PEPWAVE

Broadband Possibilities

User Manual

Pepwave AP One Series:

AP One AC Mini (HW2) / AP One Flex (HW4) / AP One AX

Pepwave AP One Firmware 3.7.3 / 3.8.1

January 2021

Table of Contents

1 Introduction and Scope

Our AP Series of enterprise-grade 802.11ac/a/b/g/n Wi-Fi access points is engineered to provide fast, dependable, and flexible operation in a variety of environments, all controlled by an easy-to-use centralized management system.
From the small but powerful AP One AC mini to the top-of-the-line AP Pro Duo our AP Series offers wireless networking solutions to suit any business need, and every access point is loaded with essential features such as multiple SSIDs, VLAN, Mesh, WDS, and Guest Protect.

A single access point provides as many as 32 virtual access points (16 on single-radio models), each with its own security policy (WPA, WPA2, etc.) and authentication mechanism (802.1x, open, captive portal, etc.), allowing faster, easier, and more cost-effective network builds.
Each member of the AP Series family also features a high-powered Wi-Fi transmitter that greatly enhances coverage and performance while reducing equipment costs and maintenance.

2 Product Features and Benefits

Key features and benefits of AP Series access points:

- High-powered Wi-Fi transmitter that enhances coverage and lowers cost of ownership.
- Independent security policies and encryption mechanisms for each virtual access point allow fast, flexible, cost-effective network builds.
- Centralized management via InControl reduces maintenance expense and time.
- Mesh support allows for wireless expansion and enhancement of Wi-Fi coverage.
- WDS support allows secure and fast network expansion.
- Guest Protect support guards sensitive business data and subnetworks.
- WMM (Wi-Fi Multimedia) and QoS (Quality of Service) support keeps video and other bandwidth-intensive data flowing fast and lag-free.

3 Package Contents

AP One AC mini (APO-AC-MINI)

1 x AP One mini
1 x 12V2A Power supply
1 x Mounting Bracket

AP One Flex (APO-FLX)

1 x AP One Flex
1 x Cable Tie
* Power supply or Pepwave Passive PoE Injector are not included

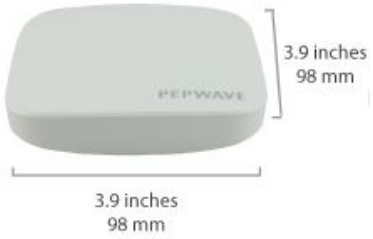
AP One AX (APO-AX)

1 x AP One AX
1 x Ceiling Mount
1 x Screw Kit

4 Hardware Overview

4.1 AP One AC mini

Front View



Rear Panel View

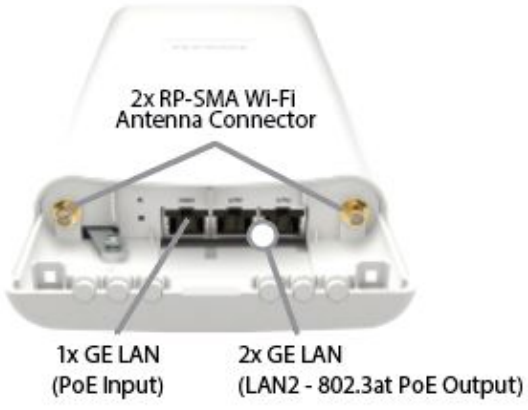
LED Indicators	
Status	RED – Access point initializing GREEN – Access point ready
Wi-Fi	OFF – 2.4/5GHz Wi-Fi radio off BLINKING – AP sending/receiving data GREEN – 2.4/5GHz Wi-Fi radio on Note that this model includes a 2.4GHz Wi-Fi radio and a 5GHz Wi-Fi radio that can operate simultaneously to increase speed and reduce interference.

4.2 AP One Flex

Front View

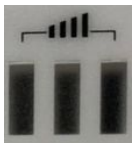
Rear Panel View

Connector Panel (Inside the Lid)



Accessory – Wall/Pole Mount with Ball Joint for IP55 Outdoor Products ^

^ Available separately.

LED Indicators		
Status	**RED**	Access point initializing
	Blinking Red	Boot up or error
	GREEN	Access point ready
LAN	**Green LED**	ON – Powered-on device connected to Ethernet port or 1000Mbps OFF – 10Mbps / 100Mbps or No device connected to Ethernet port
	Orange LED	ON – Port is connected without traffic BLINKING – Ethernet port sending/receiving data OFF – No data is being transferred or No device connected to Ethernet port
	Port Type	Auto MDI/MDI-X ports
WAN	**Green LED**	ON – Powered-on device connected to Ethernet port or 1000Mbps OFF – 10Mbps / 100Mbps or No device connected to Ethernet port
	Orange LED	ON – Port is connected without traffic BLINKING – Ethernet port sending/receiving data OFF – No data is being transferred or No device connected to Ethernet port
	Port Type	Auto MDI/MDI-X ports
	**Green LED**	ON – Powered-on device connected to Ethernet port OFF – No device connected to Ethernet port
	Number of connected clients – SignalBar1: WiFi AP client count > 0 SignalBar2: WiFi AP client count > 10 SignalBar3: WiFi AP client count > 20	

4.3 AP One AX

Front View

Top

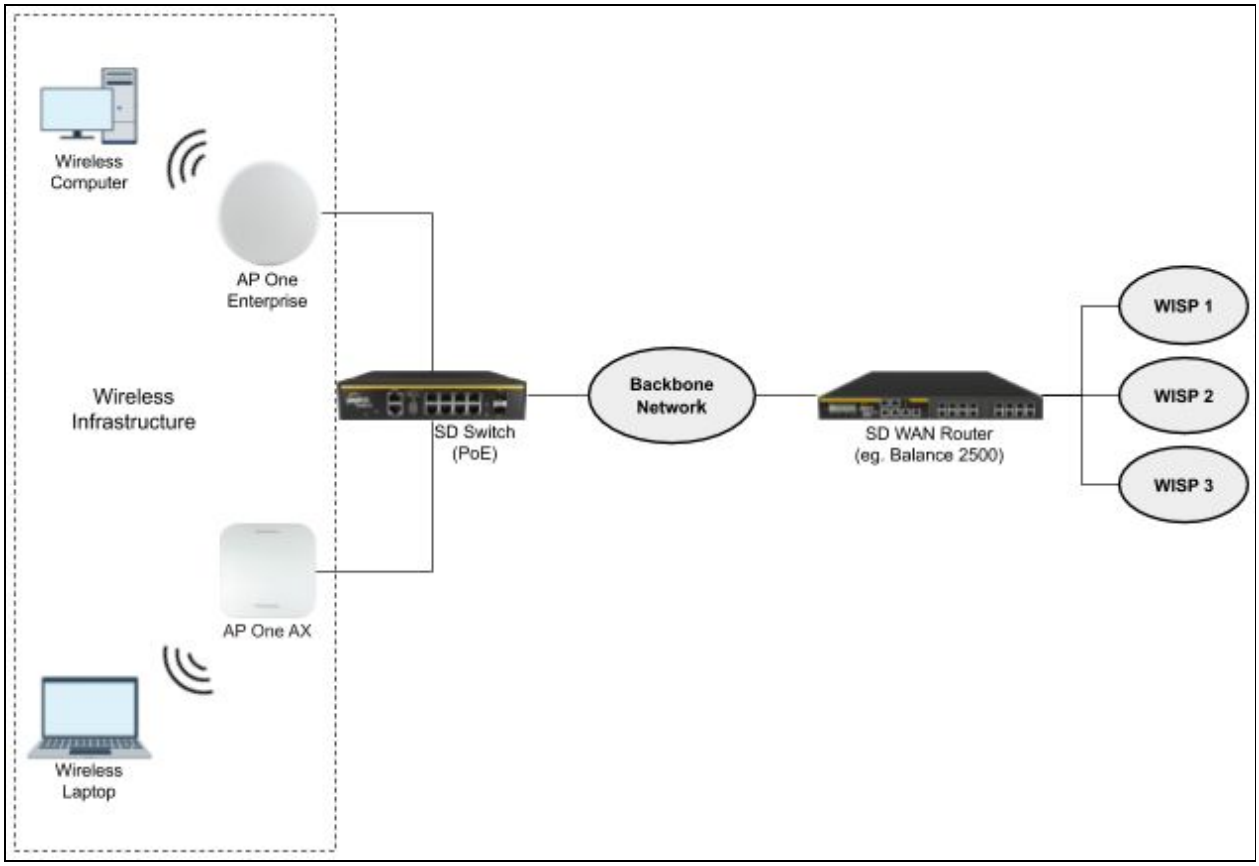
Bottom

Side

LED Indicators		
Power 	**Blue LED**	OFF – Power Off ON – Power On
Status 	**Blue LED**	OFF – Access point initializing ON – Access point ready
Ethernet Port 	**Blue LED**	OFF – No data is being transferred or No device connected to Ethernet port BLINKING – Ethernet port sending/receiving data ON – Powered-on device connected to Ethernet port
	Port Type	Auto MDI/MDI-X ports
Wi-Fi 	**Blue LED**	OFF – 2.4/5GHz Wi-Fi radio off BLINKING – AP sending/receiving data ON – 2.4/5GHz Wi-Fi radio on

5 Installation

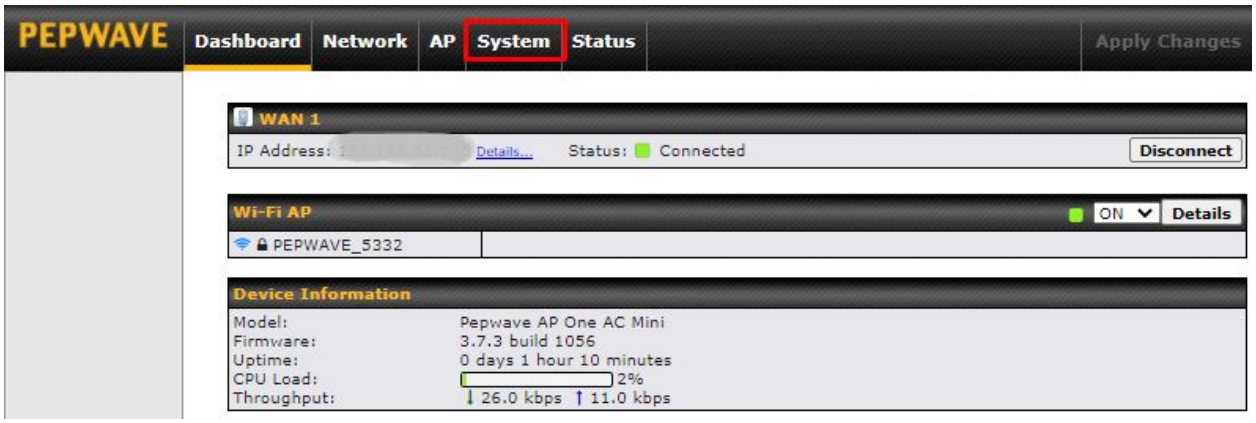
Your access point acts as a bridge between wireless and wired Ethernet interfaces.
A typical setup follows:



Installation Procedures

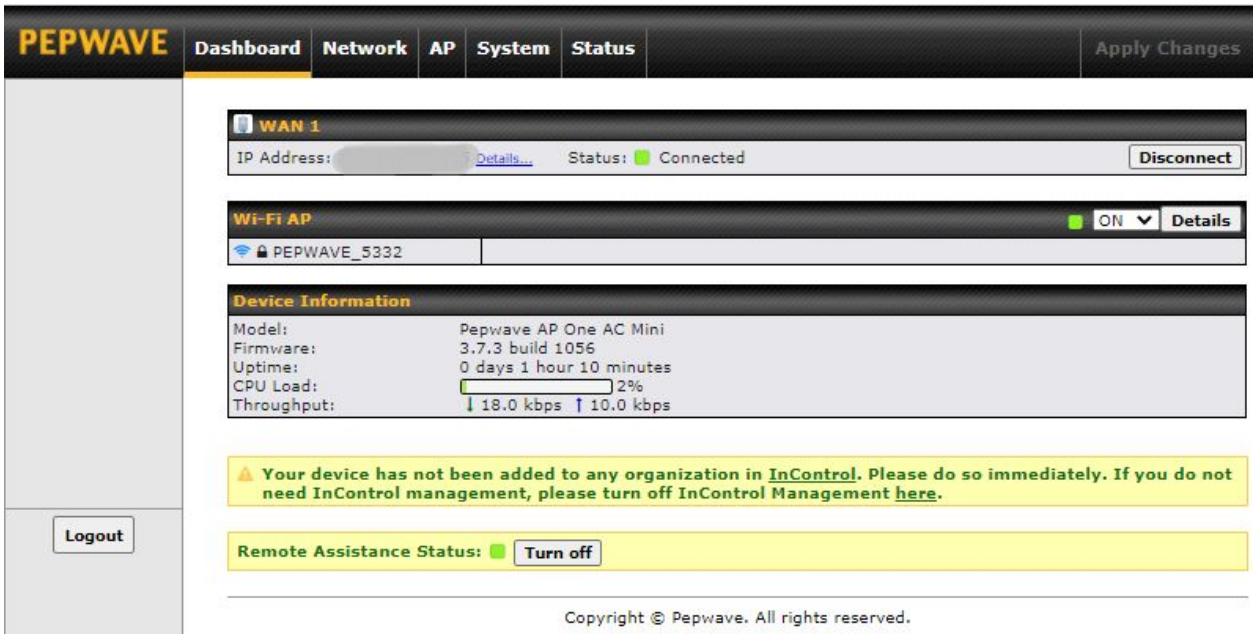
1. Connect the Ethernet port on the unit to the backbone network using an Ethernet cable. The port should auto sense whether the cable is straight-through or crossover.
2. There are two methods to power on the device as below:
   - 2.1 For those Pepwave AP devices having built-in PoE ports only, using an Ethernet cable to connect to the Power over Ethernet (PoE) switch or PoE injector.
   - 2.2 For those Pepwave AP devices that have a DC power source, plug the AC adapter to the DC connector of the unit.
3. Wait for the status LED to turn green.

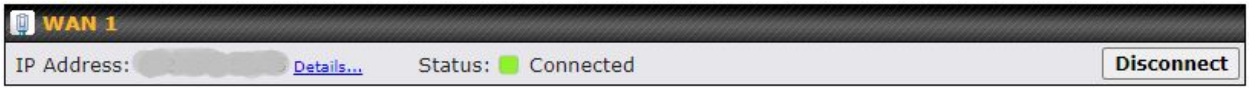
4. Connect a PC to the backbone network. Configure the IP address of the PC to be any IP address between 192.168.0.4 and 192.168.0.254, with a subnet mask of 255.255.255.0.
5. Using your favourite browser, connect to https://192.168.0.3.
6. Enter the default admin login ID and password, admin and public respectively.
7. After logging in, the Dashboard appears. Click the System tab to begin setting up your access point.



6 Dashboard

The **Dashboard** section contains a number of displays to keep you up-to-date on your access point's status and operation. Remote assistance can also be turned off here, if it has been enabled.





This section contains WAN status and general device information.

WAN	
IP Address	When your access point is connected to a WAN, this field displays the WAN IP address. For more information, click the **Details** link which shows connection type details
Status	This field displays the current WAN connection status.

Device Information	
Model	This field displays your access point's model number.
Firmware	The firmware version currently running on your access point appears here.
Uptime	This field displays your access point's uptime since the last reboot or shutdown.
CPU Load	This field shows current loading (0%-100%) on your access point.
Throughput	This field displays your access point's transfer rate in kbps.

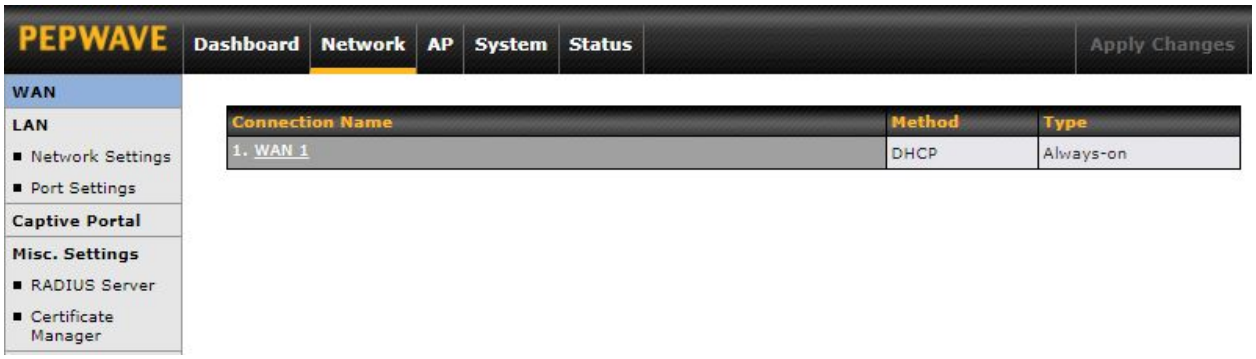
7 Network

The settings on the **Network** tab control WAN, LAN, and Port Settings. It also allows you to set up Captive Portal profiles and Misc Settings.

Additionally, some settings on the **Network** tab are able to control PepVPN, Inbound Access, NAT Mapping, and QoS when your access point is operating in **Router Mode**.

7.1 WAN

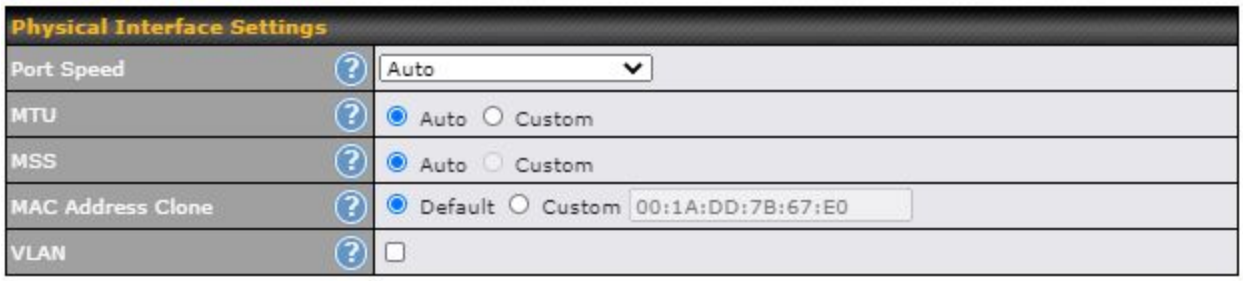
WAN connection details need to be configured in order to connect the router to the Internet.



To configure a WAN connection, go to **Network > WAN** from the menu and select the desired WAN connection by clicking on its name.

WAN Connection Settings	
WAN Connection Name	Enter a name to represent this WAN connection.
Enable	This setting enables the WAN connection. If schedules have been defined, you will be able to select a schedule to apply to the connection.
Connection Method	There are three possible connection methods for Ethernet WAN: • **DHCP** • **Static IP** • **PPPoE** The connection method and details are determined by, and can be obtained from the ISP.
Hostname	Provide a hostname for this WAN port if requested by the ISP.
DNS Server	Enter the DNS server address that your access point will use to resolve host names.
Connection Priority	This option allows you to configure the WAN connection, whether for normal daily usage or as a backup connection only. If **Always-on** is selected, the WAN connection will be kept on continuously, regardless of the priority of other WAN connections. If **Backup** is selected, the WAN connection will depend on other WAN connections. It will not be used when one or more higher priority dependent WAN connections are connected.
Independent from Backup WANs	If this is checked, the connection will be working independently from other backup WAN connections. WAN connections whose Connection Priority are set to Backup will ignore the status of this WAN connection, and will be used when none of the other higher

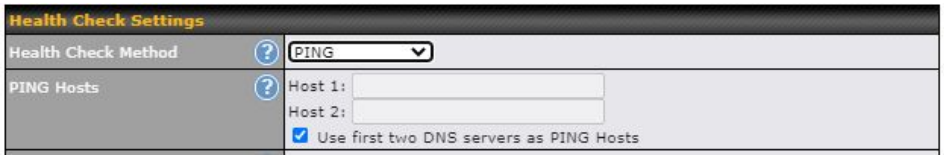
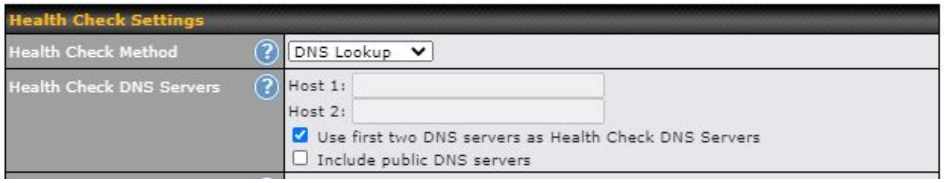
	priority connections are available.
Upload Bandwidth	This field refers to the maximum upload speed. This value is referenced when default weight is chosen for outbound traffic and traffic prioritization. A correct value can result in effective traffic prioritization and efficient use of upstream bandwidth.
Download Bandwidth	This field refers to the maximum download speed. Default weight control for outbound traffic will be adjusted according to this value.



Physical Interface Settings	
Port Speed	This is the port speed of the WAN connection. It should be set to the same speed as the connected device in case of any port negotiation problems. When a static speed is set, you may choose whether to advertise its speed to the peer device or not. In this setting, Advertise Speed is selected by default. You can choose not to advertise the port speed if the port has difficulty in negotiating with the peer device. The default setting for Port Speed is: **Auto**.
MTU	This field is for specifying the Maximum Transmission Unit value of the WAN connection. An excessive MTU value can cause file downloads to stall shortly after connecting. You may consult your ISP for the connection's MTU value. The default value is 1440.
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (maximum segment size) is computed from the MTU minus 40 bytes for TCP over IPv4. If the MTU is set to **Auto**, the MSS will also be set automatically. By default, MSS is set to **Auto**.
MAC Address Clone	Some service providers (e.g. cable providers) identify the client's MAC address and require the client to always use the same MAC address to connect to the network. In such cases, change the WAN interface's MAC address to the original client PC's MAC address via this field. The default MAC address is a unique value assigned at the factory. In most cases, the default value is sufficient. Clicking **Default** restores the MAC address to the default value.
VLAN	Click the square if you wish to enable VLAN functionality for the WAN connection and enable multiple broadcast domains. Once you enable VLAN, you will be able to enter a name for your network.

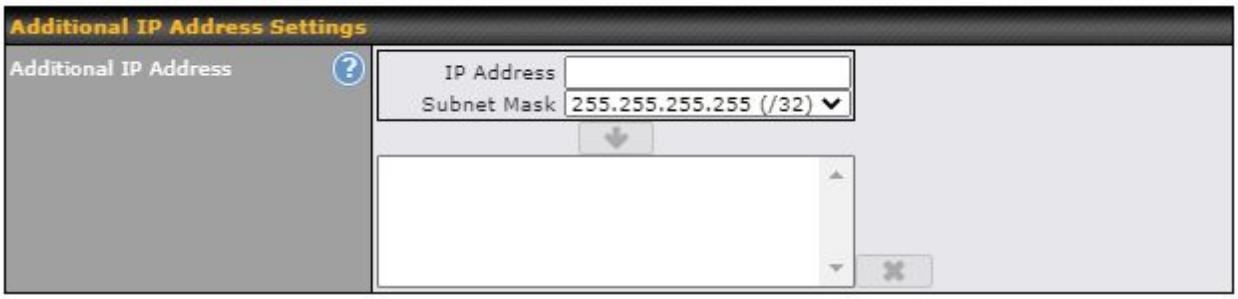
Health Check Settings

To ensure traffic is routed only to healthy WAN connections, the Pepwave AP can periodically check the health of each WAN connection. The health check settings for each WAN connection can be independently configured via **Network > WAN > *Connection Name* > Health Check Settings**.

Health Check Settings	
Health Check Method	This setting specifies the health check method for the WAN connection. This value can be configured as **Disabled**, **PING**, **DNS Lookup**, or **HTTP**. The default method is **DNS Lookup**. ● **Health Check Method: Disabled**  When **Disabled** is chosen in the method field, the WAN connection will always be considered as up. The connection will **NOT** be treated as down in the event of IP routing errors. ● **Health Check Method: PING**  ICMP ping packets will be issued to test the connectivity with a configurable target IP address or hostname. A WAN connection is considered as up if ping responses are received from either one or both of the ping hosts. **PING Host**: This setting specifies IP addresses or hostnames with which connectivity is to be tested via ICMP ping. If the **Use first two DNS servers as Ping Hosts** is checked, the target ping host will be the first DNS server for the corresponding WAN connection. Reliable ping hosts with a high uptime should be considered. By default, the first two DNS servers of the WAN connection are used as the ping hosts. ● **Health Check Method: DNS Lookup**  DNS lookups will be issued to test connectivity with target DNS servers. The connection

	will be treated as up if DNS responses are received from one or both of the servers, regardless of whether the result was positive or negative. **DNS Servers:** This field allows you to specify two DNS hosts' IP addresses with which connectivity is to be tested via DNS Lookup. If the **Use first two DNS servers as Health Check DNS Servers** is checked, the first two DNS servers will be the DNS lookup targets for checking a connection's health. If the box is not checked, **Host 1** must be filled, while a value for **Host 2** is optional. If the **Include public DNS servers** is checked and no response is received from all specified DNS servers, DNS lookups will also be issued to some public DNS servers. A WAN connection will be treated as down only if there is also no response received from the public DNS servers. Connections will be considered as up if DNS responses are received from any one of the health check DNS servers, regardless of a positive or negative result. By default, the first two DNS servers of the WAN connection are used as the health check DNS servers. • **Health Check Method: HTTP**  HTTP connections will be issued to test connectivity with configurable URLs and strings to match. **URL 1:** The URL will be retrieved when performing an HTTP health check. When **Matching String** is left blank, a health check will pass if the HTTP return code is between 200 and 299 (Note: HTTP redirect codes 301 or 302 are treated as failures). When **Matching String** is filled, a health check will pass if the HTTP return code is between 200 and 299 and if the HTTP response content contains the string. **URL 2:** If URL 2 is also provided, a health check will pass if either one of the tests passed.
Timeout	If a health check test cannot be completed within the specified amount of time, the test will be treated as failed.
Health Check Interval	This is the time interval between each health check test.
Health Check Retries	This is the number of consecutive health check failures before treating a connection as down.
Recovery Retries	This is the number of responses required after a health check failure before treating a connection as up again.

Additional IP Address Settings



Additional IP Address Settings	
Additional IP Address	The IP Address list represents the list of fixed Internet IP addresses assigned by the ISP in the event that more than one Internet IP address is assigned to this WAN connection.

Dynamic DNS Settings

Pepwave access points are capable of registering the domain name relationships to dynamic DNS service providers. Through registration with dynamic DNS service provider(s), the default public Internet IP address of each WAN connection can be associated with a host name. With dynamic DNS service enabled for a WAN connection, you can connect to your WAN's IP address from external sources, even if its IP address is dynamic. You must register for an account from the listed dynamic DNS service providers before enabling this option.

If the WAN connection's IP address is a reserved private IP address (i.e. behind a NAT router), the public IP of each WAN will be automatically reported to the DNS service provider.

Either upon a change in IP addresses or every 23 days without link reconnection, the Pepwave router will connect to the dynamic DNS service provider to perform an IP address update within the provider's records.

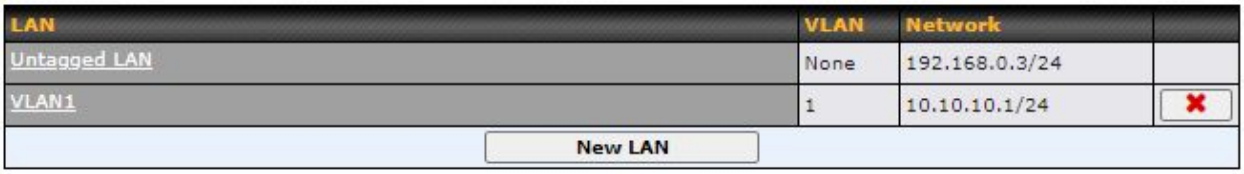
Dynamic DNS Settings	
Service Provider	This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers: • changeip.com • dyndns.org • no-ip.org • DNS-O-Matic • Others...

	When **Others…** is selected, it supports custom Dynamic DNS servers by entering its URL. Works with any service compatible with DynDNS API. Select **Disabled** to disable this feature.
User ID / Username / Email	This setting specifies the registered user name for the dynamic DNS service.
Password	This setting specifies the password for the dynamic DNS service.
Hosts	This setting specifies a list of hostnames or domains to be associated with the public Internet IP address of the WAN connection.
Update All Hosts	Check this box to automatically update all hosts.

