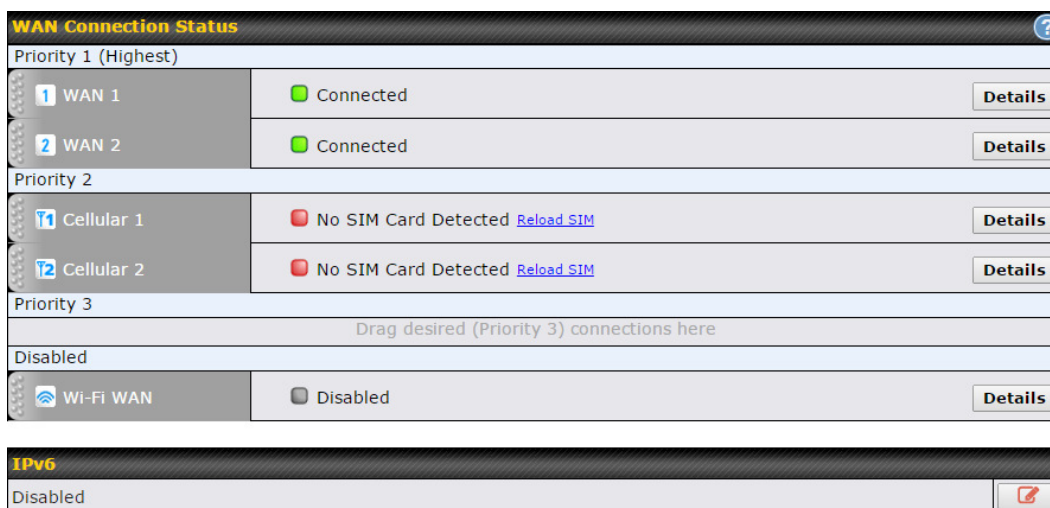


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Portal Customization	
<b>Logo Image</b>	Click the <b>Choose File</b> button to select a logo to use for the built-in portal.
<b>Message</b>	If you have any additional messages for your users, enter them in this field.
<b>Terms &amp; Conditions</b>	If you would like to use your own set of terms and conditions, please enter them here. If left empty, the built-in portal will display the default terms and conditions.
<b>Custom Landing Page</b>	Fill in this field to redirect clients to an external URL.

## 10 Configuring the WAN Interface(s)

WAN Interface settings are located at **Network>WAN**. To reorder WAN priority, drag on the appropriate WAN by holding the left mouse button, move it to the desired priority (the first one would be the highest priority, the second one would be lower priority, and so on), and drop it by releasing the mouse button.



To disable a particular WAN connection, drag on the appropriate WAN by holding the left mouse button, move it the **Disabled** row, and drop it by releasing the mouse button. You can also set priorities on the **Dashboard**. Click the **Details** button in the corresponding row to modify the connection setting.

### Important Note

Connection details will be changed and become effective immediately after clicking the **Save and Apply** button.

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## 10.1 Ethernet WAN

From **Network>WAN**, choose a WAN connection and then click **Details**.

WAN Port	
WAN Connection Name	WAN 1 <span>Default</span>
Schedule	Always on ▼
Connection Method	<span>?</span> DHCP ▼
Routing Mode	<span>?</span> <input checked="" type="radio"/> NAT
IP Address	10.10.12.49
Subnet Mask	255.255.0.0
Default Gateway	10.10.10.1
Uptime	1795 mins
Hostname (Optional)	<input type="text"/> <input type="checkbox"/> Use custom hostname
DNS Servers	<input checked="" type="checkbox"/> Obtain DNS server address automatically 10.10.10.1 <input type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>










### WAN Port (Section 1)

<b>WAN Connection Name</b>	Enter a name to represent this WAN connection.
<b>Schedule</b>	Click the drop-down menu to apply a time schedule to this interface
<b>Connection Method</b>	<p>There are three possible connection methods for Ethernet WAN:</p> <ul style="list-style-type: none"><li>• DHCP</li><li>• Static IP</li><li>• PPPoE</li></ul> <p>The connection method and details are determined by, and can be obtained from, the ISP. See the following sections for details on each connection method.</p>
<b>Routing Mode</b>	This field shows that <b>NAT</b> (network address translation) will be applied to the traffic routed over this WAN connection. <b>IP Forwarding</b> is available when you click the link in the help text.
<b>IP Address/Subnet Mask/Default Gateway</b>	Enter the WAN IP address and subnet mask, as well as the IP address of the default gateway, in these fields.

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**Hostname** Enter a hostname for this WAN port if needed.

**DNS Servers** Select a DNS server for this port to use. This port can either be automatically selected or manually designated.

Standby State	 <input checked="" type="radio"/> Remain connected <input type="radio"/> Disconnect
Upstream Bandwidth	 1 Gbps ▾
Downstream Bandwidth	 1 Gbps ▾
Health Check Settings	
Health Check Method	 PING ▾
PING Hosts	 Host 1: 8.8.8.8 Host 2: <input type="text"/> <input type="checkbox"/> Use first two DNS servers as PING Hosts
Timeout	 5 ▾ second(s)
Health Check Interval	 5 ▾ second(s)
Health Check Retries	 3 ▾
Recovery Retries	 3 ▾

## WAN Port (Section 2)

**Standby State** This setting specifies the standby state of the WAN connection. The available options are **Remain connected** and **Disconnect**. The default state is **Remain Connected**.

**Upstream Bandwidth** This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.

**Downstream Bandwidth** This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. This value is referenced as the default weight value when using the algorithm **Least Used** or the algorithm **Persistence (Auto)** in outbound policy with **Managed by Custom Rules** chosen (see **Section 15.2**).

**Health Check Method** This setting specifies the health check method for the WAN connection. The value of method can be configured as **Disabled**, **Ping**, **DNS Lookup**, or **HTTP**. The default method is **Disabled**. See **Section 10.4** for configuration details.

**PING Hosts** These fields are for specifying the target DNS servers where DNS lookups will be sent to for health check.

If the box Use first two DNS servers as Health Check DNS Servers is checked, the first two DNS servers will be the DNS lookup targets for checking the connection healthiness. If the box is not checked, the field Host 1 must be filled and the field Host 2 is optional.

The connection is considered to be up if DNS responses are received from any one of the

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	health check DNS servers, regardless of whether the result is positive or negative.
<b>Timeout</b>	If a health check test cannot be completed within the specified amount of time, the test will be treated as failed.
<b>Health Check Interval</b>	This is the number of consecutive check failures before treating a connection as down.
<b>Health Check Retries</b>	This is the number of consecutive check failures before treating a connection as down.
<b>Recovery Retries</b>	This is the number of responses required after a health check failure before treating a connection as up again.

Dynamic DNS Service Provider	<input type="text" value="Disabled"/>
Bandwidth Allowance Monitor	<input type="checkbox"/> Enable
Port Speed	<input type="text" value="Auto"/>
MTU	<input type="radio"/> Auto <input checked="" type="radio"/> Custom Value: <input type="text" value="1440"/> <input type="button" value="Default"/>

## WAN Port (Section 3)

<b>Dynamic DNS Service Provider</b>	<p>This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers:</p> <ul style="list-style-type: none"><li>• changeip.com</li><li>• dyndns.org</li><li>• no-ip.org</li><li>• tzo.com</li><li>• DNS-O-Matic</li></ul> <p>Select <b>Disabled</b> to disable this feature. See <b>Section 9.5</b> for configuration details.</p>
<b>Bandwidth Allowance Monitor</b>	<p>This option enables bandwidth usage monitoring on this WAN connection for each billing cycle. When this setting is not enabled, each month's bandwidth usage is tracked, but no action will be taken.</p>
<b>Port Speed</b>	<p>This setting specifies port speed and duplex configurations of the WAN port. By default, <b>Auto</b> is selected and the appropriate data speed is automatically detected by the Pepwave router. In the event of negotiation issues, the port speed can be manually specified. You can also choose whether or not to advertise the speed to the peer by selecting the <b>Advertise Speed</b> checkbox.</p>
<b>MTU</b>	<p>This setting specifies the maximum transmission unit. By default, MTU is set to <b>Custom 1440</b>. You may adjust the MTU value by editing the text field. Click <b>Default</b> to restore the</p>

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default MTU value. Select **Auto** and the appropriate MTU value will be automatically detected. Auto-detection will run each time the WAN connection establishes.

MSS	<input type="radio"/> Auto <input type="radio"/> Custom Value: <input type="text"/>
MAC Address Clone	<input type="text" value="00"/> : <input type="text" value="1A"/> : <input type="text" value="DD"/> : <input type="text" value="BD"/> : <input type="text" value="54"/> : <input type="text" value="41"/> <input type="button" value="Default"/>
VLAN	<input checked="" type="checkbox"/> VLAN ID: <input type="text"/>
Reply to ICMP PING	<input type="radio"/> Yes <input type="radio"/> No
Additional Public IP Address	<input type="text" value="IP Address"/> <input type="text" value="Subnet Mask 255.255.255.0 (/24)"/>
	<input type="button" value="↓"/> <input type="button" value="Delete"/>

## WAN Port (Section 4)

### MSS

This setting should be configured based on the maximum payload size that the local system can handle. The MSS (maximum segment size) is computed from the MTU minus 40 bytes for TCP over IPv4. If MTU is set to **Auto**, the MSS will also be set automatically. By default, MSS is set to **Auto**.

### MAC Address Clone

Some service providers (e.g., cable providers) identify the client's MAC address and require the client to always use the same MAC address to connect to the network. In such cases, change the WAN interface's MAC address to the original client PC's MAC address via this field. The default MAC address is a unique value assigned at the factory. In most cases, the default value is sufficient. Clicking **Default** restores the MAC address to the default value.

### VLAN

Click the square if you wish to enable VLAN functionality and enable multiple broadcast domains. Once you enable VLAN, you will be able to enter a name for your network.

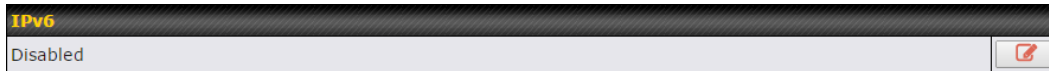
### Reply to ICMP PING

If this field is disabled, the WAN connection will not respond to ICMP ping requests. By default, this is **enabled**.

### Additional Public IP Address

The **IP Address** list represents the list of fixed Internet IP addresses assigned by the ISP, in the event that more than one Internet IP address is assigned to this WAN connection. Enter the fixed Internet IP addresses and the corresponding subnet mask, and then click the **Down Arrow** button to populate IP address entries to the **IP Address** List.

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### IPv6

**IPv6**



IPv6 support can be enabled on one of the available Ethernet WAN ports. On this screen, you can choose which WAN will support IPv6. To enable IPv6 support on a WAN, the WAN router must respond to stateless address auto configuration advertisements and DHCPv6 requests. IPv6 clients on the LAN will acquire their IPv6, gateway, and DNS server addresses from it. The device will also acquire an IPv6 address for performing ping/traceroute checks and accepting web admin accesses. Note: This feature is only available on the Pepwave MAX 700, HD2, and HD2 IP67.

## 10.1.1 DHCP Connection

There are four possible connection methods:

1. DHCP
2. Static IP
3. PPPoE
4. L2TP

The DHCP connection method is suitable if the ISP provides an IP address automatically using DHCP (e.g., satellite modem, WiMAX modem, cable, Metro Ethernet, etc.).

Connection Method	 DHCP
Routing Mode	 <input checked="" type="radio"/> NAT
IP Address	10.88.3.158
Subnet Mask	255.255.255.0
Default Gateway	10.88.3.253
Hostname (Optional)	<input type="text"/> <input type="checkbox"/> Use custom hostname
DNS Servers	<input checked="" type="checkbox"/> Obtain DNS server address automatically 10.88.3.1 <input type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>

### DHCP Connection Settings

**Routing Mode**



NAT allows substituting the real address in a packet with a mapped address that is routable on the destination network. By clicking the help icon in this field, you can display the **IP Forwarding** option, if your network requires it.

