings

Flush Connection Reload: When this option is enabled, and a firewall configuration change is made, existing connections that had been permitted by the previous firewall rules will be terminated.
That way if the new firewall rules can't permit a connection that had been previously established, it will be terminated and won't be able to reconnect.
When this option is disabled, existing connections are allowed to continue until they do timeout, even if the

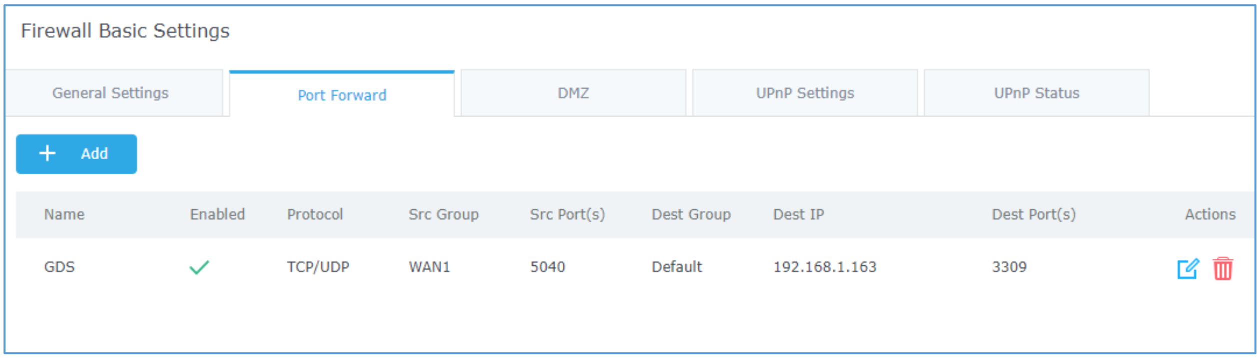
new rules wouldn’t allow these connections to be established.

Port Forwarding

Port forwarding allows redirecting a communication request from one address and port number combination to another.

Below are different possible actions:

- To add a Port Forward rule, click on + Add.
- To edit a Port Forward rule, click on ✎.
- To delete a Port Forward rule, click on 🗑.



Name	Enabled	Protocol	Src Group	Src Port(s)	Dest Group	Dest IP	Dest Port(s)	Actions
GDS	✓	TCP/UDP	WAN1	5040	Default	192.168.1.163	3309	✎ 🗑

Figure 67: Port Forward

Refer to following table for Port Forwarding option when editing or creating a port-forwarding rule:

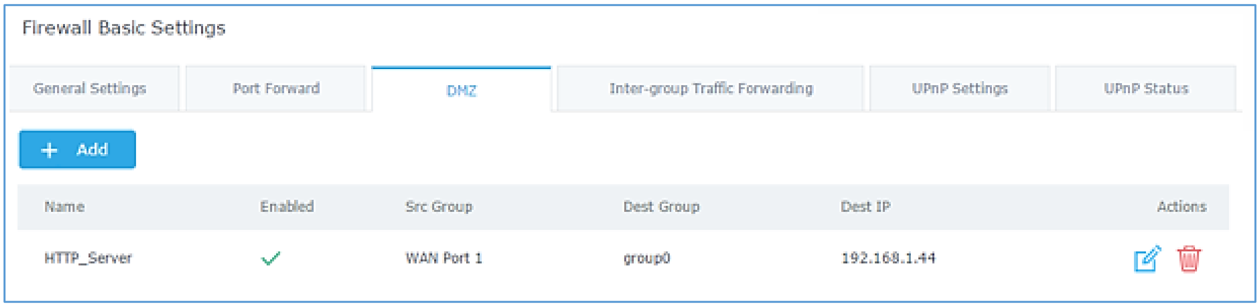
Table 35: Port Forward

Name	Specify a name for the port forward rule.
Enabled	Check to enable this port forward rule.
Protocol	Select a protocol, users can select TCP, UDP or TCP/UDP.
Source Group	Select the WAN Interface.
Source Port (s)	Set a single or a range of Ports.
Destination Group	Select the LAN or VLAN group.
Destination IP	Set the destination IP address.
Destination Port (s)	Set a single or a range of Ports.

DMZ

GWN7000 support DMZ, where it is possible to specify a LAN client to be put on the DMZ.

- To add an IP into the DMZ, click on + Add.
- To edit a DMZ entry, click on ✎ .
- To delete a DMZ entry, click on 🗑 .



Name	Enabled	Src Group	Dest Group	Dest IP	Actions
HTTP_Server	✓	WAN Port 1	group0	192.168.1.44	✎ 🗑

Figure 68: DMZ

Refer to below table for DMZ fields:

Table 36: DMZ

Name	Specify a name for the DMZ entry.
Enabled	Check to enable this DMZ entry.
Source Group	Select the WAN interface
Destination Group	Select the LAN group.
Destination IP	Set the destination IP address.

UPnP

GWN7000 supports UPnP that enables programs running on a host to configure automatically port forwarding.

UPnP allows a program to make the GWN7000 to open necessary ports, without any intervention from the user, without making any check.

UPnP settings can be accessed from GWN7000 WebGUI→**Firewall→Basic→UPnP Settings**.
Refer to below Table for UPnP settings.

Table 37: UPnP Settings

Enable Daemon	Check to enable Daemon for UPnP.
External Interface	Select the WAN interface to allow external connection to resources that enables UPnP.
Internal Interface	Check the LAN network on which to activate UPnP.
Enable UPnP	Check to Enable UPnP for the LAN clients on selected LAN network.
Enable NAT-PMP	Check to enable automatic NAT Port Mapping (NAT-PMP).
Secure Mode	Check to activate secure mode for devices that activate UPnP.
Logging to Syslog	Choose whether to log activities for UPnP into Syslog.
Download Speed	Set the Download speed value in KB/s. Default is 2048
Upload Speed	Set the Upload speed value in KB/s. Default is 1024.

Users can check the UPnP status under the menu "**Firewall → Basic → UPnP**".

Traffic Rules Settings

GWN7000 offers the possibility to fully control incoming/outgoing traffic for different protocols in customized scheduled times and taking actions for specified rules such as Accept; Reject and Drop.

Following actions are available to configure Input, output and forward rules for configured protocols

- To add new rule, Click on + Add.
- To edit a rule, Click on ✎ .
- To delete a rule, Click on 🗑 .

Input

The GWN7000 allows to filter incoming traffic to networks group or port WAN1 or WAN2 and apply rules such as:

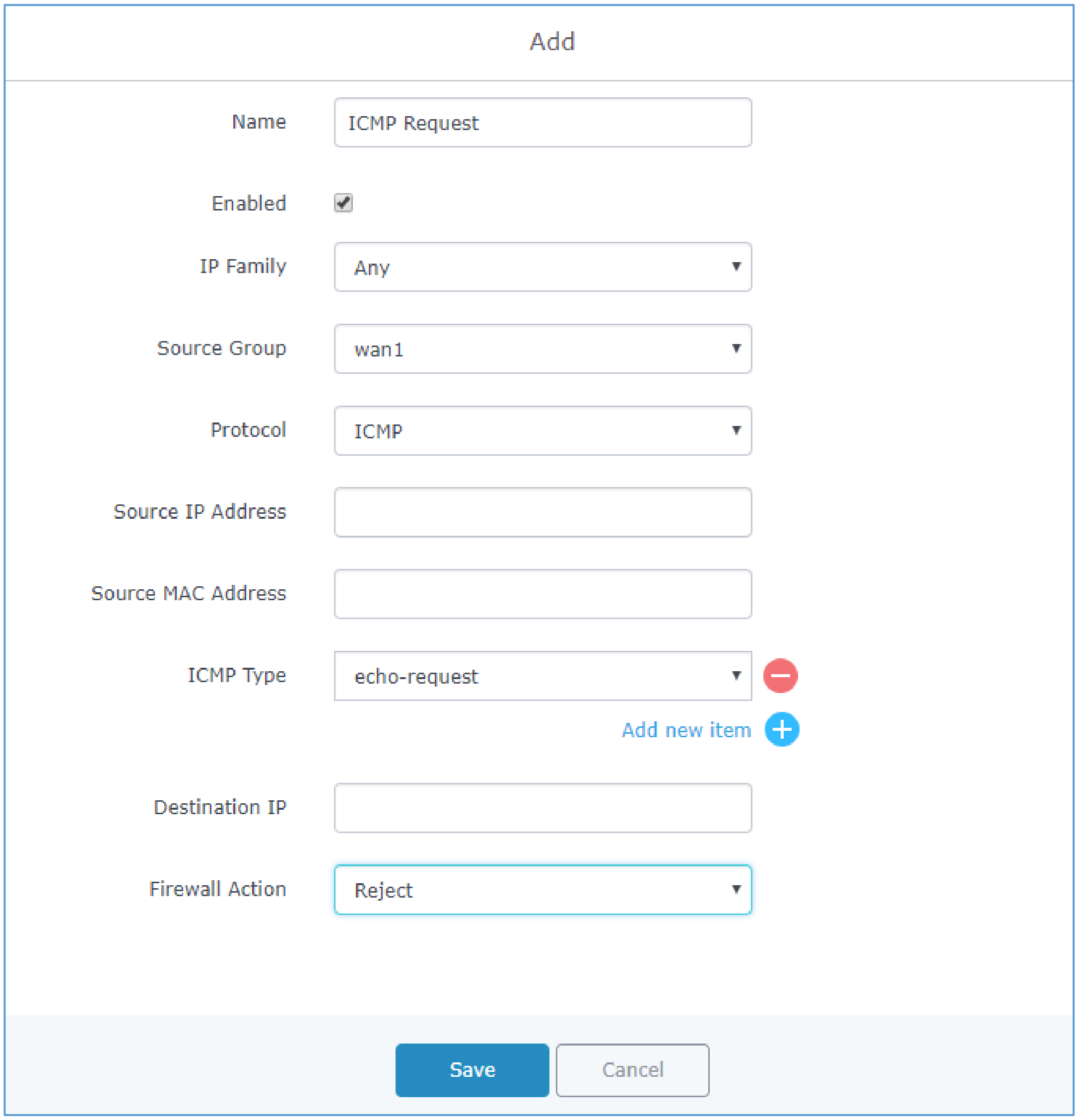
- **Accept:** To allow the traffic to go through.
- **Reject:** A reply will be sent to the remote side stating that the packet is rejected.
- **Drop:** The packet will be dropped without any notice to the remote side.

Following actions are available to configure Input rules on the GWN7000 under “Firewall > Traffic Riles > Input” for configured protocols.

- To add new rule, Click on ⊕ Add
- To edit a rule, Click on ✎
- To delete a rule, Click on 🗑

The following example rejects incoming ICMP request to WAN port 1, this means that whenever the GWN7000 receives and incoming ICMP request on WAN port 1 the destination IP address will receive a message stating that the destination IP address is unreachable.

Below screenshot shows configuration example:



Add

Name	ICMP Request
Enabled	☑
IP Family	Any
Source Group	wan1
Protocol	ICMP
Source IP Address	
Source MAC Address	
ICMP Type	echo-request
Destination IP	
Firewall Action	Reject

Figure 69: INPUT Rule Sample

Output

The GWN7000 allows to filter outgoing traffic from the local LAN networks to outside networks and apply rules such as:

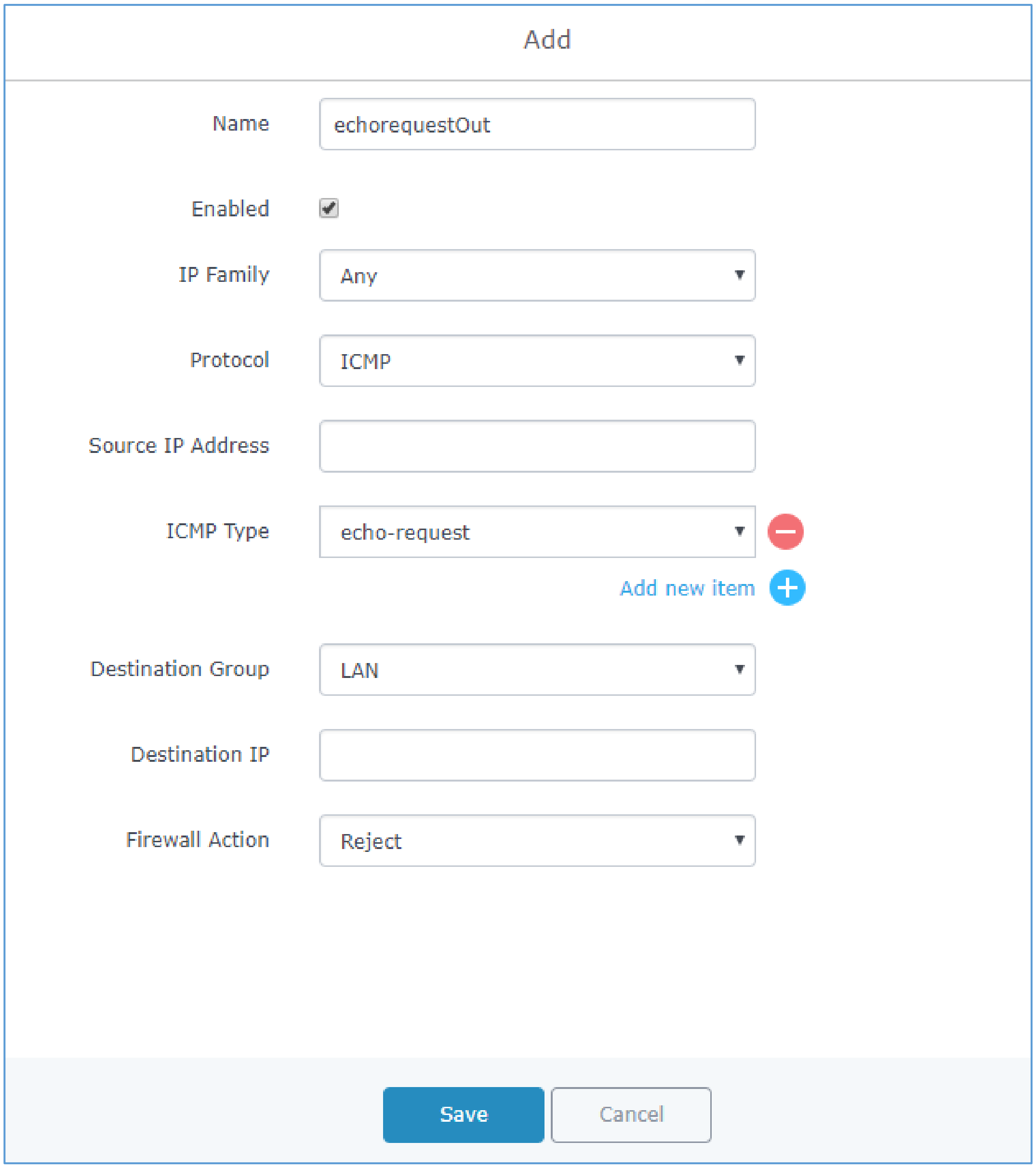
- **Accept:** To allow the traffic to go through.
- **Reject:** A reply will be sent to the remote side stating that the packet is rejected.
- **Drop:** The packet will be dropped without any notice to the remote side.

Following actions are available to configure Output rules on the GWN7000 under "**Firewall → Traffic Rules → Output**" for configured protocols.

- To add new rule, Click on ⊕ Add
- To edit a rule, Click on ✎
- To delete a rule, Click on 🗑

The following example will reject every outgoing ICMP request from GWN7000 to network Group1, this means that whenever the GWN7000 receives an ICMP "echo-request" from another network group or from WAN port 1 or 2 sent to LAN1 will be rejected.

Below screenshot shows configuration example:



Add

Name	echorequestOut
Enabled	☑
IP Family	Any
Protocol	ICMP
Source IP Address	
ICMP Type	echo-request
Destination Group	LAN
Destination IP	
Firewall Action	Reject

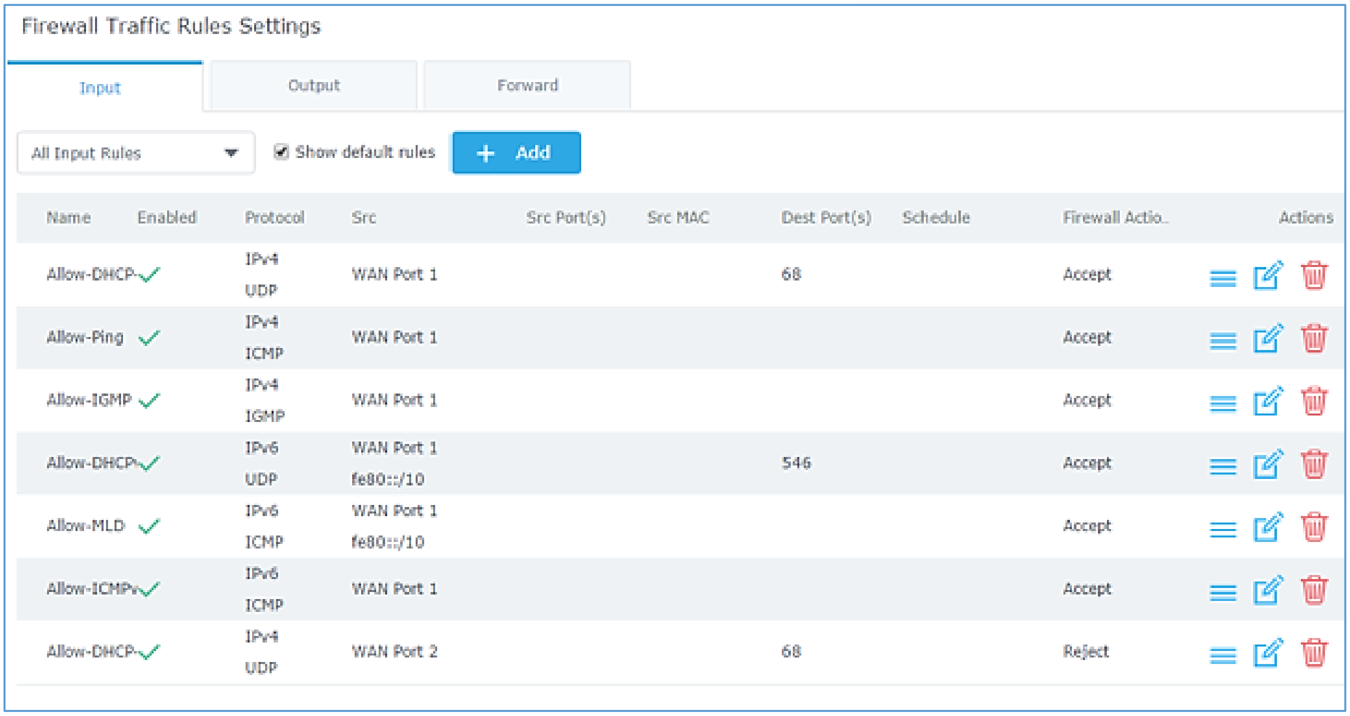
Figure 70: Output Rules Sample

GWN7000 offers the possibility to allow traffic between different groups and interfaces.

