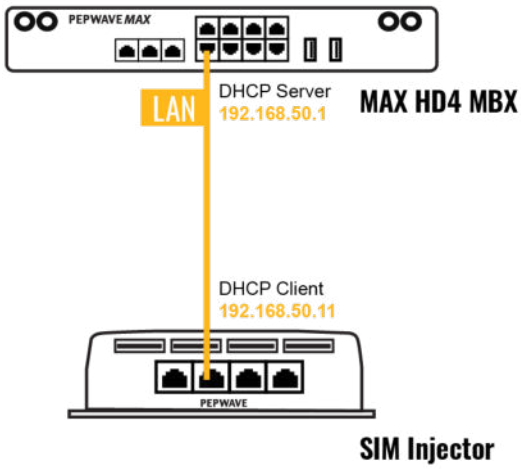
Scenario 1: SIM Injector in LAN of Cellular Router

Setup topology



This is the most basic scenario in which the SIM Injector is connected directly to the cellular router's LAN port via an ethernet cable. This allows for the cellular router to be positioned for the best possible signal. Meanwhile, the SIM cards can be conveniently located in other locations such as the office, passenger area, or the bridge of a ship. The SIM Injector allows for easily swapping SIM cards without needing to access a cellular router.

IMPORTANT: Cellular WAN will not fallback to the local SIM if it is configured to use the SIM Injector.

Configuring the SIM Injector

1. Connect the SIM Injector to the LAN port of the cellular router.
2. Insert SIM cards into the SIM Injector. The SIM cards will be automatically detected.

IMPORTANT: SIM cards inserted into SIM Injector must not have a PIN code.

Note 1: The SIM Injector gets its IP address via DHCP and doesn't have a static IP address. To find it's address, please check the DHCP lease on the cellular router.

Configuring the Cellular Router

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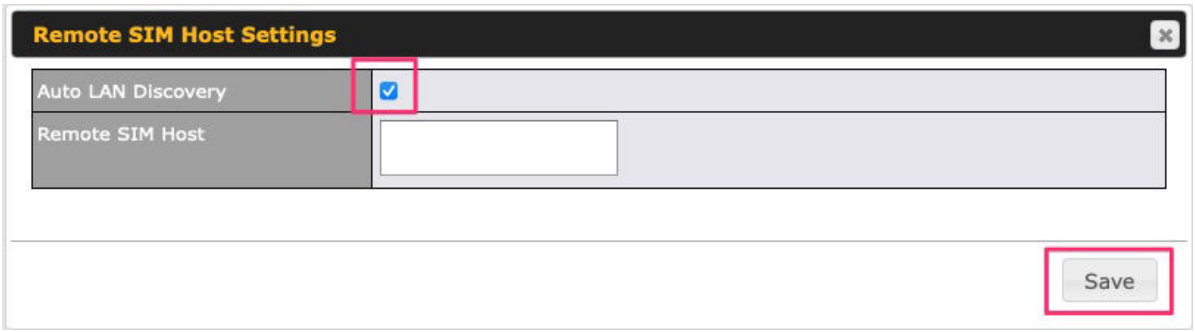
Step 1. Enable the SIM Injector communication protocol.

1a. If you are using a Balance cellular router, go to the **Network** tab (top navigation bar).
1b. If you are using a MAX cellular router, go to the **Advanced** tab (top navigation bar).
2. Under **Misc. settings** (left navigation bar) find **Remote SIM Management**.
3. In **Remote SIM Management**, click on the edit icon next to **Remote SIM is Disabled**.

4. Check the **Auto LAN discovery** checkbox and click **Save** and **Apply Changes**.

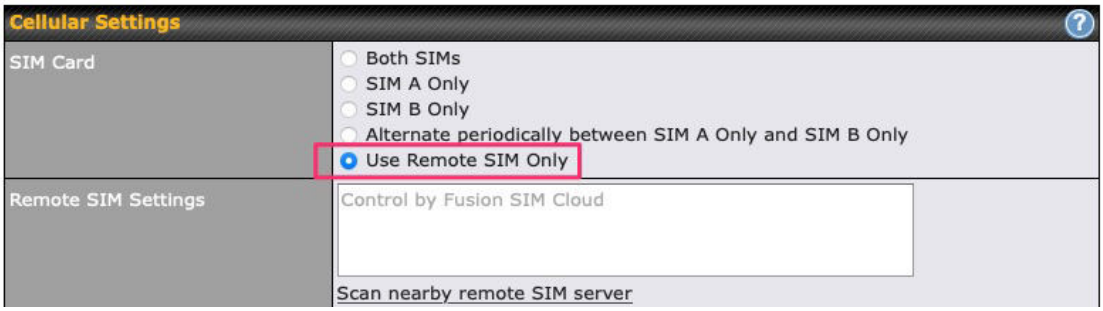


5. Click **Save** and then **Apply Changes**.

Step 2. Enable RemoteSIM for the selected Cellular interface.

1. Go to **Network** (top navigation bar), then **WAN** (left navigation bar) and click **Details** for a selected cellular WAN. This will open the WAN Connection Settings page.

2. Scroll down to **Cellular settings**.
3. In the **SIM Card** section, select **Use Remote SIM Only**.



4. Enter configuration settings in **Remote SIM Settings** section. Click on **Scan nearby remote SIM server** to show the serial number(s) of the connected SIM Injector(s). Available configuration options for cellular interface are shown below:

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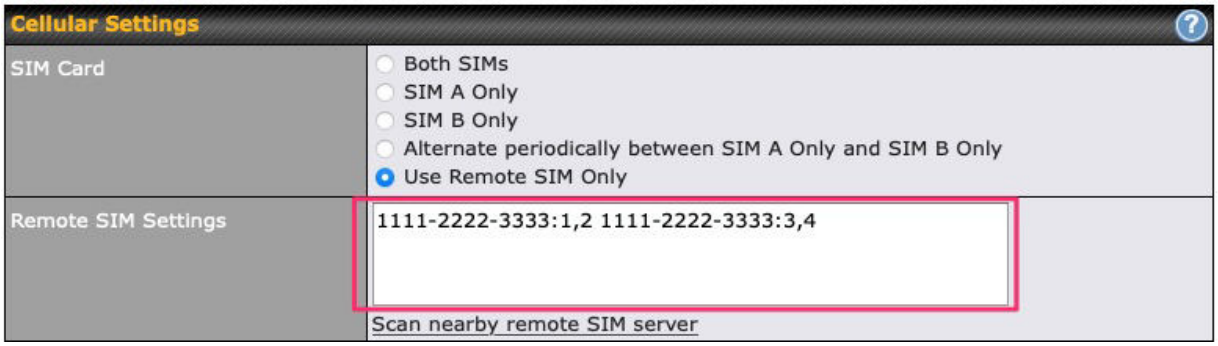
A. Defining SIM Injector(s)
- Format: <S/N>
- Example 1: 1111-2222-3333
- Example 2: 1111-2222-3333 4444-5555-6666

B. Defining SIM Injector(s) SIM slot(s):
- Format: <S/N:slot number>
- Example 1: 1111-2222-3333:7,5 (the Cellular Interface will use SIM in slot 7, then 5)
- Example 2: 1111-2222-3333:1,2 1111-2222-3333:3,4 (the cellular Interface will use SIM in slot 1, then in 2 from the first SIM Injector, and then it will use 3 and 4 from the second SIM Injector).



Note: It is recommended to use different SIM slots for each cellular interface.

5. Click **Save** and **Apply Changes**.

Step 3. (Optional) Custom SIM cards settings.

1a. For a Balance router, go to the **Network** (Top tab).
1b. For a MAX router, go to the **Advanced** (Top tab).
2. Under **Misc. settings** (Left-side tab) find **Remote SIM Management**.
3. Click on the **Add Remote SIM** button, fill in all the required info and click **Save**. This section allows defining custom requirements for a SIM card located in a certain SIM slot:
- Enable/Disable roaming (by default roaming is disabled).
- Add Custom mobile operator settings (APN, user name, password).

4. Repeat configuration for all SIM cards which need custom settings.
5. Click **Apply Changes** to take effect.

Scenario 2: SIM Injector in WAN of main Router and multiple Cellular Routers

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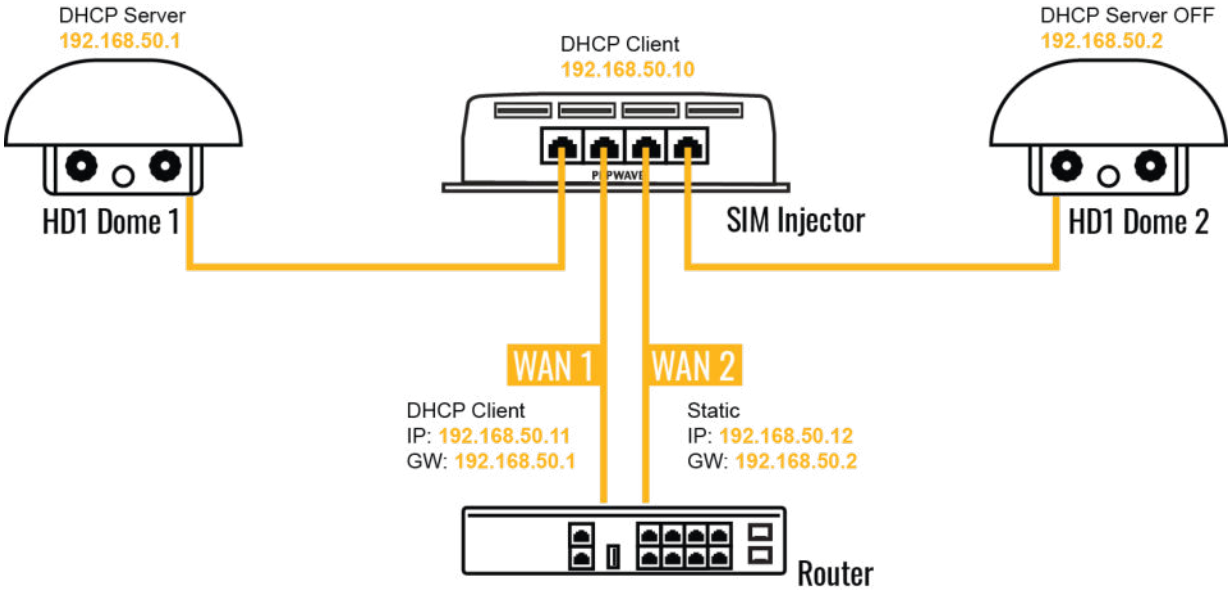
Setup topology



In this scenario, each HD Dome creates a WAN connection to the main router. A single SIM Injector is used to provide SIM cards for each HD Dome. The HD Dome can be replaced with any Peplink cellular router supporting RemoteSIM technology.

This scenario requires the completion of the configuration steps shown in Scenario 1 in addition to the configuration steps explained below.

Additional configurations for Cellular Routers

Step 1. Disable the DHCP server.

- HD Dome 1 should act as a DHCP server.
- HD Dome 2 should be configured to have a static IP address with DHCP disabled.
- Both routers should be in the same subnet (e.g. 192.168.50.1 and 192.168.50.2).

1. Go to **Network** (Top tab), then **Network Settings** (Left-side tab), and click on **Untagged LAN**. This will open up the LAN settings page.
2. Change the IP address to 192.168.50.2.
3. In the **DHCP Server** section, uncheck the checkbox to disable DHCP Server.
4. Click **Save** and **Apply Changes**.

