PEPWAVE

Broadband Possibilities

User Manual

Pepwave AP One Series:

AP One Enterprise / AP One AC mini / AP One In-Wall / AP One Rugged / AP One Rugged M12 / AP One Flex 300M

Pepwave AP Pro Series:

AP Pro / AP Pro 300M / AP Pro Duo

May 2016

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1 Introduction and Scope

Our AP Series of enterprise-grade 802.11b/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 One 300M 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, 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.

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2 Product Features and Benefits

Key features and benefits of AP Series access points:

- High-powered Wi-Fi transmitter 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.
- 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.

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3 Package Contents

3.1 AP One Enterprise

1x AP One Enterprise

1 x Instruction sheet

3.2 AP One AC mini

1 x AP One mini

1 x Omni-directional antenna

1 x Power supply

1 x Instruction sheet

3.3 AP One In-Wall

1 x AP One In-Wall

1 x Mounting kit

1 x Instruction sheet

3.4 AP One Rugged

1 x AP One Rugged

3 x Omni-directional antennas

1 x Power supply

1 x Instruction sheet

3.5 AP One Flex 300M

1 x AP One Flex 300M

1 x Instruction sheet

3.6 AP Pro / AP Pro 300M / AP Pro Duo

1 x AP Pro / AP Pro 300M / AP Pro Duo

1 x Instruction sheet

1 x Installation guide

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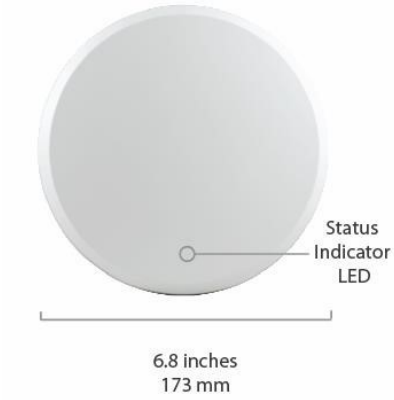
4 Hardware Overview

4.1 AP One Enterprise

Bottom View



Top View

Front View

LED Indicators	
Status	RED – Access point initializing GREEN – Access point ready OFF – No device connected to Ethernet port BLINKING – Ethernet port sending/receiving data
LAN 1	ON – Powered-on device connected to Ethernet port Note that LAN 5 displays the status of the uplink connection

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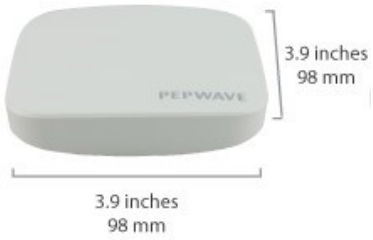
4.2 AP One AC mini

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.

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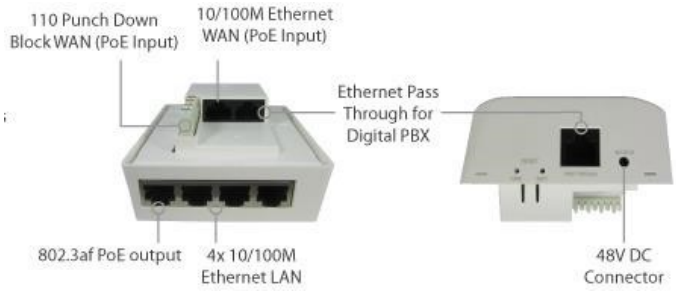
4.3 AP One In-Wall

Front View (US)

Front View (International)

Rear Panel View

Top View



LED Indicators	
Status	RED – Access point initializing GREEN – Access point ready
WLAN 1/2	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. WLAN1 displays the status of the 2.4GHz Wi-Fi radio, while WLAN2 displays the status of the 5GHz WiFi radio.
LAN 1-5	OFF – No device connected to Ethernet port BLINKING – Ethernet port sending/receiving data ON – Powered-on device connected to Ethernet port Note that LAN 5 displays the status of the uplink connection

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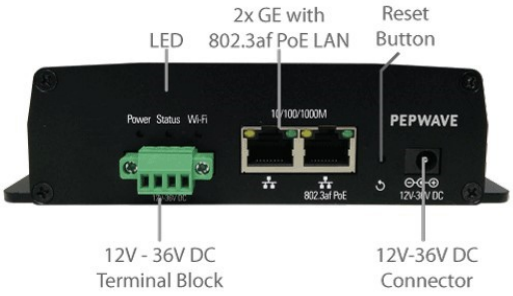
4.4 AP One Rugged / AP One Rugged M12

AP One Rugged

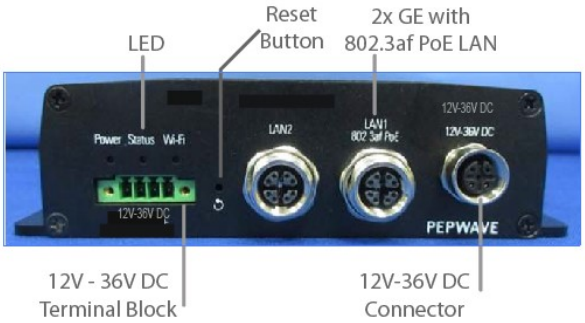
Front View (AP One Rugged)



Rear Panel View (AP One Rugged)

AP One Rugged M12

Front View (AP One Rugged M12)



Rear Panel View (AP One Rugged M12)

LED Indicators	
Power	On – Power On OFF – Power Off
Status	RED – Access point initializing GREEN – Access point ready
Wireless	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 can operate in either 2.4GHz or 5GHz mode, depending on Wi-Fi radio settings.

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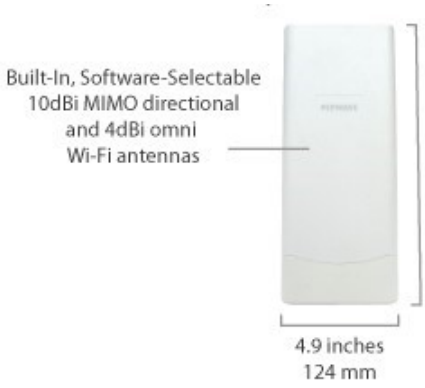
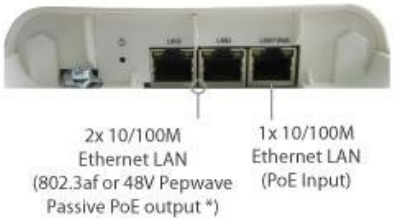
4.5 AP One Flex 300M

Front View

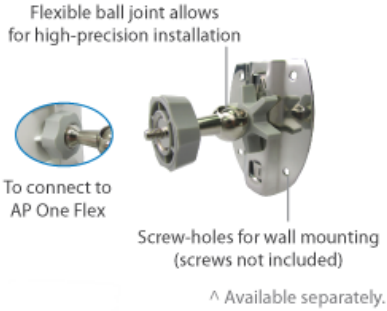


Rear Panel View

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 GREEN – Access point ready
LAN	OFF – No device connected to Ethernet port BLINKING – Ethernet port sending/receiving data ON – Powered-on device connected to Ethernet port
	Number of connected clients (1-10, 11-20, 21-30, 31-40)

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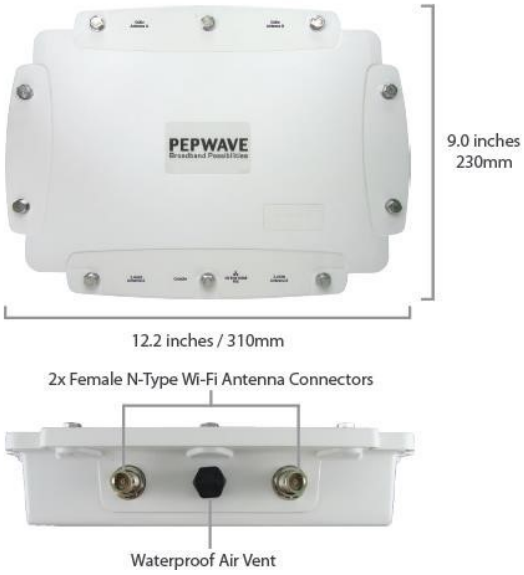
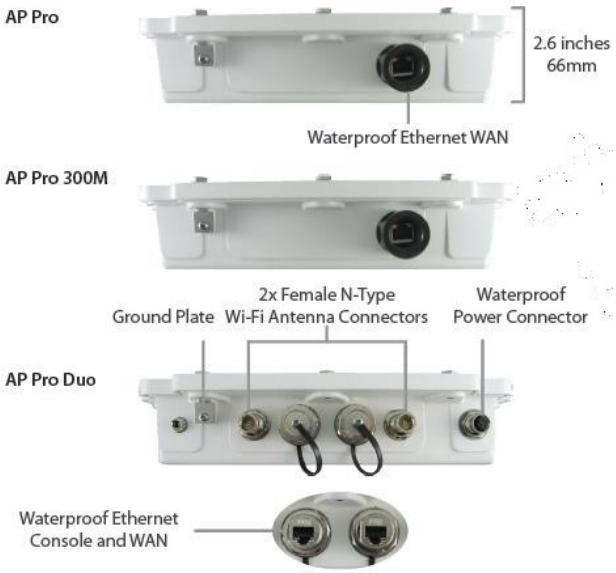
4.6 AP Pro / AP Pro 300M / AP Pro Duo

Front/Top View



Rear Panel View



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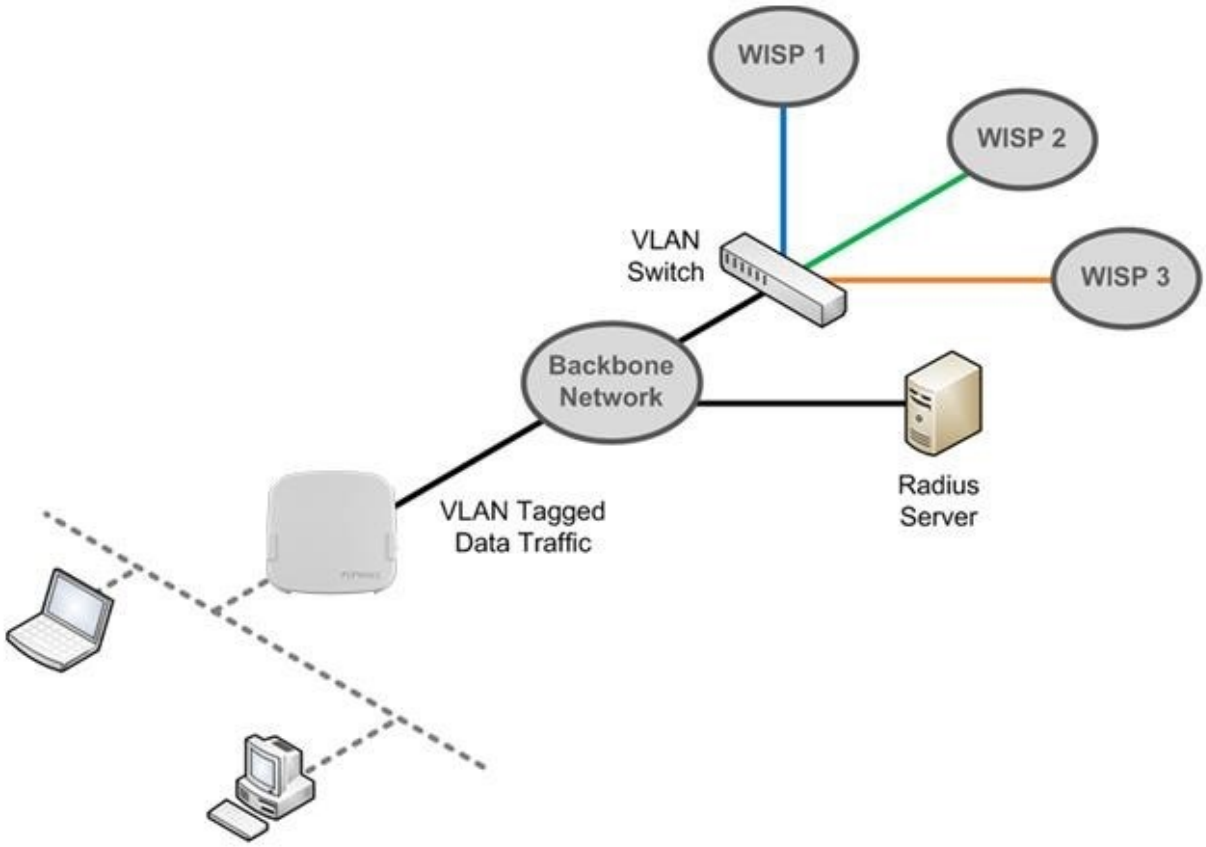
5 Installation