Users can select to edit a source group and add to it other network groups and WAN interfaces to allow inter-group traffic between the selected members.

This will either use firewall rules or policy-based routing rules, if the action select is ACCEPT, DROP or REJECT then the firewall rule will apply, otherwise if users want to trigger the policy-based routing, then the action should be set to MATCH in order to match the traffic and apply the routing policy.

For further details, check the *Policy Routing* section.



Firewall Traffic Rules Settings

Name	Enabled	Protocol	Src	Src Port(s)	Src MAC	Dest Port(s)	Schedule	Firewall Actio..	Actions
Allow-DHCP-	✓	IPv4 UDP	WAN Port 1			68		Accept	
Allow-Ping	✓	IPv4 ICMP	WAN Port 1					Accept	
Allow-IGMP	✓	IPv4 IGMP	WAN Port 1					Accept	
Allow-DHCP	✓	IPv6 UDP	WAN Port 1 fe80::/10			546		Accept	
Allow-MLD	✓	IPv6 ICMP	WAN Port 1 fe80::/10					Accept	
Allow-ICMPv	✓	IPv6 ICMP	WAN Port 1					Accept	
Allow-DHCP-	✓	IPv4 UDP	WAN Port 2			68		Reject	

Figure 71: Traffic Rules Settings

Refer to below table for each tab, when editing or creating a traffic rule:

Table 38: Firewall Traffic Rules

Name	Specify a name for the traffic rule.
Enabled	Check to enable this rule.
IP Family	Select the IP version, three options are available: IPv4, IPv6 or Any.
Source Group	Select a WAN interface or a LAN group for Source Group, or select All.
Protocol	Select one of the protocols from dropdown list or All, available options are: UDP, TCP, TCP/UCP, UDP-Lite, ICMP, AH, SCTP, IGMP and All.
Source IP Address	Set the Source IP address, it can be an IPv4 or IPv6 address.
Source Port(s)	Set the source port number. Or port range.
Source MAC address	Set the Source MAC address.
Destination IP	Set the destination IP address, it can be an IPv4 or IPv6 address.
Destination Port(s)	Set the destination's port(s).
Firewall Action	Select which action to perform for the given traffic rule, 3 options are available: Accept, Reject or Drop.

Firewall Advanced Settings

Firewall Advanced Settings page provides the ability to setup input/output policies for each WAN interface and LAN groups; as well as setting configuration for Static and Dynamic NAT.

General Settings

Click on ✎ next to a WAN interface or Network group to edit its input and output policies.

Refer to below table for general settings options:

Table 39: Firewall-General Settings

Input Policy	Select which action to apply to all incoming traffic to this interface/LAN group, 3 actions are available: Accept, Reject and Drop.
Output Policy	Select which action to apply to all outgoing traffic from this interface/LAN group, 3 actions are available: Accept, Reject and Drop.
IP Masquerading	Check to enable IP Masquerading, this will allow internal computers with no known address outside their network, to communicate to the outside. It allows one machine to act on behalf of other machines.
MSS Clamping	Check to enable MSS Clamping. This will provide a method to prevent fragmentation when the MTU value on the communication path is lower than the MSS value.
Log Dropped and Reject Traffic to Syslog	Check to send all rejected and dropped traffic logs to configured Syslog Server.
Limit for Dropped and Rejected Traffic	Specify the limit for dropped and reject traffic. The value format is N/unit, where N is a digit number, and unit can either be in second, minute, hour or day.

SNAT

Following actions are available for SNAT.

- To add new SNAT entry, click on ⊕ Add .
- To edit a SNAT entry, click on ✎
- To delete a SNAT rule, click on 🗑 .

Refer to below table when creating or editing an SNAT entry:

Table 40: SNAT

Name	Specify a name for the SNAT entry
Enabled	Check to enable this SNAT entry.

IP Family	Select the IP version, three options are available: IPv4, IPv6 or Any.
Source Group	Select a WAN interface or a LAN group for Source Group, or select All.
Destination Group	Select a WAN interface or a LAN group for Destination Group, or select All. Make sure that destination and source groups are different to avoid conflict.
Protocol	Select one of the protocols from dropdown list or All, available options are: UDP, TCP, TCP/UCP and All.
Source IP	Set the Source IP address.
Rewrite IP	Set the Rewrite IP. The source IP address of the data package from the source group will be updated to this configured IP.
Destination IP	Set the Destination IP address.
Schedule Start Date	Click on 📅 icon to schedule a start date for this SNAT entry to be applied.
Schedule End Date	Click on 📅 icon to schedule an end date for this SNAT entry to end.
Schedule Start Time	Click on 📅 icon to schedule a start time for this SNAT entry to be applied.
Schedule End Time	Click on 📅 icon to schedule an end time for this SNAT entry to end.
Schedule Weekdays List of Weekdays	Select the days, on which the SNAT entry will be applied, the unselected days will ignore this rule.
Schedule Days of the Month	Enter the days of the months (separated by space) on which the SNAT entry will be applied. Example: 5 10 15 This will be applied only on 5th, 10th and 15th day monthly.
Treat Time Values as UTC Instead of Local Time	Check to use UTC as time zone for the specified times, instead of using GWN7000's local time.

DNAT

Following actions are available for DNAT:

- To add new DNAT entry, click on ⊕ Add
- To edit a DNAT entry, click on ✎
- To delete a DNAT rule, click on 🗑

Refer to below table when creating or editing a DNAT entry:

Table 41: DNAT

Name	Specify a name for the DNAT entry
Enabled	Check to enable this DNAT entry.
IP Family	Select the IP version, three options are available: IPv4, IPv6 or Any.
Source Group	Select a WAN interface or a LAN group for Source Group, or select All.
Destination Group	Select a WAN interface or a LAN group for Destination Group, or select All. Make sure that destination and source groups are different to avoid conflict.
Protocol	Select one of the protocols from dropdown list or All, available options are: UDP, TCP, TCP/UCP and All.
Source IP	Set the Source IP address.
Destination IP	Set the Destination IP address.
Rewrite IP	Set the Rewrite IP. The source IP address of the data package from the source group will be updated to this configured IP.
Enable NAT Reflection	Check to enable NAT Reflection for this DNAT entry to allow the access of a service via the public IP address from inside the local network.

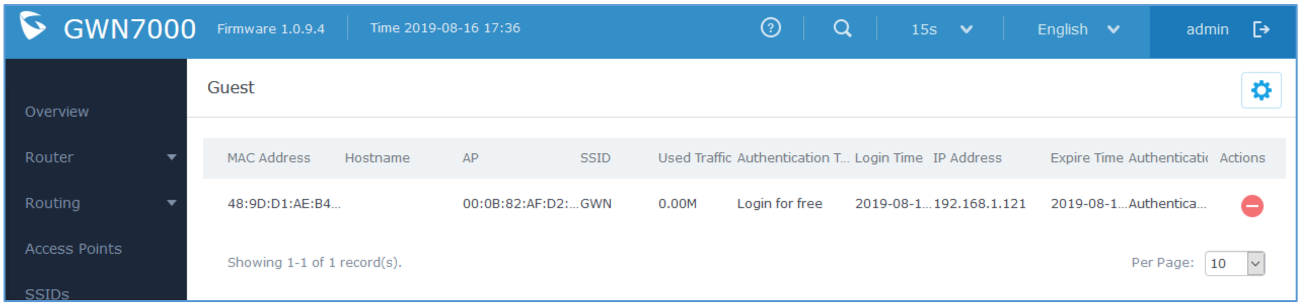
CAPTIVE PORTAL

Captive Portal feature on GWN76XX AP helps to define a Landing Page (Web page) that will be displayed on Wi-Fi clients' browsers when attempting to access Internet. Once connected to a GWN76XX AP, Wi-Fi clients will be forced to view and interact with that landing page before Internet access is granted.

The Captive Portal feature can be configured from the GWN7000 Web page under "Captive Portal".
The page contains three tabs: **Policy**, **Files** and **Clients**.

Guest

This section lists the clients connected or trying to connect to Wi-Fi via Captive Portal.



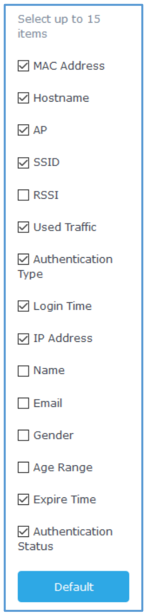
MAC Address	Hostname	AP	SSID	Used Traffic	Authentication T...	Login Time	IP Address	Expire Time	Authenticati	Actions
48:9D:D1:AE:B4...		00:0B:82:AF:D2:...	GWN	0.00M	Login for free	2019-08-1...	192.168.1.121	2019-08-1...	Authentica...	

Showing 1-1 of 1 record(s).

Per Page: 10

Figure 72: Captive Portal – Guest Page

Users can press ⚙ button to customize items to display on the page. Following items are supported:



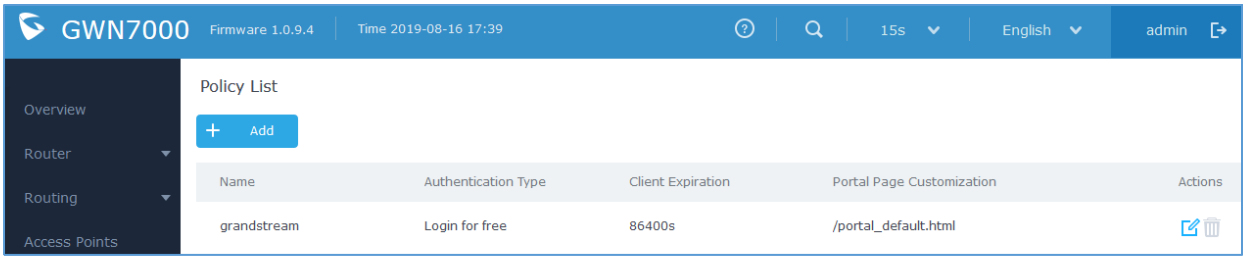
Select up to 15 items

☑ MAC Address
☑ Hostname
☑ AP
☑ SSID
☐ RSSI
☑ Used Traffic
☑ Authentication Type
☑ Login Time
☑ IP Address
☐ Name
☐ Email
☐ Gender
☐ Age Range
☑ Expire Time
☑ Authentication Status

Figure 73: Captive Portal - Guest Page - Select Items

Policy List

Users can customize a portal policy in this page.



Policy List

+ Add

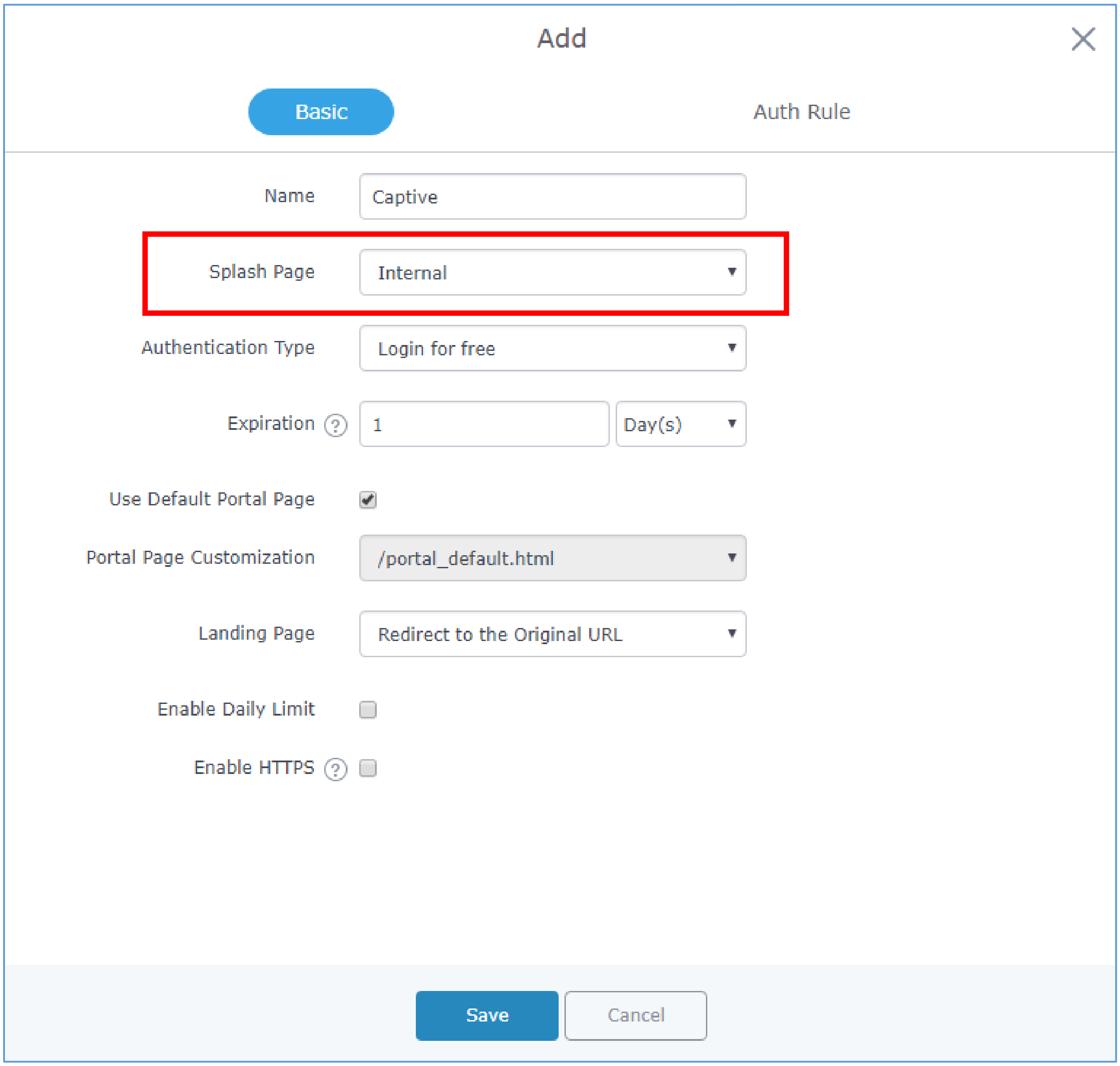
Name	Authentication Type	Client Expiration	Portal Page Customization	Actions
grandstream	Login for free	86400s	/portal_default.html	✎ 🗑

Figure 74: Captive Portal - Policy List

- Click on ✎ to edit the policy.
- Click on 🗑 to delete the policy.
- Click on **+ Add** to add a policy.

The policy configuration page allows adding multiple captive portal policies which will be applied to SSIDs and contains options for different authentication types a splash page that can be easily configured as shown on the next section.

Administrator can use an internal or external splash page.



Name: Captive

Splash Page: Internal

Authentication Type: Login for free

Expiration: 1 Day(s)

Use Default Portal Page: ☑

Portal Page Customization: /portal_default.html

Landing Page: Redirect to the Original URL

Enable Daily Limit: □

Enable HTTPS: □

Figure 75: Add a New Policy

Internal Splash Page

Below table lists the items policy add page configures.

Table 42: Captive Portal – Policy List – Splash Page is "Internal"

Field	Description
Name	Enter the name of the Captive Portal policy
Splash Page	Select Splash Page type, Internal or External.
Authentication Type	Following types of authentication are available: • **Login for free:** when choosing this option, the landing page feature will not provide any type of authentication, instead it will prompt users to accept the license agreement to gain access to internet. • **RADIUS Server:** Choosing this option will allow users to set a RADIUS server to authenticate connecting clients. • **Social Login Authentication:** Choosing this option will allow users to enable authentication Facebook or Twitter or WeChat. • **Vouchers:** Choose this page when using authentication via Vouchers. • **Login with Password:** Choose this page when using authentication via a password.
Expiration	Configures the period of validity, after the valid period, the client will be re-authenticated again.
If Authentication Type is set to "RADIUS Authentication"	
RADIUS Server Address	Fill in the IP address of the RADIUS server.
RADIUS Server Port	Set the RADIUS server port, the default value is 1812.
RADIUS Server Secret	Fill in the key of the RADIUS server.
RADIUS Authentication Method	Select the RADIUS authentication method, 3 methods are available: PAP, CHAP and MS-CHAP.
If Authentication Type is set to "Social Login Authentication"	
WeChat	Check to enable/disable WeChat Authentication
Shop ID	Fill in the Shop ID that offers WeChat Authentication.
APP ID	Fill in the APP ID provided by the WeChat in its web registration page
Secret Key	Set the key for the portal, once clients want to connect to the Wi-Fi, they should enter this key.
Facebook	Check to enable/disable Facebook Authentication
Facebook App ID	Fill in the Facebook App ID.
Facebook APP Key	Set the key for the portal, once clients want to connect to the Wi-Fi___33, they should enter this key.

Twitter	Check this box to enable Twitter Authentication.
Force to Follow	If checked, users need to Follow owner before been authenticated.
Owner	Enter the app Owner to use Twitter Login API. *This field appears only when* **Force to Follow** *is checked.*
Consumer Key	Enter the app Key to use Twitter Login API.
Consumer Secret	Enter the app secret to use Twitter Login API.
For all Authentication Types	
Use Default Portal Page	If checked, the users will be redirected to the default portal page once connected to the GWN. If unchecked, users can manually select which Portal Page to use from **Portal Page Customization** drop-down list.
Portal Page Customization	Select the customized portal page (if “Use Default Portal Page” is unchecked). • */facebook.html* • */password_auth.html* • */portal_default.html* • */portal_pass.html* • */portal_tip.html* • */social_auth.html* • */status.html* • */twitter.html* • */twitter_website.html* • */vouchers_auth.html* • */wechat.html*
Landing Page	Choose the landing page, 2 options are available: • **Redirect to the Original URL.** • **Redirect to External Page.**
Redirect External Page URL Address	Once the landing page is set to redirect to external page, user should set the URL address for redirecting. *This field appears only when* **Landing Page** *is set to “Redirect to an External Page”.*
Enable Daily Limit	If enabled, captive portal will limit user connection by times of one day.
Failsafe Mode	If checked, AP will grant access to STA if AP can’t reach to external authentication server. *This option is available only when* **Authentication Type** *is set to “RADIUS Server” or “Vouchers”.*

Enable HTTPS	Check to enable/disable HTTPS service.