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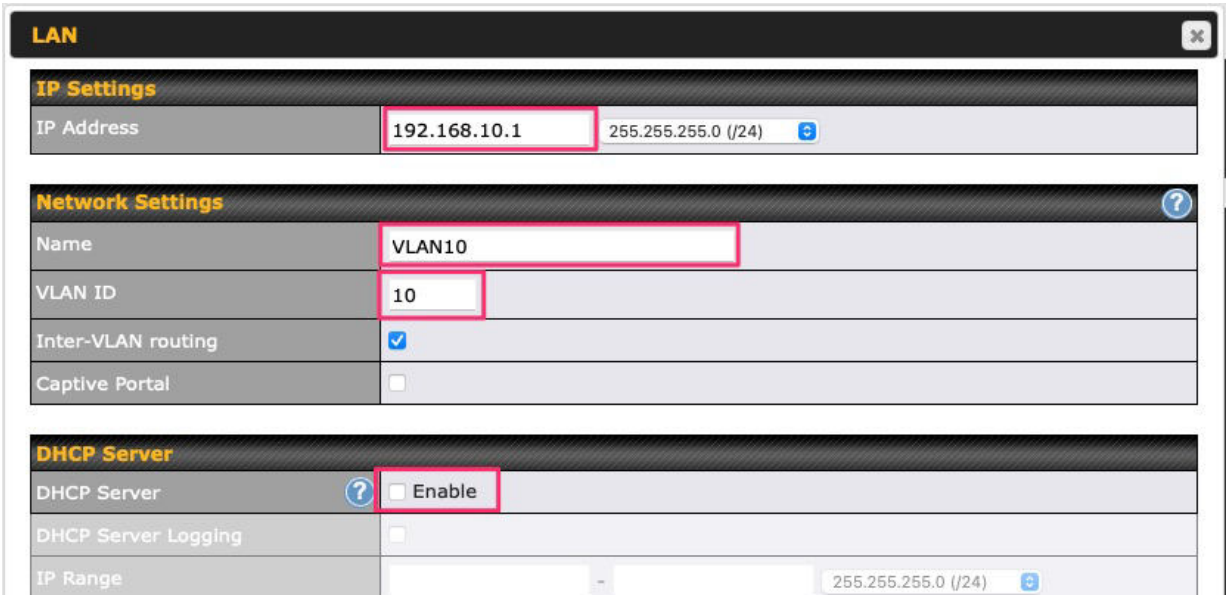
Step 2. Ethernet port configuration

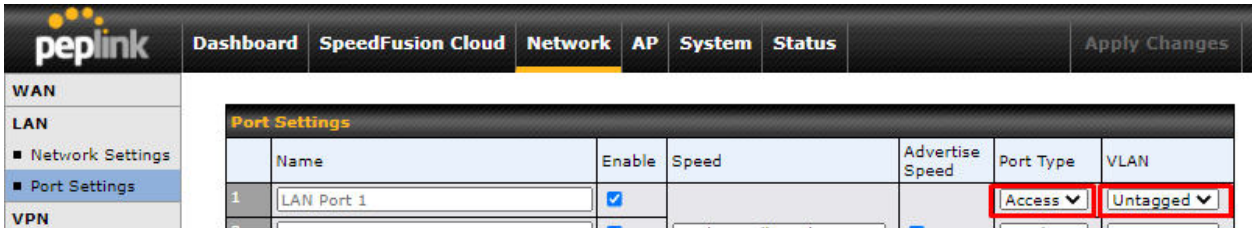
The Ethernet port must be set to **ACCESS** mode for each HD Dome. To do this, dummy VLANs need to be created first.

1. Go to **Network** (Top tab), then **Network Settings** (Left-side tab), and click on **New LAN**. This will open the settings page to create a dummy VLAN.
2. The image below shows the values that need to be changed to create a new VLAN:



Note: set different IP addresses for each HD dome (e.g. 192.168.10.1 and 192.168.10.2).

3. Click Save and **Apply Changes**.
4. Go to **Network** (Top tab), then **Port Settings** (Left-side tab).
5. Set the Port Type to **Access** and set VLAN to **Untagged LAN** (see picture below).



6. Click **Save** and **Apply Changes**.

Configuration requirements for the main Router

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Requirements for the main router are:

- Configure **WAN 1** as a DHCP client.
- **WAN 1** will automatically get the Gateway IP address from HD Dome 1.
- Configure **WAN 2** as a Static IP and set it to 192.168.50.12.
- Configure **WAN 2** Gateway to 192.168.50.2. Same as the HD Dome 2's IP address.

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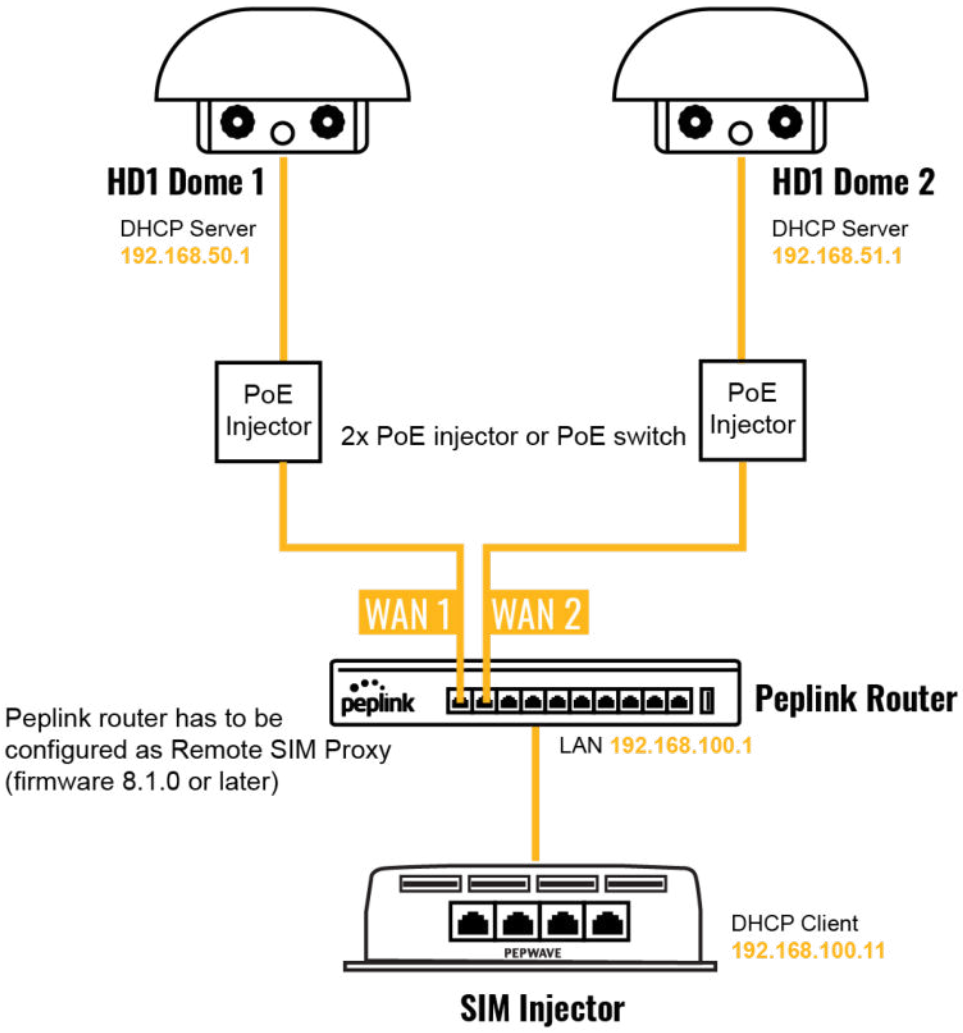
Scenario 3: SIM Injector in LAN of main Router and multiple Cellular Routers

Setup topology



In this scenario, SIMs are provided to the HD Domes via the main router. In this example, the **Remote SIM Proxy** functionality needs to be enabled on the main router.

Notes:

- HD Dome can be replaced with any other cellular router that supports RemoteSIM.

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- It is recommended to use Peplink Balance series or X series routers as the main router.

This scenario requires the completion of the configuration steps for the cellular router and the SIM Injector as in Scenario 1. The configuration for the main router is explained below.

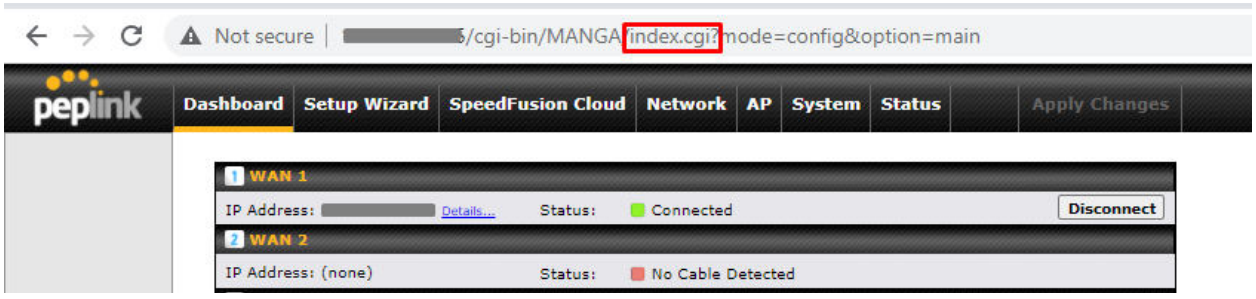
Main Router configuration

IMPORTANT: Main router LAN side and Cellular Routers must be configured using different subnets, e.g. 192.168.**50**.1/24 and 192.168.**100**.1/24.

Note: please make sure the Peplink router is running Firmware 8.1.0 or above.

1. Open the main router WEB interface and change:
From <IP address>/cgi-bin/MANGA/**index.cgi** to <IP address>/cgi-bin/MANGA/**support.cgi**.

This will open the support.cgi page.



2. Scroll down to find **Remote SIM Proxy** and click on **[click to configure]** that is located next to it.
3. Check the **Enable** checkbox.
4. Click on **Save**.
5. Go back to the index.cgi page and click on **Apply Changes**.

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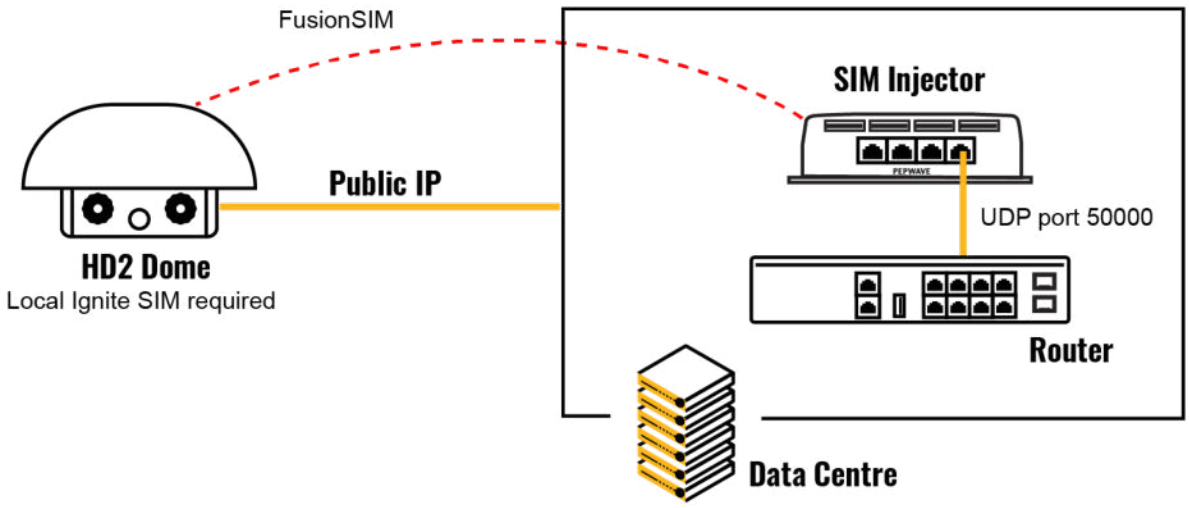
Scenario 4: SIM Injector in a remote location

Setup topology



Requirements for installing a SIM Injector in a remote location:

- Cellular router communicates with the SIM Injector via UDP port 50000. Therefore this port must be reachable via public IP over the Internet.
- The one way latency between the cellular router and the SIM Injector should be **up to 250 ms.** A higher latency may lead to stability issues.
- The cellular router must have Internet connection to connect to the SIM Injector. It can be another Internet connection via Ethernet or Fiber if possible, or a secondary cellular interface with a local SIM (Ignite SIM).
- Due to its high latency, it is not recommended to use satellite WAN for connecting to a SIM Injector in remote locations.

SIM Injector configuration is the same as in Scenario 1.

Cellular Router configuration

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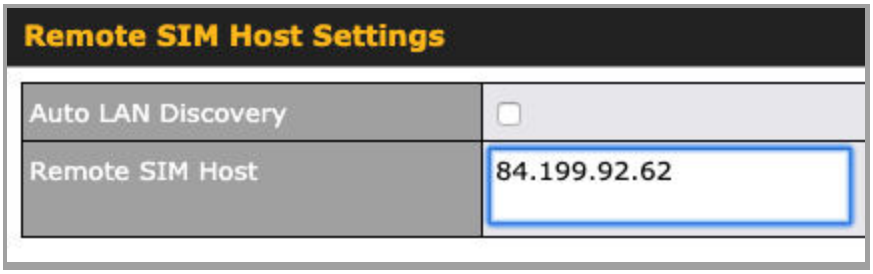
Step 1. Enable the SIM Injector communication protocol.