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



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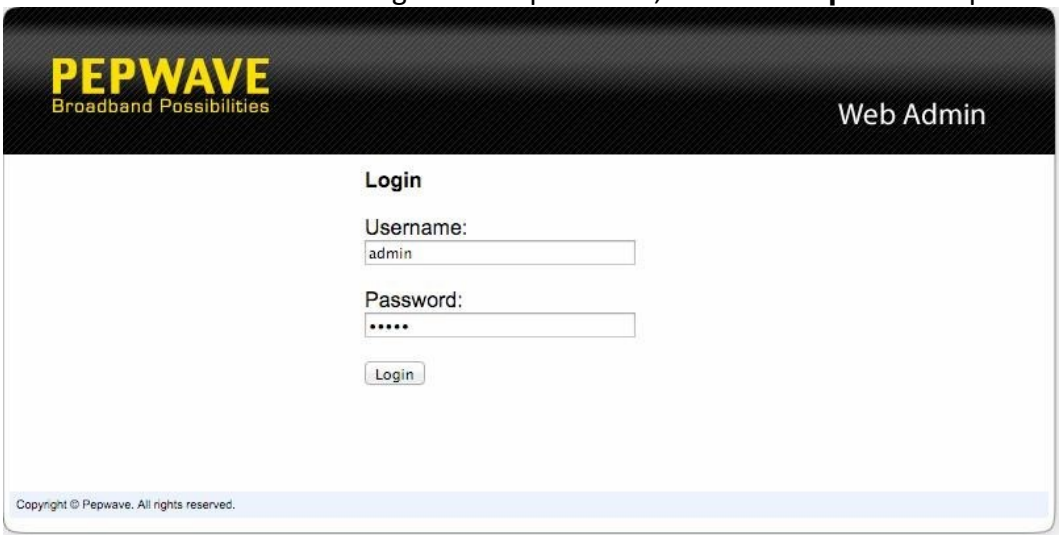
5.1 Installation Procedures

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. Connect the power adapter to the power connector of the unit. Plug the power adapter into a power source.
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 Microsoft Internet Explorer 6 or above, Mozilla Firefox 2.0 or above, or Google Chrome 2.0 or above, 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.

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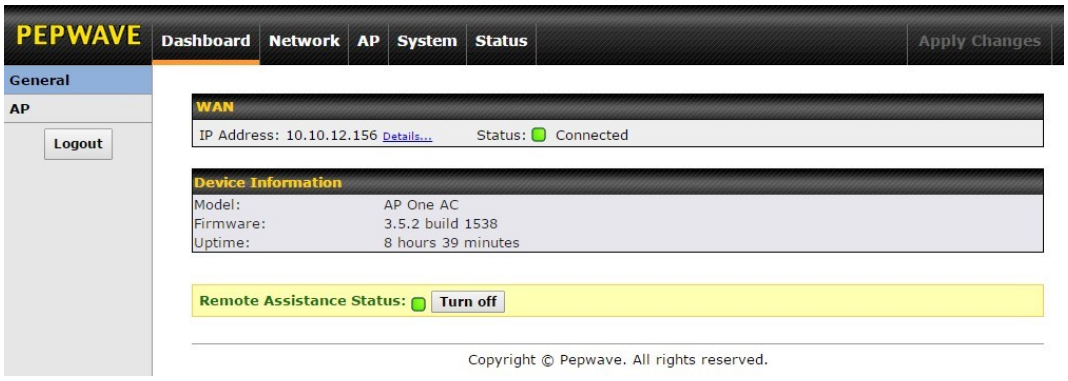
6 Using the Dashboard

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 enabled here.



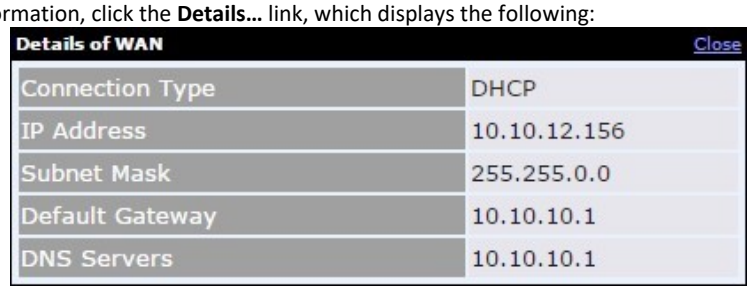
6.1 General

This section contains WAN status and general device information.

WAN

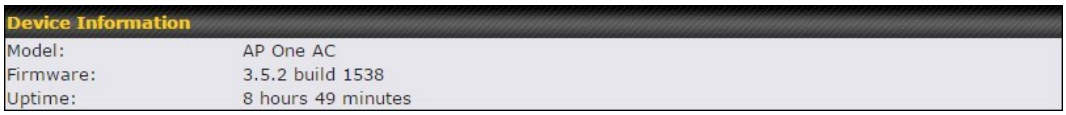
IP Address

When your access point is connected to a WAN, this field displays the WAN IP address. For more information, click the **Details…** link, which displays the following:



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.

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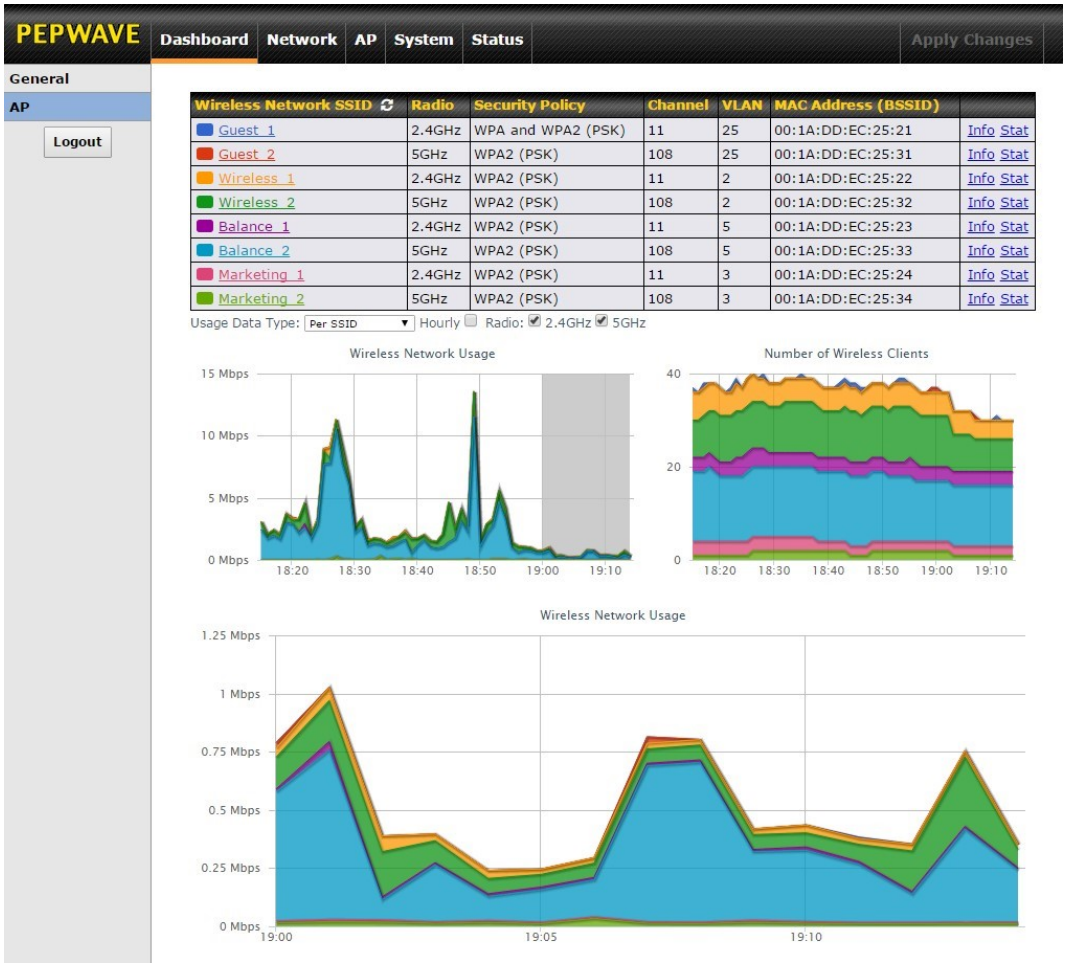
6.2 AP

This section displays a variety of information about your wireless network.



AP Status	
Wireless Network SSID	This field displays your access point's SSID.

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Radio The radio frequency currently used by your access point appears here. If you're using the AP One AC mini or the AP One In-Wall and have configured both radios, this displays both radios in use.

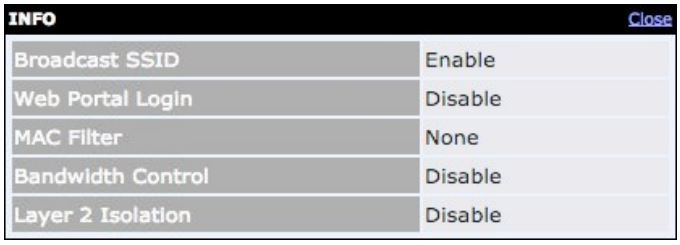
Security Policy This field displays the security policy your access point is currently using. If you're using the AP One AC mini and have configured both radios, this displays channels in use for the 2.4GHz and 5GHz bands.

Channel The channel currently used by your access point is displayed in this field.

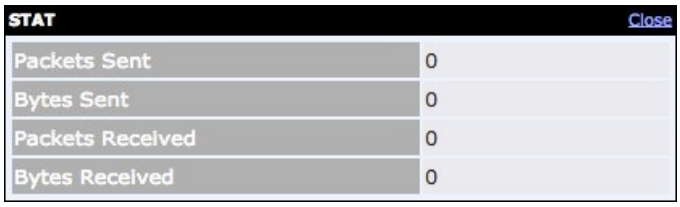
VLAN If your access point is using a VLAN ID for management traffic, it will appear here. A value of **0** indicates that a VLAN ID is not being used.

MAC Address (BSSID) Your access point's MAC address appears here. If you're using the AP One AC mini and have configured both radios, this displays a MAC address for both the 2.4GHz and 5GHz radio.

Info Click this link to display the following information panel:



Stat Click this link to display the following statistics panel:



Usage Data Type Select below. **Per SSID** or **AP Send / Recv** to determine the data displayed in the graphs

Hourly Check this box to graph wireless network usage on an hourly basis.

Wireless Network Usage/Number of Wireless Clients These graphs detail recent wireless network usage.

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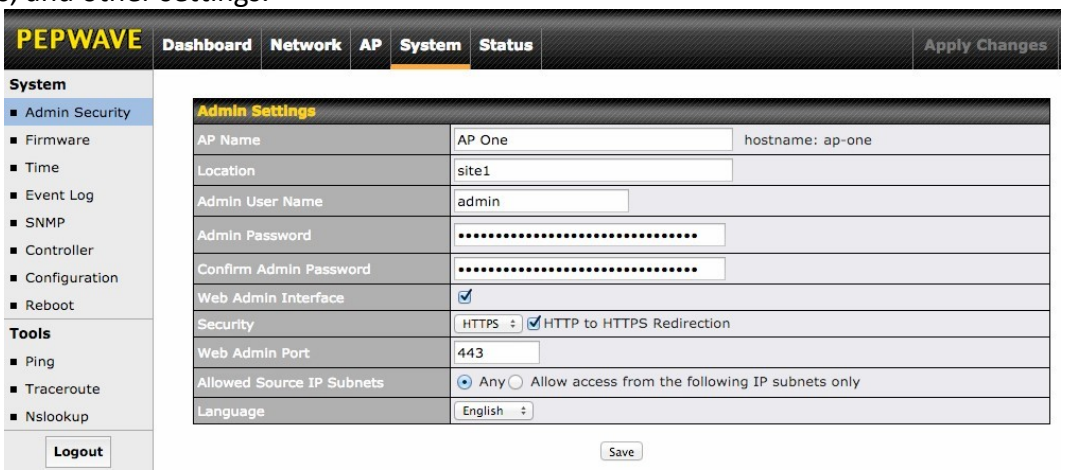
7 Configuration

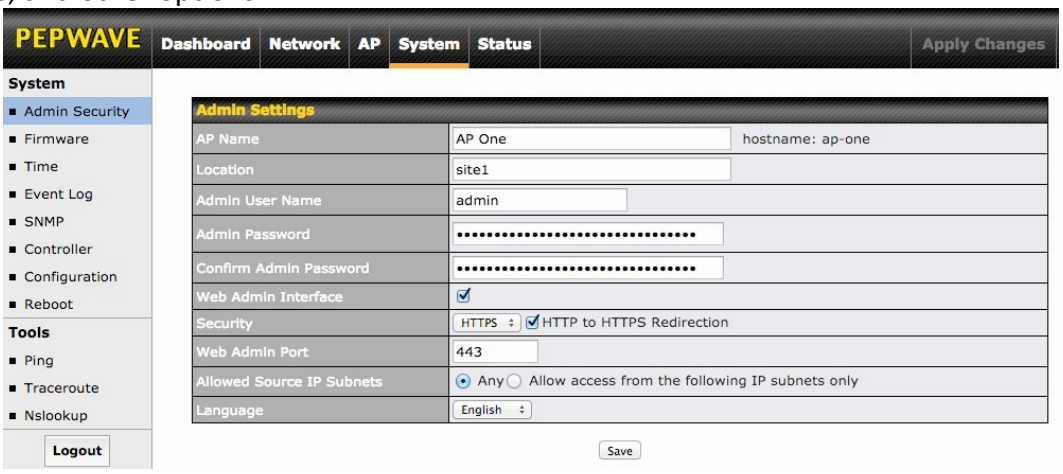
7.1 System

The options on the **System** tab control login and security settings, firmware upgrades, SNMP settings, and other settings.