Notes:

1. If Facebook authentication is configured, you will need to log in your Facebook account of https://developers.facebook.com/apps , and set the OAuth redirect to : https://cwp.gwn.cloud:8443/GsUserAuth.cgi?GsUserAuthMethod=3
2. If Twitter authentication is configured, you will need to log in your Twitter account of https://apps.twitter.com/app, and set the callback URLs to: http://cwp.gwn.cloud:8080/GsUserAuth.cgi

External Splash Page

Table 43: Captive Portal – Policy List – Splash Page is “External”

Field	Description
Name	Enter the name of the Captive Portal policy
Splash Page	Select to either use **Internal** or **External** Splash Page.
Platform	Select which external captive portal platform to use: • **Linkyfi Platform** (https://www.avsystem.com/products/linkyfi) • **Purple Platform** (https://purple.ai/) • **Universal Platform** (when using other external captive portal platforms)
External Splash Page URL	Enter the External Splash Page URL, and make sure to enter the pre-authentication rules request by the external portal platform in the pre-authentication configuration option.
RADIUS Server Address	Fill in the IP address of the RADIUS server.
RADIUS Server Port	Set the RADIUS server port, the default value is 1812.
RADIUS Server Secret	Fill in the key of the RADIUS server.
RADIUS Accounting Server Address	Configures the address for the RADIUS accounting server.
RADIUS Accounting Server Port	Configures RADIUS accounting server listening port (default is 1813).
RADIUS Accounting Server Secret	Enter the secret password for client authentication with RADIUS accounting server.
Accounting Update Interval	Enter Update Interval for RADIUS Accounting Server. The interval unit can be set by seconds, minutes, hours or days.

RADIUS NAS ID	Enter RADIUS NAS ID. *This field appears only when* **Platform** *is set to “Linkyfi Platform” or “Universal Platform”.*
Redirect URL	Specify URL where to redirect clients after authentication.

In case social media authentication is used, the user needs to allow some traffic between the AP and social medial platforms (Facebook API as example) to send authentication credentials and receive reply, this traffic can be allowed using the Authentication rules which are explained below.

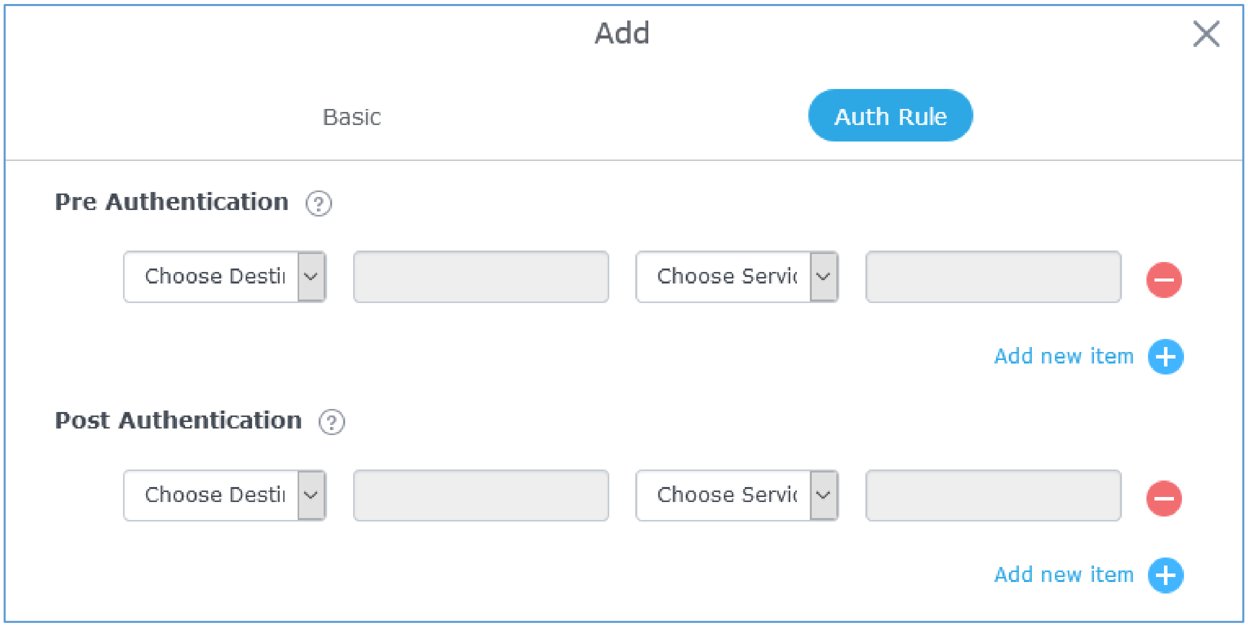


Figure 76: Authentication rules

Pre-Authentication Rules

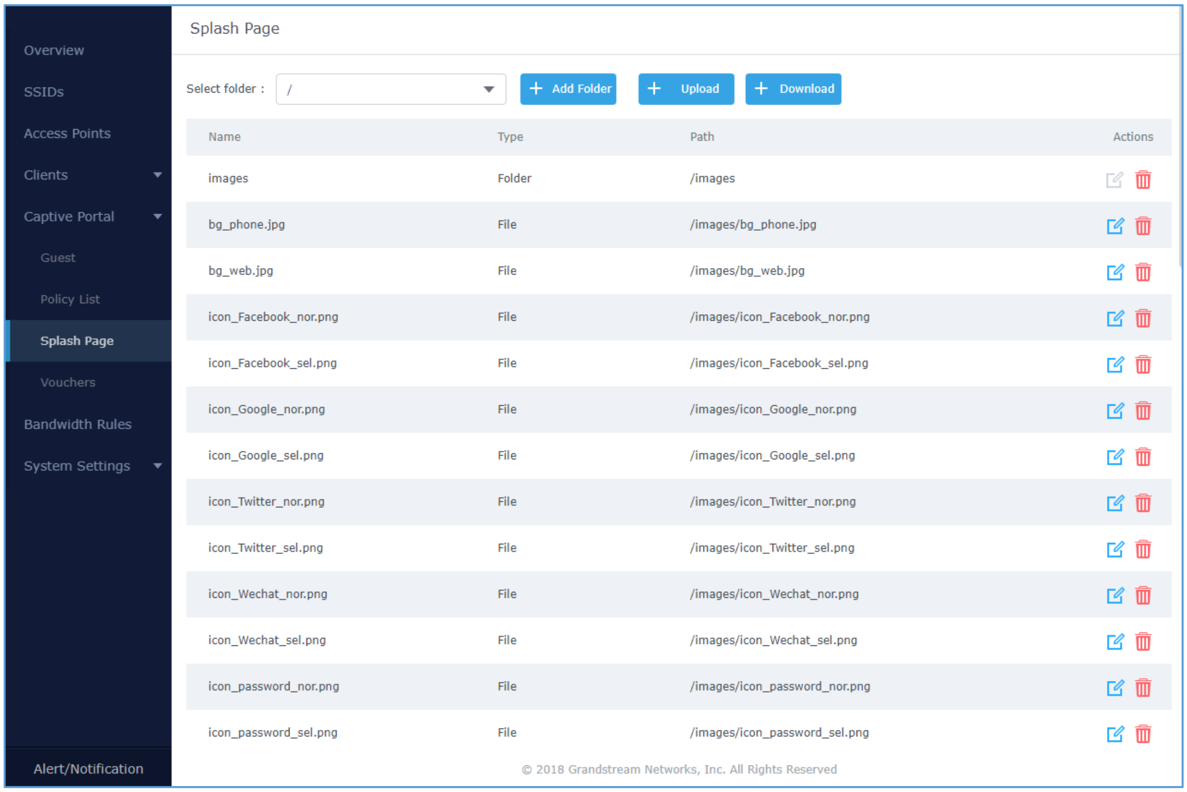
Using this option, users can set rules to match traffic that will be allowed for connected Wi-Fi users before authentication process. This can be needed for example to setup Facebook authentication where some traffic should be allowed to Facebook server(s) to process the user’s authentication. Or simply to be used to allow some type of traffic for unauthenticated users.

Post-Authentication Rules

On the other hand, post authentication rules are used to match traffic that will be banned for Wi-Fi clients after authentication. As an example, if you want to disallow connected Wi-Fi clients to issue Telnet or SSH traffic after authentication then you can set post authentication rules to match that traffic and once a connected client passes the authentication process they will be banned from issuing telnet and SSH connections.

Splash Page

Files configuration page allows users to view and upload HTML pages and related files (images…).



Name	Type	Path	Actions
images	Folder	/images	✎ 🗑
bg_phone.jpg	File	/images/bg_phone.jpg	✎ 🗑
bg_web.jpg	File	/images/bg_web.jpg	✎ 🗑
icon_Facebook_nor.png	File	/images/icon_Facebook_nor.png	✎ 🗑
icon_Facebook_sel.png	File	/images/icon_Facebook_sel.png	✎ 🗑
icon_Google_nor.png	File	/images/icon_Google_nor.png	✎ 🗑
icon_Google_sel.png	File	/images/icon_Google_sel.png	✎ 🗑
icon_Twitter_nor.png	File	/images/icon_Twitter_nor.png	✎ 🗑
icon_Twitter_sel.png	File	/images/icon_Twitter_sel.png	✎ 🗑
icon_Wechat_nor.png	File	/images/icon_Wechat_nor.png	✎ 🗑
icon_Wechat_sel.png	File	/images/icon_Wechat_sel.png	✎ 🗑
icon_password_nor.png	File	/images/icon_password_nor.png	✎ 🗑
icon_password_sel.png	File	/images/icon_password_sel.png	✎ 🗑

Figure 77: Captive Portal – Splash Page

User can add folder in corresponding folder by selecting the folder and click on + Add Folder.

- Click on + Upload to upload a file from local device.
- Click on + Download to download the files in Captive Portal folder.
- Click on ✎ to edit the corresponding file, in another word, to replace the file with a new one.
- Click on 🗑 to delete the file.

Vouchers

Voucher Feature Description

Voucher feature will allow clients to have internet access for a limited duration using a code that is randomly generated from GWN controller.

As an example, a coffee shop could offer internet access to customers via Wi-Fi using voucher codes that can be delivered on each command. Once the voucher expires the client can no longer connect to the internet.

Note that multiple users can use a single voucher for connection with expiration duration of the voucher that starts counting after first successful connection from one of the users that are allowed.

Another interesting feature is that the admin can set data bandwidth limitation on each created voucher depending on the current load on the network, users' profile (VIP customers get more speed than regular ones...etc.) and the internet connection available (fiber, DSL or cable…etc.) to avoid connection congestion and slowness of the service.

Each created voucher can be printed and served to the customers for usage, and the limit is 1000 vouchers.

The usage of voucher feature needs to be combined with captive portal that is explained after this section, in order to have the portal page requesting clients to enter voucher code for authentication.

Voucher Configuration

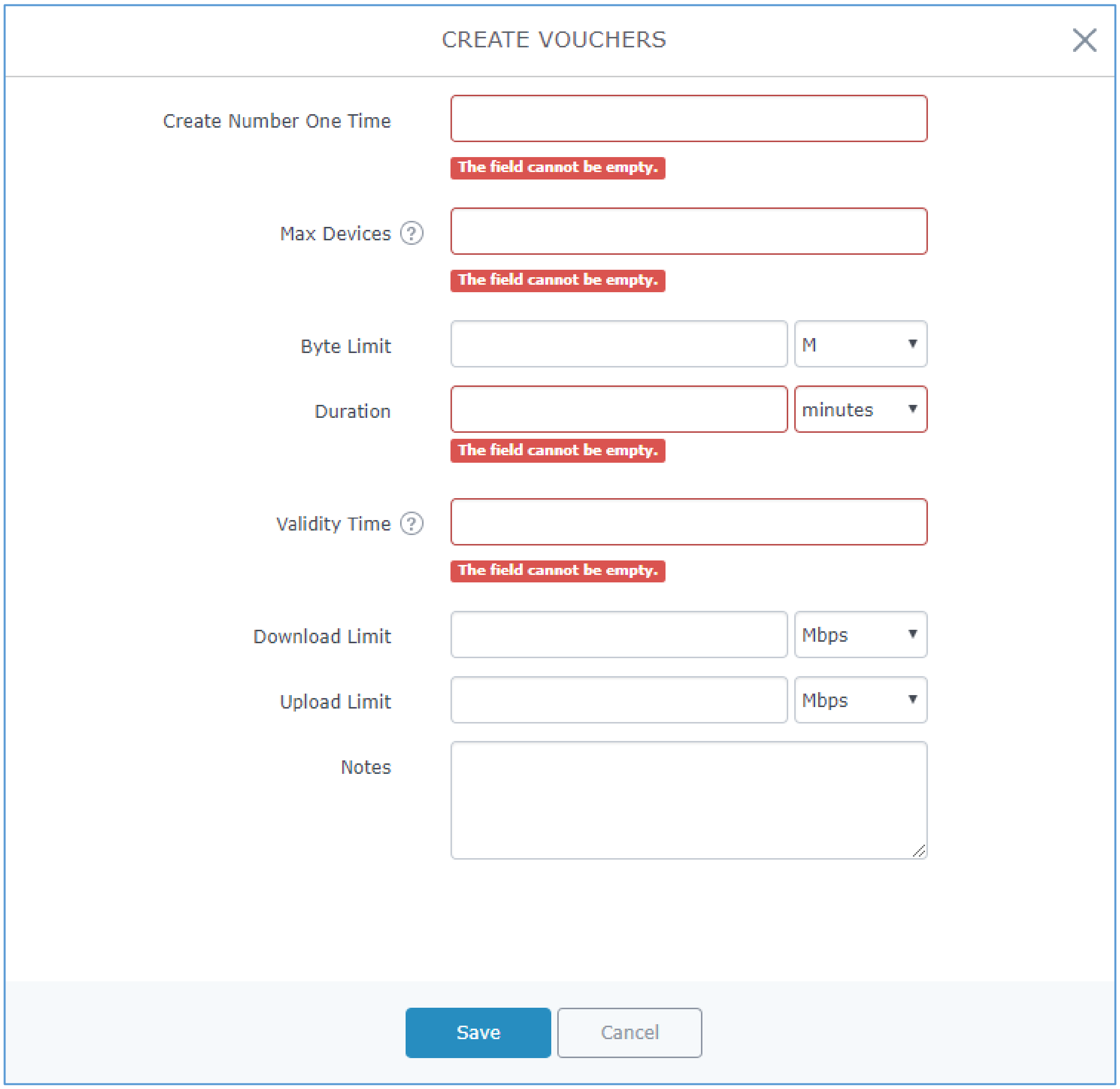
To configure/create vouchers for clients to use, follow below steps:

1. On controller web GUI, navigate under "**Captive Portal → Vouchers**"
2. Click on + Add button in order to add a new voucher.
3. Enter voucher details which are explained on the next table.
4. Press save to create the voucher(s).

Notes:

- Users can specify how many vouchers to generate which have the same profile, this way the GWN will generate as many vouchers as needed which do have the same settings avoiding creating them one by one.

- The admin can verify the status of each vocoder on the list (In use, not used, expired …etc.).
- Press 🖨 to print the voucher, 🗑 to delete it or 🔄 to renew the voucher.



Create Number One Time
The field cannot be empty.

Max Devices ?
The field cannot be empty.

Byte Limit M

Duration minutes
The field cannot be empty.

Validity Time ?
The field cannot be empty.

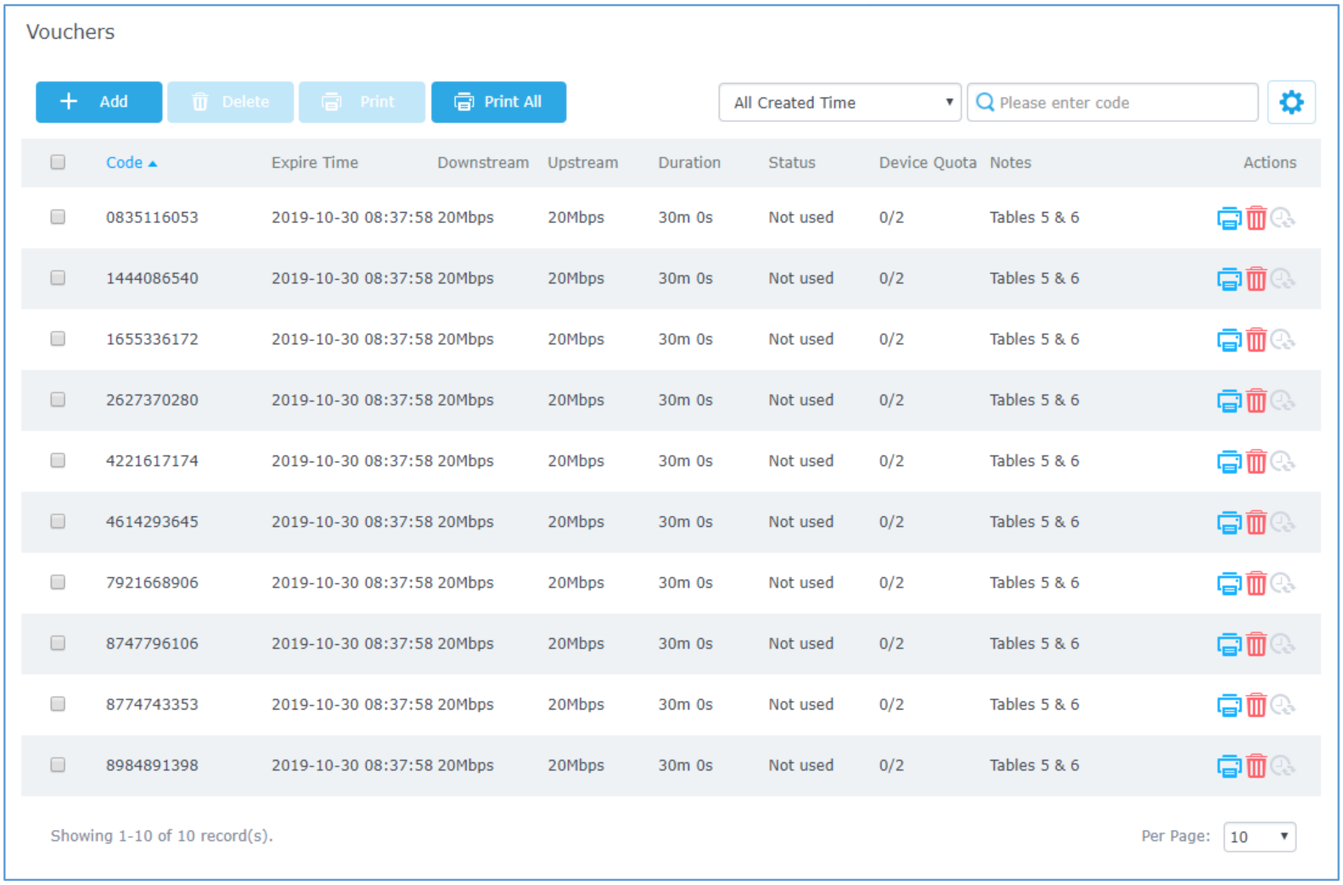
Download Limit Mbps

Upload Limit Mbps

Notes

Figure 78: Add Voucher Sample

The below figure shows the status of the vouchers after GWN randomly generates the code for each one.