1a. For a Balance cellular router, go to the **Network** (Top tab).
1b. For a MAX cellular router, go to the **Advanced** (Top tab).
2. Under **Misc. settings** (Left-side tab), find **Remote SIM Management**.
3. In **Remote SIM Management**, click on the edit icon next to **Remote SIM is Disabled.**
4. Enter the public IP of the SIM Injector and click **Save** and **Apply Changes**.



Notes:

- Do NOT check **Auto LAN Discovery**.
- Adding a SIM Injector serial number to the **Remote SIM Host** field is a mistake!

Step 2. RemoteSIM and custom SIM card settings configurations are the same as in Scenario 1.

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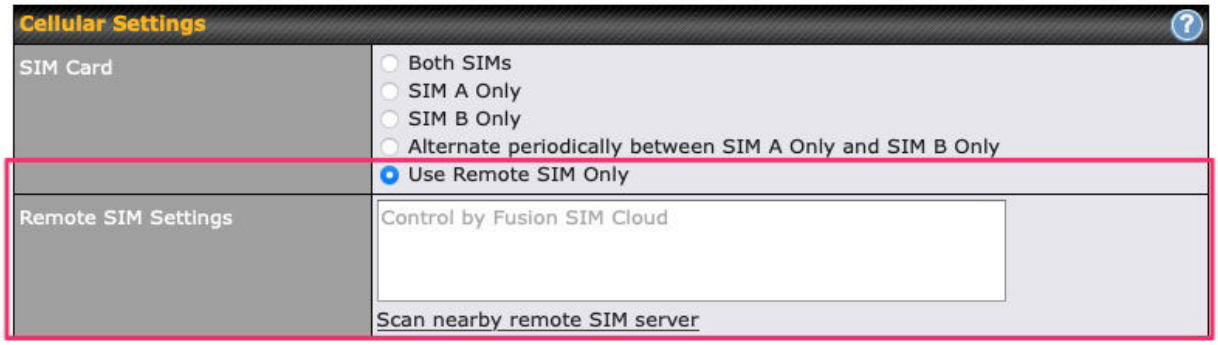
How to check if a Pepwave Cellular Router supports Remote SIM

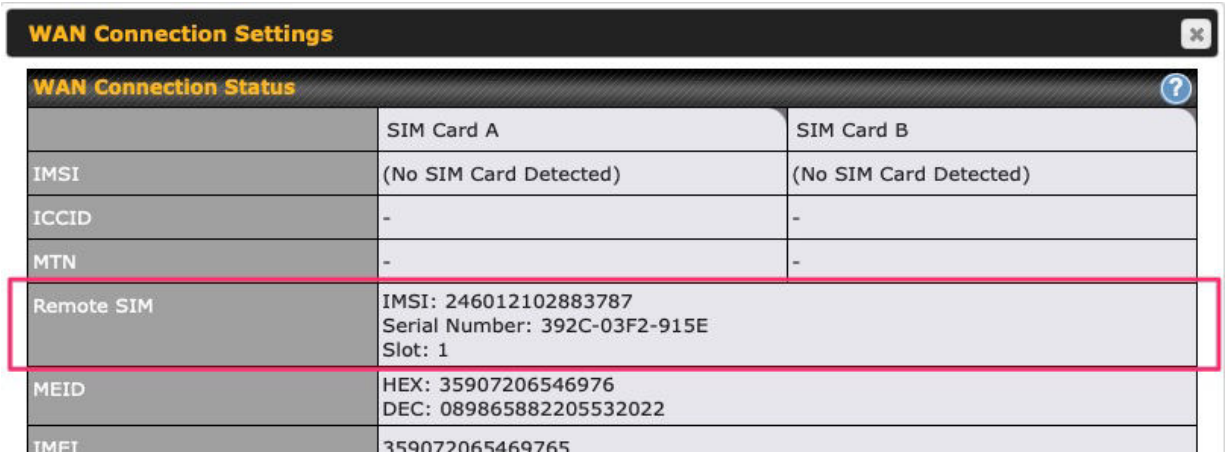
1. Go to **Network** (Top tab), then **WAN** (Left-side tab), and click **Details** on any cellular WAN. This will open the WAN Connection Settings page.
2. Scroll down to **Cellular settings**.

If you can see the **Remote SIM Settings** section, then the cellular router supports RemoteSIM.



Monitor the status of the Remote SIM

1. Go to **Network** (Top tab), then **WAN** (Left-side tab), and click **Details** on the cellular WAN which was configured to use RemoteSIM.
2. Check the **WAN Connection Status** section. Within the cell WAN details, there is a section for **Remote SIM** (SIM card IMSI, SIM Injector serial number and SIM slot).



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Appendix D. Case studies

MPLS Alternative

Our SpeedFusion enabled routers can be used to bond multiple low-cost/commodity Internet connections to replace an expensive managed business Internet connection, private leased line, MPLS, and frame relay without sacrificing reliability and availability.

Below are typical deployments for using our Balance routers to replace expensive MPLS connections with commodity connections, such as ADSL, 3G, and 4G LTE links.

Special features of Balance 580: have high availability capability
Special features of Balance 2500: have high availability capability and capable of connecting to optical fiber based LAN through SFP+ connector

Our WAN-bonding routers which comprise our Balance series and MediaFast series are capable of connecting multiple devices, and end users' networks to the Internet through multiple Internet connections.

Our MediaFast series routers have been helping students at many education institutions to enjoy uninterrupted learning

Option 1: MPLS Supplement

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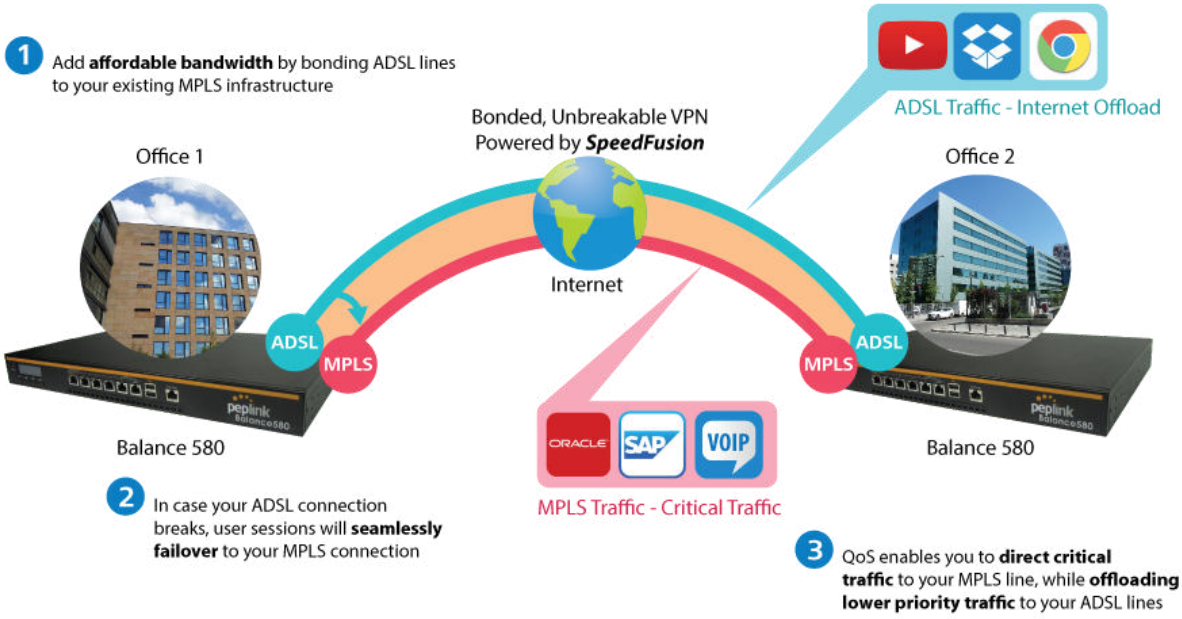

Affordably increase your bandwidth by adding commodity ADSL links to your MPLS connection. SpeedFusion technology bonds all your connections together, enabling session-persistent, user-transparent hot failover. QoS support, bandwidth control, and traffic prioritization gives you total control over your network.

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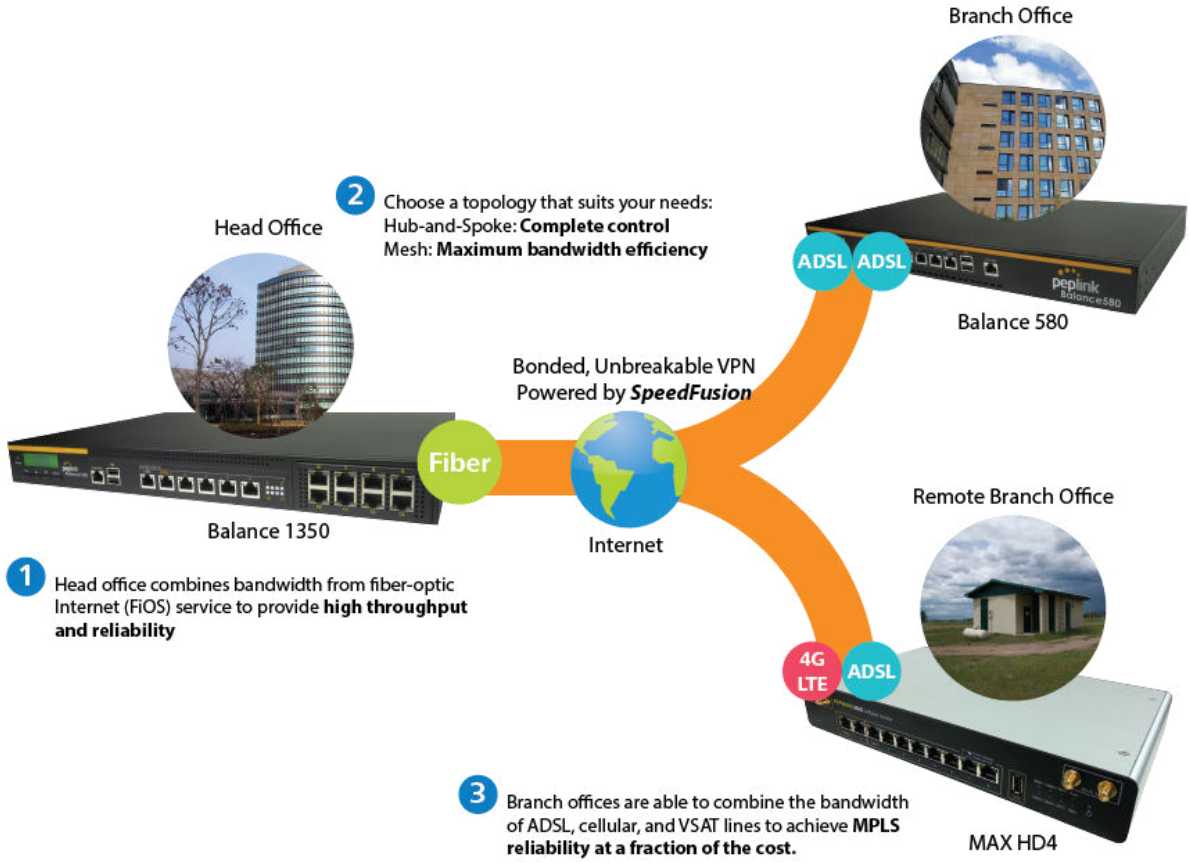
Option 2: MPLS Alternative



Achieve faster speeds and greater reliability while paying only 20% of MPLS costs by connecting multiple ADSL, 3G, and 4G LTE links. Choose a topology that suits your requirements: a hub-and-spoke topology maximizes control over your network, while a meshed topology can reduce your bandwidth overhead by enabling your devices to form Unbreakable VPN connections directly with each other.

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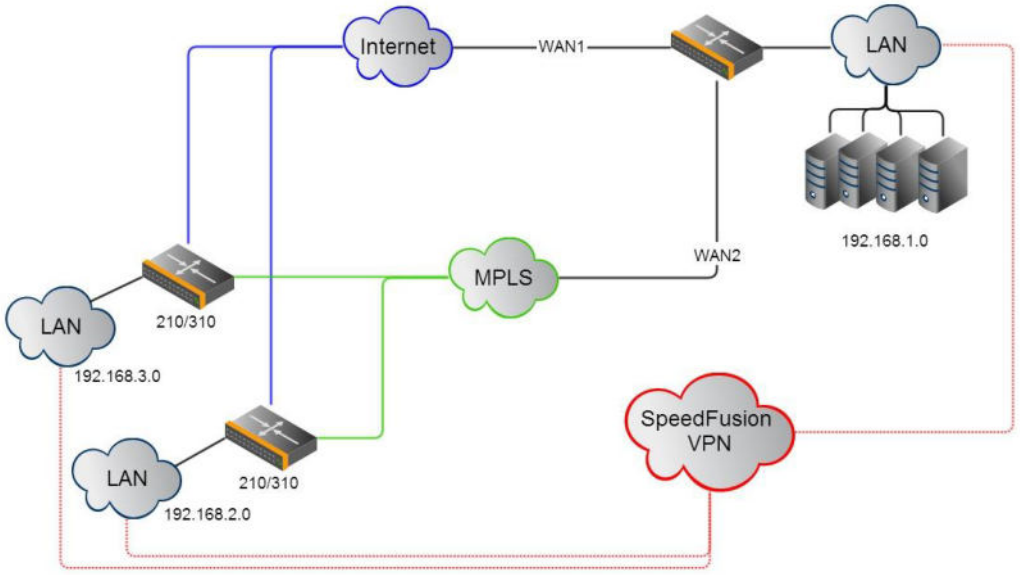
Here is an example of to supplement of existing Multi-Office MPLS network with DSL bonding through SpeedFusion using a Balance 580 at the headquarters and Balance 210/310 at branch offices.



