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.

^A - Advanced feature, please click the ⊘ button on the top right-hand corner to activate.

Important Note
Peplink proprietary SpeedFusion™ uses TCP port 32015 and UDP port 4500 for establishing VPN connections. If you have a firewall in front of your Pepwave devices, you will need to add firewall rules for these ports and protocols to allow inbound and outbound traffic to pass through the firewall.

| Tip |
| --- |
| Want to know more about VPN sub-second session failover? Visit our YouTube Channel for a video tutorial! |

http://youtu.be/TLQgdpPSY88
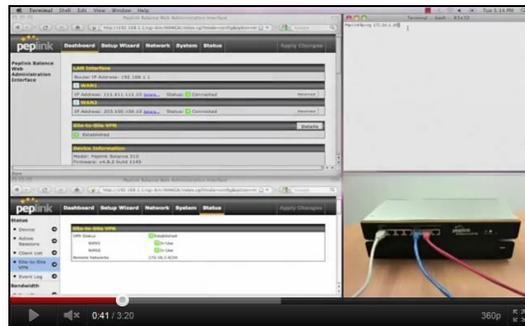
9.2 The Pepwave Router Behind a NAT Router

Pepwave routers support establishing SpeedFusion™ over WAN connections which are behind a NAT (network address translation) router.

To enable a WAN connection behind a NAT router to accept VPN connections, you can configure the NAT router in front of the WAN connection to inbound port-forward TCP port 32015 to the Pepwave router.

If one or more WAN connections on Unit A can accept VPN connections (by means of port forwarding or not), while none of the WAN connections on the peer Unit B can do so, you should enter all of Unit A's public IP addresses or hostnames into Unit B's **Remote IP Addresses / Host Names** field. Leave the field in Unit A blank. With this setting, a SpeedFusion™ connection can be set up and all WAN connections on both sides will be utilized.

See the following diagram for an example of this setup in use:
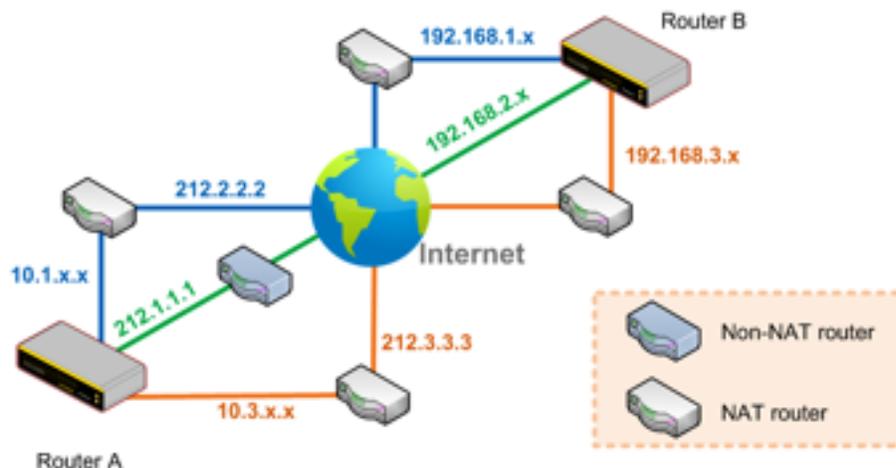
One of the WANs connected to Router A is non-NAT'd (*212.1.1.1*). The rest of the WANs connected to Router A and all WANs connected to Router B are NAT'd. In this case, the **Peer IP Addresses / Host Names** field for Router B should be filled with all of Router A's hostnames or public IP addresses (i.e., *212.1.1.1*, *212.2.2.2*, and *212.3.3.3*), and the field in Router A can be left blank. The two NAT routers on WAN1 and WAN3 connected to Router A should inbound port-forward TCP port 32015 to Router A so that all WANs will be utilized in establishing the VPN.

9.3   SpeedFusion VPN Status

SpeedFusion VPN status is shown in the Dashboard. The connection status of each connection profile is shown as below.

SpeedFusion VPN		Status
To MK2	🟩 Established	

After clicking the **Status** button at the top right corner of the SpeedFusion^{TM} table, you will be forwarded to **Status > SpeedFusion VPN**, where you can view subnet and WAN connection information for each VPN peer.

IP Subnets Must Be Unique Among VPN Peers
The entire interconnected SpeedFusion^{TM} network is a single non-NAT IP network. Avoid duplicating subnets in your sites to prevent connectivity problems when accessing those subnets.

10 IPsec VPN

IPsec VPN functionality securely connects one or more branch offices to your company's main headquarters or to other branches. Data, voice, and video communications between these locations are kept safe and confidential across the public Internet.

IPsec VPN on Pepwave routers is specially designed for multi-WAN environments. For instance, if a user sets up multiple IPsec profiles for a multi-WAN environment and WAN1 is connected and healthy, IPsec traffic will go through this link. However, should unforeseen problems (e.g., unplugged cables or ISP problems) cause WAN1 to go down, our IPsec implementation will make use of WAN2 and WAN3 for failover.

10.1 IPsec VPN Settings

Many Pepwave products can make multiple IPsec VPN connections with Peplink, Pepwave, Cisco, and Juniper routers. Note that all LAN subnets and the subnets behind them must be unique. Otherwise, VPN members will not be able to access each other. All data can be routed over the VPN with a selection of encryption standards, such as 3DES, AES-128, and AES-256. To configure IPsec VPN on Pepwave devices that support it, navigate to **Advanced>IPsec VPN.**

IPsec VPN Profiles	Remote Networks	
No IPsec VPN Profile Defined.		
New Profile		

Pepwave MAX IPsec only supports network-to-network connection with Cisco, Juniper or Pepwave MAX devices.

Click the **New Profile** button to create new IPsec VPN profiles that make VPN connections to remote Pepwave, Cisco, or Juniper routers via available WAN connections. To edit any of the profiles, click on its associated connection name in the leftmost column.

IPsec VPN Profile

Name	
Active ⓘ	☑
IKE Version	● IKEv1 ○ IKEv2
Connect Upon Disconnection of	☑ WAN 1 ⌄
Remote Gateway IP Address / Host Name ⓘ	
IPsec Type ⓘ	● Policy-based ○ Route-based
Local Networks ⓘ	☑ 192.168.50.0/24 ☐

Remote Networks	Network	Subnet Mask	
		255.255.255.0 (/24) ⌄	+

Authentication	● Preshared Key ○ X.509 Certificate
Mode	● Main Mode (All WANs need to have Static IP) ○ Aggressive Mode
Force UDP Encapsulation ⓘ	☐
Preshared Key	 ☑ Hide Characters
Local ID ⓘ	
Remote ID ⓘ	
Phase 1 (IKEv1) Proposal ⓘ	1 AES-CBC-256 & SHA1 ⌄ 2 ----- ⌄
Phase 1 DH Group ⓘ	1 Group 2 ⌄ 2 ----- ⌄
Phase 1 SA Lifetime	3600 seconds
Phase 2 (ESP) Proposal ⓘ	1 AES-CBC-256 & SHA1 ⌄ 2 ----- ⌄
Phase 2 PFS Group	None ⌄
Phase 2 SA Lifetime	28800 seconds

IPsec VPN Profile Settings	
Name	This field is for specifying a local name to represent this connection profile.
Active	When this box is checked, this IPsec VPN connection profile will be enabled. Otherwise, it will be disabled.
IKE Version	Two versions of the IKE standards are available: • IKEv1 • IKEv2

Connect Upon Disconnection of	Check this box and select a WAN to connect to this VPN automatically when the specified WAN is disconnected.
Remote Gateway IP Address / Host Name	Enter the remote peer's public IP address. For **Aggressive Mode**, this is optional.
IPsec Type	Policy-based - (default) All the matched traffic as defined in Local Networks and Remote Networks will be routed to this IPsec connection, this cannot be overridden by other routing methods. Route-based - Outbound Policy rule is required to route traffic to this tunnel and comes with more flexibility to control how to route traffic compared to Policy-based. If you want to modify the traffic selector instead of using the default (0.0.0.0/0). **Note**: This option is available for certain following models only: ● MAX: BR1 ENT, Transit, 700 HW3 or above, HD2 HW5 or above, HD4
Local Networks	Enter the local LAN subnets here. If you have defined static routes, they will be shown here. Using NAT, you can map a specific local network / IP address to another, and the packets received by remote gateway will appear to be coming from the mapped network / IP address. This allow you to establish IPsec connection to a remote site that has one or more subnets overlapped with local site. Two types of NAT policies can be defined: One-to-One NAT policy: if the defined subnet in Local Network and NAT Network has the same size, for example, policy "192.168.50.0/24 > 172.16.1.0/24" will translate the local IP address 192.168.50.10 to 172.16.1.10 and 192.168.50.20 to 172.16.1.20. This is a bidirectional mapping which means clients in remote site can initiate connection to the local clients using the mapped address too. Many-to-One NAT policy: if the defined NAT Network on the right hand side is an IP address (or having a network prefix /32), for example, policy "192.168.1.0/24 > 172.168.50.1/32" will translate all clients in 192.168.1.0/24 network to 172.168.50.1. This is a unidirectional mapping which means clients in remote site will not be able to initiate connection to the local clients.
Remote Networks	Enter the LAN and subnets that are located at the remote site here.
Authentication	To access your VPN, clients will need to authenticate by your choice of methods. Choose between the **Preshared Key** and **X.509 Certificate** methods of

	authentication.
Mode	Choose **Main Mode** if both IPsec peers use static IP addresses. Choose **Aggressive Mode** if one of the IPsec peers uses dynamic IP addresses.
Force UDP Encapsulation	For forced UDP encapsulation regardless of NAT-traversal, tick this checkbox.
Pre-shared Key	This defines the peer authentication pre-shared key used to authenticate this VPN connection. The connection will be up only if the pre-shared keys on each side match.
Remote Certificate (pem encoded)	Available only when **X.509 Certificate** is chosen as the **Authentication** method, this field allows you to paste a valid X.509 certificate.
Local ID	In **Main Mode**, this field can be left blank. In **Aggressive Mode**, if **Remote Gateway IP Address** is filled on this end and the peer end, this field can be left blank. Otherwise, this field is typically a U-FQDN.
Remote ID	In **Main Mode**, this field can be left blank. In **Aggressive Mode**, if **Remote Gateway IP Address** is filled on this end and the peer end, this field can be left blank. Otherwise, this field is typically a U-FQDN.
Phase 1 (IKE) Proposal	In **Main Mode**, this allows setting up to six encryption standards, in descending order of priority, to be used in initial connection key negotiations. In **Aggressive Mode**, only one selection is permitted.
Phase 1 DH Group	This is the Diffie-Hellman group used within IKE. This allows two parties to establish a shared secret over an insecure communications channel. The larger the group number, the higher the security. **Group 2**: **1024-bit** is the default value. **Group 5**: **1536-bit** is the alternative option.
Phase 1 SA Lifetime	This setting specifies the lifetime limit of this Phase 1 Security Association. By default, it is set at **3600** seconds.
Phase 2 (ESP) Proposal	In **Main Mode**, this allows setting up to six encryption standards, in descending order of priority, to be used for the IP data that is being transferred. In **Aggressive Mode**, only one selection is permitted.
Phase 2 PFS Group	Perfect forward secrecy (PFS) ensures that if a key was compromised, the attacker will be able to access only the data protected by that key. **None** - Do not request for PFS when initiating connection. However, since there is no valid reason to refuse PFS, the system will allow the connection to use PFS if requested by the remote peer. This is the default value. **Group 2**: 1024-bit Diffie-Hellman group. The larger the group number, the higher the security. **Group 5**: **1536-bit** is the third option.

Phase 2 SA Lifetime	This setting specifies the lifetime limit of this Phase 2 Security Association. By default, it is set at **28800** seconds.

WAN Connection Priority	
Priority	WAN Selection
1	WAN 1
2	-----

WAN Connection Priority	
WAN Connection	Select the appropriate WAN connection from the drop-down menu.

10.2 GRE Tunnel

Generic Routing Encapsulation (GRE) is a tunneling protocol that can encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an Internet Protocol network. A GRE tunnel is similar to IPSec or SpeedFusion VPN.

To configure a GRE Tunnel, navigate to **Advanced > GRE Tunnel**.

GRE Tunnel Profiles	Remote Networks	
No GRE profile defined		
New Profile		

Click the **New Profile** button to create new GRE tunnel profiles that establish tunnel connections to remote tunnel endpoints via available WAN connections. To edit the profiles, click on its associated connection name in the leftmost column.

GRE Tunnel Profile Settings	
Name	This field is for specifying a name to represent this GRE Tunnel connection profile.
Active	When this box is checked, this GRE Tunnel connection profile will be enabled. Otherwise, it will be disabled.
Remote GRE IP Address	This field is for entering the remote GRE's IP address
Tunnel Local IP Address	This field is for specifying the tunnel source IP address.
Tunnel Remote IP Address	This field is for specifying the tunnel destination IP address
Tunnel Subnet Mask	This field is to select the subnet mask that is to be used for the GRE tunnel.
Connection	Select the appropriate WAN connection from the drop-down menu.
Remote Networks	Input the LAN and subnets that are located at the remote site here.

11 OpenVPN

OpenVPN is a site to site VPN mode that can encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an Internet Protocol network.

To configure a OpenVPN, navigate to **Advanced > OpenVPN** and click the **New Profile**.

OpenVPN Profile Settings	
Name	This field is for specifying a name to represent this OpenVPN profile.
Active	When this box is checked, this OpenVPN connection profile will be enabled. Otherwise, it will be disabled.
OpenVPN Profile	Upload the OpenVPN configuration (.ovpn) file from your service provider.
Login Credential (Optional)	This option is an optional for you to enter the username and password to login for the OpenVPN connection if the profile need to login.
Connection	Select the appropriate WAN connection from the drop-down menu.

12 Outbound Policy

Pepwave routers can flexibly manage and load balance outbound traffic among WAN connections.

Important Note
Outbound policy is applied only when more than one WAN connection is active.

The settings for managing and load balancing outbound traffic are located at
Advanced > Outbound Policy.

Outbound Policy (Drag and drop rows by the left to change rule order)					
Service	**Algorithm**	**Source**	**Destination**	**Protocol / Port**	
SpeedFusion VPN / OSPF / BGP / RIPv2 Routes					
≡ HTTPS_Persistence	Persistence (Src) (Auto)	Any	Any	TCP 443	✖
Default	(Auto)				
Add Rule					

Expert Mode	
Enabled	✏

12.1 Adding Rules for Outbound Policy

The menu underneath enables you to define Outbound policy rules:

Outbound Policy (Drag and drop rows by the left to change rule order)					
Service	**Algorithm**	**Source**	**Destination**	**Protocol / Port**	
SpeedFusion VPN / OSPF / BGP / RIPv2 Routes					
≡ HTTPS_Persistence	Persistence (Src) (Auto)	Any	Any	TCP 443	✖
Default	(Auto)				
Add Rule					

The bottom-most rule is **Default**. Edit this rule to change the device's default manner of controlling outbound traffic for all connections that do not match any of the rules above it. Under the **Service** heading, click **Default** to change these settings.

To rearrange the priority of outbound rules, drag and drop them into the desired sequence.

By default, **Auto** is selected as the **Default Rule**. You can select **Custom** to change the algorithm to be used. Please refer to the upcoming sections for the details on the available algorithms.

To create a custom rule, click **Add Rule** at the bottom of the table.

New Custom Rule Settings	
Service Name	This setting specifies the name of the outbound traffic rule.
Enable	This setting specifies whether the outbound traffic rule takes effect. When **Enable** is checked, the rule takes effect: traffic is matched and actions are taken by the Pepwave router based on the other parameters of the rule. When **Enable** is unchecked, the rule does not take effect: the Pepwave router disregards the other parameters of the rule. Click the drop-down menu next to the checkbox to apply a time schedule to this custom rule.
Source	This setting specifies the source IP Address, IP Network, MAC Address or Grouped Network for traffic that matches the rule.
Destination	This setting specifies the destination IP address, IP network, Domain name, SpeedFusion Cloud, SpeedFusion VPN Profile or Grouped network for traffic that matches the rule.

If **Domain Name** is chosen and a domain name, such as *foobar.com*, is entered, any outgoing accesses to *foobar.com* and **.foobar.com* will match this criterion. You may enter a wildcard (.*) at the end of a domain name to match any host with a name having the domain name in the middle. If you enter *foobar.*,* for example, *www.foobar.com*, *www.foobar.co.jp*, or *foobar.co.uk* will also match. Placing wildcards in any other position is not supported.

Note: if a server has one Internet IP address and multiple server names, and if one of the names is defined here, access to any one of the server names will also match this rule.

|	
Protocol and Port	This setting specifies the IP protocol and port of traffic that matches this rule. Via a drop-down menu, the following protocols can be specified: ● Any ● TCP ● UDP ● IP ● DSCP Alternatively, the **Protocol Selection Tool** drop-down menu can be used to automatically fill in the protocol and 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 remains manually modifiable.
Algorithm	This setting specifies the behavior of the Pepwave router for the custom rule. One of the following values can be selected (Note that some Pepwave routers provide only some of these options): ● Weighted Balance ● Persistence ● Enforced ● Priority ● Overflow ● Least Used ● Lowest Latency ● Fastest Response Time For a full explanation of each Algorithm, please see the following article: https://forum.peplink.com/t/exactly-how-do-peplinks-load-balancing-algorithmns-work/8059
Load Distribution Weight	This is to define the outbound traffic weight ratio for each WAN connection.

When No connections are available	This field allows you to configure the default action when all the selected Connections are not available. **Drop the Traffic** - Traffic will be discarded. **Use Any Available Connections** - Traffic will be routed to any available Connection, even it is not selected in the list. **Fall-through to Next Rule** - Traffic will continue to match the next Outbound Policy rule just like this rule is inactive.
Terminate Sessions on Connection Recovery	This setting specifies whether to terminate existing IP sessions on a less preferred WAN connection in the event that a more preferred WAN connection is recovered. This setting is applicable to the **Priority** algorithms. By default, this setting is disabled. In this case, existing IP sessions will not be terminated or affected when any other WAN connection is recovered. When this setting is enabled, existing IP sessions may be terminated when another WAN connection is recovered, such that only the preferred healthy WAN connection(s) is used at any point in time.

12.1.1 Algorithm: Weighted Balance

This setting specifies the ratio of WAN connection usage to be applied on the specified IP protocol and port. This setting is applicable only when **Algorithm** is set to **Weighted Balance**.
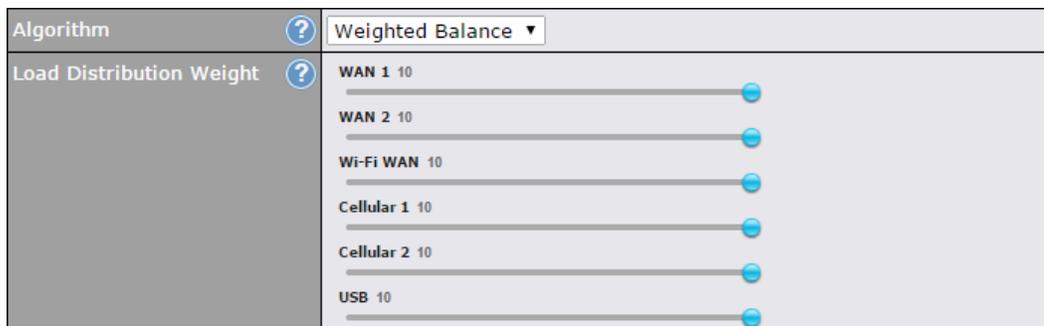
The amount of matching traffic that is distributed to a WAN connection is proportional to the weight of the WAN connection relative to the total weight. Use the sliders to change each WAN's weight.