Vouchers

□	Code ▲	Expire Time	Downstream	Upstream	Duration	Status	Device Quota	Notes	Actions
□	0835116053	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	1444086540	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	1655336172	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	2627370280	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	4221617174	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	4614293645	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	7921668906	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	8747796106	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	8774743353	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	
□	8984891398	2019-10-30 08:37:58	20Mbps	20Mbps	30m 0s	Not used	0/2	Tables 5 & 6	

Showing 1-10 of 10 record(s).

Per Page: 10 ▾

Figure 79: Vouchers List

Users can click on buttons Delete and Print to delete and print multiple vouchers or click Print All button to print all vouchers at once.

Also, users can use the drop-down list filter All Created Time ▾ to filter the vouchers that where created at specific date-time.

The following table summarizes description for voucher configuration parameters:

Table 44: Voucher Parameters

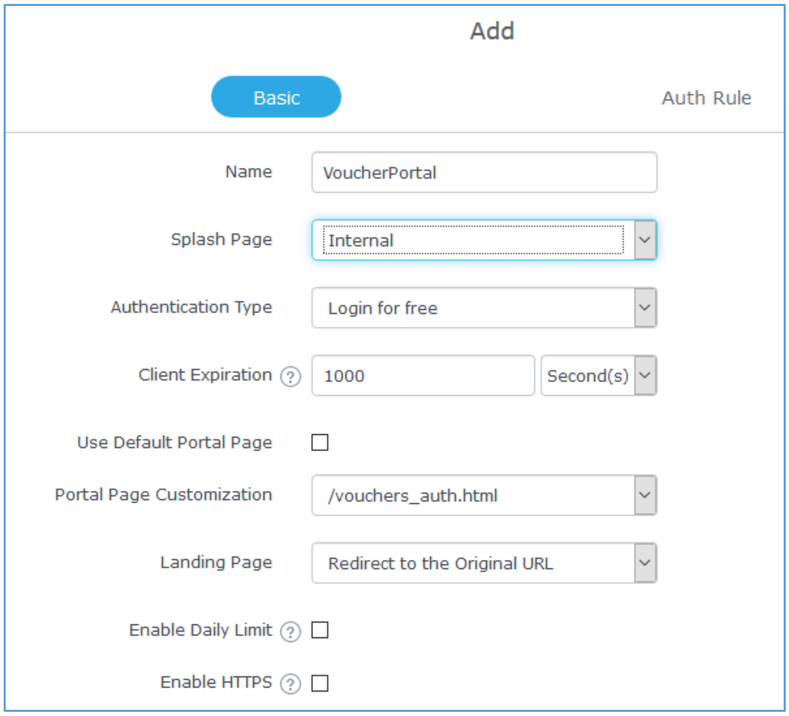
Field	Description
Create Number One Time	Specify how many vouchers to generate which will have same profile/settings (duration, bandwidth and number of users). Valid range: 1 – 1000.
Max Devices	Specify how many users can use same voucher. Valid range: 1 – 5.

Duration	Specify the duration after which the voucher will expire, and clients will be disconnected from internet. **Note:** in case or multiple users, the duration will start counting after first user starts using the voucher.
Validity Time	Set the validity period of credentials, limited to 1-365 integer. The unit is day.
Download Limit	Set the downstream bandwidth speed limit (in Kbps or Mbps).
Upload Limit	Set the upstream bandwidth speed limit (in Kbps or Mbps).
Notes	Notes for the admin when checking the list of vouchers.

Using Voucher with GWN Captive Portal

In order to successfully use the voucher feature, users will need to create a captive portal in order to request voucher authentication codes from users before allowing them access to internet. More details about captive portal will be covered on next section but for voucher configuration please follow below steps.

1. Go under “**Captive Portal → Captive portal**” menu.
2. Press + Add in order to add new captive portal policy.
3. Set the following parameters as shown on the screenshot for basic setup then save and apply.



Add

Name: VoucherPortal

Splash Page: Internal

Authentication Type: Login for free

Client Expiration: 1000 Second(s)

Use Default Portal Page: □

Portal Page Customization: /vouchers_auth.html

Landing Page: Redirect to the Original URL

Enable Daily Limit: □

Enable HTTPS: □

Figure 80: Captive Portal with Voucher authentication

Then go under your SSID configuration page and enable the generated captive portal under Wi-Fi settings tab.

BANDWIDTH RULES

The bandwidth rule is a GWN7000 feature that allows users to limit bandwidth utilization per SSID or client (MAC address or IP address).

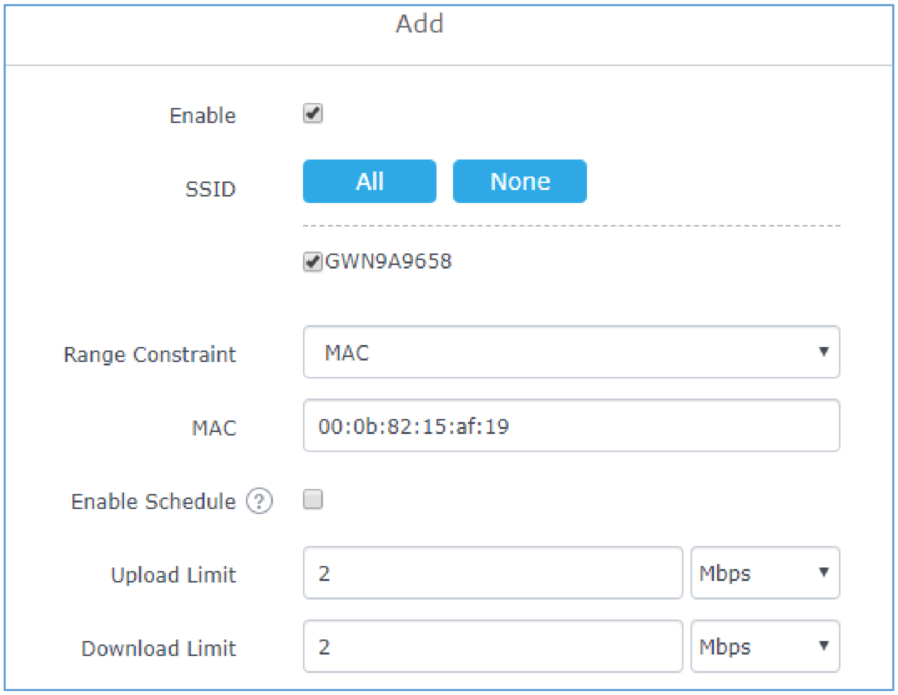
This option can be configured from the GWN7000 router web UI under **"Bandwidth Rules"**.

Click + Add to add a new rule, the following table provides an explanation about different options for bandwidth rules.

Table 45: Bandwidth Rules

Field	Description
Enable	Enable/Disable the Bandwidth rule.
SSID	Select which SSID will be affected by the bandwidth rule limitation.
Range Constraint	Choose the type of rule to be applied on bandwidth utilization from the dropdown list, three options are available: • **Per-SSID:** Set a bandwidth limitation on the SSID level. • **Per-Client:** Set a bandwidth limitation per Client. • **MAC:** Set a bandwidth limitation per MAC address. • **IP Address:** Set a bandwidth limitation per IP address.
MAC	Enter the MAC address of the device to which the limitation will be applied, this option appears only when MAC type is selected.
IP address	Enter the IP address of the device to which the limitation will be applied, this option appears only when IP Address type is selected.
Enable Schedule	Enable this option to assign a schedule for the bandwidth rule.
Upload Limit	Specify the limit for the upload bandwidth using Kbps or Mbps.
Download Limit	Specify the limit for the download bandwidth using Kbps or Mbps.

The following figure shows an example of MAC address rule limitation.

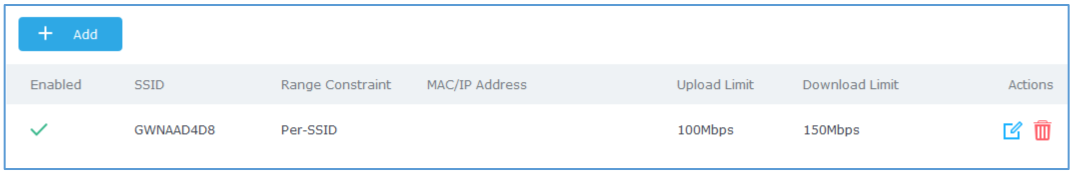


Add

Enable	☑
SSID	All None
	☑ GWN9A9658
Range Constraint	MAC ▾
MAC	00:0b:82:15:af:19
Enable Schedule ?	□
Upload Limit	2 Mbps ▾
Download Limit	2 Mbps ▾

Figure 81: MAC Address Bandwidth Rule

The following figure shows examples of bandwidth rules:



+ Add

Enabled	SSID	Range Constraint	MAC/IP Address	Upload Limit	Download Limit	Actions
✓	GWNAAD4D8	Per-SSID		100Mbps	150Mbps	

Figure 82: Bandwidth Rules

Note:

The same settings for bandwidth management are available from the following menus:

Per-Client

Navigate on the web GUI under “Clients→Edit→Bandwidth Rules” where you can set the Upstream and Downstream rate in Mbps.

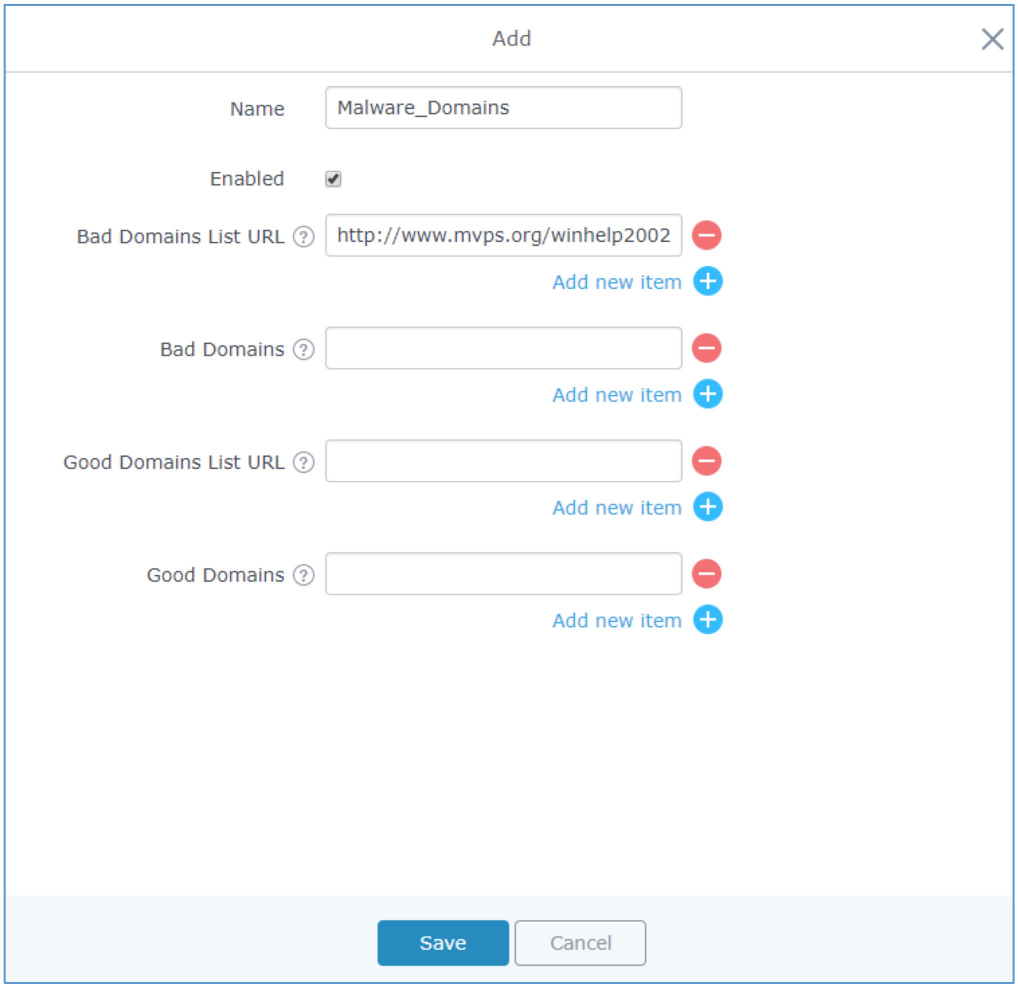
WEBSITE BLOCKING

Website blocking is a feature that allows the system administrator to download filter lists or create their own filter lists to block DNS queries to some domains. These lists can be used to block adware sites, malware sites, and can be used to block popular social media websites (Facebook, YouTube...etc).
The administrator is able to apply this feature to any combination of network groups or clients.

In order to configure website blocking policy follow the next steps:

Create Blackhole Policy

First, you need to create blocking policies on which you specify the list of domains to be blocked or allowed or specify URL from which download full list of unwanted bad domains such as malware domains.
To do so go under **"System Settings → Website Blocking → Blackhole policy"** and press + Add to create a new policy.



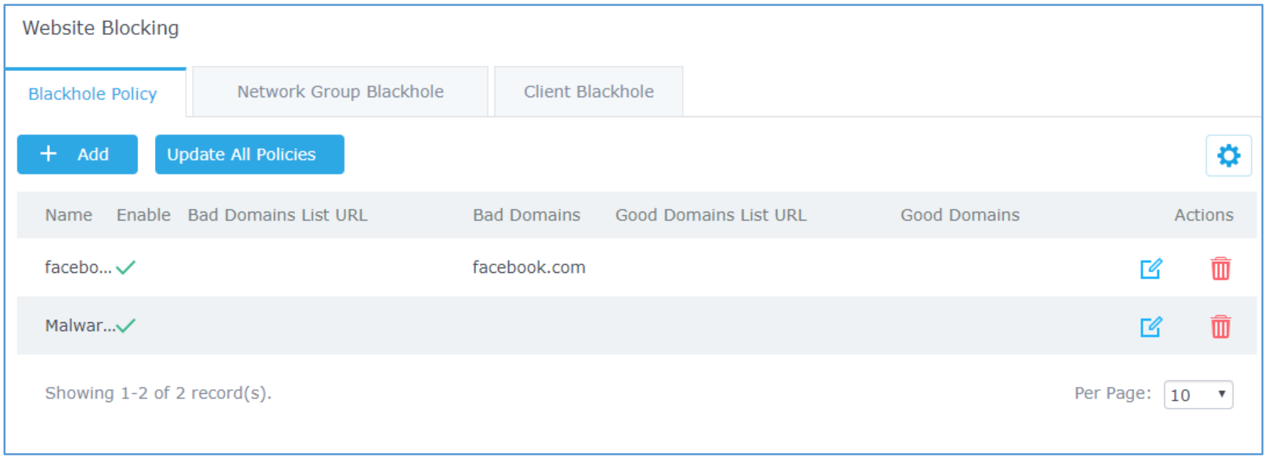
Add

Name	Malware_Domains
Enabled	☑
Bad Domains List URL	http://www.mvps.org/winhelp2002
Bad Domains	
Good Domains List URL	
Good Domains	

Figure 83: Create Blackhole Policy

On the figure above, we set the link from which the GWN will go and fetch all domain names that would be considered as bad domains and blocked.

After this, save and apply the changes and the new policy will be displayed along the existing ones.



Website Blocking

Name	Enable	Bad Domains List URL	Bad Domains	Good Domains List URL	Good Domains	Actions
facebo...	✓		facebook.com			
Malwar...	✓					

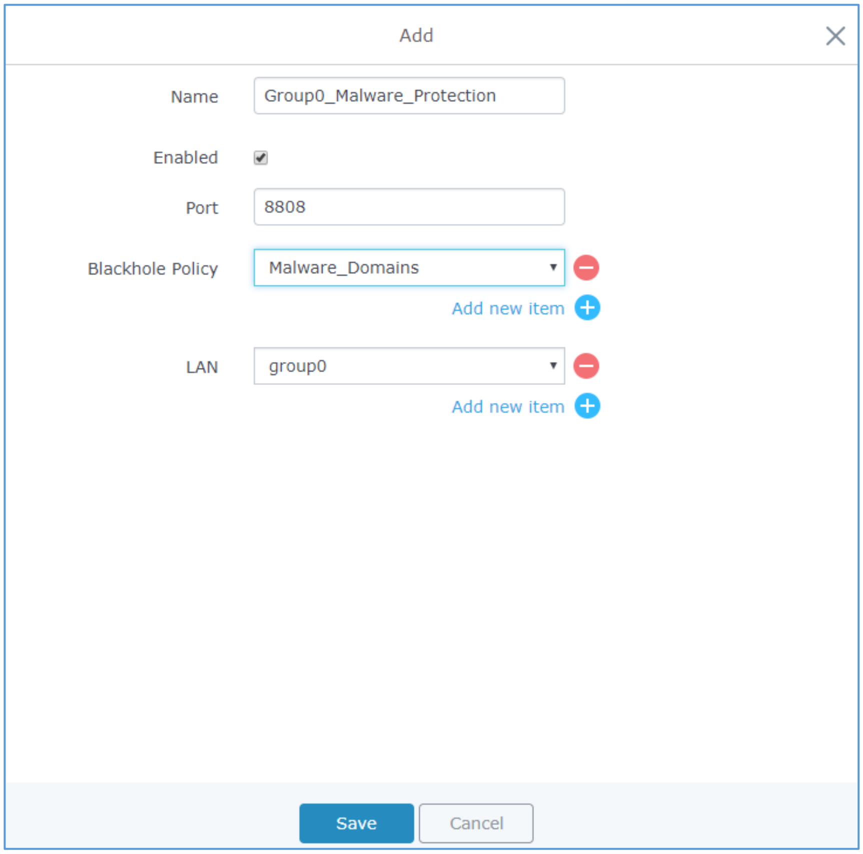
Showing 1-2 of 2 record(s).