Environment:

- This organization has one head office with two branch offices, with most of the crucial information stored in a server room at the head office.
- They are connecting the offices together using a managed MPLS Solution. However, the MPLS Network is operating at capacity and upgrading the links is cost prohibitive.
- As the organization grows, it needs a cost-efficient way to add more bandwidth to its wide area network.
- Internet access at the remote sites is sent via a web proxy at head office for corporate web filtering compliance.

Requirement:

- User sessions need to remain uninterrupted
- More bandwidth is required at the head office location for direct internet access.

Recommended Solution:

- Form a SpeedFusion tunnel between the branch offices and head office to bond the MPLS and additional DSL lines.
- SpeedFusion allows for hot failover, maintaining a persistent session while switching connections.
- The DSLs at head office can be used for direct internet access providing lots of cheap internet bandwidth.
- Head office can use outbound policies to send internet traffic out over the DSLs and only use the MPLS connection for speedfusion, freeing up bandwidth.

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Devices Deployed: Balance 210, Balance 310, Balance 580

Harrington Industrial Plastics

Overview

Harrington Plastics, the US's largest industrial plastics distributor, was looking to upgrade its network equipment. Harrington's team came across Peplink and started thinking about MPLS alternatives. By choosing Peplink, they saved a fortune on upgrades and ended up with yearly savings of up to $100,000.

Requirements

- Zero network outages
- Flexible resilience options
- Cost-effective solution

Solution

- Peplink Balance 1350
- Peplink Balance 380
- Unbreakable VPN

Benefits

- Extreme savings of $100,000 per year

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- 4x the bandwidth
- Seamless hardware failover
- Highly available network due to WAN diversity
- Highly cost-effective compared to competing solutions
- Easy resilience achieved by adding 4G USB modems

Time For An Upgrade

Harrington Industrial Plastics decided it was time to upgrade its network equipment. Its existing solution used redundant MPLS for site-to-site traffic and broadband connections for Internet access. Harrington is the US's largest distributor of industrial plastics piping, serving all industries with corrosive and high-purity applications. It requires peak performance at all times in order to serve its large customer base and 43 busy branches.

Quick Deployment and Unbreakable Connectivity

In evaluating an upgrade to its network infrastructure, it was only natural that Harrington settled on the best in the industry — Peplink. Peplink partner Frontier Computer Corporation was chosen to help design and deploy the solution. Since Peplink gear is so easy to configure and install, Harrington was able to design, prototype and roll out the entire solution to the corporate headquarters and all 43 branches within just one year.

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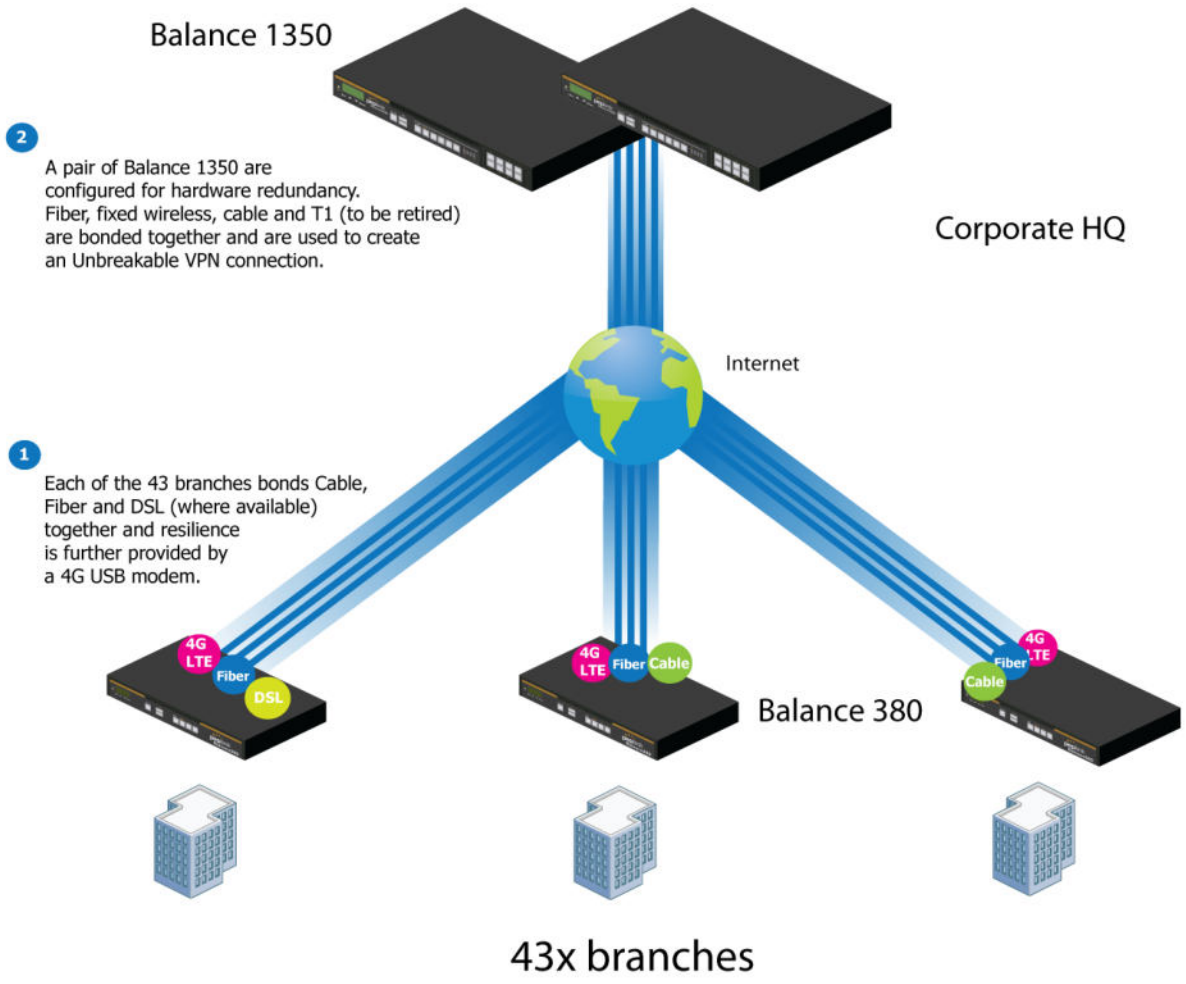

The corporate office houses a pair of redundant Balance 1350s for hardware resilience. Served by 4 separate links from multiple service providers, the network's chance of an outage is practically zero. All 43 branches are now equipped with a fleet of Balance 380s, bonding a combination of DSL, cable and fiber-optic links together with an additional 4G USB modem for added resilience. These work together to create an Unbreakable VPN connection to the Balance 1350s at the corporate office, connecting the final dot.

Dependable, Resilient Networking that's also Very Budget-friendly

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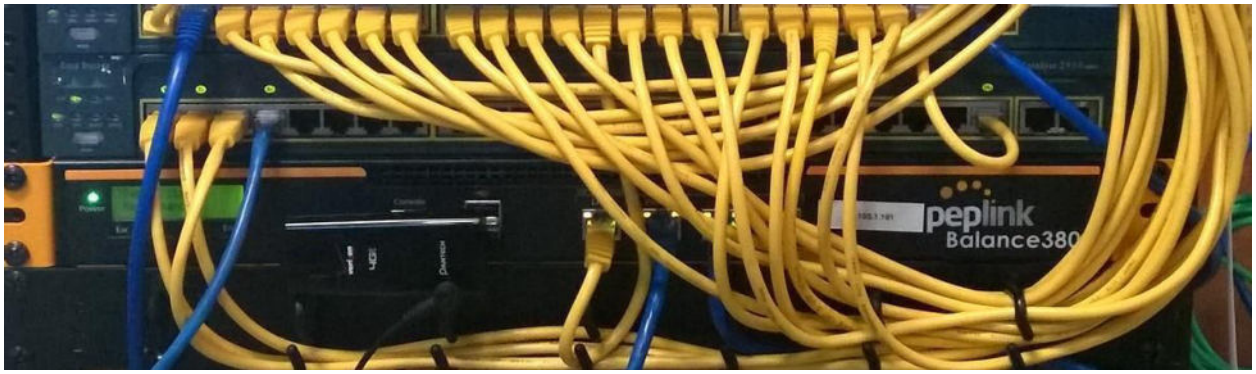

Harrington Industrial Plastics couldn't be happier. They now benefit from an extremely reliable and cost-effective network. Supplying additional resilience is as easy as plugging in a 4G USB modem. Where the MPLS 768kb deployed previously had cost them $192000 a year for all 40 sites, their new solution is now only costing them $92000. Their total bandwidth has been bumped from 36 Mbps to 138 Mbps.

PLUSS

Peplink + Citrix + VoIP Adds Up to Fast, Cost-Effective WAN for Pluss

A Peplink customer since 2006, Pluss is a social enterprise that each year makes gainful employment a reality for more than 5000 disabled and disadvantaged UK citizens. With 37 locations and 300+ active users, Pluss makes heavy use of its WAN infrastructure, which until recently was built on managed MPLS lines.

Hoping to cut expenses and, if possible, boost performance at the same time, Steve Taylor, IT Manager at Pluss, set out to find a solution that would allow Pluss to replace costly MPLS service with a commodity alternative, such as DSL or EFM.

Steve found the solution Pluss needed in Peplink products, especially the Balance series of

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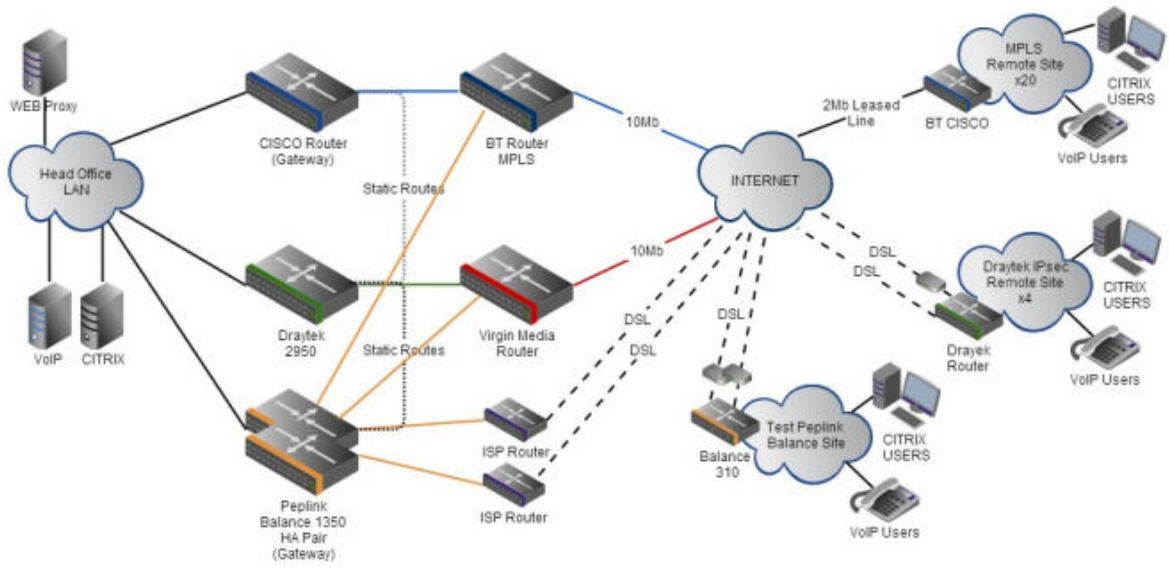
high-performance enterprise routers and SpeedFusion bonding technology. Pluss now powers its entire WAN infrastructure with simple-to-install, highly reliable, and cost-effective Peplink gear, which allows it to aggregate DSL and other commodity connections and replace expensive leased lines.