7.1.1 Admin Security

The **Admin Security** section allows you to set up your access point's name, password, security settings, and other options.



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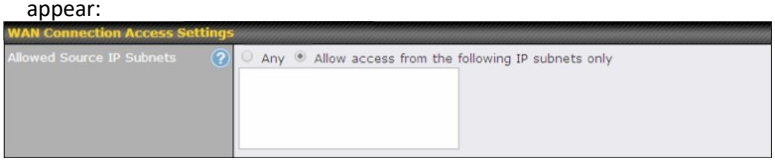
Admin Security	
AP Name	Enter a name to identify your access point. This name can be retrieved via SNMP.
Location	Enter a name to identify via SNMP. the location of your access point. This name can be retrieved
Admin User default.	This field specifies the administrator username of the web admin. It is set as *admin* by **Name**
Admin Password	T*public*his field allows you to specify a new administrator password. The default password is .
Confirm Admin Password	Re-enter the admin password.
Web Admin Interface	Check this box to turn on the web administration interface, which allows remote AP management.
Security	Choose **HTTP** or **HTTPS** as the protocol to use when accessing the web admin interface. To automatically redirect HTTP access to HTTPS, check **HTTP to HTTPS Redirection**.
Web Admin Port	Specify the port number on which the web admin interface can be accessed.
Allowed Source IP Subnets	This field allows you to restrict access to the web admin to only defined IP subnets. • **Any** - Allow web admin accesses from anywhere, without IP address restrictions. • **Allow access from the following IP subnets only** – Restricts the ability to access web admin to only defined IP subnets. When this option is chosen, a text input area will appear:  Enter your allowed IP subnet addresses into this text area. Each IP subnet must be in the form of *w.x.y.z/m*. *w.x.y.z* represents an IP address (e.g., *192.168.0.0*), and *m* represents the subnet mask in CIDR format, which is between 0 and 32 inclusively. For example: *192.168.0.0/24*. To define multiple subnets, separate each IP subnet, one per line. For example: *192.168.0.0/24* *10.8.0.0/16*

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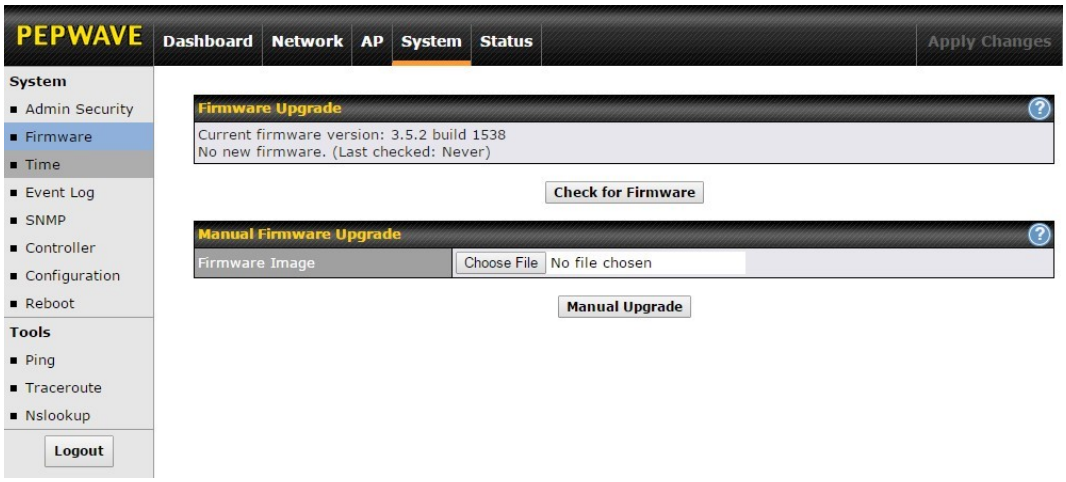
Language	Choose a language for the administration interface.

7.1.2 Firmware

The **Firmware** section lets you check the firmware version currently used by your access point, as well as check for and install new firmware via online download. You can also upgrade your firmware using a firmware file stored locally.



To check for new firmware, click the **Check for Firmware** button. If new firmware is available, your access point will automatically download and install it.

To upgrade your access point using a firmware file on your network, click **Choose File** to select the firmware file. Then click **Manual Upgrade** to initiate the firmware upgrade process using the selected file.

Note that your access point 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, simply reboot your device with the inactive firmware and then perform the firmware upgrade.

7.1.3 Time

The settings in this section govern the access point's system time zone and allow you to specify a custom timeserver.

Time

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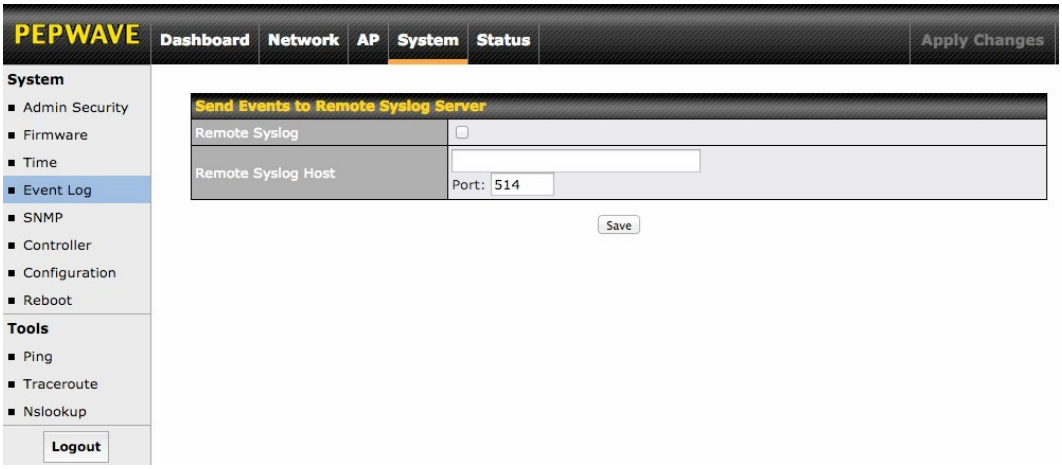
Time Zone	Time region used by the system. All choices are based on UTC.
Time Server	To choose a time server other than the default, enter the URL here. To restore the default time server, click the **Default** button.

7.1.4 Event Log

The section allows you to turn on event logging at a specified remote syslog server.



Event Log	
Remote Syslog	Check this box to turn on remote system logging.
Remote Syslog Host	Enter the IP address or hostname of the remote syslog server, as well as the port number.

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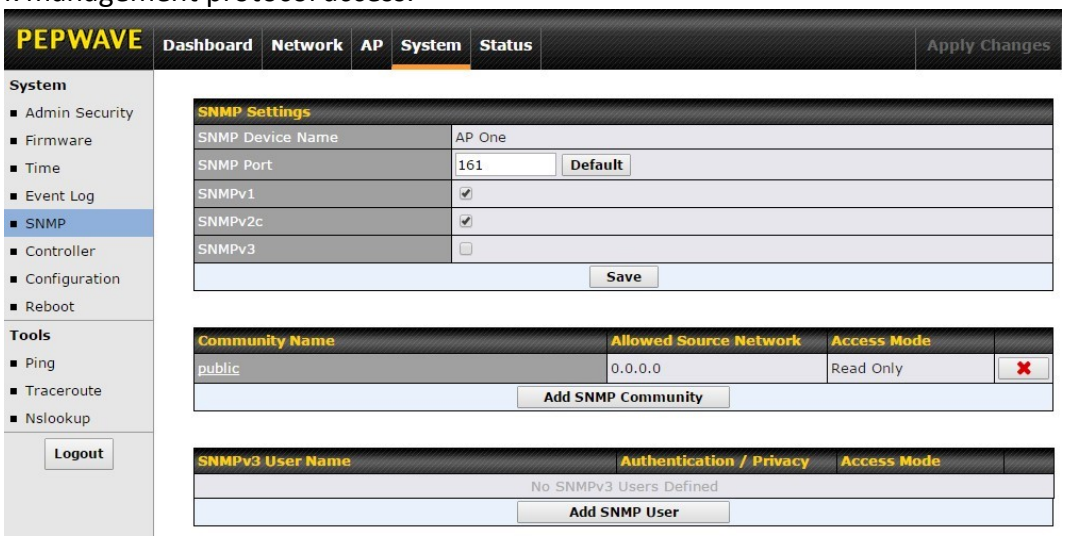
7.1.5 SNMP

SNMP, or simple network management protocol, is an open standard that can be used to collect information about your access point. The **SNMP** section offers a range of settings to control simple network management protocol access.



SNMP Settings	
SNMP Device Name	This field shows the AP 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.

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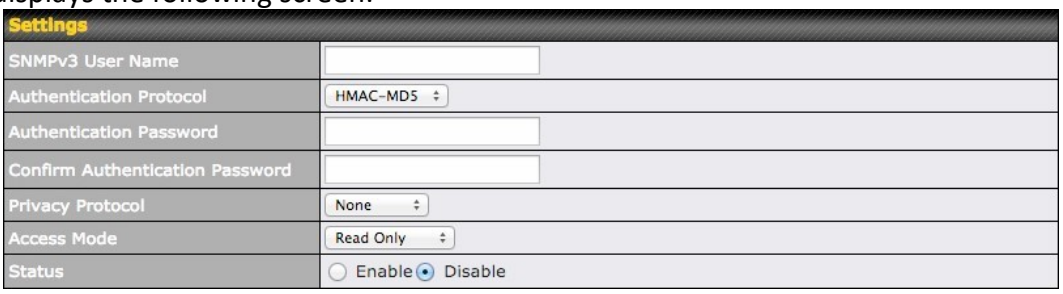
To add a community for either SNMPv1 or SNMPv2c, click the **Add SNMP Community** button in the **Community Name** table, which displays the following screen:

SNMP Community Settings	
Community Name	Enter a name for the SNMP community.
IP Address/IP Mask	These settings specify 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.
Access Mode	Select **Read Only** or **Read and Write** as the SNMP community access mode.
Status	Use these controls to enable or disable SNMP community access.

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



SNMPv3 User Settings

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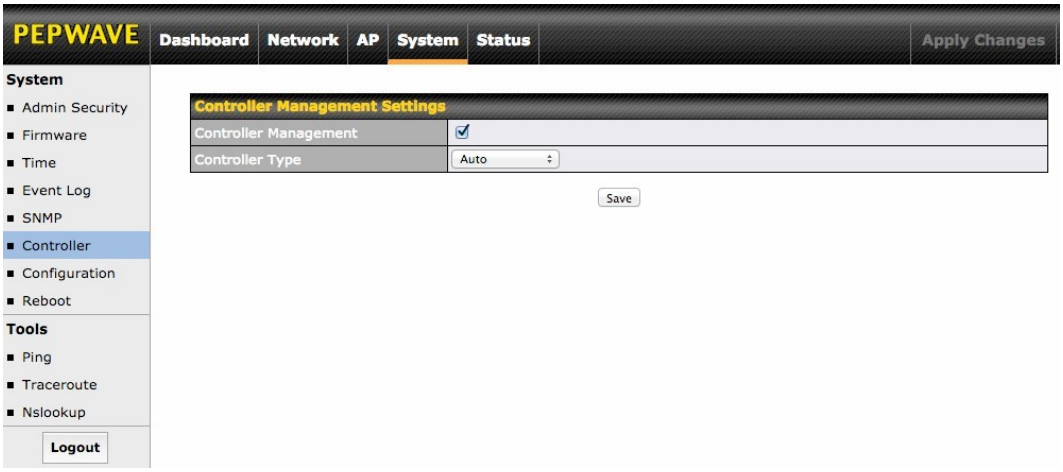
SNMPv3 User Name	Enter a user name to be used in SNMPv3.
Authentication Protocol	Select one of the following valid authentication protocols: • NONE • HMAC-MD5 • HMAC-SHA When **HMAC-MD5** or **HMAC-SHA** is selected, an entry field will appear for the password.
Authentication Password	Enter a password to use with the selected authentication protocol.
Confirm Authentication Password	Re-enter the authentication password.
Privacy Protocol	Select **None** or **CBC-DES** as the SNMPv3 privacy protocol. When **CBC-DES** is selected, an entry field will appear for the password.
Access Mode	Select **Read Only** or **Read and Write** as the SNMPv3 access mode.
Status	Use these controls to enable or disable SNMPv3 access.