Per Page: 10

Figure 84: Blackhole Policy List

Assign Blackhole Policy to Network Groups

Now, that we have created a policy. It's time to assign it to a network group or client. To assign a blocking policy to a network group go under "**System Settings → Website Blocking → Network Group Blackhole**" and press add + Add.


Add

Name: Group0_Malware_Protection

Enabled: ☑

Port: 8808

Blackhole Policy: Malware_Domains

LAN: group0

Figure 85: Network Group Blackhole

Give the network group blackhole a name, then check the box to enable it, after that set a binding port for the blackhole (range valid from 1025 to 65535) and select which policy(s) to apply to which network group(s).

Note: A network group can be assigned to only one network group blackhole, thus you need to apply all required blocking policies to a specific network group to its network group blackhole policy.

Press save and apply and the changes, and now all clients within network group0 are banned (protected) from malware websites.

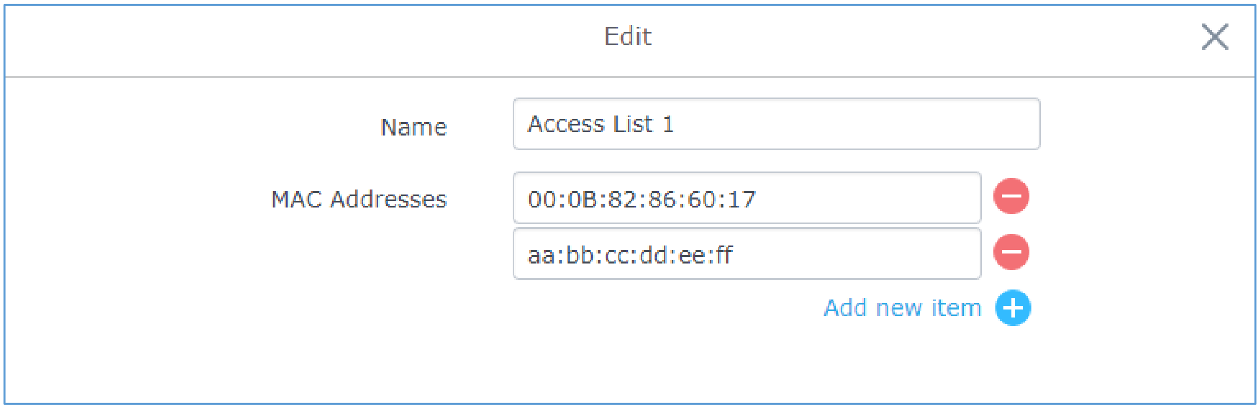
Assign Blackhole Policy to Clients

Another possibility, it to create client based blackhole(s) on which the policy will apply to specific client(s) defined by a CACL (Client Access Control List) and on this case, the admin is left with the choice to either force the network group policy on this client along with its specific policy or ignore the network group definition and keep only the client-based policy.

For example, with the configuration above and while maintaining the blocking of malware websites on group0, we want to block Facebook access from some specific clients defined on access list 1.

We assume that we have already created a blocking policy under "**System Settings → Website blocking → Blackhole Policy**" to set Facebook.com as bad domain.

Next, go under "**Clients → Client Access**" to define the list of clients to whom the policy will apply.



Edit

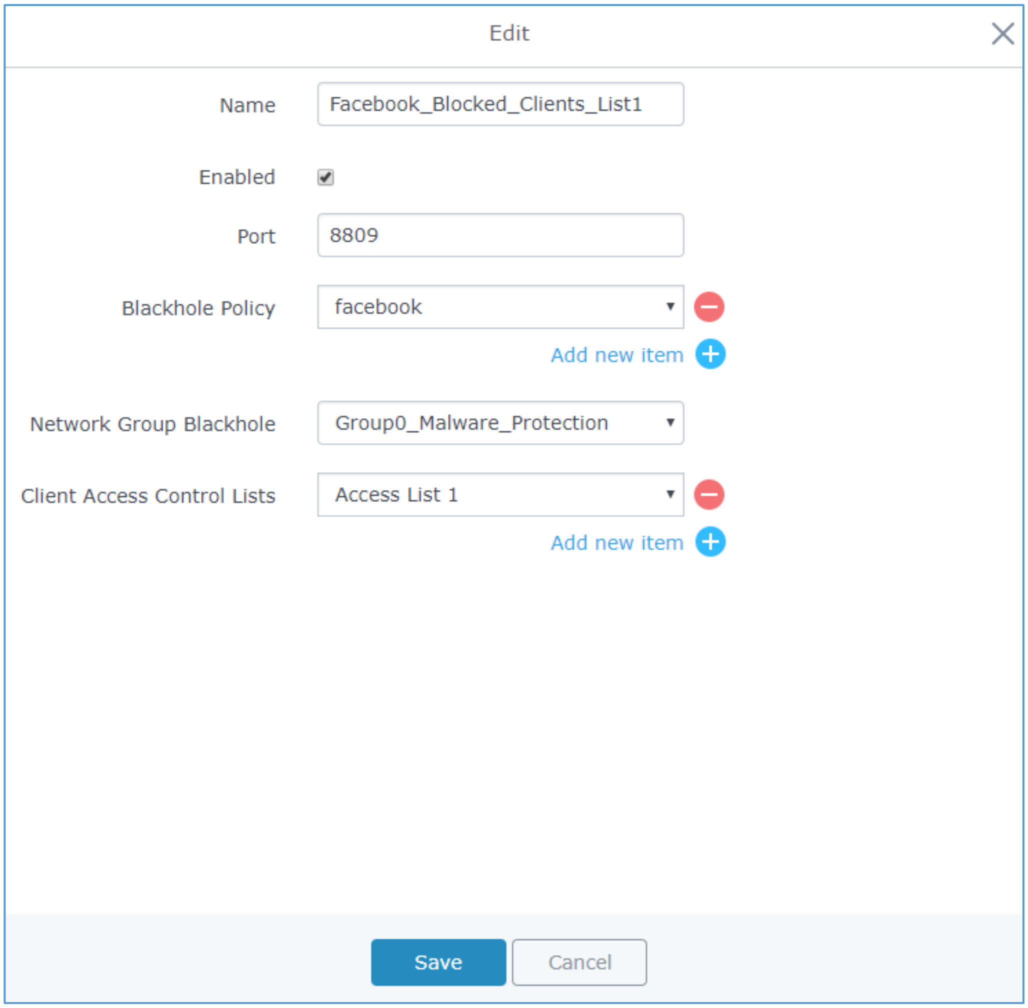
Name: Access List 1

MAC Addresses: 00:0B:82:86:60:17

aa:bb:cc:dd:ee:ff

Figure 86: Clients ACL

Finally, and in order realize the scenario above, go under "**System Settings → Website Blocking → Client Blackhole**" and click on + Add.



Edit

Name: Facebook_Blocked_Clients_List1

Enabled: ☑

Port: 8809

Blackhole Policy: facebook

Network Group Blackhole: Group0_Malware_Protection

Client Access Control Lists: Access List 1

Figure 87: Client Blackhole Configuration

On this case, we can either force the network group policy that was created for the full group0 along with the new blackhole policy (**Facebook**) or ignore it and assign only the Facebook blocking policy to the clients specified on list1.

MAINTENANCE AND TROUBLESHOOTING

GWN7000 offers multiple tools and options for maintenance and debugging to help further troubleshooting and monitoring the GWN7000 resources.

Maintenance

Maintenance page can be accessed from GWN7000 WebGUI→**System Settings**→**Maintenance**.
Maintenance page includes different tabs: Basic, Upgrade, Access, Syslog and Logserver.

Basic

Table 46: Maintenance - Basic

Rebind Protection	Anti-domain name hijacking protection. If enabled, when the address returned by the superior DNS is a private LAN address, it will be regarded as a domain name hijacking, thus discarding the analytical result. If disabled, the analytical result will not be discarded.
Web WAN Access	Enable the web WAN access. By default, it's disabled
Web HTTP Access	Enable the web HTTP Access. By default, it's disabled.
Web HTTPS Port	Specifies the HTTPS port. By default, is 443.
Country	Select the country from the drop-down list.
Time Zone	Configure time zone for the GWN7000. Please reboot the device to take effect.
NTP Server	Configure the IP address or URL of the NTP server, the device will obtain the date and time from the configured server.
Date Display Format	Change the Date Display Format, three options are possible YYYY/MM/DD, MM/DD/YYYY and DD/MM/YYYY
Reboot Schedule	Select the pre-configured schedule (**System Settings → Schedule**), once a schedule is selected, then the network will not be working for a while (reboot duration during the scheduled reboot duration.

Upgrade

Table 47: Maintenance - Upgrade

Authenticate Config File	Authenticate configuration file before acceptance. Default is disabled.
XML Config File Password	Enter the password for encrypting the XML configuration file using OpenSSL. The password is used to decrypt the XML configuration file if it is encrypted.
Upgrade Via	Specify uploading method for firmware and configuration. 3 options are available: HTTP, HTTPS and TFTP.
Firmware Server	Configure the IP address or URL for the firmware upgrade server.
Config Server	Configure the IP address or URL for the configuration file server.
Check Update on Boot	Choose whether to enable or disable automatic upgrade and provisioning after reboot. Default is disabled.
Automatic Upgrade Check Interval(m)	Specify the time period to check for firmware upgrade (in minutes).
Reboot	Click on Reboot button to reboot the device
Download Configuration	Click on Download to download the device's configuration file.
Upgrade Now	Click on Upgrade, to launch firmware/config file provisioning. Please make sure to Save and Apply changes before clicking on Upgrade.
Factory Reset	Click on Reset to restore the GWN7000 as well as all online GWN76xx units to factory default settings

Access

Table 48: Maintenance - Access

Current Administrator Password	Enter the current administrator password
New Administrator Password	Change the current password. This field is case sensitive with a maximum length of 32 characters.
Confirm New Administrator Password	Enter the new administrator password one more time to confirm.
User Password	Configure the password for user-level Web GUI access. This field is case sensitive with a maximum length of 32 characters.
User Password Confirmation	Enter the new User password again to confirm.

Syslog

Table 49: Maintenance - Syslog

Syslog Server	Enter the IP address or URL of Syslog server. Please reboot the GWN7000 to take effect.
Syslog Level	Select the level of Syslog, 5 levels are available: **None, Emergency, Alert, Critical, Error, Warning, Notice, Information** and **Debug**. Please reboot the GWN7000 to take effect.

Logserver

The logserver page allows the user to configure syslog server on GWN7000 in order to save log messages on connected external USB drive.

First connect a USB drive to the Access point, then configure the parameters and make sure to start the server in order to collect messages from devices sending syslog to GWN.

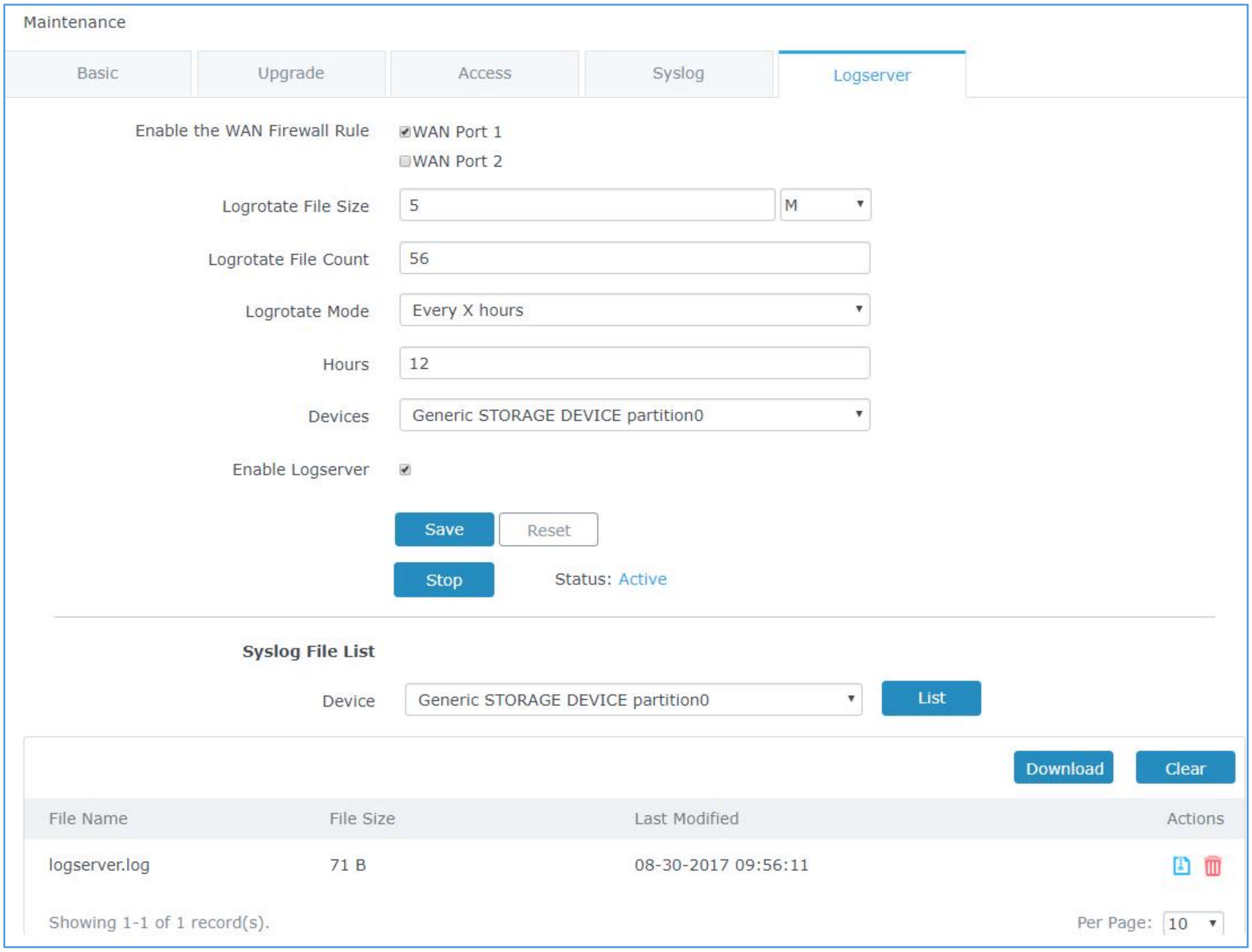
Following table gives description for configuration parameters of GWN Logserver:

Option	Description
Enable WAN Firewall Rule	Enable WAN Firewall rules to allow incoming syslog messages to the router.
Logrotate File Size	Select the size of file to trigger rotation, if left empty, then the router will use only the Logrotate frequency rules to trigger rotation.
Logrotate File Count	Select the Maximum number of rotates files to keep. Default is 56 files.
Logrotate Mode	Choose the time rotation frequency mode (default every 3 hours). • Every X hours (0-23) • Every X Minutes (0-59). • X hour of day (0-23). • X day of week (Sunday-Saturday) + X hour of day (0-23).
Hours	Enter the number of hours period after which trigger file rotation.
Minutes	Enter the number of Minutes period after which trigger file rotation.
Hour of the day	Enter the hour of day at which trigger file rotation.
Day of the week	Enter Day of the week + hour of day, at which trigger file rotation.
Devices	Select the path (a USB partition) to store collected logs. Required.

Enable Logserver	Enables the logserver

After setting up the logserver and saving the settings, users need to connect a USB external storage and press Start button in order to start collecting logs.

All log messages from all devices will be put on one single file, and the router will keep rotating and creating new files based on the configured rotation policy.



Enable the WAN Firewall Rule ☑ WAN Port 1 □ WAN Port 2

Logrotate File Size: 5 M

Logrotate File Count: 56

Logrotate Mode: Every X hours

Hours: 12

Devices: Generic STORAGE DEVICE partition0

Enable Logserver ☑

Status: Active

Syslog File List

Device: Generic STORAGE DEVICE partition0

File Name	File Size	Last Modified	Actions
logserver.log	71 B	08-30-2017 09:56:11	

Showing 1-1 of 1 record(s). Per Page: 10

Figure 88: Logserver Configuration

Debug

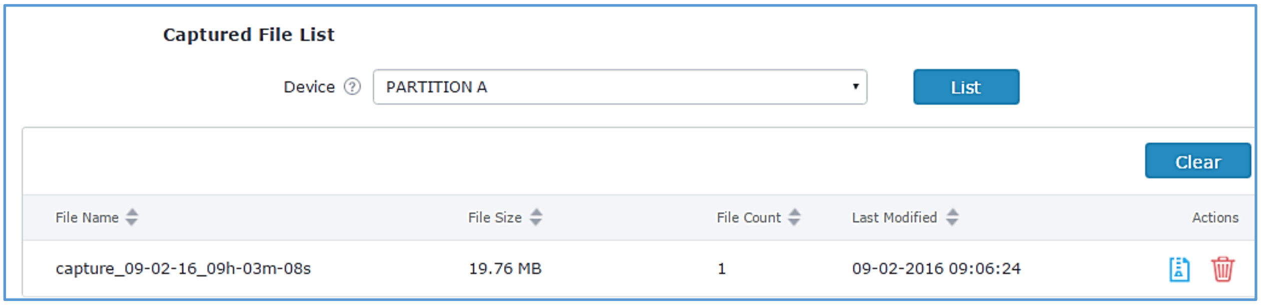
Many debugging tools are available on GWN7000's WebGUI to check the status and troubleshoot GWN7000's services and networks.

Debug page offers 4 tabs: Capture, Ping/Traceroute, Syslog and Connection Table.

Capture

This section is used to capture packet traces from the GWN7000 interfaces (WAN ports and network groups) for troubleshooting purpose or monitoring...
It is needed to plug an USB storage device to one of the USB ports on the back of the GWN7000.

- Click on Start to start capturing on a certain device plugged to the USB port.
- Click on Stop to stop the capture.
- Click on List to show the captured files on a chosen device, and the capture files details will appear, click on Clear to delete all files, click on 📄 next to a capture file to download it on a local folder, or click on 🗑 to delete it.