Colégio Next - Enabling eLearning

Colégio Next, a recognized Apple Distinguished School - deploys over 500 iPads to its 600 students as a teaching and learning tool.

Despite being equipped with iPads, teachers and students alike were not making use of them. The reason for this was because of the slow network access speeds. Apps would not download

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and course contents were inaccessible. Often, having more than a couple students connected to the same Wi-Fi access point was enough to bring it to its knees.

Colégio Next needed a unique solution, so they contacted Peplink.

Requirements

- Solve network congestion problem caused by 600 students over rural Internet connections
- Wi-Fi that can handle 50+ users per classroom
- An affordable network infrastructure that can provide simultaneous access to media-rich educational content

Solution

- Peplink MediaFast
- Multi-WAN Content-caching router, tailor-made for Education networking.
- AP One 300M
- Enterprise grade AP, 5GHz Wi-Fi, up to 60 concurrent users.

Benefits

- Instant, simultaneous access to media-rich educational content for 500+ iPads
- Wi-Fi connection stability for 50+ users per classroom, not achievable by other tested equipment
- Teachers, students and guests can be assigned access priority to available bandwidth, further preventing congestion
- iOS updates (often 2GB size) no longer congest the network as they are downloaded only once, cached on the MediaFast and then distributed to all iOS devices

- AP Controller makes MAC Address Filtering easy. Students are assigned to designated APs by their devices' MAC Address in order to prevent saturating any single AP.
- Flawless iPad AirPlay mirroring at all times
- iPads are used all day, reaching their full potential with a fast and stable network all the time
- Students are far more engaged and teachers rely on their iPads all day

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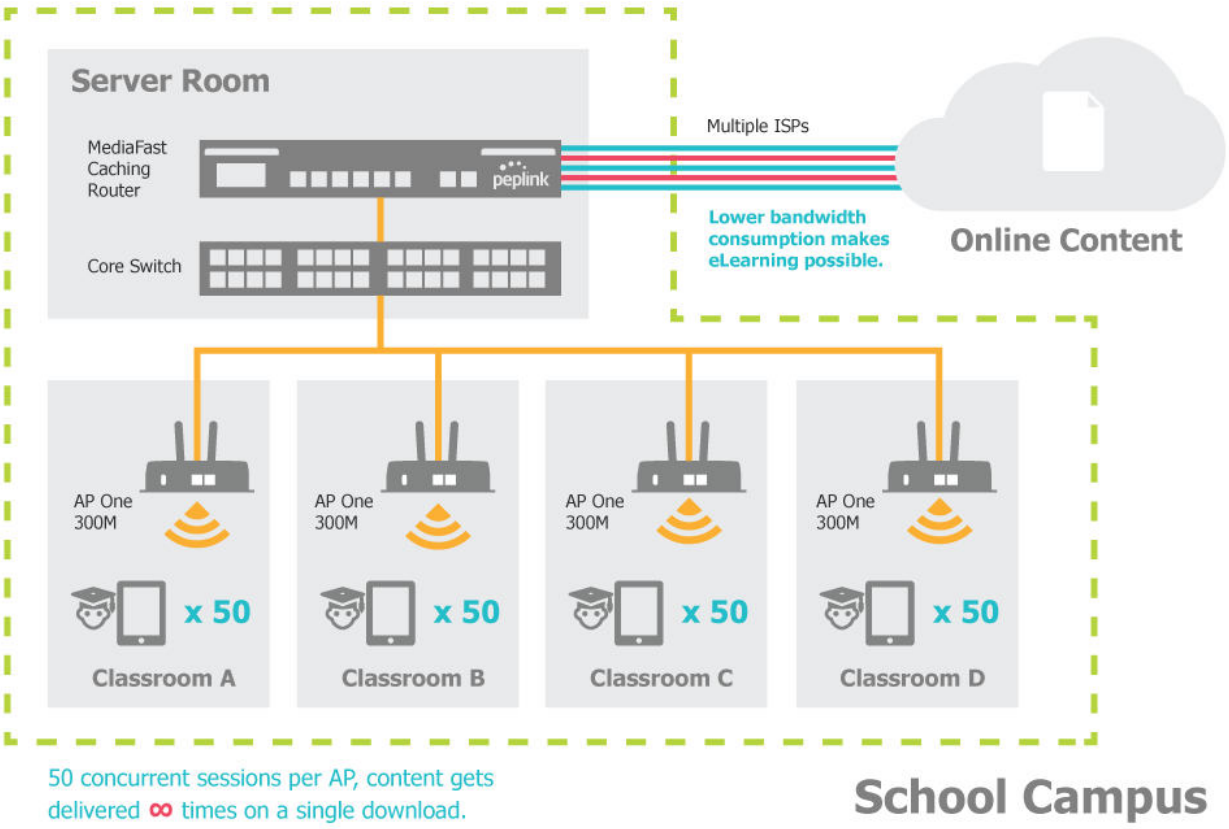

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Performance Optimization

Scenario

In this scenario, email and web browsing are the two main Internet services used by LAN users.

The mail server is external to the network. The connections are ADSL (WAN1, with slow uplink and fast downlink) and Metro Ethernet (WAN2, symmetric).

Solution

For optimal performance with this configuration, individually set the WAN load balance according to the characteristics of each service.

- Web browsing mainly downloads data; sending emails mainly consumes upload bandwidth.
- Both connections offer good download speeds; WAN2 offers good upload speeds.
- Define WAN1 and WAN2's inbound and outbound bandwidths to be 30M/2M and 50M/50M, respectively. This will ensure that outbound traffic is more likely to be routed through WAN2.
- For HTTP, set the weight to 3:4.
- For SMTP, set the weight to 1:8, such that users will have a greater chance to be routed via WAN2 when sending email.

Maintaining the Same IP Address Throughout a Session

Scenario

Some IP address-sensitive websites (for example, Internet banking) use both client IP address and cookie matching for session identification. Since load balancing uses different IP addresses, the session is dropped when a mismatched IP is detected, resulting in frequent interruptions while visiting such sites.

Solution

Make use of the persistence functionality of the Peplink Balance. With persistence configured and the **By Destination** option selected, the Peplink Balance will use a consistent WAN connection for source-destination pairs of IP addresses, preventing sessions from being dropped.

With persistence configured and the option **By Source** is selected, the Peplink Balance uses a consistent WAN connection for same-source IP addresses. This option offers higher application compatibility but may inhibit the load balancing function unless there are many clients using the Internet.

Settings

Set persistence in at **Advanced>Outbound Policy**.

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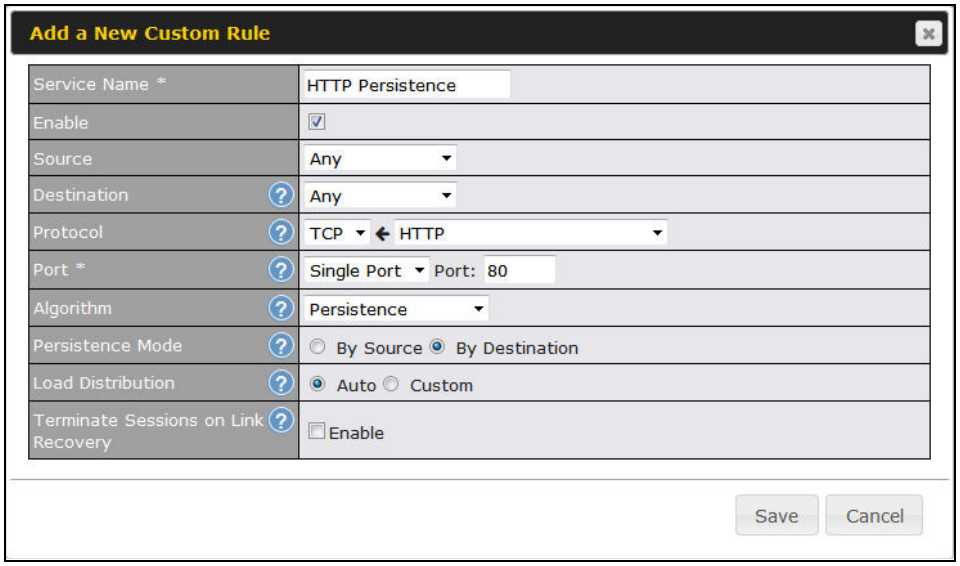
Click **Add Rule**, select **HTTP** (TCP port 80) for web service, and select **Persistence**. Click **Save** and then **Apply Changes**, located at the top right corner, to complete the process.



Tip

A network administrator can use the traceroute utility to manually analyze the connection path of a particular WAN connection.

Bypassing the Firewall to Access Hosts on LAN

Scenario

There are times when remote access to computers on the LAN is desirable; for example, when hosting web sites, online businesses, FTP download and upload areas, etc. In such cases, it may be appropriate to create an inbound NAT mapping for the network to allow some hosts on the LAN to be accessible from outside of the firewall.

Solution

The web admin interface can be used to add an inbound NAT mapping to a host and to bind the host to the WAN connection(s) of your choice. To begin, navigate to **Network>NAT Mappings**.

In this example, the host with an IP address of 192.168.1.102 is bound to 10.90.0.75 of WAN1:

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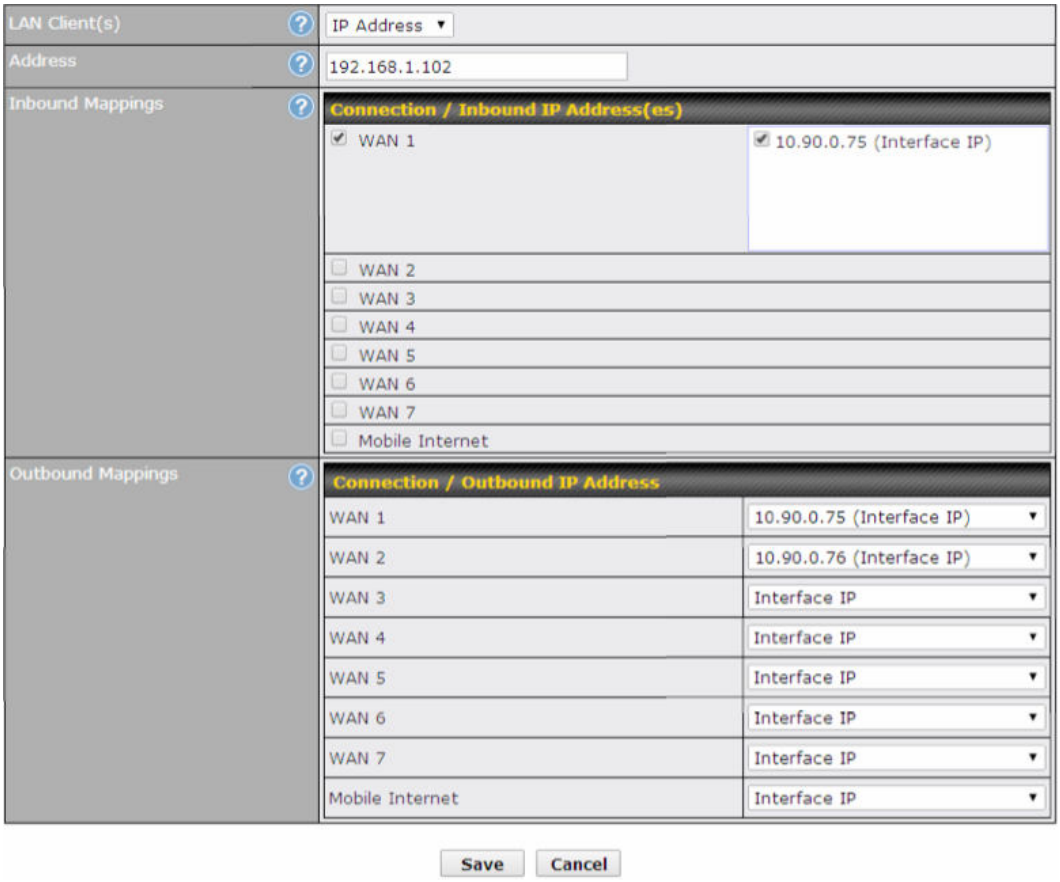

Click **Save** and then **Apply Changes**, located at the top right corner, to complete the process.

Inbound Access Restriction

Scenario

A firewall is required in order to protect the network from potential hacker attacks and other Internet security threats.

Solution

Firewall functionality is built into the Peplink Balance. By default, inbound access is unrestricted. Enabling a basic level of protection involves setting up firewall rules.