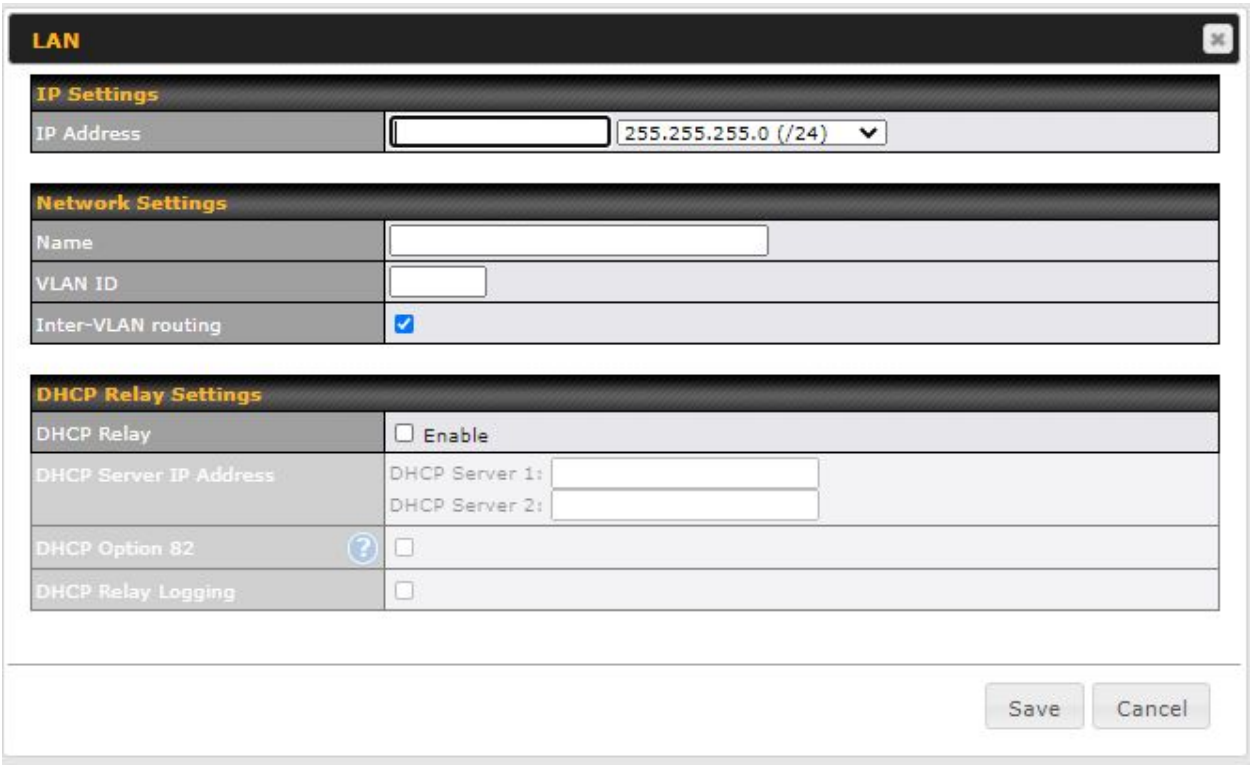
7.2 LAN

7.2.1 Network Settings

LAN interface settings are located at **Network > LAN > Network Settings**. Navigating to that page will show the following dashboard:



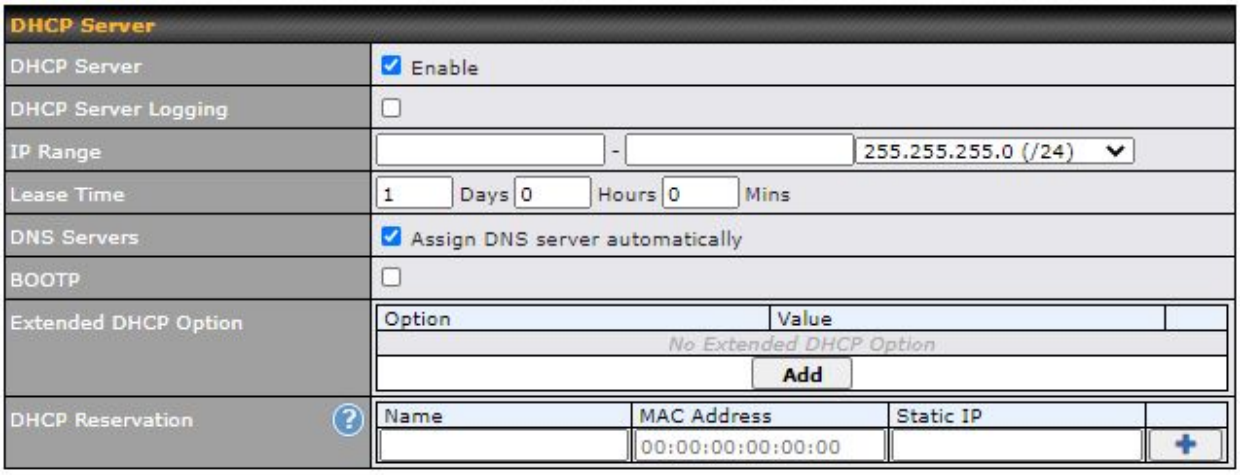
Clicking on any of the existing LAN interfaces (or creating a new VLAN) will show the following:



IP Settings	
IP Address	Enter the LAN IP address and subnet mask of the Pepwave access point on the LAN.
NetworkSettings	
Name	Enter a name for the LAN.

VLAN ID	Enter a number for your VLAN.
Inter-VLAN routing	Check this box to enable routing between virtual LANs.
DHCP Relay Settings	
DHCP Relay	Check the Enable box to enable the DHCP Relay server.
DHCP Server IP Address	Enter the IP addresses of one or two DHCP servers in the provided fields. The DHCP servers entered here will receive relayed DHCP requests from the LAN. For active-passive DHCP server configurations, enter active and passive DHCP server relay IP addresses in **DHCP Server 1** and **DHCP Server 2**.
DHCP Option 82	This feature includes device information as a relay agent for the attached client when forwarding DHCP requests from a DHCP client to a DHCP server. Device MAC address and network name are embedded to circuit ID and Remote ID in option 82.
DHCP Relay Logging	Enable logging of DHCP events in the eventlog by selecting the checkbox.

*Please note that the following settings will be available only when your access point is operating in **Router Mode**.



DHCP Server Settings	
DHCP Server	When this setting is enabled, the DHCP server automatically assigns an IP address to each computer that is connected via LAN and configured to obtain an IP address via DHCP. The Pepwave router's DHCP server can prevent IP address collision on the LAN.

DHCP Server Logging	Enable logging of DHCP events in the eventlog by selecting the checkbox.
IP Range	These settings allocate a range of IP addresses that will be assigned to LAN computers by the Pepwave router's DHCP server.
Lease Time	This setting specifies the length of time throughout which an IP address of a DHCP client remains valid. Upon expiration of the lease time, the assigned IP address will no longer be valid and renewal of the IP address assignment will be required.
DNS Servers	This option allows you to input the DNS server addresses to be offered to DHCP clients. If **Assign DNS server automatically** is selected, the Pepwave router's built-in DNS server address (i.e. LAN IP address) will be offered.
BOOTP	Check this box to enable BOOTP on older networks that still require it.
Extended DHCP Option	In addition to standard DHCP options (e.g., DNS server address, gateway address, subnet mask), you can specify the value of additional extended DHCP options, as defined in RFC 2132. With these extended options enabled, you can pass additional configuration information to LAN hosts. To define an extended DHCP option, click the **Add** button, choose the option to define, and then enter its value. For values that are in IP address list format, you can enter one IP address per line in the provided text area input control. Each option can be defined once only.
DHCP Reservation	This setting reserves the assignment of fixed IP addresses for a list of computers on the LAN. The computers to be assigned fixed IP addresses on the LAN are identified by their MAC addresses. The fixed IP address assignment is displayed as a cross-reference list between the computers' names, MAC addresses, and fixed IP addresses. **Name** (an optional field) allows you to specify a name to represent the device. MAC addresses should be in the format of **00:AA:BB:CC:DD:EE**. Click on  to create a new record. Click on  to remove a record. Reserved clients information can be imported from the **Client List**, located at **Status > Client List**.

7.2.2 Port Settings

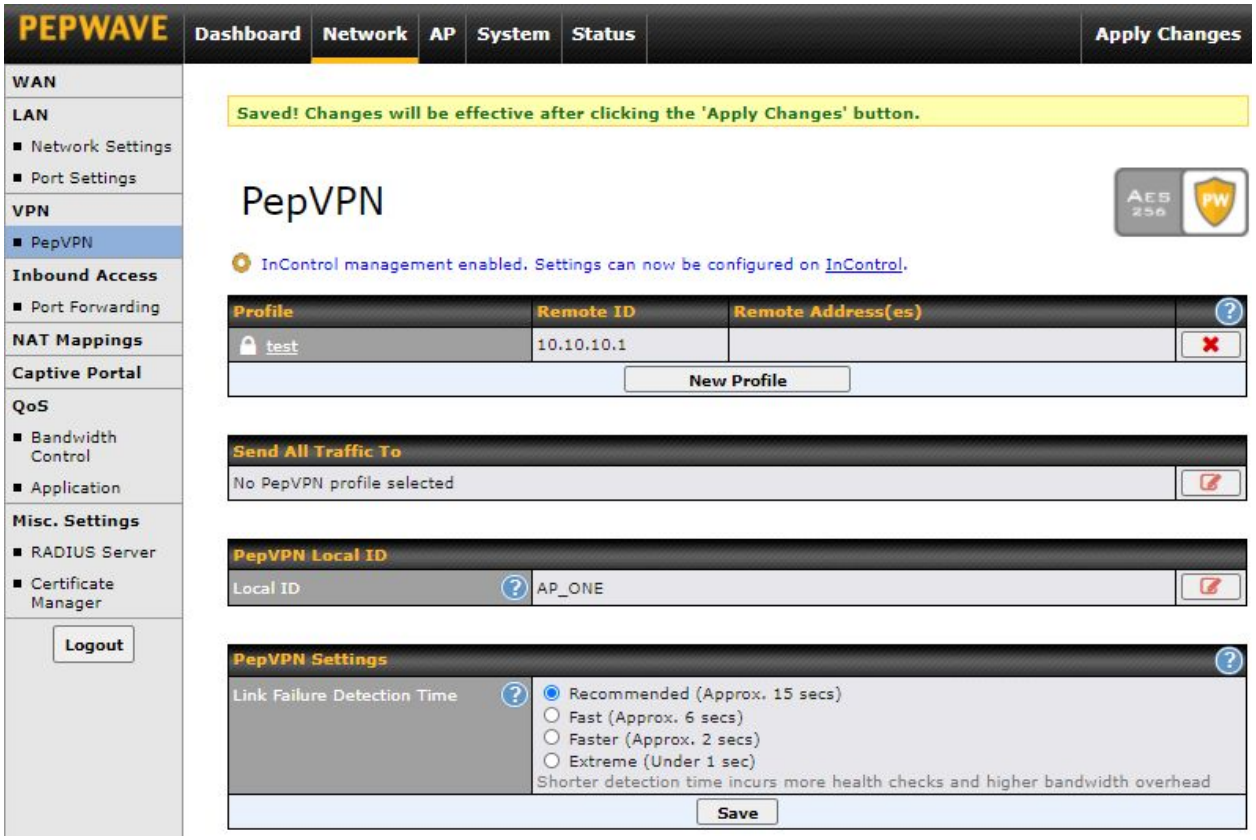
To configure port settings, navigate to **Network > LAN > Port Settings**.

On this screen, you can configure the name of the LAN port and enable or disable a specific port.

7.3 PepVPN

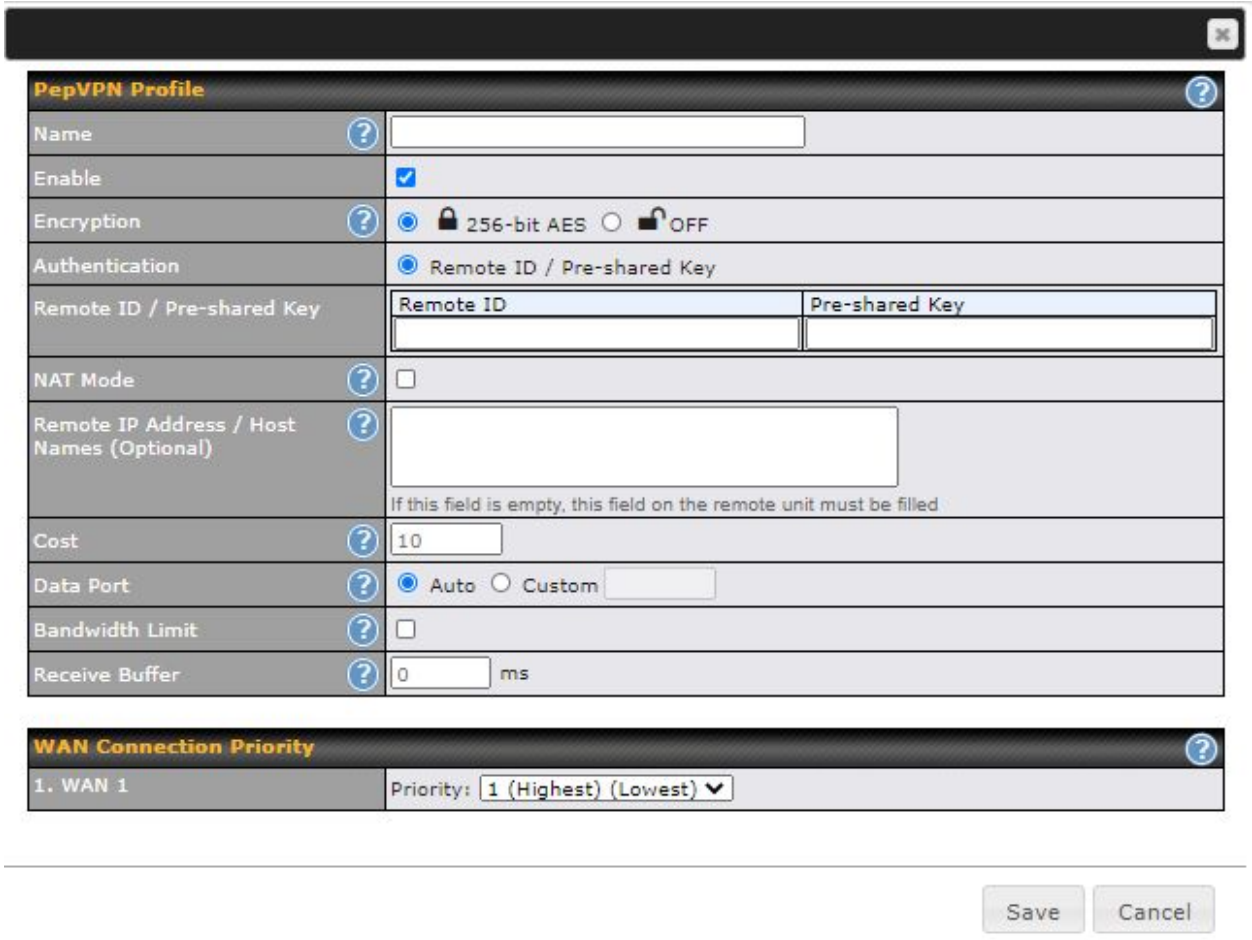
PepVPN securely connects one or more remote sites to the site running your access point.

*Please note that the following settings will be available only when your access point is operating in **Router Mode**.



To set up PepVPN, first give your site a local PepVPN ID. To modify an existing local ID, click on  .

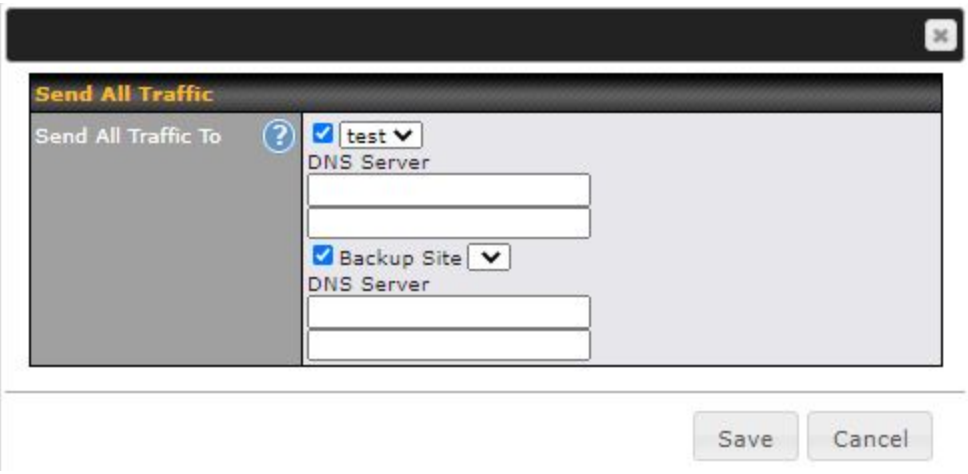
Once you've specified a local ID, click the **New Profile** button to configure PepVPN.



PepVPN Profile Settings	
Name	Enter a name to represent this profile. The name can be any combination of alphanumeric characters (0-9, A-Z, a-z), underscores (_), dashes (-), and/or non-leading/trailing spaces ( ).
Enable	Check this box to enable PepVPN.
Encryption	By default, VPN traffic is encrypted with **256-bit AES**. If **Off** is selected on both ends of a VPN connection, no encryption will be applied.
Authentication	Select **Remote ID / Pre-shared Key** to specify the method your access point will use to authenticate peers. When selecting **Remote ID / Pre-shared Key**, be sure to enter a unique peer ID number in the **Remote ID** field.
Remote ID / Pre-shared Key	This optional field becomes available when **Remote ID / Pre-shared Key** is selected as the Pepwave access point's VPN Authentication method, as explained above. Pre-shared Key defines the pre-shared key used for this particular VPN connection. The VPN connection's session key will be further protected by the pre-shared key. The

	connection will be up only if the pre-shared keys on each end match.
NAT Mode	Check this box to allow the local DHCP server to assign an IP address to the remote peer. When **NAT Mode** is enabled, all remote traffic over the VPN will be tagged with the assigned IP address using network address translation.
Remote IP Address / Host Names (Optional)	If **NAT Mode** is not enabled, you can enter a remote peer's WAN IP address or hostname(s) here. If the remote peer uses more than one address, enter only one of them here. Multiple hostnames are allowed and can be separated by a space character or carriage return. Dynamic-DNS host names are also accepted. This field is optional. With this field filled, the Peplink Balance will initiate connection to each of the remote IP addresses until it succeeds in making a connection. If the field is empty, the Peplink Balance will wait for connection from the remote peer. Therefore, at least one of the two VPN peers must specify this value. Otherwise, VPN connections cannot be established.
Cost	Define path cost for this profile. OSPF will determine the best route through the network using the assigned cost. Default: 10
Data Port	This field specifies the outgoing UDP port number for transporting VPN data. If **Default** is selected, port 4500 will be used by default. Port 32015 will be used if port 4500 is unavailable. If **Custom** is selected, you can input a custom outgoing port number between 1 and 65535.
Bandwidth Limit	Define maximum download and upload speed to each individual peer. This functionality requires the peer to use PepVPN version 4.0.0 or above.
Receive Buffer	Receive Buffer can help to reduce out-of-order packets and jitter, but will introduce extra latency to the tunnel. Default is 0 ms, which disables the buffer, and the maximum buffer size is 2000 ms.
WAN Connection Priority	
WAN Connection Priority	If your device supports it, you can specify the priority of WAN connections to be used for making VPN connections. WAN connections set to **OFF** will never be used. Only available WAN connections with the highest priority will be used. To enable asymmetric connections, connection mapping to remote WANs, cut-off latency, and packet loss suspension time, click the  button.

Send All Traffic To
This feature allows you to redirect all traffic to a specified PepVPN connection. Click the  button to select your connection and the following menu will appear:



You could also specify a DNS server to resolve incoming DNS requests. Check the box next to **Backup Site** to designate a backup SpeedFusion profile that will take over should the main PepVPN connection fail.

Link Failure Detection Time

Link Failure Detection Time

The bonded VPN can detect routing failures on the path between two sites over each WAN connection. Failed WAN connections will not be used to route VPN traffic. Health check packets are sent to the remote unit to detect any failure. The more frequently checks are sent, the shorter the detection time, although more bandwidth will be consumed.

When **Recommended** (default) is selected, a health check packet is sent every five seconds, and the expected detection time is 15 seconds.

When **Fast** is selected, a health check packet is sent every three seconds, and the expected detection time is six seconds.

When **Faster** is selected, a health check packet is sent every second, and the expected detection time is two seconds.

When **Extreme** is selected, a health check packet is sent every 0.1 second, and the expected detection time is less than one second.

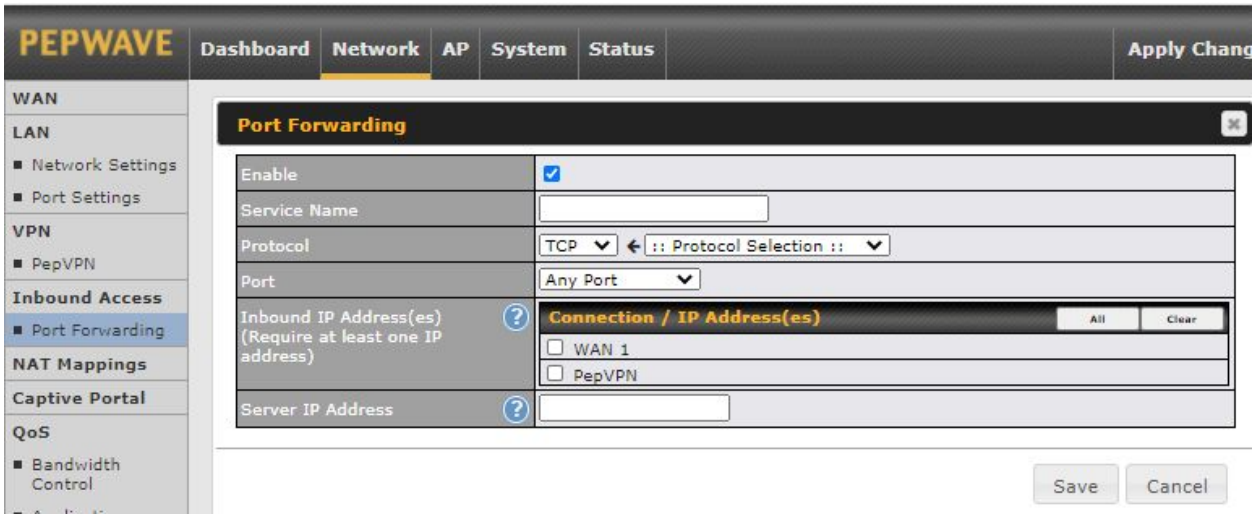
7.4 Inbound Access

*Please note that the following settings will be available only when your access point is operating in **Router Mode**.

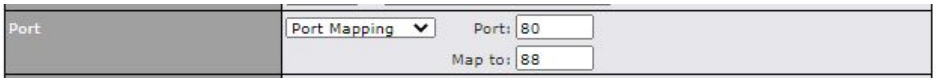
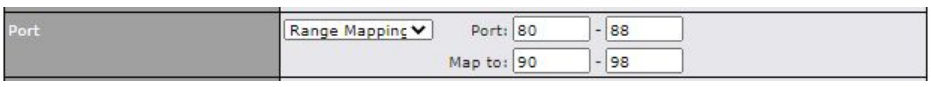
7.4.1 Port Forwarding

Pepwave access points can act as a firewall that blocks, by default, all inbound access from the Internet. Inbound port forwarding rules can be defined at **Network > Inbound Access > Port Forwarding**.

To define a new service, click **Add Service**.



Port Forwarding Settings	
Enable	Check the box to enable the port forwarding profile for Inbound Access.
Service Name	This setting identifies the service to the system administrator. Valid values for this setting consist of only alphanumeric and underscore "_" characters.

Protocol	The **Protocol** setting, along with the **Port** setting, specifies the protocol of the service as TCP, UDP, ICMP, or IP. Traffic that is received by the Pepwave access point via the specified protocol at the specified port(s) is forwarded to the LAN hosts specified by the server setting. Please see below for details on the **Port** and server settings. Alternatively, the **Protocol Selection Tool** drop-down menu can be used to automatically fill in the protocol and a single port number of common Internet services (e.g., HTTP, HTTPS, etc.). After selecting an item from the **Protocol Selection Tool** drop-down menu, the protocol and port number remain manually modifiable.
Port	The **Port** setting specifies the port(s) that correspond to the service, and can be configured to behave in one of the following manners:  **Any Port**: all traffic that is received by the Pepwave router via the specified protocol is forwarded to the server specified by the server setting. For example, with **IP Protocol** set to **TCP**, and **Port** set to **Any Port**, all TCP traffic is forwarded to the configured servers.  **Single Port**: traffic that is received by the Pepwave router via the specified protocol at the specified port is forwarded via the same port to the server specified by the server setting. For example, with **IP Protocol** set to **TCP**, **Port** set to **Single Port**, and the port set to 80, TCP traffic received on port 80 is forwarded to the configured servers via port 80.  **Port Range**: traffic that is received by the Pepwave router via the specified protocol at the specified port range is forwarded via the same respective ports to the LAN hosts specified by the server setting. For example, with **IP Protocol** set to **TCP**, **Port** set to **Port Range**, and the port range set to 80-88, TCP traffic received on ports 80 through 88 is forwarded to the configured servers via the respective ports.  **Port Mapping**: traffic that is received by Pepwave router via the specified protocol at the specified port is forwarded via a different port to the servers specified by the server setting. For example, with the **IP Protocol** set to **TCP**, the **Port** set to **Port Mapping**, the port set to 80, and the **Map to Port** set to 88, TCP traffic on port 80 is forwarded to the configured servers via port 88.  **Range Mapping**: traffic that is received by the Pepwave router via the specified protocol at the specified port range is forwarded via a different port to the servers specified by the server setting.
Inbound IP Address(es)	This setting specifies the WAN connections and Internet IP address(es) from which the service can be accessed.

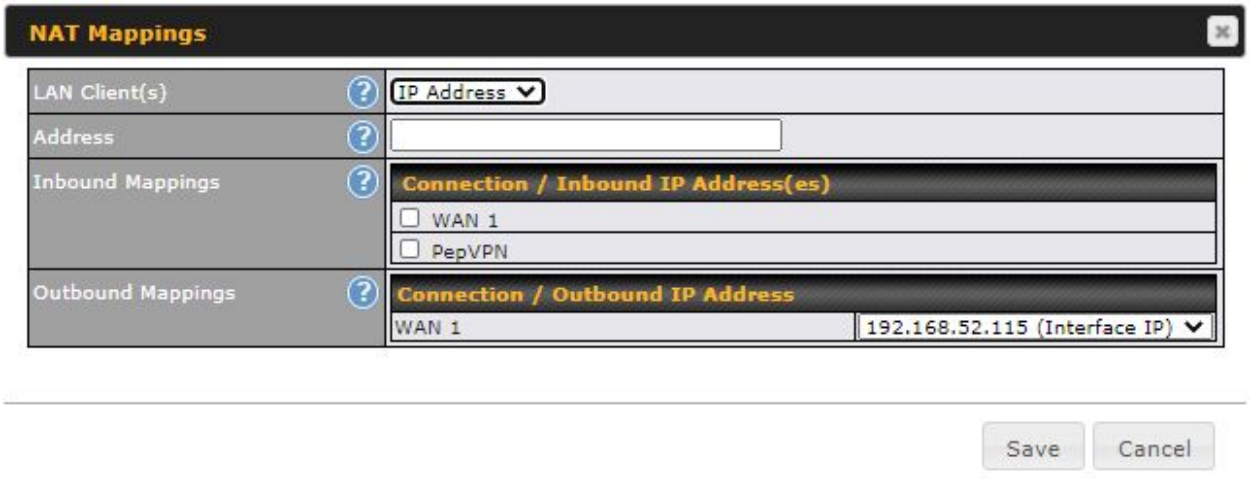
Server IP Address	This setting specifies the LAN IP address of the server that handles the requests for the service.

7.5 NAT Mapping

NAT mappings allow IP address mapping of all inbound and outbound NAT'd traffic to and from an internal client IP address. Settings to configure NAT mappings are located at **Network > NAT Mappings**.

*Please note that the following settings will be available only when your access point is operating in **Router Mode**.

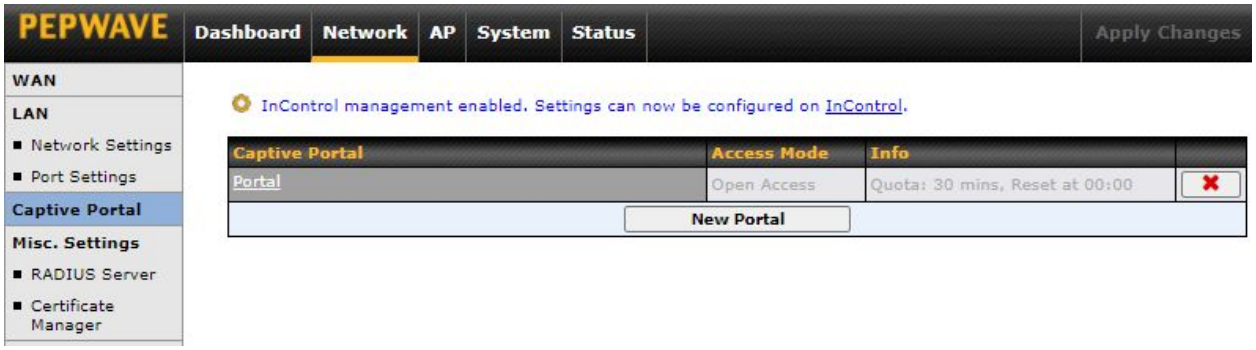
To add a rule for NAT mappings, click **Add NAT Rule**.



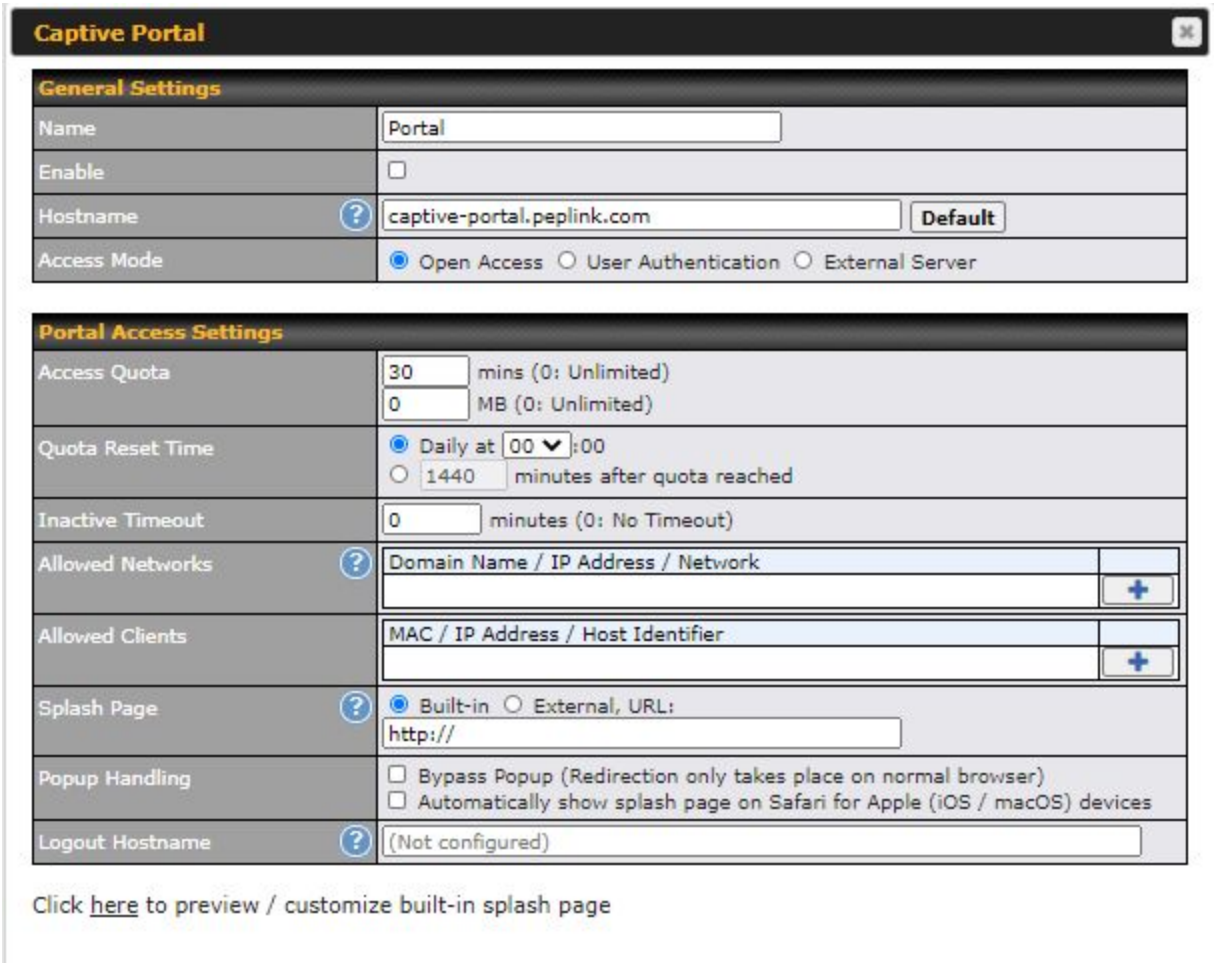
NAT Mapping Settings

LAN Client(s)	NAT mapping rules can be defined for a single LAN **IP Address,** an **IP Range,** or an **IP Network**.
Address	This is the IP address of the LAN host where the system will map the selected connection IP addresses.
Inbound Mappings	This section is to define which inbound IP addresses should be forwarded to the **LAN Client(s)**.
Outbound Mappings	This section is to define which IP addresses of each WAN should be used when an IP connection is made from the LAN host to the Internet.