Captured File List

Device ? PARTITION A ▾ List

Clear

File Name	File Size	File Count	Last Modified	Actions
capture_09-02-16_09h-03m-08s	19.76 MB	1	09-02-2016 09:06:24	📄 🗑

Figure 89: Capture Files

The below table will show different fields used on capture page

Table 50: Debug-Capture

File Name	Enter the name of the capture file that will be generated.
Interface	Choose an Interface (WAN port1 or 2, or a network group) from where to begin the capture.
Device	Choose a device plugged to USB port to save the capture once started.
File Size	Set a File size that the capture will not exceed (Optional field).
Rotate Count	Set a value for rotating captures (Optional Field).
Direction	Choose if you want to get all traffic or only outgoing or incoming to the choses interface.
Source Port	Set the Source Port to filter capture traffic coming from the defined source port.
Destination Port	Set the Destination Port to filter capture traffic coming from the defined port.

Source IP	Set the Source IP to filter capture traffic coming from the defined source IP.
Destination IP	Set the Destination IP to filter capture traffic coming from the defined destination IP.
Protocol	Choose ALL or a specific protocol to capture (IP, ARP, RARP, TCP, UDP, ICMP, IPv6)

Ping/Traceroute

Ping and Traceroute are useful debugging tools to verify reachability with other clients across the network (WAN or LAN). The GWN7000 offers both Ping and Traceroute tools for IPv4 and IPv6 protocols.

To use these tools, go to GWN7000 WebGUI→**System Settings→Debug** and click on **Ping/Traceroute.**

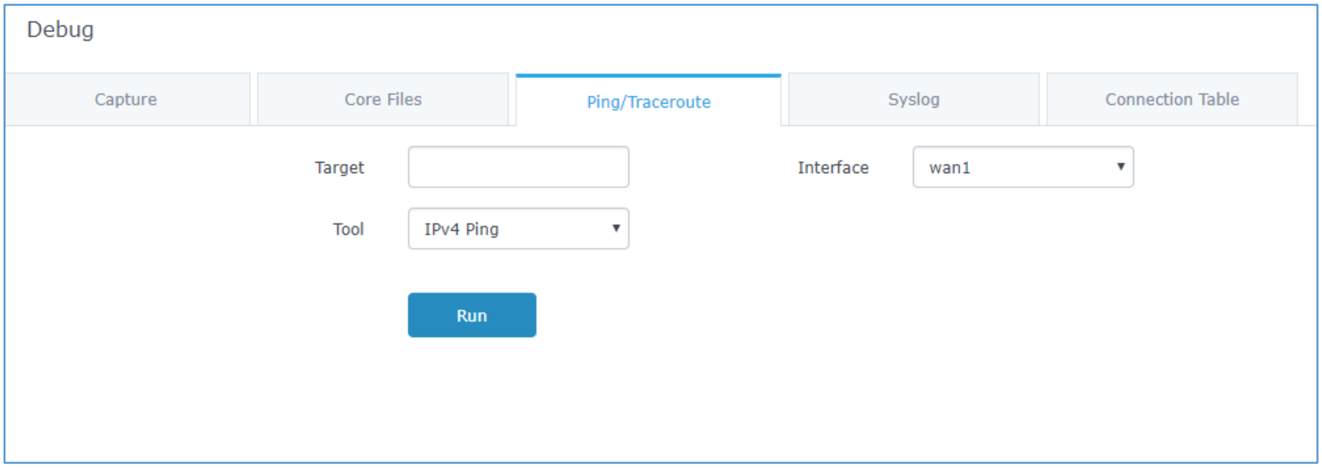
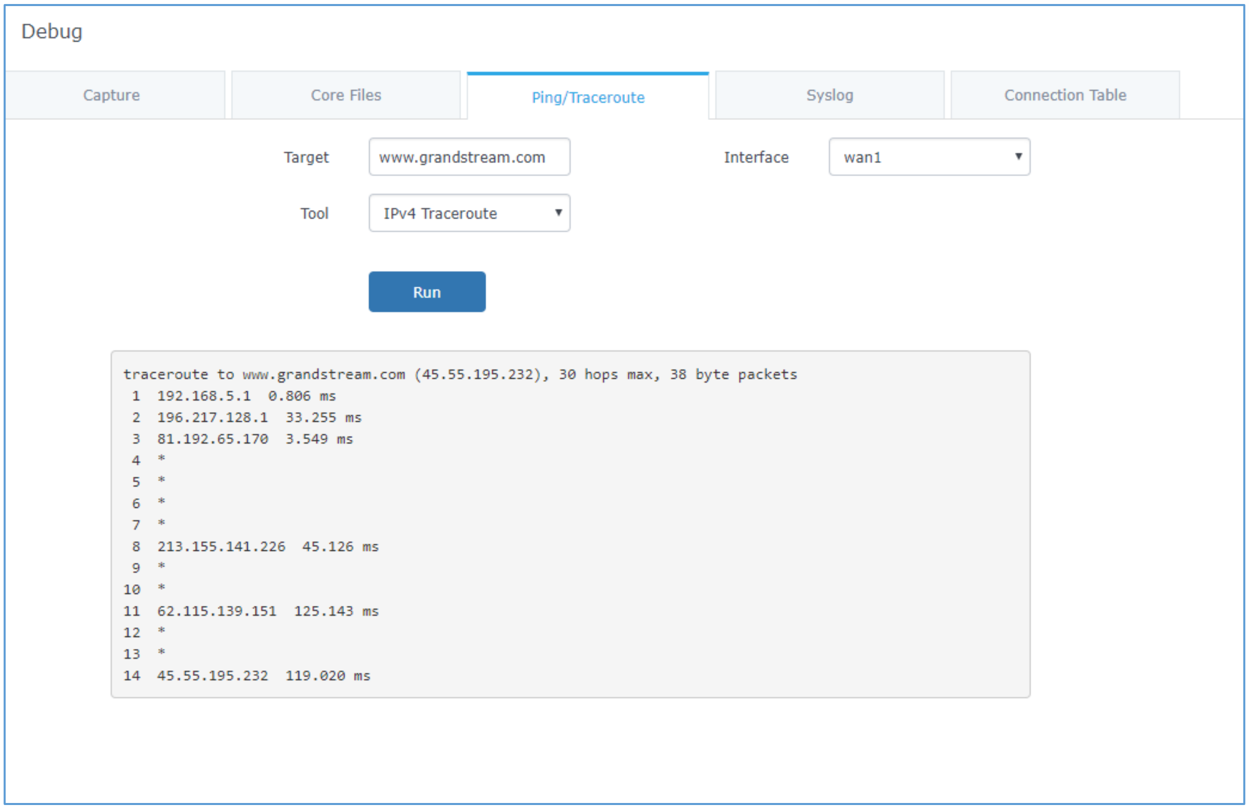


Figure 90: IP Ping

1. Type in the destination's IP address/domain name in **Target** field.
2. Select from which interface to issue the Ping/Traceroute from **Interface** dropdown list.
3. Next to **Tool** choose from the dropdown menu:
    - IPv4 Ping for an IPv4 Ping test to Target
    - IPv6 Ping for an IPv6 Ping test to Target
    - IPv4 Traceroute for an IPv4 Traceroute to Target
    - IPv6 Traceroute for an IPv6 Traceroute to Target
4. Click on **Run**.



Target: www.grandstream.com

Interface: wan1

Tool: IPv4 Traceroute

```
traceroute to www.grandstream.com (45.55.195.232), 30 hops max, 38 byte packets
 1  192.168.5.1  0.806 ms
 2  196.217.128.1  33.255 ms
 3  81.192.65.170  3.549 ms
 4  *
 5  *
 6  *
 7  *
 8  213.155.141.226  45.126 ms
 9  *
10  *
11  62.115.139.151  125.143 ms
12  *
13  *
14  45.55.195.232  119.020 ms
```

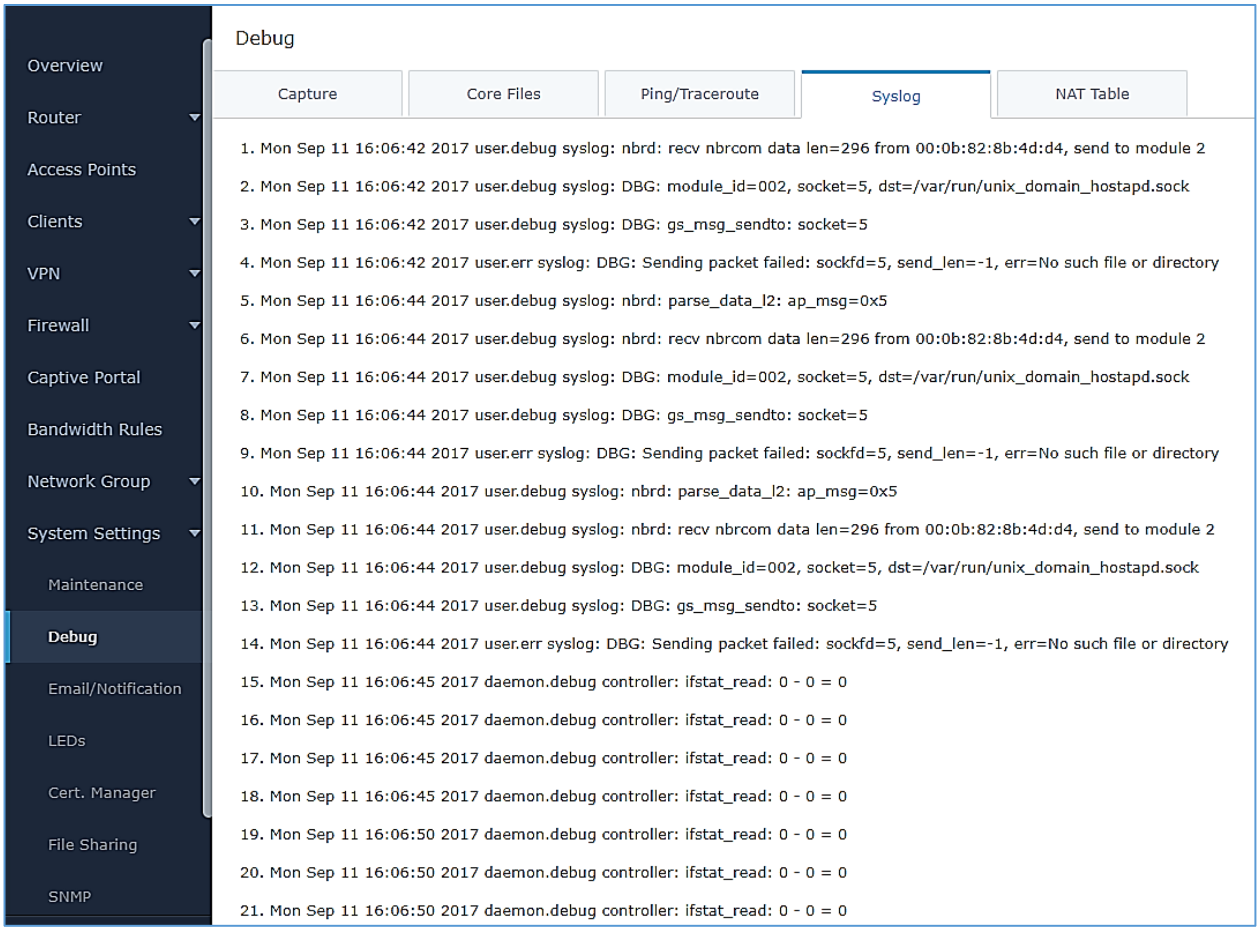
Figure 91: Traceroute

Syslog

GWN7000 supports dumping the syslog information to a remote server under Web GUI→**System Settings→Maintenance→Syslog**.

Enter the syslog server hostname or IP address and select the level for the syslog information. Five levels of syslog are available: None, Debug, Info, Warning, and Error.

Syslog messages are also displayed in real time under Web GUI→**System Settings→Debug→Syslog.**



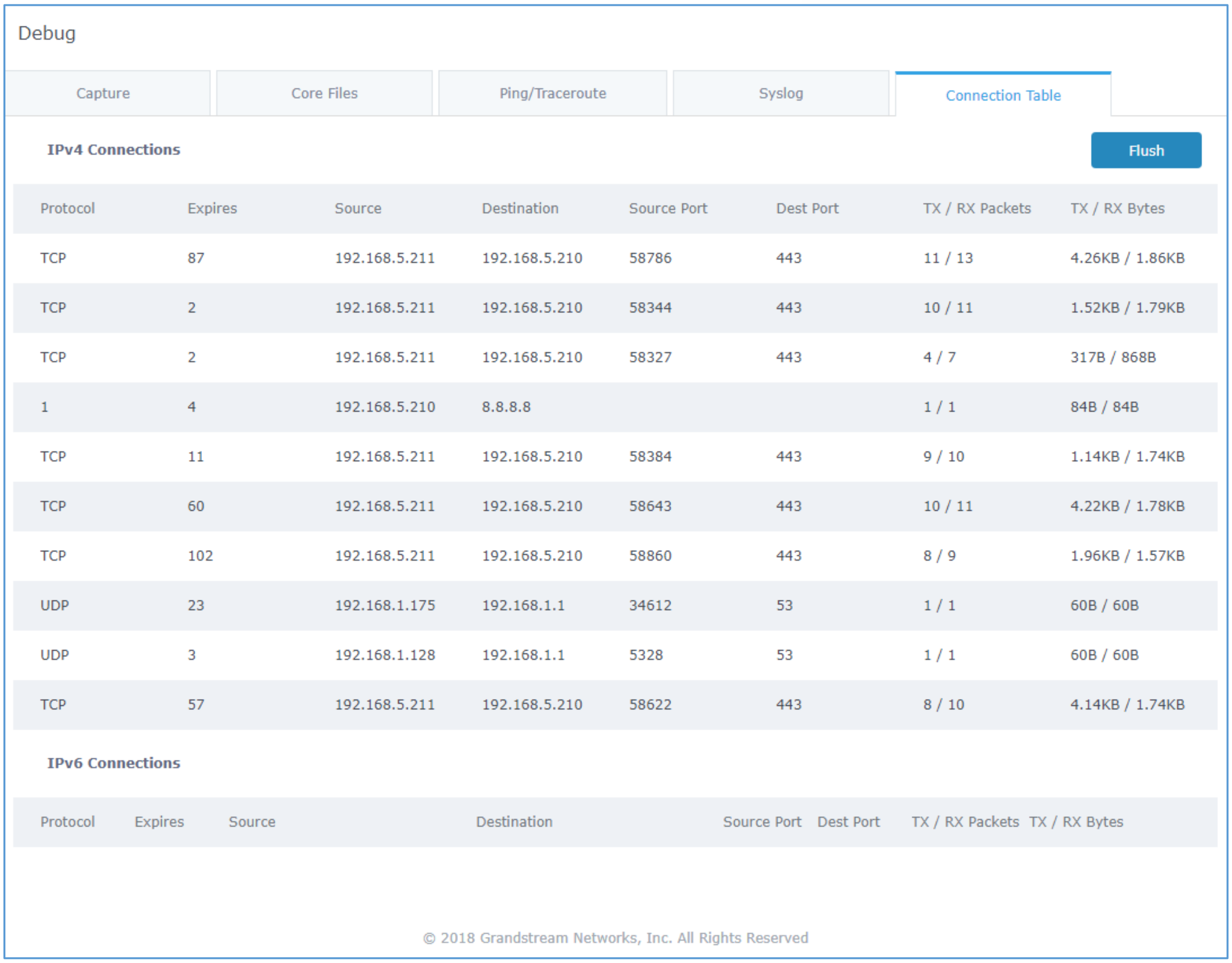
```
1. Mon Sep 11 16:06:42 2017 user.debug syslog: nbrd: recv nbrcom data len=296 from 00:0b:82:8b:4d:d4, send to module 2
2. Mon Sep 11 16:06:42 2017 user.debug syslog: DBG: module_id=002, socket=5, dst=/var/run/unix_domain_hostapd.sock
3. Mon Sep 11 16:06:42 2017 user.debug syslog: DBG: gs_msg_sendto: socket=5
4. Mon Sep 11 16:06:42 2017 user.err syslog: DBG: Sending packet failed: sockfd=5, send_len=-1, err=No such file or directory
5. Mon Sep 11 16:06:44 2017 user.debug syslog: nbrd: parse_data_l2: ap_msg=0x5
6. Mon Sep 11 16:06:44 2017 user.debug syslog: nbrd: recv nbrcom data len=296 from 00:0b:82:8b:4d:d4, send to module 2
7. Mon Sep 11 16:06:44 2017 user.debug syslog: DBG: module_id=002, socket=5, dst=/var/run/unix_domain_hostapd.sock
8. Mon Sep 11 16:06:44 2017 user.debug syslog: DBG: gs_msg_sendto: socket=5
9. Mon Sep 11 16:06:44 2017 user.err syslog: DBG: Sending packet failed: sockfd=5, send_len=-1, err=No such file or directory
10. Mon Sep 11 16:06:44 2017 user.debug syslog: nbrd: parse_data_l2: ap_msg=0x5
11. Mon Sep 11 16:06:44 2017 user.debug syslog: nbrd: recv nbrcom data len=296 from 00:0b:82:8b:4d:d4, send to module 2
12. Mon Sep 11 16:06:44 2017 user.debug syslog: DBG: module_id=002, socket=5, dst=/var/run/unix_domain_hostapd.sock
13. Mon Sep 11 16:06:44 2017 user.debug syslog: DBG: gs_msg_sendto: socket=5
14. Mon Sep 11 16:06:44 2017 user.err syslog: DBG: Sending packet failed: sockfd=5, send_len=-1, err=No such file or directory
15. Mon Sep 11 16:06:45 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
16. Mon Sep 11 16:06:45 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
17. Mon Sep 11 16:06:45 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
18. Mon Sep 11 16:06:45 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
19. Mon Sep 11 16:06:50 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
20. Mon Sep 11 16:06:50 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
21. Mon Sep 11 16:06:50 2017 daemon.debug controller: ifstat_read: 0 - 0 = 0
```

Figure 92: Syslog

Connection Table

NAT table is updated dynamically on GWN7000's WebGUI, to check the NAT table go to **System Settings→Debug→Connection Table**.

Users could press Flush button to clear all entries.