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<b>IP Address/ Subnet Mask/ Default Gateway</b>	This information is obtained from the ISP automatically.
<b>Hostname (Optional)</b>	If your service provider's DHCP server requires you to supply a hostname value upon acquiring an IP address, you may enter the value here. If your service provider does not provide you with the value, you can safely bypass this option.
<b>DNS Servers</b>	<p>Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) servers to be used when a DNS lookup is routed through this connection.</p> <p>Selecting <b>Obtain DNS server address automatically</b> results in the DNS servers being assigned by the WAN DHCP server to be used for outbound DNS lookups over the connection. (The DNS servers are obtained along with the WAN IP address assigned from the DHCP server.)</p> <p>When <b>Use the following DNS server address(es)</b> is selected, you may enter custom DNS server addresses for this WAN connection into the <b>DNS Server 1</b> and <b>DNS Server 2</b> fields.</p>

## 10.1.2 Static IP Connection

The static IP connection method is suitable if your ISP provides a static IP address to connect directly.

Connection Method	 Static IP ▾
Routing Mode	 <input type="radio"/> NAT
IP Address	10.88.3.158
Subnet Mask	255.255.255.0
Default Gateway	10.88.3.253
IP Address	<input type="text"/>
Subnet Mask	255.255.255.0 (/24) ▾
Default Gateway	<input type="text"/>
DNS Servers	<input checked="" type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>

### Static IP Settings

#### Routing Mode

NAT allows substituting the real address in a packet with a mapped address that is routable on the destination network. By clicking the help icon in this field, you can display the **IP Forwarding** option, if your network requires it.

#### IP Address / Subnet Mask / Default Gateway

These settings allow you to specify the information required in order to communicate on the Internet via a fixed Internet IP address. The information is typically determined by and can be obtained from the ISP.

#### DNS Servers

Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) servers to be used when a DNS lookup is routed through this connection. Selecting **Obtain DNS server address automatically** results in the DNS servers being assigned by the WAN DHCP server to be used for outbound DNS lookups over the connection. (The DNS servers are obtained along with the WAN IP address assigned from the DHCP server.) When **Use the following DNS server address(es)** is

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selected, you may enter custom DNS server addresses for this WAN connection into the **DNS Server 1** and **DNS Server 2** fields.

## 10.1.3 PPPoE Connection

This connection method is suitable if your ISP provides a login ID/password to connect via PPPoE.

Connection Method	<input type="button" value="?"/> PPPoE
Routing Mode	<input type="button" value="?"/> <input type="radio"/> NAT
IP Address	10.88.3.158
Subnet Mask	255.255.255.0
Default Gateway	10.88.3.253
PPPoE User Name	<input type="text"/>
PPPoE Password	<input type="password"/>
Confirm PPPoE Password	<input type="password"/>
Service Name (Optional)	<input type="text"/> Leave it blank unless it is provided by ISP
IP Address (Optional)	<input type="text"/> Leave it blank unless it is provided by ISP
DNS Servers	<input checked="" type="checkbox"/> Obtain DNS server address automatically 10.88.3.1 <input checked="" type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>

### PPPoE Settings

#### Routing Mode

NAT allows substituting the real address in a packet with a mapped address that is routable on the destination network. By clicking the help icon in this field, you can display the **IP Forwarding** option, if your network requires it.

#### IP Address / Subnet Mask / Default Gateway

This information is obtained from the ISP automatically.

#### PPPoE User Name / Password

Enter the required information in these fields in order to connect via PPPoE to the ISP. The parameter values are determined by and can be obtained from the ISP.

#### Confirm PPPoE Password

Verify your password by entering it again in this field.

#### Service Name (Optional)

Service name is provided by the ISP.

**Note: Leave this field blank unless it is provided by your ISP.**

#### IP Address (Optional)

If your ISP provides a PPPoE IP address, enter it here.

**Note: Leave this field blank unless it is provided by your ISP.**

#### DNS Servers

Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) servers to be used when a DNS lookup is routed through this connection. Selecting **Obtain DNS server address automatically** results



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in the DNS servers being assigned by the WAN DHCP server to be used for outbound DNS lookups over the connection. (The DNS servers are obtained along with the WAN IP address assigned from the DHCP server.) When **Use the following DNS server address(es)** is selected, you may enter custom DNS server addresses for this WAN connection into the **DNS Server 1** and **DNS Server 2** fields.

## 10.1.4 L2TP Connection

L2TP has all the compatibility and convenience of PPTP with greater security. Combine this with IPsec for a good balance between ease of use and security.

Connection Method	<input type="button" value="?"/> L2TP
Routing Mode	<input type="button" value="?"/> <input checked="" type="radio"/> NAT
IP Address	10.88.3.158
Subnet Mask	255.255.255.0
Default Gateway	10.88.3.253
L2TP User Name	<input type="text"/>
L2TP Password	<input type="text"/>
Confirm L2TP Password	<input type="text"/>
Server IP Address / Host	<input type="text"/>
Address Type	<input checked="" type="radio"/> Dynamic IP <input type="radio"/> Static IP
DNS Servers	<input checked="" type="checkbox"/> Obtain DNS server address automatically 10.88.3.1 <input checked="" type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>

### L2TP Settings

#### L2TP User Name / Password

Enter the required information in these fields in order to connect via L2TP to your ISP. The parameter values are determined by and can be obtained from your ISP.

#### Confirm L2TP Password

Verify your password by entering it again in this field.

#### Server IP Address / Host

L2TP server address is a parameter which is provided by your ISP. Note: Leave this field blank unless it is provided by your ISP.

#### Address Type

Your ISP will also indicate whether the server IP address is Dynamic or Static. Please click the appropriate value.

#### DNS Servers

Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) servers to be used when a DNS lookup is routed through this connection.

Selecting **Obtain DNS server address automatically** results in the DNS servers assigned by the PPPoE server to be used for outbound DNS lookups over the WAN connection. (The DNS servers are obtained along with the WAN IP address assigned from the PPPoE server.)

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When **Use the following DNS server address(es)** is selected, you can enter custom DNS server addresses for this WAN connection into the **DNS server 1** and **DNS server 2** fields.

## 10.2 Cellular WAN

The screenshot shows the 'WAN Connection Status' interface. It is divided into three priority sections: Priority 1 (Highest), Priority 2, and Priority 3. Under Priority 1, there are two entries: 'WAN 1' and 'WAN 2', both showing a green 'Connected' status with a 'Details' button. Under Priority 2, there are two entries: 'Cellular 1' and 'Cellular 2', both showing a red 'No SIM Card Detected' status with a 'Reload SIM' link and a 'Details' button. The 'Cellular 1' and 'Cellular 2' labels and their respective 'Details' buttons are highlighted with orange boxes. Under Priority 3, there is a message 'Drag desired (Priority 3) connections here'. At the bottom, there is a 'Disabled' section with a 'Wi-Fi WAN' entry that is 'Disabled' and has a 'Details' button.

To access cellular WAN settings, click **Network>WAN>Details**.  
(Available on the Pepwave MAX BR1, HD2, and HD2 IP67 only)

### Connection Details

The screenshot shows the 'Cellular 1 Status' interface. It is a table with the following data:


Cellular 1 Status	
IMSI	(No SIM Card Detected)
MEID	A100001F7DC038 270113180708241208
ESN	8052FC8A
IMEI	356144040031862

### Cellular Status






<b>IMSI</b>	This is the International Mobile Subscriber Identity which uniquely identifies the SIM card. This is applicable to 3G modems only.
<b>MEID</b>	Some Pepwave routers support both HSPA and EV-DO. For Sprint or Verizon Wireless EV-DO users, a unique MEID identifier code (in hexadecimal format) is used by the carrier to associate the EV-DO device with the user. This information is presented in hex and decimal format.
<b>ESN</b>	This serves the same purpose as MEID HEX but uses an older format.
<b>IMEI</b>	This is the unique ID for identifying the modem in GSM/HSPA mode.

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WAN Connection Settings <span style="float: right;">?</span>	
WAN Connection Name	Cellular 2 <span style="float: right;">Default</span>
Schedule	Always on ▼
Network Mode	<input checked="" type="radio"/> HSPA <input type="radio"/> Sprint,EV-DO <input type="radio"/> Verizon Wireless,EV-DO
Subnet Selection <span style="float: right;">?</span>	<input checked="" type="radio"/> Auto
Routing Mode <span style="float: right;">?</span>	<input checked="" type="radio"/> NAT
DNS Servers	<input checked="" type="checkbox"/> Obtain DNS server address automatically <input type="checkbox"/> Use the following DNS server address(es) DNS Server 1: <input type="text"/> DNS Server 2: <input type="text"/>


WAN Connection Settings	
<b>WAN Connection Name</b>	Enter a name to represent this WAN connection.
<b>Schedule</b>	Click the drop-down menu to apply a time schedule to this interface if needed.
<b>Network Mode</b>	Users have to specify the network they are on accordingly.
<b>Subnet Selection</b>	Auto: The subnet mask will be set automatically.  Force /31 Subnet: The subnet mask will be set as 255.255.255.254(/31), and the gateway IP address will be recalculated.
<b>Routing Mode</b>	This option allows you to select the routing method to be used in routing IP frames via the WAN connection. The mode can be either <b>NAT</b> (network address translation) or <b>IP Forwarding</b> . Click the  button to enable IP forwarding.
<b>DNS Servers</b>	Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) servers to be used when a DNS lookup is routed through this connection.  Selecting <b>Obtain DNS server address automatically</b> results in the DNS servers assigned by the PPPoE server to be used for outbound DNS lookups over the WAN connection. (The DNS servers are obtained along with the WAN IP address assigned from the PPPoE server.)  When <b>Use the following DNS server address(es)</b> is selected, you can enter custom DNS server addresses for this WAN connection into the <b>DNS server 1</b> and <b>DNS server 2</b> fields.

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Cellular Settings	
Network Selection	 <input type="radio"/> Auto <input type="radio"/> Manual
3G/2G	 Auto ▾
Authentication	Auto ▾
Band Selection	<input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (800 MHz) <input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (850 MHz) <input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (900 MHz) <input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (1700 MHz) <input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (1900 MHz) <input checked="" type="checkbox"/> WCDMA / HSDPA / HSUPA / HSPA+ (2100 MHz) <input checked="" type="checkbox"/> GSM / GPRS / EDGE (850 MHz) <input checked="" type="checkbox"/> GSM / GPRS / EDGE (900 MHz) <input checked="" type="checkbox"/> GSM / GPRS / EDGE (1800 MHz) <input checked="" type="checkbox"/> GSM / GPRS / EDGE (1900 MHz)
Data Roaming	<input type="checkbox"/>
Operator Settings	<input type="radio"/> Auto <input type="radio"/> Custom
APN	<input type="text"/>
Username	<input type="text"/>
Password	<input type="text"/>
SIM PIN (Optional)	 <input type="text"/>
Bandwidth Allowance Monitor	 <input checked="" type="checkbox"/> Enable
Action	 <input type="checkbox"/> Disconnect when usage hits 100% <small>Email notification is currently disabled. You can get notified when usage hits 75%/95% of monthly allowance by enabling <a href="#">Email Notification</a>.</small>
Start Day	On 1st ▾ of each month
Monthly Allowance	<input type="text"/> GB ▾

## Cellular Settings

### Network Selection

By default, the MAX router will automatically choose a network to connect to. If you wish to use only certain networks, click the  button beside the menu item.

### 3G/2G

This drop-down menu allows restricting cellular to particular band. Click the  button to enable the selection of specific bands.

### Authentication

Choose from **PAP Only** or **CHAP Only** to use those authentication methods exclusively. Select **Auto** to automatically choose an authentication method.

### Data Roaming

This checkbox enables data roaming on this particular SIM card. Please check your service provider's data roaming policy before proceeding.