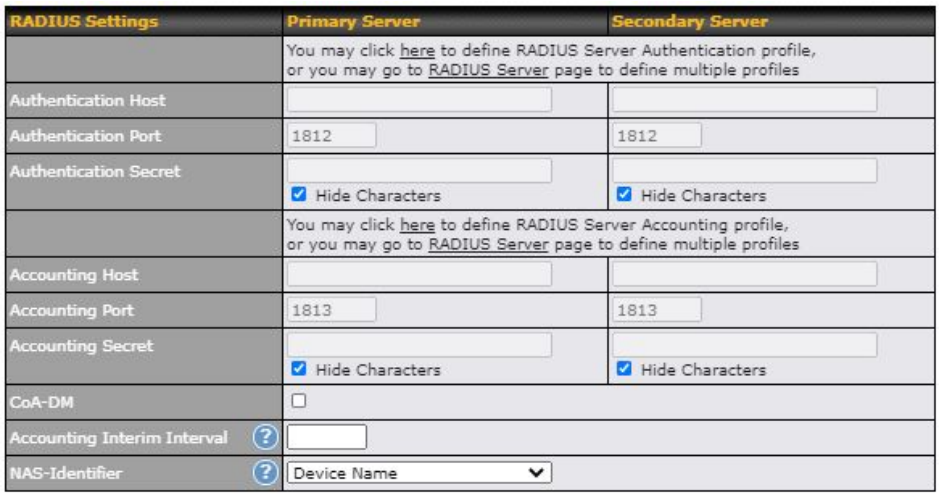
7.6 Captive Portal



The captive portal serves as a gateway that clients have to pass if they wish to access the Internet using your router. To configure the captive portal, navigate to **Network > Captive Portal**.



Captive Portal Settings	
Name	Enter a name for the Captive Portal Profile.
Enable	Check the **Enable** box to turn on your access point's built-in captive portal functionality.
Hostname	To customize the portal's form submission and redirection URL, enter a new URL in this field.
Access Mode	**Open Access** allows clients to freely access your router. **User Authentication** forces your clients to authenticate before accessing your router. **External Server** uses the captive portal with HotSpotSystem or CoovaChilli. As described in the following knowledgebase article: https://forum.peplink.com/t/using-hotspotsystem-wi-fi-on-pepwave-max-routers/
User Authentication	This authenticates your clients through a RADIUS server. After selecting this option, you will see the following fields:

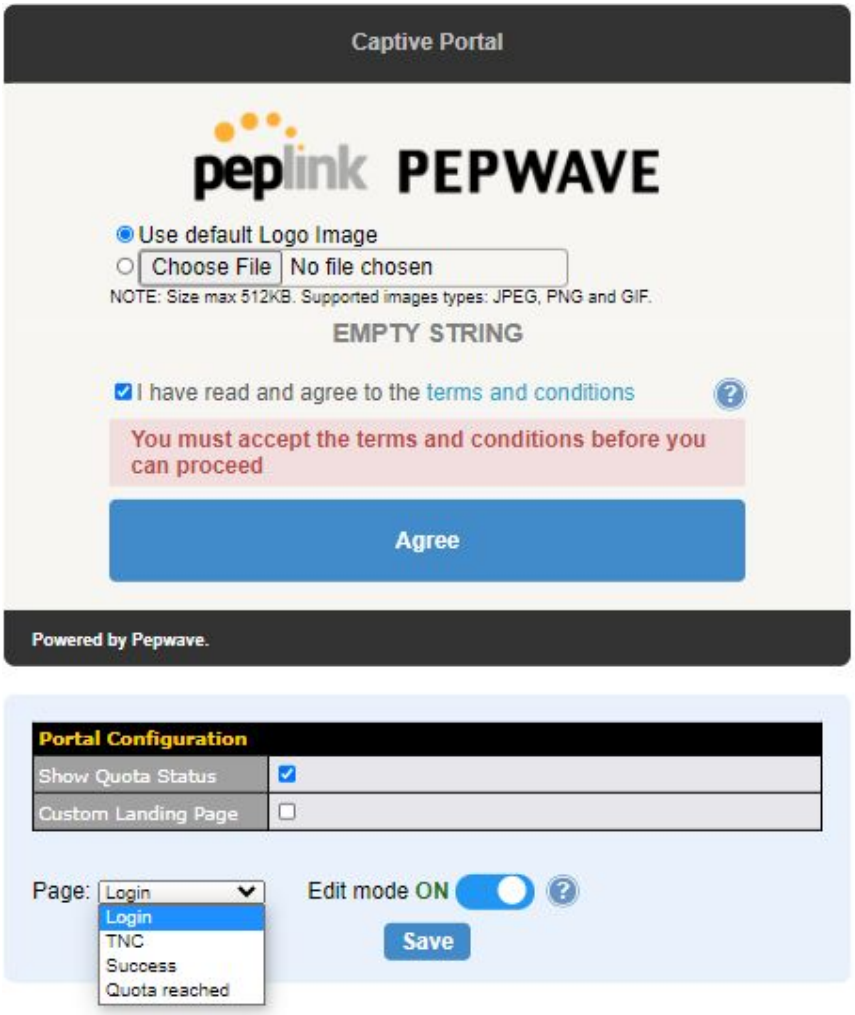


RADIUS Settings	Primary Server	Secondary Server
	You may click here to define RADIUS Server Authentication profile, or you may go to RADIUS Server page to define multiple profiles	
Authentication Host		
Authentication Port	1812	1812
Authentication Secret	Hide Characters	Hide Characters
	You may click here to define RADIUS Server Accounting profile, or you may go to RADIUS Server page to define multiple profiles	
Accounting Host		
Accounting Port	1813	1813
Accounting Secret	Hide Characters	Hide Characters
CoA-DM		
Accounting Interim Interval		
NAS-Identifier	Device Name	

Fill in the necessary information to complete your connection to the server and enable authentication.

Access Quota	Enter a value in minutes to limit access time on a given login or enter **0** to allow unlimited use time on a single login. Likewise, enter a value in MB for the total bandwidth allowed or enter **0** to allow unlimited bandwidth on a single login.
Quota Reset Time	This menu determines how your usage quota resets. Setting it to **Daily** will reset it at a specified time every day. Setting a number of **minutes after quota reached** establishes a timer for each user that begins after the quota has been reached.
Inactive Timeout	Enter a value in minutes to logout following the specified period of inactivity or enter 0 to disable inactivity logouts.
Allowed Networks	To whitelist a network, enter the domain name / IP address here and click the  . To delete an existing network from the list of allowed networks, click the  button next to the listing.
Allowed Clients	To whitelist a client, enter the MAC address / IP address here and click the  . To delete an existing client from the list of allowed clients, click the  button next to the listing.
Splash Page	Here, you can choose between using the Pepwave access point's built-in captive portal or redirecting clients to a URL that you define.
Popup Handling	Configurable options for popup handling: - Bypass popup (redirection only takes place on a normal browser) - Automatically show splash page on Safari for Apple (iOS / macOS) devices
Logout Hostname	A hostname that can be used to logout captive portal when being accessed on the browser.
Customize splash	Click on the provided link in the Captive Portal Profile to customize the splash page. A new browser tab with a WYSIWYG editor of the splash page will be opened. To edit the

page	content, switch Edit Mode on and select the corresponding elements to edit.

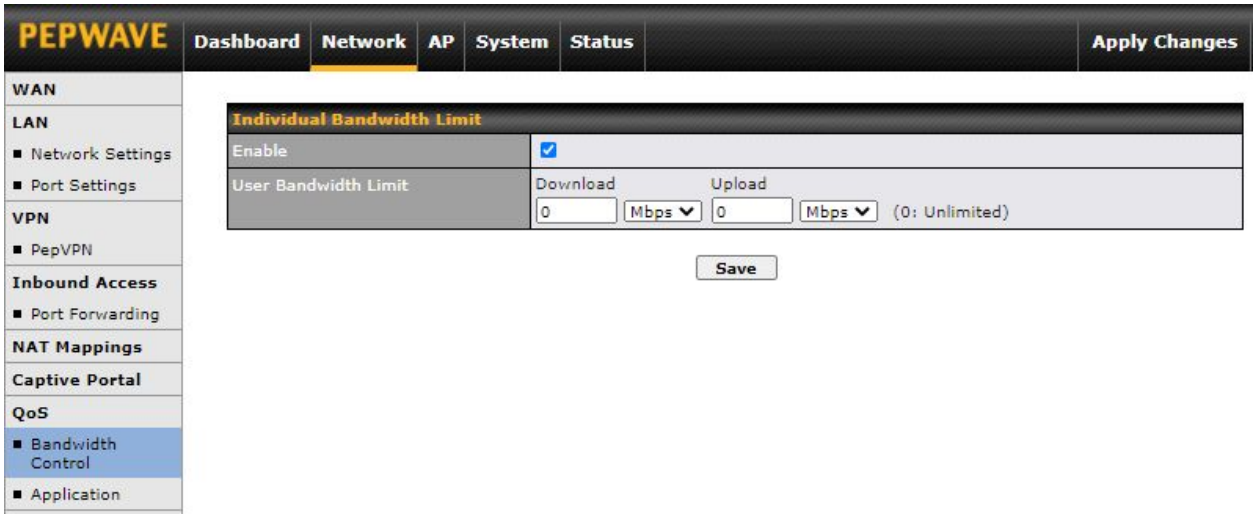


7.7 QoS

*Please note that the following settings will be available only when your access point is operating in **Router Mode**.

7.7.1 Bandwidth Control

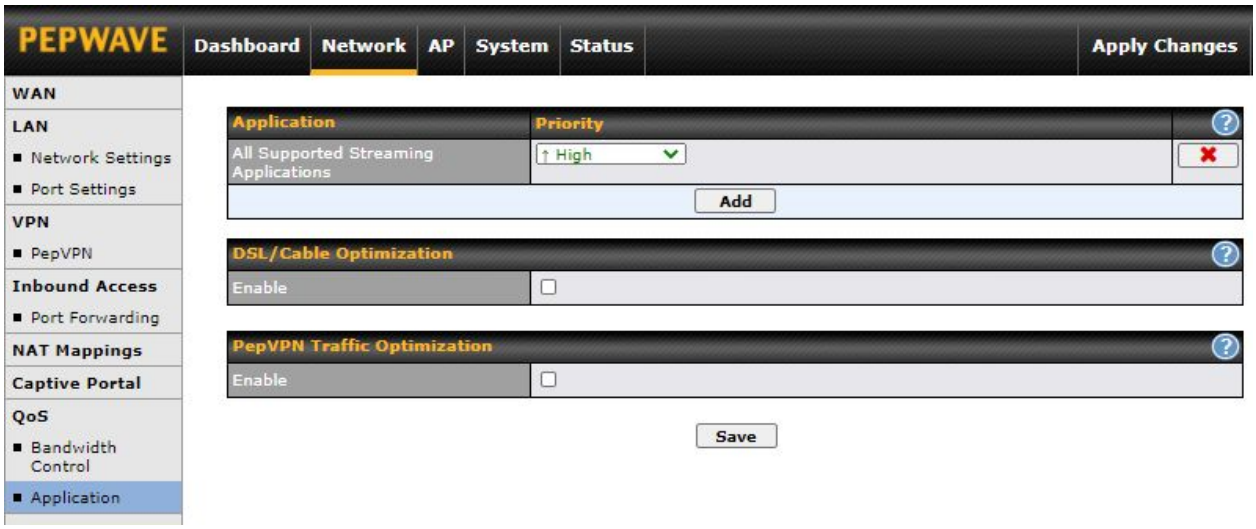
The default download and upload limits are set to unlimited (set as 0). This can be changed as necessary to restrict the speeds to individual devices connected to the router, no matter if they are wired or wireless. Note that this limit is applied to all connected devices.



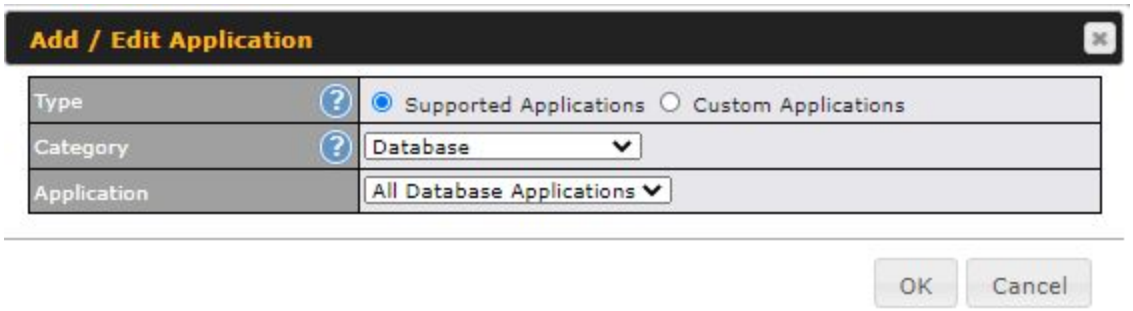
7.7.2 Application

Define the priority level of selected applications. Available priorities are ↑**High**,— Normal, and ↓Low. Applications not defined in the table are assigned a "Normal" priority level.

Pepwave access points can detect various application traffic by inspecting the packets' content. Select an application by choosing a supported application, or by manually defining a custom application. The priority preference of supported applications is placed at the top of the table. Custom applications are at the bottom.



Click the **Add** button to define a custom application. Click the ✖ button in the Action column to delete the custom application in the corresponding row.



When **Supported Applications** is selected, the Pepwave access point will inspect network traffic and prioritize the selected applications. Alternatively, you can select **Custom Applications** and define the application by providing the protocol, scope, port number, and DSCP value.

DSL / Cable Optimization

DSL/cable-based WAN connections normally have their upload bandwidth set lower than their download bandwidth. When a DSL/cable circuit's uplink is congested, the download bandwidth will be affected. Users will not be able to download data at full speed until the uplink becomes less congested. The **DSL/Cable Optimization** can relieve such issues. When it is enabled, the

download speed will be less affected by the upload traffic.

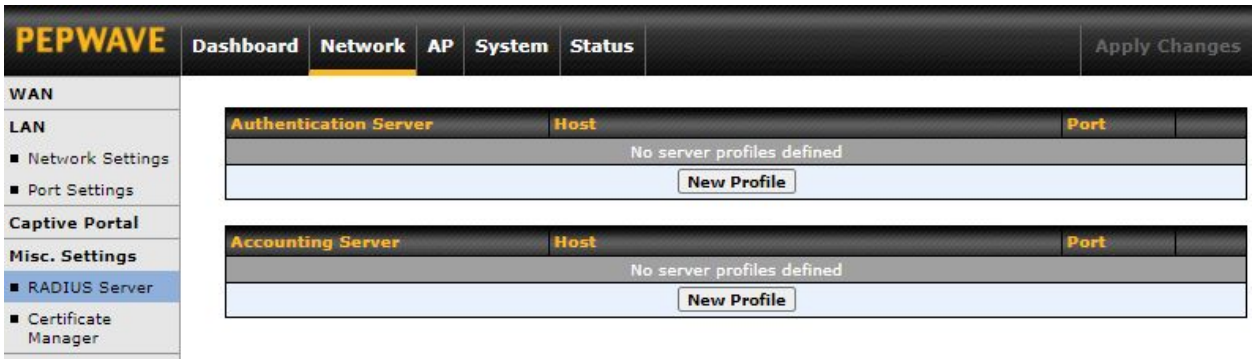
PepVPN Traffic Optimization

Check the box to enable PepVPN traffic to have the highest priority when the WAN is congested.

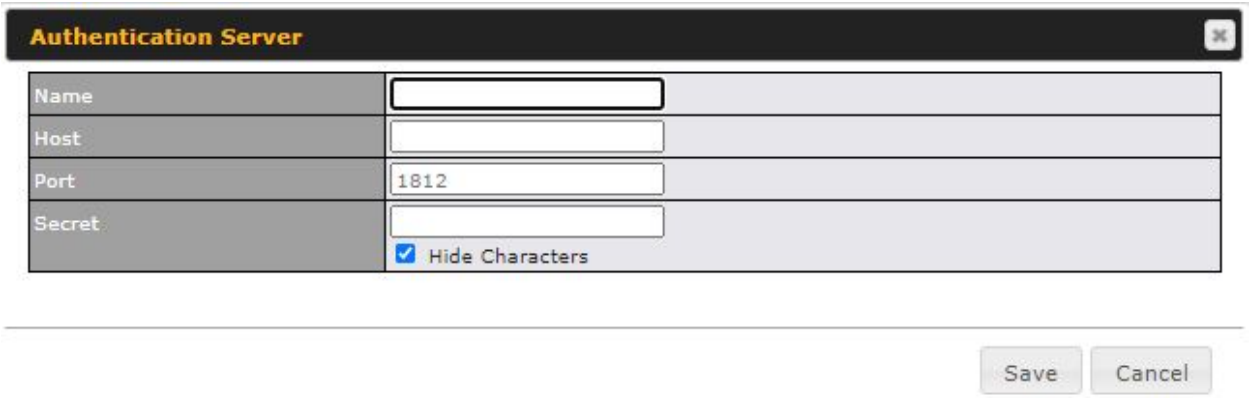
7.8 Misc. Settings

7.8.1 Radius Server

RADIUS Server settings are located at **Network > Misc. Settings > RADIUS Server**.

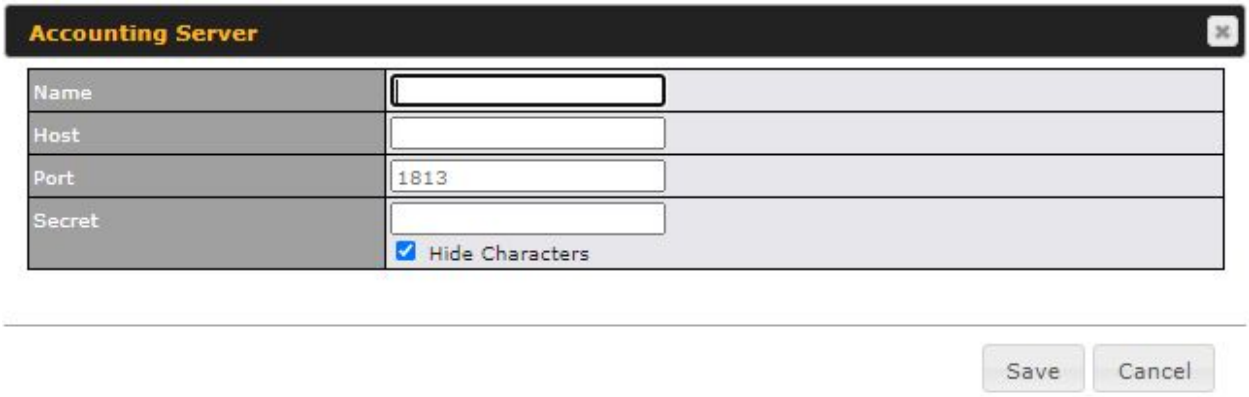


Click **New Profile** to display the following screen:



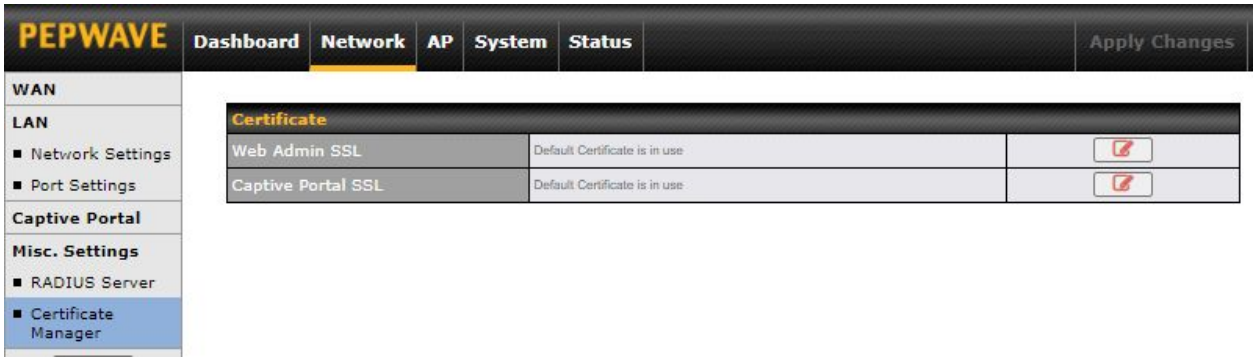
Authentication Server

Name	This field is for specifying a name to represent this profile.
Host	Specifies the IP address or hostname of the RADIUS server host.
Port	This setting specifies the UDP destination port for authentication requests. By default, the port number is 1812.
Secret	This field is for entering the secret key for communicating to the RADIUS server.



Accounting Server	
Name	This field is for specifying a name to represent this profile.
Host	Specifies the IP address or hostname of the RADIUS server host.
Port	This setting specifies the UDP destination port for authentication requests. By default, the port number is 1813.
Secret	This field is for entering the secret key for communicating to the RADIUS server.

7.8.2 Certificate Manager



This section allows for certificates to be assigned to the Web Admin SSL and Captive Portal SSL.

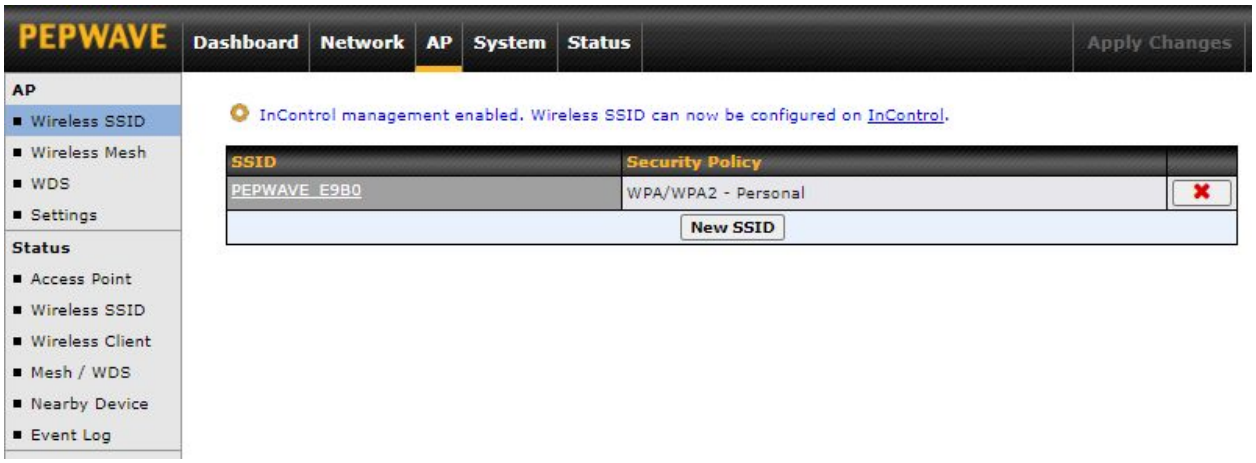
The following knowledge base article describes how to create self-signed certificates and import it to a Peplink Product.
https://forum.peplink.com/t/how-to-create-a-self-signed-certificate-and-import-it-to-a-peplinkproduct/

8 AP Tab

8.1 AP

Use the controls on the **AP** tab to set the wireless SSID, AP settings and Mesh, as well as wireless distribution system (WDS) settings.

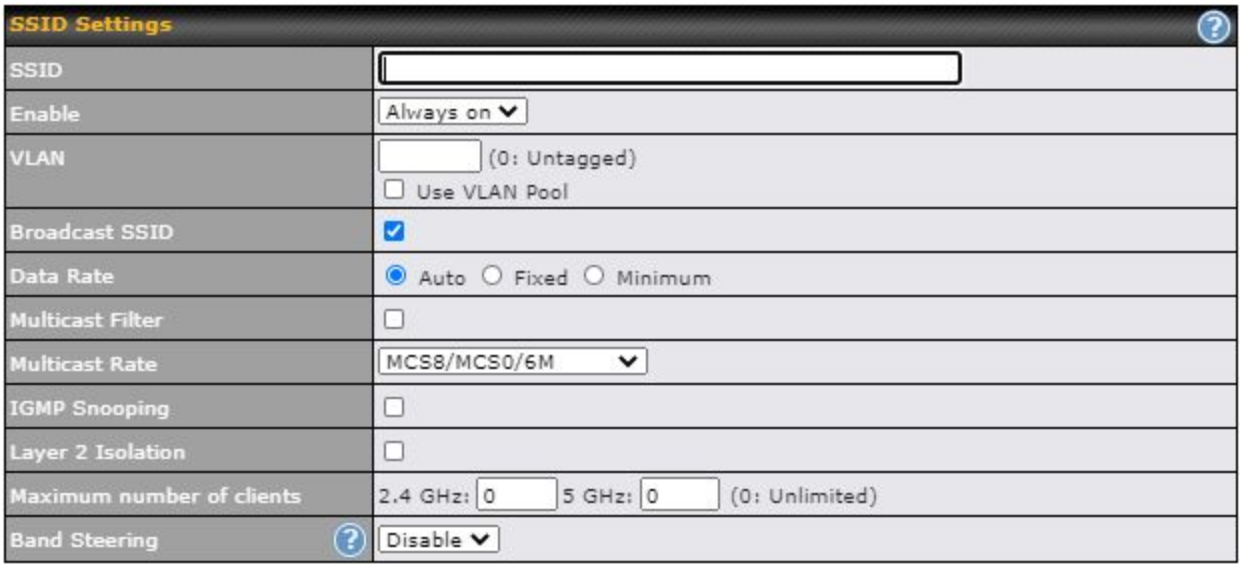
8.1.1 Wireless SSID



Wireless network settings, including the name of the network (SSID) and security policy, can be

defined and managed in this section.

Click **New SSID** to create a new network profile, or click the existing network profile to modify its settings.

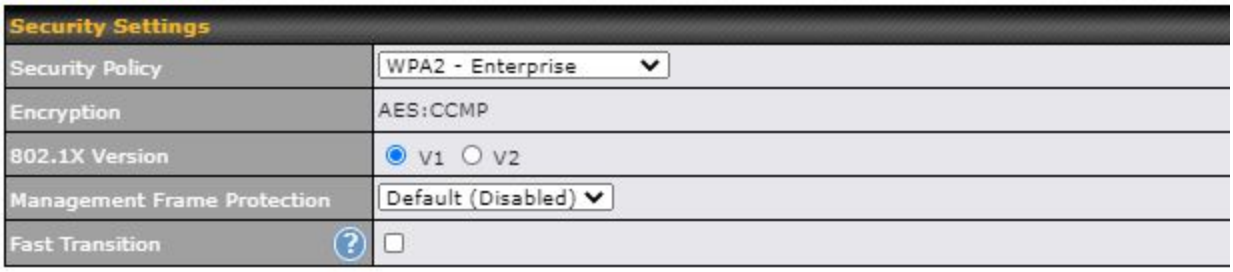


SSID Settings	
SSID	This setting specifies the router's SSID that Wi-Fi clients will see when scanning for Wi-Fi signals..
Enable	Click the drop-down menu to choose predefined schedules as your starting point. Please note that upon selection, previous changes on the schedule map will be deleted.
VLAN	This setting specifies the VLAN ID to be tagged on all outgoing packets generated from this wireless network (i.e. packets that travel from the Wi-Fi segment through your access point to the ethernet segment via the LAN port). If 802.1x is enabled and a per-user VLAN ID is specified in the authentication reply from the Radius server, then the value specified by the default VLAN ID will be overridden. The default value of this setting is **0**, which means that VLAN tagging is disabled (instead of tagged with zero). If **Use VLAN Pool** is enabled, enter the VLAN pool value specified in VLAN.
Broadcast SSID	This setting specifies whether or not Wi-Fi clients can scan the SSID of this wireless network. **Broadcast SSID** is enabled by default.
Data Rate	Select **Auto** to allow your access point to set the data rate automatically, or select **Fixed** or **Minimum** to choose a set rate from a drop-down menu.
Multicast Filter	This setting enables the filtering of multicast network traffic to the wireless SSID.