7.1.6 Controller

In the **Controller** section, you can set up Peplink InControl or AP Controller remote management.



Controller Management Settings	
Controller Management	Check this box to enable remote management.

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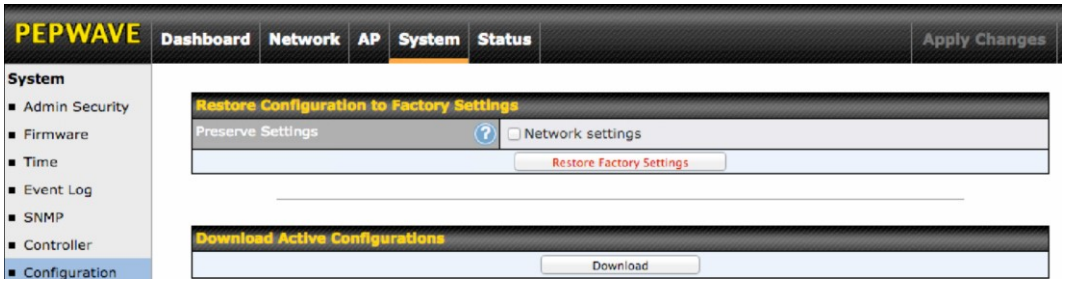
Controller Type	Select **Auto**, **InControl**, or **AP Controller** as your remote AP management method. When **Auto** is selected, your access point will automatically choose the appropriate mode.



7.1.7 Configuration

In section, you can manage and backup access point configurations, as well as reset your access point to its factory configuration. Backing up your access point's settings immediately after successful initial setup is strongly recommended.

Configuration	
Restore Configuration to Factory Settings	The **Restore Factory Settings** button resets the configuration to factory default settings. After clicking the button, click the **Apply Changes** button on the top right corner to make the settings effective. To save existing network settings when restoring factory settings, check the **Network Settings** box before clicking **Restore Factory Settings**.
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.

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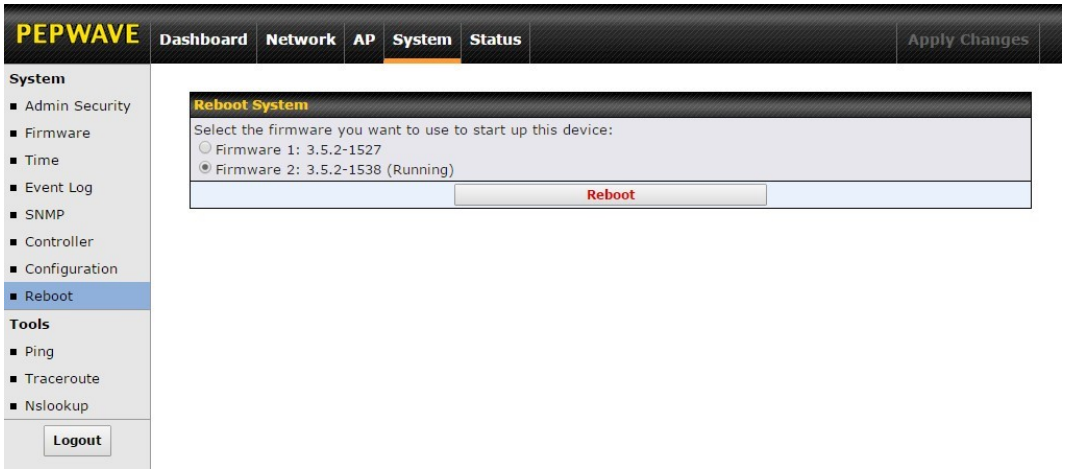
7.1.8 Reboot

This section provides a reboot button for restarting the system. For maximum reliability, your access point can equip with two copies of firmware, and 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.



7.2 AP

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

7.2.1 Wireless SSID

Wireless network settings, including the name of the network (SSID) and security policy, can be defined and managed in this section.

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

SSID Settings	
Enable	Check this box to enable wireless SSID.
Radio Selection	Available only on the AP One AC mini, this setting, shown below, allows you to enable or disable either of the two on-board radios. Radio Selection: ☑ 2.4GHz ☑ 5GHz
SSID	This setting specifies the AP SSID that Wi-Fi clients will see when scanning.
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.

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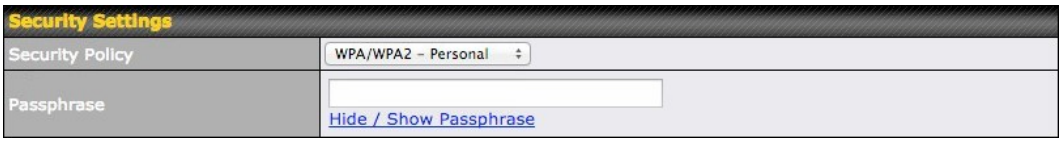
Data Rate	Select **Auto** to allow your access point to set the data rate automatically, or select **Fixed** and choose a rate from the drop-down menu. Click the **MCS Index** link to display a reference table containing MCS and matching HT20 and HT40 values.
Multicast Filter	This setting enables the 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.
DHCP Setting	To set your access point as a DHCP server or relay, select **Server** or **Relay**. Otherwise, select **None**.
DHCP Option 82	If you use a distributed DHCP server/relay environment, you can enable this option to provide additional information on the manner in which clients are physically connected to the network.
Default VLAN ID	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 **authentication reply from the Radius server**, then the value specified by **Default VLAN ID** will be overridden. The default value of this setting is **0**, which means VLAN tagging is disabled (instead of tagged with zero).
VLAN Pooling	Check this box to enable VLAN pooling using the values specified in **VLAN Pool**.
VLAN Pool	If VLAN pooling is enabled, enter VLAN pool values separated by commas.
Network Priority (QoS)	Select from **Gold**, **Silver**, and **Bronze** to control the QoS priority of this wireless network's traffic.
Layer 2 Isolation	**Layer 2** refers to the second layer in the ISO Open System Interconnect model. When this option is enabled, clients on the same VLAN, SSID, or subnet are isolated to that VLAN, SSID, or subnet, which can enhance security. Traffic is passed to upper communication layer(s). By default, the setting is disabled.
Maximum Number of Clients	Enter the maximum number of clients that can simultaneously connect to your access point, or enter **0** to allow unlimited Wi-Fi clients.



Security Settings

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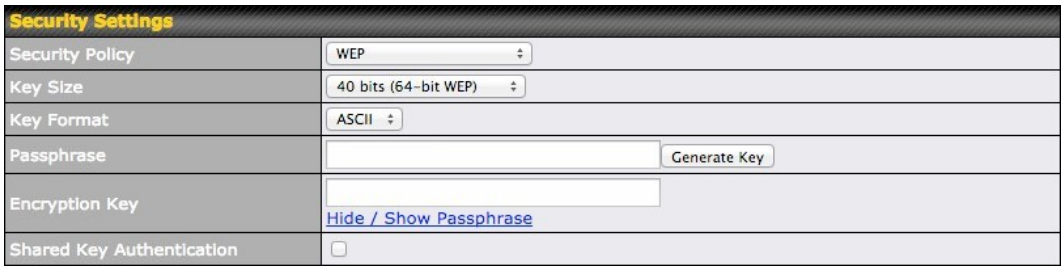
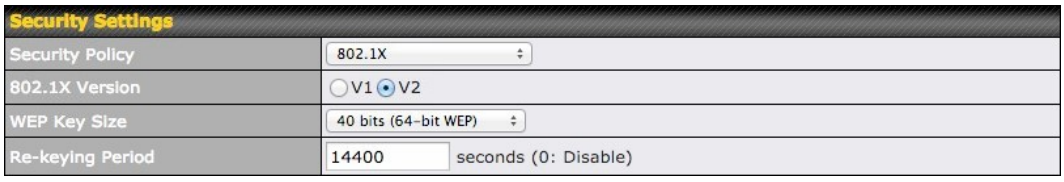
Security Policy	This setting configures the wireless authentication and encryption methods. Available options are **Open (No Encryption)**, **WEP**, **802.1X, WPA2 – Personal**, **WPA2 – Enterprise**, **WPA/WPA2 - Personal**, and **WPA/WPA2 – Enterprise**. To allow any Wi-Fi client to access your AP without authentication, select **Open (No Encryption)**. Details on each of the available authentication methods follow.



WEP	
Key Size	Select **40 bits (64-bit WEP)** or **104 bits (128-bit WEP)**.
Key Format	Choose **ASCII** or **Hex** format for the WEP key. ASCII can be applied only to encryption keys that are manually entered. Hex can be applied to encryption keys that are manually entered or automatically generated.
Passphrase	Enter a series of alphanumeric characters, and then click **Generate Key** to create a WEP key using the passphrase.
Encryption Key	The generated WEP key appears here. Click **Hide / Show Passphrase** to toggle visibility.
Shared Key Authentication	Check to **enable** shared key authentication. The default is disabled, meaning open authentication is used.



802.1X

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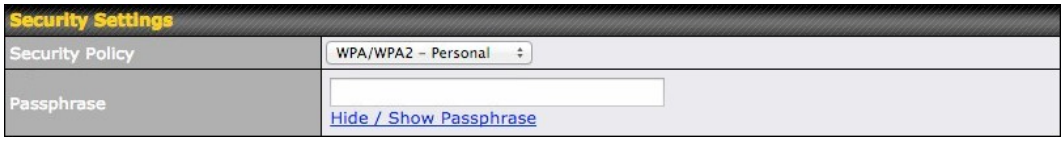
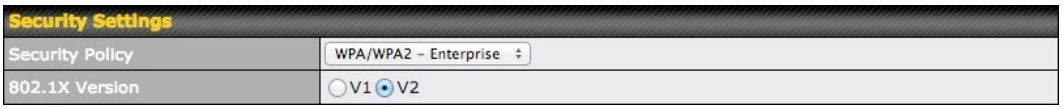
802.1X Version	Choose **v1** or **v2** of the 802.1x EAPOL. When **v1** is selected, both v1 and v2 clients can associate with the access point. When **v2** is selected, only v2 clients can associate with the access point. Most modern wireless clients support v2. For stations that do not support v2, select **v1**. The default is **v2**.
WEP Key Size	Select **40 bits (64-bit WEP)** or **104 bits (128-bit WEP)**.
Re-keying Period	This option specifies the length of time throughout which the broadcast key remains valid. When the re-keying period expires, the broadcast key is no longer valid and broadcast key renewal is required. The default is **14400** seconds (four hours). **0** disables re-keying.



WPA/WPA2 – Personal	
Passphrase	Enter a passphrase of between 8 and 63 alphanumeric characters to create a passphrase used for data encryption and authentication. Click **Hide / Show Passphrase** to toggle visibility.



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**.

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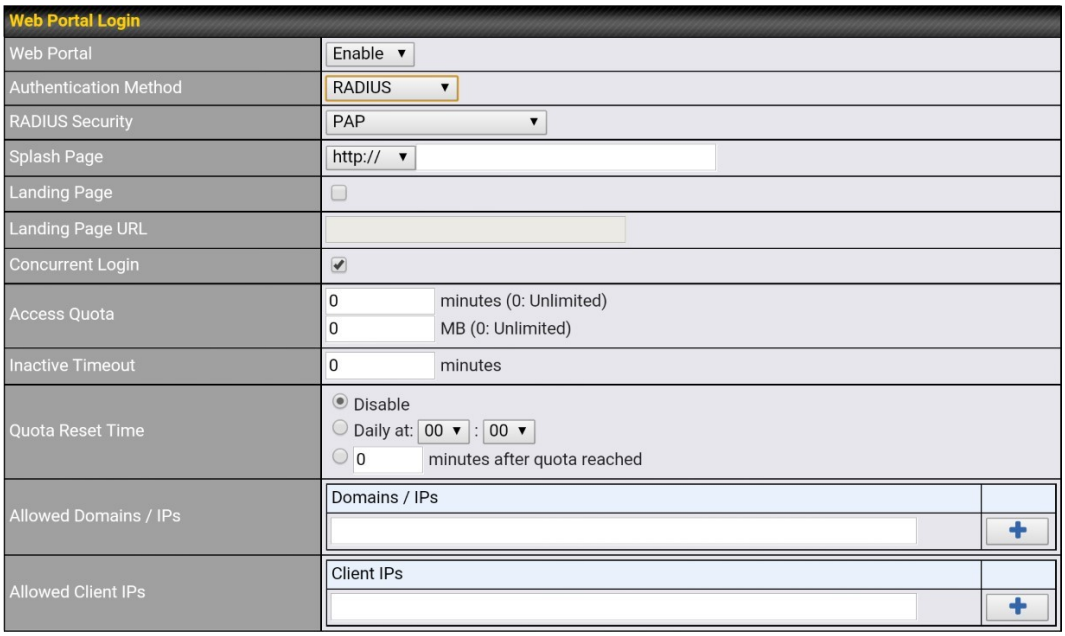

Web Portal Login	
Web Portal	Select **Enable** to turn on your access point's built-in web portal functionality.
Authentication Method	Choose **Open Access** to allow users to connect without authentication or **RADIUS** to require authentication. If **RADIUS** is selected, you'll be given the opportunity to select a RADIUS security method in the next field.
RADIUS Security	Select **PAP**, **EAP-TTLS PAP**, **EAP-TTLS MSCHAPv2**, or **PEAPv0 EAP-MSCHAPv2**.
Splash Page	If your web portal will use a splash page, choose **HTTP** or **HTTPS** and enter the splash page's URL.
Landing Page	If your web portal will use a landing page, check this box.
Landing Page URL	If you have checked **Landing Page**, enter your landing page's URL here.
Concurrent Login	Check this box to allow users to have more than one logged in session active at a time.