For example, with the following weight settings:

- Ethernet WAN1: 10
- Ethernet WAN2: 10
- Wi-Fi WAN: 10
- Cellular 1: 10
- Cellular 2: 10

- USB: 10

Total weight is 60 = (10 +10 + 10 + 10 + 10 + 10).

Matching traffic distributed to Ethernet WAN1 is 16.7% = (10 / 60 x 100%.

Matching traffic distributed to Ethernet WAN2 is 16.7% = (10 / 60) x 100%.

Matching traffic distributed to Wi-Fi WAN is 16.7% = (10 / 60) x 100%.

Matching traffic distributed to Cellular 1 is 16.7% = (10 / 60) x 100%.

Matching traffic distributed to Cellular 2 is 16.7% = (10 / 60) x 100%.

Matching traffic distributed to USB is 16.7% = (10 / 60) x 100%.

12.1.2 Algorithm: Persistence

The configuration of persistent services is the solution to the few situations where link load distribution for Internet services is undesirable. For example, for security reasons, many e-banking and other secure websites terminate the session when the client computer's Internet IP address changes mid-session.

In general, different Internet IP addresses represent different computers. The security concern is that an IP address change during a session may be the result of an unauthorized intrusion attempt. Therefore, to prevent damages from the potential intrusion, the session is terminated upon the detection of an IP address change.

Pepwave routers can be configured to distribute data traffic across multiple WAN connections. Also, the Internet IP depends on the WAN connections over which communication actually takes place. As a result, a LAN client computer behind the Pepwave router may communicate using multiple Internet IP addresses. For example, a LAN client computer behind a Pepwave router with three WAN connections may communicate on the Internet using three different IP addresses.

With the persistence feature, rules can be configured to enable client computers to persistently utilize the same WAN connections for e-banking and other secure websites. As a result, a client computer will communicate using one IP address, eliminating the issues mentioned above.

There are two persistent modes: **By Source** and **By Destination**.

By Source:	The same WAN connection will be used for traffic matching the rule and originating from the same machine, regardless of its destination. This option will provide the highest level of application compatibility.
By Destination:	The same WAN connection will be used for traffic matching the rule, originating from the same machine, and going to the same destination. This option can better distribute loads to WAN connections when there are only a few client machines.

The default mode is **By Source**. When there are multiple client requests, they can be distributed (persistently) to WAN connections with a weight. If you choose **Auto** in **Load Distribution**, the weights will be automatically adjusted according to each WAN's **Downstream Bandwidth** which is specified in the WAN settings page). If you choose **Custom**, you can customize the weight of each WAN manually by using the sliders.

12.1.3 Algorithm: Enforced

This setting specifies the WAN connection usage to be applied on the specified IP protocol and port. This setting is applicable only when **Algorithm** is set to **Enforced**.

Matching traffic will be routed through the specified WAN connection, regardless of the health check status of the WAN connection. Starting from Firmware 5.2, outbound traffic can be enforced to go through a specified SpeedFusion™ connection.

12.1.4 Algorithm: Priority

This setting specifies the priority of the WAN connections used to route the specified network service. The highest priority WAN connection available will always be used for routing the specified type of traffic. A lower priority WAN connection will be used only when all higher priority connections have become unavailable.

Algorithm ?	Priority ▾
Priority Order ?	**Highest Priority** / WAN: WAN / WAN: Cellular 1 / WAN: Cellular 2 / WAN: USB / WAN: LAN 1 as WAN / WAN: GRE WAN 1 / WAN: GRE WAN 2 / WAN: OpenVPN WAN 1 / Lowest Priority — Not In Use
When No Connections are Available ?	Drop the Traffic ▾
Terminate Sessions on Connection Recovery ?	☐ Enable

Starting from Firmware 5.2, outbound traffic can be prioritized to go through SpeedFusion™ connection(s). By default, VPN connections are not included in the priority list.

Tip
Configure multiple distribution rules to accommodate different kinds of services.

12.1.5 Algorithm: Overflow

The traffic matching this rule will be routed through the healthy WAN connection that has the highest priority and is not in full load. When this connection gets saturated, new sessions will be routed to the next healthy WAN connection that is not in full load.

Algorithm ?	Overflow ▾
Overflow Order ?	**Highest Priority** / WAN: WAN 1 / WAN: WAN 2 / WAN: Wi-Fi WAN / WAN: Cellular 1 / WAN: Cellular 2 / WAN: USB / Lowest Priority

Drag and drop to specify the order of WAN connections to be used for routing traffic. Only the highest priority healthy connection that is not in full load will be used.

12.1.6 Algorithm: Least Used

The traffic matching this rule will be routed through the healthy WAN connection that is selected in **Connection** and has the most available download bandwidth. The available download bandwidth of a WAN connection is calculated from the total download bandwidth specified on the WAN settings page and the current download usage. The available bandwidth and WAN selection is determined every time an IP session is made.

12.1.7 Algorithm: Lowest Latency

The traffic matching this rule will be routed through the healthy WAN connection that is selected in **Connection** and has the lowest latency. Latency checking packets are issued periodically to a nearby router of each WAN connection to determine its latency value. The latency of a WAN is the packet round trip time of the WAN connection. Additional network usage may be incurred as a result.

Tip
The roundtrip time of a 6M down/640k uplink can be higher than that of a 2M down/2M up link because the overall round trip time is lengthened by its slower upload bandwidth, despite its higher downlink speed. Therefore, this algorithm is good for two scenarios: ● All WAN connections are symmetric; or ● A latency sensitive application must be routed through the lowest latency WAN, regardless of the WAN's available bandwidth.

12.1.8 Expert Mode

Expert Mode is available on some Pepwave routers for use by advanced users. To enable the feature, click on the help icon and click **turn on Expert Mode**.

In Expert Mode, a new special rule, **SpeedFusion™ Routes**, is displayed in the **Custom Rules** table. This rule represents all SpeedFusion™ routes learned from remote VPN peers. By default, this bar is on the top of all custom rules. This position means that traffic for remote VPN subnets will be routed to the corresponding VPN peer. You can create custom **Priority** or **Enforced** rules and move them

above the bar to override the SpeedFusion™ routes.

Upon disabling Expert Mode, all rules above the bar will be removed.

13   Port Forwarding

Pepwave routers can act as a firewall that blocks, by default, all inbound access from the Internet. By using port forwarding, Internet users can access servers behind the Pepwave router. Inbound port forwarding rules can be defined at **Advanced > Port Forwarding**.

Service	IP Address(es)	Server	Protocol	
	No Services Defined			
	Add Service			

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

Port Forwarding

Enable	☑
Service Name	
Protocol	TCP ▼ ← :: Protocol Selection :: ▼
Port	Any Port ▼
Inbound IP Address(es) (Require at least one IP address)	**Connection / IP Address(es)** All Clear ☐ WAN ☐ Cellular ☐ Wi-Fi WAN on 2.4 GHz ☐ Wi-Fi WAN on 5 GHz ☐ SpeedFusion VPN
Server IP Address	

Save   Cancel

Port Forwarding Settings	
Enable	This setting specifies whether the inbound service takes effect. When **Enable** is checked, the inbound service takes effect: traffic is matched and actions are taken by the Pepwave router based on the other parameters of the rule. When this setting is disabled, the inbound service does not take effect: the Pepwave router disregards the other parameters of the rule.
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 **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 the Pepwave router 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: **Any Port**, **Single Port**, **Port Range**, **Port Map**, and **Range Mapping** **Any Port**: all traffic that is received by the Pepwave router via the specified protocol is forwarded to the servers specified by the **Servers** 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 servers specified by the **Servers** 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 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 **Servers** 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 Pepwave router via the specified protocol at the specified port is forwarded via a different port to the servers specified by the **Servers** 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 servers via port 88. (Please see below for details on the **Servers** setting.)

| Port | | Range Mapping ▼ | Service Ports: | 80 | - | 88 | |
| | | | Map to Ports: | 88 | - | 96 | |

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 **Servers** 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.

13.1 UPnP / NAT-PMP Settings

UPnP and NAT-PMP are network protocols which allow a computer connected to the LAN port to automatically configure the router to allow parties on the WAN port to connect to itself. That way, the process of inbound port forwarding becomes automated.

When a computer creates a rule using these protocols, the specified TCP/UDP port of all WAN connections' default IP address will be forwarded.

Check the corresponding box(es) to enable UPnP and/or NAT-PMP. Enable these features only if you trust the computers connected to the LAN ports.

UPnP / NAT-PMP Settings	
UPnP	☐ Enable
NAT-PMP	☐ Enable
	Save

When the options are enabled, a table listing all the forwarded ports under these two protocols can be found at **Status > UPnP / NAT-PMP**.

14   NAT Mappings

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 **Advanced > NAT Mappings**.

LAN Clients	Inbound Mappings	Outbound Mappings	
192.168.1.23	(WAN 1):10.88.3.158 (Interface IP)	Use *Interface IP* only	✖
	Add NAT Rule		

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

NAT Mapping Settings	
LAN Client	NAT mapping rules can be defined for a single LAN **IP Address**, an **IP Range**, or an **IP Network**.
IP Address	This refers to the LAN host's private IP address. The system maps this address to a number of public IP addresses (specified below) in order to facilitate inbound and outbound traffic. This option is only available when **IP Address** is selected.
IP Range	The IP range is a contiguous group of private IP addresses used by the LAN host. The system maps these addresses to a number of public IP addresses (specified below) to facilitate outbound traffic. This option is only available when **IP Range** is selected.

IP Network	The IP network refers to all private IP addresses and ranges managed by the LAN host. The system maps these addresses to a number of public IP addresses (specified below) to facilitate outbound traffic. This option is only available when **IP Network** is selected.
Inbound Mappings	This setting specifies the WAN connections and corresponding WAN-specific Internet IP addresses on which the system should bind. Any access to the specified WAN connection(s) and IP address(es) will be forwarded to the LAN host. This option is only available when **IP Address** is selected in the **LAN Client(s)** field. **Note that:** inbound mapping is not needed for WAN connections in drop-in mode or IP forwarding mode. Also note that each WAN IP address can be associated to one NAT mapping only.
Outbound Mappings	This setting specifies the WAN IP addresses that should be used when an IP connection is made from a LAN host to the Internet. Each LAN host in an IP range or IP network will be evenly mapped to one of each selected WAN's IP addresses (for better IP address utilization) in a persistent manner (for better application compatibility). **Note that:** if you do not want to use a specific WAN for outgoing accesses, you should still choose default here, then customize the outbound access rule in the **Outbound Policy** section. Also note that WAN connections in drop-in mode or IP forwarding mode are not shown here.

Click **Save** to save the settings when configuration has been completed.

Important Note
Inbound firewall rules override the **Inbound Mappings** settings.

15   Media Fast

MediaFast settings can be configured from the **Advanced** menu.

15.1   Setting Up MediaFast Content Caching

To access MediaFast content caching settings, select **Advanced > Cache Control**

MediaFast	
Enable	Click the checkbox to enable MediaFast content caching.
Domains / IP Addresses	Choose to **Cache on all domains**, or enter domain names and then choose either **Whitelist** (cache the specified domains only) or **Blacklist** (do not cache the specified domains).
Source IP Subnet	This setting allows caching to be enabled on custom subnets only. If "Any" is selected, then caching will apply to all subnets.

The **Secure Content Caching** menu operates identically to the **MediaFast** menu, except it is for secure content cachting accessible through https://.

In order for Mediafast devices to cache and deliver HTTPS content, every client needs to have the necessary certificates installed*.

*See https://forum.peplink.com/t/certificate-installation-for-mediafast-https-caching/

Cache Control	
Content Type	Check these boxes to cache the listed content types or leave boxes unchecked to disable caching for the listed types.
Cache Lifetime Settings	Enter a file extension, such as JPG or DOC. Then enter a lifetime in days to specify how long files with that extension will be cached. Add or delete entries using the controls on the right.

15.2 Viewing MediaFast Statistics

To get details on storage and bandwidth usage, select **Status > MediaFast**.
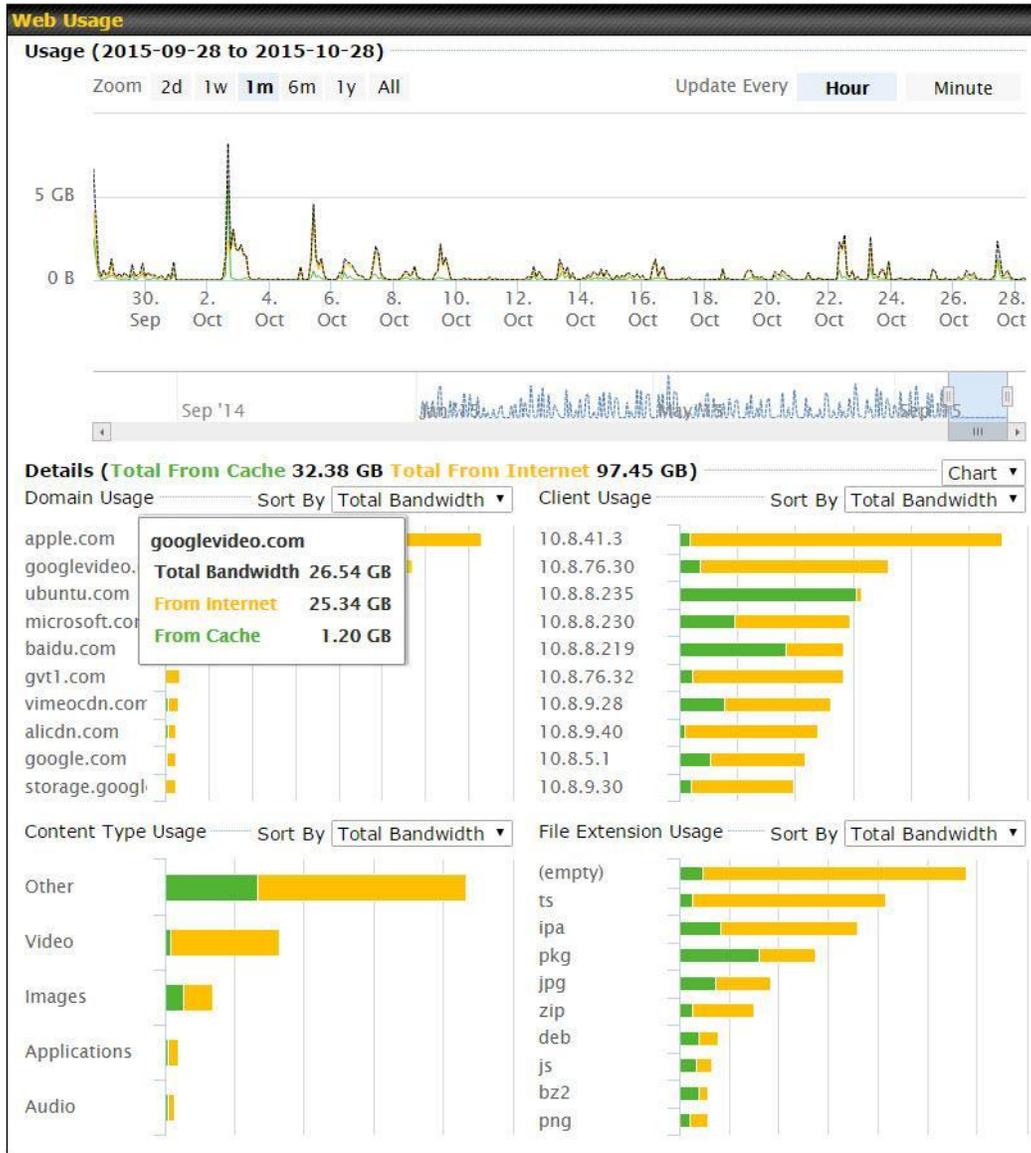
15.3 Prefetch Schedule

Content prefetching allows you to download content on a schedule that you define, which can help to preserve network bandwidth during busy times and keep costs down. To access MediaFast content prefetching settings, select **Advanced > Prefetch Schedule**.

Prefetch Schedule Settings	
Name	This field displays the name given to the scheduled download.
Status	Check the status of your scheduled download here.
Next Run Time/Last Run Time	These fields display the date and time of the next and most recent occurrences of the scheduled download.
Last Duration	Check this field to ensure that the most recent download took as long as expected to complete. A value that is too low might indicate an incomplete download or incorrectly specified download target, while a value that is too long could mean a download with an incorrectly specified target or stop time.
Result	This field indicates whether downloads are in progress (🕑) or complete (✔).
Last Download	Check this field to ensure that the most recent download file size is within the expected range. A value that is too low might indicate an incomplete download or incorrectly specified download target, while a value that is too long could mean a download with an incorrectly specified target or stop time. This field is also useful for quickly seeing which downloads are consuming the most storage space.
Actions	To begin a scheduled download immediately, click ⬇ . To cancel a scheduled download, click ⬛ . To edit a scheduled download, click ✎ . To delete a scheduled download, click ✖ .

New Schedule	Click to begin creating a new scheduled download. Clicking the button will cause the following screen to appear: **MediaFast Schedule** ✕ Name (optional) [ ] Active ☑ URL URL [ ] ➕ Depth [2 ▾] levels [Default] Time Period From [00 ▾] : [00 ▾] to [01 ▾] : [00 ▾] Repeat [Everyday ▾] Bandwidth Limit [0] [Gbps ▾] (0: Unlimited) [Save & Apply Now] [Cancel] Simply provide the requested information to create your schedule.
Clear Web Cache	To clear all cached content, click this button. Note that this action cannot be undone.
Clear Statistics	To clear all prefetch and status page statistics, click this button.

16 Edge Computing

ContentHub allows you to deliver webpages and applications to users connected to the SSID using the local storage on your router, like the Max HD2/HD4 with Mediafast, which can store up to 8GB of media. Users will be able to access news, articles, videos, and access your web app without the need for internet access.

The ContentHub can be used to provide infotainment to connected users on transport.

16.1 Configuring the ContentHub

ContentHub storage needs to be configured before content can be uploaded to the ContentHub. Click on the link on the information panel to configure storage.

ContentHub storage has not been configured. Click here to review storage configuration

To access ContentHub, navigate to **Advanced** > **ContentHub** and check the **Enable** box.

On an external server, configure content (a website or application) that will be synced to the ContentHub. For example, an html5 website.

To configure a website or application as content, follow the steps below.

16.2 Configure a website for ContentHub

This option allows you to sync a website to the Pepwave router. This website will then be published with the specified domain from the router itself and makes the content available to the client via the HTTP/HTTPS protocol.

Only FTP sync is supported for this type of ContentHub content.

The content should be uploaded to an FTP server before you sync it with ContentHub.

Click **New Website** and a window with the following configuration options will appear:

Schedule	
Active	Checking the box toggles the activation of the content.
Type	Select the type of content: Website or Application.
Protocol	Configure the protocol to be used: HTTP, HTTPS or both.
Domain/Path	Enter the URL for the ContenHub to use as the domain name for client access (such as http://mytest.com).
Method	Only applicable for **Application** type content. Choose between sync or file upload.
Source	Enter the details of the server that the content will be downloaded from. Enter credentials under **Username** and **Password**.
Period	This field determines how often the router will search for updates to the source content.
Bandwidth Limit	Set a bandwidth limit for clients.

Click "**Save & Apply Now**" to activate the changes. A screenshot of the display after configuration is shown below:

The content will be synced regularly according to the time set in the **Period** that was configured earlier.