IPv4 Connections

Protocol	Expires	Source	Destination	Source Port	Dest Port	TX / RX Packets	TX / RX Bytes
TCP	87	192.168.5.211	192.168.5.210	58786	443	11 / 13	4.26KB / 1.86KB
TCP	2	192.168.5.211	192.168.5.210	58344	443	10 / 11	1.52KB / 1.79KB
TCP	2	192.168.5.211	192.168.5.210	58327	443	4 / 7	317B / 868B
1	4	192.168.5.210	8.8.8.8			1 / 1	84B / 84B
TCP	11	192.168.5.211	192.168.5.210	58384	443	9 / 10	1.14KB / 1.74KB
TCP	60	192.168.5.211	192.168.5.210	58643	443	10 / 11	4.22KB / 1.78KB
TCP	102	192.168.5.211	192.168.5.210	58860	443	8 / 9	1.96KB / 1.57KB
UDP	23	192.168.1.175	192.168.1.1	34612	53	1 / 1	60B / 60B
UDP	3	192.168.1.128	192.168.1.1	5328	53	1 / 1	60B / 60B
TCP	57	192.168.5.211	192.168.5.210	58622	443	8 / 10	4.14KB / 1.74KB

IPv6 Connections

Protocol	Expires	Source	Destination	Source Port	Dest Port	TX / RX Packets	TX / RX Bytes

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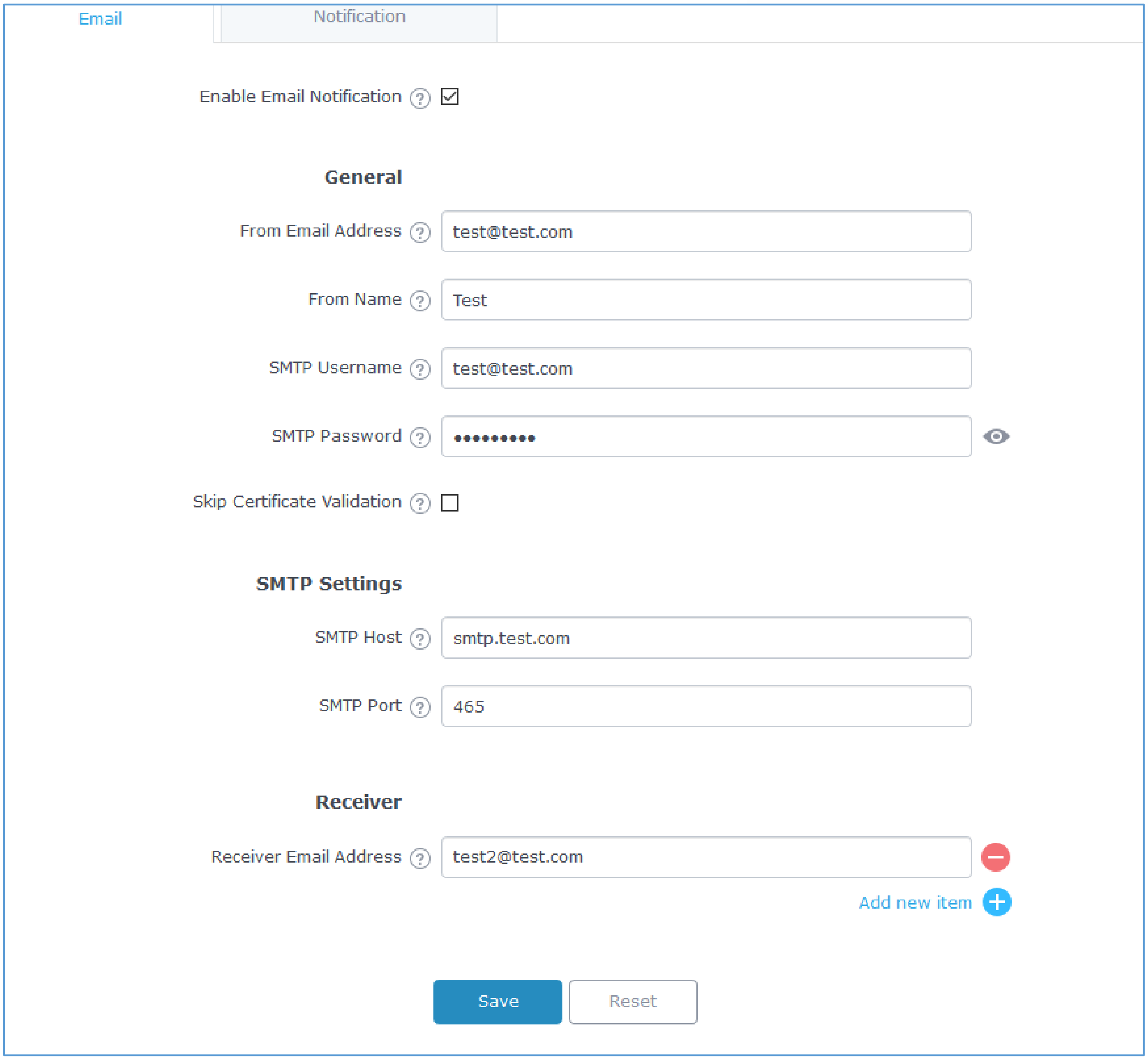
Figure 93: Connection Table

Email/Notification

The Email/Notification page allows the administrator to select a predefined set of system events and to send notifications upon the change of the set events.



Enable Email Notification ☑

General

From Email Address: test@test.com

From Name: Test

SMTP Username: test@test.com

SMTP Password: ●●●●●●●●●

Skip Certificate Validation □

SMTP Settings

SMTP Host: smtp.test.com

SMTP Port: 465

Receiver

Receiver Email Address: test2@test.com

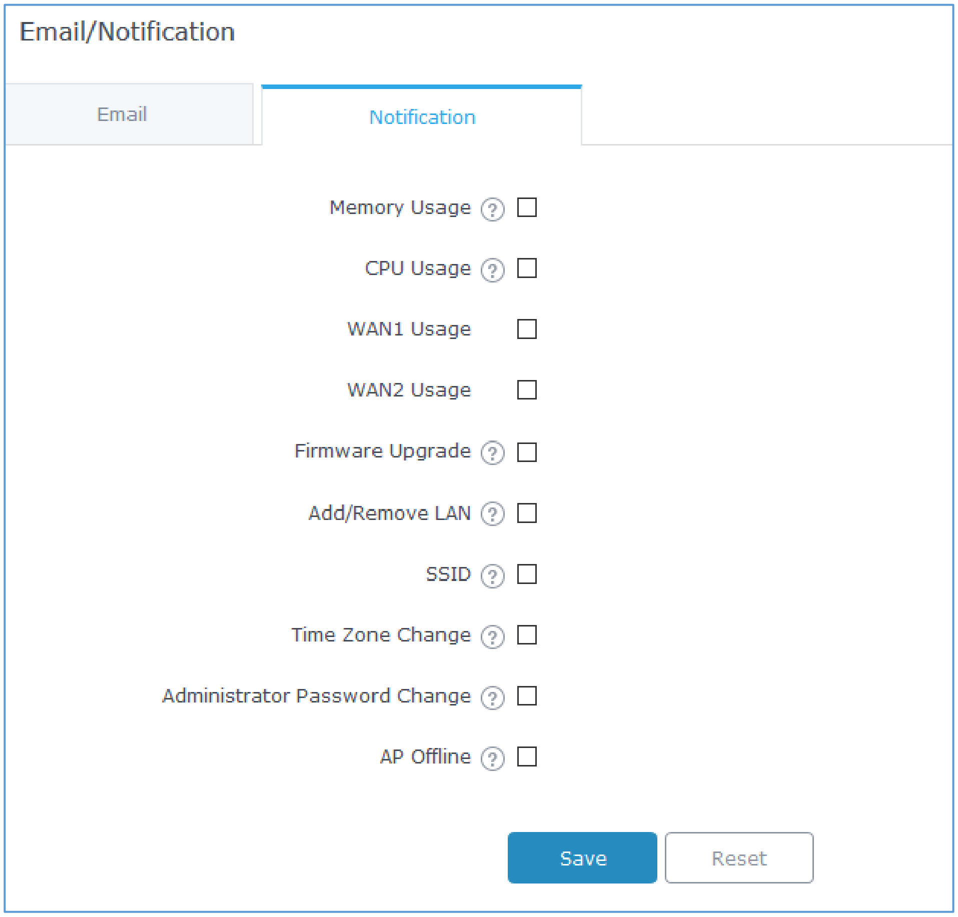
Figure 94: Email settings

Table 51: Email Setting

Filed	Description
Enable Email Notification	Once enabled, AP will send related notification email to the the receivers. **Note**: if no event is specified in the Notification page, server will send an empty mail.
General	
From Email Address	Specify the email address of the notification sender. If the address is not specified, AP will use the SMTP username as a sender.

From Name	Specifies the name of the notification sender.
SMTP Username	Specifies the username to login to the mail server
Email Address	Specifies the email address of the administer where to receive notifications.
Skip Certificate Validation	Check this box to skip the certificate validation
SMTP Settings	
SMTP Host	Configures the SMTP Email Server IP or Domain Name.
SMTP Port	Specifies the Port number used by server to send email.
Receiver Email Address	Specifies the email addresses to receive notifications.

Figure 95: Notification



Email/Notification

Memory Usage ? □

CPU Usage ? □

WAN1 Usage □

WAN2 Usage □

Firmware Upgrade ? □

Add/Remove LAN ? □

SSID ? □

Time Zone Change ? □

Administrator Password Change ? □

AP Offline ? □

The following table describe the notifications configuration settings.

Table 52: Email Events

Filed	Description
Enabled	Enable/disable the notification. By default, it's disabled

Memory Usage	Configures whether to send notification if memory usage is greater than the configured threshold. By default, it's disabled.
Memory Usage Threshold (%)	Specifies the Memory Usage Threshold (%). Must be integer between 1 and 100.
CPU Usage	Configures whether to send notification if CPU usage is greater than the configured threshold. By default, it's disabled.
CPU Usage Threshold (%)	Specifies the CPU Usage Threshold (%). Must be integer between 1 and 100.
WAN1 Usage	Configures whether to send notification if WAN1 usage is greater than the configured threshold. By default, it's disabled.
WAN1 Usage Threshold (%)	Specifies the WAN1 Usage Threshold (%). Must be integer between 1 and 100.
WAN2 Usage	Configures whether to send notification if WAN2 usage is greater than the configured threshold. By default, it's disabled.
WAN2 Usage Threshold (%)	Specifies the WAN2 Usage Threshold (%). Must be integer between 1 and 100.
Firmware upgrade	Configures whether to send notification on firmware upgrade. Default is disabled.
Add/Remove LAN	Configures whether to send notification on LAN added or removed. Default is disabled.
SSID	Configures whether to send notification if any SSID is enabled. Default is disabled.
Time Zone Change	Configures whether to send notification on time zone change. Default is disabled.
Administrator Password Change	Configures whether to send notification on admin password change. Default is disabled.
AP Offline	Configures whether to send notification when AP going offline. Default is disabled.

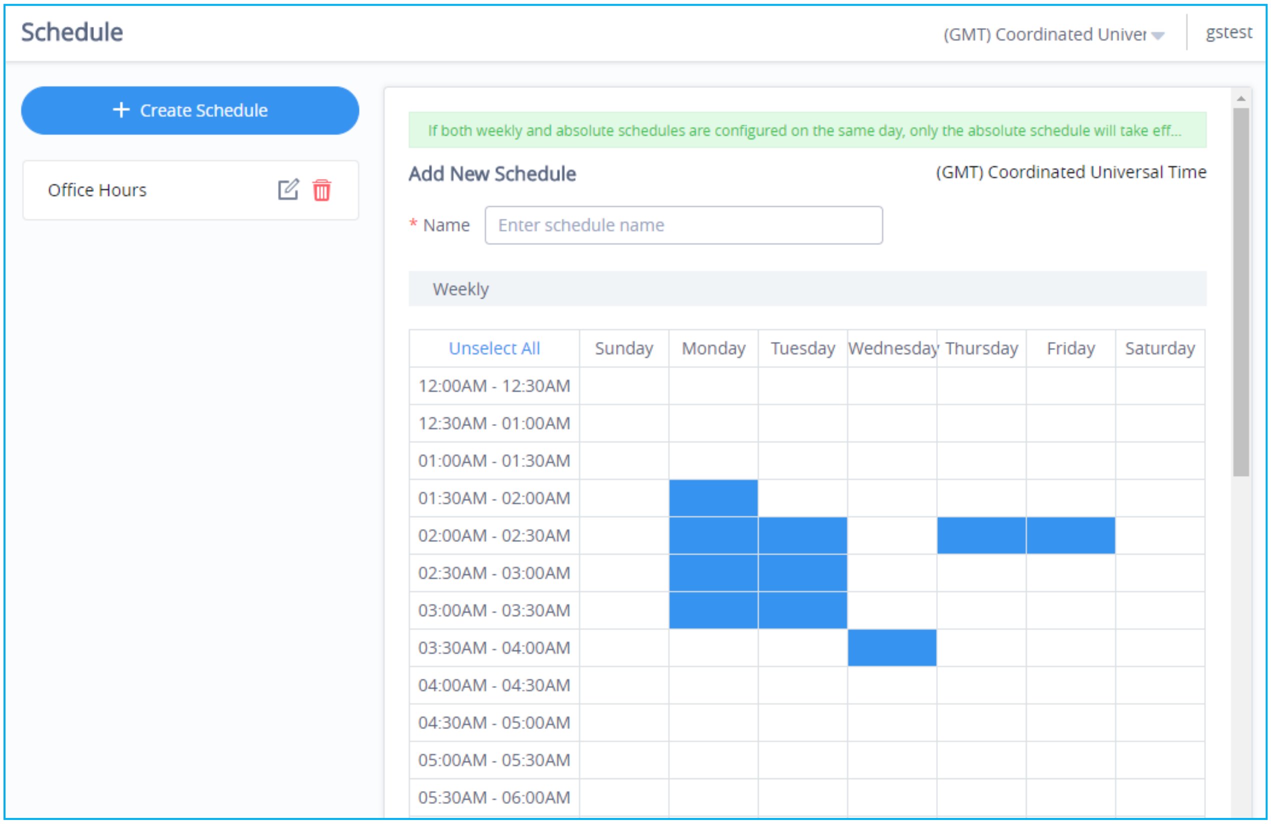
Schedule

Users can use the schedule configuration menu to set specific schedule for GWN features while giving the flexibility to specify the date and time to turn ON/OFF the selected feature.

The Schedule can be used for settings up specific time for Wi-Fi where the service will be active or for LED schedule or bandwidth rules …etc.

In order to configure a new schedule, follow below steps:

1- Go under “**Schedule**” and click on **Create New Schedule**.



Schedule

(GMT) Coordinated Univer

gstest

Office Hours

If both weekly and absolute schedules are configured on the same day, only the absolute schedule will take eff...

Add New Schedule

(GMT) Coordinated Universal Time

* Name: Enter schedule name

Weekly

Unselect All	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
12:00AM - 12:30AM							
12:30AM - 01:00AM							
01:00AM - 01:30AM							
01:30AM - 02:00AM		■					
02:00AM - 02:30AM		■	■		■	■	
02:30AM - 03:00AM		■	■				
03:00AM - 03:30AM		■	■				
03:30AM - 04:00AM				■			
04:00AM - 04:30AM							
04:30AM - 05:00AM							
05:00AM - 05:30AM							
05:30AM - 06:00AM							

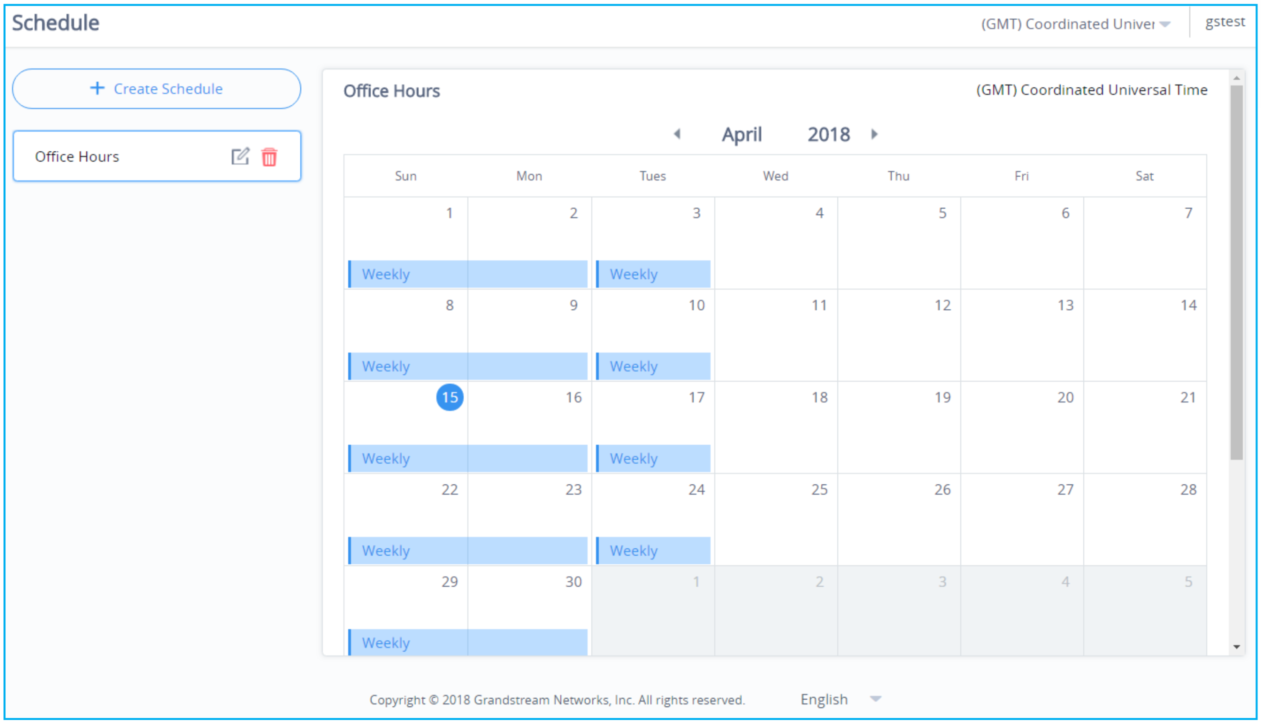
Figure 96: Create New Schedule

2- Select the periods on each day that will be included on the schedule and enter a name for the schedule (ex: office hours).

3- Users can choose to set weekly schedule or absolute schedule (for specific days for example), and if both weekly schedule and absolute schedules are configured on the same day then the absolute schedule will take effect and the weekly program will be cancelled for that specific date.

4- Once the schedule periods are selected, click on **Save** to save the schedule.