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<b>Operator Settings</b>	This setting applies to 3G/EDGE/GPRS modems only. It does not apply to EVDO/EVDO Rev. A modems. This allows you to configure the APN settings of your connection. If <b>Auto</b> 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 connection, you may select <b>Custom</b> to enter your carrier's <b>APN, Login, Password, and Dial Number</b> settings manually. The correct values can be obtained from your carrier. The default and recommended setting is <b>Auto</b> .
<b>APN / Login / Password / SIM PIN</b>	When <b>Auto</b> is selected, the information in these fields will be filled automatically. Select <b>Custom</b> to customize these parameters. The parameter values are determined by and can be obtained from the ISP.
<b>Bandwidth Allowance Monitor</b>	Check the box Enable to enable bandwidth usage monitoring on this WAN connection for each billing cycle. When this option is not enabled, bandwidth usage of each month is still being tracked but no action will be taken.
<b>Action</b>	If email notification is enabled, you will be notified by email when usage hits 75% and 95% of the monthly allowance. If <b>Disconnect when usage hits 100% of monthly allowance</b> is checked, this WAN connection will be disconnected automatically when the usage hits the monthly allowance. It will not resume connection unless this option has been turned off or the usage has been reset when a new billing cycle starts.
<b>Start Day</b>	This option allows you to define which day of the month each billing cycle begins.
<b>Monthly Allowance</b>	This field is for defining the maximum bandwidth usage allowed for the WAN connection each month.

General Settings	
Standby State	<input checked="" type="radio"/> Remain connected <input type="radio"/> Disconnected
Idle Disconnect	<input checked="" type="checkbox"/> 3 minutes Time value is global. A change will affect all WAN profiles.

General Settings	
<b>Standby State</b>	This option allows you to choose whether to remain connected or disconnected when this WAN connection is no longer in the highest priority and has entered the standby state. When <b>Remain connected</b> is chosen, bringing up this WAN connection to active makes it immediately available for use.
<b>Idle Disconnect</b>	When Internet traffic is not detected within the user-specified timeframe, the modem will automatically disconnect. Once the traffic is resumed by the LAN host, the connection will be re-activated.

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Health Check Settings	
Health Check Method	<input type="text" value="SmartCheck"/>
Timeout	<input type="text" value="5"/> second(s)
Health Check Interval	<input type="text" value="10"/> second(s)
Health Check Retries	<input type="text" value="3"/>
Recovery Retries	<input type="text" value="3"/>

## Health Check Settings

### Health Check Method

This setting allows you to specify the health check method for the cellular connection. Available options are **Disabled**, **Ping**, **DNS Lookup**, **HTTP**, and **SmartCheck**. The default method is **DNS Lookup**. See **Section 10.4** for configuration details.

### Timeout

If a health check test cannot be completed within the specified amount of time, the test will be treated as failed.

### Health Check Interval

This is the time interval between each health check test.

### Health Check Retries

This is the number of consecutive check failures before treating a connection as down.

### Recovery Retries

This is the number of responses required after a health check failure before treating a connection as up again.

Dynamic DNS Settings	
Dynamic DNS Service Provider	<input type="text" value="Disabled"/>

## Dynamic DNS Settings

### Dynamic DNS Service Provider

This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers:

- changeip.com
- dyndns.org
- no-ip.org
- tzo.com
- DNS-O-Matic

Select **Disabled** to disable this feature. See **Section 9.5** for configuration details.

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## 10.3 Wi-Fi WAN

To access Wi-Fi WAN settings, click **Network>WAN>Details**.

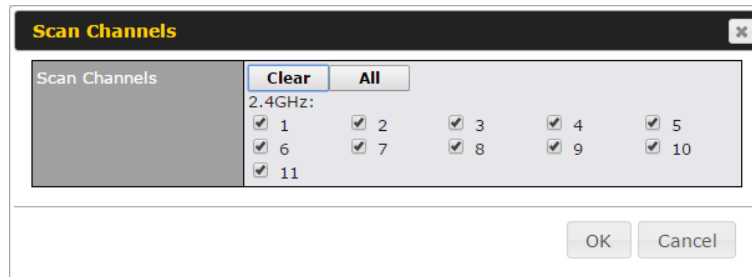
WAN Connection Settings	
WAN Connection Name	Wi-Fi WAN <span>Default</span>
Schedule	Always on ▼
Standby State	<input checked="" type="radio"/> Remain connected <input type="radio"/> Disconnected
MTU	<input type="radio"/> Auto <input checked="" type="radio"/> Custom Value: 1500 <span>Default</span>
Reply to ICMP PING	<input checked="" type="radio"/> Yes <input type="radio"/> No

Wi-Fi Connection Settings	
<b>WAN Connection Name</b>	Enter a name to represent this WAN connection.
<b>Schedule</b>	Click the drop-down menu to apply a time schedule to this interface.
<b>Standby State</b>	This setting specifies the state of the WAN connection while in standby. The available options are <b>Remain Connected</b> (hot standby) and <b>Disconnect</b> (cold standby).
<b>MTU</b>	This setting specifies the maximum transmission unit. By default, MTU is set to <b>Custom 1440</b> . You may adjust the MTU value by editing the text field. Click <b>Default</b> to restore the default MTU value. Select <b>Auto</b> and the appropriate MTU value will be automatically detected. The auto-detection will run each time the WAN connection establishes
<b>Reply to ICMP PING</b>	If this setting is disabled, the WAN connection will not respond to ICMP ping requests. By default, this setting is enabled.

Wi-Fi WAN Settings	
Channel Selection	<input checked="" type="radio"/> Auto <input type="radio"/> Custom
Roaming	<input type="checkbox"/>
Connect to Any Open Mode AP	<input type="radio"/> Yes <input checked="" type="radio"/> No



Wi-Fi WAN Settings	
<b>Channel Selection</b>	Determine whether the channel will be automatically selected. If you select custom, the following table will appear:

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**Roaming** Checking this box will enable Wi-Fi roaming. Click the  icon for additional options.

**Connect to Any Open Mode AP** This option is to specify whether the Wi-Fi WAN will connect to any open mode access points it finds.

Bandwidth Allowance Monitor	
Bandwidth Allowance Monitor 	<input checked="" type="checkbox"/> Enable
Action 	Email notification is currently disabled. You can get notified when usage hits 75%/95% of monthly allowance by enabling <a href="#">Email Notification</a> . <input checked="" type="checkbox"/> Disconnect when usage hits 100% of monthly allowance
Start Day	On <input type="text" value="1st"/> of each month at 00:00 midnight
Monthly Allowance	<input type="text"/> MB <input type="text"/>

## Bandwidth Allowance Monitor

**Action** If **Error! Reference source not found.** is enabled, you will be notified by email when usage hits 75% and 95% of the monthly allowance.

If **Disconnect when usage hits 100% of monthly allowance** is checked, this WAN connection will be disconnected automatically when the usage hits the monthly allowance. It will not resume connection unless this option has been turned off or the usage has been reset when a new billing cycle starts.

**Start Day** This option allows you to define which day of the month each billing cycle begins.

**Monthly Allowance** This field is for defining the maximum bandwidth usage allowed for the WAN connection each month.



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Health Check Settings	
Health Check Method	<input type="text" value="DNS Lookup"/>
Health Check DNS Servers	Host 1: <input type="text"/> Host 2: <input type="text"/> <input checked="" type="checkbox"/> Use first two DNS servers as Health Check DNS Servers <input type="checkbox"/> Include public DNS servers
Timeout	<input type="text" value="5"/> second(s)
Health Check Interval	<input type="text" value="5"/> second(s)
Health Check Retries	<input type="text" value="3"/>
Recovery Retries	<input type="text" value="3"/>

## Health Check Settings

### Method

This setting specifies the health check method for the WAN connection. This value can be configured as **Disabled**, **PING**, **DNS Lookup**, or **HTTP**. The default method is **DNS Lookup**. For mobile Internet connections, the value of **Method** can be configured as **Disabled** or **SmartCheck**.

### Health Check Disabled

Health Check Settings	
Health Check Method	<input type="text" value="Disabled"/> <small>Health Check disabled. Network problem cannot be detected.</small>

When **Disabled** is chosen in the **Method** field, the WAN connection will always be considered as up. The connection will **NOT** be treated as down in the event of IP routing errors.

### Health Check Method: PING

Health Check Method	<input type="text" value="PING"/>
PING Hosts	Host 1: <input type="text"/> Host 2: <input type="text"/> <input checked="" type="checkbox"/> Use first two DNS servers as PING Hosts

ICMP ping packets will be issued to test the connectivity with a configurable target IP address or hostname. A WAN connection is considered as up if ping responses are received from either one or both of the ping hosts.

### PING Hosts

This setting specifies IP addresses or hostnames with which connectivity is to be tested via ICMP ping. If **Use first two DNS servers as Ping Hosts** is checked, the target ping host will be the first DNS server for the corresponding WAN connection. Reliable ping hosts with a high uptime should be considered. By default, the first two DNS servers of the WAN connection are used as the ping hosts.

### Health Check Method: DNS Lookup

Health Check Method	<input type="text" value="DNS Lookup"/>
Health Check DNS Servers	Host 1: <input type="text"/> Host 2: <input type="text"/> <input checked="" type="checkbox"/> Use first two DNS servers as Health Check DNS Servers <input type="checkbox"/> Include public DNS servers

DNS lookups will be issued to test connectivity with target DNS servers. The connection will be treated as up if DNS responses are received from one or both of the servers, regardless of whether the result was positive or negative.

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## Health Check DNS Servers

This field allows you to specify two DNS hosts' IP addresses with which connectivity is to be tested via DNS Lookup.

If **Use first two DNS servers as Health Check DNS Servers** is checked, the first two DNS servers will be the DNS lookup targets for checking a connection's health. If the box is not checked, **Host 1** must be filled, while a value for **Host 2** is optional.

If **Include public DNS servers** is selected and no response is received from all specified DNS servers, DNS lookups will also be issued to some public DNS servers. A WAN connection will be treated as down only if there is also no response received from the public DNS servers.

Connections will be considered as up if DNS responses are received from any one of the health check DNS servers, regardless of a positive or negative result. By default, the first two DNS servers of the WAN connection are used as the health check DNS servers.

## Health Check Method: HTTP

Health Check Method	<input type="text" value="HTTP"/>
URL 1	<input type="text" value="http://"/> Matching String: <input type="checkbox"/>
URL 2	<input type="text" value="http://"/> Matching String: <input type="checkbox"/>

HTTP connections will be issued to test connectivity with configurable URLs and strings to match.

## URL1

### WAN Settings>WAN Edit>Health Check Settings>URL1

The URL will be retrieved when performing an HTTP health check. When **String to Match** is left blank, a health check will pass if the HTTP return code is between 200 and 299 (Note: HTTP redirection codes 301 or 302 are treated as failures). When **String to Match** is filled, a health check will pass if the HTTP return code is between 200 and 299 and if the HTTP response content contains the string.





## URL 2

### WAN Settings>WAN Edit>Health Check Settings>URL2

If **URL2** is also provided, a health check will pass if either one of the tests passed.

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## Other Health Check Settings


Timeout		5 ▾ second(s)
Health Check Interval		5 ▾ second(s)
Health Check Retries		3 ▾
Recovery Retries		3 ▾

**Timeout** This setting specifies the timeout in seconds for ping/DNS lookup requests. The default timeout is **5 seconds**.

**Health Check Interval** This setting specifies the time interval in seconds between ping or DNS lookup requests. The default health check interval is **5 seconds**.

**Health Check Retries** This setting specifies the number of consecutive ping/DNS lookup timeouts after which the Peplink Balance will treat the corresponding WAN connection as down. Default health retries is set to **3**. Using the default **Health Retries** setting of **3**, the corresponding WAN connection will be treated as down after three consecutive timeouts.

**Recovery Retries** This setting specifies the number of consecutive successful ping/DNS lookup responses that must be received before the Peplink Balance treats a previously down WAN connection as up again. By default, **Recover Retries** is set to **3**. Using the default setting, a WAN connection that is treated as down will be considered as up again upon receiving three consecutive successful ping/DNS lookup responses.

Dynamic DNS Settings 	
Service Provider	DNS-O-Matic ▾
Username	<input type="text"/>
Password	<input type="password"/>
Confirm Password	<input type="password"/>
Update All Hosts	<input type="checkbox"/>
Hosts / IDs	<input type="text"/>

## Dynamic DNS Settings

**Service Provider** This setting specifies the dynamic DNS service provider to be used for the WAN. Supported providers are:

- changeip.com
- dyndns.org
- no-ip.org
- tzo.com
- DNS-O-Matic

Select **Disabled** to disable this feature.