If you want to activate the sync manually, you can click the " " icon. The "Status" column will display the sync progress. When the sync is completed, a summary will be displayed, as shown in the screenshot below:
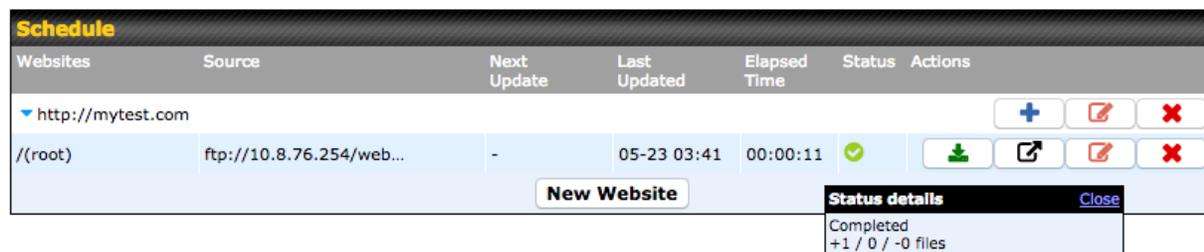
To access the content, open a browser in the MFA's client and enter the domain details that were configured earlier (such as http://mytest.com).

16.3 Configure an application for ContentHub

MediaFast routers allow you to configure and publish any application from the router itself by using one of the supported frameworks below:
- Python (version 2.7.12)
- Ruby (version 2.3.3)
- Node.js (version 6.9.2)

Install the desired framework under "Package Manager" as shown below:

After installing the framework, change the "Type" to "Application" and configure the website.

The setting is the same as the Website type (refer to the description in the section above).

Application type content need to be packed as explained below:
1. Implement two bash script files, start.sh and stop.sh in the root folder, to start and stop your application. The MediaFast router will only execute start.sh and stop.sh when the corresponding website is enabled and disabled respectively.
2. Compress the application files and the bash script to .tar.gz format.
3. Upload this tar file to the router.

17   Docker

MediaFast enabled routers can host Docker containers when running Firmware 7.1 or later.

Docker is an open platform for developing, shipping, and running applications.

From Firmware version 7.1.0 and upwards, it is possible to install and run Docker Containers on your Pepwave routers with MediaFast, such as the MAX HD2 and the MAX HD4.

Due to the nature of Docker and its unlimited variables, this feature is supported by Pepwave up to the point of creating a running Docker Container.

Information about Docker can be found on the Docker Documentation site:

https://docs.docker.com/ 2

This will allow you to run a file sharing platform (ownCloud), a web server (WordPress, Joomla!) , a learning platform (Moodle), or a visualisation tool for viewing large scale data (Kibana).

When creating a new Docker Container, the Pepwave router will search through the Docker Hub repository. https://hub.docker.com/explore/ 7

For detailed configuration instructions, refer to our knowledge base:

https://forum.peplink.com/t/how-to-run-a-docker-application-on-a-peplink-mediafast-router/16021

18 KVM

MediaFast enabled routers now support KVM. Users will have to download and install Virtual Machine Manager to manage the KVM virtual machines. Through this, users are able to virtualise a Linux environment.

KVM	
Enable	☑

Save

Click here to open file manager

For detailed configuration instructions, refer to our knowledge base articles:

1. **How to install a Virtual Machine on Peplink/Pepwave - MediaFast/ContentHub Routers**

2. **How to Install Virtual Machine with USB storage on Peplink/Pepwave - MediaFast/ContentHub Routers**

19   QoS

19.1   User Groups

LAN and PPTP clients can be categorized into three user groups: **Manager, Staff, and Guest**. This menu allows you to define rules and assign client IP addresses or subnets to a user group. You can apply different bandwidth and traffic prioritization policies on each user group in the **Bandwidth Control** and **Application** sections (note that the options available here vary by model).

The table is automatically sorted by rule precedence. The smaller and more specific subnets are put towards the top of the table and have higher precedence; larger and less specific subnets are placed towards the bottom.

Click the **Add** button to define clients and their user group. Click the [×] button to remove the defined rule. Two default rules are pre-defined and put at the bottom. They are **All DHCP reservation clients** and **Everyone**, and they cannot be removed. The **All DHCP reservation client represents** the LAN clients defined in the DHCP Reservation table on the LAN settings page. **Everyone** represents all clients that are not defined in any rule above. Click on a rule to change its group.

Add / Edit User Group	
Grouped by	From the drop-down menu, choose whether you are going to define the client(s) by an **IP Address** or a **Subnet**. If **IP Address** is selected, enter a name defined in DHCP reservation table or a LAN client's IP address. If **Subnet** is selected, enter a subnet address and specify its subnet mask.
User Group	This field is to define which **User Group** the specified subnet / IP address belongs to.

Once users have been assigned to a user group, their internet traffic will be restricted by rules defined for that particular group. Please refer to the following two sections for details.

19.2 Bandwidth Control

This section is to define how much minimum bandwidth will be reserved to each user group when a WAN connection is **in full load**. When this feature is enabled, a slider with two indicators will be shown. You can move the indicators to adjust each group's weighting. The lower part of the table shows the corresponding reserved download and uploads bandwidth value of each connection.

By default, **50%** of bandwidth has been reserved for Manager, **30%** for Staff, and **20%** for Guest.

Group Bandwidth Reservation			
Enable	✔		
	Manager	Staff	Guest
Bandwidth %	50%	30%	20%
WAN 1	500.0M/500.0M	300.0M/300.0M	200.0M/200.0M
WAN 2	500.0M/500.0M	300.0M/300.0M	200.0M/200.0M

You can define a maximum download speed (over all WAN connections) and upload speed (for each WAN connection) that each individual Staff and Guest member can consume. No limit can be imposed on individual Managers. By default, download and upload bandwidth limits are set to unlimited (set as **0**).

Individual Bandwidth Limit		
Enable	✔	
User Bandwidth Limit	Download	Upload
Manager	Unlimited	Unlimited
Staff	0 Mbps	0 Mbps (0: Unlimited)
Guest	0 Mbps	0 Mbps (0: Unlimited)

19.3 Application Queue

This section is to define the QoS Application Queue. You can set guaranteed bandwidth for a queue and assign it to applications.

QoS Application Queue
No Application Queue Defined
Add

Click the Add button to create the QoS Application Queue.

Add Queue	
Name	This setting specifies a name for the QoS Application Queue.
Bandwidth	Bandwidth to be reserved (for each WAN connection) for this queue. When WAN is congested, this bandwidth will remain available for applications assigned to this queue.
Borrow Spare Bandwidth	Enable this option if you want this queue to utilize WAN's unused bandwidth.

19.4 Application

19.4.1 Application Prioritization

On many Pepwave routers, you can choose whether to apply the same prioritization settings to all user groups or customize the settings for each group.

Three application priority levels can be set: ↑ **High**, ▬ **Normal**, and ↓ **Low**. Pepwave routers can detect various application traffic types by inspecting the packet content. Select an application by choosing a supported application, or by defining a custom application manually. The priority preference of supported applications is placed at the top of the table. Custom applications are at the bottom.

19.4.2 Prioritization for Custom Applications

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 router 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.

19.4.3 DSL/Cable Optimization

DSL/cable-based WAN connections have lower upload bandwidth and higher 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. **DSL/Cable Optimization** can relieve such an issue. When it is enabled, the download speed will become less affected by the upload traffic. By default, this feature is disabled.

19.4.4 SpeedFusion VPN Traffic Optimization

To enable this option to allow SpeedFusion VPN traffic has highest priority when WAN is congested.

20   Firewall

A firewall is a mechanism that selectively filters data traffic between the WAN side (the Internet) and the LAN side of the network. It can protect the local network from potential hacker attacks, access to offensive websites, and/or other inappropriate uses.

The firewall functionality of Pepwave routers supports the selective filtering of data traffic in both directions:

-
-
- Outbound (LAN to WAN)
- Inbound (WAN to LAN)
- Internal Network (VLAN to VLAN)
- Local Service

The firewall also supports the following functionality:
- Intrusion detection and DoS prevention
- Web blocking

With SpeedFusion™ enabled, the firewall rules also apply to VPN tunneled traffic.

20.1 Access Rules

Outbound Firewall Rules

The outbound firewall settings are located at **Advanced > Firewall > Access Rules.**

To enable or disable the Outbound Firewall to manage device local network traffic, click on the help icon and click here, the sceen will shows below.

Note

To utilize the Outbound Firewall Rule to block the Peplink device from contacting InControl 2. may refer to the link below:

https://forum.peplink.com/t/faq-prevent-device-reaching-incontrol-2./63f48fdfd466df34ab475f55/

Click **Add Rule** to display the following screen:

Inbound Firewall Rules

Inbound firewall settings are located at **Advanced > Firewall > Access Rules.**

Click **Add Rule** to display the following screen:

Internal Network Firewall Rules

Internal Network firewall settings are located at **Advanced > Firewall > Access Rules.**

Click **Add Rule** to display the following window:

Inbound / Outbound / Internal Network Firewall Settings	
Rule Name	This setting specifies a name for the firewall rule.
Enable	This setting specifies whether the firewall rule should take effect. If the box is checked, the firewall rule takes effect. If the traffic matches the specified protocol/IP/port, actions will be taken by the Pepwave router based on the other parameters of the rule. If the box is not checked, the firewall rule does not take effect. The Pepwave router will disregard the other parameters of the rule. Click the dropdown menu next to the checkbox to place this firewall rule on a time schedule.
WAN Connection (Inbound)	Select the WAN connection that this firewall rule should apply to.
Protocol	This setting specifies the protocol to be matched. Via a drop-down menu, the following protocols can be specified: ● **Any** ● **TCP** ● **UDP** ● **ICMP** ● **DSCP** ● **IP** Alternatively, the **Protocol Selection Tool** drop-down menu can be used to automatically fill in the protocol and 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 remains manually modifiable.
Source IP & Port	This specifies the source IP address(es) and port number(s) to be matched for the firewall rule. A single address, or a network, can be specified as the **Source IP & Port** setting, as indicated by the following screenshot: In addition, a single port, or a range of ports, can be specified for the **Source IP & Port** settings.
Destination IP & Port	This specifies the destination IP address(es) and port number(s) to be matched for the firewall rule. A single address, or a network, can be specified as the **Destination IP & Port** setting, as indicated by the following screenshot: In addition, a single port, or a range of ports, can be specified for the **Destination IP & Port** settings.
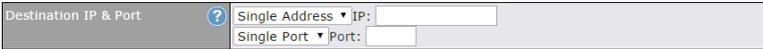
Action	This setting specifies the action to be taken by the router upon encountering traffic that matches the both of the following: ● Source IP & port ● Destination IP & port With the value of **Allow** for the **Action** setting, the matching traffic passes through the router (to be routed to the destination). If the value of the **Action** setting is set to **Deny**, the matching traffic does not pass through the router (and is discarded).
Event Logging	This setting specifies whether or not to log matched firewall events. The logged messages are shown on the page **Status>Event Log**. A sample message is as follows: Aug 13 23:47:44 Denied CONN=Ethernet WAN SRC=20.3.2.1 DST=192.168.1.20 LEN=48 PROTO=TCP SPT=2260 DPT=80 ● **CONN:** The connection where the log entry refers to ● **SRC:** Source IP address ● **DST:** Destination IP address ● **LEN:** Packet length ● **PROTO:** Protocol ● **SPT:** Source port ● **DPT:** Destination port

Click **Save** to store your changes. To create an additional firewall rule, click **Add Rule** and repeat the above steps.

To change a rule's priority, simply drag and drop the rule:

● Hold the left mouse button on the rule.
● Move it to the desired position.
● Drop it by releasing the mouse button.
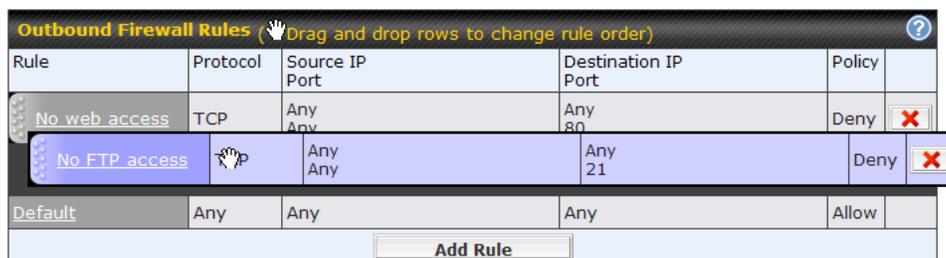
To remove a rule, click the ![X] button.

Rules are matched from top to bottom. If a connection matches any one of the upper rules, the matching process will stop. If none of the rules match, the **Default** rule will be applied. By

default, the **Default** rule is set as **Allow** for Outbound, Inbound and Internal Network access.

Tip
If the default inbound rule is set to **Allow** for NAT-enabled WANs, no inbound Allow firewall rules will be required for inbound port forwarding and inbound NAT mapping rules. However, if the default inbound rule is set as **Deny**, a corresponding Allow firewall rule will be required.

Intrusion Detection and DoS Prevention

Pepwave routers can detect and prevent intrusions and denial-of-service (DoS) attacks from the Internet. To turn on this feature, click , check the **Enable** check box, and press the **Save** button.

When this feature is enabled, the Pepwave router will detect and prevent the following kinds of intrusions and denial-of-service attacks.

- Port scan
  - o NMAP FIN/URG/PSH
  - o Xmas tree
  - o Another Xmas tree
  - o Null scan
  - o SYN/RST
  - o SYN/FIN
- SYN flood prevention
- Ping flood attack prevention

Local Service Firewall Rules

For every WAN inbound traffic to local service, rules will be matched to take the defined action. The Local Service firewall settings are located at **Advanced > Firewall > Access Rules**.

Click **Add Rule** to display the following window:

Local Service Firewall Settings	
Rule Name	This setting specifies a name for the firewall rule.
Enable	This setting specifies whether the firewall rule should take effect.
	If the box is checked, the firewall rule takes effect. If the traffic matches the specified protocol/IP/port, actions will be taken by Peplink Balance based on the other parameters of the rule.
	If the box is not checked, the firewall rule does not take effect. The Peplink Balance will disregard the other parameters of the rule.
	Click the dropdown menu next to the checkbox to place this firewall rule on a time schedule.
Service	This option allows you to define the supported local service to be matched.
	If Any is chosen, the firewall rule will match to all supported local services from the list.
	Via a drop-down menu, the following services can be specified:
	• Any
	• SpeedFusion / PepVPN Handshake
	• SpeedFusion / PepVPN Data Port
	• Web Admin Access
	• DNS Server
	• SNMP Server
	• KVM Management Port
	• KVM VNC Port
	• FusionSIM Agent / Remote SIM Proxy
WAN Connection	Select the WAN connection that this firewall rule should apply to.
Source	This specifies the source IP address and IP Network to be matched for the firewall rule.
Action	With the value of **Allow** for the **Action** setting, the matching traffic passes through the router (to be routed to the destination). If the value of the **Action** setting is set to **Deny**, the matching traffic does not pass through the router (and is discarded).

Event Logging	This setting specifies whether or not to log matched firewall events. The logged messages are shown on the page **Status>Event Log**. A sample message is as follows:
	Aug 13 23:47:44 Denied CONN=Ethernet WAN SRC=20.3.2.1
	DST=192.168.1.20 LEN=48 PROTO=TCP SPT=2260 DPT=80
	● **CONN:** The connection where the log entry refers to
	● **SRC:** Source IP address
	● **DST:** Destination IP address
	● **LEN:** Packet length
	● **PROTO:** Protocol
	● **SPT:** Source port
	● **DPT:** Destination port

20.2 Content Blocking

20.2.1 Application Blocking

Choose applications to be blocked from LAN/PPTP/SpeedFusion VPN peer clients' access, except for those on the Exempted User Groups or Exempted Subnets defined below.

20.2.2 Web Blocking

Defines website domain names to be blocked from LAN/PPTP/SpeedFusion VPN peer clients' access except for those on the Exempted User Groups or Exempted Subnets defined below.

If "foobar.com" is entered, any web site with a host name ending in foobar.com will be blocked, e.g. www.foobar.com, foobar.com, etc. However, "myfoobar.com" will not be blocked.

You may enter the wild card ".*" at the end of a domain name to block any web site with a host name having the domain name in the middle. If you enter "foobar.*", then "www.foobar.com", "www.foobar.co.jp", or "foobar.co.uk" will be blocked. Placing the wild card in any other position

is not supported.

The device will inspect and look for blocked domain names on all HTTP and HTTPS traffic.

20.2.3 Customized Domains

Enter an appropriate website address, and the Pepwave MAX will block and disallow LAN/PPTP/SpeedFusionTM peer clients to access these websites. Exceptions can be added using the instructions in Sections 20.1.3.2 and 20.1.3.3.

You may enter the wild card ".*" at the end of a domain name to block any web site with a host name having the domain name in the middle. For example, If you enter "foobar.*," then "www.foobar.com," "www.foobar.co.jp," or "foobar.co.uk" will be blocked. Placing the wild card in any other position is not supported.

The Pepwave MAX will inspect and look for blocked domain names on all HTTP traffic. Secure web (HTTPS) traffic is not supported.

20.2.4 Exempted User Groups

Check and select pre-defined user group(s) who can be exempted from the access blocking rules. User groups can be defined at **QoS>User Groups** section. Please refer to **Section 17.1** for details.

20.2.5 Exempted Subnets

With the subnet defined in the field, clients on the particular subnet(s) can be exempted from the access blocking rules.

21   Routing Protocols

21.1   OSPF & RIPv2

The Pepwave supports OSPF and RIPv2 dynamic routing protocols.
Click the **Advanced** tab from the top bar, and then click the **Routing Protocols > OSPF & RIPv2** item on the sidebar to reach the following menu:

OSPF			
Router ID	LAN IP Address		📝
Area	**Interfaces**		
No OSPF Area Defined.			
Add			

RIPv2	
No RIPv2 Defined.	📝

OSPF & RIPv2 Route Advertisement		
SpeedFusion VPN Route Isolation ❓	☐ Enable	
Network Advertising ❓	--- ▼	➕
	All LAN/VLAN networks will be advertised when no network advertising is chosen.	
Static Route Advertising ❓	☑ Enable	
	Excluded Networks	Subnet Mask
		255.255.255.0 (/24) ▼ ➕
Save		

OSPF	
Router ID	This field determines the ID of the router. By default, this is specified as the WAN IP address. If you want to specify your own ID, enter it into the **Custom** field.
Area	This is an overview of the OSPF areas that you have defined. Clicking on the name under Area allows you to configure the connection. To define a new area, click **Add**. To delete an existing area, click on the ❌ .

OSPF settings

Area ID	0.0.0.0
Link Type	⦿ Broadcast ◯ Point-to-Point
Authentication	None ▾
Interfaces	☐ Untagged LAN ☐ V167 (192.168.167.1/24) ☐ WAN 1 ☐ WAN 2 ☐ WAN 3 ☐ WAN 4 ☐ WAN 5 ☑ PepVPN

Save Cancel

OSPF Settings	
Area ID	Assign a name to be applied to this group. Machines linked to this group will send and receive related OSPF packets, while unlinked machines will ignore them.
Link Type	Choose the type of network that this area will use.
Authentication	If an authentication method is used, select one from this drop-down menu. Available options are **MD5** and **Text**. Authentication key(s) may be input next to the drop-down menu after selecting an authentication method.
Interfaces	Select the interface(s) that this area will use to listen to and deliver OSPF packets.

To access RIPv2 settings, click on [edit icon] .

RIPv2 settings

Authentication	None ▾
Interfaces	☐ Untagged LAN ☐ V167 (192.168.167.1/24) ☐ WAN 1 ☐ WAN 2 ☐ WAN 3 ☐ WAN 4 ☐ WAN 5

Save Cancel

RIPv2 Settings	
Authentication	If an authentication method is used, select one from this drop-down menu. Available options are **MD5** and **Text**. Authentication key(s) may be input next to the drop-down menu after selecting an authentication method.
Interfaces	Select the interface(s) that this area will use to listen to and deliver RIPv2 packets.