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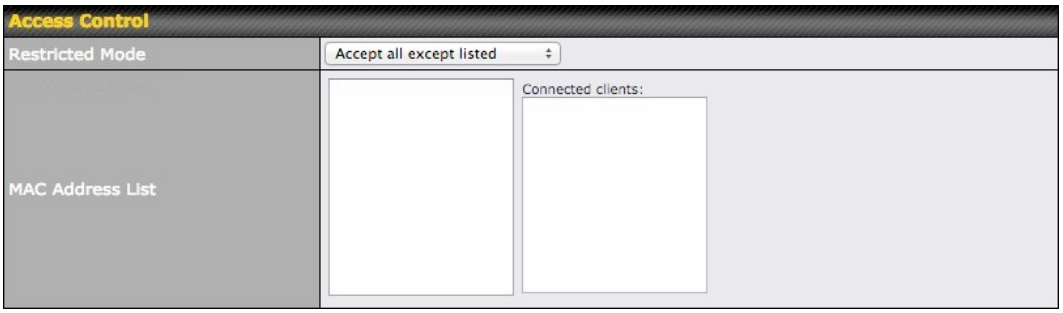
Access Quota	Enter a value in minutes to limit access time on a given login or enter **0** to allow unlimited use time on a single login. Likewise, enter a value in MB for the total bandwidth allowed or enter **0** to allow unlimited bandwidth on a single login.
Inactive Timeout	Enter a value in minutes to logout following the specified period of inactivity or enter **0** to disable inactivity logouts.
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.
Allowed Domains / IPs	To whitelist a domain or IP address, enter the domain name / IP address here and click . To delete an existing entry, click the button next to it.
Allowed Client IPs	To whitelist a client IP address, enter the IP address here and click . To delete an existing entry, click the button next to it.



Access Control	
Restricted Mode	The settings allow 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.

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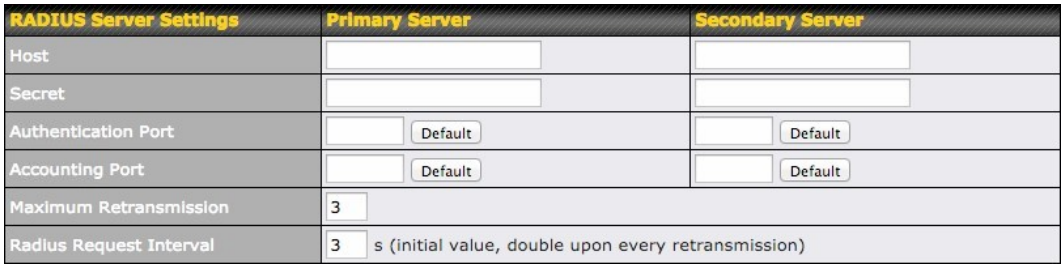

RADIUS Server Settings	Primary Server	Secondary Server
Host		
Secret		
Authentication Port	Default	Default
Accounting Port	Default	Default
Maximum Retransmission	3	
Radius Request Interval	3 s (initial value, double upon every retransmission)	

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**.
Maximum Retransmission	Enter the maximum number of allowed retransmissions.
RADIUS Request Interval	Enter a value in seconds to limit RADIUS request frequency. Note the initial value will double on each retransmission.

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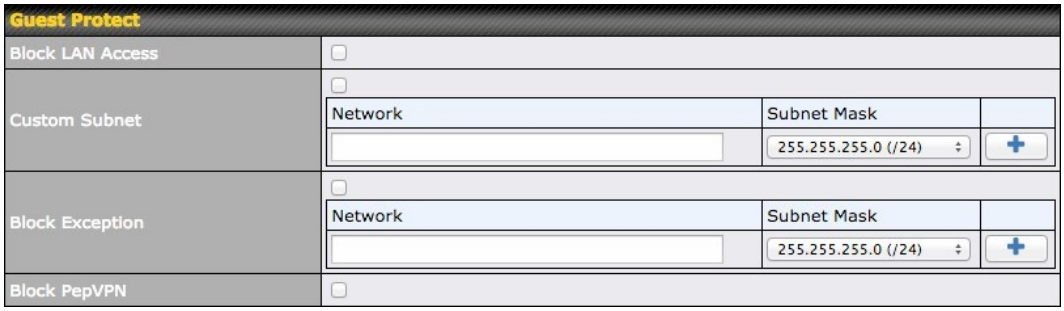
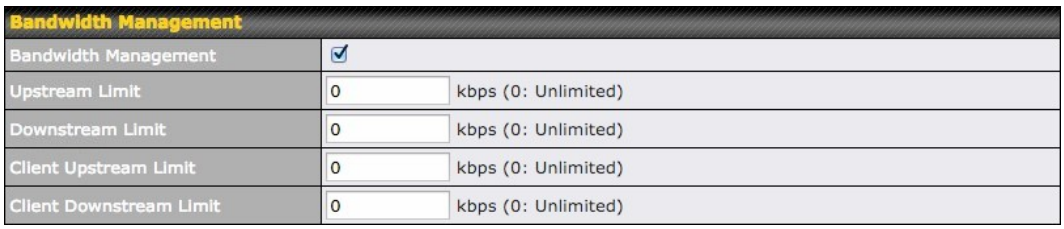


Guest Protect	
Block LAN Access	Check this box to block access from the LAN.
Custom Subnet	To specify a subnet to block, enter the IP address and choose a subnet mask from the drop-down menu. To add the blocked subnet, click . To delete a blocked subnet, click .
Block Exception	To create an exception 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 .
Block PepVPN	To block PepVPN access, check this box.



Bandwidth Management	
Bandwidth Management	Check this box to enable bandwidth management.
Upstream Limit	Enter a value in kpbs to limit the wireless network's upstream bandwidth. Enter **0** to allow unlimited upstream bandwidth.
Downstream Limit	Enter a value in kpbs to limit the wireless network's downstream bandwidth. Enter **0** to allow unlimited downstream bandwidth.

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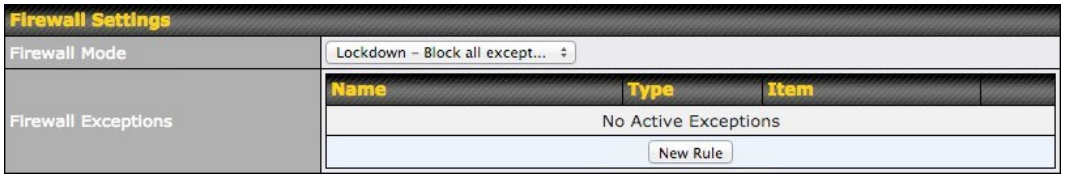
Client Upstream Limit	Enter a value in kpbs to limit connected clients' upstream bandwidth. Enter **0** to allow unlimited upstream bandwidth.
Client Downstream Limit	Enter a value in kpbs to limit connected clients' downstream bandwidth. Enter **0** to allow unlimited downstream bandwidth.



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**, **Domain**, **IP Address**, or **MAC Address** to allow or deny traffic from any of those identifiers. Depending on the option chosen, the following fields will vary.
Protocol / 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 Address / Subnet Mask	If you have chosen **IP Address** as your firewall rule type, enter the IP address and subnet mask identifying the subnet to allow or deny.

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

7.2.2 Settings

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

AP Settings	5GHz
Protocol	802.11na
Operating Country	United States
Channel Bonding	20 MHz
Channel	Auto Edit
Output Power	Max Boost
Beacon Rate	6Mbps
Beacon Interval	100ms
DTIM	1
RTS Threshold	0
Fragmentation Threshold	0
Distance / Time Convertor	4050 m (input distance for recommended values)
Slot Time	Auto Custom 9 µs Default
ACK Timeout	48 µs Default
Frame Aggregation	☑
Aggregation Length	50000
Maximum Number of Clients	0 (0: Unlimited)
Client Signal Strength Threshold	0 (0: Unlimited)

AP Settings

Protocol

Choose **802.11ng** or **802.11na** 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 **802.11ac** protocol for the 5GHz band, as shown below.

AP Settings	2.4GHz	5GHz
Protocol	802.11ng	802.11ac

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 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.

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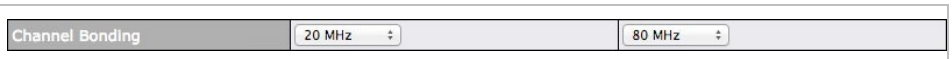
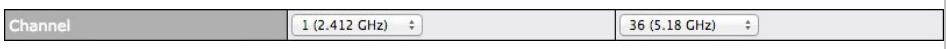
Channel Bonding	There are three options: **20 MHz**, **40 MHz**, and **20/40 MHz**. With this feature enabled, the Wi-Fi system can use two channels at once. Using two channels improves the performance of the Wi-Fi connection. The AP One AC mini offers channel bonding options for the 2.4GHz and 5GHz bands, as shown below. In addition to **20 MHz**, **40 MHz**, and **20/40 MHz**, the 5Ghz band offers **80Mhz**, which is the default setting.

	
Channel	This drop-down menu selects the 5GHz 802.11 channel to be used. If **Auto** is set, the system will perform channel scanning based on the scheduled time set and choose the most suitable channel automatically. The AP One AC mini allows setting channels on the 2.4GHz and 5GHz bands, as shown below. 
Output Power	This drop-down menu determines the power at which your access point will broadcast. When fixed settings are selected, the AP will broadcast at the specified power level, regardless of context. When **Auto** is selected, the AP will adjust its power level based on surrounding APs to maximize performance. While single-radio models allow setting power output levels for one frequency band only, the AP One AC mini provide output power settings for both the 2.4GHz and 5GHz bands, as shown below.
Beacon Rate	This drop-down menu provides the option to send beacons in different transmit bit rates. The bit rates are **1Mbps**, **2Mbps**, **5.5Mbps**, **6Mbps**, and **11Mbps**.
Beacon Interval	Set the time between each beacon send. Available options are **100ms**, **250ms**, and **500ms**.
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**.

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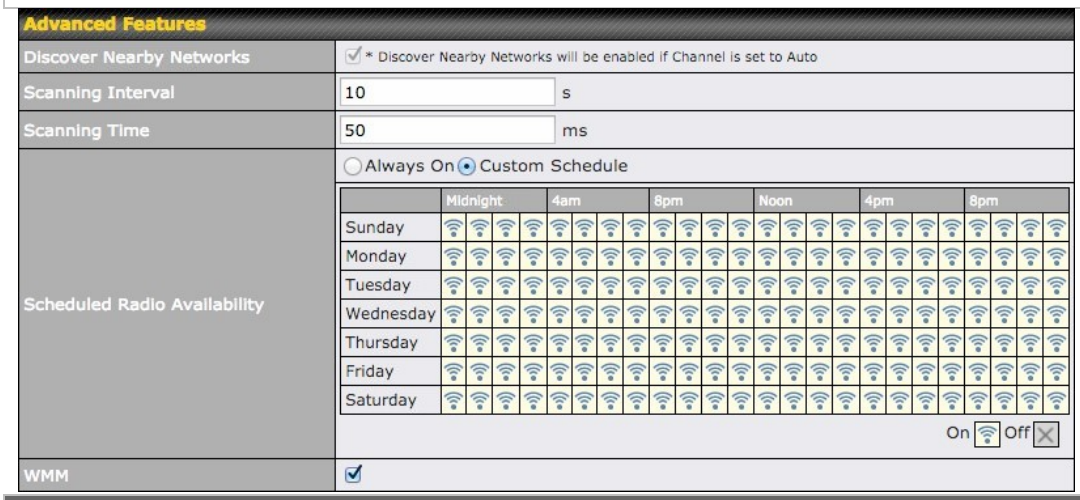
ACK Timeout	Set the wait time to receive an acknowledgement packet before retransmitting. The default value is **48µs**.
Frame Aggregation	With this feature enabled, throughput will be increased by sending two or more data frames in a single transmission.
Aggregation Length	This field is only available when **Frame Aggregation** is enabled. It specifies the frame length for frame aggregation. By default, it is set to **50000**.
Max 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.
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.