**User ID / User / Email** This setting specifies the registered user name for the dynamic DNS service.

**Password / Pass /** This setting specifies the password for the dynamic DNS service.

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TZO Key	
<b>Update All Hosts</b>	Check this box to automatically update all hosts.
<b>Hosts / Domain</b>	This setting specifies a list of hostnames or domains to be associated with the public Internet IP address of the WAN connection.

## Important Note

In order to use dynamic DNS services, appropriate hostname registration(s), as well as a valid account with a supported dynamic DNS service provider, are required.

A dynamic DNS update is performed whenever a WAN's IP address is changed, such as when an IP is changed after a DHCP IP refresh or reconnection.

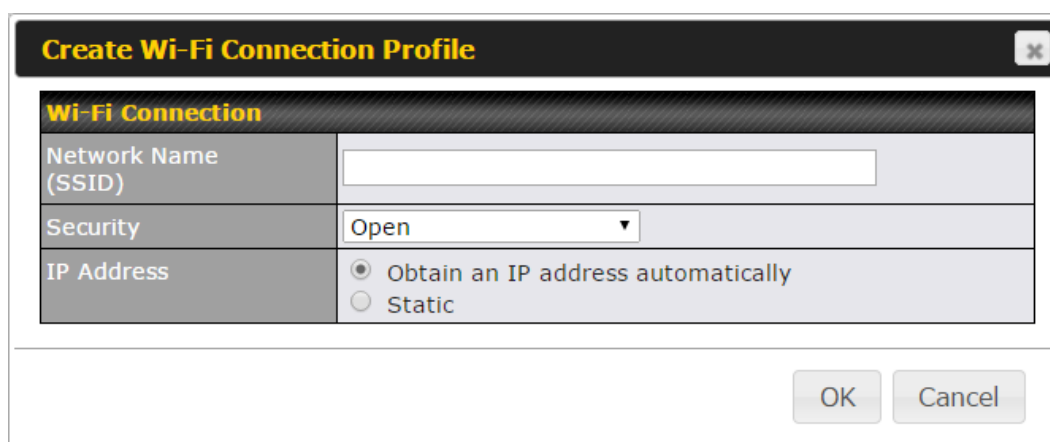
Due to dynamic DNS service providers' policies, a dynamic DNS host expires automatically when the host record has not been updated for a long time. Therefore, the Peplink Balance performs an update every 23 days, even if a WAN's IP address did not change.

### 10.3.1 Creating Wi-Fi Connection Profiles

You can manually create a profile to connect to a Wi-Fi connection. This is useful for creating a profile for connecting to hidden-SSID access points. Click **Network>WAN>Details>Create Profile...** to get started.



This will open a window similar to the one shown below:



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Wi-Fi Connection Profile Settings																									
<b>Type</b>	Select whether the network will connect automatically or manually.																								
<b>Network Name (SSID)</b>	Enter a name to represent this Wi-Fi connection.  This option allows you to select which security policy is used for this wireless network. Available options:																								
<b>Security</b>	<ul style="list-style-type: none"><li>• <b>Open</b> <table border="1"><tr><td>Security</td><td>Open</td></tr></table></li><li>• <b>WEP</b> <table border="1"><tr><td>Security</td><td>WEP</td></tr><tr><td>Encryption Key</td><td><input type="text"/> <input checked="" type="checkbox"/> Hide Characters</td></tr></table></li><li>• <b>WPA/WPA2 – Personal</b> <table border="1"><tr><td>Security</td><td>WPA/WPA2-Personal</td></tr><tr><td>Shared Key</td><td><input type="text"/> <input checked="" type="checkbox"/> Hide Characters</td></tr></table></li><li>• <b>WPA/WPA2 – Enterprise</b> <table border="1"><tr><td>Security</td><td>WPA/WPA2-Enterprise</td></tr><tr><td>Login ID</td><td><input type="text"/></td></tr><tr><td>Password</td><td><input type="text"/></td></tr><tr><td>Confirm Password</td><td><input type="text"/></td></tr><tr><td>EAP Method</td><td>PEAP</td></tr><tr><td>EAP Phase 2 Method</td><td>EAP/CHAP</td></tr><tr><td>EAP outer authentication identity</td><td><input type="radio"/> Anonymous <input type="radio"/> User Credentials <input type="radio"/> Other: <input type="text"/></td></tr></table></li></ul>	Security	Open	Security	WEP	Encryption Key	<input type="text"/> <input checked="" type="checkbox"/> Hide Characters	Security	WPA/WPA2-Personal	Shared Key	<input type="text"/> <input checked="" type="checkbox"/> Hide Characters	Security	WPA/WPA2-Enterprise	Login ID	<input type="text"/>	Password	<input type="text"/>	Confirm Password	<input type="text"/>	EAP Method	PEAP	EAP Phase 2 Method	EAP/CHAP	EAP outer authentication identity	<input type="radio"/> Anonymous <input type="radio"/> User Credentials <input type="radio"/> Other: <input type="text"/>
	Security	Open																							
	Security	WEP																							
	Encryption Key	<input type="text"/> <input checked="" type="checkbox"/> Hide Characters																							
Security	WPA/WPA2-Personal																								
Shared Key	<input type="text"/> <input checked="" type="checkbox"/> Hide Characters																								
Security	WPA/WPA2-Enterprise																								
Login ID	<input type="text"/>																								
Password	<input type="text"/>																								
Confirm Password	<input type="text"/>																								
EAP Method	PEAP																								
EAP Phase 2 Method	EAP/CHAP																								
EAP outer authentication identity	<input type="radio"/> Anonymous <input type="radio"/> User Credentials <input type="radio"/> Other: <input type="text"/>																								

## 10.4 WAN Health Check

To ensure traffic is routed to healthy WAN connections only, the Pepwave router can periodically check the health of each WAN connection. The health check settings for each WAN connection can be independently configured via **Network>WAN>Details**.

Health Check Settings	
<b>Method</b>	This setting specifies the health check method for the WAN connection. This value can be configured as <b>Disabled</b> , <b>PING</b> , <b>DNS Lookup</b> , or <b>HTTP</b> . The default method is <b>DNS Lookup</b> . For mobile Internet connections, the value of <b>Method</b> can be configured as <b>Disabled</b> or <b>SmartCheck</b> .
<b>Health Check Disabled</b>	

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Health Check Method	<input type="text" value="Disabled"/>
Health Check disabled. Network problem cannot be detected.	

When **Disabled** is chosen in the **Method** field, the WAN connection will always be considered as up. The connection will **NOT** be treated as down in the event of IP routing errors.

## Health Check Method: PING

Health Check Method	<input type="text" value="PING"/>
PING Hosts	Host 1: <input type="text"/> Host 2: <input type="text"/> <input checked="" type="checkbox"/> Use first two DNS servers as PING Hosts

ICMP ping packets will be issued to test the connectivity with a configurable target IP address or hostname. A WAN connection is considered as up if ping responses are received from either one or both of the ping hosts.

### PING Hosts

This setting specifies IP addresses or hostnames with which connectivity is to be tested via ICMP ping. If **Use first two DNS servers as Ping Hosts** is checked, the target ping host will be the first DNS server for the corresponding WAN connection. Reliable ping hosts with a high uptime should be considered. By default, the first two DNS servers of the WAN connection are used as the ping hosts.

## Health Check Method: DNS Lookup

Health Check Method	<input type="text" value="DNS Lookup"/>
Health Check DNS Servers	Host 1: <input type="text"/> Host 2: <input type="text"/> <input checked="" type="checkbox"/> Use first two DNS servers as Health Check DNS Servers <input type="checkbox"/> Include public DNS servers

DNS lookups will be issued to test connectivity with target DNS servers. The connection will be treated as up if DNS responses are received from one or both of the servers, regardless of whether the result was positive or negative.

### Health Check DNS Servers

This field allows you to specify two DNS hosts' IP addresses with which connectivity is to be tested via DNS lookup.

If **Use first two DNS servers as Health Check DNS Servers** is checked, the first two DNS servers will be the DNS lookup targets for checking a connection's health. If the box is not checked, **Host 1** must be filled, while a value for **Host 2** is optional.

If **Include public DNS servers** is selected and no response is received from all specified DNS servers, DNS lookups will also be issued to some public DNS servers. A WAN connection will be treated as down only if there is also no response received from the public DNS servers.

Connections will be considered as up if DNS responses are received from any one of the health check DNS servers, regardless of a positive or negative result. By default, the first two DNS servers of the WAN connection are used as the health check DNS servers.

## Health Check Method: HTTP

Health Check Method	<input type="text" value="HTTP"/>
URL 1	http:// <input type="text"/> Matching String: <input type="checkbox"/>
URL 2	http:// <input type="text"/> Matching String: <input type="checkbox"/>

HTTP connections will be issued to test connectivity with configurable URLs and strings to match.

### URL1

#### WAN Settings>WAN Edit>Health Check Settings>URL1

The URL will be retrieved when performing an HTTP health check. When **String to Match** is left blank, a health check will pass if the HTTP return code is between 200 and 299 (Note: HTTP redirection codes 301 or 302 are treated as failures). When **String to Match** is





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filled, a health check will pass if the HTTP return code is between 200 and 299 and if the HTTP response content contains the string.

## URL 2

### WAN Settings>WAN Edit>Health Check Settings>URL2

If **URL2** is also provided, a health check will pass if either one of the tests passed.

Timeout		10 ▾ second(s)
Health Check Interval		5 ▾ second(s)
Health Check Retries		3 ▾
Recovery Retries		3 ▾

## Other Health Check Settings

### Timeout

This setting specifies the timeout in seconds for ping/DNS lookup requests. The default timeout is **5 seconds**.

### Health Check Interval

This setting specifies the time interval in seconds between ping or DNS lookup requests. The default health check interval is **5 seconds**.

### Health Check Retries


This setting specifies the number of consecutive ping/DNS lookup timeouts after which the Pepwave router will treat the corresponding WAN connection as down. Default health retries is set to **3**. Using the default **Health Retries** setting of **3**, the corresponding WAN connection will be treated as down after three consecutive timeouts.

### Recovery Retries

This setting specifies the number of consecutive successful ping/DNS lookup responses that must be received before the Pepwave router treats a previously down WAN connection as up again. By default, **Recover Retries** is set to **3**. Using the default setting, a WAN connection that is treated as down will be considered as up again upon receiving three consecutive successful ping/DNS lookup responses.

## Automatic Public DNS Server Check on DNS Test Failure

When the health check method is set to **DNS Lookup** and health checks fail, the Pepwave router will automatically perform DNS lookups on public DNS servers. If the tests are successful, the WAN may not be down, but rather the target DNS server malfunctioned. You will see the following warning message on the main page:

 **Failed to receive DNS response from the health-check DNS servers for WAN connection 3. But public DNS server lookup test via the WAN passed. So please check the DNS server settings.**

## 10.5 Dynamic DNS Settings

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

If the WAN connection's IP address is a reserved private IP address (i.e., behind a NAT

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router), the public IP of each WAN will be automatically reported to the DNS service provider.

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

The settings for dynamic DNS service provider(s) and the association of hostname(s) are configured via **Network>WAN>Details>Dynamic DNS Service Provider/Dynamic DNS Settings**.

Dynamic DNS Service Provider	<input type="text" value="changeip.com"/>
User ID	<input type="text"/>
Password	<input type="text"/>
Confirm Password	<input type="text"/>
Hosts	<input type="text"/>

## Dynamic DNS Settings

### Dynamic DNS

This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers:

- changeip.com
- dyndns.org
- no-ip.org
- tzo.com
- DNS-O-Matic
- Others...

Support custom Dynamic DNS servers by entering its URL. Works with any service compatible with DynDNS API.

Select **Disabled** to disable this feature.

### Account Name / Email Address

This setting specifies the registered user name for the dynamic DNS service.

### Password / TZO Key

This setting specifies the password for the dynamic DNS service.

### Hosts / Domain

This field allows you to specify a list of host names or domains to be associated with the public Internet IP address of the WAN connection. If you need to enter more than one host, use a carriage return to separate them.