OSPF & RIPv2 Route Advertisement	
SpeedFusion VPN Route Isolation	Isolate SpeedFusion VPN peers from each other. Received SpeedFusion VPN routes will not be forwarded to other SpeedFusion VPN peers to reduce bandwidth consumption..
Network Advertising	Networks to be advertised over OSPF & RIPv2. If no network is selected, all LAN / VLAN networks will be advertised by default.
Static Route Advertising	Enabling OSPF & RIPv2 Route Advertising allows it to advertise LAN static routes over OSPF & RIPv2. Static routes on the Excluded Networks table will not be advertised.

21.2 BGP

Click the **Advanced** tab along the top bar, and then click the **BGP** item on the sidebar to configure BGP.

Click the "**x**" to delete a BGP profile.
Click "**Add**" to create a new BGP profile.

BGP Profile	
Name	This field specifies the name that represents this profile.
Enable	When this box is checked, this BGP profile will be enabled. If it is left unchecked, it will be disabled.
Interface	The interface in which the BGP neighbor is located.
Router ID	This field specifies the unique IP as the identifier of the local device running BGP.
Autonomous System	The Autonomous System Number (ASN) assigned to this profile.
Neighbor	BGP Neighbors and their details.
IP address	The IP address of the Neighbor.
Autonomous System	The Neighbor's ASN.
Multihop/TTL	This field determines the Time-to-live (TTL) of BGP packets. Leave this field blank if the BGP neighbor is directly connected, otherwise you must specify a TTL value. This option should be used if the configured Neighbor's IP address does not match the selected Interface's network subnets. The TTL value must be between 2 to 255.
Password	(Optional) Assign a password for MD5 authentication of BGP sessions.
AS-Path Prepending:	AS path to be prepended to the routes received from this Neighbor. Values must be ASN and separated by commas. For example: inputting "64530,64531" will prepend "64530, 64531" to received

	routes.
Hold Time	Wait time in seconds for a keepalive message from a Neighbor before considering the BGP connection as stalled. The value must be either 0 (infinite hold time) or between 3 and 65535 inclusively. Default: 240
Next Hop Self	Enable this option to advertise your own source address as the next hop when propagating routes.
iBGP Local Preference	This is the metric advertised to iBGP Neighbors to indicate the preference for external routes. The value must be between 0 to 4294967295 inclusively. Default: 100
BFD	Enable this option to add Bidirectional Forwarding Detection for path failure. All directly connected Neighbors that use the same physical interface share the same BFD settings. All mulithop Neighbors share the same multihop BFD settings. You can configure BFD settings in the BGP profile listing page after this option is enabled.

Network Advertising	Select the Networks that will be advertised to the BGP Neighbor.
Static Route Advertising	Enable this option to advertise static LAN routes. Static routes that match the Excluded Networks table will not be advertised.
Custom Route Advertising	Additional routes to be advertised to the BGP Neighbor.
Advertise OSPF Route	When this box is checked, every learnt OSPF route will be advertised.
Set Community	Assign a prefix to a Community.

Community:

Two numbers in new-format.

e.g. 65000:21344

Well-known communities:

no-export 65535:65281

no-advertise 65535:65282

no-export-subconfed 65535:65283

no-peer 65535:65284

Route Prefix:

Comma separated networks.

e.g. 172.168.1.0/24,192.168.1.0/28

Route Import

Filter Mode	Accept ▼			
Restricted Networks	Network	Subnet Mask	Exact Match	
		255.255.255.0 (/24) ▼	☐	✚

Filter Mode	This field allows for the selection of the filter mode for route import. **None**: All BGP routes will be accepted. **Accept**: Routes in "Restricted Networks" will be accepted, routes not in the list will be rejected. **Reject**: Routes in "Blocked Networks" will be rejected, routes not in the list will be accepted.
Restricted Networks / Blocked Networks	This field specifies the network(s) in the "route import" entry. **Exact Match:** When this box is checked, only routes with the same Network and Subnet Mask will be filtered. Otherwise, routes within the Networks and Subnets will be filtered.

Route Export

Filter Mode	Accept ▼			
Restricted Networks	Network	Subnet Mask	Exact Match	
		255.255.255.0 (/24) ▼	☐	✚
Export to other BGP Profile	☐			
Export to OSPF	☐			

Filter Mode	This field allows for the selection of the filter mode for route export.

	None: All BGP routes will be accepted.
	Accept: Routes in "Restricted Networks" will be accepted, routes not in the list will be rejected.
	Reject: Routes in "Blocked Networks" will be rejected, routes not in the list will be accepted.
Restricted Networks / Blocked Networks	This field specifies the network(s) in the "route export" entry. **Exact Match:** When this box is checked, only routes with the same Network and Subnet Mask will be filtered. Otherwise, routes within the Networks and Subnets will be filtered.
Export to other BGP Profile	When this box is checked, routes learnt from this BGP profile will be exported to other BGP profiles.
Export to OSPF	When this box is checked, routes learnt from this BGP profile will be exported to the OSPF routing protocol.

22   Remote User Access

A remote-access VPN connection allows an individual user to connect to a private business network from a remote location using a laptop or desktop computer connected to the Internet. Networks routed by a Pepwave router can be remotely accessed via OpenVPN, L2TP with IPsec or PPTP. To configure this feature, navigate to **Advanced > Remote User Access** and choose the required VPN type.

Remote User Access Settings	
Enable	☑
VPN Type	⦿ L2TP with IPsec ◯ PPTP ◯ OpenVPN
Preshared Key	⦿ ☐
	☑ Hide Characters
Listen On	**Connection / IP Address(es)**
	☐ WAN 1
	☐ WAN 2
	☐ Wi-Fi WAN
	☐ Cellular 1
	☐ Cellular 2
	☐ USB
Authentication	Local User Accounts ▾
User Accounts	Username	Password	
			+
Save	

Remote User Access Settings	
Enable	When this box is checked, this Remote User Access profile will be enabled. If it is left unchecked, it will be disabled.
VPN Type	This field allows you to select the VPN type for the remote user access connection. The available options are: ● L2TP with IPsec <table><tr><td>VPN Type</td><td>⦿ L2TP with IPsec ◯ PPTP ◯ OpenVPN</td></tr><tr><td>Preshared Key</td><td>☐</td></tr><tr><td></td><td>☑ Hide Characters</td></tr></table> If L2TP with IPsec is selected, it may need to enter the pre-shared key for the remote user access. ● PPTP

| VPN Type | ○ L2TP with IPsec ● PPTP ○ OpenVPN |

If PPTP selected, there is no additional configuration required. The Point-to-Point Tunneling Protocol (PPTP) is an obsolete method for implementing virtual private networks. PPTP has many well known security issues

- OpenVPN

| VPN Type | ○ L2TP with IPsec ○ PPTP ● OpenVPN
You can obtain the OpenVPN client profile from the status page. |
| Connection Security Refresh | 60 minute(s) |

If the OpenVPN is selected, the OpenVPN Client profile can be downloaded from the **Status > Device** page after the configuration has been saved.

| OpenVPN Client Profile | ? | Route all traffic | Split tunnel |

You have a choice between 2 different OpenVPN Client profiles:
- **"Route all traffic" profile**
  Using this profile, VPN clients will send all the traffic through the OpenVPN tunnel
- **"Split tunnel" profile**
  Using this profile, VPN clients will ONLY send those traffic designated to the untagged LAN and VLAN segment through the OpenVPN tunnel.

Pre-shared Key	If **L2TP with IPsec** is selected in the VPN Type, enter the pre shared key in the text field. Please note that remote devices will need this preshared key to access the Balance.
Disabled Weak Ciphers	You may click the ? button to show in the Pre-shared key and enable this option. When checked, weak ciphers such as 3DES will be disabled. Please note: Legacy and Android devices may not able to connect.
Connection Security Refresh	If **OpenVPN** is selected in the VPN Type, this settings is for specifying the interval for refreshing the connection.
Listen On	This setting is for specifying the WAN IP addresses that allow remote user access.
Port	If **OpenVPN** is selected in the VPN Type, the **Port** setting specifies the port(s) that correspond to the service.
Authentication	Determine the method of authenticating remote users: - **Local User Accounts** Authentication: Local User Accounts User Accounts ? : Username / Password This setting allows you to define the Remote User Accounts. Click **Add** ⊞

to input username and password to create an account. After adding the user accounts, you can click on a username to edit the account password.

Note:

The username must contain lowercase letters, numerics, underscore(_), dash(-), at sign(@), and period(.) only.
The password must be between 8 and 12 characters long

- **LDAP Server**

Authentication	LDAP Server ⌄
Authentication Protocol	MS-CHAP v2 ⌄
LDAP Server	[ ] Port 389 ☐ Use DN/Password to bind to LDAP Server
Base DN	[ ]
Base Filter	[ ]

Enter the matching LDAP server details to allow for LDAP server authentication.

- **Radius Server**

Authentication Protocol	MS-CHAP v2 ⌄
	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
Authentication Secret	[ ] ☑ 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
Accounting Secret	[ ] ☑ Hide Characters
Source Network Address	Untagged LAN ⌄

Enter the matching Radius server details to allow for Radius server authentication.

- **Active Diretory**

| Authentication	Active Directory ⌄
Server IP Address	[ ]
Server Hostname	[ ]
Domain	[ ]
Custom Workgroup	(Optional)
Admin Username	[ ]
Admin Password	[ ] ☑ Hide Characters

Enter the matching Active Directory details to allow for Active Directory server authentication.

23   Miscellaneous Settings

The miscellaneous settings include configuration for High Availability, Certificate Manager, service forwarding, service passthrough, GPS forwarding, GPIO, Groupe Networks and SIM Toolkit (depending the feature is supported on the model of Peplin router that is being used).

23.1   High Availability

Many Pepwave routers support high availability (HA) configurations via an open standard virtual router redundancy protocol (VRRP, RFC 3768). In an HA configuration, two Pepwave routers provide redundancy and failover in a master-slave arrangement. In the event that the master unit is down, the slave unit becomes active. High availability will be disabled automatically where there is a drop-in connection configured on a LAN bypass port.
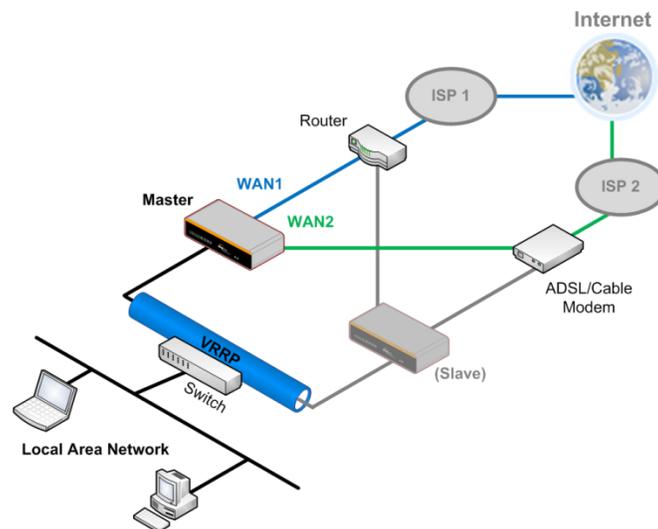
In the diagram, the WAN ports of each Pepwave router connect to the router and to the modem. Both Pepwave routers connect to the same LAN switch via a LAN port.

An elaboration on the technical details of the implementation of the virtual router redundancy protocol (VRRP, RFC 3768) by Pepwave routers follows:

- In an HA configuration, the two Pepwave routers communicate with each other using VRRP over the LAN.
- The two Pepwave routers broadcast heartbeat signals to the LAN at a frequency of one heartbeat signal per second.
- In the event that no heartbeat signal from the master Pepwave router is received in 3 seconds (or longer) since the last heartbeat signal, the slave Pepwave router becomes active.
- The slave Pepwave router initiates the WAN connections and binds to a previously

configured LAN IP address.

● At a subsequent point when the master Pepwave router recovers, it will once again become active.

You can configure high availability at **Advanced > Misc. Settings > High Availability**.

Interface for Master Router   Interface for Slave Router

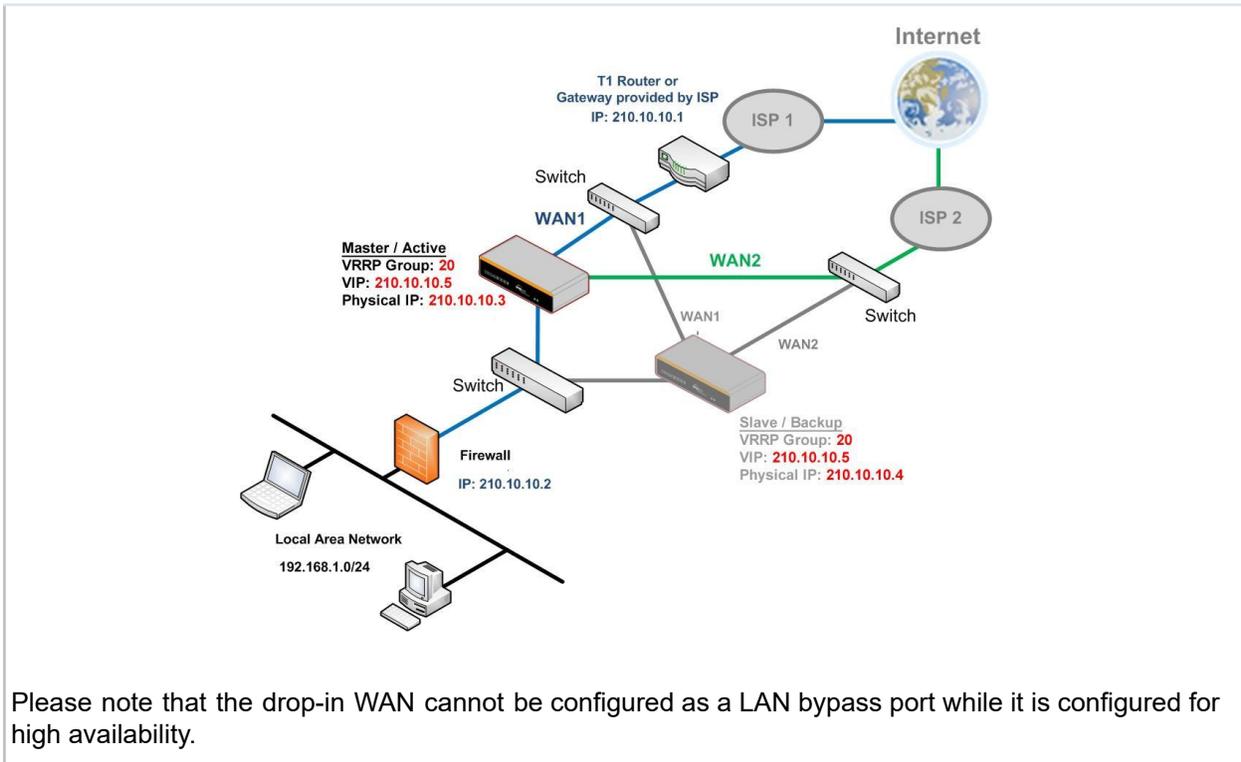| High Availability	
Enable	Checking this box specifies that the Pepwave router is part of a high availability configuration.
Group Number	This number identifies a pair of Pepwave routers operating in a high availability configuration. The two Pepwave routers in the pair must have the same **Group Number** value.
Preferred Role	This setting specifies whether the Pepwave router operates in master or slave mode. Click the corresponding radio button to set the role of the unit. One of the units in the pair must be configured as the master, and the other unit must be configured as the slave.
Resume Master Role Upon Recovery	This option is displayed when **Master** mode is selected in **Preferred Role**. If this option is enabled, once the device has recovered from an outage, it will take over and resume its **Master** role from the slave unit.
Configuration Sync.	This option is displayed when **Slave** mode is selected in **Preferred Role**. If this option is enabled and the **Master Serial Number** entered matches with the actual master unit's, the master unit will automatically transfer the configuration to this unit. Please make sure the **LAN IP Address** and the **Subnet Mask** fields are set correctly in the LAN settings page. You can refer to the **Event Log** for the configuration synchronization status.
Master Serial Number	If **Configuration Sync.** is checked, the serial number of the master unit is required here for the feature to work properly.
Virtual IP	The HA pair must share the same **Virtual IP**. The **Virtual IP** and the **LAN**

	Administration IP must be under the same network.
LAN Administration IP	This setting specifies a LAN IP address to be used for accessing administration functionality. This address should be unique within the LAN.
Subnet Mask	This setting specifies the subnet mask of the LAN.

<table>
<tr><td style="background:orange">Important Note</td></tr>
<tr><td>

For Pepwave routers in NAT mode, the virtual IP (VIP) should be set as the default gateway for all hosts on the LAN segment. For example, a firewall sitting behind the Pepwave router should set its default gateway as the virtual IP instead of the IP of the master router.

In drop-in mode, no other configuration needs to be set.

</td></tr>
</table>
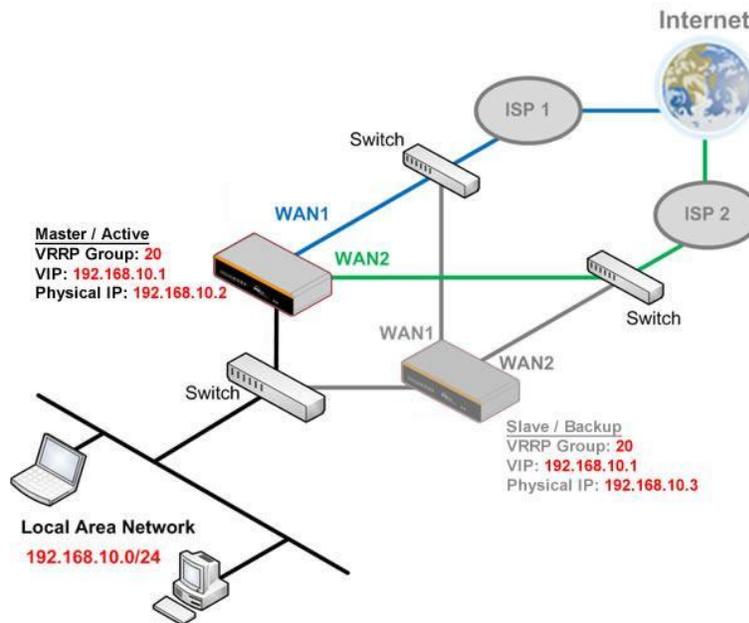
Please note that the drop-in WAN cannot be configured as a LAN bypass port while it is configured for high availability.

23.2 RADIUS Server

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

To configure the Authentication Server and Accounting 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 accounting requests. By default, the port number is 1813.	
Secret	This field is for entering the secret key for communicating to the RADIUS server.	

23.3 Certificate Manager

Certificate		
SpeedFusion/IPsec VPN	No Certificate	
Web Admin SSL	Default Certificate is in use	
Captive Portal SSL	Default Certificate is in use	
OpenVPN CA ⚠	Default Certificate is in use	

Wi-Fi WAN Client Certificate
No Certificates defined
Add Certificate

Wi-Fi WAN CA Certificate
No Certificates defined
Add Certificate

This section allows for certificates to be assigned to the local VPN, Web Admin SSL, Captive Portal SSL, OpenVPN CA, Wi-Fi WAN Client certificate and Wi-Fi WAN CA Certificate.

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-peplink-product/

23.4 Service Forwarding

Service forwarding settings are located at **Advanced > Misc. Settings > Service Forwarding**.