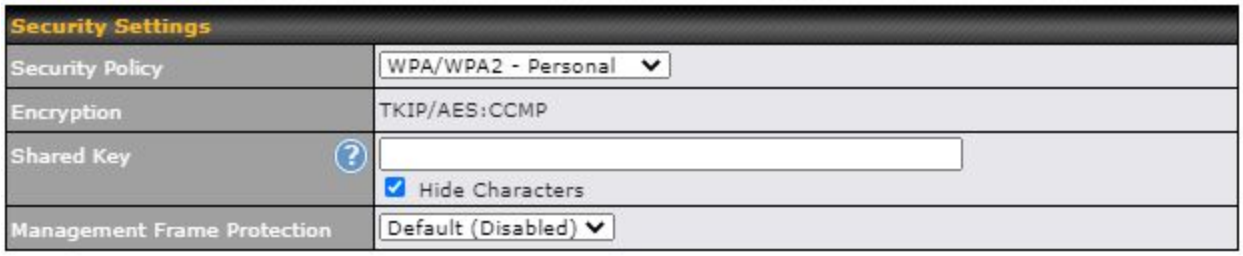
Multicast Rate	This setting specifies the transmit rate to be used for sending multicast network traffic.
IGMP Snooping	To allow your access point to convert multicast traffic to unicast traffic for associated clients, select this option.
Layer 2 Isolation	Layer 2 refers to the second layer in the ISO Open System Interconnect model. When this option is enabled, it will block communication between Wi-Fi clients within the same VLAN, SSID or subnet, as a security measure that best suits a company Guest/Visitor Wi-Fi access scenario. Do refer to this link (https://forum.peplink.com/t/lan-isolation-with-balance30-and-ap-one-ac-minihelp-needed/3914/4) for visual illustration of the feature. By default, the setting is disabled.
Maximum Number of Clients	The maximum number of clients that can simultaneously connect to your access point, or enter **0** to allow unlimited Wi-Fi clients.
Band Steering	This setting, shown below, allows you to reduce 2.4 GHz band overcrowding, AP with band steering steers clients capable of 5 GHz operation to 5 GHz frequency. **Force** - Clients capable of 5 GHz operation are only offered with 5 GHz frequency. **Prefer** - Clients capable of 5 GHz operation are encouraged to associate with 5 GHz frequency. If the clients insist to attempt on 2.4 GHz frequency, 2.4 GHz frequency will be offered. Default: **Disable** 

Security Settings	
Security Policy	This setting configures the wireless authentication and encryption methods. Available options are: • **Open (No Encryption)** • **WPA3 -Personal (AES:CCMP)** • **WPA2/WPA3 -Personal (AES:CCMP)** • **WPA2 -Personal (AES:CCMP)** • **WPA2 – Enterprise** • **WPA/WPA2 - Personal (TKIP/AES: CCMP)** • **WPA/WPA2 – Enterprise** To allow any Wi-Fi client to access your AP without authentication, select **Open (No Encryption)**. Details on each of the available authentication methods follow.

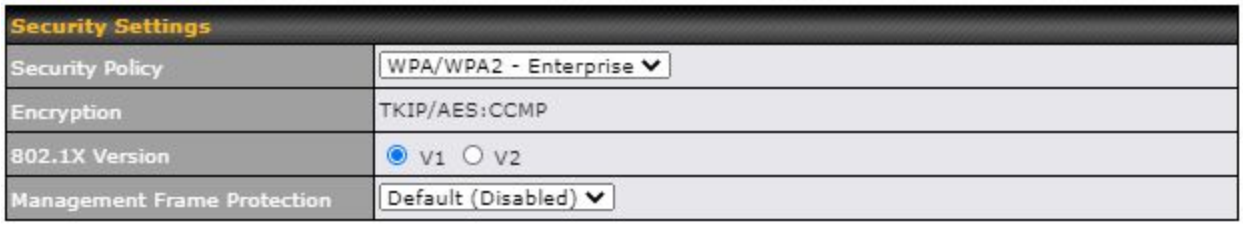
WPA2 – Personal	
Shared Key	Enter a passphrase of between 8 and 63 alphanumeric characters to create a passphrase used for data encryption and authentication. Click **Hide / Show Characters** to toggle visibility.
Management Frame Protection	This feature protects stations against forged management frames spoofed from other devices. Frames that are protected include Disassociation, Deauthentication and QoS Action.
Fast Transition	Fast Transition [802.11r] The transition process of a mobile client as it moves between access points is improved when this option is ticked.



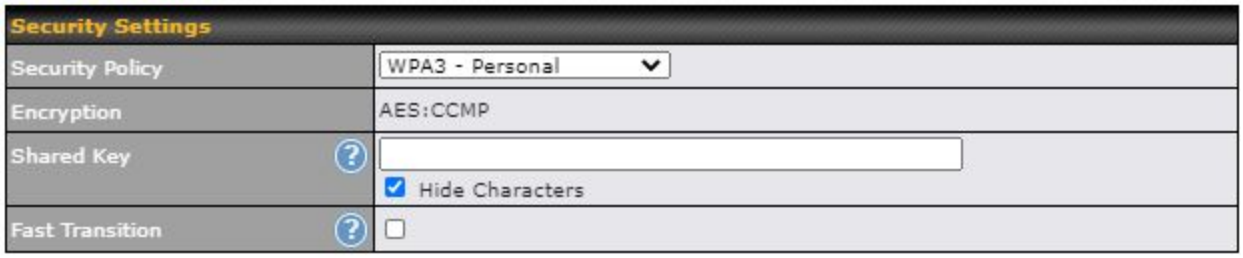
WPA2 – Enterprise	
802.1X Version	Choose **v1** or **v2** of the 802.1x EAPOL. When **v1** is selected, both v1 and v2 clients can associate with the access point. When **v2** is selected, only v2 clients can associate with the access point. Most modern wireless clients support v2. For stations that do not support v2, select **v1**. The default is **v2**.
Management Frame Protection	This feature protects stations against forged management frames spoofed from other devices. Frames that are protected include Disassociation, Deauthentication and QoS Action.
Fast Transition	Fast Transition [802.11r] The transition process of a mobile client as it moves between access points is improved when this option is ticked.



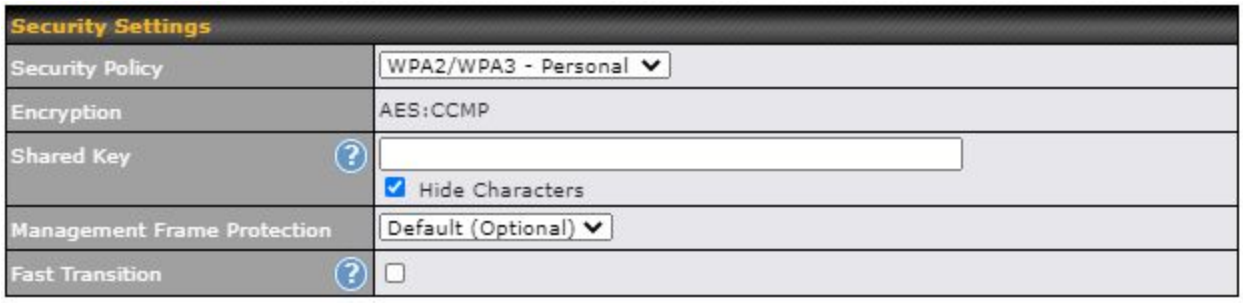
WPA/WPA2 – Personal	
Shared Key	Enter a passphrase of between 8 and 63 alphanumeric characters to create a passphrase used for data encryption and authentication. Click **Hide / Show Characters** to toggle visibility.
Management Frame Protection	This feature protects stations against forged management frames spoofed from other devices. Frames that are protected include Disassociation, Deauthentication and QoS Action.



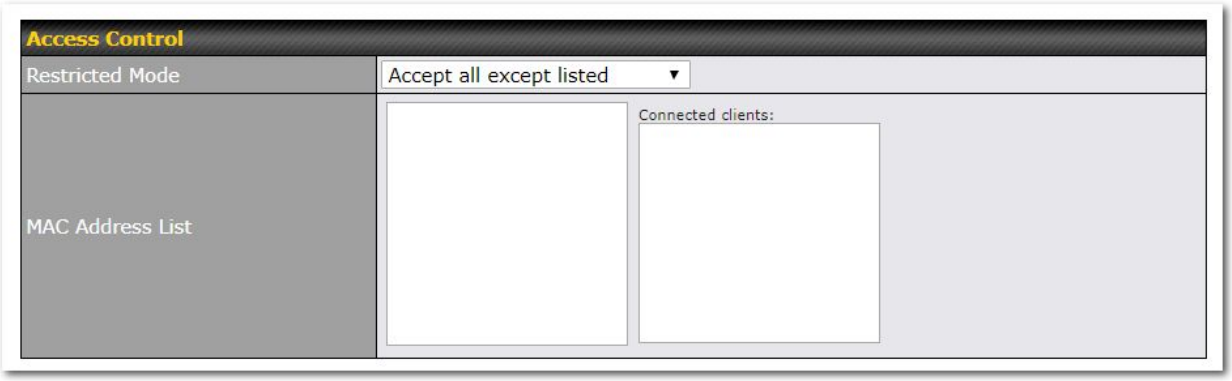
WPA/WPA2 – Enterprise	
802.1X Version	Choose **v1** or **v2** of the 802.1x EAPOL. When **v1** is selected, both v1 and v2 clients can associate with the access point. When **v2** is selected, only v2 clients can associate with the access point. Most modern wireless clients support v2. For stations that do not support v2, select **v1**. The default is **v2**.
Management Frame Protection	This feature protects stations against forged management frames spoofed from other devices. Frames that are protected include Disassociation, Deauthentication and QoS Action.



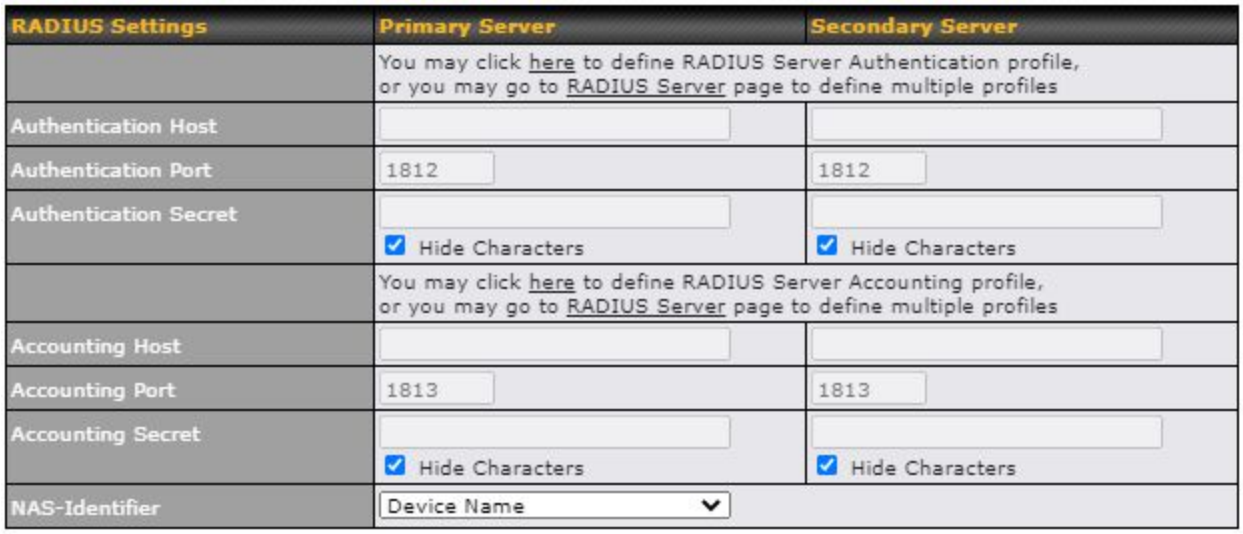
WPA3 – Personal	
Shared Key	Enter a passphrase of between 8 and 63 alphanumeric characters to create a passphrase used for data encryption and authentication. Click **Hide / Show Characters** to toggle visibility.
Fast Transition	Fast Transition [802.11r] The transition process of a mobile client as it moves between access points is improved when this option is ticked.



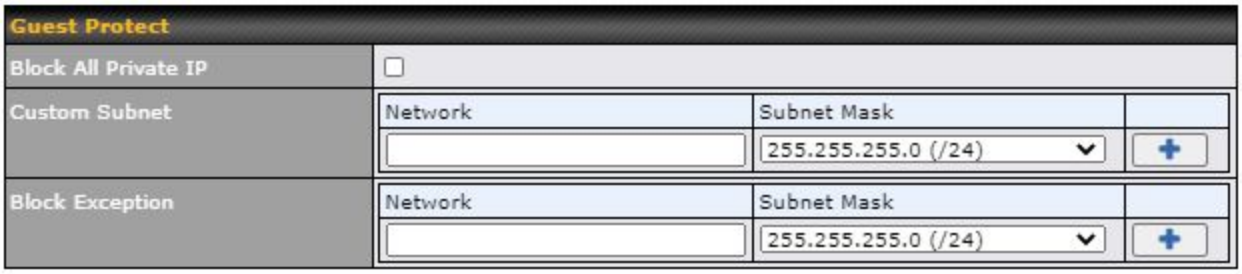
WPA2/WPA3 – Personal	
Shared Key	Enter a passphrase of between 8 and 63 alphanumeric characters to create a passphrase used for data encryption and authentication. Click **Hide / Show Characters** to toggle visibility.
Management Frame Protection	This feature protects stations against forged management frames spoofed from other devices. Frames that are protected include Disassociation, Deauthentication and QoS Action.
Fast Transition	Fast Transition [802.11r] The transition process of a mobile client as it moves between access points is improved when this option is ticked.



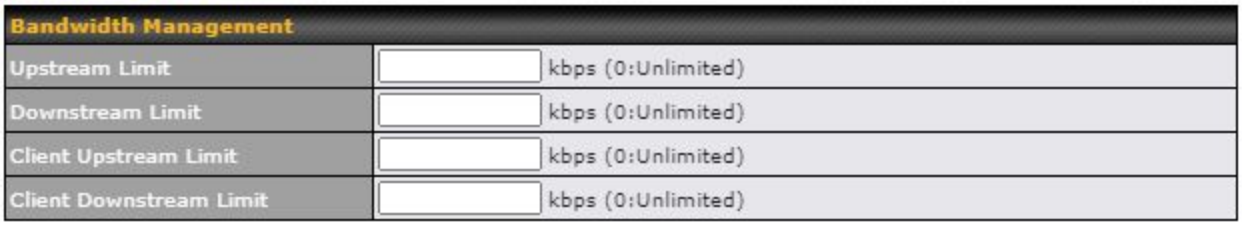
Access Control	
Restricted Mode	The settings allow the administrator to control access using Mac address filtering. Available options are **None**, **Deny all except listed**, **Accept all except listed**, and **RADIUS MAC Authentication**.
MAC Address List	Connections coming from the MAC addresses in this list will be either denied or accepted based on the option selected in the previous field.



RADIUS Server Settings	
Host	Enter the IP address of the primary RADIUS server and, if applicable, the secondary RADIUS server.
Secret	Enter the RADIUS shared secret for the primary server and, if applicable, the secondary RADIUS server.
Authentication Port	Enter the UDP authentication port(s) used by your RADIUS server(s) or click the **Default** button to enter **1812**.
Accounting Port	Enter the UDP accounting port(s) used by your RADIUS server(s) or click the **Default** button to enter **1813**.
NAS-Identifier	Information added to access requests to identify the NAS. Select **Device Name**, **LAN MAC Address**, **Device Serial Number** or enter a **Custom Value** When the NAS ID is not defined, the Device Name will be used as the NAS ID in RADIUS requests.



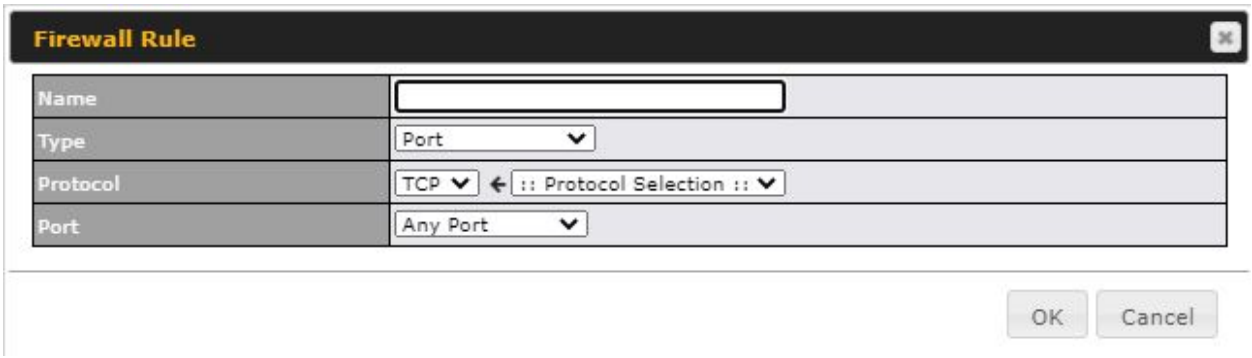
Guest Protect	
Block All Private IP	Check this box to block access from the Private IP.
Custom Subnet	To specify a subnet to block, enter the IP address and choose a subnet mask from the drop-down menu. To add the blocked subnet, click + . To delete a blocked subnet, click ✖ .
Block Exception	To create an exception to a blocked subnet (above), enter the IP address and choose a subnet mask from the drop-down menu. To add the exception, click + . To delete an exception, click ✖ .



Bandwidth Management	
Upstream Limit	Enter a value in kbps to limit the wireless network's upstream bandwidth. Enter **0** to allow unlimited upstream bandwidth.
Downstream Limit	Enter a value in kbps to limit the wireless network's downstream bandwidth. Enter **0** to allow unlimited downstream bandwidth.
Client Upstream Limit	Enter a value in kbps to limit connected clients' upstream bandwidth. Enter **0** to allow unlimited upstream bandwidth.
Client	Enter a value in kbps to limit connected clients' downstream bandwidth. Enter **0** to allow unlimited downstream bandwidth.

Downstream Limit

Firewall Settings	
Firewall Mode	Choose **Flexible – Allow all except…** or **Lockdown – Block all except…** to turn on the firewall, then create rules for the firewall exceptions by clicking New Rule. See the discussion below for details on creating a firewall rule. To delete a rule, click the associated button. To turn off the firewall, select **Disable**.



Firewall Rule	
Name	Enter a descriptive name for the firewall rule in this field.
Type	Choose **Port**, **IP Network**, **MAC Address** or **Domain Name** to allow or deny traffic from any of those identifiers. Depending on the option chosen, the following fields will vary.
Port	Choose **TCP** or **UDP** from the **Protocol** drop-down menu to allow or deny traffic using either of those protocols. From the **Port** drop-down menu, choose **Any Port** to allow or deny TCP or UDP traffic on any port. Choose **Single Port** and then enter a port number in the provided field to allow or block TCP or UDP traffic from that port only. You can also choose **Port Range** and enter a range of ports in the provided fields to allow or deny TCP or UDP traffic from the specified port range.
IP Network	If you have chosen **IP Network** as your firewall rule type, enter the IP address and subnet mask identifying the subnet to allow or deny.

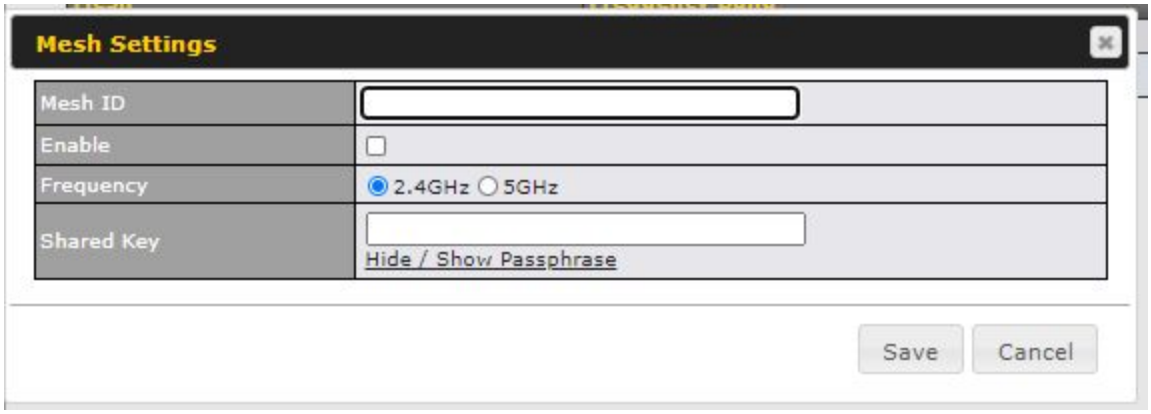
MAC Address	If you have chosen **MAC Address** as your firewall rule type, enter the MAC address identifying the machine to allow or deny.
Domain Name	If you have chosen **Domain Name** as your firewall rule type, enter the Domain Name identifying the machine to allow or deny.

8.1.2 Wireless Mesh

Mesh support enables an access point (AP) to connect wirelessly to other wired mesh APs, providing redundancy in the event of AP failure. Mesh support is available for Wi-Fi networks 802.11ac (Wi-Fi 5) and above.

Please note that the AP's Mesh settings need to match the Mesh ID and Shared Key of the selected frequency band in order for the AP to join the network.

To create a new Wireless Mesh profile, go to **AP > Mesh**, and click **Add**.

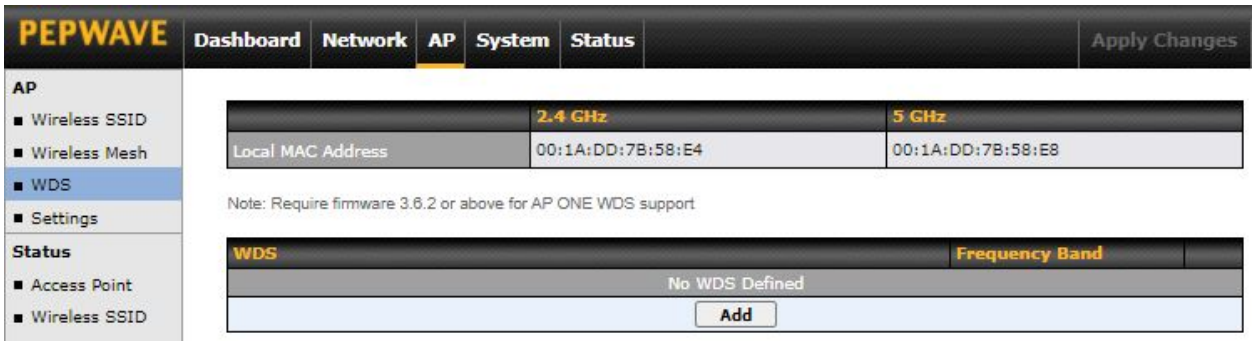


Mesh Settings	
Mesh ID	Enter a name to represent the Mesh profile.
Enable	Check the box to enable the Mesh Profile.
Frequency	Select the 2.4GHz or 5GHz frequency to be used.

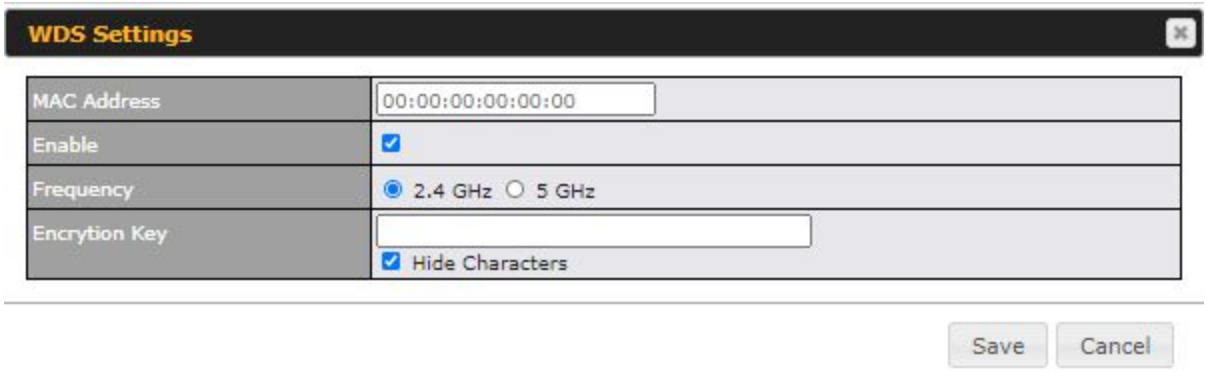
Shared Key	Enter the shared key in the text field. Please note that it needs to match the shared keys of the other APs in the Mesh. Click **Hide / Show Passphrase** to toggle visibility.

8.1.3 WDS

A wireless distribution system (WDS) provides a way to link access points together when wired or cabled connections are not feasible or desirable. A WDS can also extend wireless network coverage for wireless clients. Please note that your access point's channel setting should not be set to **Auto** when using WDS.



To create a new WDS, go to **AP > WDS**, and click **Add**.



WDS	
MAC Address	Enter the MAC address of the access point with which to form a WDS link.
Enable	Check this box to enable WDS.
Frequency	Select the frequency (2.4GHz or 5GHz) for WDS peer connection.

Encryption	Select **AES** to enable encryption for WDS peer connections. Selecting **None** disables encryption.

8.1.4 Settings

Basic access point operation settings, such as the protocol and channels used, as well as scanning intervals and other advanced settings can be defined and managed in this section.

AP Settings		
SSID	2.4 GHz ☑ 5 GHz ☑ PEPLINK_	
Operating Country	United States	
	2.4 GHz	5 GHz
Protocol	802.11ng	802.11n/ac
Channel Width	Auto	Auto
Channel	Auto Edit Channels: 1 2 3 4 5 6 7 8 9 10 11	Auto Edit Channels: 36 40 44 48 149 153 157 161 165
Auto Channel Update	Daily at Clear All ☐ 00:00 ☐ 01:00 ☐ 02:00 ☑ 03:00 ☐ 04:00 ☐ 05:00 ☐ 06:00 ☐ 07:00 ☐ 08:00 ☐ 09:00 ☐ 10:00 ☐ 11:00 ☐ 12:00 ☐ 13:00 ☐ 14:00 ☐ 15:00 ☐ 16:00 ☐ 17:00 ☐ 18:00 ☐ 19:00 ☐ 20:00 ☐ 21:00 ☐ 22:00 ☐ 23:00 ☑ Wait until no active client associated	Daily at Clear All ☐ 00:00 ☐ 01:00 ☐ 02:00 ☑ 03:00 ☐ 04:00 ☐ 05:00 ☐ 06:00 ☐ 07:00 ☐ 08:00 ☐ 09:00 ☐ 10:00 ☐ 11:00 ☐ 12:00 ☐ 13:00 ☐ 14:00 ☐ 15:00 ☐ 16:00 ☐ 17:00 ☐ 18:00 ☐ 19:00 ☐ 20:00 ☐ 21:00 ☐ 22:00 ☐ 23:00 ☑ Wait until no active client associated
Output Power	Custom 20 dBm	Custom 20 dBm
Client Signal Strength Threshold	0 -95 dBm (0: Unlimited)	0 -95 dBm (0: Unlimited)
Maximum number of clients	0 (0: Unlimited)	0 (0: Unlimited)
Discover Nearby Networks	☑ Note: Feature will be automatically turned on with Auto Channel / Dynamic Output Power	
Beacon Rate	1 Mbps	
Beacon Interval	100 ms	
DTIM	1	
RTS Threshold	0	
Fragmentation Threshold	0 (0: Disable)	
Distance / Time Converter	4050 m Note: Input distance for recommended values	
Slot Time	○ Auto ◉ Custom 9 µs	
ACK Timeout	48 µs	

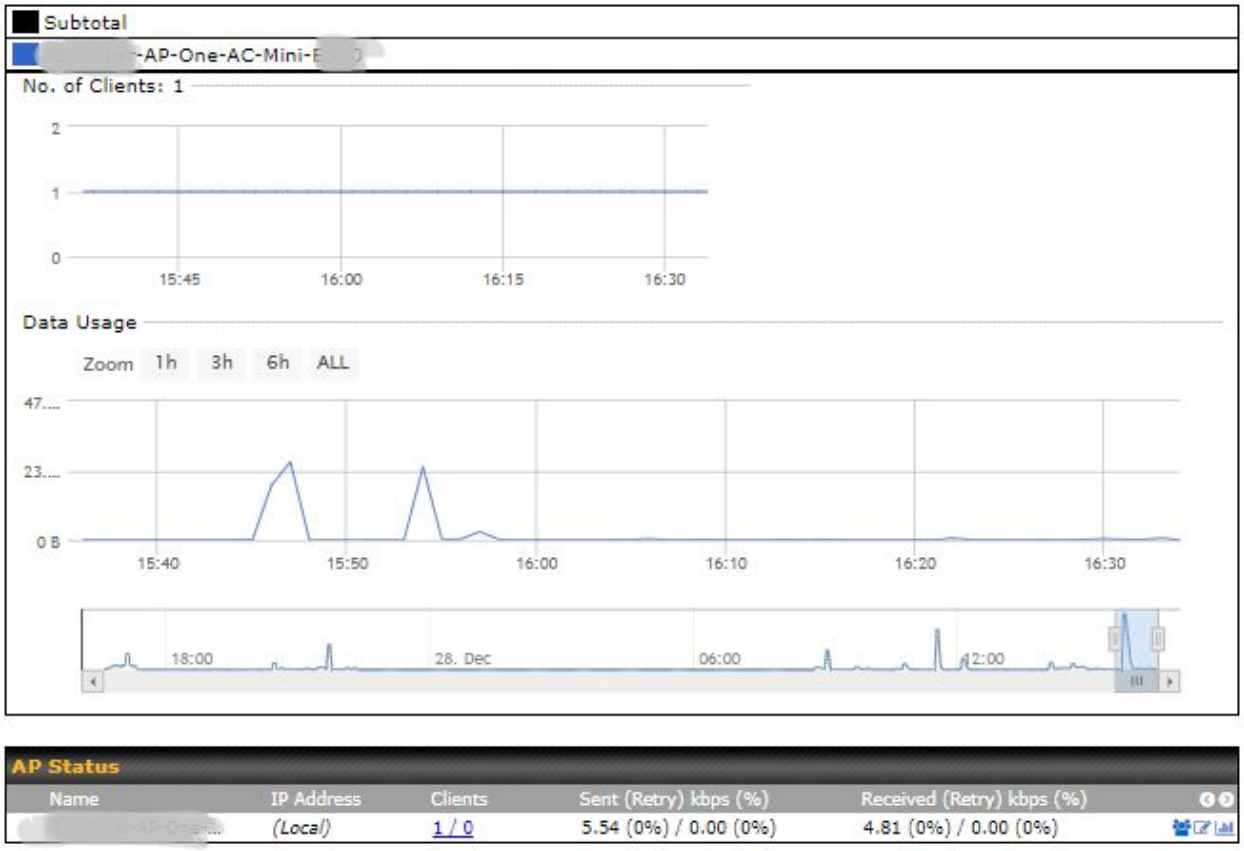
AP Settings	
SSID	Select if an SSID is broadcasting on 2.4 GHz, 5 GHz or both bands.
Operating Country	This drop-down menu specifies the national / regional regulations the AP should follow. If a North American region is selected, RF channels 1 to 11 will be available and the maximum transmission power will be 26 dBm (400 mW). If a European region is selected, RF channels 1 to 13 will be available. The maximum transmission power will be 20 dBm (100 mW). NOTE: Users are required to choose an option suitable to local laws and regulations. Per FCC regulation, the country selection is not available on all models marketed in the US. All US models are fixed to US channels only.
Protocol	Choose **802.11ng** or **802.11n/ac** as your access point's Wi-Fi protocol. The AP One AC mini provides the **802.11ng** protocol for the 2.4 GHz band and the **802.11n/ac** protocol for the 5GHz band, as shown below.
Channel Width	This option defines which channel width the radio will use: **20MHz** - Supports clients with 20MHz capability. This is the default value for 802.11ng. **40MHz** - Supports clients with 20/40MHz capability. **20/40MHz** - Supports clients with 20/40 MHz capability. The radio will fall back to 20MHz if it detects APs that only support 20MHz. This is the default value for 802.11na. **80MHz** - Supports clients with 20/40/80MHz capability. This is the default value for 802.11n/ac.
Channel	This drop-down menu selects the 2.4 GHz and 5GHz 802.11 channels to be used. When **Auto** is selected, the system will perform channel scanning based on the scheduled time set and choose the most suitable channel automatically.
Output Power	This option enables the configuration of transmission power. Choose between: Max / High / Medium / Low / Custom. **Max** is the Maximum power supported for that country or Maximum power supported for the device (whichever is the smaller value). **High** is 3dBm below the max value. **Medium** is 3dBm below high value. **Low** is 3 dBm below Medium value.
Client Signal Strength Threshold	This field determines the minimum acceptable client signal strength, specified in megawatts. If client signal strength does not meet this minimum, the client will not be allowed to connect.
Maximum number of Clients	Enter the maximum clients that can simultaneously connect to your access point or set the value to **0** to allow unlimited clients.
Discover Nearby Networks	Check this box to enable network discovery. Note that setting **Channel** to **Auto** will activate this feature automatically.