Advanced Features	
Discover Nearby Networks	Check this box to enable network discovery. Note that setting **Channel** to **Auto** will activate this feature automatically.
Scanning Interval	This setting controls the interval, in seconds, that your access point scans for nearby networks.
Scanning Time	This setting specifies the time, in milliseconds, that your access point scans any particular channel while searching for nearby networks.
Scheduled Radio Availability	Click **Custom Schedule** to specify radio availability schedule options or select **Always On** to make the radio continuously available.
WMM	This checkbox enables Wi-Fi Multimedia (WMM), also known as Wireless Multimedia Extensions (WME), on your access point. The default is **enabled**.

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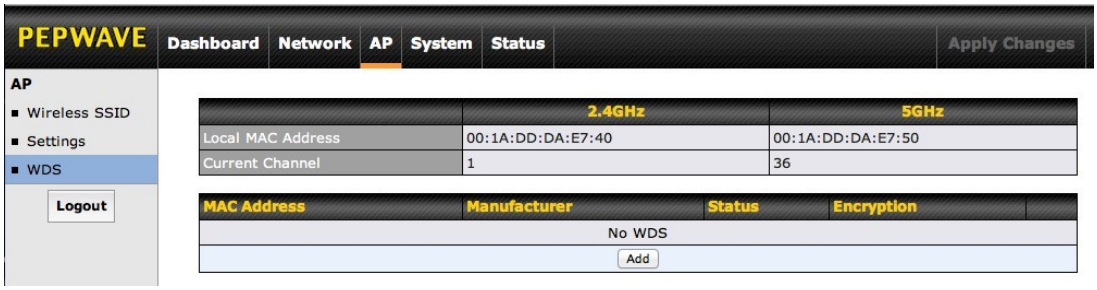
7.2.3 WDS

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



To create a new WDS, click **Add**.

WDS	
Enable	Check this box to enable WDS.
MAC Address	Enter the MAC address of the access point with which to form a WDS link.
Encryption	Select **AES** to enable encryption for WDS peer connections. Selecting **None** disables encryption.

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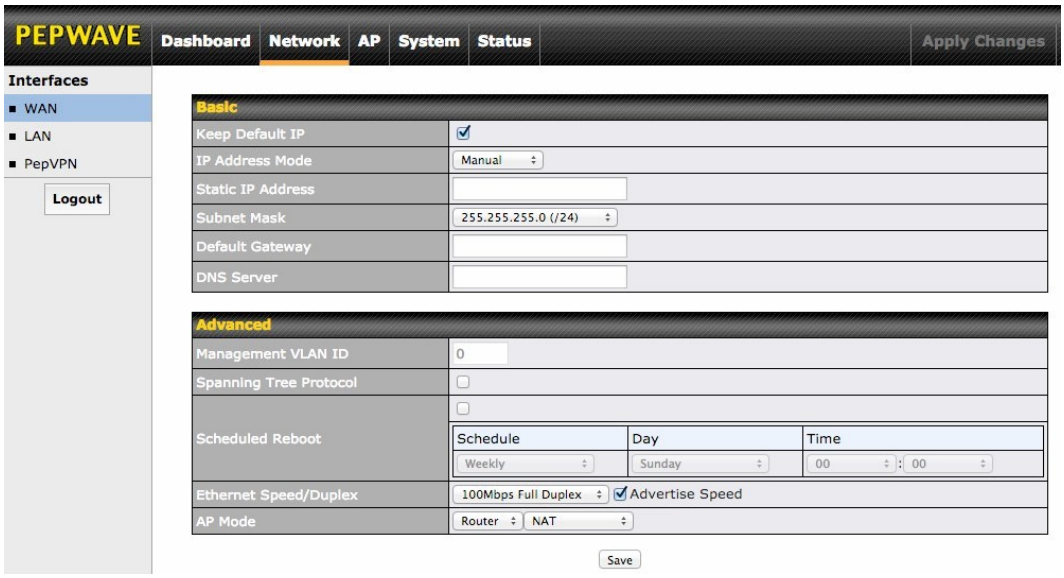
7.3 Network

The settings on the **AP** tab control WAN and LAN settings, as well as allow you to set up PepVPN profiles.

7.3.1 WAN

This section provides basic and advanced WAN settings.



Basic	
Keep Default IP	When enabled, this option maintains **192.168.0.3** as your access point's IP address.
IP Address Mode	**IP Address Mode** options are **Automatic** and **Manual**. In **Automatic** mode, the IP address of your access point is acquired from a DHCP server on the Ethernet segment. In **Manual** mode, a user-specified IP address is used for your access point, as described below.
Static IP Address / Subnet Mask	You can use these fields to specify a unique IP address that your access point will use to communicate on the Ethernet segment. This IP address is distinct from the admin IP address (192.168.0.3) on the Ethernet segment.
Default Gateway	Enter the IP address of the default gateway to the internet.
DNS Server	Enter the DNS server address that your access point will use to resolve host names.

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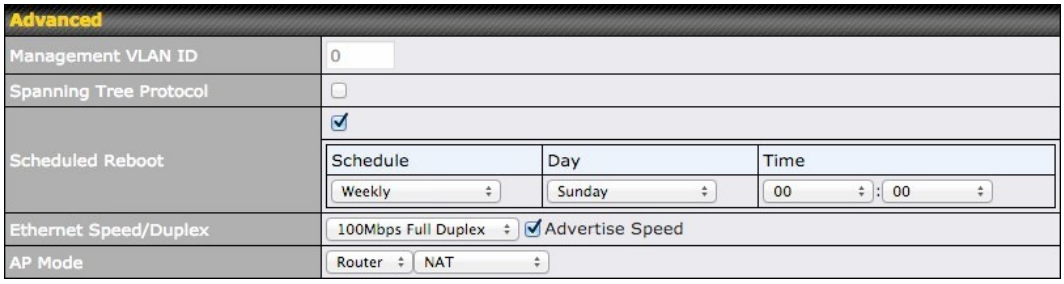

Advanced	
Management VLAN ID	This field specifies the VLAN ID to tag to management traffic, such as AP-to-AP controller communication traffic. The value is **0** by default, meaning that no VLAN tagging will be applied. NOTE: change this value with caution as alterations may result in loss of connection to the AP controller.
Spanning Tree Protocol	Checking this box enables spanning tree protocol, used to prevent loops in bridged Ethernet LANs
Scheduled Reboot	When this box is checked, your access point can be scheduled to reboot automatically on a recurring basis, as indicated by the values under the **Schedule**, **Day**, and **Time** headings.
Ethernet Speed/Duplex	Select a speed and duplex setting for sending and receiving. When selecting a speed manually, you can also control whether the access point's speed will be advertised on the network by checking or unchecking the **Advertise Speed** box. When **Auto** is selected, your access point will automatically negotiate speeds.
AP Mode	Your access point can act as a bridge or as a router, depending on your selection here. When **Router** is selected, you can additionally select whether the access point will function in **NAT** or **IP Forwarding** mode.

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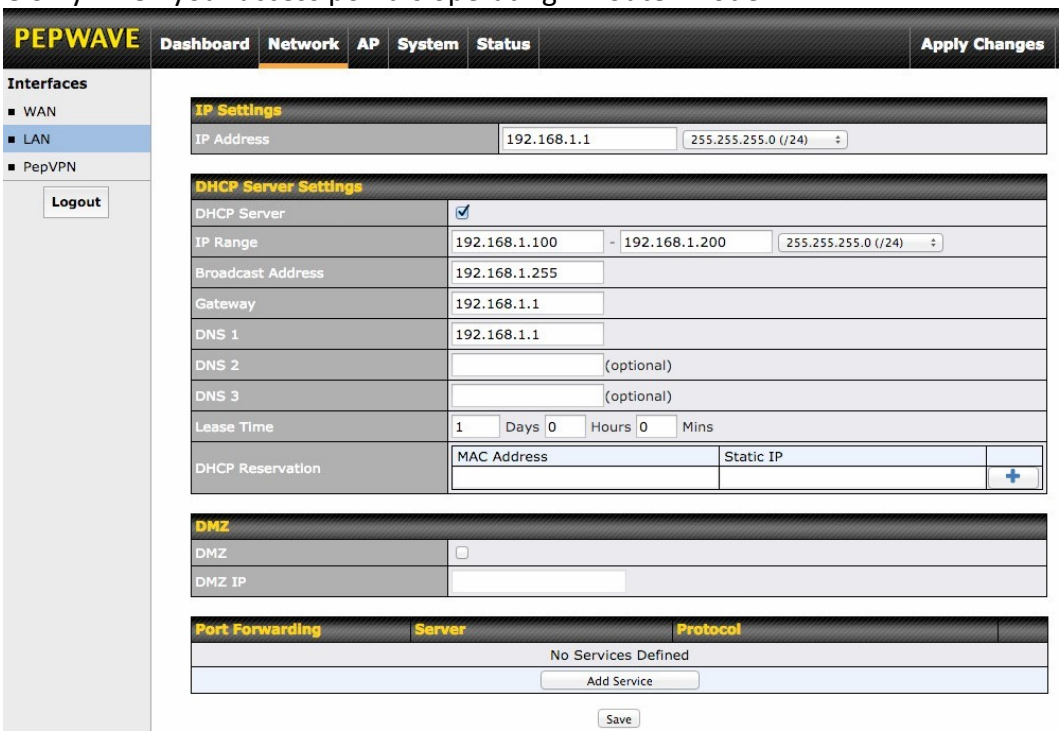
7.3.2 LAN

This section offers a variety of settings that affect your access point's operation on the LAN, such as settings for DHCP, DMZ, and port forwarding. Note that the following settings will be available only when your access point is operating in router mode.



IP Settings	
IP Address	Enter the LAN IP address and subnet mask to assign to your access point on the LAN.

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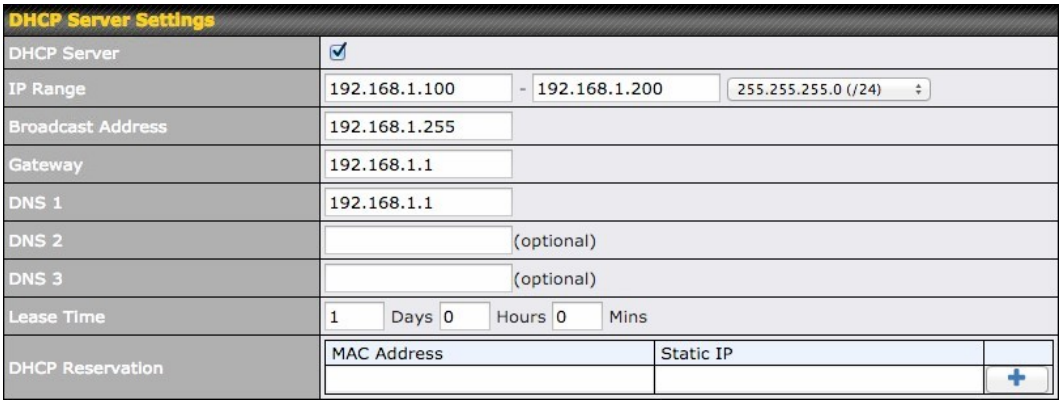

DHCP Server Settings	
DHCP Server	Check to enable the DHCP server feature of your access point. Enabling DHCP is the best option for most users. The following options will be enabled once you have checked and enabled the DHCP server.
IP Range	Enter the first and last IP addresses of the range of addresses that your access point will make available to DHCP clients. The default range is from **192.168.1.100** to **192.168.1.200**, with 24-bit subnet mask.
Broadcast Address	Enter the broadcast address that DHCP clients will use when communicating with the entire LAN segment. The default value is **192.168.1.255**.
Gateway	Enter the default gateway address that DHCP clients will use to access the internet. By default, this address will be the same as your access point's IP address on the LAN.
DNS 1/2/3	In **DNS 1**, enter the IP address of the primary DNS server offered to DNS clients or accept the default of **192.168.1.1**, which is your access point's address on the LAN. You can also specify up to two additional DNS servers to use when the primary server is busy or down.
Lease Time	Specify the length of time that an IP address of a DHCP client remains valid. When an address lease time has expired, the assigned IP address is no longer valid, and renewal of the IP address assignment is required. By default, this value is set to one day.
DHCP Reservation	To reserve certain addresses for specific clients, such as network printers, the device's MAC Address and a static IP to be assigned to the device. Click enter the DHCP reservation. To delete a DHCP reservation, click .