SMTP Forwarding Setup	
SMTP Forwarding	☐ Enable

Web Proxy Forwarding Setup	
Web Proxy Forwarding	☐ Enable

DNS Forwarding Setup	
Forward Outgoing DNS Requests to Local DNS Proxy	☐ Enable

Custom Service Forwarding Setup	
Custom Service Forwarding	☐ Enable

Service Forwarding	
SMTP Forwarding	When this option is enabled, all outgoing SMTP connections destined for any host at TCP port 25 will be intercepted. These connections will be redirected to a specified SMTP server and port number. SMTP server settings for each WAN can be specified after selecting **Enable**.
Web Proxy Forwarding	When this option is enabled, all outgoing connections destined for the proxy server specified in **Web Proxy Interception Settings** will be intercepted. These connections will be redirected to a specified web proxy server and port number. Web proxy interception settings and proxy server settings for each WAN can be specified after selecting **Enable**.
DNS Forwarding	When this option is enabled, all outgoing DNS lookups will be intercepted and redirected to the built-in DNS name server. If any LAN device is using the DNS name servers of a WAN connection, you may want to enable this option to enhance the DNS availability without modifying the DNS server setting of the clients. The built-in DNS name server will distribute DNS lookups to corresponding DNS servers of all available WAN connections. In this case, DNS service will not be interrupted, even if any WAN connection is down.
Custom Service Forwarding	When custom service forwarding is enabled, outgoing traffic with the specified TCP port will be forwarded to a local or remote server by defining its IP address and port number.

23.4.1 SMTP Forwarding

Some ISPs require their users to send e-mails via the ISP's SMTP server. All outgoing SMTP connections are blocked except those connecting to the ISP's. Pepwave routers support intercepting and redirecting all outgoing SMTP connections (destined for TCP port 25) via a WAN connection to the WAN's corresponding SMTP server.

SMTP Forwarding Setup	☑ Enable		
SMTP Forwarding			

Connection	Enable Forwarding?	SMTP Server	SMTP Port
WAN 1	☐		
WAN 2	☐		
Wi-Fi WAN	☐		
Cellular 1	☐		
Cellular 2	☐		
USB	☐		

To enable the feature, select **Enable** under **SMTP Forwarding Setup**. Check **Enable Forwarding** for the WAN connection(s) that needs forwarding. Under **SMTP Server**, enter the ISP's e-mail server host name or IP address. Under **SMTP Port**, enter the TCP port number for each WAN.

The Pepwave router will intercept SMTP connections. Choose a WAN port according to the outbound policy, and then forward the connection to the SMTP server if the chosen WAN has enabled forwarding. If the forwarding is disabled for a WAN connection, SMTP connections for the WAN will be simply be forwarded to the connection's original destination.

Note
If you want to route all SMTP connections only to particular WAN connection(s), you should create a custom rule in outbound policy (see **Section 14.2**).

23.4.2 Web Proxy Forwarding

Web Proxy Forwarding Setup		
Web Proxy Forwarding	☑ Enable	
Web Proxy Interception Settings		
Proxy Server	IP Address _____ Port _____ (Current settings in users' browser)	

Connection	Enable Forwarding?	Proxy Server IP Address : Port
WAN 1	☐	_____ : ____
WAN 2	☐	_____ : ____
Wi-Fi WAN	☐	_____ : ____
Cellular 1	☐	_____ : ____
Cellular 2	☐	_____ : ____
USB	☐	_____ : ____

When this feature is enabled, the Pepwave router will intercept all outgoing connections destined for the proxy server specified in **Web Proxy Interception Settings**, choose a WAN connection with reference to the outbound policy, and then forward them to the specified web proxy server and port number. Redirected server settings for each WAN can be set here. If forwarding is disabled for a WAN, web proxy connections for the WAN will be simply forwarded to the connection's original destination.

23.4.3 DNS Forwarding

When DNS forwarding is enabled, all clients' outgoing DNS requests will also be intercepted and forwarded to the built-in DNS proxy server.

23.4.4 Custom Service Forwarding

After clicking the **enable** checkbox, enter your TCP port for traffic heading to the router, and then specify the IP Address and Port of the server you wish to forward to the service to.

23.5 Service Passthrough

Service passthrough settings can be found at **Advanced > Misc. Settings > Service Passthrough**.

Some Internet services need to be specially handled in a multi-WAN environment. Pepwave routers can handle these services such that Internet applications do not notice being behind a multi-WAN router. Settings for service passthrough support are available here.

Service Passthrough Support	
SIP	Session initiation protocol, aka SIP, is a voice-over-IP protocol. The Pepwave router can act as a SIP application layer gateway (ALG) which binds connections for the same SIP session to the same WAN connection and translate IP address in the SIP packets correctly in NAT mode. Such passthrough support is always enabled, and there are two modes for selection: **Standard Mode** and **Compatibility Mode**. If your SIP server's signal port number is non-standard, you can check the box **Define custom signal ports** and input the port numbers to the text boxes.
H.323	With this option enabled, protocols that provide audio-visual communication sessions will be defined on any packet network and pass through the Pepwave router.
FTP	FTP sessions consist of two TCP connections; one for control and one for data. In a multi-WAN situation, they must be routed to the same WAN connection. Otherwise, problems will arise in transferring files. By default, the Pepwave router monitors TCP control connections on port 21 for any FTP connections and binds TCP connections of the same FTP session to the same WAN. If you have an FTP server listening on a port number other than 21, you can check **Define custom control ports** and enter the port numbers in the text boxes.
TFTP	The Pepwave router monitors outgoing TFTP connections and routes any incoming TFTP data packets back to the client. Select **Enable** if you want to enable TFTP passthrough support.

IPsec NAT-T	This field is for enabling the support of IPsec NAT-T passthrough. UDP ports 500, 4500, and 10000 are monitored by default. You may add more custom data ports that your IPsec system uses by checking **Define custom ports**. If the VPN contains IPsec site-to-site VPN traffic, check **Route IPsec Site-to-Site VPN** and choose the WAN connection to route the traffic to.

23.6 UART

Selected Pepwave MAX routers feature a RS-232 serial interface on the built-in terminal block. The RS-232 serial interface can be used to connect to a serial device and make it accessible over an TCP/IP network.

The serial interface can be enabled and parameters can be set on the web admin page under **Advanced > UART**. Make sure they match the serial device you are connecting to.

Serial to Network

Enable	☑
Allowed Source IP Subnets	◉ Any ○ Allows access from the following IP subnets only
Web Console	☐

Serial Parameters

Baud Rate	9600 ▾
Data Bits	8 ▾
Stop Bits	1 ▾
Parity	None ▾
Flow Control	None ▾
Interface	RS232 ▾

Operating Settings

Operation Mode	TCP Server Mode ▾
Local TCP Port	4001
Max Connection	1
TCP Alive Check Time	7 min(s)
Inactivity Time	0 ms

Data Packing

Packing Length	0 byte(s)
Delimiter	☐
Delimiter process	Do Nothing ▾
Force Transmit	0 ms

There are 4 pins i.e. TX, RX, RTS, CTS on the terminal block for serial connection and they correspond to the pins in a DB-9 connector as follows:

DB-9   Pepwave MAX Terminal Block

Pin 1   –

Pin 2   Rx (rated -+25V)

Pin 3   Tx (rated -+12V)

Pin 4   –

Pin 5   –

Pin 6   –

Pin 7   RTS

Pin 8   CTS

Pin 9   –

The RS232 serial interface is not an isolated RS232. External galvanic isolation may be added if required.

Be sure to check whether your serial cable is a null modem cable, commonly known as crossover cable, or a straight through cable. If in doubt, swap Rx and Tx, and RTS and CTS, at the other end and give it another go.

Once connected, your serial device should be accessible on your Pepwave MAX router LAN IP address at the specified TCP port.

23.7 GPS Forwarding

Using the GPS forwarding feature, some Pepwave routers can automatically send GPS reports to a specified server. To set up GPS forwarding, navigate to **Advanced > Misc. Settings > GPS Forwarding**.

GPS Forwarding					
Enable	☑				
Server	Server IP Address / Host Name	Port	Protocol	Report Interval (s)	
			UDP ▾	1	✚
GPS Report Format	⦿ NMEA ○ TAIP				
NMEA Sentence Type	☑ GPRMC ☐ GPGGA ☐ GPVTG ☐ GPGSA ☐ GPGSV				
Vehicle ID	❓ ☐				

GPS Forwarding	
Enable	Check this box to turn on GPS forwarding.
Server	Enter the name/IP address of the server that will receive GPS data. Also specify a port number, protocol (**UDP** or **TCP**), and a report interval of between 1 and 10 seconds. Click ✚ to save these settings.
GPS Report Format	Choose from NMEA or TAIP format for sending GPS reports.
NMEA Sentence Type	If you've chosen to send GPS reports in NMEA format, select one or more sentence types for sending the data (**GPRMC**, **GPGGA**, **GPVTG**, **GPGSA**, and **GPGSV**).
Vehicle ID	The vehicle ID will be appended in the last field of the NMEA sentence. Note that the NMEA sentence will become customized and non-standard.
TAIP Sentence Type/TAIP ID (optional)	If you've chosen to send GPS reports in TAIP format, select one or more sentence types for sending the data (**PV—Position / Velocity Solution** and **CP—Compact Velocity Solution**). You can also optionally include an ID number in the **TAIP ID** field.

23.8 Ignition Sensing

Ignition Sensing detects the ignition signal status of a vehicle it is installed in.

This feature allows the cellular router to start up or shut down when the engine of that vehicle is started or turned off.

The time delay setting between ignition off and power down of the router is a configurable setting, which allows the router to stay on for a period of time after the engine of a vehicle is turned off.

Ignition Sensing installation

Function		Colour Wire
I/O	optional *	Brown
IGN I/P	connected to positive feed on the ignition **	Orange
DC IN -	connected to permanent negative feed (ground)	Black
DC IN +	connected to permanent positive feed (power)	Red
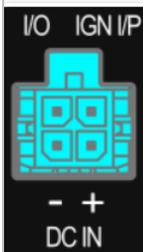
* Currently not functional; will be used for additional features in future firmware.

** Connecting IGN I/P is optional and is needed only if the Ignition Sensing feature is configured.

![Peplink | PEPWAVE]

Connectivity diagram for devices with 4-pin connector
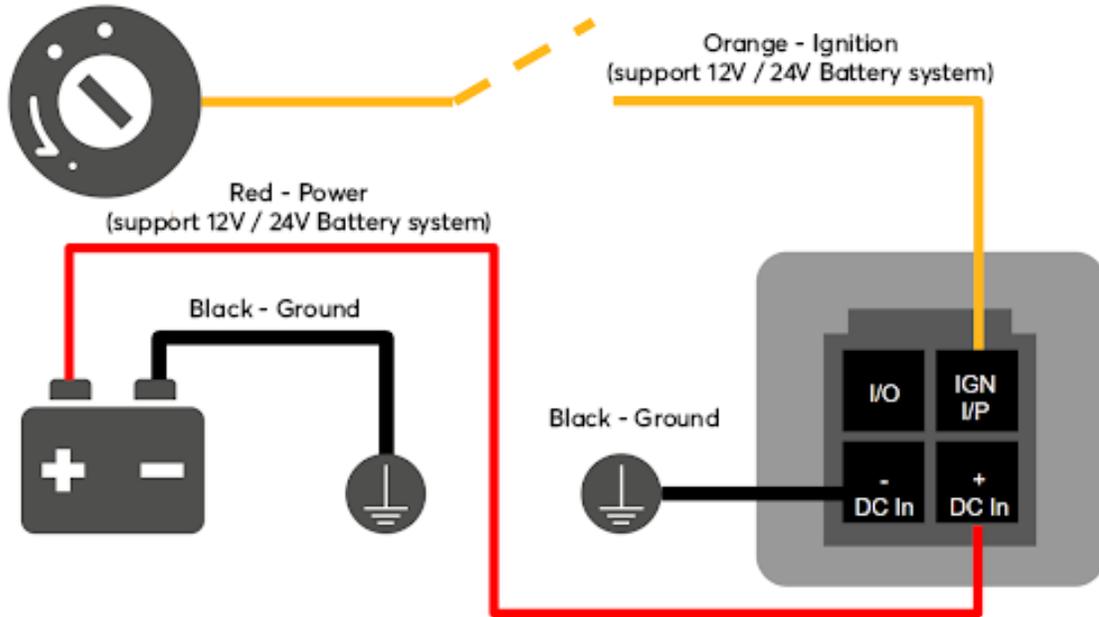
Connectivity diagram for devices with terminal block connection
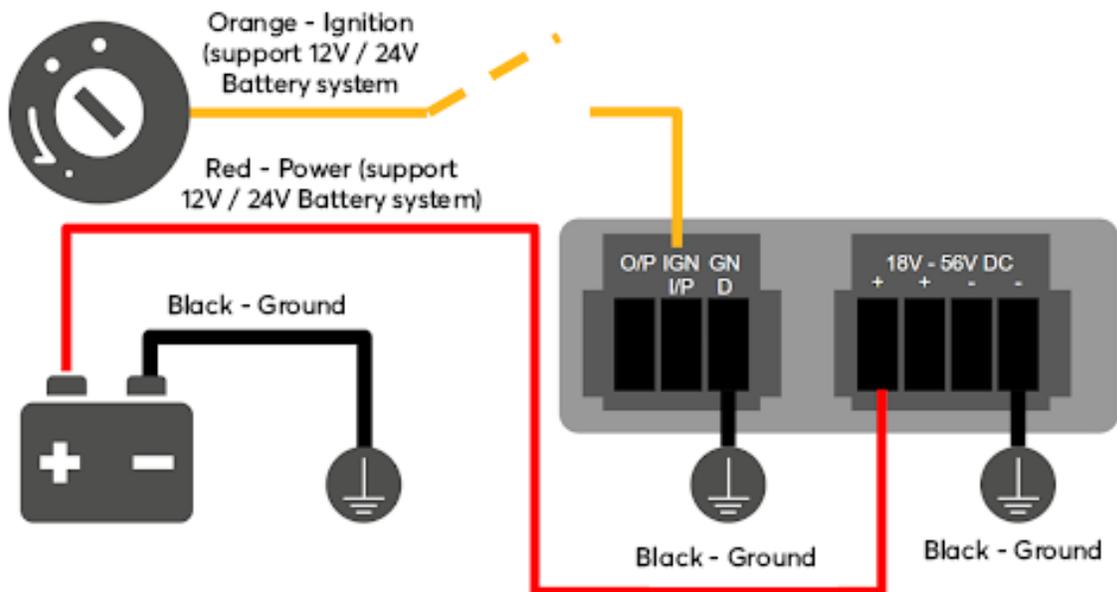
GPIO Menu

Note: This feature is applicable for certain models that come with a GPIO interface.

Ignition Sensing options can be found in **Advanced > Misc. Settings > GPIO.**
The configurable option for Ignition Input is **Delay;** the time in seconds that the router stays powered on after the ignition is turned off.

IGN I/P	
Enable	☑
Type	Digital Input ▾
Mode	Ignition Sensing ▾
Delay	[____] seconds

The O/P (connected to the I/O pin on a 4 pin connector) can be configured as a digital input, a digital output, or an analog input.

Digital Input - the connection supports input sensing; it reads the external input and determines if the settings should be 'High' (on) or 'Low' (off).

Digital Output - when there is a healthy WAN connection, the output pin is marked as 'High' (on). Otherwise, it will be marked as 'Low' (off).

O/P	
Enable	☑
Type	Digital Output ▾
Mode	WAN Status ▾

Note: The Digital Output state (on/off) upon rebooting the device may vary depending on the model, eg. MAX BR1 MK2 = Persistent; MAX Transit Mini with ContentHub = Reset to default, etc.

Analog Input - to be confirmed. In most cases, it should read the external input and determine the voltage level.

23.9 NTP Server

Pepwave routers can now serve as a local NTP server. Upon start up, it is now able to provide connected devices with the accurate time, precise UTC from either an external NTP server or via GPS and ensuring that connected devices always receive the correct time.

Compatible with: BR1 ENT, BR1 Pro CAT-20/5G, 700 HW3, HD2/4, Transit

NTP Server setting can be found via: **Advanced > Misc. Settings > NTP Server**

NTP Server	
Enable	☐

Save

Time Settings can be found at **System > Time > Time Settings**

Time Settings	
Time Zone	(GMT) Casablanca ▾ ☐ Show all
Time Sync	Time Server ▾
Time Server	0.peplink.pool.ntp.org

Save

23.10 Grouped Networks

Advanced > Misc. Settings > Grouped Networks allows to configure destination networks in grouped format.

Select Add group to create a new group with single IP addresses or subnets from different VLANs.

The created network groups can be used in outbound policies, firewall rules.

23.11 Remote SIM Management

The Remote SIM management is accessible via **Advanced > Misc Settings > Remote SIM Management**. By default, this feature is disabled.

Please note that a limited number of Pepwave routers support the SIM Injector, may refer to the link: https://www.peplink.com/products/sim-injector/ or Appendix B for more details on FusionSIM Manual.

Remote SIM Host	
Remote SIM is disabled	✎

Remote SIM Host Settings

Remote SIM Host Settings		✕
Auto LAN Discovery	☐	
Remote SIM Host		

Save

Remote SIM Host Settings	
Active LAN Discovery	Check this box to enable Auto LAN discovery of the remote SIM server..
Remote SIM Host	Enter the public IP address of the SIM Injector. If you enter IP addresses here, it is not necessary to tick the "**Auto LAN Discovery**" box above.

Remote SIM Host	
192.168.1.10	✎

Remote SIM Management	Server	Slot
No Remote SIM Defined.		
Add Remote SIM		

You may define the Remote SIM information by clicking the "**Add Remote SIM**". Here, you can enable **Data Roaming** and **custom APN** for your SIM cards.

Add Remote SIM Settings	
SIM Server	Add a new SIM Server
SIM Server - Serial Number	Enter the serial number of SIM Server
SIM Server - Name	This optional field allows you define a name for the SIM Server
SIM Slot	Click the drop-down menu and choose which SIM slot you want to connect.
SIM Slot - Name	This optional field allows you define a name for the SIM slot.
Data Roaming	Enables data roaming on this particular SIM card.
Operator Settings (for LTE//HSPA/EDGE/GPRS Only)	This setting allows you to configure the APN settings of your connection. If **Auto** is selected, the mobile operator should be detected automatically. The connected device will be configured and connection will be made automatically. If there is any difficulty in making a connection, you may select **Custom** to enter your carrier's APN, Username and Password settings manually. The correct values can be obtained from your carrier. The default and recommended setting is Auto.

23.12 SIM Toolkit

The SIM Toolkit, accessible via **Advanced > Misc Settings > SIM Toolkit**, supports two functionalities, USSD and SMS.

USSD
Unstructured Supplementary Service Data (USSD) is a protocol used by mobile phones to communicate with their service provider's computers. One of the most common uses is to query the available balance.

SIM Status	
WAN Connection	Cellular
SIM Card	1
IMSI	
Tool	USSD

USSD	
USSD Code	Submit

Enter your USSD code under the **USSD Code** text field and click **Submit**.

SIM Status	
WAN Connection	Cellular
SIM Card	1
IMSI	856195002108538
USSD Code	*138# Submit
Receive SMS	Get

You will receive a confirmation. To check the SMS response, click **Get**.

SIM Status	
WAN Connection	Cellular
SIM Card	1
IMSI	856195002108538
USSD Code	*138# Submit
USSD Status	Request is sent successfully
Receive SMS	Get

After a few minutes you will receive a response to your USSD code

Received SMS

	PCX	
May 27 20:02	As of May 27th Account Balance: $ 0.00 Amount Unbilled Voice Calls: 0 minutes Video Calls: 0 minutes SMS (Roaming): 0 SMS (Within Network): 0 MMS (Roaming):0 MMS (Within Network): 0 Data Usage: 7384KB (For reference only, please refer to bill)	✖
Aug 8 , 2013 14:51	PCX iPhone & Android users need to make sure "PCX" is entered as the APN under "Settings" > "Mobile network setting" for web browsing and mobile data service. Other handset models will receive handset settings via SMS shortly (PIN: 1234) (Consumer Service Hotline: 1000 / Business Customer Hotline 10088)	✖

SMS

The SMS option allows you to read SMS (text) messages that have been sent to the SIM in your Pepwave router.