For example, in order to protect your private network from external access, you can set up a firewall rule between the Internet and your private network. To do so, navigate to **Network>Firewall>Access Rules**. Then click the **Add Rule** button in the **Inbound Firewall Rules** table and change the settings according to the following screenshot:

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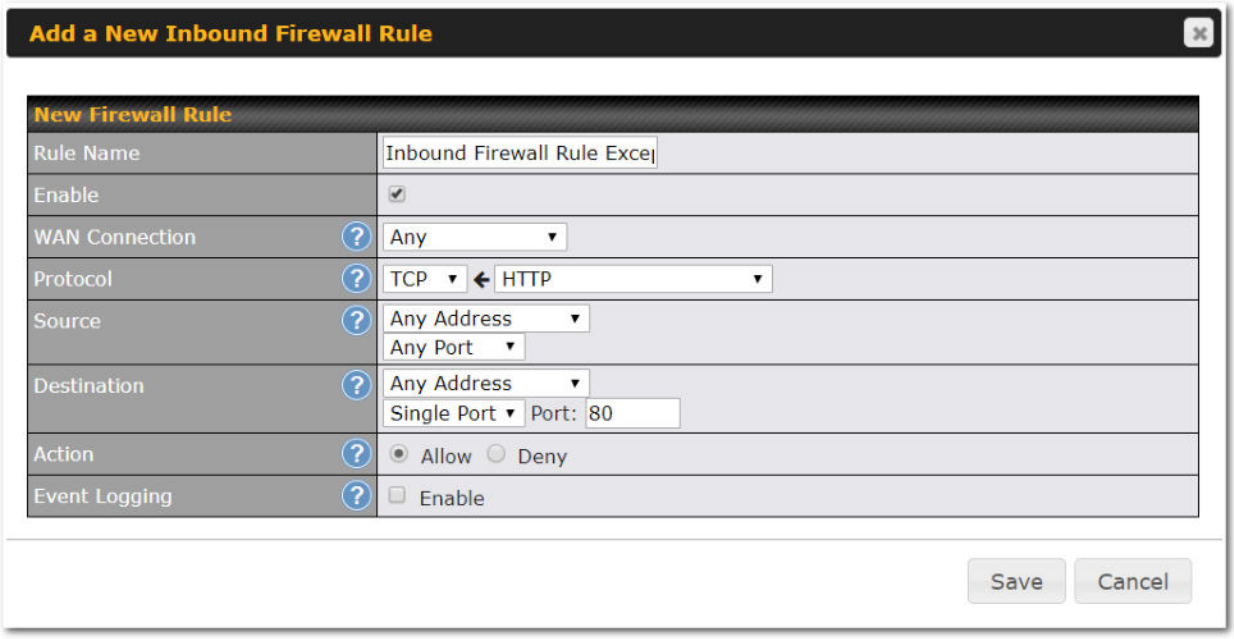

After the fields have been entered as in the screenshot, click **Save** to add the rule. Afterwards, change the default inbound rule to **Deny** by clicking the **default** rule in the **Inbound Firewall Rules** table. Click **Apply Changes** on the top right corner to complete the process.

Outbound Access Restriction

Scenario

For security reasons, it may be appropriate to restrict outbound access. For example, you may want to prevent LAN users from using ftp to transfer files to and from the Internet. This can easily be achieved by setting up an outbound firewall rule with the Peplink Balance.

Solution

To setup a firewall between the Internet and private network for outbound access, navigate to **Network>Firewall>Access Rules**. Click the **Add Rule** button in the **Outbound Firewall Rules** table, and then adjust settings according the screenshot:

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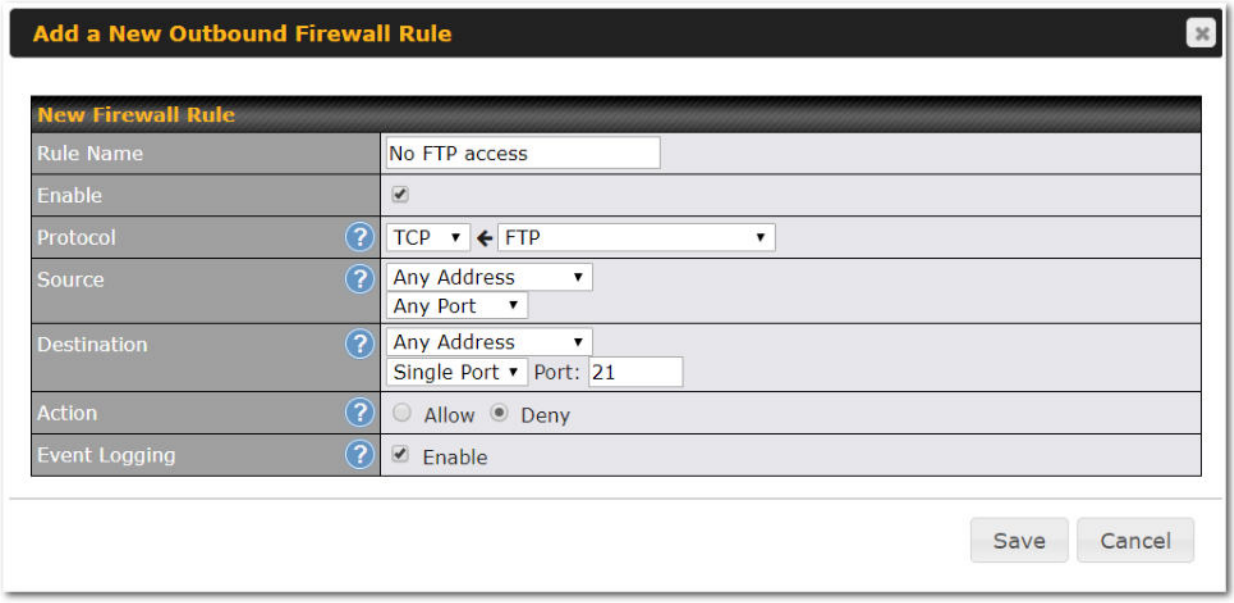

After the fields have been entered as in the screenshot, click **Save** to add the rule. Click **Apply Changes** on the top right corner to complete the process.

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Appendix E. Overview of ports used by Peplink SD-WAN routers and other Peplink services

Default Port Number	Usage	Service	Inbound/Outbound	Default Status
UDP 5246	Data flow	InControl	Outbound	Enabled
TCP 443	HTTPS service	InControl	Outbound	Enabled
TCP 5246	Optional, used when TCP 443 is not responding	InControl	Outbound	Enabled
TCP 5246	Remote Web Admin	InControl Virtual Appliance	Outbound	Enabled
TCP 4500	VPN Data (TCP Mode)	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
TCP 32015	VPN handshake	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
UDP 4500	VPN Data	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
UDP 32015º	VPN Data (alternative)	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
TCP/UDP 4500+N-1^	VPN Sub-Tunnels Data	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
UDP 32015+N-1^	VPN Sub-Tunnels Data (alternative)	PepVPN / SpeedFusion	Inbound / Outbound*	Disabled
UDP 4500	VPN Data	IPsec	Inbound / Outbound*	Disabled
UDP 500	VPN initiation	IPsec	Inbound / Outbound*	Disabled
UDP 500	L2TP	Remote User Access	Inbound	Disabled
UDP 1701	L2TP	Remote User Access	Inbound	Disabled
UDP 4500	L2TP	Remote User Access	Inbound	Disabled
UDP 1194	OpenVPN	Remote User Access	Inbound	Disabled
IP 47	PPTP (GRE)	Remote User Access	Inbound	Disabled
TCP 2222	Remote Assistance Direct connection	Peplink Troubleshooting Assistance	Outbound	Enabled
TCP 80	HTTP traffic	Web Admin Interface	Inbound	Enabled

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		access		
TCP 443	HTTPS traffic	Web Admin Interface access (secure)	Inbound	Enabled
TCP 8822	SSH	SSH	Inbound	Disabled
UDP 161	SNMP Get	SNMP monitoring	Inbound	Disabled
UDP 162	SNMP Trap	SNMP monitoring	Outbound	Disabled
TCP, UDP 1812	Radius Authentication	Radius	Outbound	Disabled
TCP, UDP 1813	Radius Accounting	Radius	Outbound	Disabled
UDP 123	Network Time Protocol	NTP	Inbound Outbound	Disabled Enabled
TCP 60660	Real-time location data in NMEA format	GPS	Outbound	Disabled

Disclaimer:

- By default, only TCP 32015 and UDP 4500 are needed for PepVPN / SpeedFusion.
- Inbound / Outbound* - Inbound = For Server mode; Outbound = For Client mode
- UDP 32015º - If IPsec VPN or L2TP/IPsec RUA is enabled, the UDP 4500 is occupied, so PepVPN / SpeedFusion will automatically switch to UPD 32015 as VPN data port .
- UDP 32015+N-1^ / TCP/UDP 4500+N-1^ - When using Sub-Tunnels, multiple ports are in use (1 for each Sub-Tunnel profile).
- The default UDP data ports used when using (N number of Sub-Tunnel profiles) are: 4500…4500+N-1, or (when port 4500 is in use by IPsec or L2TP/IPsec) 32015… 32015+N-1".

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Appendix F. Troubleshooting

Problem 1

Outbound load is only distributed over one WAN connection.

Solution

Outbound load balancing can only be distribute traffic evenly between available WAN connections if many outbound connections are made. If there is only one user on the LAN and only one download session is made from his/her browser, the WAN connections cannot be fully utilized.

For a single user, download management applications are recommended. The applications can split a file into pieces and download the pieces simultaneously. Examples include: DownThemAll (Firefox Extension), iGetter (Mac), etc.

If the outbound traffic is going across the SpeedFusion™ tunnel, (i.e., transferring a file to a VPN peer) the bandwidth of all WAN connections will be bonded. In this case, all bandwidth will be utilized and a file will be transferred across all available WAN connections.

For additional details, please refer to this FAQ:

https://forum.peplink.com/t/speed-test-tool-for-combined-download-speed-in-multi-wan-environment/8457

Problem 2

I am using a download manager program (e.g., Download Accelerator Plus, DownThemAll, etc.). Why is the download speed still only that of a single link?

Solution

First, check whether all WAN connections are up. Second, ensure your download manager application has split the file into 3 parts or more. It is also possible that all of 2 or even 3 download sessions were being distributed to the same link by chance.

Problem 3

I am using some websites to look up my public IP address, e.g., www.whatismyip.com. When I press the browser's Refresh button, the server almost always returns the same address. Isn't the IP address supposed to be changing for every refresh?

Solution

The web server has enabled the **Keep Alive** function, which ensures that you use the same TCP session to query the server. Try to test with a website that does not enable **Keep Alive**.

Problem 4

What can I do if I suspect a problem on my LAN connection?

Solution

You can test the LAN connection using ping. For example, if you are using DOS/Windows, at

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the command prompt, type *ping 192.168.1.1.* This pings the Peplink Balance device (provided that Peplink Balance's IP is 192.168.1.1) to test whether the connection to the Peplink Balance is OK.

Problem 5

What can I do if I suspect a problem on my Internet/WAN connection?

Solution

You can test the WAN connection using ping, as in the solution to Problem 4. As we want to isolate the problems from the LAN, ping will be performed from the Peplink Balance. By using **Ping**/**Traceroute** under the **Status** tab of the Peplink Balance, you may able to find the source of problem.

Problem 6

When I upload files to a server via FTP, the transfer stalls after a few kilobytes of data are sent. What should I do?

Solution

The maximum transmission unit (MTU) or MSS setting may need to be adjusted. By default, the MTU is set at 1440. Choose **Auto** for all of your WAN connections. If that does not solve the problem, you can try the MTU 1492 if a connection is DSL. If problem still persists, change the size to progressive smaller values until your problem is resolved (e.g., 1462, 1440, 1420, 1400, etc).

Additional troubleshooting resources:

Peplink Community Forums: https://forum.peplink.com/

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Appendix G.

FCC Requirements for Operation in the United States
Federal Communications Commission (FCC) Compliance Notice:

For Balance 30 Pro

Federal Communication Commission Interference Statement

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

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

Radiation Exposure Statement :
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 49 cm between the radiator and your body.

Note The country code selection is for non-US models only and is not available to all US models. Per FCC regulation, all WiFi products marketed in US must fixed to US operation channels only.

Battery Caution Statement
Risk of explosion if the battery is replaced by an incorrect type.