Beacon Rate	This drop-down menu provides the option to send beacons in different transmit bit rates. The bit rates are **1 Mbps**, **2 Mbps**, **5.5 Mbps**, **6 Mbps**, and **11 Mbps**.
Beacon Interval	Set the time between each beacon send. Available options are **100 ms**, **250 ms**, and **500 ms**.
DTIM	Set the frequency for the beacon to include delivery traffic indication messages (DTIM). The interval unit is measured in milliseconds.
RTS Threshold	Set the minimum packet size for your access point to send an RTS using the RTS/CTS handshake. Setting **0** disables this feature.
Fragmentation Threshold	Enter a value to limit the maximum frame size, which can improve performance.
Distance / Time Convertor	This slider and text entry field can be used to interactively set slot time.
Slot Time	This field provides the option to modify the unit wait time before your access point transmits. The default value is **9µs**.
ACK Timeout	Set the wait time to receive an acknowledgement packet before retransmitting. The default value is **48µs**.

8.2 Status

8.2.1 Access Point

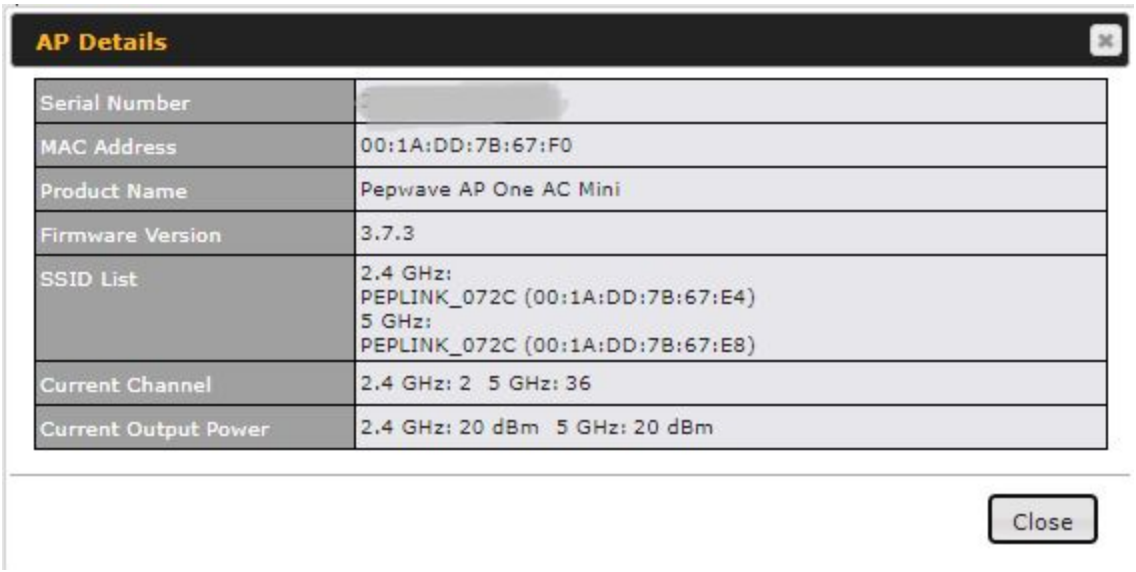
A detailed breakdown of data usage and number of clients for each AP is available at **AP > Status > Access Point**.



This table shows the detailed information on each AP, including channel, number of clients, power, upload traffic, and download traffic. On the right of the table, you will see the following icons:

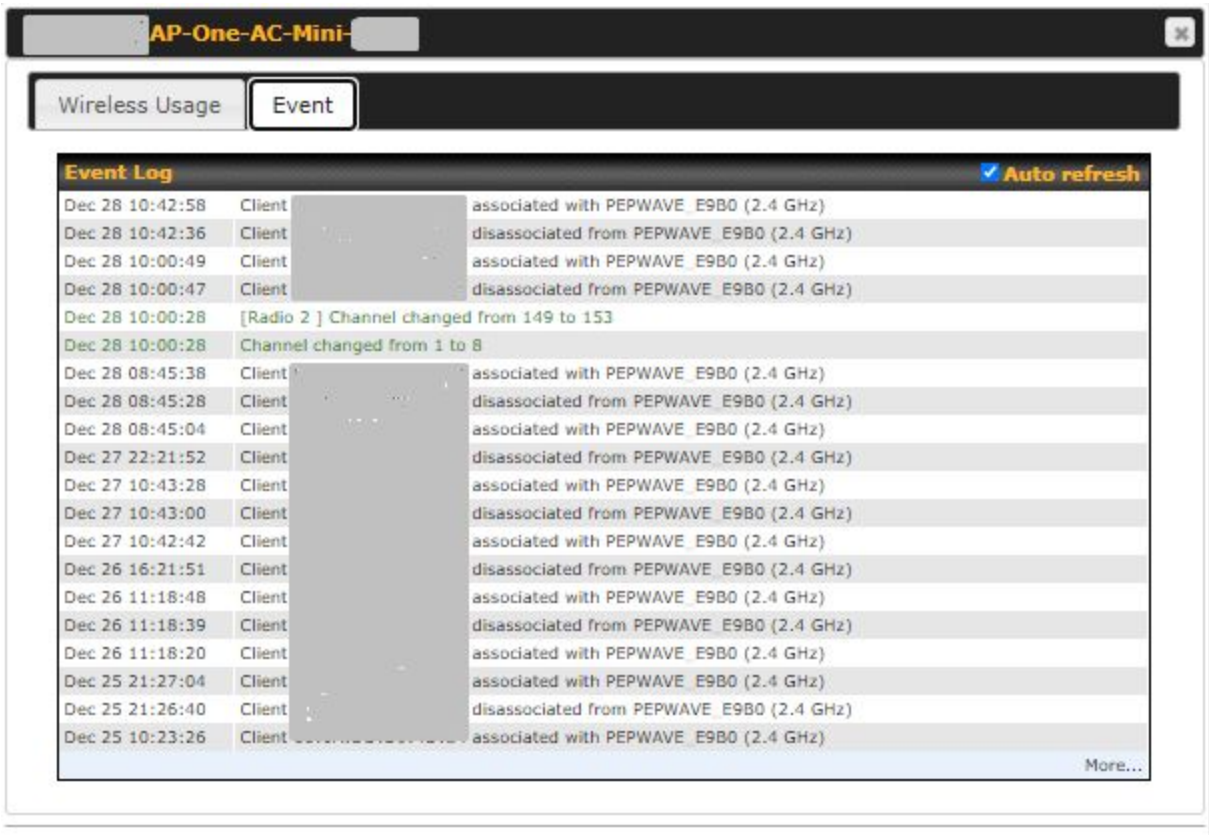
Click the icon to see a usage table for each client:

Click the icon to configure AP details.



Click the icon to see a graph displaying usage.

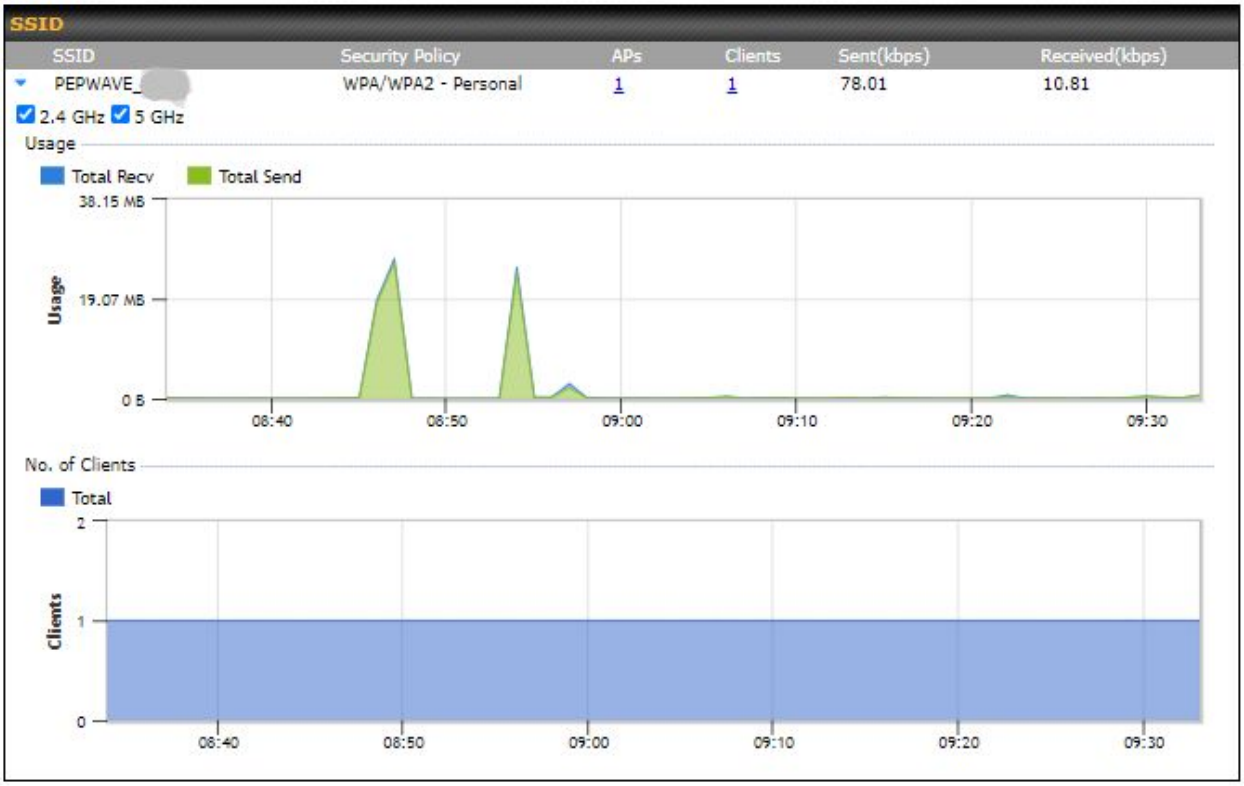
Click any point on the graphs to display detailed usage and client information for that device, using that SSID, at that point in time. On the **Data Usage by** drop-down menu, you can display the information by SSID or by AP send/receive rate.



You may click the **Event** tab which is next to **Wireless Usage** to view a detailed event log for that particular device.

8.2.2 Wireless SSID

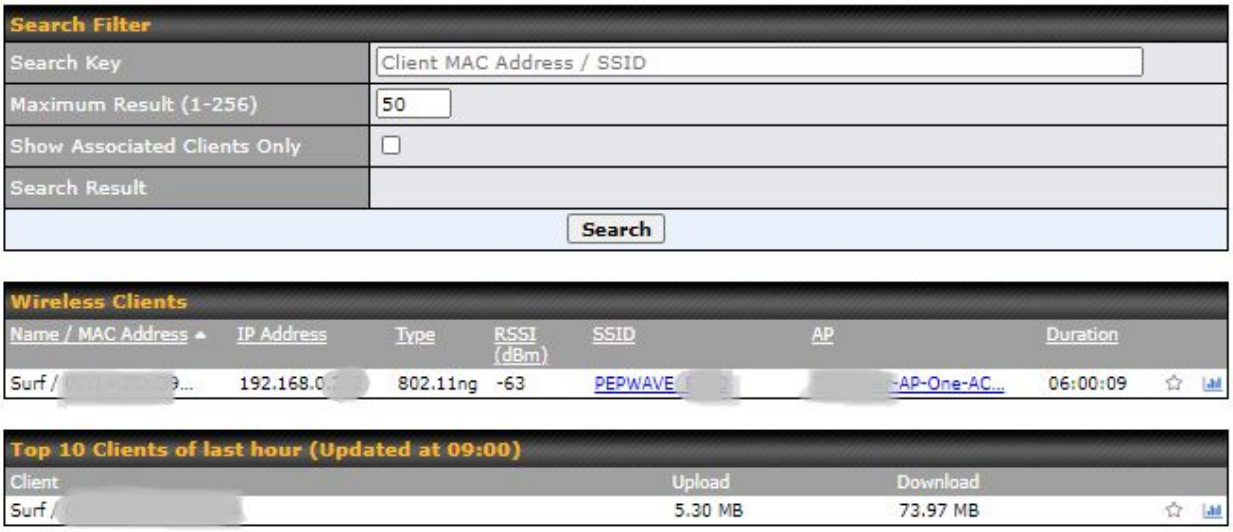
In-depth SSID reports are available under **AP > Status > Wireless SSID**.



Click the blue arrow on any SSID to obtain more detailed usage information on each SSID.

8.2.3 Wireless Client

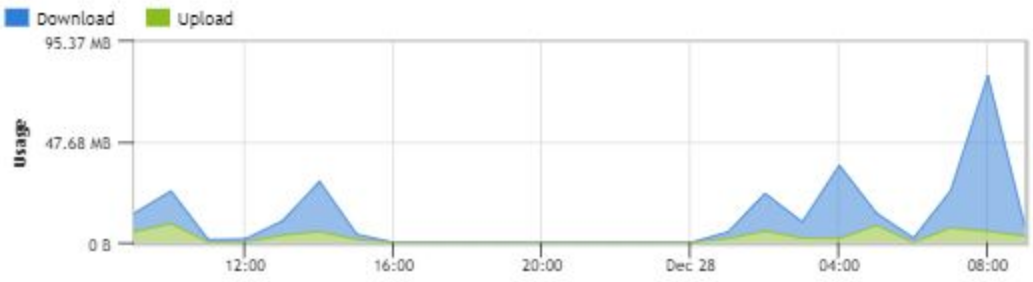
You can search for specific Wi-Fi users by navigating to **AP > Status > Wireless Client**.



Wireless Client allows you to be able to see your network's heaviest users as well as search for specific users. Click the ☆ icon to bookmark specific users, and click the icon for additional details about each user.

Client 00:1A:DD:D9:4D:84

Information	
Status	Associated
Client	Surf /
Access Point	AP-One-AC-Mini- /
SSID	PEPWAVE_E9B0
IP Address	
Duration	06:08:21
Usage (Download / Upload)	145.02 MB / 27.00 MB
RSSI	-65 dBm
Rate (Download / Upload)	72M / 72.2M
Type	802.11ng



SSID	AP	From	To	Download	Upload
PEPWAVE_E9B0 *(2.4 GHz)*	TK-Cyber-AP-One-AC-...	Dec 28 03:42:58	-	145.01 MB	26.99 MB
PEPWAVE_E9B0 *(2.4 GHz)*	TK-Cyber-AP-One-AC-...	Dec 28 03:00:49	Dec 28 03:42:36	1.82 MB	702.7 KB
PEPWAVE_E9B0 *(2.4 GHz)*	TK-Cyber-AP-One-AC-...	Dec 28 01:45:38	Dec 28 03:00:47	20.90 MB	7.37 MB

8.2.4 Mesh / WDS

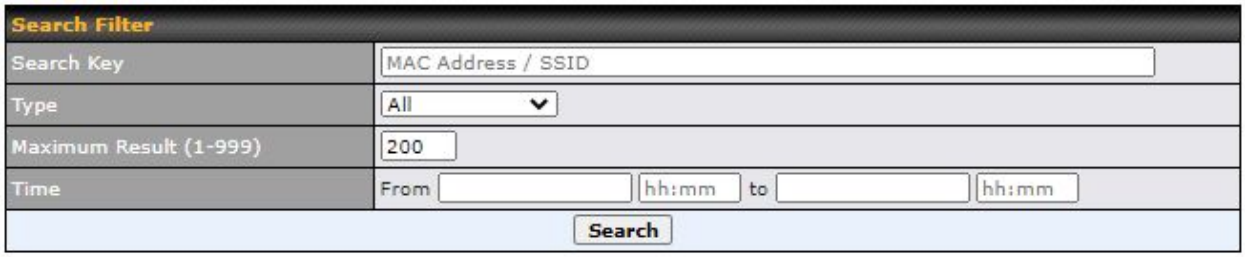
Mesh / WDS

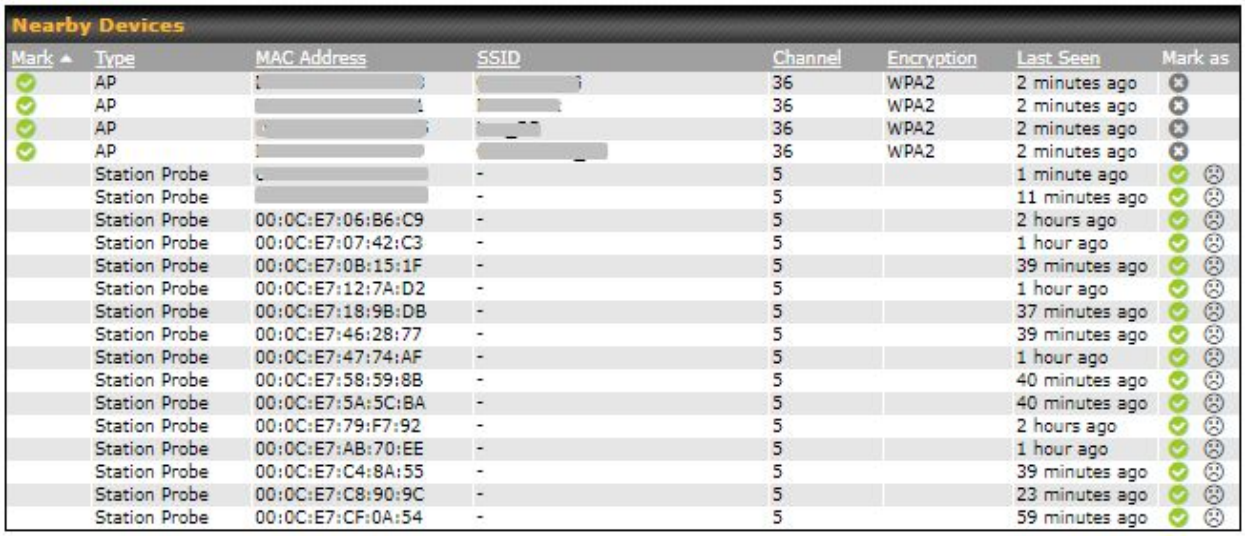
Type	MAC	Protocol	Rate (Send)	Rate (Receive)	Signal (dBm)	Duration
AP_One_AC_Mini_5332/						
Mesh (test)	00:1A:DD:DA:EB:F0	802.11ac	520M	866.7M	-32	00:01:19

Mesh/WDS allows you to monitor the status of your wireless distribution system (WDS) or Mesh, and track activity by MAC address. This table shows the detailed information of each AP, including protocol, transmit rate (sent / received), signal strength, and duration.

8.2.5 Nearby Device

A listing of near devices can be accessed by navigating to **AP > Status > Nearby Device**.



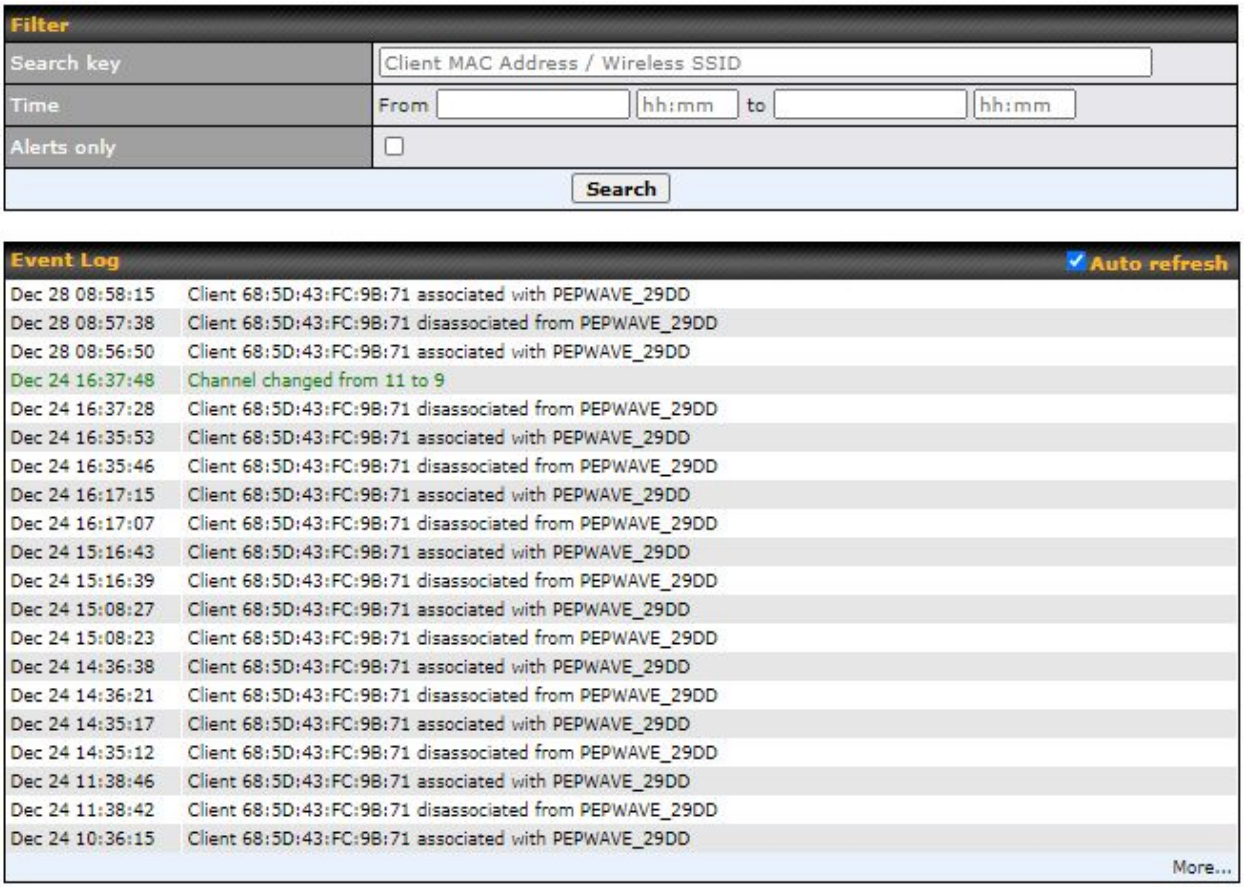


Nearby Devices

Hovering over the device MAC address will result in a popup with information on how this device was detected. You may click the icon to mark the device as a known device or click the icon to mark the device as a rogue device. Marking a device with either icon will move the device to the bottom of the table of identified devices.You can sort devices by their assigned mark by clicking the **Mark** column. You may unmark a device by clicking on the icon.

8.2.6 Event Log

You can access the AP Controller Event log by navigating to **AP > Status > Event Log**.

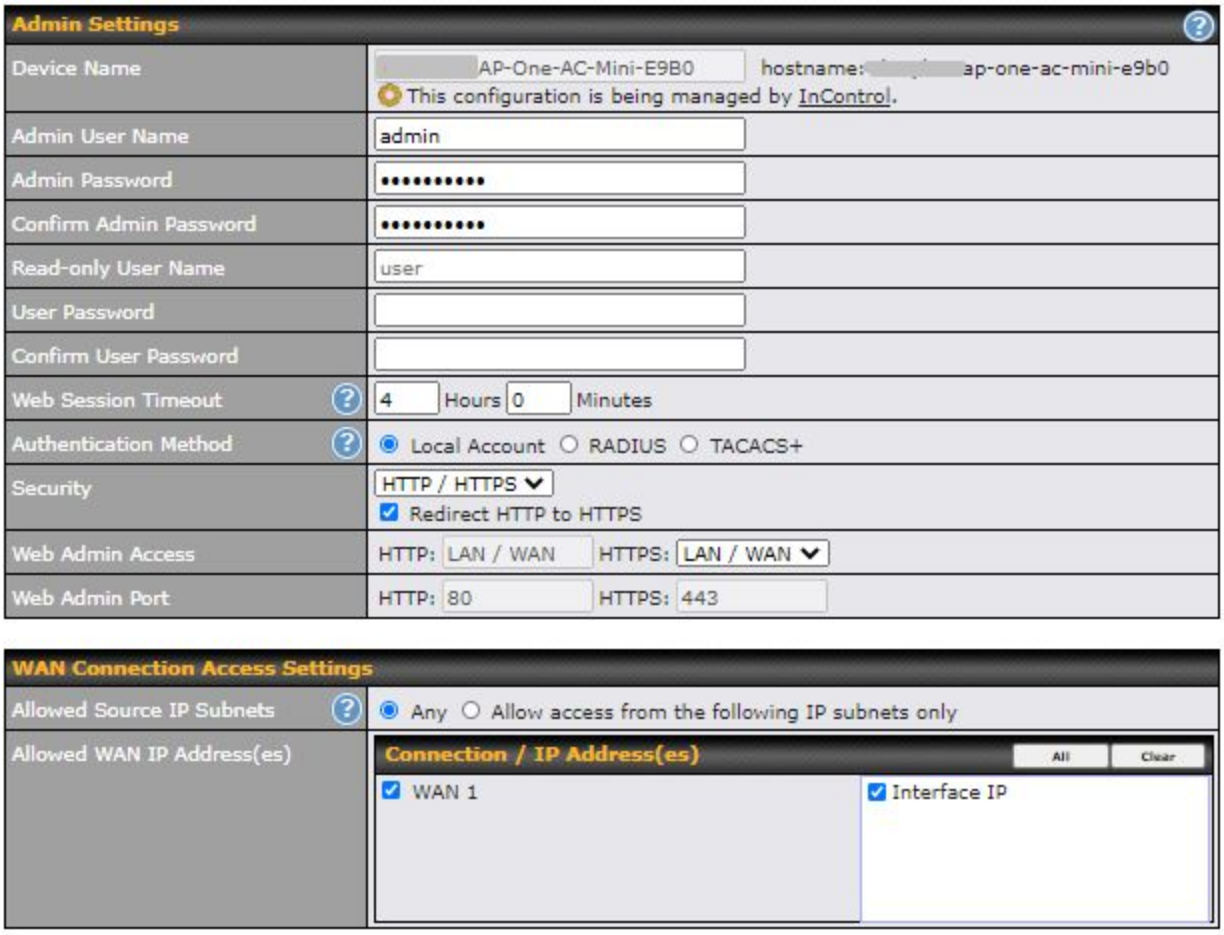


Event Log

This event log displays all activity on your AP network, down to the client level. You can use the filter box to search by MAC address, SSID, AP Serial Number, or AP Profile name. Click **View Alerts** to see only alerts, and click the **More…** link for additional records.

9 System Tab

9.1 Admin Security



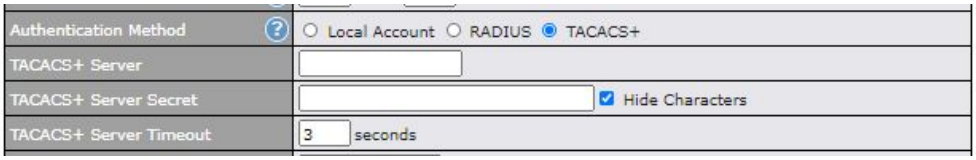
Admin Settings	
Devicer Name	This field allows you to define a name for this Peplink Balance unit. By default, **Device Name** is set as **Model_XXXX**, where *XXXX* refers to the last 4 digits of the serial number of that unit.
Admin User Name	**Admin User Name** is set as **admin** by default, but can be changed.
Admin Password	This field allows you to specify a new administrator password.

Confirm Admin Password	This field allows you to confirm the new administrator password.
Read-only User Name	**Read-only User Name** is set as user by default, but can be changed, if desired.
User Password	This field allows you to specify a new user password. Once the user password is set, the read-only user feature will be enabled.
Confirm User Password	This field allows you to confirm the new user password.
Web Session Timeout	A web login session will be logged out automatically when it has been idle longer than the Web Session Timeout. Unlimited session timeout: 0 hours 0 minutes. Default: 4 hours 0 minutes.
Authentication Method	When **External Authentication** is selected, the web admin will authenticate using the corresponding external server. Authenticated users are treated as either "admin" with full read-write permission or “user” with read-only access. Local admin and user accounts will be disabled. However, when the device is not able to communicate with the external server, local accounts are enabled to allow emergency access. By default, it is set to Local Account. Available options: ● Local Account ● RADIUS

Authentication Protocol	This specifies the authentication protocol used. Available options are **MSCHAP v2** and **PAP**.
Authentication Host	This specifies the IP address or hostname of the RADIUS server host.
Authentication Port	This setting specifies the UDP destination port for authentication requests.