## Important Note

In order to use dynamic DNS services, appropriate host name registration(s) and a valid account with a supported dynamic DNS service provider are required. A dynamic DNS update is performed whenever a WAN's IP address changes (e.g., the IP is changed after a DHCP IP refresh, reconnection, etc.). Due to dynamic DNS service



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providers' policy, a dynamic DNS host will automatically expire if the host record has not been updated for a long time. Therefore the Pepwave router performs an update every 23 days, even if a WAN's IP address has not changed.

## 11 Advanced Wi-Fi Settings

Wi-Fi settings can be configured at **Advanced>Wi-Fi Settings** (or **AP>Settings** on some models). Note that menus displayed can vary by model.

Wi-Fi Radio Settings	
Operating Country	United States


Wi-Fi Radio Settings	
<b>Operating Country</b>	<p>This drop-down menu specifies the national/regional regulations which the Wi-Fi radio should follow.</p> <ul style="list-style-type: none"><li>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).</li><li>If European region is selected, RF channels 1 to 13 will be available. The maximum transmission power will be 20 dBm (100 mW).</li></ul> <p>NOTE: Users are required to choose an option suitable to local laws and regulations.</p>






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.	

Wi-Fi AP Settings	
Protocol	802.11ng
Channel	1 (2.412 GHz)
Channel Width	Auto
Output Power	Max <input type="checkbox"/> Boost

Wi-Fi AP Settings	
<b>Protocol</b>	This option allows you to specify whether 802.11b and/or 802.11g client association requests will be accepted. Available options are <b>802.11ng</b> and <b>802.11na</b> . By default, <b>802.11ng</b> is selected.
<b>Channel</b>	This option allows you to select which 802.11 RF channel will be utilized. <b>Channel 1 (2.412 GHz)</b> is selected by default.
<b>Channel Width</b>	Available options are <b>20 MHz</b> , <b>40 MHz</b> , and <b>Auto (20/40 MHz)</b> . Default is <b>Auto (20/40 MHz)</b> , which allows both widths to be used simultaneously.
<b>Output Power</b>	This option is for specifying the transmission output power for the Wi-Fi AP. There are 4 relative power levels available – <b>Max</b> , <b>High</b> , <b>Mid</b> , and <b>Low</b> . The actual output power will be bound by the regulatory limits of the selected country.

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Advanced Wi-Fi AP settings can be displayed by clicking the  on the top right-hand corner of the **Wi-Fi AP Settings** section, which can be found at **AP>Settings**. Other models will display a separate section called **Wi-Fi AP Advanced Settings**, which can be found at **Advanced>Wi-Fi Settings**.

Beacon Rate		1Mbps ▾
Beacon Interval		100ms ▾
DTIM		1
Slot Time		9 $\mu$ s
ACK Timeout		48 $\mu$ s
Frame Aggregation		<input checked="" type="checkbox"/> Enable
Guard Interval		<input type="radio"/> Short <input checked="" type="radio"/> Long

Wi-Fi AP Advanced Settings	
<b>Beacon Rate</b> <sup>A</sup>	This option is for setting the transmit bit rate for sending a beacon. By default, <b>1Mbps</b> is selected.
<b>Beacon Interval</b> <sup>A</sup>	This option is for setting the time interval between each beacon. By default, <b>100ms</b> is selected.
<b>DTIM</b> <sup>A</sup>	This field allows you to set the frequency for the beacon to include delivery traffic indication messages. The interval is measured in milliseconds. The default value is set to <b>1 ms</b> .
<b>Slot Time</b> <sup>A</sup>	This field is for specifying the unit wait time before transmitting a packet. By default, this field is set to <b>9 <math>\mu</math>s</b> .
<b>ACK Timeout</b> <sup>A</sup>	This field is for setting the wait time to receive an acknowledgement packet before performing a retransmission. By default, this field is set to <b>48 <math>\mu</math>s</b> .
<b>Frame Aggregation</b> <sup>A</sup>	This option allows you to enable frame aggregation to increase transmission throughput.
<b>Guard Interval</b> <sup>A</sup>	This is where you opt for a short or long guard period interval for your transmissions.

<sup>A</sup> - Advanced feature, please click the  button on the top right-hand corner to activate.

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Wi-Fi WAN settings can be configured at **Advanced>Wi-Fi Settings** (or **Advanced>Wi-Fi WAN** or some models).

Wi-Fi WAN Settings	
Channel Width	20/40 MHz ▾
Bit Rate	Auto ▾
Output Power	Max ▾ <input type="checkbox"/> Boost

## Wi-Fi WAN Settings

### Channel Width

Available options are **20/40 MHz** and **20 MHz**. Default is **20/40 MHz**, which allows both widths to be used simultaneously.

### Bit Rate

This option allows you to select a specific bit rate for data transfer over the device's Wi-Fi network. By default, **Auto** is selected.

### 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. Note that selecting the **Boost** option may cause the MAX's radio output to exceed local regulatory limits.

## 12 MediaFast Configuration

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

### 12.1 Setting Up MediaFast Content Caching

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

**Cache Control**

**Domains / IP Addresses** ?  Cache all  Whitelist  Blacklist  
ted.com

**Source IP Subnet** ?  Any  Custom

Network	Subnet Mask	
10.8.41.0	255.255.255.0 (/24)	✖
10.8.76.0	255.255.255.0 (/24)	✖
	255.255.255.0 (/24)	+

**Content Type** ?  Video  Audio  Images  OS / Application Updates

**Cache Lifetime Settings** ?

File Extension	Lifetime (days)	
jpg	30	✖
		+

Cache Control Settings	
<b>Domain</b>	Choose to <b>Cache on all domains</b> , or enter domain names and then choose either <b>Cache the specified domains only</b> or <b>Do not cache the specified domains</b> .
<b>Source IP Subnet</b>	This setting allows caching to be applied to the user-specified IP subnets. If "Any" is selected, then caching will apply to all subnets.
<b>Content Type</b>	Check these boxes to cache the listed content types or leave boxes unchecked to disable caching for the listed types.
<b>Cache Lifetime Settings</b>	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.

## 12.2 Scheduling Content Prefetching

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**

Name	Status	Next Run Time	Last Run Time	Last Duration	Result	Last Download	Actions
▶ Course Progress	Downloading	04-11 06:00	04-09 02:03	-		0 B	
▶ National Geog	Ready	04-11 00:00	04-09 00:00	00:01		4.98 kB	
▶ Syllabus	Downloading	04-11 06:00	04-09 06:00	-		0 B	
▶ Vimeo	Ready	04-11 00:00	04-09 02:03	00:01		115.91 kB	
▶ ted	Ready	04-11 00:00	04-09 00:00	00:01		62.26 kB	

[New Schedule](#)

**Tools**


[Clear Web Cache](#) [Clear Statistics](#)


Prefetch Schedule Settings	
<b>Name</b>	This field displays the name given to the scheduled download.
<b>Status</b>	Check the status of your scheduled download here.
<b>Next Run Time/Last Run Time</b>	These fields display the date and time of the next and most recent occurrences of the scheduled download.
<b>Last Duration</b>	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.
<b>Result</b>	This field indicates whether downloads are in progress () or complete () .
<b>Last Download</b>	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.


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## Actions

To begin a scheduled download immediately, click .

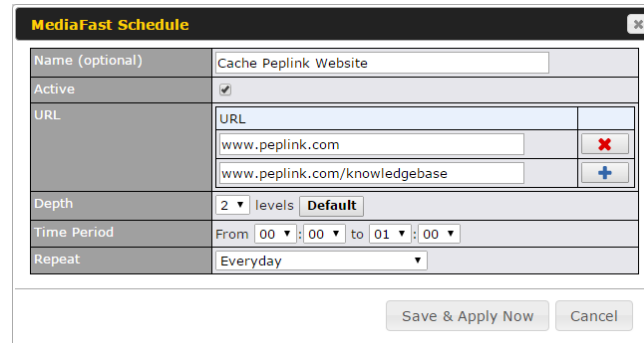
To cancel a scheduled download, click .

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:



The screenshot shows a window titled "MediaFast Schedule" with the following fields and controls:

Name (optional)	Cache Peplink Website
Active	<input checked="" type="checkbox"/>
URL	www.peplink.com 
	www.peplink.com/knowledgebase 
Depth	2 levels <b>Default</b>
Time Period	From 00:00 to 01:00
Repeat	Everyday

Buttons: Save & Apply Now, Cancel

Simply provide the requested information to create your schedule.

## Clear Web Cache

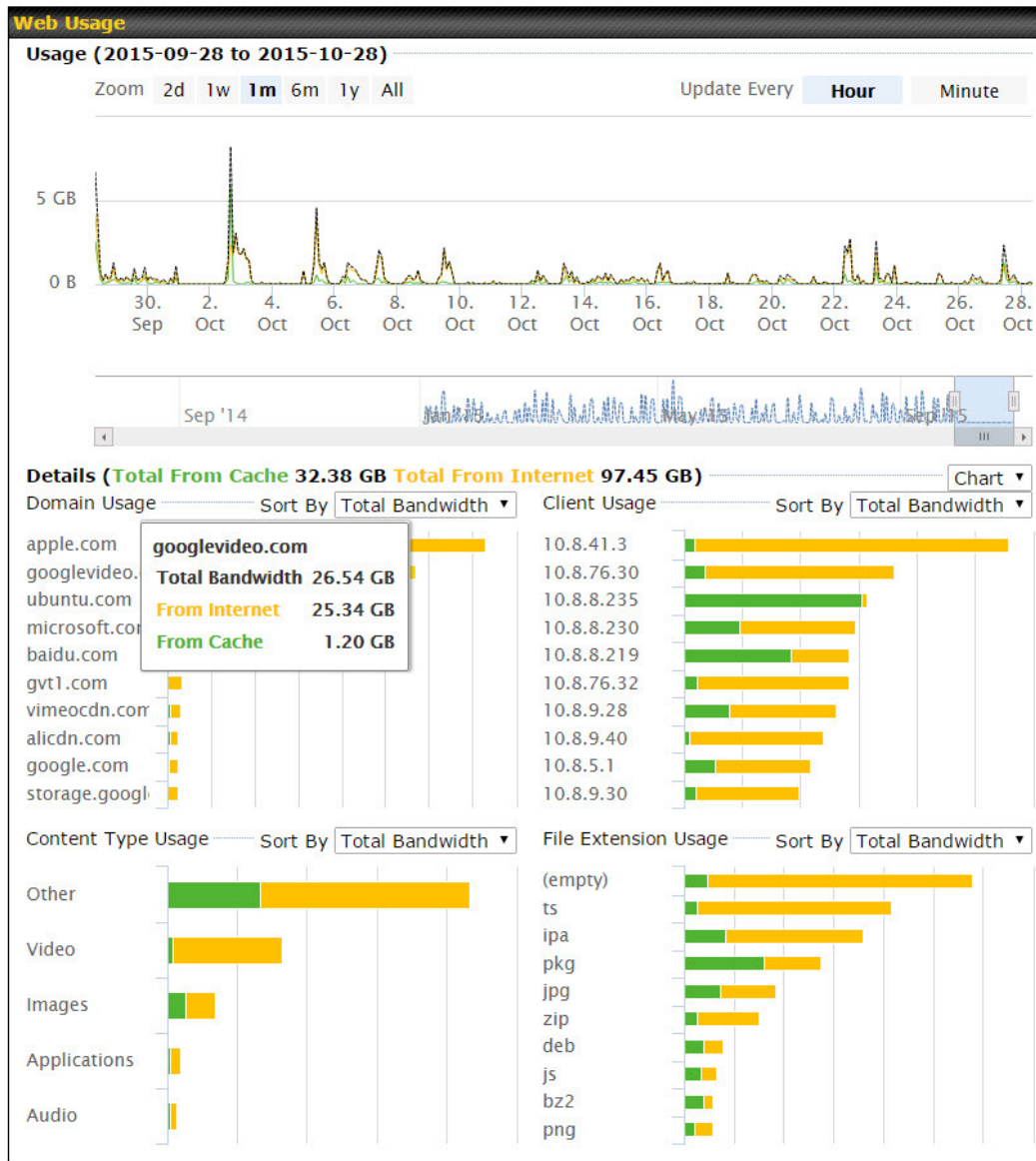
To clear all cached content, click this button. Note that this action cannot be undone.