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CE Statement for Pepwave Routers (Balance 30 Pro)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building Phase 6, 481 Castle Peak Road Cheung Sha Wan Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Peplink Balance 30 Pro BPL-031-LTEA-W-T Balance 30 Pro Pismo 811AC B30 Pro
Trade name of the appliance	PEPWAVE / PEPLINK

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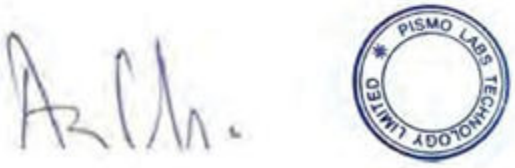
The construction of the appliance is in accordance with the following standards:

EN 300 328 V2.1.1
EN 301 893 V2.1.1
EN 301908-1 V11.1.1
EN 301 489-1 V2.2.1
Draft EN 301 489-17 V3.2.0
Draft EN 301 489-52 V1.1.0
EN 55032: 2015 + AC:2016
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55024: 2010 + A1 :2015
EN 62311 : 2008
EN 62368-1:2014/AC:2015

Yours sincerely,



Antony Chong
Director of Hardware Engineering
Peplink International Limited

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AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	EL	HU	IE
IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	ES	SE	UK(NI)

2.4GHz (2412 - 2472 MHz) : 19.93 dBm

5GHz (5150 - 5250 MHz) : 22.88 dBm

WWAN : Refer 3GPP TS 36.521 -1 (UE Power class)

Table 4-6: Conducted Tx (Transmit) Power Tolerances

Parameter	Conducted transmit power	Notes
LTE		
LTE Band 1,3,8,20	+23 dBm ± 1 dB	
LTE Band 7	+22 dBm ± 1 dB	
UMTS		
Band 1 (IMT 2100 12.2 kbps) Band 3 (UMTS 1800 12.2 kbps) Band 8 (UMTS 900 12.2 kbps)	+23 dBm ± 1 dB	Connectorized (Class 3)

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

Contact as: https://www.peplink.com/

FCC Requirements for Operation in the United States
Federal Communications Commission (FCC) Compliance Notice:

 Copyright @ 2021 Peplink

For Balance one

Federal Communication Commission Interference Statement

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

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Radiation Exposure Statement

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

Industry Canada Statement (Balance one)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement économique Canada.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired opera- tion of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio ex- empts de licence. L'exploitation est autorisee aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le

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brouillage est susceptible d'en

(i) The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potent for harmful interference to co-channel mobile satellite systems

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

The high-power radars are allocated as primary users (i.e. priority users) of the band 5725-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

(i) Le dispositif fonctionnant dans la bande 5150-5250 MHz est reserve uniquement pour

utilisation a l'interieur afin de reduire les risques de brouillage prejudiciable aux systemes de satellites mobiles utilisant les memes canaux

(ii) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisan bande 5725-5850 MHz doit se conformer a la limitation P.I.R.E specifiee pour l'exploitation point a point et non point a point, selon le cas.

En outre, les utilisateurs devraient aussi etre avises que les utilisateurs de radars de haute puissance sont designes utilisateurs principaux (c.-a-d., qu'ils ont la priorite) pour les bande 5725-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Radiation Exposure Statement

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

Cet equipement est conforme avec l'exposition aux radiations ISED definies pour un environnement non controle. Cet equipement doit etre installe et utilise a une distance minimum de 20 cm entre le radiateur et votre corps.

.

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CE Statement for Pepwave Routers (Balance One)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	Pismo Labs Technology Limited
Contact information of the manufacturer	Unit A5, 5/F, HK Spinners Ind. Bldg., Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	Peplink / Pepwave / Pismo wireless product
Model name of the appliance	Balance One Balance One AC, Balance One Core
Trade name of the appliance	Pepwave / Peplink / Pismo

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The construction of the appliance is in accordance with the following standards:

EN 55032:2015
EN 55024:2010+A1:2015
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 301 489-1 V2.1.1
EN 301 489-3 V2.1.1
EN 301 489-17 V3.1.1
EN 300 328 V2.1.1
EN 301 893 V2.1.1
EN 300 440 V2.1.1
EN 50385:2017
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

Yours sincerely,

Keith Chau
General Manager
Peplink International Limited

AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	EL	HU	IE
IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	ES	SE	UK(NI)

2.4GHz (2412 - 2472 MHz) : 16.59 dBm
5GHz (5150 - 5250 MHz) : 21.38 dBm

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5GHz (5725 - 5850 MHz) : 13.25 dBm

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

Contact as: https://www.peplink.com/

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For Balance one core, Balance 20, Balance 30 LTE, Balance 210, Balance 310X, Balance 310X 5G, Balance 310 5G, Balance 310 Fiber 5G, Balance 305, Balance 380, Balance 580, Balance 710, Balance 1350, Balance 2500, EPX, Balance SDX, MediaFast 500, MediaFast 750

Federal Communication Commission Interference Statement

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

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Radiation Exposure Statement (Balance 30 LTE, Balance 310X, Balance 310X 5G, Balance 310 5G, Balance 310 Fiber 5G)

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

Industry Canada Statement (Balance one core, Balance 20, Balance 30 LTE, Balance 310X, Balance 310X 5G, Balance 310 5G, Balance 310 Fiber 5G, Balance 305, Balance 380, Balance 580, Balance 710, Balance 1350, Balance 2500, EPX, Balance SDX, MediaFast 500, MediaFast 750)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Le present produit est conforme aux specifications techniques applicables d'Innovation, Sciences et Developpement economique Canada.

For Balance 30 LTE, Balance 310X, Balance 310X 5G, Balance 310 5G, Balance 310 Fiber 5G

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

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(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en

Radiation Exposure Statement (Balance 30 LTE, Balance 310X, Balance 310X 5G, Balance 310 5G, Balance 310 Fiber 5G)

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

Cet équipement est conforme avec l'exposition aux radiations ISED définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimum de 20 cm entre le radiateur et votre corps.

Battery Caution Statement (Balance 30 LTE, Balance 210, Balance 310 5G, Balance 310X, Balance 310X 5G, Balance 310 Fiber 5G, Balance SDX)

Risk of explosion if the battery is replaced by an incorrect type.

Safety Statement (Balance SDX)

Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.

All Ethernet cables are designed for intra-building connection to other equipment. Do not connect these ports directly to communication wiring or other wiring that exits the building where the appliance is located.

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FCC Requirements for Operation in the United States
Federal Communications Commission (FCC) Compliance Notice:

For Balance Two

Federal Communication Commission Interference Statement

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

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Battery Caution Statement

Risk of explosion if the battery is replaced by an incorrect type.

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FCC Requirements for Operation in the United States
Federal Communications Commission (FCC) Compliance Notice:

For Balance 20X

Federal Communication Commission Interference Statement

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

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Radiation Exposure Statement

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

Industry Canada Statement (Balance 20X)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement économique Canada.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired opera- tion of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio ex- empts de licence. L'exploitation est autorisee aux deux conditions suivantes:

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(1) l’appareil ne doit pas produire de brouillage, et
(2) l’utilisateur de l’appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d’en

(i) The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potent for harmful interference to co-channel mobile satellite systems

(ii) For devices with detachable antenna(s), the maximum antenna gain permitted for devices in band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate and
The high-power radars are allocated as primary users (i.e. priority users) of the band 5725-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

(i) Le dispositif fonctionnant dans la bande 5150-5250 MHz est reserve uniquement pour utilisation a l'interieur afin de reduire les risques de brouillage prejudiciable aux systemes de satellites mobiles utilisant les memes canaux

(ii) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisan bande 5725-5850 MHz doit se conformer a la limitation P.I.R.E specifiee pour l'exploitation point a point et non point a point, selon le cas.
En outre, les utilisateurs devraient aussi etre avises que les utilisateurs de radars de haute puissance sont designes utilisateurs principaux (c.-a-d., qu'ils ont la priorite) pour les bande 5725-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Radiation Exposure Statement

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

Cet equipement est conforme avec l'exposition aux radiations ISED definies pour un environnement non controle. Cet equipement doit etre installe et utilise a une distance minimum de 20 cm entre le radiateur et votre corps.

Battery Caution Statement

Risk of explosion if the battery is replaced by an incorrect type.

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CE Statement for Pepwave Routers (Balance One Core)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	Pismo Labs Technology Limited
Contact information of the manufacturer	Unit A5, 5/F, HK Spinners Ind. Bldg., Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	Peplink / Pepwave / Pismo wireless product
Model name of the appliance	Balance One Core
Trade name of the appliance	Pepwave / Peplink / Pismo

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The construction of the appliance is in accordance with the following standards:

EN 55032:2015
EN 55024:2010+A1:2015
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

Yours sincerely,

Keith Chau
General Manager
Peplink International Limited

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CE Statement for Pepwave Routers (Balance Two)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Electromagnetic Compatibility Directive 2014/30/EU, and Low Voltage Directive 2014/35/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Balance Product Dual-WAN Router
Model name of the appliance	Balance Two BPL-TWO PismoX09A
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 55032: 2015 + AC:2016
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55035: 2017
IEC 62368-1:2014 (Second Edition) and/or EN 62368-1:2014

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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CE Statement for Pepwave Routers (Balance 20X Pro)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building Phase 6, 481 Castle Peak Road Cheung Sha Wan Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Balance 20X B20X Surf SOHO Surf SOHO LTE Surf SOHO LTEA Balance 20X LTE Balance 20X LTEA PismoAC8E BPL-021X-LTE-E-T BPL-021X-LTEA-W-T EXM-MINI-1LTEA-W EXM-MINI-1LTEA-P PismoAC8P PismoAC8
Trade name of the appliance	PEPWAVE / PEPLINK

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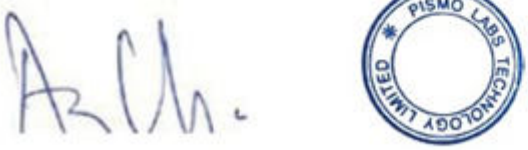
The construction of the appliance is in accordance with the following standards:

EN 300 328 V2.1.1
EN 301 893 V2.1.1
EN 301908-1 V11.1.1
Draft EN 301 489-1 V2.2.1
Draft EN 301 489-17 V3.2.0
Draft EN 301 489-52 V1.1.0
EN 55032: 2015 + AC:2016-07
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55035: 2017
EN 62311 : 2008
EN 62368-1:2014/A11:2017
EN 303 413 V1.1.1
EN 301 489-19 V2.1.1

Yours sincerely,



Antony Chong
Director of Hardware Engineering
Peplink International Limited

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2.4GHz (2412 - 2472 MHz) : 19.84 dBm
5GHz (5150 - 5250 MHz) : 22.89 dBm
WWAN : Refer 3GPP TS 36.521 -1 (UE Power class)

Table 4-6: Conducted Tx (Transmit) Power Tolerances

Parameter	Conducted transmit power	Notes
LTE		
LTE Band 1,3,8,20	+23 dBm ± 1 dB	
LTE Band 7	+22 dBm ± 1 dB	
UMTS		
Band 1 (IMT 2100 12.2 kbps) Band 3 (UMTS 1800 12.2 kbps) Band 8 (UMTS 900 12.2 kbps)	+23 dBm ± 1 dB	Connectorized (Class 3)

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

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CE Statement for Pepwave Routers (Balance 30 LTE)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Peplink Balance 30 LTE BPL-031-LTE-E-T Balance 30 LTE Pismo 811AC B30 LTE Peplink Balance 30
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 301 908-1 V11.1.1
Draft EN 301 489-1 V2.2.0
Draft EN 301 489-52 V1.1.0
EN 55032: 2015 + AC:2016
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55035 : 2017
EN 62311 : 2008
EN 62368-1:2014/AC:2015

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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WWAN : Refer 3GPP TS 36.521 -1 (UE Power class)

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Output Power	Class 3 (23dBm±2dB) for LTE FDD Class 3 (23dBm±2dB) for LTE TDD Class 3 (24dBm +1/-3dB) for TD-SCDMA Class 3 (24dBm +1/-3dB) for UMTS Class E2 (27dBm ±3dB) for EDGE 850/900MHz Class E2 (26dBm +3/-4dB) for EDGE 1800/1900MHz Class 4 (33dBm ±2dB) for GSM 850/900MHz Class 1 (30dBm ±2dB) for GSM 1800/1900MHz

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

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CE Statement for Pepwave Routers (Balance 210)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Electromagnetic Compatibility Directive 2014/30/EU, and Low Voltage Directive 2014/35/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building Phase 6, 481 Castle Peak Road Cheung Sha Wan Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Balance 210 Peplink 210 BPL-210 Peplink Balance Router 210 Peplink Balance SD-WAN Router Peplink Balance 210 Pismo 809
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 55032: 2015 + AC:2016-07
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55035: 2017
EN 62368-1:2014/A11:2017