SIM Status

WAN Connection	Cellular ▼
SIM Card	1
IMSI	░░░░░░░░
Tool	SMS ▼

SMS   Refresh

Jun 21, 2017 18:00	░░░░░░░░░░░░░░░░░░░░░░░	✖
May 06, 2017 12:23	░░░░░░░░░░░░░░░░░░░░░░░	✖
Mar 15, 2017 10:03	░░░░░░░░░░░░░░░░░░░░░░░	✖
Mar 06, 2017 14:50	░░░░░░░░░░░░░░░░░░░░░░░	✖
Dec 28, 2016 09:53	░░░░░░░░░░░░░░░░░░░░░░░	✖
Dec 06, 2016 13:09	░░░░░░░░░░░░░░░░░░░░░░░	✖
Nov 08, 2016 11:29	░░░░░░░░░░░░░░░░░░░░░░░	✖
Sep 07, 2016 17:05	░░░░░░░░░░░░░░░░░░░░░░░	✖

23.13 UDP Relay

You may define the UDP relay by clicking the **Advanced > Misc Settings > UDP Relay**. You can click [icon] to enable the UDP relay to relay UDP Broadcast or Multicast traffic for LAN/VLAN/SpeedFusion VPN.

UDP Relay	
Disabled	[icon]

Click "*New UDP Relay Rule*" to define the relay rule.

Name	Port / Multicast Address	Source Network	Destination Network	
		No UDP relay rules defined		
		New UDP Relay Rule		

UDP Relay

Name	
Port	
Multicast	☑ Address:
Source Network	LAN: Untagged LAN
Destination Network	Any

Save   Cancel

UDP Relay	
Name	This field is for specifying a name to represent this profile.
Port	This feid is to enter the specific port number for the UDP relay
Multicast	If Multicast is not selected, it will broadcast relay rule. If Multicast is selected, you may need to enter a valid multicast address.
Secure Network	Select the specific connection as a source network to where the device is to relay UDP Broadcast packets.
Destination Network	You may select the specific connection from the drop-down list or may custom combination network as a destination network that receives the UDP packet relays.

24   AP

24.1 AP Controller

The AP controller acts as a centralized controller of Pepwave Access Points.
With this feature, users can customize and manage up to 1500 Access Points from a single Pepwave router interface.
To configure, navigate to the **AP** tab. and the following screen appears.

AP Controller		
AP Management	❓	☑ Integrated AP ☑ External AP
Sync. Method	❓	As soon as possible ▾
Permitted AP	❓	⦿ Any ◯ Approved List

AP Controller	
AP Management	The AP controller for managing Pepwave APs can be enabled by checking this box. When this option is enabled, the AP controller will wait for management connections originating from APs over the LAN on TCP and UDP port 11753. It will also wait for captive portal connections on TCP port 443. An extended DHCP option, **CAPWAP Access Controller addresses** (field 138), will be added to the DHCP server. A local DNS record, **AP Controller**, will be added to the local DNS proxy.
Sync Method	● As soon as possible ● Progressively ● One at a time
Permitted AP	Access points to manage can be specified here. If **Any** is selected, the AP controller will manage any AP that reports to it. If **Approved List** is selected, only APs with serial numbers listed in the provided text box will be managed.

24.2 Wireless SSID

SSID	Security Policy	
No SSID Defined		
Add		

Current SSID information appears in the **SSID** section. To edit an existing SSID, click its name in the list. To add a new SSID, click **Add**. Note that the following settings vary by model.
The below settings ishows a new SSID window with Advanced Settings enabled (these are available by selecting the question mark in the top right corner).

SSID Settings	
SSID	This setting specifies the SSID of the virtual AP to be scanned by Wi-Fi clients.
Schedule	Click the drop-down menu to apply a time schedule to this interface
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 the Pepwave AP One unit to the Ethernet segment via the LAN port). The default value of this setting is **0**, which means VLAN tagging is disabled (instead of tagged with zero).
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 [A]	Select **Auto** to allow the Pepwave router to set the data rate automatically, or select **Fixed** and choose a rate from the displayed drop-down menu.
Multicast Filter[A]	This setting enables the filtering of multicast network traffic to the wireless SSID.

Multicast Rate[A]	This setting specifies the transmit rate to be used for sending multicast network traffic. The selected **Protocol** and **Channel Bonding** settings will affect the rate options and values available here.
IGMP Snooping [A]	To allow the Pepwave router to listen to internet group management protocol (IGMP) network traffic, select this option.
Layer 2 Isolation [A]	**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 the upper communication layer(s). By default, the setting is disabled.
Maximum Number of Clients [A]	Indicate the maximum number of clients that should be able to connect to each frequency.
Band Steering [A]	To reduce 2.4 GHz band overcrowding, AP with band steering steers clients capable of 5 GHz operation to 5 GHz frequency. Choose between: **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. **Disable** - Default

[A] - Advanced feature. Click the button on the top right-hand corner to activate.

Security Settings	
Security Policy	This setting configures the wireless authentication and encryption methods. Available options : • **Open (**No Encryption) • **Enhanced Open** (OWE) • **WPA3 -Personal** (AES:CCMP) • **WPA3 -Enterprise** (AES:CCMP) • **WPA2/WPA3 -Personal** (AES:CCMP) • **WPA2 -Personal** (AES:CCMP) • **WPA2 – Enterprise** • **WPA/WPA2 - Personal** (TKIP/AES: CCMP)

● **WPA/WPA2 – Enterprise**

When **WPA/WPA2 - Enterprise** is configured, RADIUS-based 802.1 x authentication is enabled. Under this configuration, the **Shared Key** option should be disabled. When using this method, select the appropriate version using the **V1/V2** controls. The security level of this method is known to be very high.

When **WPA/WPA2- Personal** is configured, a shared key is used for data encryption and authentication. When using this configuration, the **Shared Key** option should be enabled. Key length must be between eight and 63 characters (inclusive). The security level of this method is known to be high.

NOTE:

When **WPA2/WPA3- Personal** is configured, if a managed AP which is NOT WPA3 PSK capable, the AP Controller will not push those WPA3 and WPA2/WPA3 SSID to that AP.

Access Control Settings	
Restricted Mode	Deny all except listed ▾
MAC Address List ❓	

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	Connection coming from the MAC addresses in this list will be either denied or accepted based on the option selected in the previous field. If more than one MAC address needs to be entered, you can use a carriage return to separate them.

RADIUS Settings	
Authentication Host	This field is for specifying the IP address of the primary RADIUS server for Authentication and, if applicable, the secondary RADIUS server.
Authentication Port	In the field, the UDP authentication port(s) used by your RADIUS server(s) or click the **Default** is **1812**.
Authentication Secret	This settings is enter the RADIUS shared secret for the primary server and, if applicable, the secondary RADIUS server.
Accounting Host	This field is for specifying the IP address of the primary RADIUS server for Accounting and, if applicable, the secondary RADIUS server.
Accounting Port	In the field, enter the UDP accounting port(s) used by your RADIUS server(s) or click the **Default** is **1813**.
Accounting Secret	This settings is enter the RADIUS shared secret for the primary server and, if applicable, the secondary RADIUS server.
NAS-Identifier	Choose between **Device Name**, **LAN MAC address**, **Device Serial Number** and **Custom Value**

Guest Protect		
Block All Private IP	Check this box to deny all connection attempts by private IP addresses.	
Custom Subnet	To create a custom subnet for guest access, enter the IP address and choose a subnet mask from the drop-down menu.	
Block Exception	To block access from a particular subnet, enter the IP address and choose a subnet mask from the drop-down menu.	

Firewall Settings	
Firewall Mode	The settings allow administrators to control access to the SSID based on Firewall Rules. Available options are **Disable, Lockdown - Block all except...** and **Flexible -Allow all except…**
Firewall Exceptions	Create Firewall Rules based on **Port, IP Network, MAC address** or **Domain Name**

24.3 Wireless Mesh

Wireless Mesh	Frequency Band	
No Wireless Mesh Defined		
Add		
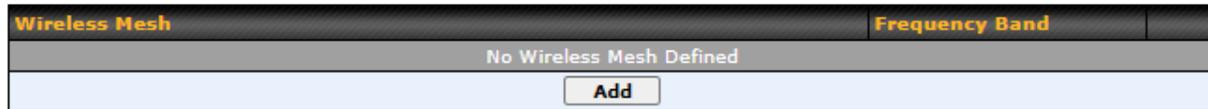
Wireless Mesh Support is available on devices running 802.11ac (Wi-Fi 5) and above. Along with the AP Controller, mesh network extensions can be established, which can expand network coverage. Note that the Wireless Mesh settings need to match the Mesh ID and Shared Key of the other devices on the same selected frequency band.

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

Wireless Mesh Settings	
Mesh ID	
Frequency	● 2.4 GHz ○ 5 GHz
Shared Key	
	☑ Hide Characters

Wireless Mesh Settings	
Mesh ID	Enter a name to represent 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 Wireless Mesh settings. Click **Hide / Show Characters** to toggle visibility.

24.4 Settings

To configure the AP settings, navigating to **AP > Settings** :

AP Settings	
SSID	These buttons specify which wireless networks will use this AP profile. You can also select the frequencies at which each network will transmit. Please note that the Pepwave MAX does not detect whether the AP is capable of transmitting at

	both frequencies. Instructions to transmit at unsupported frequencies will be ignored by the AP.
Operating Country	This drop-down menu specifies the national / regional regulations which 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.
Preferred Frequency	These buttons determine the frequency at which access points will attempt to broadcast. This feature will only work for APs that can transmit at both 5.4GHz and 5GHz frequencies.
Protocol	This option allows you to specify whether 802.11b and/or 802.11g client association requests will be accepted. Available options are **802.11ng** and **802.11na**. By default, **802.11ng** is selected.
Channel Width	There are three options: 20 MHz, 20/40 MHz, and 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.
Channel	This drop-down menu selects the 802.11 channel to be utilized. Available options are from 1 to 11 and from 1 to 13 for the North America region and Europe region, respectively. (Channel 14 is only available when the country is selected as Japan with protocol 802.11b.) If **Auto** is set, the system will perform channel scanning based on the scheduled time set and choose the most suitable channel automatically.
Auto Channel Update	Indicate the time of day at which update automatic channel selection.
Output Power	This drop-down menu determines the power at which the AP under this profile will broadcast. When fixed settings are selected, the AP will broadcast at the specified power level, regardless of context. When **Dynamic** settings are selected, the AP will adjust its power level based on its surrounding APs in order to maximize performance. The **Dynamic: Auto** setting will set the AP to do this automatically. Otherwise, the **Dynamic: Manual** setting will set the AP to dynamically adjust only if instructed to do so. If you have set **Dynamic:Manual**, you can go to **AP>Toolbox>Auto Power Adj.** to give your AP further instructions. If you click the **Boost** checkbox, the AP under this profile will transmit using additional power. Please note that using this option with several APs in close proximity will lead to increased interference.

Client Signal Strength Threshold	This field determines that maximum signal strength each individual client will receive. The measurement unit is megawatts.
Max number of Clients	This field determines the maximum clients that can be connected to APs under this profile.
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.
Discover Nearby Networks[A]	This option is to turn on and off to scan the nearby the AP. **Note**: Feature will be automatically turned on with Auto Channel / Dynamic Output Power
Beacon Rate[A]	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[A]	This drop-down menu provides the option to set the time between each beacon send. Available options are **100ms**, **250ms**, and **500ms**.
DTIM[A]	This field provides the option to set the frequency for beacon to include delivery traffic indication message (DTIM). The interval unit is measured in milliseconds.
RTS Threshold[A]	This field provides the option to set the minimum packet size for the unit to send an RTS using the RTS/CTS handshake. Setting **0** disables this feature.
Fragmentation Threshold[A]	Determines the maximum size (in bytes) that each packet fragment will be broken down into. Set 0 to disable fragmentation.
Distance/Time Converter[A]	Select the distance you want your Wi-Fi to cover in order to adjust the below parameters. Default values are recommended.
Slot Time[A]	This field provides the option to modify the unit wait time before it transmits. The default value is **9μs.**
ACK Timeout[A]	This field provides the option to set the wait time to receive acknowledgement packet before doing retransmission. The default value is **48μs.**

[A] - Advanced feature. Click the ⓘ button on the top right-hand corner to activate.

Important Note
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.

The device with integrated AP can operate under the Wi-Fi Operating Mode, and the default setting is **WAN + AP** mode:

Note: This option is available for selected devices only (HD2/HD4 and HD2/HD4 MBX).

Integrated AP	

WAN	In this mode, all Wi-Fi will operate as Wi-Fi WAN and no integrated Wi-Fi AP will be operated on this device.
	
	If Wi-Fi Operating mode is choosing **WAN**, The status indicated by the front panel LED is as follows:
	   - Wi-Fi 1 is Green if Wi-Fi WAN 1 is enabled.
	   - Wi-Fi 2 is Green if Wi-Fi WAN 2 is enabled.

WAN + AP	In this mode, some Wi-Fi will operate as Wi-Fi WAN. Some other Wi-Fi WANs will be forced offline and their Wi-Fi resources will be reserved for integrated Wi-Fi AP operations.
	
	If Wi-Fi Operating mode is choosing **WAN + AP**, The status indicated by the front panel LED is as follows:
	   - Wi-Fi 1 is Green if WI-FI WAN is enabled.
	   - Wi-Fi 2 is Green if Wi-Fi AP is ON.

AP	In this mode, all Wi-Fi functions as integrated Wi-Fi AP. All Wi-Fi WANs will be forced to go offline.
	
	If Wi-Fi Operating mode is choosing **AP**, The status indicated by the front panel LED is as follows:
	   - W-Fi 1 is Green, if there is any Wireless SSID is selected 2.4GHz.
	   - W-Fi 2 is Green, if there is any Wireless SSID is selected 5GHz.

Web Administration Settings (on External AP)	
Enable	Check the box to allow the Pepwave router to manage the web admin access information of the AP.
Web Access Protocol	These buttons specify the web access protocol used for accessing the web admin of the AP. The two available options are **HTTP** and **HTTPS**.
Management Port	This field specifies the management port used for accessing the device.
HTTP to HTTPS Redirection	This option will be available if you have chosen **HTTPS** as the **Web Access Protocol**. With this enabled, any HTTP access to the web admin will redirect to HTTPS automatically.
Admin User Name	This field specifies the administrator username of the web admin. It is set as *admin* by default.
Admin Password	This field allows you to specify a new administrator password. You may also click the **Generate** button and let the system generate a random password automatically.

This allow user to configure AP Time Settings (both Timezone and NTP) in AP Controller.

AP Time Settings	
Time Zone	Ths field is to select the time zone for the AP controller.
Time Server	Ths field is to select the time server for the AP controller.

This settings is to allow user to manage external AP's controller unreachable action. When **Manage Unreachable Action** is checked, there will have 2 options which are "**None**" and "**Radio Off**".

AP Controller Settings	
Client Load Balancing	☐

This is an option to enable client load balancing for AP Controller. When the option is enabled, it is trying to balance the station count on APs within the same profile.

Some Pepwave models displays a screen similar to the one shown below, navigating to **AP > Settings**:

Wi-Fi Radio Settings	
Operating Country	United States ▾
Wi-Fi Antenna	◯ Internal ◉ External

Wi-Fi Radio Settings	
Operating Country	This option sets the country whose regulations the Pepwave router follows.
Wi-Fi Antenna	Wi-Fi Antenna Choose from the router's internal or optional external antennas, if so equipped.

Wi-Fi AP Settings	
Protocol	802.11ng ▾
Channel	1 (2.412 GHz) ▾
Channel Width	Auto ▾
Output Power	Max ▾ ☐ Boost
Beacon Rate	1Mbps ▾
Beacon Interval	100ms ▾
DTIM	1
Slot Time	9 μs
ACK Timeout	48 μs
Frame Aggregation	☑ Enable
Guard Interval	◯ Short ◯ Long

Wi-Fi AP Settings	
Protocol	This option allows you to specify whether 802.11b and/or 802.11g client association requests will be accepted. Available options are **802.11ng** and **802.11na**. By default, 802.11ng is selected.

Channel	This option allows you to select which 802.11 RF channel will be used. **Channel 1 (2.412 GHz)** is selected by default.
Channel Width	**Auto (20/40 MHz)** and **20 MH**z are available. The default setting is **Auto (20/40 MHz)**, which allows both widths to be used simultaneously.
Output Power	This option is for specifying the transmission output power for the Wi-Fi AP. There are 4 relative power levels available – **Max**, **High**, **Mid**, and **Low**. The actual output power will be bound by the regulatory limits of the selected country.
Beacon Rate[A]	This option is for setting the transmit bit rate for sending a beacon. By default, **1Mbps** is selected.
Beacon Interval[A]	This option is for setting the time interval between each beacon. By default, **100ms** is selected.
DITM[A]	This field allows you to set the frequency for the beacon to include a delivery traffic indication message. The interval is measured in milliseconds. The default value is set to **1 ms**.
Slot Time[A]	This field is for specifying the wait time before the Router transmits a packet. By default, this field is set to **9 µs**.
ACK Time[A]	This field is for setting the wait time to receive an acknowledgement packet before performing a retransmission. By default, this field is set to **48 µs**.
Frame Aggreagtion[A]	This option allows you to enable frame aggregation to increase transmission throughput.
Guard Interval[A]	This setting allows choosing a short or long guard period interval for your transmissions.

25   AP Controller Status

25.1 Info

A comprehensive overview of your AP can be accessed by navigating to **AP > Controller Status > Info**.

AP Controller	
License Limit	This field displays the maximum number of AP your Balance router can control. You can purchase licenses to increase the number of AP you can manage.
Frequency	Underneath, there are two check boxes labeled **2.4 Ghz** and **5 Ghz**. Clicking either box will toggle the display of information for that frequency. By default, the graphs display the number of clients and data usage for both 2.4GHz and 5 GHz frequencies.
SSID	The colored boxes indicate the SSID to display information for. Clicking any colored box will toggle the display of information for that SSID. By default, all the graphs show information for all SSIDs.
No. of APs	This pie chart and table indicates how many APs are online and how many are offline.
No.of Clients	This graph displays the number of clients connected to each network at any

	given time. Mouse over any line on the graph to see how many clients connected to a specific SSID for that point in time.
Data Usage	This graph enables you to see the data usage of any SSID for any given time period. Mouse over any line on the graph to see the data usage by each SSID for that point in time. Use the buttons next to **Zoom** to select the time scale you wish to view. In addition, you could use the sliders at the bottom to further refine your timescale.

Events
This event log displays all activity on your AP network, down to the client level. Click **View Alerts** to see only alerts, and click the **More…** link for additional records.

This allow user to configure AP Time Settings (both Timezone and NTP) in AP Controller.

AP Time Settings	
Time Zone	Ths field is to select the time zone for the AP controller.
Time Server	Ths field is to select the time server for the AP controller.

This settings is to allow user to manage external AP's controller unreachable action. When **Manage Unreachable Action** is checked, there will have 2 options which are "**None**" and "**Radio Off**".

This is an option to enable client load balancing for AP Controller. When the option is enabled, it is trying to balance the station count on APs within the same profile.