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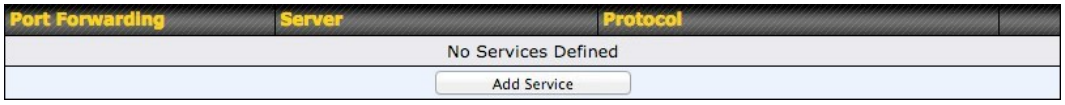
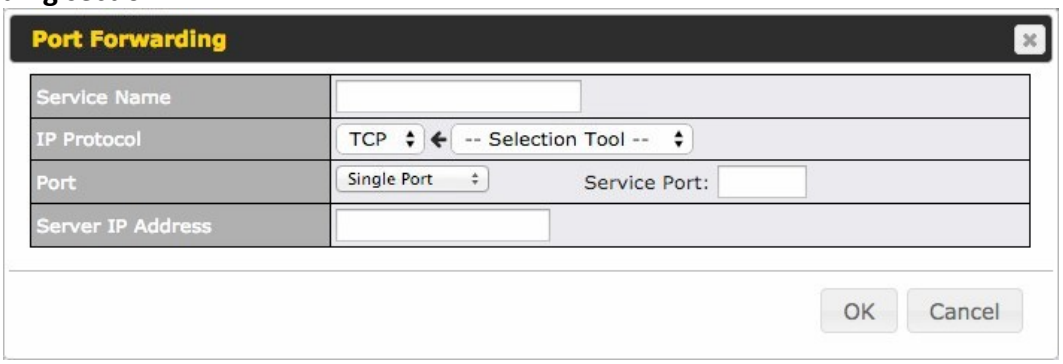
DMZ	
DMZ	Check this box to forward traffic sent to the WAN IP address to the DMZ IP address.
DMZ IP	Enter an IP address clients will use to connect to the DMZ.



To create a port forwarding rule, first click the **Add Service** button, located in the **Port Forwarding** section.



Port Forwarding	
Service Name	Enter a name for the new port forwarding rule. Valid values for this setting consist of alphanumeric and underscore "_" characters only.
IP Protocol	The **IP Protocol** setting, along with the **Port** setting, specifies the protocol of the service as TCP, UDP, ICMP, or IP. Traffic that is received by your access point via the specified protocol at the specified port(s) is forwarded to the LAN hosts specified by the **Servers** setting. Please see below for details on the **Port** and **Servers** 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: **Single Port**, **Port Range**, **Port Mapping**

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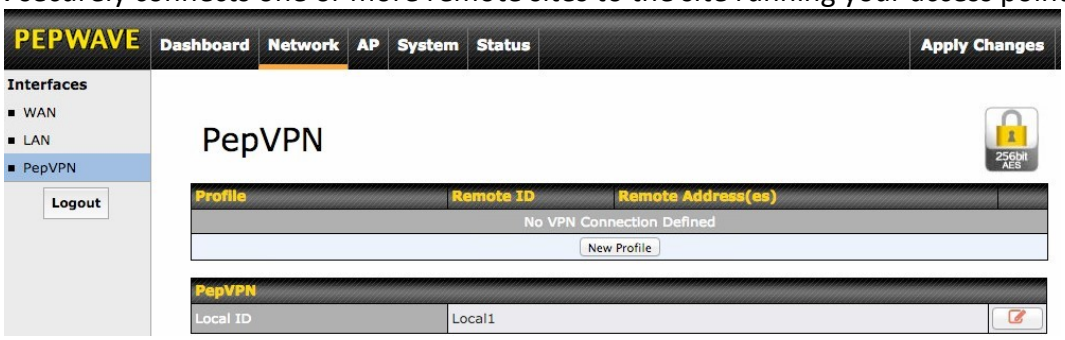
	Single Port: Traffic that is received by your access point via the specified protocol at the specified port is forwarded via the same port to the servers specified by the **Server IP Address** setting. For example, with **IP Protocol** set to **TCP**, and **Port** set to **Single Port** and **Service Port** 80, TCP traffic received on port 80 is forwarded to the configured servers via port 80. **Port Range**: Traffic that is received by your access point via the specified protocol at the specified port range is forwarded via the same respective ports to the LAN hosts specified by the **Server IP Address** setting. For example, with **IP Protocol** set to **TCP**, and **Port** set to **Port Range** and **Service Ports** 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 your access point via the specified protocol at the specified port is forwarded via a different port to the servers specified by the **Server IP Address** setting. For example, with **IP Protocol** set to **TCP**, and Port set to **Port Mapping**, **Service Port** 80, and **Map to Port** 88, TCP traffic on Port 80 is forwarded to the configured server via Port 88.
Server IP Address	Enter the LAN IP address of the server that handles requests for the forwarded service.

7.3.3 PepVPN

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



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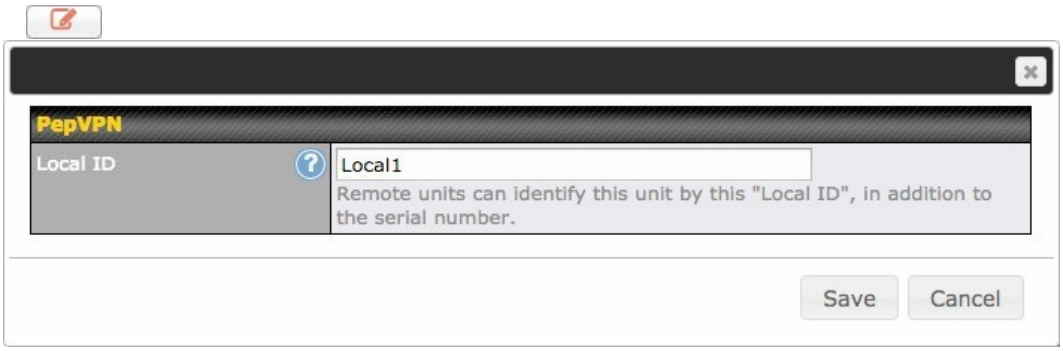
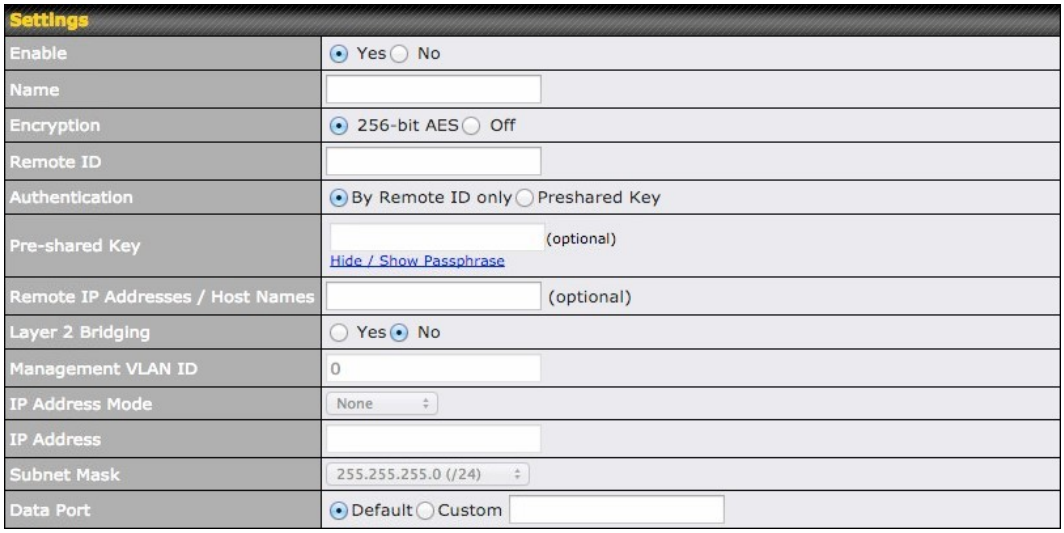
To set up PepVPN, first give your site a local PepVPN ID. To modify an existing local ID, click .



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



PepVPN Profile Settings	
Enable	Check this box to enable PepVPN.
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 nonleading/trailing spaces ( ).
Encryption	By default, VPN traffic is encrypted with **256-bit AES**. If **Off** is selected on both sides of a VPN connection, no encryption will be applied.
Remote ID	To allow your access point to establish a VPN connection with a specific remote peer using a unique identifying number, enter the peer's ID or serial number here.
Authentication	Select **By Remote ID Only** or **Preshared Key** to specify the method your access point will use to authenticate peers. When selecting **By Remote ID Only**, be sure to enter a unique peer ID number in the **Remote ID** field.

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Pre-shared Key	This optional field becomes available when **Pre-shared Key** is selected as the 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 side match. Click **Hide / Show Passphrase** to toggle passphrase visibility.
Remote IP Address / Host Names (Optional)	Optionally, you can enter a remote peer's WAN IP address or hostname(s) here. If the remote client 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. With this field filled, your access point will initiate connection to each of the remote IP addresses until it succeeds in making a connection. If the field is empty, your access point 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.
Layer 2 Bridging	When this check box is unchecked, traffic between local and remote networks will be IP forwarded. To bridge the Ethernet network of an Ethernet port on a local and remote network, select **Layer 2 Bridging**. When this check box is selected, the two networks will become a single LAN, and any broadcast (e.g., ARP requests) or multicast traffic (e.g., Bonjour) will be sent over the VPN.
Management VLAN ID	This field specifies the VLAN ID that will be tagged to management traffic, such as AP-to-AP controller communication traffic. A value of 0 indicates that no VLAN tagging will be applied.
IP Address Mode	Choose **Automatic** or **Manual**. In automatic mode, your access point acquires an IP from a DHCP server on the Ethernet segment. In manual mode, your access point uses a user-specified IP address.
IP Address/Subnet Mask	When using manual IP addressing (above), enter an IP address and subnet mask in these fields.
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.

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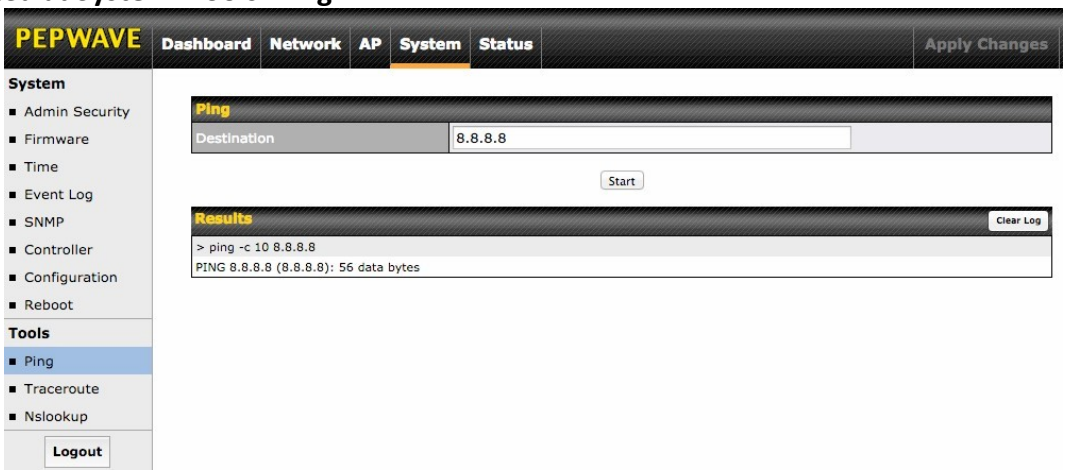
8 Tools

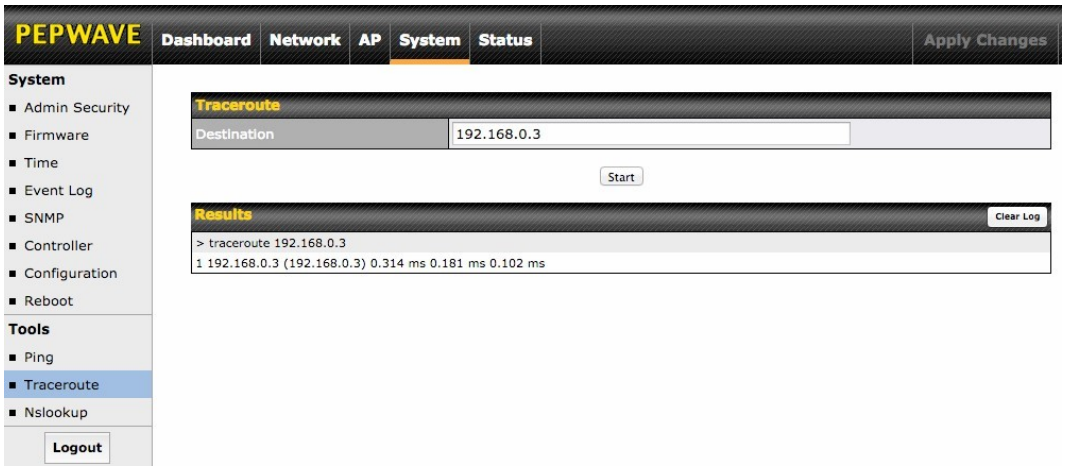
8.1 Ping

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



8.2 Traceroute

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



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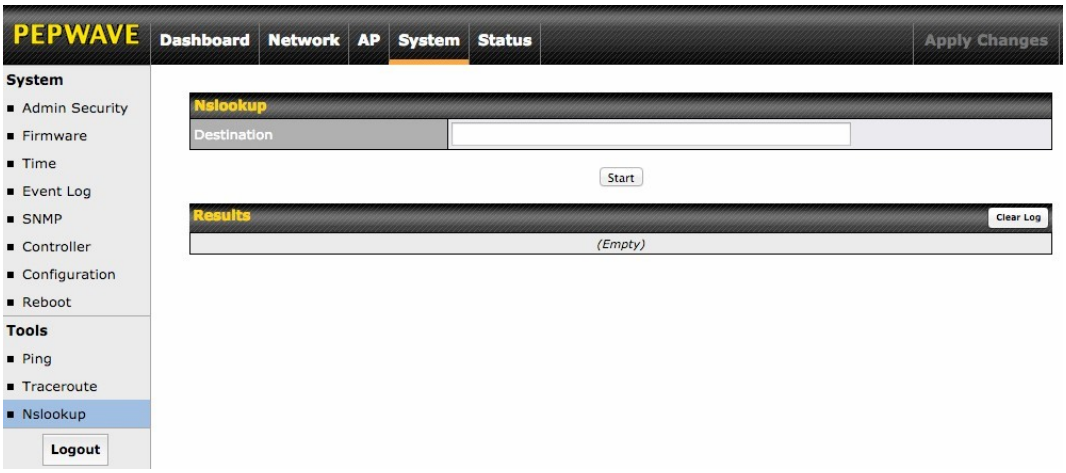
8.3 Nslookup

The nslookup tool is used to test DNS name servers. The nslookup utility can be found at **System>Tools>Nslookup**.