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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CE Statement for Pepwave Routers (Balance 310 5G)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial. Building., Phase 6, 481 Castle Peak Road, Cheung Sha Wan,Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Balance 310 5G BPL-310-5GD-K-T BPL-310-5GH-K-T
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 301 908-1 V13.1.1
EN 301 489-1 V2.2.3
Draft ETSI EN 301 489-52 V1.1.0
EN 55032 : 2015 / A11:2020
EN 55035 : 2017 / A11:2020
EN 61000-3-2 : 2019
EN 61000-3-3 : 2013/A1:2019
EN 62311:2020
IEC 62368-1:2018
EN IEC 62368-1:2020+A11:2020
BS EN IEC 62368-1:2020+A11:2020
EN IEC 62368-3:2020

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	ES	SE	UK(NI)

WWAN : Refer 3GPP TS 36.521 -1 (UE Power class)
EM7565 module:

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Table 3-6: Conducted Tx (Transmit) Power Tolerances

Bands	Conducted Tx power	Notes
LTE		
LTE bands 1,3,8,20,28	+23 dBm ± 1 dB	
LTE bands 7	Single cell: +22 dBm ± 1 dB UL CA: +22.8 dBm ± 1 dB	0.8 dB offset for UL CA hardcoded by chipset manufacturer
UMTS		
Band 1 (IMT 2100 12.2 kbps) Band 8 (UMTS 900 12.2 kbps)	+23 dBm ± 1 dB	Connectorized (Class 3)

EM9191 module:

Table 4-11: Conducted Maximum Tx (Transmit) Power[a] Tolerances

Bands	Conducted Tx Power	Notes
5G		
FR1 Sub-6G Bands	+23 dBm ± 1.5 dB	Power Class 3
LTE		
LTE B7, B38, B42	+23 dBm +1.8 dB/-1.0 dB	Power Class 3
LTE all other bands	+23 dBm ± 1 dB	Power Class 3
UMTS		
All bands (12.2 kbps)	+23.5 dBm ± 1 dB	Connectorized (Power Class 3)

a. Tx Power is based on no maximum power reduction (MPR) configuration as 3GPP defined. For configurations that require MPR or additional MPR, refer to 3GPP for the power reduction.

MV31-W module:

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5G	Bands	FR1 (Sub 6G): FDD: n1, n3, n28 TDD: n41, n77, n78
	Band combinations	For supported E-UTRAN New Radio Dual Connectivity (EN-DC) see Section 6.2
	4x4 MIMO	n1, n3, n41, n77, n78,
	DSS	n1, n3
	Category	3GPP Rel 15
	Output Power	FR1 (Sub 6G): n41, n77, n78: 26dBm +2/-3dB all other bands: 23dBm ±2dB
4G	Bands	FDD: B1, B3, B7, B8, B20, B28 TDD: B34, B42
	Band combinations	For supported carrier aggregations (CA) see Section 6.1
	4x4 MIMO	B1, B3, B7, B38, B42
	RX Diversity	all LTE bands
	Category	UE Cat. 13 (UL: 150Mbps) + UE Cat. 20 (DL: 2Gbps); 7xDL CA, 3xUL CA (Intra-band), 5xDL CA+4X4 MIMO (Up to UE Cat20)
	Output Power	all bands: 23dBm ±2dB
3G	Bands	Bd.I, Bd.VIII
	RX Diversity	all 3G bands
	Category	DC-HSPA+ – DL Cat. 24 (42Mbps) / UL Cat. 6 (11Mbps) HSUPA – UL 5.76Mbps Compressed mode (CM) supported according to 3GPP TS25.212
	Output Power	all bands: 24dBm +1.7/-3.7dB

This equipment complies with CE radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 21cm between the radiator & your body.

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CE Statement for Pepwave Routers (Balance 310X 5G)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial. Building., Phase 6, 481 Castle Peak Road, Cheung Sha Wan,Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	MAX HD2 MBX 5G MAX-HD2-MBX-5GD-T MAX HD4 MBX 5G MAX-HD4-MBX-5GD-T Balance 310X Balance 310X 5G BPL-310X-5GD-T MBX Expansion Module Expansion Module with 1x 5G modems EXM-310X-5GD Expansion Module with 4x 5G modems EXM-MBX-T4-5GD Expansion Module with 2x 5G modules EXM-MBX-T2-5GD
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 301 908-1 V13.1.1
EN 300 328 V2.2.2
EN 301 893 V2.1.1
EN 303 413 V1.1.1
EN 62311: 2020
EN 301 489-1 V2.2.3
EN 301 489-17 V3.2.4
Draft EN 301 489-19 V2.2.0
Draft EN 301 489-52 V1.1.2
EN 55032: 2015 / A11: 2020
EN 55035: 2017 / A11: 2020
EN 61000-3-2: 2014
EN 61000-3-3: 2013 / A1:2019
EN 62368-1:2020 + A11:2020

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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CE Statement for Pepwave Routers (Balance 310 Fiber 5G)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial. Building., Phase 6, 481 Castle Peak Road, Cheung Sha Wan,Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Balance 310 Fiber 5G BPL-310-FBR-5GD-T-PRM
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 300 328 V2.2.2
EN 301 893 V2.1.1
EN 301 908-1 V13.1.1
EN 62311: 2020
EN 301 489-1 V2.2.3
EN 301 489-17 V3.2.4
Draft EN 301 489-52 V1.1.2
EN 55032: 2015 / A11:2020
EN 55035: 2017 / A11:2020
EN 61000-3-2: 2014
EN 61000-3-3: 2013 / A1:2019
EN 62368-1:2020 + A11:2020

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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2.4GHz (2412 – 2472 MHz) : 19.94 dBm

5GHz (5150 - 5250 MHz) : 22.76 dBm

WWAN : Refer 3GPP TS 36.521 -1 (UE Power class)

5G	Bands	FR1 (Sub 6G): FDD: n28 TDD: n78
	Band combinations	For supported E-UTRAN New Radio Dual Connectivity (EN-DC) see Section 6.2
	4x4 MIMO	n78
	DSS	n28
	Category	3GPP Rel 15
	Output Power	FR1 (Sub 6G): n78: 26dBm +2/-3dB all other bands: 23dBm ±2dB
4G	Bands	FDD: B1, B3, B7, B8, B20, B28 TDD: B38, B40
	Band combinations	For supported carrier aggregations (CA) see Section 6.1
	4x4 MIMO	B1, B3, B7, B40, B38
	RX Diversity	all LTE bands
	Category	UE Cat. 13 (UL: 150Mbps) + UE Cat. 20 (DL: 2Gbps); 7xDL CA, 3xUL CA (Intra-band), 5xDL CA+4X4 MIMO (Up to UE Cat20)
	Output Power	23dBm ±2dB
3G	Bands	Bd.I, Bd.VIII
	RX Diversity	all 3G bands
	Category	DC-HSPA+ – DL Cat. 24 (42Mbps) / UL Cat. 6 (11Mbps) HSUPA – UL 5.76Mbps Compressed mode (CM) supported according to 3GPP TS25.212
	Output Power	all bands: 24dBm +1.7/-3.7dB

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

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CE Statement for Pepwave Routers (Balance SDX)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Peplink Balance SDX SDX Main Chassis (BPL-SDX) SDX Main Chassis (BPL-SDX-F1) SDX Main Chassis (BPL-SDX-C1) BPL-SDX BPL-SDX-F1 BPL-SDX-C1
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 55032: 2015 + AC:2016
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55035 : 2017
EN 62368-1:2014+A11:2017

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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FCC Requirements for Operation in the United States

Federal Communications Commission (FCC) Compliance Notice:

For Balance SDX Pro

Federal Communication Commission Interference Statement

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

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Industry Canada Statement (Balance SDX Pro)

This product meets the applicable Innovation, Science and Economic Development Canada technical Specifications.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement économique Canada.

Battery Caution Statement (Balance SDX Pro)

Risk of explosion if the battery is replaced by an incorrect type.

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CE Statement for Pepwave Routers (Balance SDX Pro)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial. Building., Phase 6, 481 Castle Peak Road, Cheung Sha Wan,Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Balance Product
Model name of the appliance	Balance SDX Pro BPL-SDX-PRO-M2 BPL-SDX-PRO-M2-1TB BPL-SDX-PRO-M2-2TB Peplink Balance SDX Pro
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 55032: 2015 + A11:2020
EN 55035: 2017 + A11:2020
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 62368-1:2014 + A11:2017

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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FCC Requirements for Operation in the United States

Federal Communications Commission (FCC) Compliance Notice:

For Balance 380X, Balance 580X

Federal Communication Commission Interference Statement

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

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Industry Canada Statement (Balance 380X, Balance 580X)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Ce produit répond aux spécifications techniques applicables à l'innovation, Science et Développement économique Canada.

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CE Statement for Pepwave Routers (Balance 380X / Balance 580X)

DECLARATION OF CONFORMITY

We affirm the electrical equipment manufactured by us fulfils the requirements of the Radio Equipment Directive 2014/53/EU.

Name of manufacturer	PISMO LABS TECHNOLOGY LIMITED
Contact information of the manufacturer	A8, 5/F, HK Spinners Industrial. Building., Phase 6, 481 Castle Peak Road, Cheung Sha Wan,Kowloon, Hong Kong tel. (852) 2990 7600, fax. (852) 3007 0588 e-mail: cs@peplink.com
Description of the appliance	PEPWAVE / PEPLINK Wireless Product
Model name of the appliance	Balance 380X Balance 580X Peplink Balance 380X Peplink Balance 580X BPL-380X BPL-580X
Trade name of the appliance	PEPWAVE / PEPLINK

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The construction of the appliance is in accordance with the following standards:

EN 55032: 2015 + A11:2020
EN 55035: 2017 + A11:2020
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 62368-1:2014 + A11:2017

Yours sincerely,

Antony Chong
Director of Hardware Engineering
Peplink International Limited

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FCC Requirements for Operation in the United States
Federal Communications Commission (FCC) Compliance Notice:

For Balance 20X Pro

Federal Communication Commission Interference Statement

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

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

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

Radiation Exposure Statement

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

Industry Canada Statement (Balance 20X Pro)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement économique Canada.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio ex-empts de licence. L'exploitation est autorisee aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en

(i) The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potent for harmful interference to co-channel mobile satellite systems;

(ii) For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; (detachable antenna only) ; and
The high-power radars are allocated as primary users (i.e. priority users) of the band 5725-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

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

(i) Le dispositif fonctionnant dans la bande 5150-5250 MHz est réservé uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(ii) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant la bande 5725-5850 MHz doit se conformer à la limitation P.I.R.E spécifiée pour l'exploitation point à point et non point à point, selon le cas.
En outre, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5725-5850 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

(iii) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant la bande 5725-5850 MHz doit se conformer à la limitation P.I.R.E spécifiée pour l'exploitation point à point et non point à point.

Radiation Exposure Statement

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

Cet appareil doit être installé et utilisé avec une distance minimale de 20cm entre l'émetteuret votre corps. Cet appareil et sa ou ses antennes ne doivent pas être co-localisés ou fonctionner en conjonction avec tout autre antenne ou transmetteur.

This radio transmitter IC: 20682-P1AX19 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

WIFI Antenna type: Omni-directional
WIFI Antenna gain: 2.4GHz / 2.44 dBi
5150 ~ 5250 MHz / 4.10 dBi
5725 ~ 5850 MHz / 4.73 dBi

Cet émetteur radio IC : 20682-P1AX11 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antennes répertoriés ci-dessous, avec le gain maximal autorisé indiqué. Les types d'antenne non inclus dans cette liste qui ont un gain supérieur au gain maximum indiqué pour tout type répertorié sont strictement interdits pour une utilisation avec cet appareil.

Type d'antenne WIFI : omnidirectionnelle
Gain de l'antenne Wi-Fi : 2.4 GHz / 2.44 dBi
5150 ~ 5250 MHz / 4.10 dBi
5725 ~ 5850 MHz / 4.73 dBi

Battery Caution Statement

Risk of explosion if the battery replaced by an incorrect type, place the battery into fire, a hot oven, extremely high temperature or low air pressure surrounding environment, the leakage of flammable liquid or gas, and mechanically crushing or cutting of the battery.

USB WAN Modem Port Specification

Balance Series

	20X Pro	30 LTE	30 Pro	ONE	TWO	210
Output Rating	5V DC, 2A	5V DC, 2A	5V DC, 2A	5V DC, 2A	5V DC, 1.5A	5V DC, 1A

	310X	380	380X	580	580X	710	1350	2500
Output Rating	5V DC, 0.5A	5V DC, 0.5A	5V DC, 1A	5V DC, 0.5A	5V DC, 1A	5V DC, 2.5A	5V DC, 2.5A	5V DC, 2.5A

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