25.2 Access Point

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

Managed APs	
Managed APs	This table shows the detailed information on each AP, including channel, number of clients, upload traffic, and download traffic. Click the blue arrows at the left of the table to expand and collapse information on each device group. On the right of the table, you will see the following icons: ⬛⬛⬛ . Click the ⬛ icon to see a usage table for each client:

Client List

MAC Address	IP Address	Type	Signal	SSID	Upload	Download
80:56:f2:98:75:ff	10.9.2.7	802.11ng	Excellent (37)	Balance	66.26 MB	36.26 MB
c4:6a:b7:bf:d7:15	10.9.2.123	802.11ng	Excellent (42)	Balance	6.65 MB	2.26 MB
70:56:81:1d:87:f3	10.9.2.102	802.11ng	Good (23)	Balance	1.86 MB	606.63 KB
e0:63:e5:83:45:c8	10.9.2.101	802.11ng	Excellent (39)	Balance	3.42 MB	474.52 KB
18:00:2d:3d:4e:7f	10.9.2.66	802.11ng	Excellent (25)	Balance	640.29 KB	443.57 KB
14:5a:05:80:4f:40	10.9.2.76	802.11ng	Excellent (29)	Balance	2.24 KB	3.67 KB
00:1a:dd:c5:4e:24	10.8.9.84	802.11ng	Excellent (29)	Wireless	9.86 MB	9.76 MB
00:1a:dd:bb:29:ec	10.8.9.73	802.11ng	Excellent (25)	Wireless	9.36 MB	11.14 MB
40:b0:fa:c3:26:2c	10.8.9.18	802.11ng	Good (23)	Wireless	118.05 MB	7.92 MB
e4:25:e7:8a:d3:12	10.10.11.23	802.11ng	Excellent (35)	Marketing	74.78 MB	4.58 MB
04:f7:e4:ef:68:05	10.10.11.71	802.11ng	Poor (12)	Marketing	84.84 KB	119.32 KB

Close

Click the ✏ icon to configure each client

AP Details

Serial Number	1111-2222-3333
MAC Address	00:1A:DD:BD:73:E0
Product Name	Pepwave AP Pro Duo
Name	
Location	
Firmware Version	3.5.2
Firmware Pack	Default (None) ▾
AP Client Limit	◉ Follow AP Profile ○ Custom
2.4 GHz SSID List	T4Open
5 GHz SSID List	T4Open
Last config applied by controller	Mon Nov 23 11:25:03 HKT 2015
Uptime	Wed Nov 11 15:00:27 HKT 2015
Current Channel	1 (2.4 GHz) 153 (5 GHz)
Channel	2.4 GHz: Follow AP Profile ▾ 5 GHz: Follow AP Profile ▾
Output Power	2.4 GHz: Follow AP Profile ▾ 5 GHz: Follow AP Profile ▾

Close

For easier network management, you can give each client a name and designate its location. You can also designate which firmware pack (if any) this client will follow, as well as the channels on which the client will broadcast.

Click the 📊 icon to see a graph displaying usage:
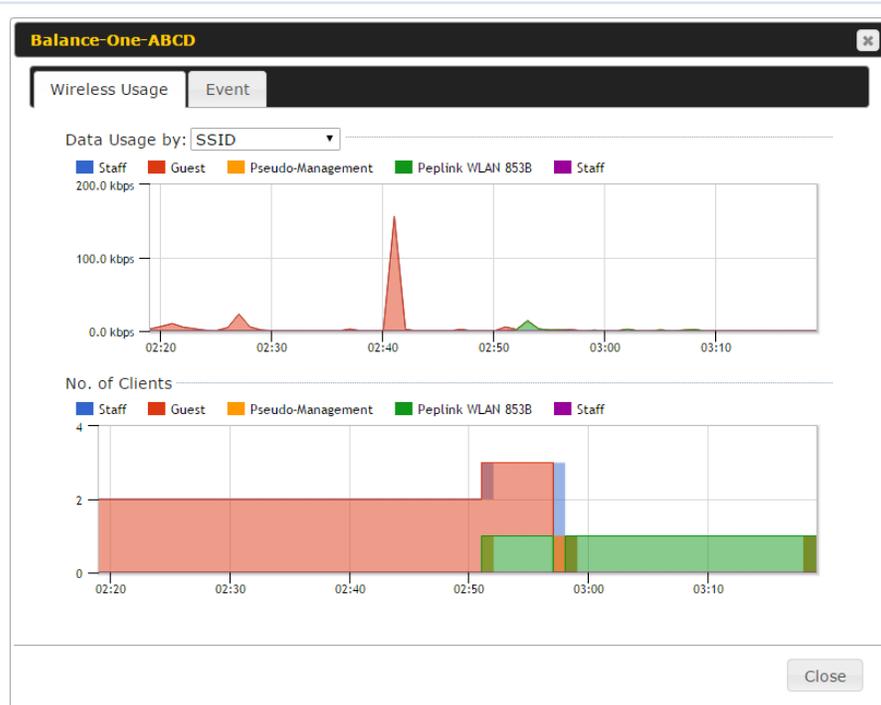
Click any point in the graphs to display detailed usage and client information for that device, using that SSID, at that point in time. On the **Data Usage by** menu, you can display the information by SSID or by AP send/receive rate.

Click the **Event** tab next to **Wireless Usage** to view a detailed event log for that particular device:

25.3 Wireless SSID

In-depth SSID reports are available under **AP > Controller Status > Wireless SSID**.
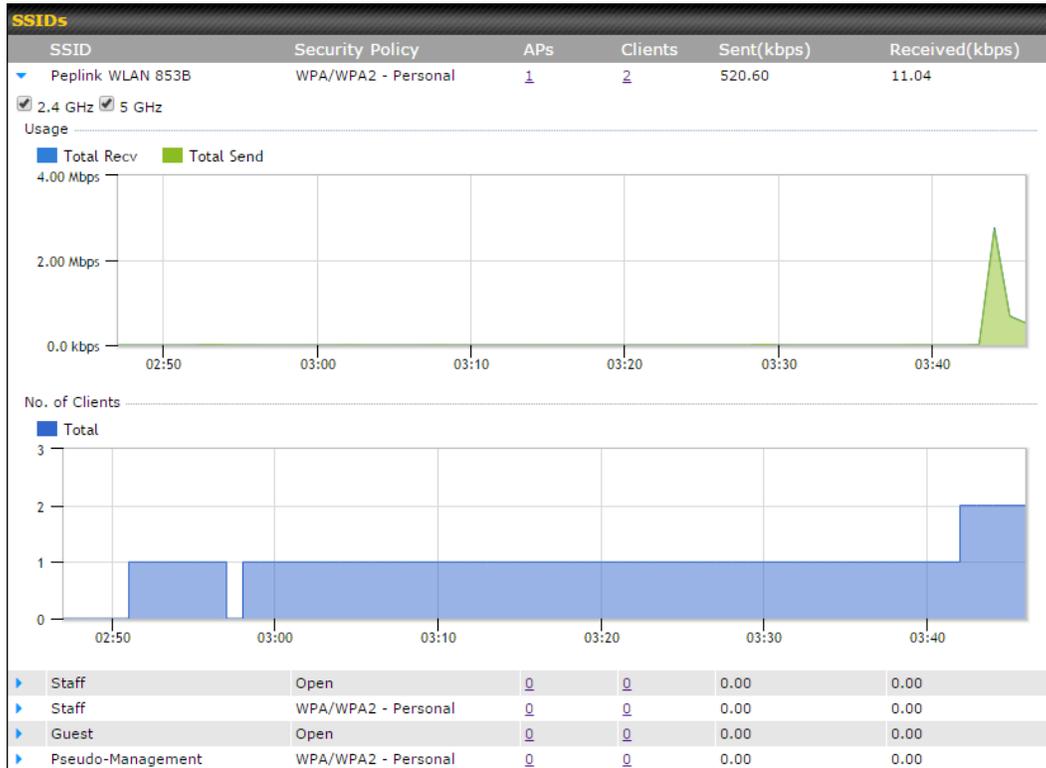
Click the blue arrow on any SSID to obtain more detailed usage information on each SSID.

25.4 Wireless Client

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

Here, you will 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:

25.5 Mesh / WDS

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

Type ▲	Peer MAC	Protocol	Rate (Send)	Rate (Receive)	Signal (dBm)	Duration
▼ APOACM-HW1/						
Mesh ( )		802.11ac	325M	650M	▁▃▄▅ -56	19:13:35
▼ APOACM-HW2/						
Mesh ( )		802.11ac	650M	351M	▁▃▄ -63	00:49:20
Mesh ( )		802.11ac	390M	325M	▁▃▄ -67	01:35:09
▼ APOE-HW1/						
Mesh ( )		802.11ac	58.5M	130M	▁▃▄ -69	00:45:22
▼ APOR-HW1/						
Mesh ( )		802.11ac	325M	866.7M	▁▃▄▅ -53	19:14:44
▼ B20X-MESH-GW/						
Mesh ( )		802.11ac	433M	650M	▁▃▄ -69	19:14:44
Mesh ( )		802.11ac	325M	390M	▁▃▄ -66	01:35:42
Mesh ( )		802.11ac	351M	650M	▁▃▄ -70	19:13:45
Mesh ( )		802.11ac	130M	117M	▁ -88	00:45:52

Network Graph
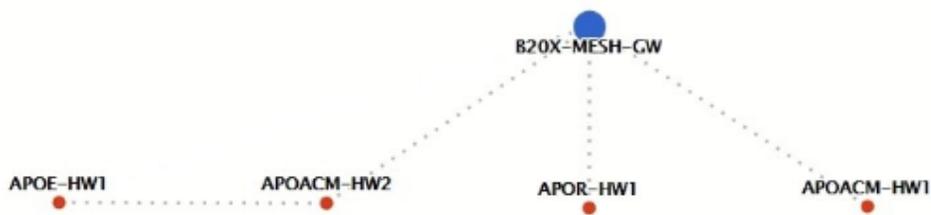
25.6 Nearby Device

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

Suspected Rogue APs					
BSSID	SSID	Channel	Encryption	Last Seen	Mark as
00:1A:DD:EC:25:22	Wireless	11	WPA2	10 hours ago	✓ ☹
00:1A:DD:EC:25:23	Accounting	11	WPA2	10 hours ago	✓ ☹
00:1A:DD:EC:25:24	Marketing	11	WPA2	11 hours ago	✓ ☹
00:03:7F:00:00:00	MYB1PUSH	1	WPA & WPA2	11 minutes ago	✓ ☹
00:03:7F:00:00:01	MYB1	1	WPA2	15 minutes ago	✓ ☹
00:1A:DD:B9:60:88	PEPWAVE_CB7E	1	WPA & WPA2	5 minutes ago	✓ ☹
00:1A:DD:BB:09:C1	Micro_S1_1	6	WPA & WPA2	1 hour ago	✓ ☹
00:1A:DD:BB:52:A8	MAX HD2 Gobi	11	WPA & WPA2	2 minutes ago	✓ ☹
00:1A:DD:BF:75:81	PEPLINK_05B5	4	WPA & WPA2	1 minute ago	✓ ☹
00:1A:DD:BF:75:82	LK_05B5	4	WPA2	1 minute ago	✓ ☹
00:1A:DD:BF:75:83	LK_05B5_VLAN22	4	WPA2	1 minute ago	✓ ☹
00:1A:DD:C1:ED:E4	dev_captive_portal_test	1	WPA & WPA2	3 minutes ago	✓ ☹
00:1A:DD:C2:E4:C5	PEPWAVE_7052	11	WPA & WPA2	2 hours ago	✓ ☹
00:1A:DD:C3:F1:64	dev_captive_portal_test	6	WPA & WPA2	6 minutes ago	✓ ☹
00:1A:DD:C4:DC:24	ssid_test	8	WPA & WPA2	2 minutes ago	✓ ☹
00:1A:DD:C4:DC:25	SSID New	8	WPA & WPA2	2 minutes ago	✓ ☹
00:1A:DD:C5:46:04	Guest SSID	9	WPA2	2 minutes ago	✓ ☹
00:1A:DD:C5:47:04	PEPWAVE_67B8	1	WPA & WPA2	5 minutes ago	✓ ☹
00:1A:DD:C5:4E:24	G BR1 Portal	2	WPA2	2 minutes ago	✓ ☹
00:1A:DD:C6:9A:48	ssid_test	8	WPA & WPA2	2 hours ago	✓ ☹

Suspected Rogue Devices
Hovering over the device MAC address will result in a popup with information on how this device was detected. Click the ✓ ☹ icons and the device will be moved to the bottom table of identified devices.

25.7 Event Log

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

Filter					
Search key	Client MAC Address / Wireless SSID / AP Serial Number / AP Profile Name				
Time	From		hh:mm	to	hh:mm
Alerts only	☐				
	Search				

Events		View Alerts

Jan 2 11:01:11	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 11:00:42	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
Jan 2 11:00:38	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 11:00:36	AP One 300M: Client 00:21:6A:35:59:A4 associated with Balance_11a
Jan 2 11:00:20	AP One 300M: Client 60:67:20:24:B6:4C disassociated from Marketing_11a
Jan 2 11:00:09	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
Jan 2 10:59:09	AP One 300M: Client 00:21:6A:35:59:A4 disassociated from Balance_11a
Jan 2 10:59:08	Office Fiber AP: Client 18:00:2D:3D:4E:7F associated with Balance
Jan 2 10:58:53	Michael's Desk: Client 18:00:2D:3D:4E:7F disassociated from Wireless
Jan 2 10:58:18	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 10:58:03	Office InWall: Client 10:BF:48:E9:76:C7 associated with Wireless
Jan 2 10:57:47	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
Jan 2 10:57:19	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 10:57:09	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
Jan 2 10:56:48	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 10:56:39	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
Jan 2 10:56:19	AP One 300M: Client 00:26:BB:05:84:A4 associated with Marketing_11a
Jan 2 10:56:09	AP One 300M: Client 9C:04:EB:10:39:4C associated with Marketing_11a
Jan 2 10:55:42	AP One 300M: Client 54:EA:A8:2D:A0:D5 disassociated from Marketing_11a
Jan 2 10:55:29	AP One 300M: Client 54:EA:A8:2D:A0:D5 associated with Marketing_11a
	More...

Events
This event log displays all activity on your AP network, down to the client level. Use to 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.

26 Toolbox

Tools for managing firmware packs can be found at **AP > Toolbox**.

Firmware Packs
Here, you can manage the firmware of your AP. Clicking on will result in information regarding each firmware pack. To receive new firmware packs, you can click **Check for Updates** to download new packs, or you can click **Manual Upload** to manually upload a firmware pack. Click **Default** to define which firmware pack is default.

27 System

27.1 Admin Security

There are two types of user accounts available for accessing the web admin: *admin* and *user*. They represent two user levels: the admin level has full administrative access, while the user level is read-only. The user level can access only the device's status information; users cannot make any changes on the device.

A web login session will be logged out automatically when it has been idle longer than the **Web Session Timeout**. Before the session expires, you may click the **Logout** button in the web admin to exit the session.

0 hours 0 minutes signifies an unlimited session time. This setting should be used only in special situations, as it will lower the system security level if users do not log out before closing the browser. The **default** is 4 hours, 0 minutes.

For security reasons, after logging in to the web admin Interface for the first time, it is recommended to change the administrator password. Configuring the administration interface to be accessible only from the LAN can further improve system security. Administrative settings configuration is located at **System > Admin Security**.

Admin Settings	
Device Name	This field allows you to define a name for this Pepwave router. By default, **Device Name** is set as **MAX_XXXX**, where *XXXX* refers to the last 4 digits of

	the unit's serial number.
Admin User Name	**Admin User Name** is set as *admin* by default, but can be changed, if desired.
Admin Password	This field allows you to specify a new administrator password.
Confirm Admin Password	This field allows you to verify and 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.
Read-only 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 Read-only Password	This field allows you to verify and confirm the new user password.
Web Session Timeout	This field specifies the number of hours and minutes that a web session can remain idle before the Pepwave router terminates its access to the web admin interface. By default, it is set to **4 hours**.
Authentication Method	With this box is checked, the web admin will authenticate using an external RADIUS 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. When the device is not able to communicate with the external RADIUS server, local accounts will be enabled again for emergency access. Additional authentication options will be available once this box is checked. Available options: ● Local Account ● RADIUS

Authentication Method	⑦	○ Local Account ● RADIUS ○ TACACS+
Authentication Protocol		MS-CHAP v2 ▼
		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
Authentication Secret		
		☑ 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
Accounting Secret		
		☑ Hide Characters
Authentication Timeout		3 seconds

Authentication	This specifies the authentication protocol used.

Protocol	Available options are **MS-CHAP 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+

Authentication Method	⃝ Local Account ⃝ RADIUS ⦿ TACACS+
TACACS+ Server	
TACACS+ Server Secret	☑ Hide Characters
TACACS+ Server Timeout	3 seconds

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

CLI SSH & Console	The CLI (command line interface) can be accessed via SSH. This field enables CLI support. For additional information regarding CLI, please refer to **Section 30.5.**
CLI SSH Access	This menu allows you to choose between granting access to LAN and WAN clients, or to LAN clients only.

CLI SSH Port	This field determines the port on which clients can access CLI SSH.
CLI SSH Access Public Key	This field is for entering the Public Key for Admin Users and Read-only Users to access CLI SSH.
Security	This option is for specifying the protocol(s) through which the web admin interface can be accessed: ● HTTP ● HTTPS ● HTTP/HTTPS HTTP to HTTPS redirection is enabled by default to force HTTPS access to the web admin interface.
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.

WAN Connection Access Settings	
Allowed Source IP Subnets	This field allows you to restrict web admin access only from defined IP subnets. ● **Any** - Allow web admin accesses to be from anywhere, without IP address restriction. ● **Allow access from the following IP subnets only** - Restrict web admin access only from 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 (For example, *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 is to choose which WAN IP address(es) the web server should listen on.

27.2 Firmware

Web admin interface : automatically check for updates

Upgrading firmware can be done in one of three ways.
Using the router's interface to automatically check for an update, using the router's interface to manually upgrade the firmware, or using InControl2 to push an upgrade to a router.

The automatic upgrade can be done from **System** > **Firmware**.

If an update is found the buttons will change to allow you to **Download and Update** the firmware.
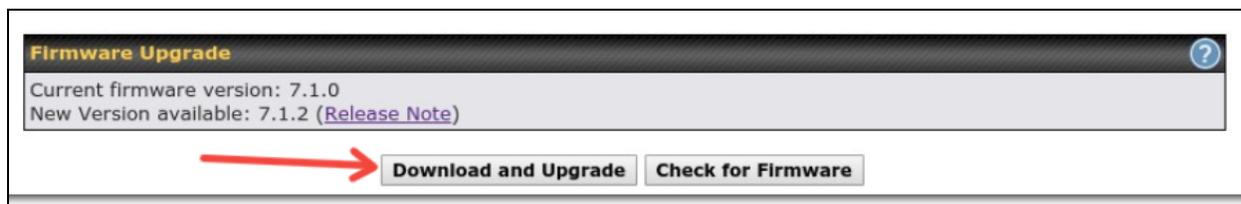
Click on the **Download and Upgrade** button. A prompt will be displayed advising to download the Current Active Configuration. Please click on the underlined download text. After downloading the current config click the **Ok** button to start the upgrade process.

The router will download and then apply the firmware. The time that this process takes will depend on your internet connection's speed.
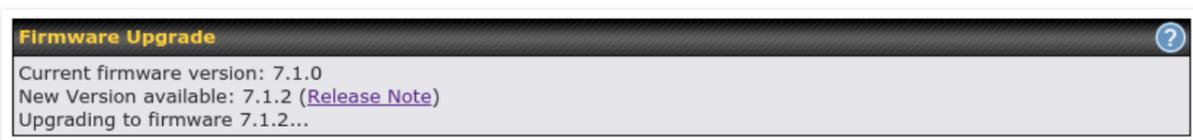
The firmware will now be applied to the router*. The amount of time it takes for the firmware to upgrade will also depend on the router that's being upgraded.

Upgrading the firmware will cause the router to reboot.