Authentication Secret	This field is for entering the secret key for accessing the RADIUS server.
Accounting Host	This specifies the IP address or hostname of the RADIUS server host.
Accounting Port	This setting specifies the UDP destination port for accounting requests.
Accounting Secret	This field is for entering the secret key for accessing the accounting server.
Authentication Timeout	This option specifies the time value for authentication timeout.

- TACACS+



TACACS+ Server	This specifies the access address of the external TACACS+ server.
TACACS+ Server Secret	This field is for entering the secret key for accessing the RADIUS server.
TACACS+ Server Timeout	This option specifies the time value for TACACS+ timeout.

Security	This option is for specifying the protocol(s) through which the web admin interface can be accessed: • HTTP • HTTPS • HTTP/HTTPS
Web Admin Access	This option is for specifying the network interfaces through which the web admin interface can be accessed: • LAN only • LAN/WAN If **LAN/WAN** is chosen, the WAN Connection Access Settings form will be displayed.
Web Admin Port	This field is for specifying the port number on which the web admin interface can be accessed.

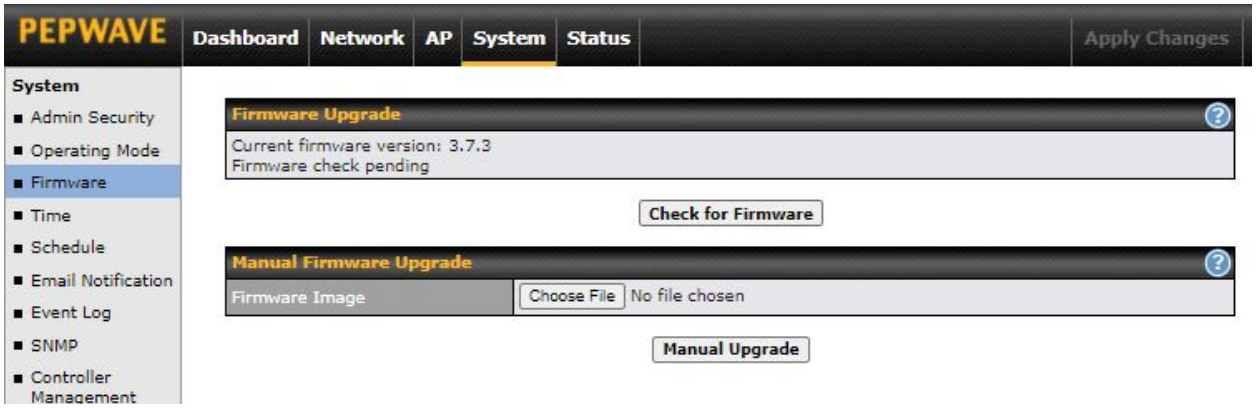
Allowed Source IP Subnets	This option is for specifying the IP subnets through which the web admin interface can be accessed. ● Any - Allow web admin access to be from anywhere, and without an IP address. ● Allow access from the following IP subnets only - Restrict web admin access to only the defined IP subnets. When this is chosen, a text input area will be displayed beneath: The allowed IP subnet addresses should be entered into this text area. Each IP subnet must be in form of w.x.y.z/m, where w.x.y.z is an IP address (e.g. 192.168.0.0), and m is the subnet mask in CIDR format, which is between 0 and 32 inclusively (e.g. 192.168.0.0/24). To define multiple subnets, separate each IP subnet one in a line. For example: ● 192.168.0.0/24 ● 10.8.0.0/16
Allowed WAN IP Address(es)	This field allows you to select the WAN IP address(es) the web server should connect to.

9.2 Operating Mode

You can select the operating mode you want to use for the access point device. The available options are:

- Router Mode
- Bridge Mode
- Bridge Mode, without LAN IP address

9.3 Firmware



There are two ways to upgrade the unit. The first method is through an online download. The second method is to upload a firmware file manually.

To perform an online download, click on the **Check for Firmware** button. The access point will check online for new firmware. If new firmware is available, the access point automatically downloads the firmware. The rest of the upgrade process will be automatically initiated.

You may also download a firmware image from the Peplink website and update the unit manually. To update using a firmware image, click **Choose File** to select the firmware file from the local computer, and then click **Manual Upgrade** to send the firmware to the access point. It will then automatically initiate the firmware upgrade process.

Please note that all devices can store two different firmware versions in two different partitions. A firmware upgrade will always replace the inactive partition. If you want to keep the inactive firmware, you can simply reboot your device with the inactive firmware and then perform the firmware upgrade.

Firmware Upgrade Status

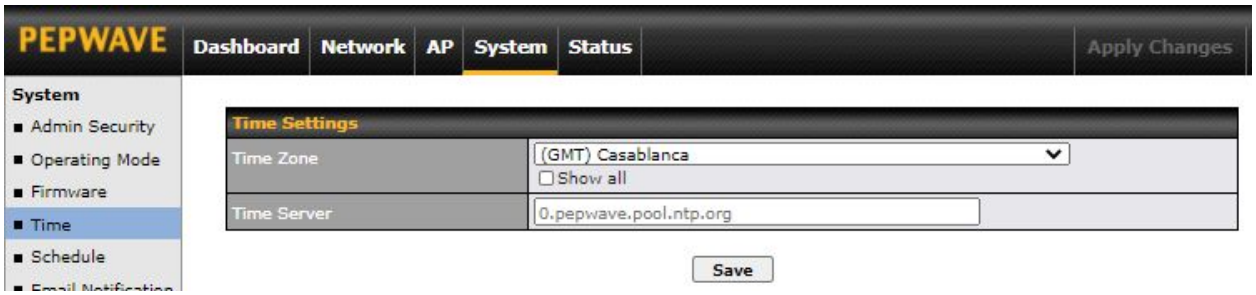
Status LED information during firmware upgrade:

- OFF – Firmware upgrade in progress (DO NOT disconnect power.)
- Red – Unit is rebooting
- Green – Firmware upgrade successfully completed

Important Note

The firmware upgrade process may not necessarily preserve the previous configuration, and the behavior varies on a case-by-case basis. Consult the release notes for the particular firmware version before installing. Do not disconnect the power during the firmware upgrade process. Do not attempt to upload a non-firmware file or a firmware file that is not supported by Peplink. Upgrading the Peplink Balance with an invalid firmware file will damage the unit and may void the warranty.

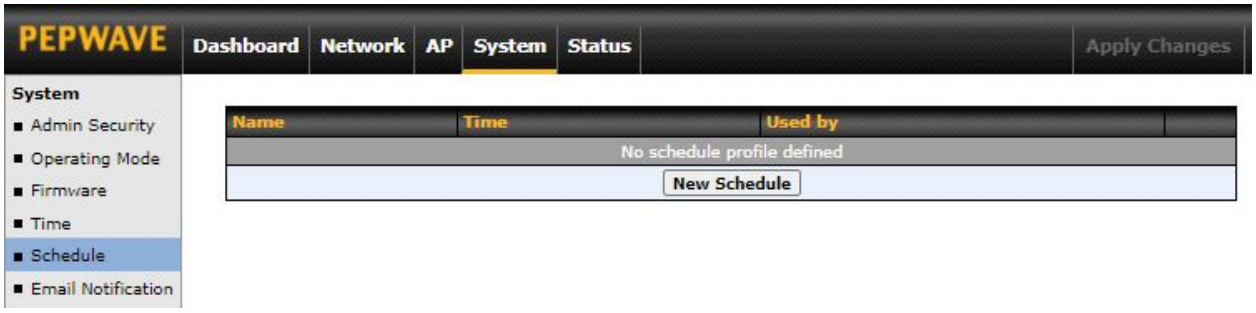
9.4 Time



The time server functionality enables the system clock of the access point to be synchronized with a specified time server. The settings for time server configuration are located at **System > Time**.

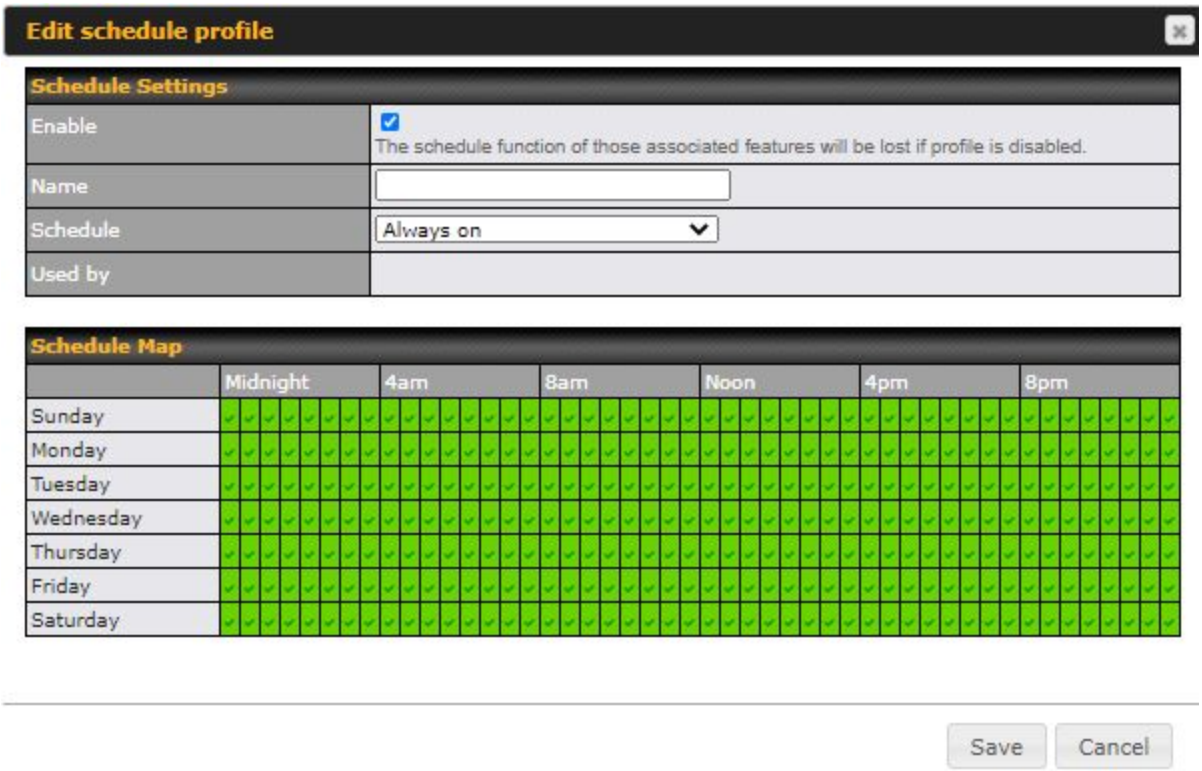
Time Settings	
Time Zone	This specifies the time zone (along with the corresponding Daylight Savings Time scheme) in which Pepwave AP operates. The **Time Zone** value affects the time stamps in the event log of the Pepwave AP and e-mail notifications. Check **Show all** to show all time zone options.
Time Server	This setting specifies the NTP network time server to be utilized by the Pepwave AP.

9.5 Schedule



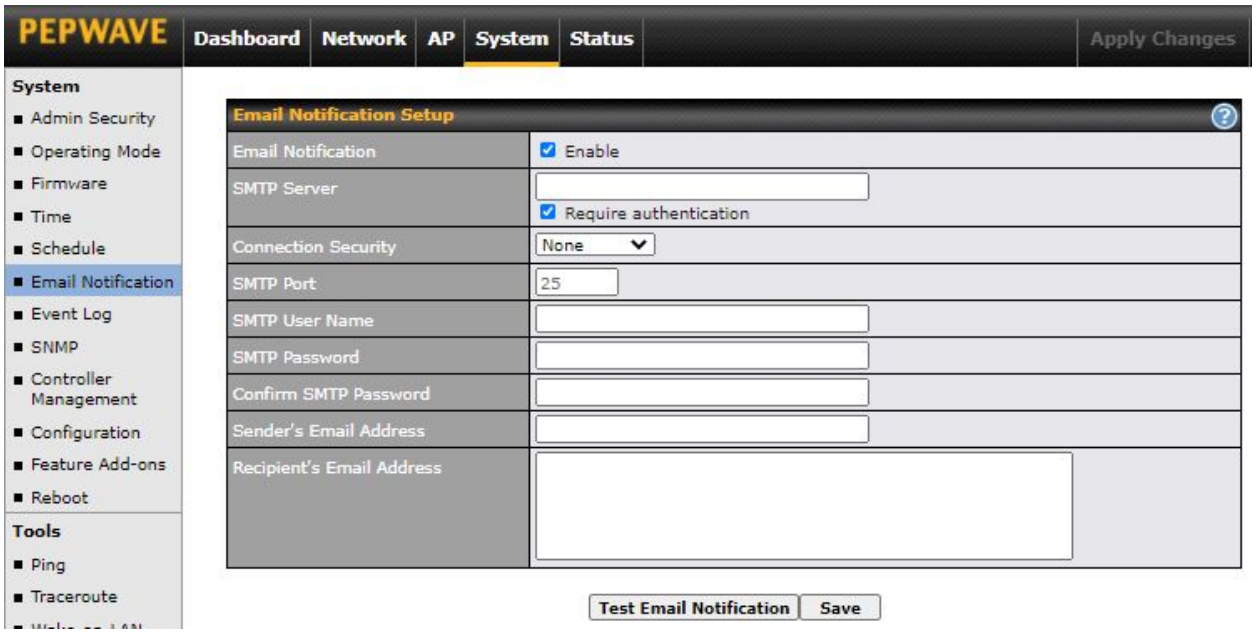
Enable and disable different functions such as WAN connections and SSID at different times, based on a user-scheduled configuration profile. The settings for this are located at **System > Schedule**.

Click on **New Schedule** to begin the schedule profile.



Edit Schedule Profile	
Enable	Click this checkbox to enable this schedule profile. Note that if this is disabled, then any associated features will also have their scheduling disabled.
Name	Enter your desired name for this particular schedule profile.
Schedule	Click the drop-down menu to choose from predefined schedules as your starting point. Please note that upon selecting a predefined schedule, previous changes on the schedule map will be deleted.
Schedule Map	Click on the desired times to enable features for that time period. You can hold down your mouse button for faster entry.

9.6 Email Notification



Email notification functionality provides a system administrator with up-to-date information on network status. The settings for configuring email notifications are found at **System > Email Notification**.

Email Notification Settings	
Email Notification	This setting specifies whether or not to enable email notification. If **Enable** is checked, the Pepwave AP will send email messages to system administrators when the WAN status changes or when new firmware is available. If **Enable** is unchecked, email notification is disabled and the Pepwave AP will not send email messages.
SMTP Server	This setting specifies the SMTP server to be used for sending the email notifications. If the server requires authentication, check **Require authentication**.
Connection Security	This setting specifies via a drop-down menu one of the following valid connection security options: • None • STARTTLS • SSL/TTS When a connection security option is selected, the **SMTP Port** will automatically set a default port number.
SMTP Port	This field is for specifying the SMTP port number. By default, this is set to **25**. When **STARTTLS** is selected, the default port number will be set to **587**.

	When **SSL/TTS** is selected, the default port number will be set to **465**. You may customize the port number by editing this field.
SMTP User Name / Password	This setting specifies the SMTP username and password for accessing the **SMTP Server** to send the email notifications. These fields are only visible when the **Require authentication** box is checked in the **SMTP Server** setting.
Confirm SMTP Password	This field allows you to verify that the SMTP password matches (if a password is provided in the SMTP Password field).
Sender's Email Address	This setting specifies the email address that the Pepwave AP will send reports from.
Recipient's Email Address	This setting specifies the email address(es) to which the Pepwave AP will send email notifications. For multiple recipients, separate each email address using the **Enter** key.

After you have finished setting up email notifications, you may click the **Test Email Notification** button to test the settings before saving them. After **Test Email Notification** is clicked, you will see this screen to confirm the settings:

Click **Send Test Notification** to send the test email with the current settings. In a few seconds, you will see a message with detailed test results.

Test email sent.
(NOTE: Settings are not saved. To confirm the update, click 'Save' button.)

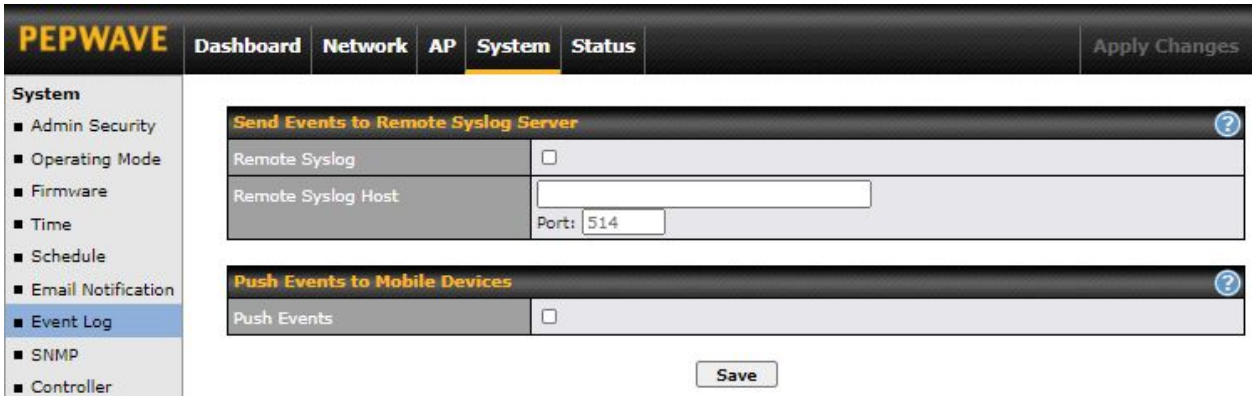
Email Notification Setup	
Email Notification	☑ Enable
SMTP Server	[redacted] ☑ Require authentication
Connection Security	SSL/TLS (Note: any server certificate will be accepted)
SMTP Port	465
SMTP User Name	[redacted]
SMTP Password	••••••••••••••••
Confirm SMTP Password	••••••••••••••••
Sender's Email Address	[redacted]
Recipient's Email Address	[redacted]

Test Email Notification | Save

Test Result

```
[INFO] Try email through auto detected connection
[INFO] SMTP through SSL connected
[<-] 220 smtp.gmail.com ESMTP h11sm3907691pjg.46 - gsmtp
[->] EHLO balance.peplink.com
[<-] 250-smtp.gmail.com at your service, [14.192.209.255]
[<-] 250-SIZE 35882577
[<-] 250-8BITMIME
[<-] 250-AUTH LOGIN PLAIN XOAUTH2 PLAIN-CLIENTTOKEN OAUTHBEARER XOAUTH
[<-] 250-ENHANCEDSTATUSCODES
[<-] 250-PIPELINING
[<-] 250-CHUNKING
[<-] 250 SMTPUTF8
[->] AUTH PLAIN AGdwc2dhbjk0QGdtYWlsLmNvbQBwdnJ6bWF6cGhtYXJpanpp
```


9.7 Event Log

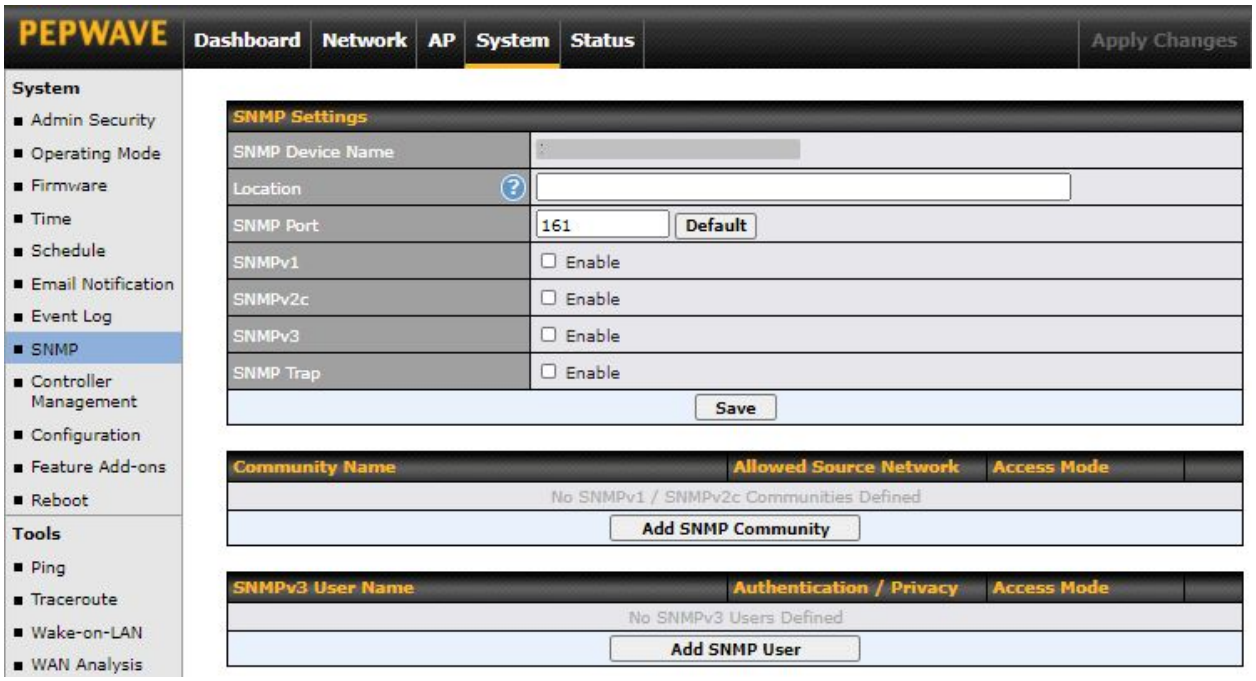


Event log functionality enables event logging at a specified remote syslog server. The settings for configuring the remote system log can be found at **System > Event Log**.

Remote Syslog Settings	
Remote Syslog	This setting specifies whether or not to log events at the specified remote syslog server.
Remote Syslog Host	This setting specifies the IP address or hostname of the remote syslog server. Default Port is: 514
Push Event	The Pepwave AP can also send push notifications to mobile devices that have our Mobile Router Utility installed. Check the box to activate this feature. For more information on the Router Utility, go to: www.peplink.com/products/router-utility

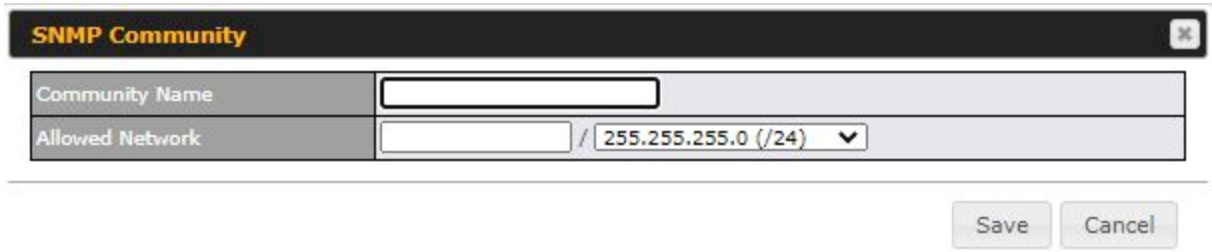
9.8 SNMP

SNMP or simple network management protocol is an open standard that can be used to collect information about the Pepwave AP unit. SNMP configuration is located at **System > SNMP**.



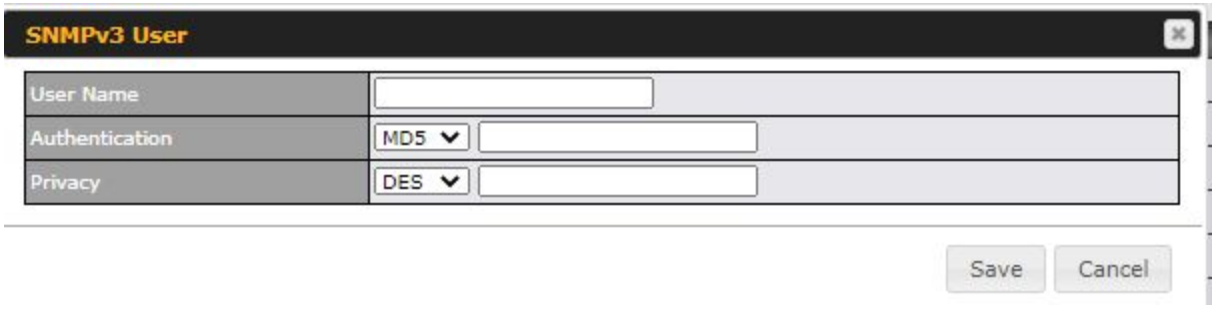
SNMP Settings	
SNMP Device Name	This field displays the router name defined at **System > Admin Security**.
SNMP Port	This option specifies the port which SNMP will use. The default port is **161**.
SNMPv1	This option allows you to enable SNMP version 1.
SNMPv2c	This option allows you to enable SNMP version 2c.
SNMPv3	This option allows you to enable SNMP version 3.
SNMP Trap	This option allows you to enable SNMP Trap.

To add a community for either SNMPv1 or SNMPv2c, click the **Add SNMP Community** button in the **Community Name** table, upon which the following screen is displayed:



SNMP Community Settings	
Community Name	This setting specifies the SNMP community name.
Allowed Network	This setting specifies a subnet from which access to the SNMP server is allowed. Enter the subnet address here (e.g. *192.168.1.0*) and select the appropriate subnet mask.

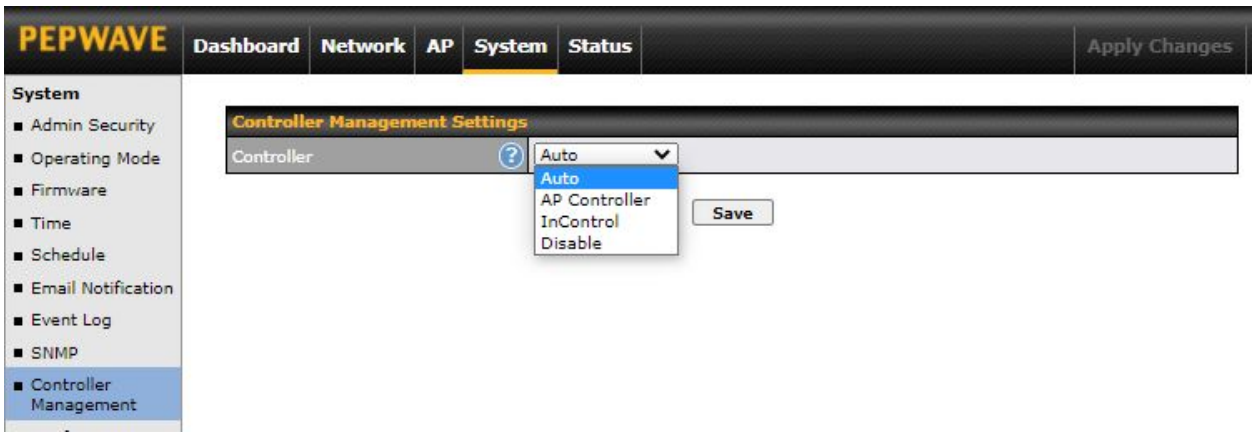
To define a user name for SNMPv3, click **Add SNMP User** in the **SNMPv3 User Name** table, upon which the following screen is displayed:



SNMPv3 User Settings	
User Name	This setting specifies a user name to be used in SNMPv3.
Authentication Protocol	This setting specifies via a drop-down menu one of the following valid authentication protocols: • None • MD5 • SHA When MD5 or SHA is selected, an entry field will appear for the password.
Privacy	This setting specifies via a drop-down menu one of the following valid privacy protocols: • NONE • DES • AES

When DES or AES is selected, an entry field will appear for the password.

9.9 Controller Management



Here is the option to choose the controller management for the access point. This setting specifies via a drop-down menu one of the following valid authentication protocols:

- Auto - AP automatically assigned to active AP Controller.
- AP Controller - AP is controlled by Peplink Balance with AP controller feature.

AP Controller	
Persistent Controller	Check the box **Persistent Controller** and enter the IP address of the Peplink Balance under Controller Host.

- InControl - AP is controlled by InControl*

InControl	
Restricted to Status Reporting Only	When the box **Restricted to Status Reporting Only** is ticked, the AP will only report its status, but can't be managed or configured by InControl.
Privately Host InControl	Check the box "**Privately Host InControl**" and enter the IP Address or hostname of your InControl Appliance.

- Disable - You can disable the controller feature on the AP.

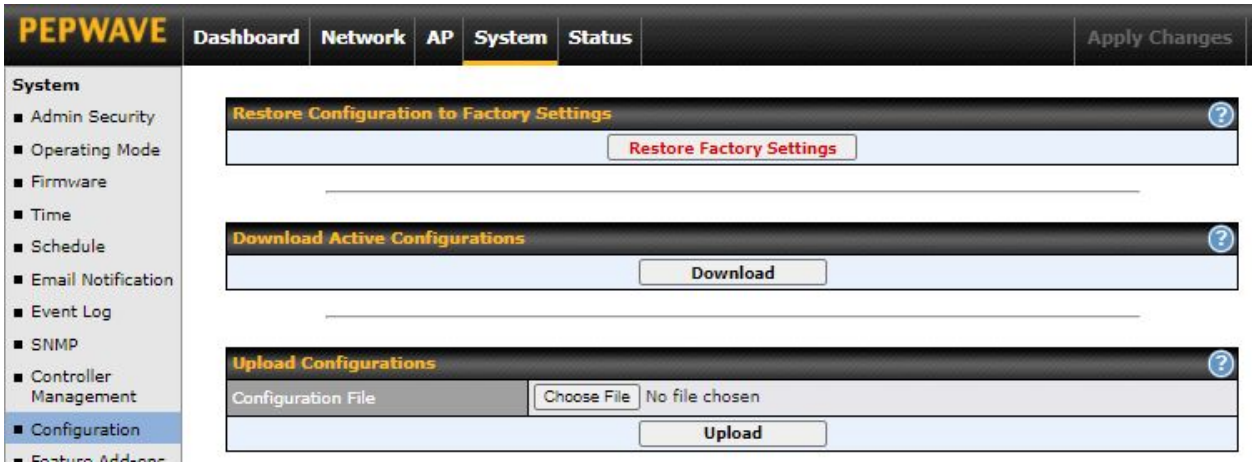
*InControl is a cloud-based service which allows you to manage all of your Peplink and Pepwave devices with one unified system. With it, you can generate reports, gather statistics, and configure your devices automatically.