The list of created schedules will be displayed as shown on the figure below. With the possibility to edit or delete each schedule:


Schedule
(GMT) Coordinated Univer
gstest
+ Create Schedule
Office Hours
Office Hours
(GMT) Coordinated Universal Time
April 2018
Copyright © 2018 Grandstream Networks, Inc. All rights reserved.
English

Sun	Mon	Tues	Wed	Thu	Fri	Sat
1 Weekly	2	3 Weekly	4	5	6	7
8 Weekly	9	10 Weekly	11	12	13	14
15 Weekly	16	17 Weekly	18	19	20	21
22 Weekly	23	24 Weekly	25	26	27	28
29 Weekly	30	1	2	3	4	5

Figure 97: Schedules List

LED

GWN76xx Access Points series support also the LED schedule feature. This feature is used to set the timing when the LEDs are ON and when they will go OFF at customer's convenience.

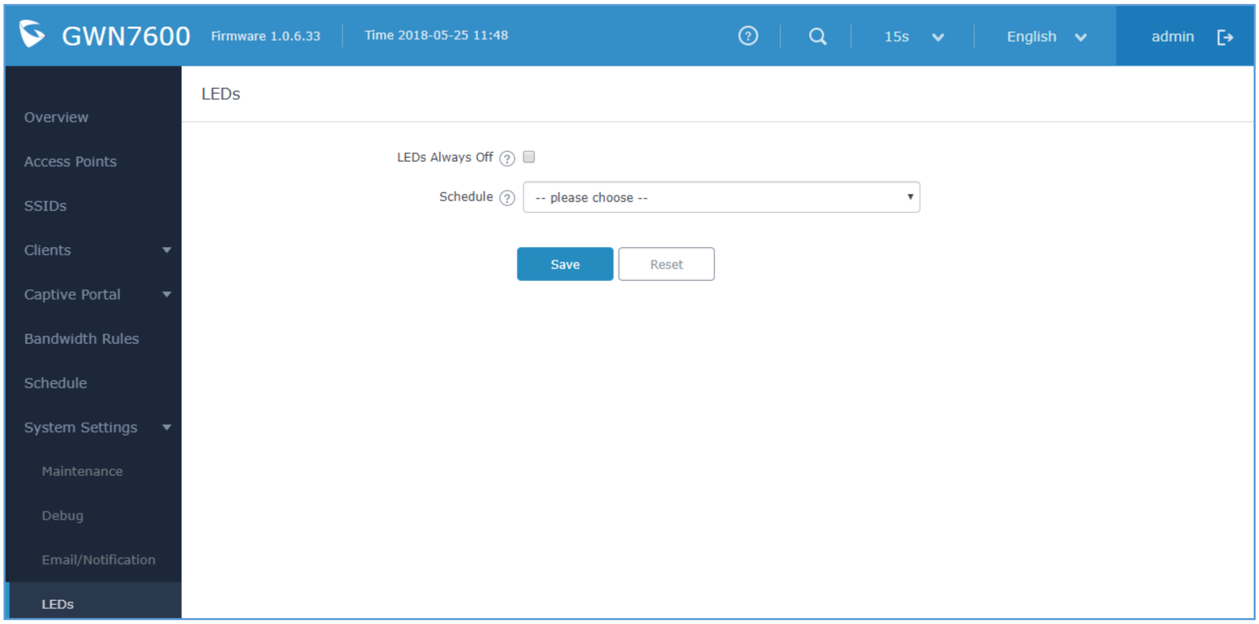
This can be useful for example when the LEDs become disturbing during some periods of the day, this way with the LED scheduler, you can set the timing so that the LEDs are off at night after specific hours and maintain the Wi-Fi service for other clients without shutting down the AP.

To configure LED schedule, on the GWN76xx AP WebGUI navigate to "**System Settings→LEDs**".

Following options are available:

Table 53: LEDs

Field	Description
LEDs Always Off	Configure whether to disable the AP LED dictator
Schedule	Please choose a schedule to assign to LEDs, users can configure schedules under the menu *Schedule*



LEDs

LEDs Always Off ☐

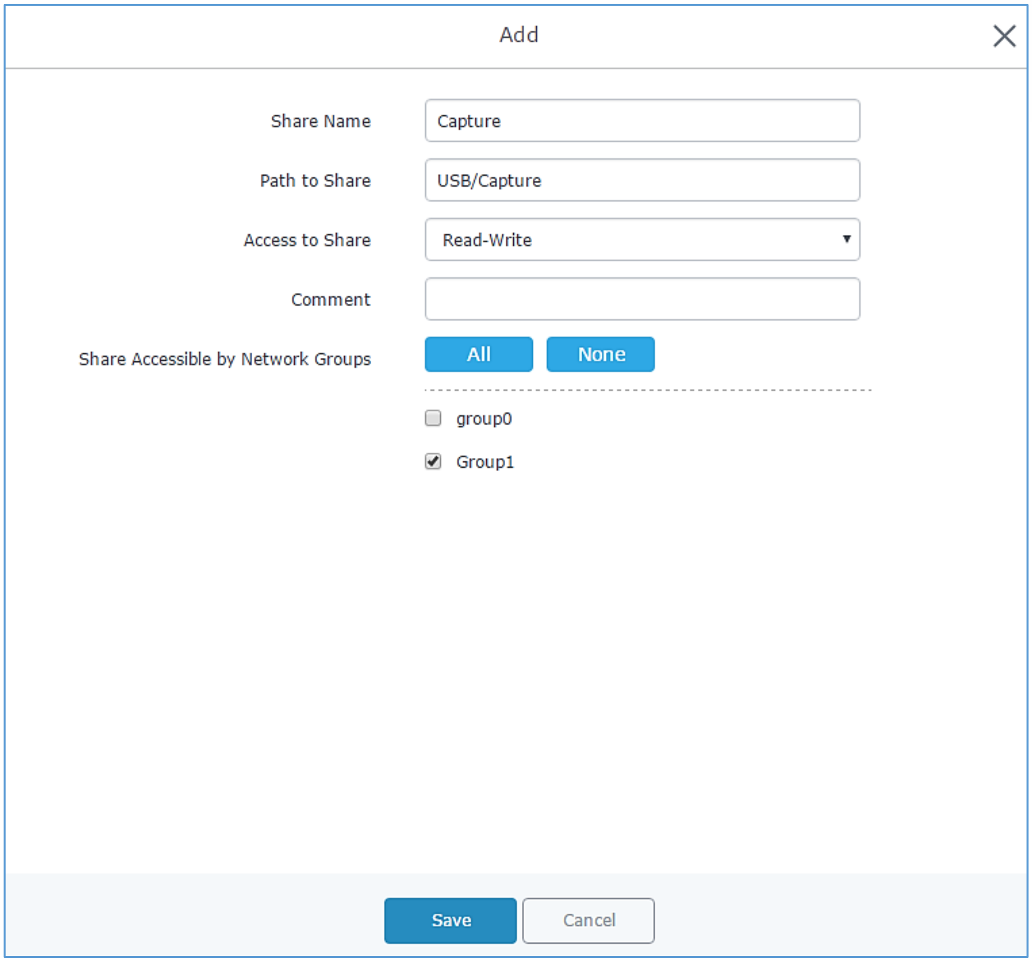
Schedule: -- please choose --

Figure 98: LED Scheduling Sample

File Sharing

The GWN7000 has 2 USB ports that can be also used for file sharing, to enable file sharing on devices plugged on the USB ports, go to **System Settings→File Sharing.**

Click on ⊕ Add to share a directory and its contents on a device connected to one of the USB ports of the GWN7000, the following figure will pop up.



Add ✕

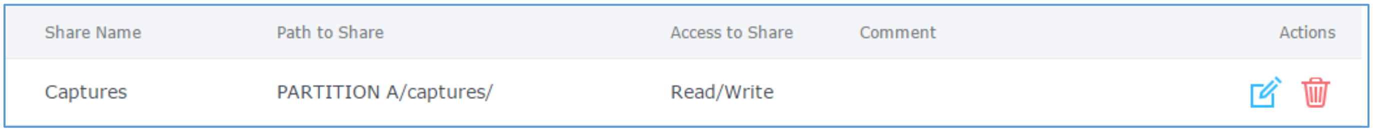
Share Name	Capture
Path to Share	USB/Capture
Access to Share	Read-Write ▾
Comment	
Share Accessible by Network Groups	All / None
	□ group0
	☑ Group1

Figure 99: Add a New File to Share

Table 54: Add a New File to Share

Share Name	Enter the share name
Path to Share	Choose from the drop menu the path to share.
Access to Share	Choose whether to allow users to **Read/Write** or **Read Only** on the shared path.
Comment	Enter a comment for the added shared file.
Share Accessible by LAN	Choose whether to allow **All** LANs to access the shared path, restrict access by selecting only some groups or **None**.

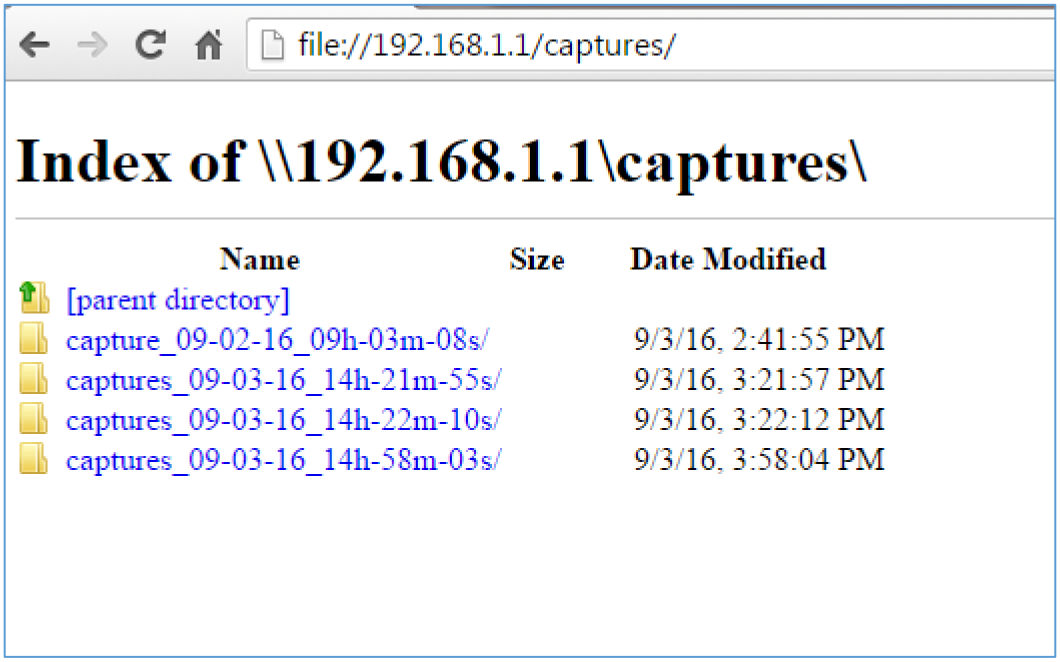
Edit a Shared Folder by clicking on ✎ or delete it by clicking on 🗑



Share Name	Path to Share	Access to Share	Comment	Actions
Captures	PARTITION A/captures/	Read/Write		✎ 🗑

Figure 100: File Share Actions

A device connected to one of the allowed network groups to the shared files can use the following path for access: \\GWN_Address\Share_Name\ Where **GWN_Address** is the GWN7000 IP address, and **Share_Name** is the Share Name created for the File Share. It is also possible to map a network drive on Windows, or use a Samba client on Linux machine.



file://192.168.1.1/captures/

Index of \\192.168.1.1\captures\

Name	Size	Date Modified
[parent directory]		
capture_09-02-16_09h-03m-08s/		9/3/16, 2:41:55 PM
captures_09-03-16_14h-21m-55s/		9/3/16, 3:21:57 PM
captures_09-03-16_14h-22m-10s/		9/3/16, 3:22:12 PM
captures_09-03-16_14h-58m-03s/		9/3/16, 3:58:04 PM

Figure 101: Access File Share

SNMP

GWN7000 supports SNMP (Simple Network Management Protocol) which is widely used in network management for network monitoring for collecting information about monitored devices.

To configure SNMP settings, go to GWN7000 Web GUI→**System Settings→SNMP**, this page has two tabs: Basic and Advanced, refer to the below tables for each tab.

Table 55: SNMP Basic Page

System Location	Set the System Location information, for example: *SNMP-Server Lobby GWN.*
System Contact	Set the System Contact information, for example: Contact *Supervisor_GWN via extension is 1000.*
System Name	Set the System Name information, for example: *Supervisor_GWN.*
Read-Only Community for IPv4	Gives the permission for the set community to access and read only to devices in management information base via IPv4 Protocol.

Read-Write Community for IPv4	Gives the permission for the set community to access and read/write to devices in management information base via IPv4 Protocol.
Read-Only Community for IPv6	Gives the permission for the set community to access and read only to devices in management information base via IPv6 Protocol.
Read-Write Community for IPv6	Gives the permission for the set community to access and read/write to devices in management information base via IPv6 Protocol.
Trap Type	Choose the Trap Type from drop-down menu, 4 options are available: None, SNMPv1, SNMPv2c and SNMPv2cInforms.
Monitoring Host	Enter the Monitoring Host's IP/Domain Name (Network Management System "NMS")
Monitoring Host Port	Enter the Monitoring Host's Port (Network Management System "NMS")
Trap Community	Enter the Trap Community string to authenticate the client against the server.

Table 56: SNMP Advanced Page

SNMP Service Listening on	Click on ⊕ Add to add an SNMP Service Listening on: • Set the **Transport** Type: UDPv4, UDPv6, TCPv4 or TCPv6. • Choose the **IP Address** from drop-down menu list. • Set the **Port** number on which the GWN7000 will listen on.
SNMPv3 Users	Click on ⊕ Add to add an SNMPv3 User: • Set the **Username** for authentication. • Choose the **Authentication** type, 2 options are available: SHA and MD5. • Set the Authentication Password from **Authentication Passphrase.** • Enter the Password again to confirm from **Authentication Passphrase Confirmation.** • Choose the **Privacy Protocol**, 3 options are available: None, DES and AES. • Set the **Privacy Passphrase.** • Enter the **Privacy Passphrase** in **Privacy Passphrase Confirmation** field.

User Manager

Under this section, administrator can generate or create user accounts that will be used for VPN connection authentication, click on Add in order to create a new user account.

The following table summarizes the configuration parameters:

Table 57: VPN User Parameters

Option	Description
Enabled	Check this option to enable/disable the user account.
PPTP Server	Check this option to enable the user connection to the PPTP server.
Full Name	Enter user full name. When using PPTP it defaults to pptpd.
Username	Enter user Username.
Password	Enter user password.
IPSec Pre-Shared Key	Set user pre-shared key for authentication.
Enabled PPTP Client Subnet	Check this option when using PPTP, and enter the client subnet.
Client Subnet	Configured to which subnet this client belongs to (ex: 192.168.1.0/24).
OpenVPN Subnet	Configures OpenVPN user subnet (ex: 192.168.1.0/24).

UPGRADING AND PROVISIONING

Upgrading Firmware

The GWN7000 can be upgraded to a new firmware version remotely or locally. This section describes how to upgrade your GWN7000.

Upgrading via WEB GUI

The GWN7000 can be upgraded via TFTP/HTTP/HTTPS by configuring the URL/IP Address for the TFTP/HTTP/HTTPS server and selecting a download method. Configure a valid URL for TFTP, HTTP or HTTPS; the server name can be FQDN or IP address.

Examples of valid URLs:
firmware.grandstream.com/BETA
192.168.5.87

The upgrading configuration can be accessed via **Web GUI→Router→Maintenance→Upgrade**.

Table 58: Network Upgrade Configuration

Upgrade Via	Choose the firmware upgrade method: TFTP, HTTP or HTTPS.
Firmware Server	Define the server path for the firmware server.
Check/Download New Firmware and Config at Boot	Allows the device to check if there is a firmware from the configured firmware server at boot.
Allow DHCP options 66 and 43 override	Configure whether to allow DHCP options 66 and 43 to override upgrade and provisioning settings.
Automatic Upgrade	Specify the time to check for firmware upgrade (in minutes).
Upgrade Now	Click on Upgrade button to begin the upgrade. Note that the device will reboot after downloading the firmware.

⚠ **Note:**

Please do not interrupt or power cycle the GWN7000 during upgrading process.

Service providers should maintain their own firmware upgrade servers. For users who do not have TFTP/HTTP/HTTPS server, some free windows version TFTP servers are available for download from http://www.solarwinds.com/products/freetools/free_tftp_server.aspx http://tftpd32.jounin.net

Please check our website at http://www.grandstream.com/support/firmware for latest firmware.

Instructions for local firmware upgrade via TFTP:

1. Unzip the firmware files and put all of them in the root directory of the TFTP server;
2. Connect the PC running the TFTP server and the GWN7000 to the same LAN segment;
3. Launch the TFTP server and go to the File menu→Configure→Security to change the TFTP server's default setting from "Receive Only" to "Transmit Only" for the firmware upgrade;
4. Start the TFTP server and configure the TFTP server in the GWN7000 web configuration interface;
5. Configure the Firmware Server to the IP address of the PC;
6. Update the changes and reboot the GWN7000.

End users can also choose to download a free HTTP server from http://httpd.apache.org/ or use Microsoft IIS web server.

Provisioning and backup

The GWN7000 configuration can be backed up locally or via network. The backup file will be used to restore the configuration on GWN7000 when necessary.

Download Configuration

Download the GWN7000 configurations for restore purpose under **Web GUI → Router → Maintenance → Upgrade**

Click on Download to download locally the configuration file.

Configuration Server

Configuration Server Page allows to provision the GWN7000 by putting the config file on a TFTP/HTTP or HTTPS server, and set Config Server to the TFTP/HTTP or HTTPS server used in order for the GWN7000 to be provisioned with that config server file.

Reset and Reboot

Used to reboot and reset the device to factory functions under **Web GUI→ Router→ Maintenance → Upgrade** by clicking on Reboot button.

Reset Will restore all the online GWN76xx as well as well as the GWN7000 itself to factory settings.

EXPERIENCING THE GWN7000 ENTERPRISE ROUTER

Please visit our website: http://www.grandstream.com to receive the most up- to-date updates on firmware releases, additional features, FAQs, documentation and news on new products.

We encourage you to browse our product related documentation, FAQs and User and Developer Forum for answers to your general questions. If you have purchased our products through a Grandstream Certified Partner or Reseller, please contact them directly for immediate support.

Our technical support staff is trained and ready to answer all of your questions. Contact a technical support member or submit a trouble ticket online to receive in-depth support.

Thank you again for purchasing Grandstream GWN7000 Enterprise Multi-WAN Gigabit VPN Router, it will be sure to bring convenience and color to both your business and personal life