Web admin interface : install updates manually

In some cases, a special build may be provided via a ticket or it may be found in the forum. Upgrading to the special build can be done using this method, or using IC2 if you are using that to manage your firmware upgrades. A manual upgrade using the GA firmware posted on the site may also be recommended or required for a couple of reasons.

All of the Peplink/Pepwave GA firmware can be found here Navigate to the relevant product line (ie. Balance, Max, FusionHub, SOHO, etc). Some product lines may have a dropdown that lists all of the products in that product line. Here is a screenshot from the Balance line.

If the device has more than one firmware version the current hardware revision will be required to know what firmware to download.

Navigate to System > Firmware and click the Choose File button under the Manual Firmware Upgrade section. Navigate to the location that the firmware was downloaded to select the ".img" file and click the Open button.

Click on the Manual Upgrade button to start the upgrade process.

A prompt will be displayed advising to download the Current Active Configuration. Please click on the underlined download text. After downloading the current config click the Ok button to start the upgrade process. The firmware will now be applied to the router*. The amount of time it takes for the firmware to upgrade will depend on the router that's being upgraded.

Upgrading the firmware will cause the router to reboot.

The InControl method

Described in this knowledgebase article on our forum.

27.3 Time

Time Settings enables the system clock of the Pepwave router to be synchronized with a specified time server. Time settings are located at **System > Time**.

Time Settings	
Time Zone	This specifies the time zone (along with the corresponding Daylight Savings Time scheme). The **Time Zone** value affects the time stamps in the Pepwave router's event log and e-mail notifications. Check **Show all** to show all time zone options.

Time Sync	This field allows to select your time sync mode, the available options are: ● Time Server ● GPS ● GPS with Time Server as fallback
Time Server	This setting specifies the NTP network time server to be utilized by the Pepwave router.

27.4 Schedule

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

Enable scheduling, and then click on your schedule name or on the **New Schedule** button to begin.

Edit Schedule Profile	
Enabling	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 pre-defined schedules as your starting point. Please note that upon selection, previous changes on the schedule map will be deleted.
Schedule Map	Click on the desired times to enable features at that time period. You can hold your mouse for faster entry.

27.5 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 router will send email messages to system administrators when the WAN status changes or when new firmware is available. If **Enable** is not checked, email notification is disabled and the Pepwave router will not send email messages.

SMTP Server	This setting specifies the SMTP server to be used for sending email. 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: ● None ● STARTTLS ● SSL/TLS
SMTP Port	This field is for specifying the SMTP port number. By default, this is set to **25**. If Connection Security is selected "**STARTTLS**", the default port number will be set to **587**. If Connection Security is selected "**SSL/TLS**", 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 while sending email. These options are shown only if **Require authentication** is checked in the **SMTP Server** setting.
Confirm SMTP Password	This field allows you to verify and confirm the new administrator password.
Sender's Email Address	This setting specifies the email address the Pepwave router will use to send reports.
Recipient's Email Address	This setting specifies the email address(es) to which the Pepwave router will send email notifications. For multiple recipients, separate each email addresses using the enter key.

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

Click **Send Test Notification** to confirm. 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
```

27.6 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**.

Event Log 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.
Source Network Address	Via drop-down list, you may choose the LAN interface for Event Log, URL Logging, Sessions Logging and RADIUS.
Push Events	The Pepwave router can also send push notifications to mobile devices that have our Mobile Router Utility installed. Check the box to activate this feature.
URL Logging	This setting is to enable event logging at the specified log server.
URL Logging Host	This setting specifies the IP address or hostname of the URL log server.

Session Logging	This setting is to enable event logging at the specified log server.
Session Logging Host	This setting specifies the IP address or hostname of the Session log server.
	For more information on the Router Utility, go to: www.peplink.com/products/router-utility

27.7 SNMP

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

SNMP Settings

SNMP Device Name	MAX_TST_3D8B
Location	
SNMP Port	161 Default
SNMPv1	☐ Enable
SNMPv2c	☐ Enable
SNMPv3	☐ Enable
SNMP Trap	☑ Enable
SNMP Trap Community	
SNMP Trap Server	
SNMP Trap Port	162
SNMP Trap Server Heartbeat	☐
	Save

Community Name	Allowed Source Network	Access Mode	
No SNMPv1 / SNMPv2c Communities Defined			
Add SNMP Community			

SNMPv3 User Name	Authentication / Privacy	Access Mode	
No SNMPv3 Users Defined			
Add SNMP User			

SNMP Settings	
SNMP Device	This field shows the router name defined at **System > Admin Security**.

Name	
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.
SNMPv2	This option allows you to enable SNMP version 2.
SNMPv3	This option allows you to enable SNMP version 3.
SNMP Trap	This option allows you to enable SNMP Trap. If enabled, the following entry fields will appear.
SNMP Trap Community	This setting specifies the SNMP Trap community name.
SNMP Trap Server	Enter the IP address of the SNMP Trap server.
SNMP Trap Port	This option specifies the port which the SNMP Trap server will use. The default port is **162**.
SNMP Trap Server Heartbeat	This option allows you to enable and configure the heartbeat interval for the SNMP Trap server.

To add a community for either SNMPv1 or SNMPv2, 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 Source Subnet Address	This setting specifies a subnet from which access to the SNMP server is allowed. Enter 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 Protocol	This setting specifies via a drop-down menu one of the following valid privacy protocols: ● NONE ● DES When DES is selected, an entry field will appear for the password.

27.8 SMS Control

SMS Control allows the user to control the device using SMS even if the modem does not have a data connection. The settings for configuring the SMS Control can be found at **System > SMS Control**.

Supported Models

- **Balance/MAX**: *-LTE-E, *-LTEA-W, *-LTEA-P, *-LTE-MX
- **EPX**: *-LW*, *-LP*

When this box is checked, the device will be allowed to take actions according to received commands via SMS.

Make sure your mobile plan supports SMS, and note that some plans may incur additional charges for this.

SMS Control can reboot devices and configure cellular settings over signalling channels, even if the modem does not have a data connection.

For details of supported SMS command sets, please refer to our knowledge base.

SMS Control Settings	
Enable	Click the checkbox to enable the SMS Control.
Password	This setting sets the password for authentication - maximum of 32 characters, which cannot include semicolon (;).
White List	Optionally, you can add phone number(s) to the whitelist. Only matching phone numbers are allowed to issue SMS commands. Phone numbers must be in the E.164 International Phone Numbers format.

27.9 InControl

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. All of this is now possible with InControl.

When this check box is checked, the device's status information will be sent to the Peplink InControl system. This device's usage data and configuration will be sent to the system if you enable the features in the system.

Alternatively, you can also privately host InControl. Simply check the "Privately Host InControl" box and enter the IP Address of your InControl Host. If you have multiple hosts, you may enter the primary and backup IP addresses for the InControl Host and tick the "Fail over to InControl in the cloud" box. The device will connect to either the primary InControl Host or the secondary/backup ICA/IC2.

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.

27.10 Configuration

Backing up Pepwave router settings immediately after successful completion of initial setup is strongly recommended. The functionality to download and upload Pepwave router settings is found at **System > Configuration**. Note that available options vary by model.

Restore Configuration to Factory Settings
Restore Factory Settings

Download Active Configurations
Download

Upload Configurations
Configuration File   Browse_ No file selected.
Upload

Upload Configurations from High Availability Pair
Configuration File   Browse_ No file selected.
Upload

Configuration	
Restore Configuration to	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**

Factory Settings	**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.
Upload Configurations from High Availability Pair	In a high availability (HA) configuration, a Pepwave router can quickly load the configuration of its HA counterpart. To do so, click the **Upload** button. After loading the settings, configure the LAN IP address of the Pepwave router so that it is different from the HA counterpart.

27.11 Feature Add-ons

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

Feature Activation

Activation Key

27.12 Reboot

This page provides a reboot button for restarting the system. For maximum reliability, the Pepwave router can equip with 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.

Reboot System
Select the firmware you want to use to start up this device:
◉ Firmware 1: 6.2.1 build 2977 (Running)
○ Firmware 2: 6.2.1b01 build 2949
Reboot

28 Tools

28.1 Ping

The ping test tool sends pings through a specific Ethernet interface or a SpeedFusion™ VPN connection. You can specify the number of pings in the field **Number of times**, to a maximum number of 10 times. **Packet Size** can be set to a maximum of 1472 bytes. The ping utility is located at **System > Tools > Ping,** illustrated below:

Ping	
Connection	WAN 1 ▾
Destination	10.10.10.1
Packet Size	56
Number of times	Times 5

Start   Stop

Results	Clear Log
PING 10.10.10.1 (10.10.10.1) from 10.88.3.158 56(84) bytes of data.	
64 bytes from 10.10.10.1: icmp_req=1 ttl=62 time=27.6 ms	
64 bytes from 10.10.10.1: icmp_req=2 ttl=62 time=26.5 ms	
64 bytes from 10.10.10.1: icmp_req=3 ttl=62 time=28.9 ms	
64 bytes from 10.10.10.1: icmp_req=4 ttl=62 time=28.3 ms	
64 bytes from 10.10.10.1: icmp_req=5 ttl=62 time=27.7 ms	
--- 10.10.10.1 ping statistics ---	
5 packets transmitted, 5 received, 0% packet loss, time 4005ms	
rtt min/avg/max/mdev = 26.516/27.855/28.933/0.814 ms	

Tip
A system administrator can use the ping utility to manually check the connectivity of a particular LAN/WAN connection.

28.2 Traceroute Test

The traceroute test tool traces the routing path to the destination through a particular Ethernet interface or a SpeedFusion™ connection. The traceroute test utility is located at **System > Tools > Traceroute**.

28.3 Wake-on-LAN

Pepwane routers can send special "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"

28.4 WAN Analysis

The WAN Analysis feature allows you to run a WAN to WAN speed test between 2 Peplink devices .

You can set a device up as a **Server** or a **Client**. 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 port is 6000 and can be changed 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's been entered on the server side. Select the WAN(s) that will be used for testing and enter the Servers WAN IP address. Once all of the options have been set, click the **Start Test** button.

WAN Performance Analysis
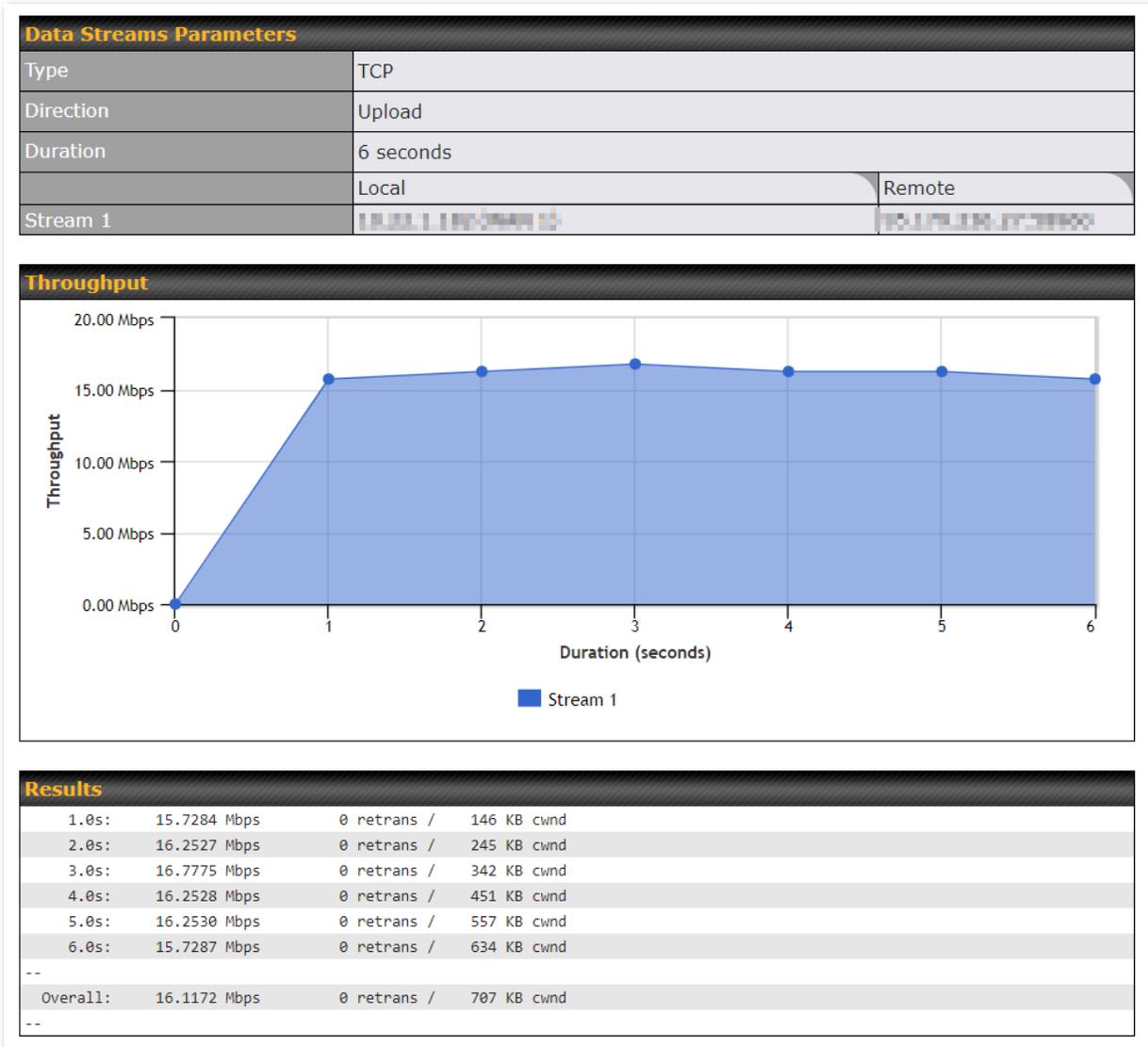Check your point-to-point WAN performance with another peer

Client Settings

Control Port	6000
Data Port	57280 - 57287
Type	⦿ TCP ○ UDP
Direction	⦿ Upload ○ Download
Duration	20 seconds (5 - 600)

Data Streams

| Local WAN Connection	Remote IP Address
1. -- Not Used -- ▾	
2. -- Not Used -- ▾	
3. -- Not Used -- ▾	
4. -- Not Used -- ▾	
5. -- Not Used -- ▾	
6. -- Not Used -- ▾	
7. -- Not Used -- ▾	
8. -- Not Used -- ▾	

Start Test

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

Data Streams Parameters		
Type	TCP	
Direction	Upload	
Duration	6 seconds	
	Local	Remote
Stream 1	[redacted]	[redacted]

Throughput

Results

```
   1.0s:    15.7284 Mbps      0 retrans /    146 KB cwnd
   2.0s:    16.2527 Mbps      0 retrans /    245 KB cwnd
   3.0s:    16.7775 Mbps      0 retrans /    342 KB cwnd
   4.0s:    16.2528 Mbps      0 retrans /    451 KB cwnd
   5.0s:    16.2530 Mbps      0 retrans /    557 KB cwnd
   6.0s:    15.7287 Mbps      0 retrans /    634 KB cwnd
--
 Overall:   16.1172 Mbps      0 retrans /    707 KB cwnd
--
```

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

28.5 CLI (Command Line Interface Support)

The CLI (command line interface) can be accessed via SSH. This field enables CLI support. The below settings specify which TCP port and which interface(s) should accept remote SSH CLI access. The user name and password used for remote SSH CLI access are the same as those used for web admin access.
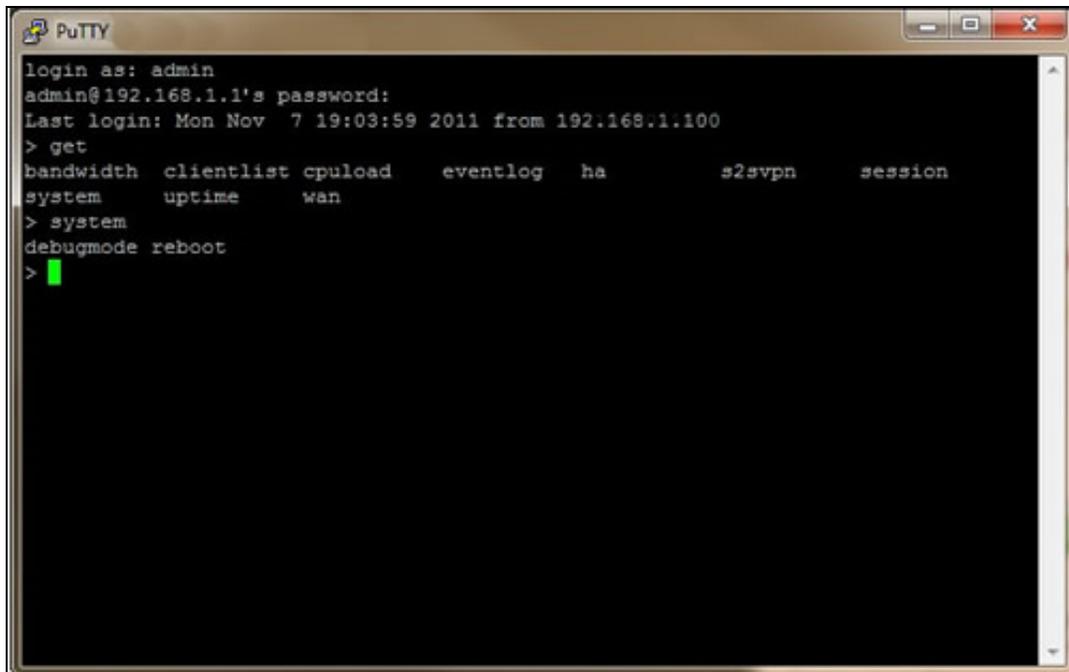
29 Status

29.1 Device

System information is located at **Status > Device**.

System Information	
Device Name	
Model	Pepwave MAX BR1 Pro 5G
Product Code	
Hardware Revision	1
Serial Number	
Firmware	8.3.0 build 5229
SpeedFusion VPN Version	9.2.0
Host Name	
Uptime	2 minutes
System Time	Mon Feb 20 11:25:42 +08 2023
GPS File	(?) 2023-02-03 ▼ Download
Diagnostic Report	Download
Remote Assistance	Turn On for 7 days

MAC Address	
LAN	
WAN	
Wi-Fi WAN on 5 GHz	
PepVPN NAT Mode	

⚖ Legal

System Information	
Device Name	This is the name specified in the **Device Name** field located at **System > Admin Security**.
Model	This shows the model name and number of this device.
Product Code	If your model uses a product code, it will appear here.
Hardware Revision	This shows the hardware version of this device.

Serial Number	This shows the serial number of this device.
Firmware	This shows the firmware version this device is currently running.
SpeedFusion VPN Version	This shows the current SpeedFusion VPN version.
Modem Support Version	This shows the modem support version. For a list of supported modems, click **Modem Support List**.
InControl Managed Configuration	InControl Managed Configurations (firmware, VLAN, Captive Portal, etcetera)
Host Name	The host name assigned to the Pepwave router appears here.
Uptime	This shows the length of time since the device has been rebooted.
System Time	This shows the current system time.
OpenVPN Client Profile	Link to download OpenVpn Client profile when this is enabled in Remote User Access
Diagnostic Report	The **Download** link is for exporting a diagnostic report file required for system investigation.
Remote Assistance	This option is to **Turn on** remote assistance with the time duration.

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

29.2 GPS Data

GPS enabled models automatically store up to seven days of GPS location data in GPS eXchange format (GPX). To review this data using third-party applications, click **Status > Device** and then download your GPX file.

The Pepwave GPS enabled devices export real-time location data in NMEA format through the LAN IP address at TCP port 60660. It is accessible from the LAN or over a SpeedFusion connection. To access the data via a virtual serial port, install a virtual serial port driver. Visit http://www.peplink.com/index.php?view=faq&id=294 to download the driver.

29.3 Active Sessions

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

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**.