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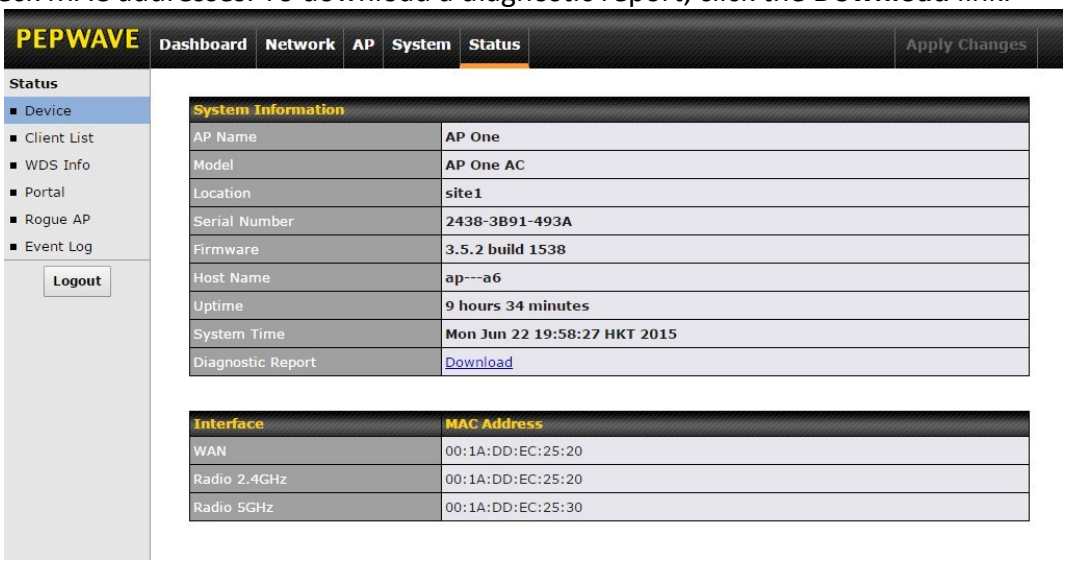
9 Monitoring Device Status

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

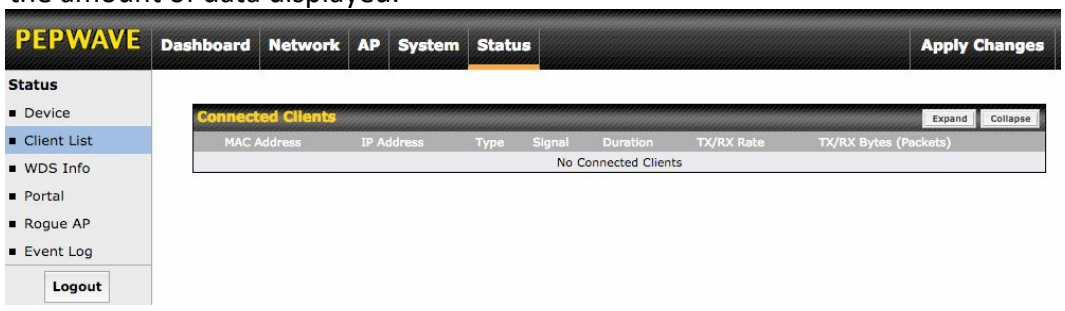
9.1 Device

Here you can access a variety of data about your access point, download a diagnostic report, and check MAC addresses. To download a diagnostic report, click the **Download** link.



9.2 Client List

The **Client List** displays all currently connected clients. Use the **Expand** and **Collapse** buttons to control the amount of data displayed.



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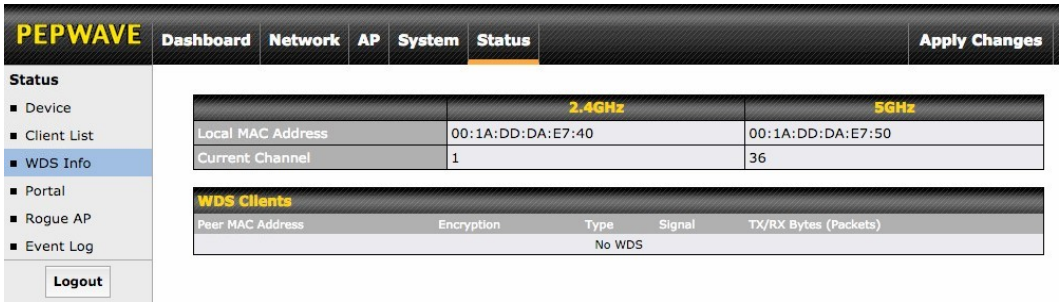
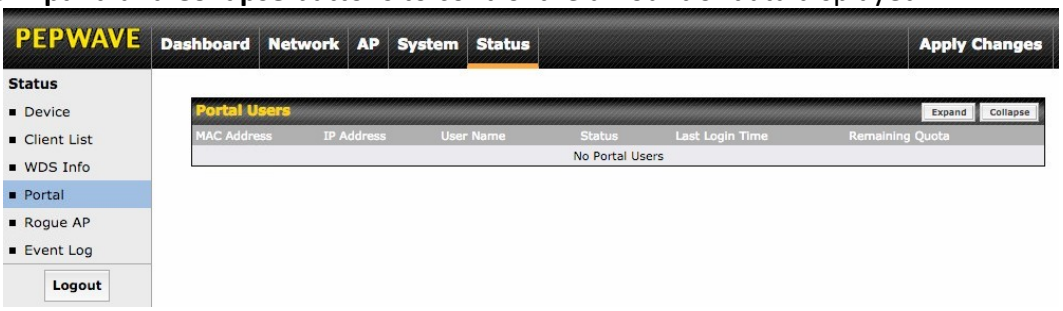
9.3 WDS Info

Here you can monitor the status of your wireless distribution system (WDS) and track activity by MAC address. If you're using the AP One AC mini, this section will display information for both the 2.4GHz and 5GHz radios.



9.4 Portal

If you've turned on your access point's captive portal, client connection data will appear here. Use the **Expand** and **Collapse** buttons to control the amount of data displayed.



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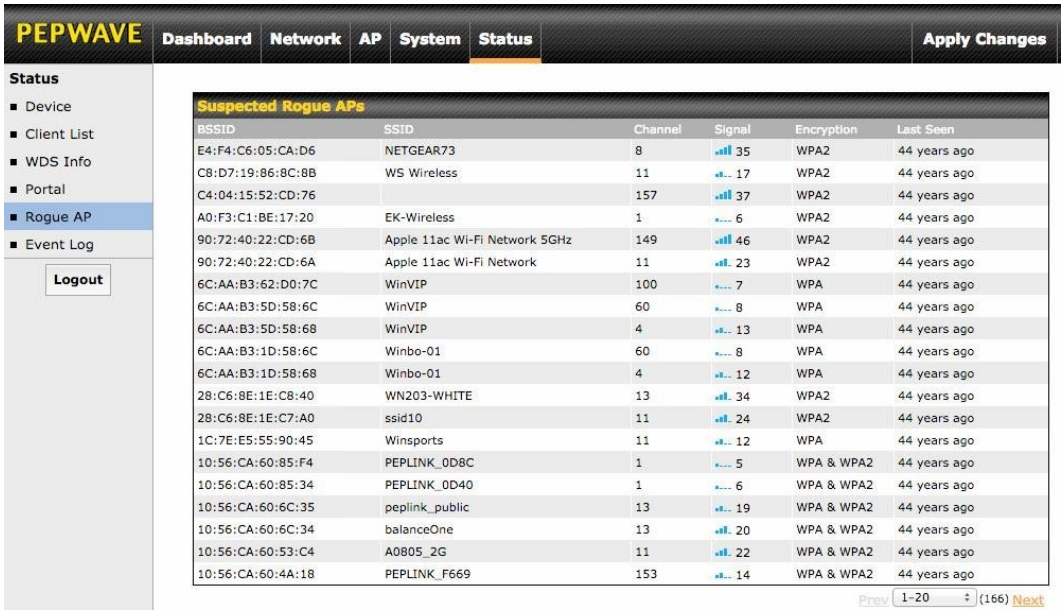
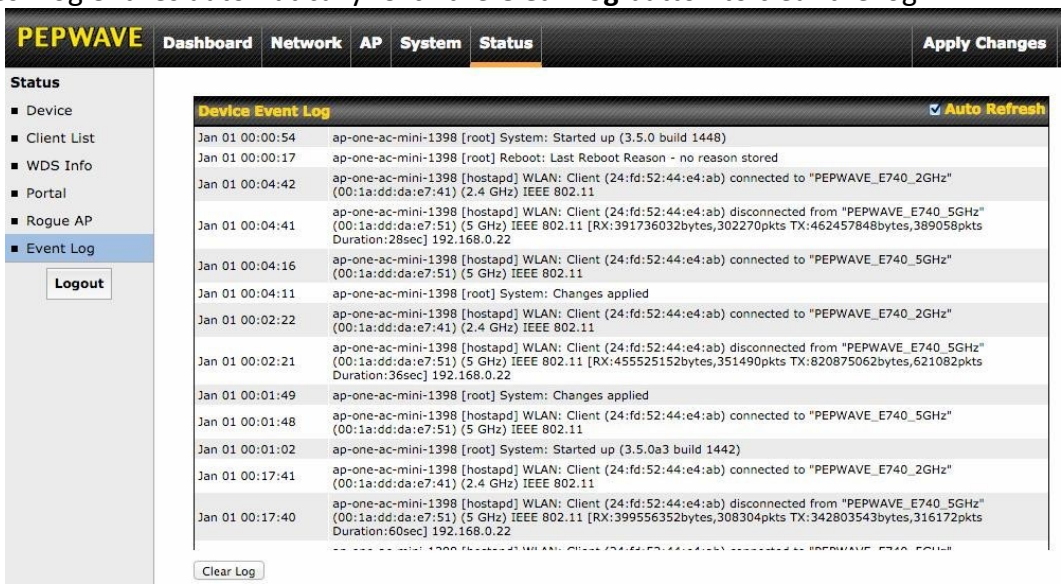
9.5 Rogue AP

This section displays a list of nearby suspected rogue access points.



9.6 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.



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10 Restoring Factory Defaults

The following procedure restores the settings of your access point to factory defaults:

- Power on the unit and wait for one minute.
- Press and hold the reset button for at least five seconds, then release.
- The unit will automatically reboot.
- Wait for one minute or until the status LED turns green, upon which the settings of the device will have been restored to the factory defaults.

By default, the unit will acquire an IP address from a DHCP server.

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11 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.

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.

5.15 ~ 5.25GHz is for indoor user only.

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 minimum distance 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 are country dependent and are firmware programmed at the factory to match the intended destination.

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Federal Communication Commission Interference Statement (AP One Rugged M12)

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

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

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

IMPORTANT NOTE

FCC Radiation Exposure Statement

This equipment complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 20cm separation distance will be maintained between the device (excluding its handset) and users.

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Industry Canada Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate;

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

12 Datasheets

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