You can sign up for an InControl account at https://incontrol2.peplink.com. You can register your

devices under the account, monitor their status, see their usage reports, and receive offline notifications.

9.10 Configuration

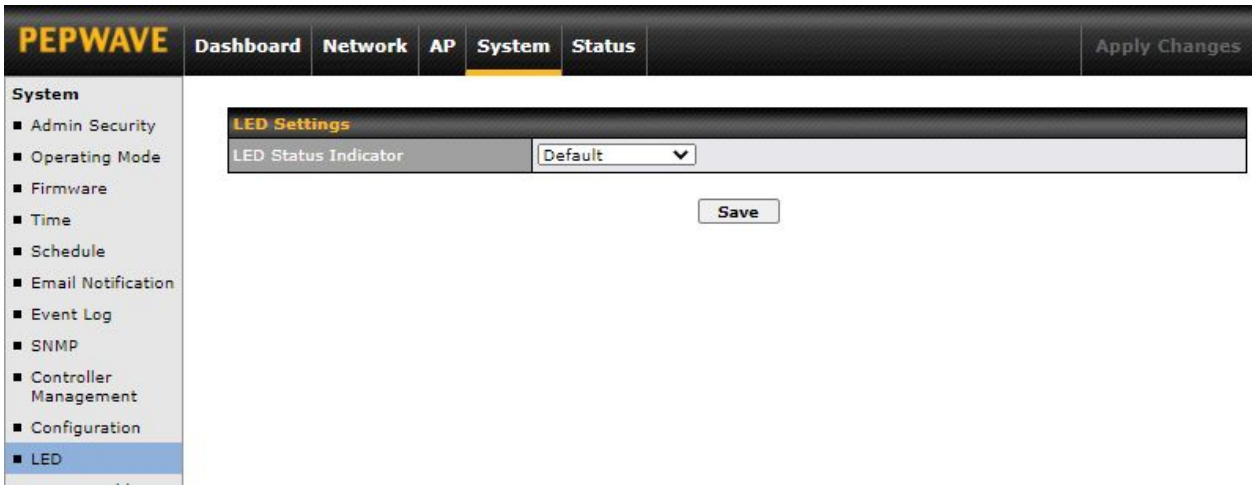
Backing up your Pepwave access point settings immediately after successful completion of the initial setup is strongly recommended. The functionality to download and upload Pepwave access point settings is found at **System > Configuration**.



Configuration	
Restore Configuration to Factory Settings	The **Restore Factory Settings** button is to reset the configuration to factory default settings. After clicking the button, you will need to click the **Apply Changes** button on the top right corner to make the settings effective.
Download Active Configurations	Click **Download** to backup the current active settings.
Upload Configurations	To restore or change settings based on a configuration file, click **Choose File** to locate the configuration file on the local computer, and then click **Upload**. The new settings can then be applied by clicking the **Apply Changes** button on the page header, or you can cancel the procedure by pressing **discard** on the main page of the web admin interface.

9.11 LED

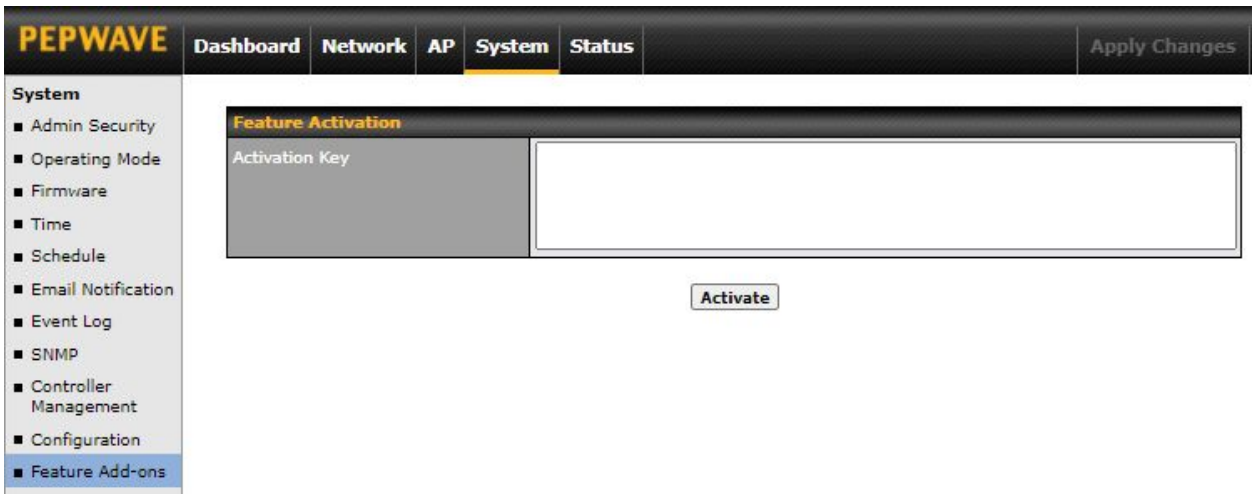
*Please note that the following settings are available only for AP One AX devices.



You can control the LED Status Indicator (available only for AP One AX devices). Available options are:

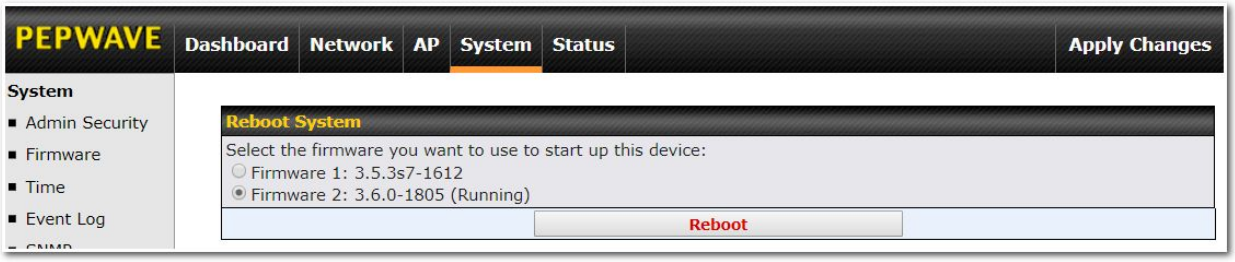
- Default
- Always Turn Off

9.12 Feature Add-Ons



Some Pepwave access point models have features that can be activated upon purchase. Once the purchase is complete, you will receive an activation key. Enter the activation key into the **Activation Key** field, click **Activate**, and then click **Apply Changes**.

9.13 Reboot

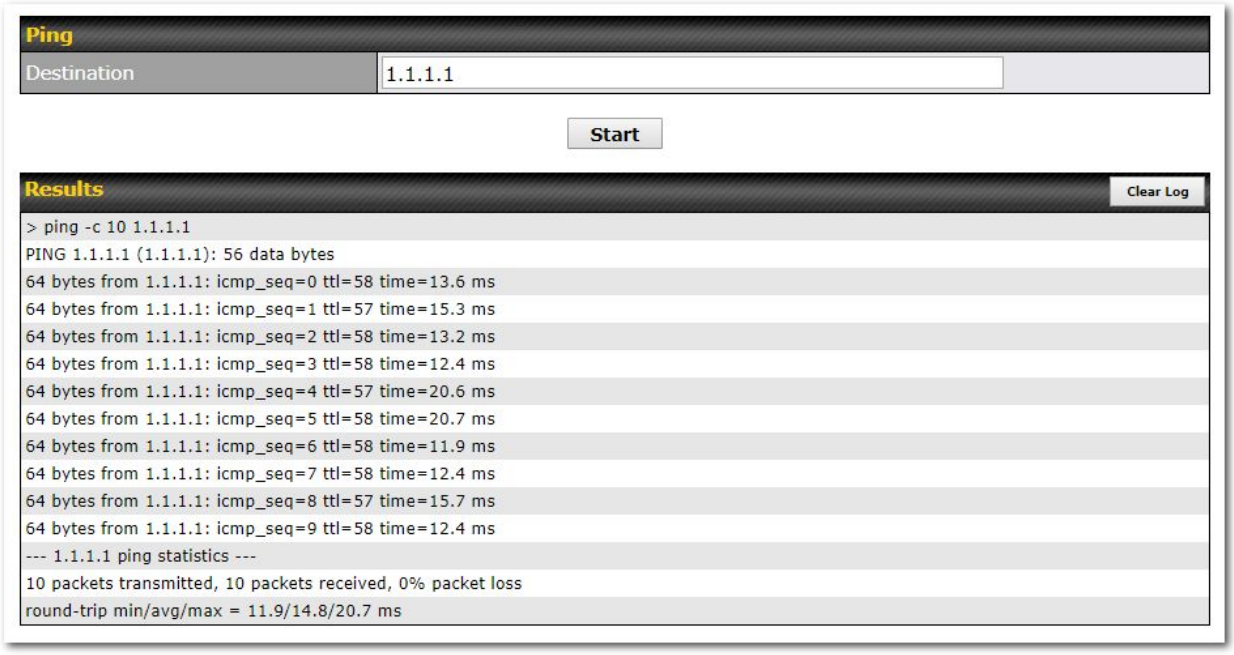


Restart the access point with the **Reboot** button. For maximum reliability, the Pepwave access point can contain two copies of firmware; each copy can be a different version. You can select the firmware version you would like to reboot the device with. The firmware marked with **(Running)** is the current system boot up firmware.

Please note that a firmware upgrade will always replace the inactive firmware partition.

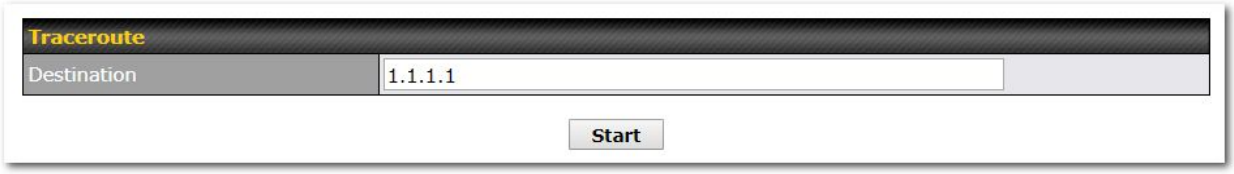
9.14 Tools

9.14.1 PING



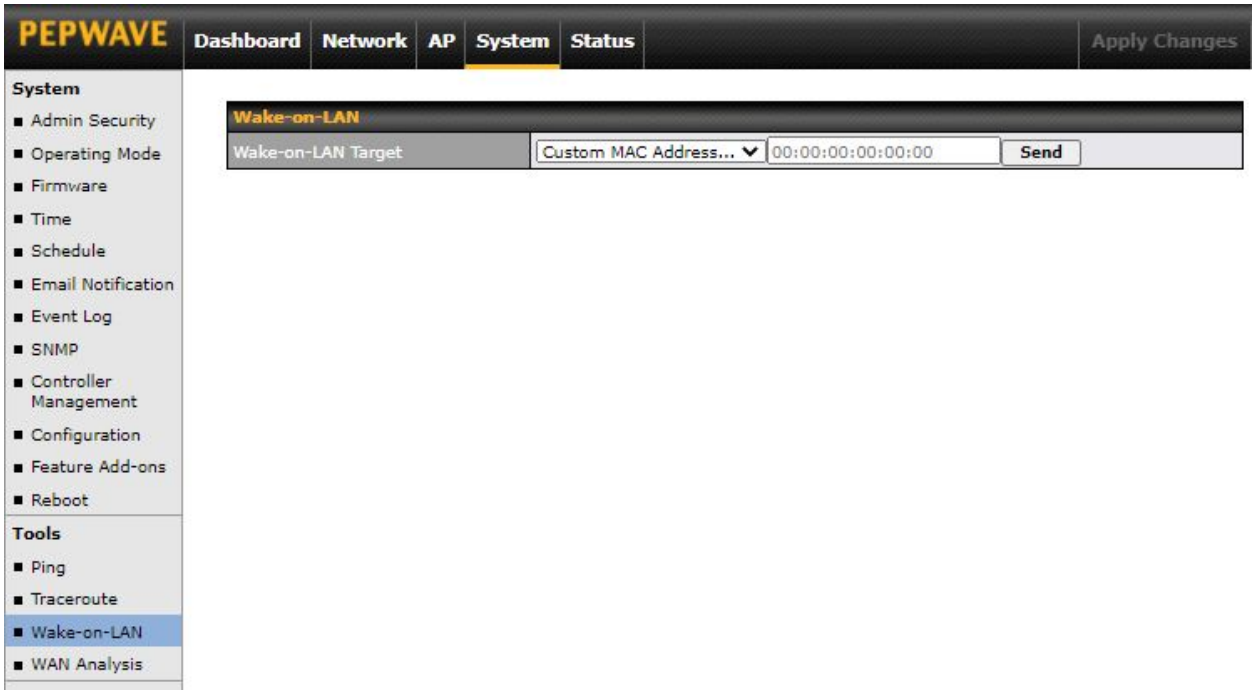
The ping test tool tests connectivity by pinging the specified destination IP address. The ping utility is located at **System > Tools > Ping**.

9.14.2 Traceroute



The traceroute test tool traces the routing path to the specified IP address. The traceroute test utility is located at **System > Tools > Traceroute**.

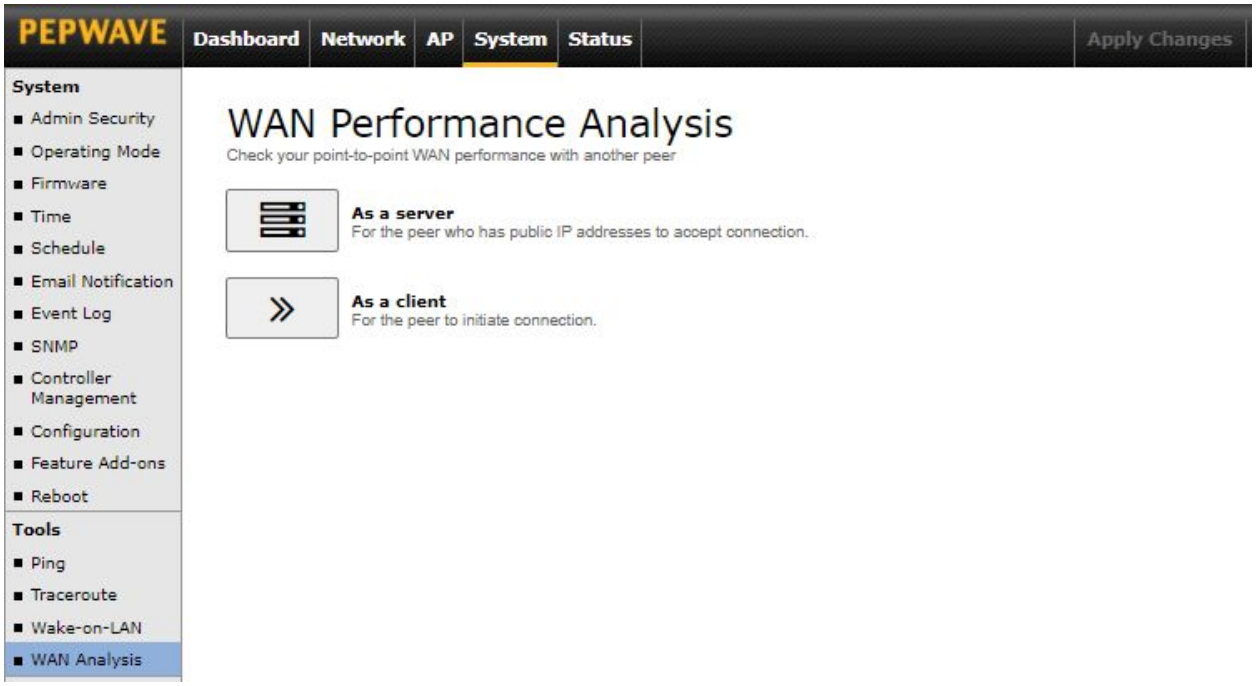
9.14.3 Wake-on-LAN



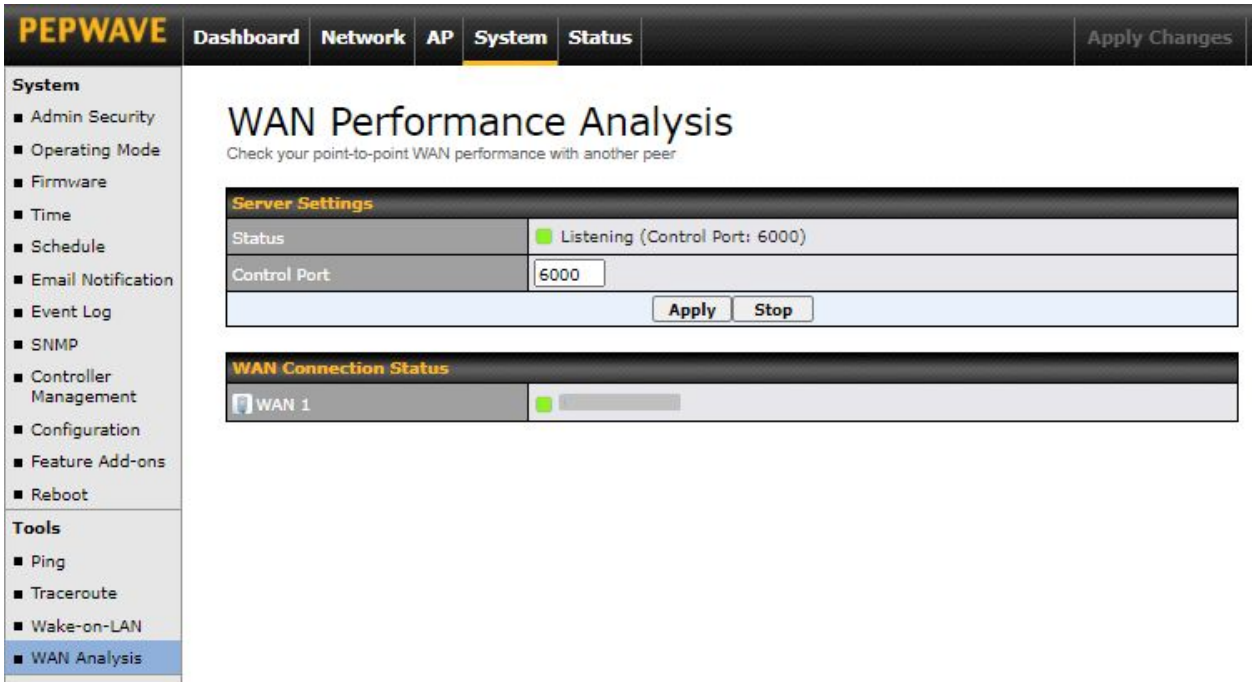
Pepwave access points can send Magic Packets to any client specified from the Web UI. To access this feature, navigate to **System > Tools > Wake-on-LAN**.

Select a client from the drop-down list and click **Send** to send a Magic Packet.

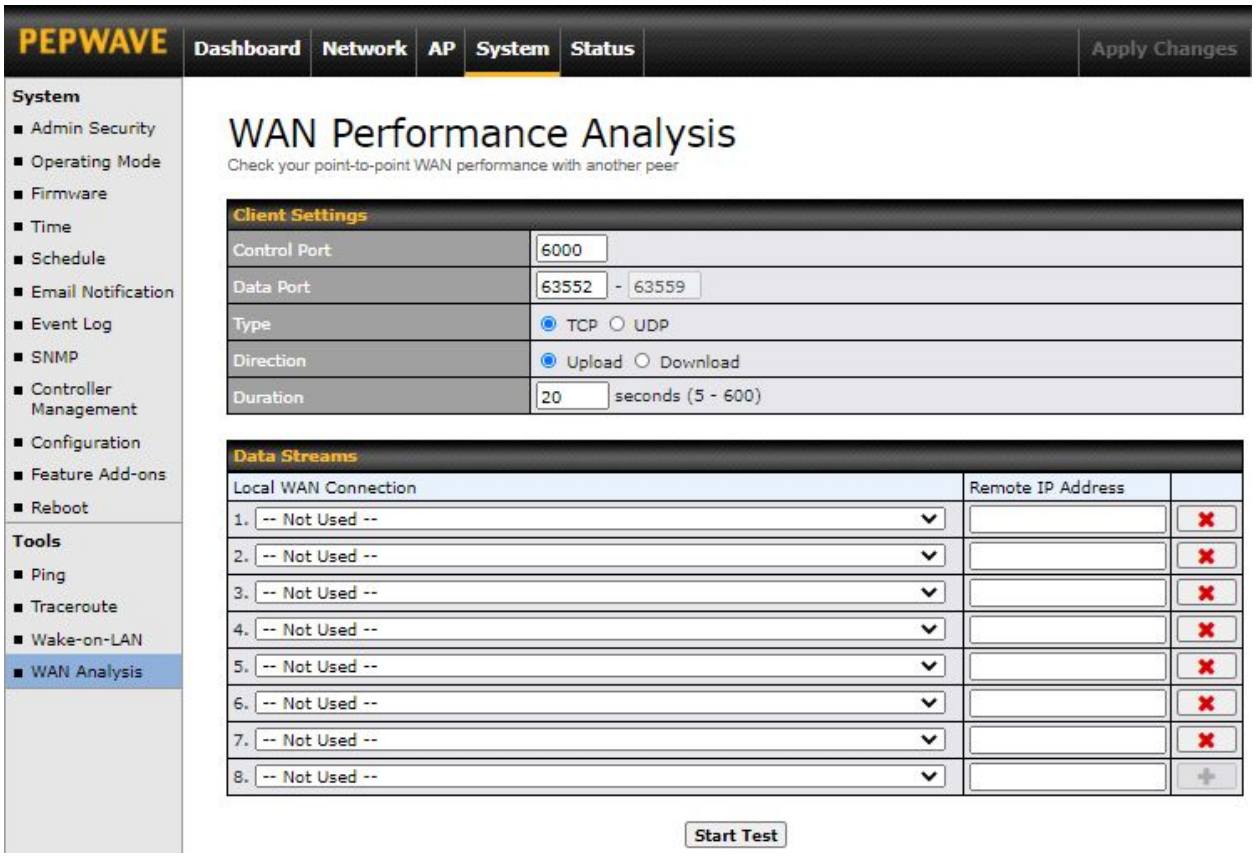
9.14.4 WAN Analysis



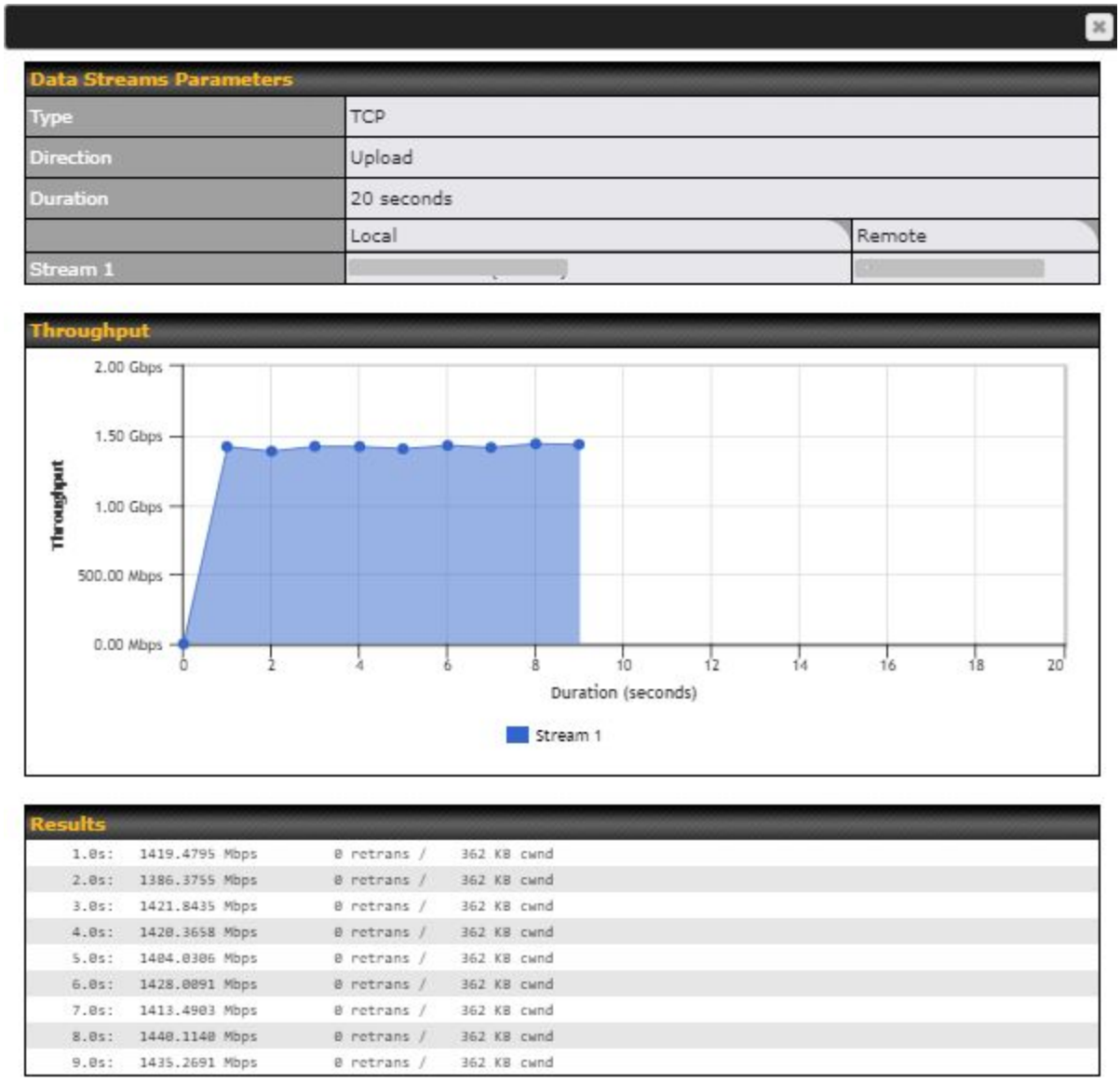
The WAN Analysis feature allows you to run a WAN to WAN speed test between two Peplink devices. You may set up a device as either a server or a client. However, one device must be set up as a server to run the speed tests, and the server must have a public IP address.



The default **Control Port** is 6000 and it can be customized if required. The IP address of the WAN interface will be shown in the **WAN Connection Status** section.



The client side has a few more settings that can be changed. Make sure that the **Control Port** matches what is entered on the server side. Select the WAN(s) that will be used for testing and enter the server's WAN IP address(es). Once all of the options have been set, click the **Start Test** button.



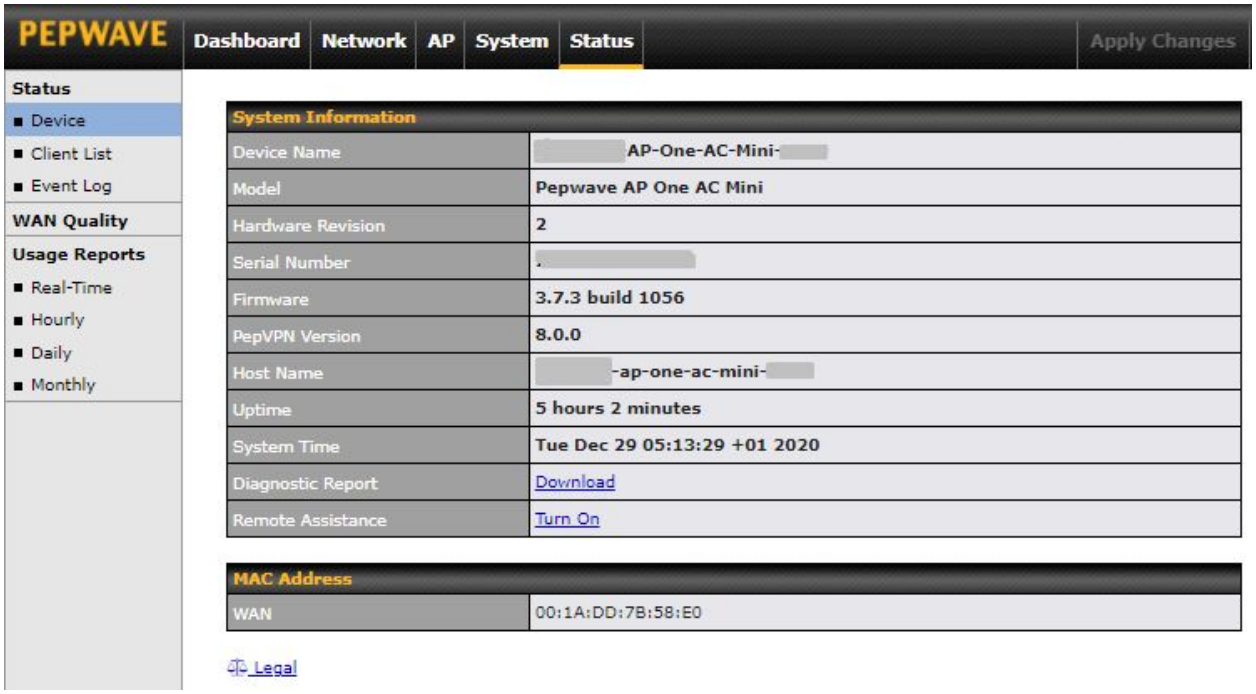
The test output will show the **Data Streams Parameters**, the **Throughput** as a graph, and the **Results**.

The test can be run again once it is complete by clicking the **Start** button or you can click **Close** and change the parameters for the test.

10 Status Tab

The displays available on the **Status** tab help you monitor device data, client activity, event log, and more.

10.1 Device



System Information	
Device Name	This is the name specified in the **Device Name** field located at **System > Admin Security**.
Model	This displays the model of the device.
Hardware Revision	This displays the hardware version of this device.
Serial Number	This displays the serial number of this device.
Firmware	This displays the firmware version this device is currently running.
PepVPN Version	This displays the current PepVPN version.

Host name	This displays the hostname of the device.
Uptime	This displays the length of time since the device has been rebooted.
System Time	This displays the current system time.
Diagnostic Report	The **Download** link is for exporting a diagnostic report file required for system investigation.
Remote Assistance	Click **Turn On** to enable remote assistance.