**Clear Statistics** To clear all prefetch and status page statistics, click this button.

## 12.3 Viewing MediaFast Statistics

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

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## 13 Bandwidth Bonding SpeedFusion™ / PepVPN



Pepwave bandwidth bonding SpeedFusion™ is our patented technology that enables our SD-WAN routers to bond multiple Internet connections to increase site-to-site bandwidth and reliability. SpeedFusion functionality securely connects your Pepwave router to another Pepwave or Peplink device (Peplink Balance 210/310/380/580/710/1350 only). Data, voice, or video communications between these locations are kept confidential across the public Internet.

Bandwidth bonding SpeedFusion™ is specifically designed for multi-WAN environments. In case of failures and network congestion at one or more WANs, other WANs can be used to continue carrying the network traffic.

Different models of our SD-WAN routers have different numbers of site-to-site connections allowed. End-users who need to have more site-to-site connections can purchase a SpeedFusion license to increase the number of site-to-site connections allowed.


Pepwave routers can aggregate all WAN connections' bandwidth for routing SpeedFusion™ traffic. Unless all the WAN connections of one site are down, Pepwave routers can keep the VPN up and running.

VPN bandwidth bonding is supported in Firmware 5.1 or above. All available bandwidth will be utilized to establish the VPN tunnel, and all traffic will be load balanced at packet level across all links. VPN bandwidth bonding is enabled by default.


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## 13.1 PepVPN

To configure PepVPN and SpeedFusion, navigate to **Advanced>SpeedFusion™** or **Advanced>PepVPN**.




**PepVPN with SpeedFusion™**



 InControl management enabled. Settings can now be configured on [InControl](#).

Profile	Remote ID	Remote Address(es)	
 EL_Office	8345-5F7A-DE97		


**Send All Traffic To**

No PepVPN profile selected 

**PepVPN**

Local ID  MAX\_HD2\_DEF1 

**Link Failure Detection**

Link Failure Detection Time   Recommended (Approx. 15 secs)  
 Fast (Approx. 6 secs)  
 Faster (Approx. 2 secs)  
 Extreme (Under 1 sec)  
Shorter detection time incurs more health checks and higher bandwidth overhead

The local LAN subnet and subnets behind the LAN (defined under **Static Route** on the LAN settings page) will be advertised to the VPN. All VPN members (branch offices and headquarters) will be able to route to local subnets.

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 using the 256-bit AES encryption standard. To configure, navigate to **Advanced>SpeedFusion™** or **Advanced>PepVPN** and click the **New Profile** button to create a new VPN profile (you may have to first save the displayed default profile in order to access the **New Profile** button). Each profile specifies the settings for making VPN connection with one remote Pepwave or Peplink device. Note that available settings vary by model.


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PepVPN Profile					
Name	<input type="text" value="Balance 2942-1257-1241"/>				
Active	<input checked="" type="checkbox"/>				
SpeedFusion	Supported				
Encryption	<input checked="" type="radio"/> 256-bit AES <input type="radio"/> OFF				
Authentication	<input checked="" type="radio"/> Remote ID / Pre-shared Key <input type="radio"/> X.509				
Remote ID / Pre-shared Key	<table border="1"> <tr> <th>Remote ID</th> <th>Pre-shared Key</th> </tr> <tr> <td>Balance 9875-A63D-92AS</td> <td>.....</td> </tr> </table>	Remote ID	Pre-shared Key	Balance 9875-A63D-92AS	.....
Remote ID	Pre-shared Key				
Balance 9875-A63D-92AS	.....				
NAT Mode	<input type="checkbox"/> Untagged LAN ▼				
Remote IP Address / Host Names (Optional)	<input type="text"/> <small>If this field is empty, this field on the remote unit must be filled</small>				
Data Port	<input checked="" type="radio"/> Default <input type="radio"/> Custom <input type="text"/>				
Bandwidth Limit	<input type="checkbox"/>				
Cost	<input type="text" value="10"/>				
WAN Smoothing	<input type="text" value="Off"/>				
Use IP ToS	<input type="checkbox"/>				

A list of defined SpeedFusion connection profiles and a **Link Failure Detection Time** option will be shown. Click the **New Profile** button to create a new VPN connection profile for making a VPN connection to a remote Peplink Balance via the available WAN connections. Each profile is for making a VPN connection with one remote Peplink Balance.

PepVPN Profile Settings	
<b>Name</b>	This field is for specifying a name to represent this profile. The name can be any combination of alphanumeric characters (0-9, A-Z, a-z), underscores ( _ ), dashes ( - ), and/or non-leading/trailing spaces ( ).
<b>Active</b>	When this box is checked, this VPN connection profile will be enabled. Otherwise, it will be disabled.
<b>Encryption</b>	By default, VPN traffic is encrypted with <b>256-bit AES</b> . If <b>Off</b> is selected on both sides of a VPN connection, no encryption will be applied.
<b>Authentication</b>	Select from <b>By Remote ID Only</b> , <b>Preshared Key</b> , or <b>X.509</b> to specify the method the Peplink Balance will use to authenticate peers. When selecting <b>By Remote ID Only</b> , be sure to enter a unique peer ID number in the <b>Remote ID</b> field.
<b>Remote ID / Pre-shared Key</b>	This optional field becomes available when <b>Remote ID / Pre-shared Key</b> is selected as the Peplink Balance's VPN <b>Authentication</b> method, as explained above. <b>Pre-shared Key</b> defines the pre-shared key used for this particular VPN connection. The VPN connection's session key will be further protected by the pre-shared key. The connection will be up only if the pre-shared keys on each side match. When the peer is running firmware 5.0+, this setting will be ignored.

# Pepwave MAX and Surf User Manual

	Enter Remote IDs either by typing out each Remote ID and Pre-shared Key, or by pasting a CSV. If you wish to paste a CSV, click the  icon next to the "Remote ID / Preshared Key" setting.
<b>Remote ID/Remote Certificate</b>	These optional fields become available when <b>X.509</b> is selected as the Peplink Balance's VPN authentication method, as explained above. To authenticate VPN connections using X.509 certificates, copy and paste certificate details into these fields. To get more information on a listed X.509 certificate, click the <b>Show Details</b> link below the field.
<b>Allow Shared Remote ID</b>	When this option is enabled, the router will allow multiple peers to run using the same remote ID.
<b>NAT Mode</b>	Check this box to allow the local DHCP server to assign an IP address to the remote peer. When <b>NAT Mode</b> is enabled, all remote traffic over the VPN will be tagged with the assigned IP address using network address translation.
<b>Remote IP Address / Host Names (Optional)</b>	<p>If <b>NAT Mode</b> is not enabled, you can enter a remote peer's WAN IP address or hostname(s) here. If the remote uses more than one address, enter only one of them here. Multiple hostnames are allowed and can be separated by a space character or carriage return. Dynamic-DNS host names are also accepted.</p> <p>This field is optional. With this field filled, the Peplink Balance will initiate connection to each of the remote IP addresses until it succeeds in making a connection. If the field is empty, the Peplink Balance will wait for connection from the remote peer. Therefore, at least one of the two VPN peers must specify this value. Otherwise, VPN connections cannot be established.</p>
<b>Data Port</b>	This field is used to specify a UDP port number for transporting outgoing VPN data. If <b>Default</b> is selected, UDP port 4500 will be used. Port 32015 will be used if the remote unit uses Firmware prior to version 5.4 or if port 4500 is unavailable. If <b>Custom</b> is selected, enter an outgoing port number from 1 to 65535.
<b>Bandwidth Limit</b>	Define maximum download and upload speed to each individual peer. This functionality requires the peer to use PepVPN version 4.0.0 or above.
<b>Cost</b>	Define path cost for this profile. OSPF will determine the best route through the network using the assigned cost. Default: 10
<b>WAN Smoothing<sup>A</sup></b>	Select the degree to which WAN Smoothing will be implemented across your WAN links.

<sup>A</sup> - Advanced feature, please click the  button on the top right-hand corner to activate. To enable Layer 2 Bridging between PepVPN profiles, navigate to **Network>LAN>Basic Settings>\*LAN Profile Name\*** and refer to instructions in section 9.1


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WAN Connection Priority <span style="float: right;">?</span>					
	Priority	Direction	Connect to Remote	Cut-off latency (ms)	Suspension Time after Packet Loss (ms)
1. WAN 1	1 (Highest) ▼	Up/Down ▼	All ▼		
2. WAN 2	1 (Highest) ▼	Up/Down ▼	All ▼		
3. Wi-Fi WAN	1 (Highest) ▼	Up/Down ▼	All ▼		
4. Cellular 1	1 (Highest) ▼	Up/Down ▼	All ▼		
5. Cellular 2	1 (Highest) ▼	Up/Down ▼	All ▼		
6. USB	1 (Highest) ▼	Up/Down ▼	All ▼		


## WAN Connection Priority

### WAN Connection Priority


If your device supports it, you can specify the priority of WAN connections to be used for making VPN connections. WAN connections set to **OFF** will never be used. Only available WAN connections with the highest priority will be used.

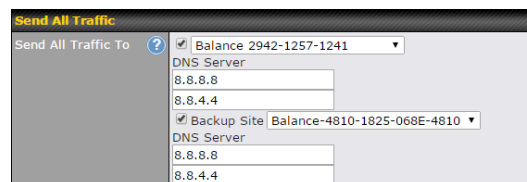
To enable asymmetric connections, connection mapping to remote WANs, cut-off latency, and packet loss suspension time, click the  button.

### Send All Traffic To

No PepVPN profile selected 

## Send All Traffic To

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



Send All Traffic To ?

Balance 2942-1257-1241 ▼  
DNS Server  
8.8.8.8  
8.8.4.4

Backup Site Balance-4810-1825-068E-4810 ▼  
DNS Server  
8.8.8.8  
8.8.4.4

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

## Outbound Policy/PepVPN Outbound Custom Rules


Some models allow you to set outbound policy and custom outbound rules from **Advanced>PepVPN**. See **Section 14** for more information on outbound policy settings.

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The image shows two screenshots from the Pepwave configuration interface. The top screenshot is titled "Outbound Policy" and shows a dropdown menu set to "According to custom rules" with an edit icon. The bottom screenshot is titled "PepVPN Outbound Custom Rules" and shows a table with columns for Service, Algorithm, Source, Destination, and Protocol. The Source field is set to "(Auto)". There is an "Add Rule" button at the bottom.

The image shows a screenshot of the "PepVPN Local ID" configuration screen. It features a text input field containing "MAX\_HD2\_8D1C" and a question mark icon to its left. An edit icon is visible on the right side of the field.

## PepVPN Local ID

The local ID is a text string to identify this local unit when establishing a VPN connection. When creating a profile on a remote unit, this local ID must be entered in the remote unit's **Remote ID** field. Click the  icon to edit **Local ID**.

The image shows a screenshot of the "PepVPN Settings" configuration screen. It includes several settings: "Handshake Port" with radio buttons for "Default" and "Custom" and an input field; "Backward Compatibility" with radio buttons for "High (firmware 5.3+)" and "Latest (firmware 6.2+)"; and "Link Failure Detection Time" with radio buttons for "Recommended (Approx. 15 secs)", "Fast (Approx. 6 secs)", "Faster (Approx. 2 secs)", and "Extreme (Under 1 sec)". A note at the bottom states: "Shorter detection time incurs more health checks and higher bandwidth overhead".

## PepVPN Settings

<b>Handshake Port<sup>A</sup></b>	To designate a custom handshake port (TCP), click the <b>custom</b> radio button and enter the port number you wish to designate.
<b>Backward Compatibility</b>	Determine the level of backward compatibility needed for PepVPN tunnels. The use of the <b>Latest</b> setting is recommended as it will improve the performance and resilience of SpeedFusion connections.
<b>Link Failure Detection Time</b>	<p>The bonded VPN can detect routing failures on the path between two sites over each WAN connection. Failed WAN connections will not be used to route VPN traffic. Health check packets are sent to the remote unit to detect any failure. The more frequently checks are sent, the shorter the detection time, although more bandwidth will be consumed.</p> <p>When <b>Recommended</b> (default) is selected, a health check packet is sent every five seconds, and the expected detection time is 15 seconds.</p> <p>When <b>Fast</b> is selected, a health check packet is sent every three seconds, and the expected detection time is six seconds.</p> <p>When <b>Faster</b> is selected, a health check packet is sent every second, and the expected detection time is two seconds.</p> <p>When <b>Extreme</b> is selected, a health check packet is sent every 0.1 second, and the expected detection time is less than one second.</p>

<sup>A</sup> - Advanced feature, please click the  button on the top right-hand corner to activate.

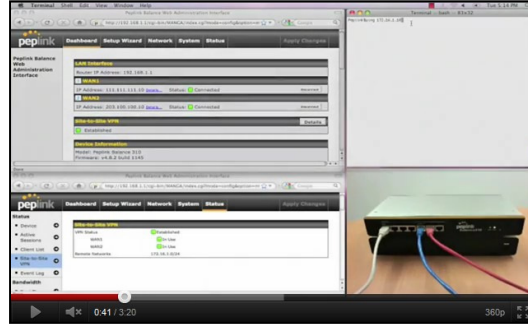
## Important Note

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.

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## Tip

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



<http://youtu.be/TLQgdPSY88>

# Pepwave MAX and Surf User Manual

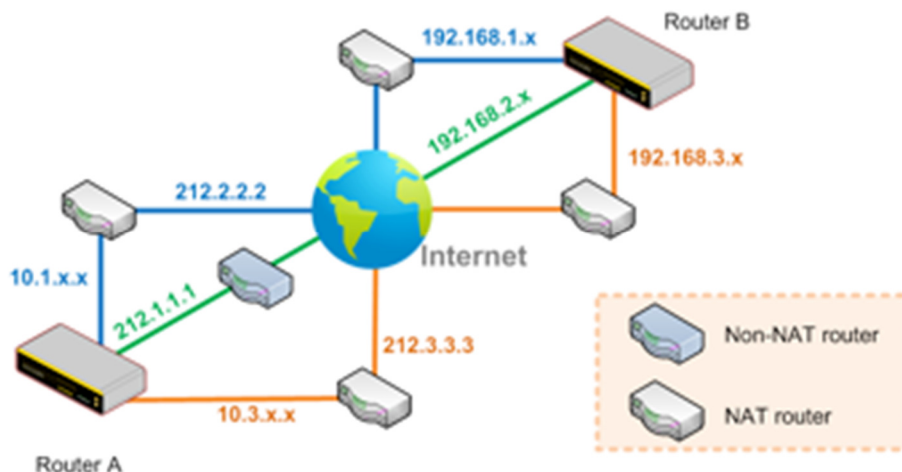
## 13.2 The Pepwave Router Behind a NAT Router

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.



## 13.3 SpeedFusion™ Status

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

SpeedFusion™		Status
FL Office	 Established	
NY Office	 Established	

After clicking the **Status** button at the top right corner of the SpeedFusion™ table, you will be forwarded to **Status>SpeedFusion™**, where you can view subnet and WAN connection information for each VPN peer. Please refer to **Section 22.6** for details.

### IP Subnets Must Be Unique Among VPN Peers

The entire interconnected SpeedFusion™ network is a single non-NAT IP network. Avoid duplicating subnets in your sites to prevent connectivity problems when accessing those subnets.

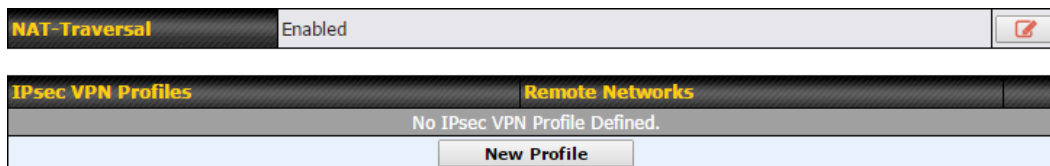
## 14 IPsec VPN

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.

### 14.1 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**.



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

A **NAT-Traversal** option and list of defined **IPsec VPN** profiles will be shown. **NAT-Traversal** should be enabled if your system is behind a NAT router. 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.



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Name	Profile 1							
Active	<input checked="" type="checkbox"/>							
Connect Upon Disconnection of	<input checked="" type="checkbox"/> WAN 2							
Remote Gateway IP Address / Host Name	12.12.12.12							
Local Networks	<p>Propose the following networks to remote gateway:</p> <p><input type="checkbox"/> 172.16.1.1/24</p> <p><input type="checkbox"/> 172.16.2.1/24</p> <p><input type="checkbox"/> 172.16.3.1/24</p> <p><input checked="" type="checkbox"/> 10.10.0.1/32</p> <p><input checked="" type="checkbox"/> 192.168.10.0/24</p> <p><input checked="" type="checkbox"/> 192.168.11.0/24</p> <p><input type="checkbox"/> <input type="text"/></p> <p>Apply the following NAT policies:</p> <p><input checked="" type="checkbox"/> 172.16.1.0/24      <input checked="" type="checkbox"/> 192.168.10.0/24</p> <p><input checked="" type="checkbox"/> 172.16.2.0/24      <input checked="" type="checkbox"/> 10.10.0.1/32</p> <p><input checked="" type="checkbox"/> 172.16.3.11/32      <input checked="" type="checkbox"/> 192.168.11.101/32</p> <p><input checked="" type="checkbox"/> 172.16.3.21/32      <input checked="" type="checkbox"/> 192.168.11.201/32</p> <p><input type="checkbox"/> Local Network      <input checked="" type="checkbox"/> NAT Network</p>							
Remote Networks	<table border="1"> <thead> <tr> <th>Network</th> <th>Subnet Mask</th> <th></th> </tr> </thead> <tbody> <tr> <td>192.167.11.193</td> <td>255.255.255.0 (/24)</td> <td><input type="button" value="+"/></td> </tr> </tbody> </table>	Network	Subnet Mask		192.167.11.193	255.255.255.0 (/24)	<input type="button" value="+"/>	
Network	Subnet Mask							
192.167.11.193	255.255.255.0 (/24)	<input type="button" value="+"/>						
Authentication	<input checked="" type="radio"/> Preshared Key <input type="radio"/> X.509 Certificate							
Mode	<input checked="" type="radio"/> Main Mode (All WANs need to have Static IP)							
	<input type="radio"/> Aggressive Mode							
Force UDP Encapsulation	<input type="checkbox"/>							
Preshared Key	<input type="text" value="....."/> <input checked="" type="checkbox"/> Hide Characters							
Local ID	<input type="text"/>							
Remote ID	<input type="text"/>							
Phase 1 (IKE) Proposal	1 AES-256 & SHA1 2 -----							
Phase 1 DH Group	<input checked="" type="checkbox"/> Group 2: MODP 1024 <input type="checkbox"/> Group 5: MODP 1536							
Phase 1 SA Lifetime	3600 seconds <input type="button" value="Default"/>							
Phase 2 (ESP) Proposal	1 AES-256 & SHA1 2 -----							
Phase 2 PFS Group	<input checked="" type="radio"/> None <input type="radio"/> Group 2: MODP 1024 <input type="radio"/> Group 5: MODP 1536							
Phase 2 SA Lifetime	28800 seconds <input type="button" value="Default"/>							

## IPsec VPN 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

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	will be disabled.
<b>Connect Upon Disconnection of</b>	Check this box and select a WAN to connect to this VPN automatically when the specified WAN is disconnected.
<b>Remote Gateway IP Address / Host Name</b>	Enter the remote peer's public IP address. For <b>Aggressive Mode</b> , this is optional.
<b>Local Networks</b>	<p>Enter the local LAN subnets here. If you have defined static routes, they will be shown here.</p> <p>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.</p> <p>Two types of NAT policies can be defined:</p> <p><b>One-to-One NAT policy:</b> if the defined subnet in Local Network and NAT Network has the same size, for example, policy "192.168.50.0/24 &gt; 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.</p> <p><b>Many-to-One NAT policy:</b> 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 &gt; 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.</p>
<b>Remote Networks</b>	Enter the LAN and subnets that are located at the remote site here.
<b>Authentication</b>	To access your VPN, clients will need to authenticate by your choice of methods. Choose between the <b>Preshared Key</b> and <b>X.509 Certificate</b> methods of authentication.
<b>Mode</b>	Choose <b>Main Mode</b> if both IPsec peers use static IP addresses. Choose <b>Aggressive Mode</b> if one of the IPsec peers uses dynamic IP addresses.
<b>Force UDP Encapsulation</b>	For forced UDP encapsulation regardless of NAT-traversal, tick this checkbox.
<b>Pre-shared Key</b>	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.
<b>Remote Certificate (pem encoded)</b>	Available only when <b>X.509 Certificate</b> is chosen as the <b>Authentication</b> method, this field allows you to paste a valid X.509 certificate.
<b>Local ID</b>	In <b>Main Mode</b> , this field can be left blank. In <b>Aggressive Mode</b> , if <b>Remote Gateway IP Address</b> is filled on this end and the peer end, this field can be left blank. Otherwise, this

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	field is typically a U-FQDN.
<b>Remote ID</b>	In <b>Main Mode</b> , this field can be left blank. In <b>Aggressive Mode</b> , if <b>Remote Gateway IP Address</b> is filled on this end and the peer end, this field can be left blank. Otherwise, this field is typically a U-FQDN.
<b>Phase 1 (IKE) Proposal</b>	In <b>Main Mode</b> , this allows setting up to six encryption standards, in descending order of priority, to be used in initial connection key negotiations. In <b>Aggressive Mode</b> , only one selection is permitted.
<b>Phase 1 DH Group</b>	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. <b>Group 2: 1024-bit</b> is the default value. <b>Group 5: 1536-bit</b> is the alternative option.
<b>Phase 1 SA Lifetime</b>	This setting specifies the lifetime limit of this Phase 1 Security Association. By default, it is set at <b>3600</b> seconds.
<b>Phase 2 (ESP) Proposal</b>	In <b>Main Mode</b> , 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 <b>Aggressive Mode</b> , only one selection is permitted.
<b>Phase 2 PFS Group</b>	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. <b>None</b> - 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. <b>Group 2: 1024-bit</b> Diffie-Hellman group. The larger the group number, the higher the security. <b>Group 5: 1536-bit</b> is the third option.
<b>Phase 2 SA Lifetime</b>	This setting specifies the lifetime limit of this Phase 2 Security Association. By default, it is set at <b>28800</b> 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.

## 15 Outbound Policy Management

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** or **Advanced>PepVPN**, depending on the model.

Service	Algorithm	Source	Destination	Protocol / Port
HTTPS Persistence	Persistence (Src) (Auto)	Any	Any	TCP 443
Default	(Auto)			

### 15.1 Outbound Policy

Outbound policies for managing and load balancing outbound traffic are located at **Network>Outbound Policy** or **Advanced>PepVPN>Outbound Policy**.

Select an Outbound Policy

Policy: Custom (selected)

High Application Compatibility

Normal Application Compatibility

Custom

Save Cancel

There are three main selections for the outbound traffic policy:

- High Application Compatibility
- Normal Application Compatibility
- Custom

Note that some Pepwave routers provide only the **Send All Traffic To** setting here. See **Section 12.1** for details.

### Outbound Policy Settings

#### High

Outbound traffic from a source LAN device is routed through the same WAN connection regardless of the destination Internet IP address and protocol. This option provides the

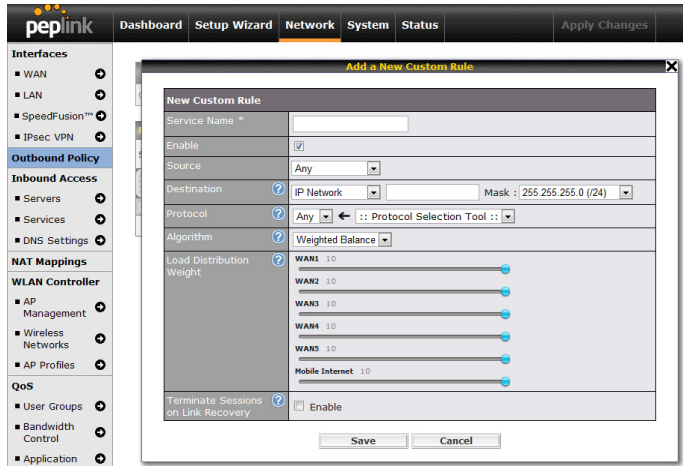
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<b>Application Compatibility</b>	highest application compatibility.
<b>Normal Application Compatibility</b>	Outbound traffic from a source LAN device to the same destination Internet IP address will be routed through the same WAN connection persistently, regardless of protocol. This option provides high compatibility to most applications, and users still benefit from WAN link load balancing when multiple Internet servers are accessed.
<b>Custom</b>	Outbound traffic behavior can be managed by defining rules in a custom rule table. A default rule can be defined for connections that cannot be matched with any of the rules.