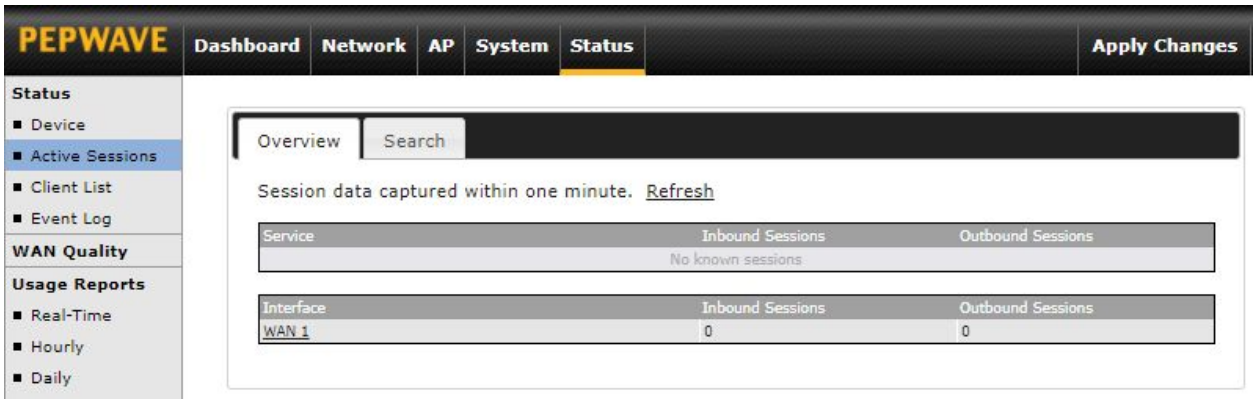
The second table shows the MAC address of each connected LAN/WAN interface. To view your device's End User License Agreement (EULA), follow the **Legal link**.

Important Note
If you encounter issues and would like to contact the Peplink Support Team (https://contact.peplink.com/secure/create-support-ticket.html), please download the diagnostic report file and attach it along with a description of your issue.

10.2 Active Session

Information on active sessions can be found at **Status > Active Sessions > Overview**.

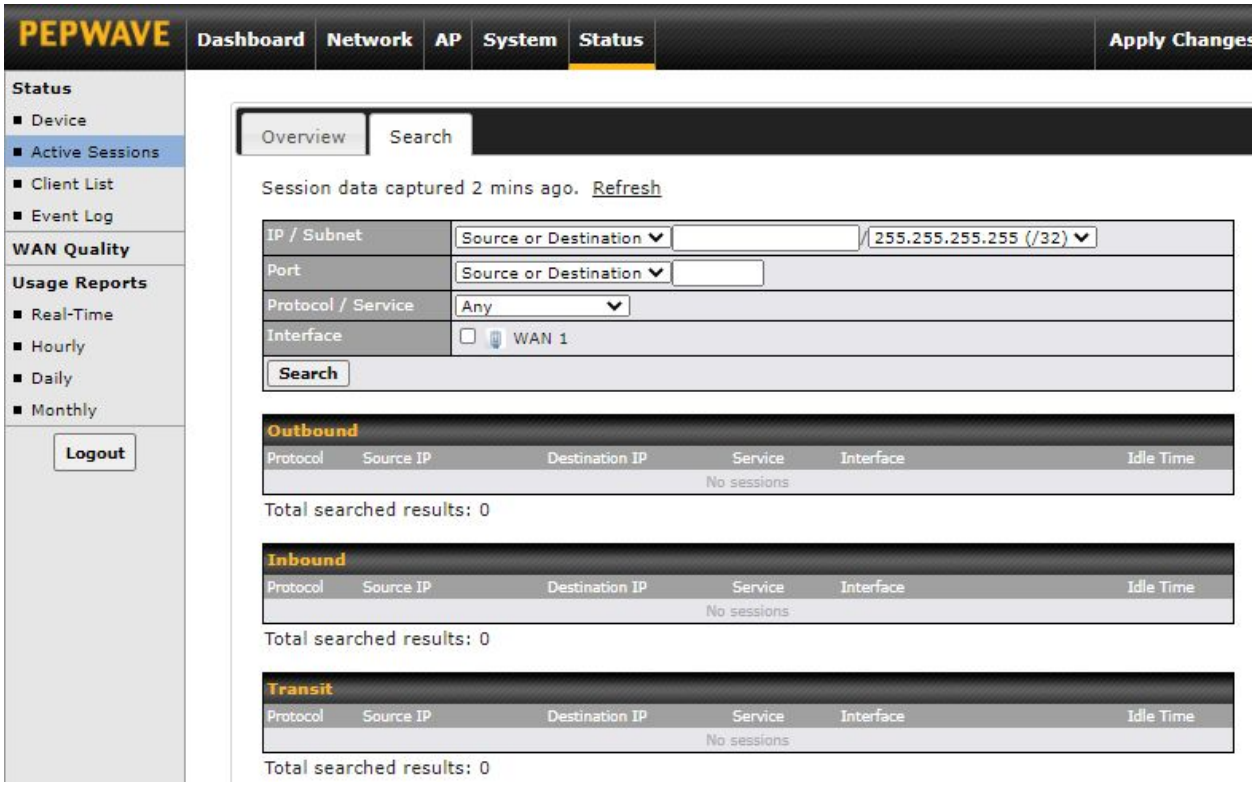
*Please note that the following active session will be available only when your access point is operating in **Router Mode**.



This screen displays the number of sessions initiated by each application. Click on each service listing for additional information. This screen also indicates the number of sessions initiated by each WAN port. In addition, you can see which clients are initiating the most sessions.

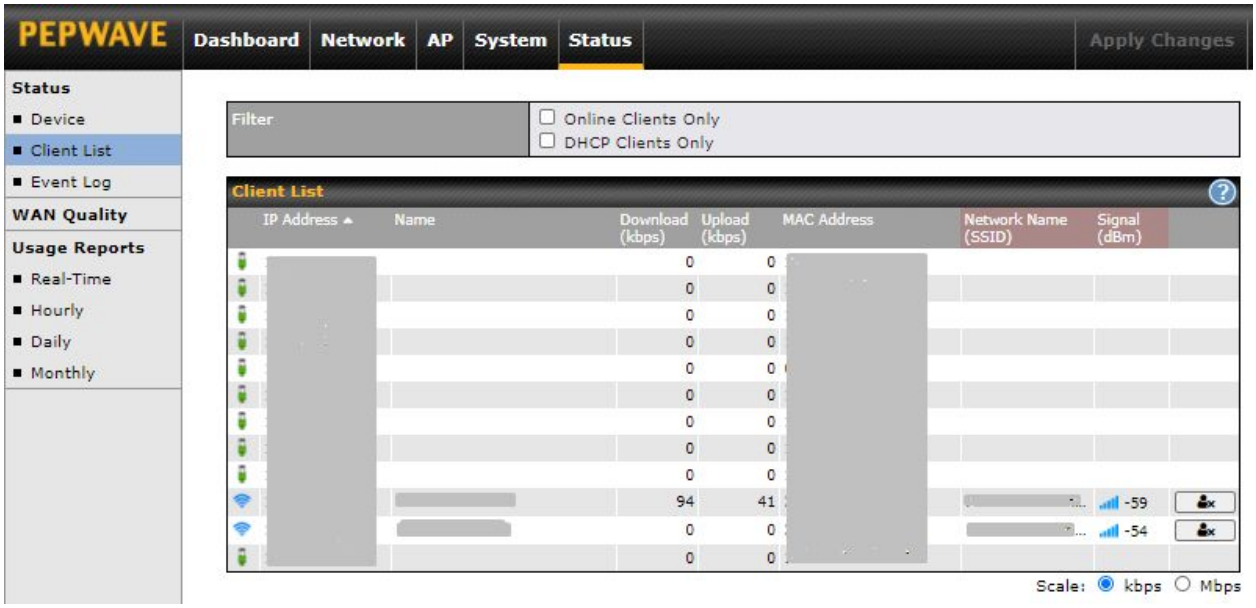
You can also perform a filtered search for specific sessions. You can filter by subnet, port,

protocol, and interface. To perform a search, navigate to **Status > Active Sessions > Search**.



This **Active Sessions** section displays the active inbound/outbound sessions of each WAN connection on the Pepwave router. A filter is available to sort active session information. Enter a keyword in the field or check the box of one of the WAN connections to filter your search.

10.3 Client List



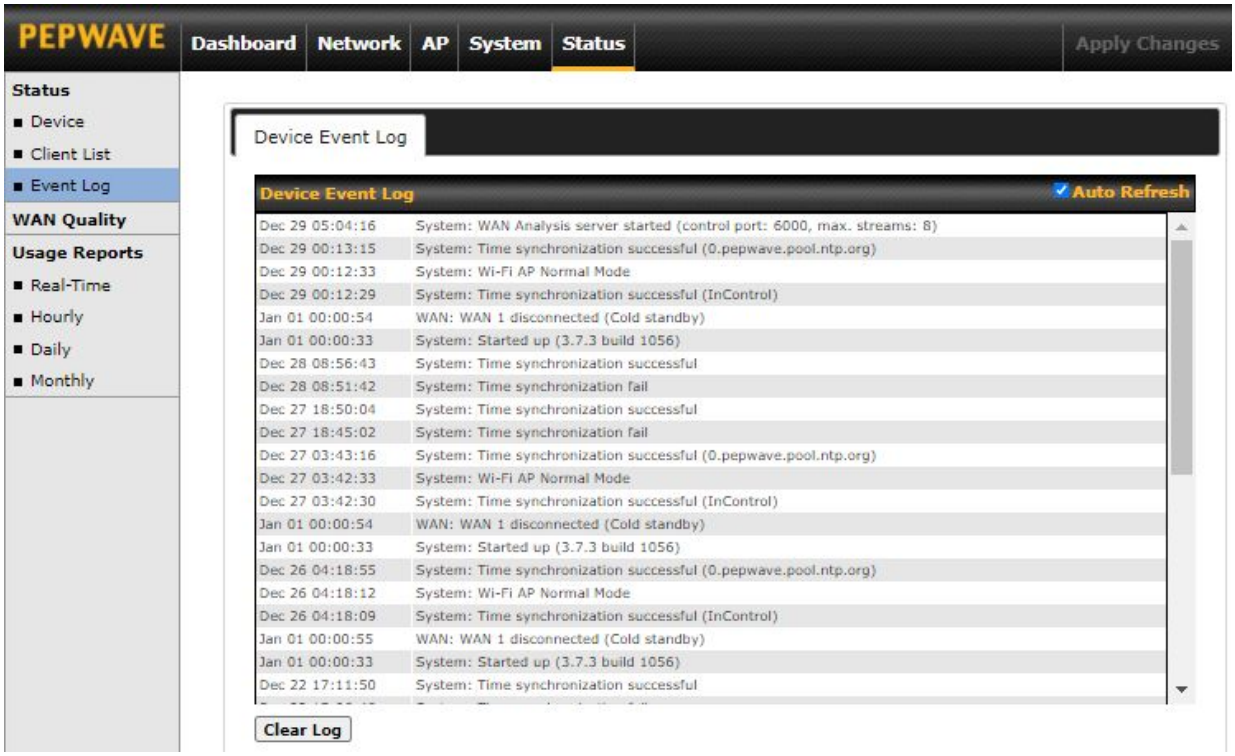
The **Client List** displays all currently connected clients. It lists DHCP and online client IP addresses, names (retrieved from the DHCP reservation table or defined by users), current download and upload rate, and MAC address.

In the client list table, there is a **Ban Client** feature which can be used to disconnect Wi-Fi clients by clicking the  button on the right.

There is a blocklist on the same page after you have banned Wi-Fi clients.

You may also unblock Wi-Fi clients when the client devices need to reconnect to the network by clicking the  button on the right.

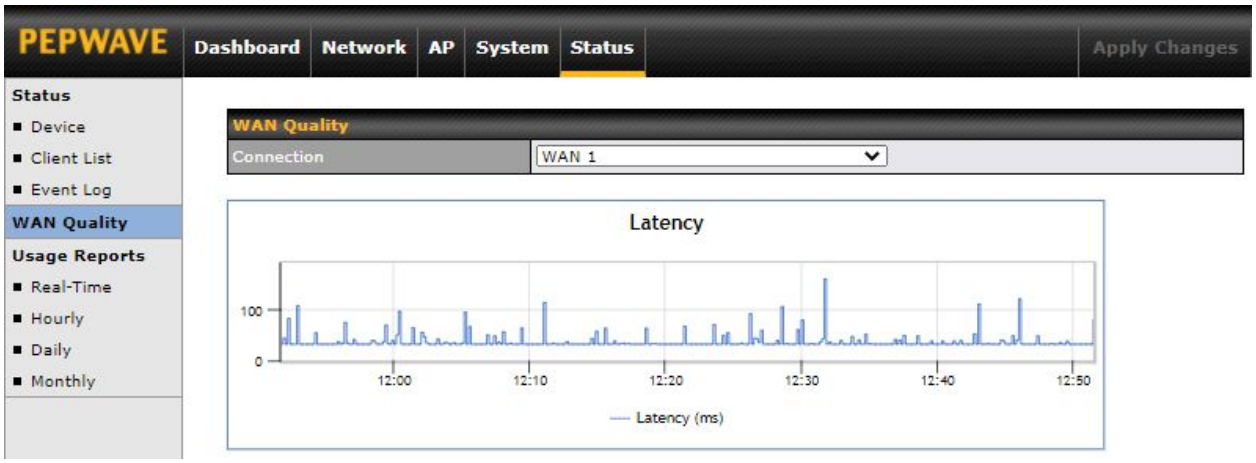
10.4 Event Log



The **Event Log** displays a list of all events associated with your access point. Check **Auto Refresh** to refresh log entries automatically. Click the **Clear Log** button to clear the log.

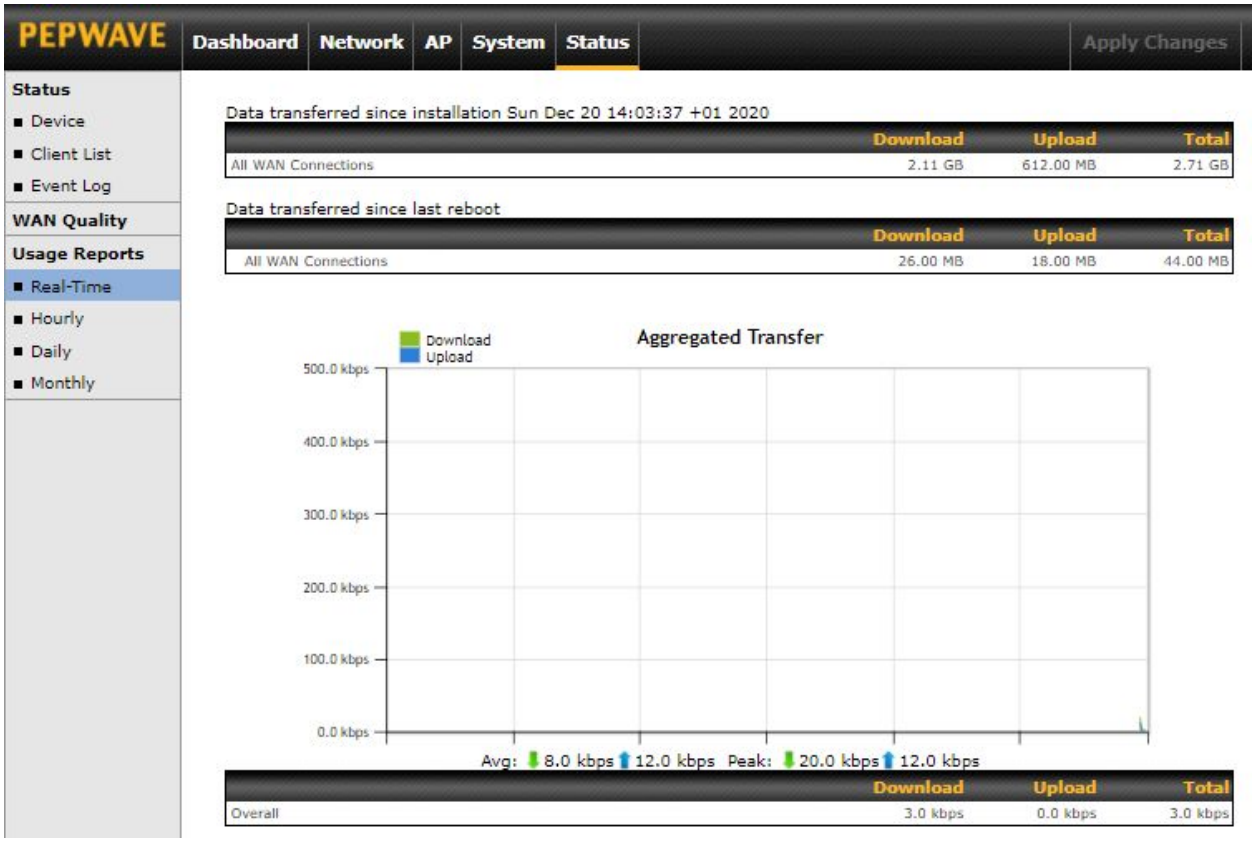
10.5 WAN Quality

The **Status > WAN Quality** allows you to select each WAN and view current WAN quality. Detailed information can be seen when selecting a point on the graph.



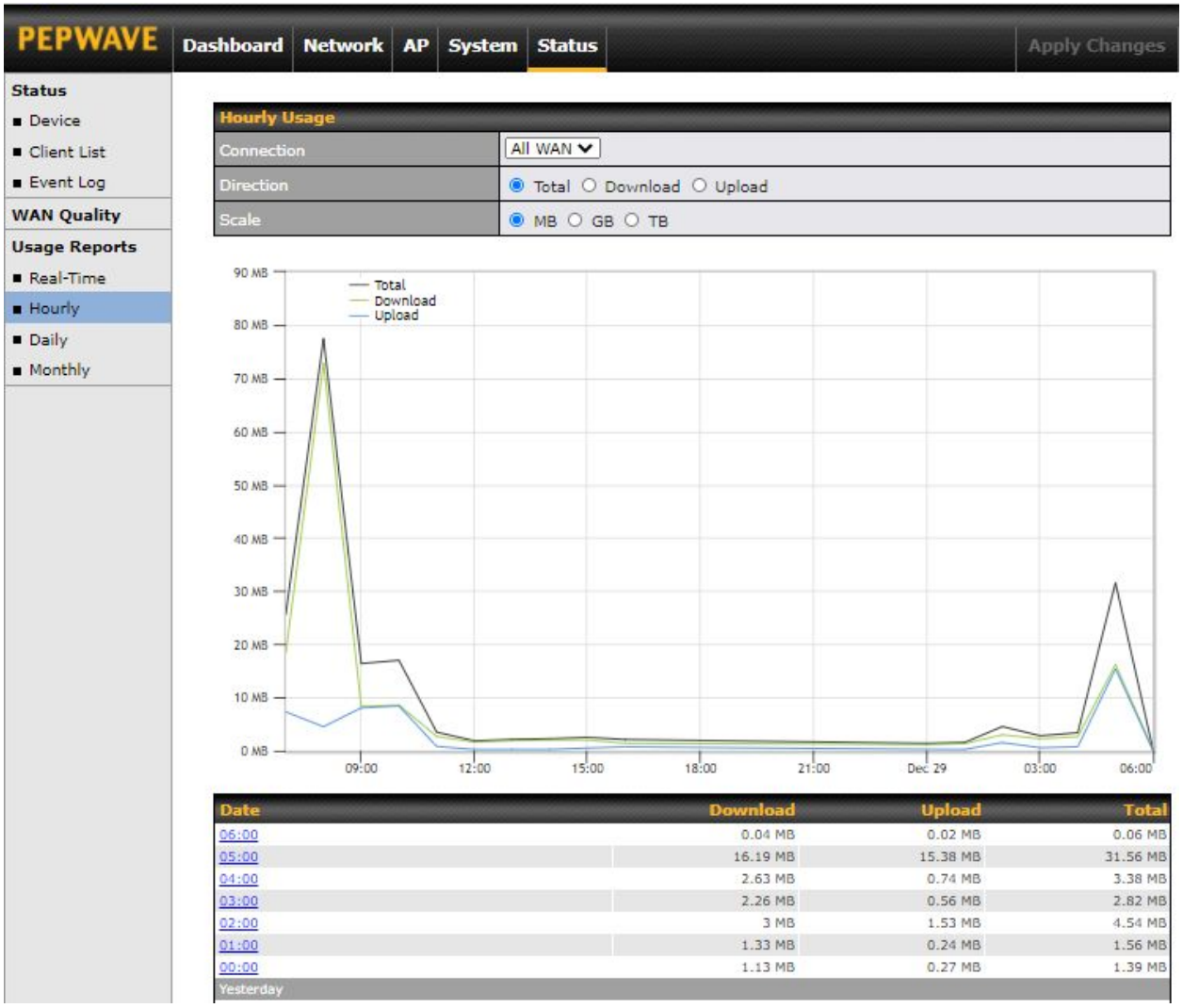
10.6 Usage Reports

10.6.1 Real-Time



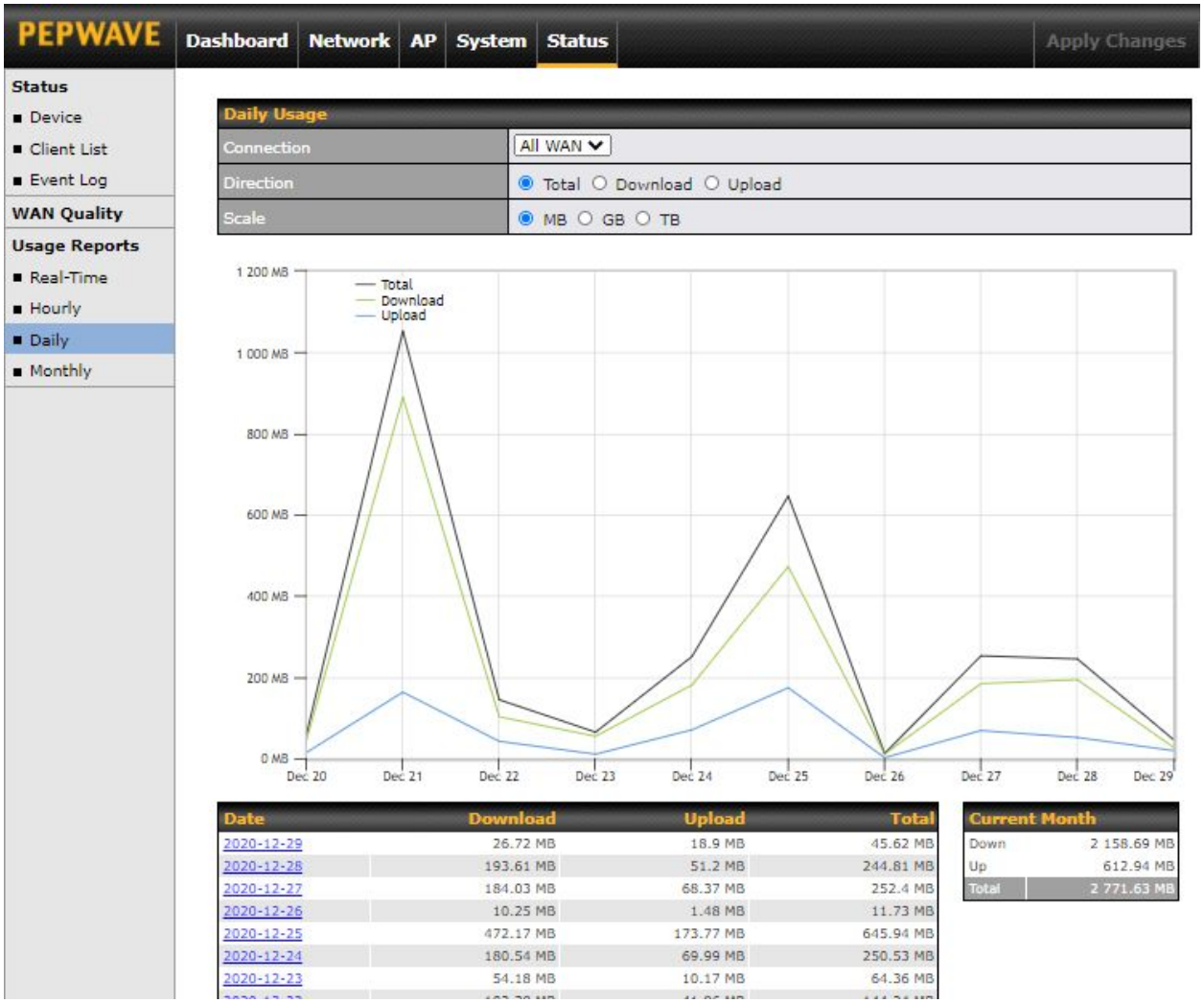
The **Data transferred since installation** table indicates how much network traffic has been processed by the device since the first bootup. The **Data transferred since last reboot** table indicates how much network traffic has been processed by the device since the last boot up.

10.6.2 Hourly



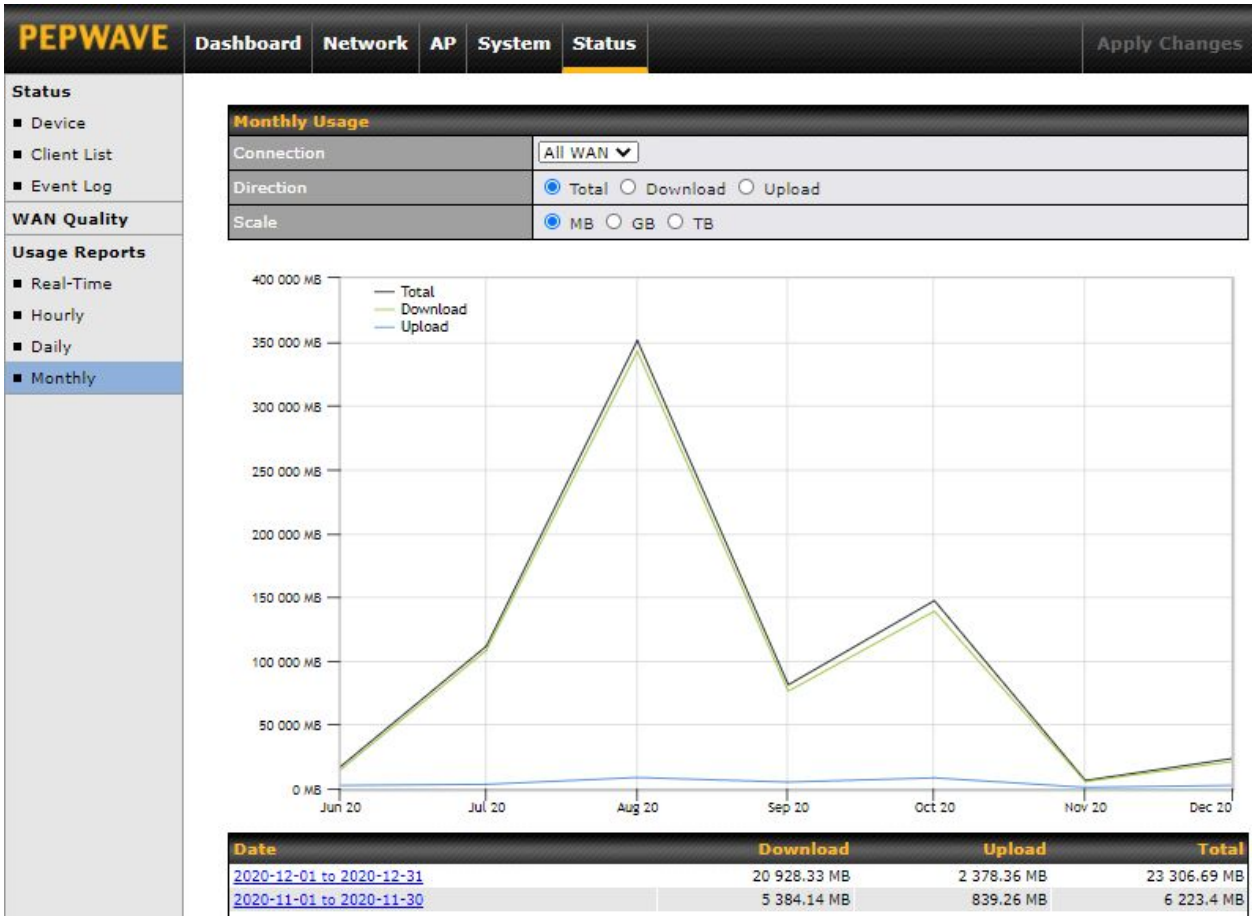
This page shows the hourly bandwidth usage for all WAN connections. Individual connections may be viewed by selecting the desired connection from the drop-down menu.

10.6.3 Daily



This page shows the daily bandwidth usage for all WAN connections. Individual connections may be viewed by selecting the connection from the drop-down menu. You can check the **Current Billing Cycle** table for that WAN connection to be displayed. Click on a date to view the client bandwidth usage of that specific date. The scale of the graph can be set to display megabytes (**MB**), gigabytes (**GB**), or terabytes (**TB**).

10.6.4 Monthly



This page shows the monthly bandwidth usage for each WAN connection. You can check the usage of each particular connection and view the information by **Billing Cycle** or by **Calendar Month**. Select the first two rows to view the client bandwidth usage for the last two months. The scale of the graph can be set to display megabytes (**MB**), gigabytes (**GB**), or terabytes (**TB**).

11 Restoring Factory Defaults

To restore the factory default settings on a Pepwave AP One router, follow the steps below:

1. Locate the reset button on the front or back panel of the Pepwave AP One router.
2. With a paperclip, press and keep the reset button pressed.

Note: There is a dual function to the reset button.

Hold for 5 seconds for admin password reset (Note: The LED status light blinks in RED 2 times and release the button, green status light starts blinking)

Hold for 5 seconds for factory reset (Note: The LED status light blinks in RED 3 times and release the button, all WAN/LAN port lights start blinking)

After the Pepwave AP One router finishes rebooting, the factory default settings will be restored.

Important Note
All previous configurations and bandwidth usage data will be lost after restoring factory default settings. Regular backup of configuration settings is strongly recommended.

12 Appendix

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

IMPORTANT NOTE

FCC Radiation Exposure Statement

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands is country dependent and is firmware programmed at the factory to match the intended destination.