The default policy is **Normal Application Compatibility**.

**Tip**

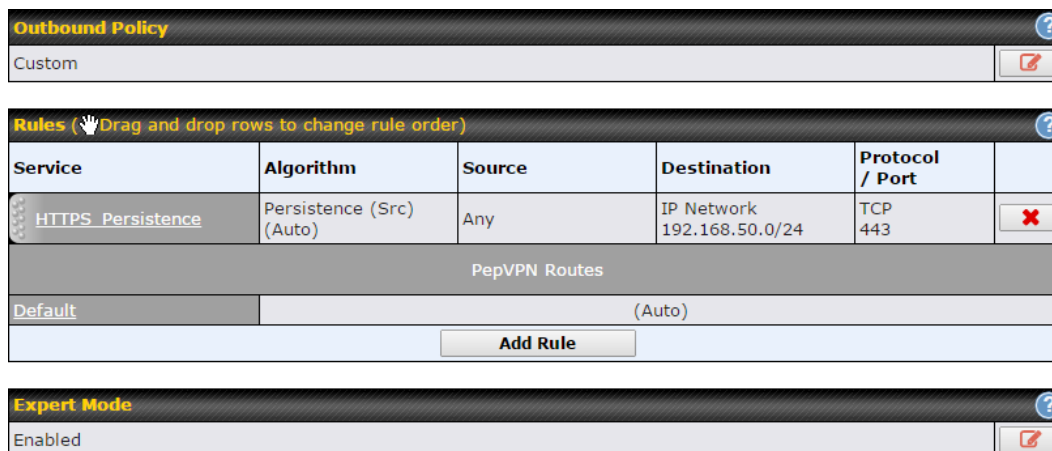
Want to know more about creating outbound rules? Visit our YouTube Channel for a video tutorial!



[http://youtu.be/rKH4AS\\_bQnE](http://youtu.be/rKH4AS_bQnE)


## 15.2 Custom Rules for Outbound Policy

Click  in the **Outbound Policy** form. Choose **Custom** and press the **Save** button.



Outbound Policy					
Custom					

Rules (Drag and drop rows to change rule order)					
Service	Algorithm	Source	Destination	Protocol / Port	
HTTPS Persistence	Persistence (Src) (Auto)	Any	IP Network 192.168.50.0/24	TCP 443	
PepVPN Routes					
Default			(Auto)		
<b>Add Rule</b>					

Expert Mode	
Enabled	

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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.

Edit Default Custom Rule	
Default Rule ?	<input checked="" type="radio"/> Custom <input type="radio"/> Auto
Algorithm ?	Weighted Balance ▾
Load Distribution Weight ?	WAN 1 10 <input type="range"/>
	WAN 2 10 <input type="range"/>
	Wi-Fi WAN 10 <input type="range"/>
	Cellular 1 10 <input type="range"/>
	Cellular 2 10 <input type="range"/>
	USB 10 <input type="range"/>
Terminate Sessions on Link Recovery ?	<input type="checkbox"/> Enable
Save Cancel	

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. Note that some Pepwave routers display this button at **Advanced>PepVPN>PepVPN Outbound Custom Rules**.



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**Add a New Custom Rule** ✕

Service Name *	<input type="text"/>
Enable	<input checked="" type="checkbox"/> Always on ▾
Source	Any ▾
Destination	<input type="text"/> IP Network ▾ <input type="text"/> Mask: <input type="text"/> 255.255.255.0 (/24) ▾
Protocol	Any ▾ ◀ :: Protocol Selection Tool :: ▾
Algorithm	Weighted Balance ▾
Load Distribution Weight	WAN 1 10 <input type="range"/> WAN 2 10 <input type="range"/> Wi-Fi WAN 10 <input type="range"/> Cellular 1 10 <input type="range"/> Cellular 2 10 <input type="range"/> USB 10 <input type="range"/>
Terminate Sessions on Link Recovery	<input type="checkbox"/> Enable

## New Custom Rule Settings

<b>Service Name</b>	This setting specifies the name of the outbound traffic rule.										
<b>Enable</b>	<p>This setting specifies whether the outbound traffic rule takes effect. When <b>Enable</b> 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 <b>Enable</b> is unchecked, the rule does not take effect: the Pepwave router disregards the other parameters of the rule.</p> <p>Click the drop-down menu next to the checkbox to apply a time schedule to this custom rule.</p>										
<b>Source</b>	This setting specifies the source IP address, IP network, or MAC address for traffic that matches the rule.										
<b>Destination</b>	<p>This setting specifies the destination IP address, IP network, or domain name for traffic that matches the rule.</p> <div style="border: 1px solid gray; padding: 2px; margin-bottom: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Destination</td> <td>Domain Name ▾</td> </tr> <tr> <td>Protocol</td> <td>Any</td> </tr> <tr> <td>Algorithm</td> <td>IP Address</td> </tr> <tr> <td></td> <td>IP Network</td> </tr> <tr> <td></td> <td style="background-color: #007bff; color: white;">Domain Name</td> </tr> </table> </div> <p>If <b>Domain Name</b> is chosen and a domain name, such as <i>foobar.com</i>, is entered, any outgoing accesses to <i>foobar.com</i> and <i>*.foobar.com</i> 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 <i>foobar.*</i>, for example, <i>www.foobar.com</i>, <i>www.foobar.co.jp</i>, or <i>foobar.co.uk</i> will also match. Placing wildcards in any other position is not supported.</p> <p>NOTE: if a server has one Internet IP address and multiple server names, and if one of the names is defined here, accesses to any one of the server names will also match this rule.</p>	Destination	Domain Name ▾	Protocol	Any	Algorithm	IP Address		IP Network		Domain Name
Destination	Domain Name ▾										
Protocol	Any										
Algorithm	IP Address										
	IP Network										
	Domain Name										

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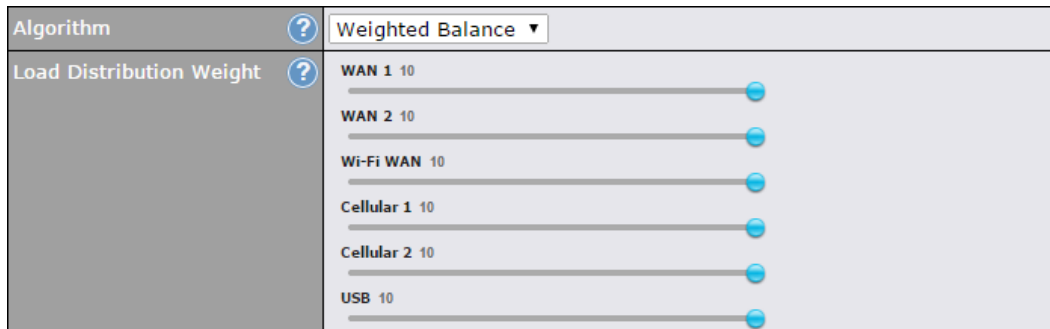
<b>Protocol and Port</b>	This setting specifies the IP protocol and port of traffic that matches this rule.
<b>Algorithm</b>	<p>This setting specifies the behavior of the Pepwave router for the custom rule. One of the following values can be selected (note that some Pepwave routers provide only some of these options):</p> <ul style="list-style-type: none"><li>• Weighted Balance</li><li>• Persistence</li><li>• Enforced</li><li>• Priority</li><li>• Overflow</li><li>• Least Used</li><li>• Lowest Latency</li></ul> <p>The upcoming sections detail the listed algorithms.</p>
<b>Terminate Sessions on Link Recovery</b>	<p>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 <b>Weighted</b>, <b>Persistence</b>, and <b>Priority</b> 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.</p>

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## 15.2.1 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**.

Algorithm	Weighted Balance
Load Distribution Weight	WAN 1 10
	WAN 2 10
	Wi-Fi WAN 10
	Cellular 1 10
	Cellular 2 10
	USB 10



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%.

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## 15.2.2 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.

Algorithm	<input type="text" value="Persistence"/>
Persistence Mode	<input checked="" type="radio"/> By Source <input type="radio"/> By Destination
Load Distribution	<input type="radio"/> Auto <input checked="" type="radio"/> Custom
Load Distribution Weight	<p>WAN 1 10 <input type="range"/></p> <p>WAN 2 10 <input type="range"/></p> <p>Wi-Fi WAN 10 <input type="range"/></p> <p>Cellular 1 10 <input type="range"/></p> <p>Cellular 2 10 <input type="range"/></p> <p>USB 10 <input type="range"/></p>

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

<b>By Source:</b>	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.
<b>By Destination:</b>	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.

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## 15.2.3 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**.

Algorithm	?	Enforced	
Enforced Connection	?	WAN: WAN 1	
		WAN: WAN 1	
		WAN: WAN 2	
		WAN: Wi-Fi WAN	
		WAN: Cellular 1	
		WAN: Cellular 2	
		WAN: USB	
		VPN: Connection 1	
			Save Cancel

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.

## 15.2.4 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	Not In Use
		WAN: WAN 1	VPN: Connection 1
		WAN: WAN 2	
		WAN: Wi-Fi WAN	
		WAN: Cellular 1	
		WAN: Cellular 2	
		WAN: USB	
		Lowest Priority	
Terminate Sessions on Link Recovery	?	<input type="checkbox"/> 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.

## 15.2.5 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.

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Algorithm	<span>?</span> Overflow
Overflow Order	<span>?</span> Highest Priority <input type="checkbox"/> WAN: WAN 1 <input type="checkbox"/> WAN: WAN 2 <input type="checkbox"/> WAN: Wi-Fi WAN <input type="checkbox"/> WAN: Cellular 1 <input type="checkbox"/> WAN: Cellular 2 <input type="checkbox"/> 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.

## 15.2.6 Algorithm: Least Used

Algorithm	<span>?</span> Least Used
Connection	<input checked="" type="checkbox"/> WAN 1 <input checked="" type="checkbox"/> WAN 2 <input checked="" type="checkbox"/> Wi-Fi WAN <input type="checkbox"/> Cellular 1 <input type="checkbox"/> Cellular 2 <input type="checkbox"/> USB

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.

## 15.2.7 Algorithm: Lowest Latency

Algorithm	<span>?</span> Lowest Latency Note: Use of Lowest Latency will incur additional network usage.
Connection	<input checked="" type="checkbox"/> WAN 1 <input checked="" type="checkbox"/> WAN 2 <input checked="" type="checkbox"/> Wi-Fi WAN <input type="checkbox"/> Cellular 1 <input type="checkbox"/> Cellular 2 <input type="checkbox"/> USB

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

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- A latency sensitive application must be routed through the lowest latency WAN, regardless of the WAN's available bandwidth.

## 15.2.8 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.

**Help** Close

This table allows you to fine tune how the outbound traffic should be distributed to the WAN connections.

Click the *Add Rule* button to add a new rule. Click the *X* button to remove a rule. Drag a rule to promote or demote its precedence. A higher position of a rule signifies a higher precedence. You may change the default outbound policy behavior by clicking the *Default* link.

If you require advanced control of PepVPN traffic, [turn on Expert Mode](#).

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

Rules ( Drag and drop rows to change rule order )					
Service	Algorithm	Source	Destination	Protocol / Port	
HTTPS_Persistence	Persistence (Src) (Auto)	Any	Any	TCP 443	X
PepVPN Routes					
Default	(Auto)				
Add Rule					