RV340 Administration Guide

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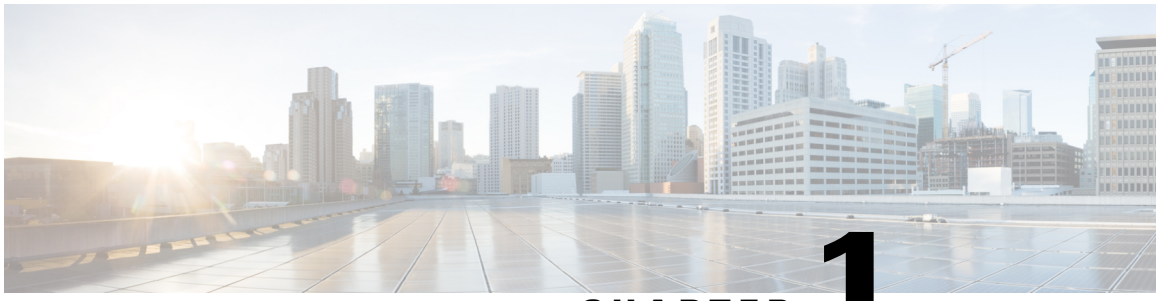
CONTENTS



CHAPTER 1

Introduction

Thank you for choosing the Cisco RV340 router. This guide describes how to install and manage your router. This chapter includes information to help you get started on your device. Your Cisco RV340 comes with default settings. However, your internet service provider (ISP) might require you to modify the settings. You can modify the settings using a web browser such as Internet Explorer (version 10 and higher), Firefox, or Chrome (for PC) or Safari (for Mac).

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This section contains the following topics:

Getting Started

This page displays the most common configuration tasks on your device. To start the router, follow these steps:

Step 1 Connect a PC to a numbered LAN port on the device. If the PC is configured to become a DHCP client, an IP address in the 192.168.1.x range is assigned to the PC.

Step 2 Start a web browser.

Step 3 In the address bar, enter the default IP address of the device, **192.168.1.1**. The browser might issue a warning that the website is untrusted. Continue to the website.

Step 4 When the sign-in page appears, enter the default username cisco and the default password cisco (lowercase).

Step 5 Click **Login**.

Note During the system boot up, the power LED will progressively keep flashing until the system has fully booted. At start up, the PWR, LINK/ACT and GIGIBIT LEDs of LAN 1 will flash. At 25% boot up, the PWR, LINK/ACT and GIGIBIT LEDs of LAN 1 and 2 will flash. At 50% boot up, the PWR, LINK/ACT and GIGIBIT LEDs of LAN 1, 2 and 3 will flash. At 75% boot up, the PWR, LINK/ACT and GIGIBIT LEDs of LAN 1, 2, 3 and 4 will flash.

The system boot time will be less than 3 minutes typically. If the router is fully configured with all feature configuration settings set to a maximum, it may take up to 7 minutes to fully boot the system.

Table 1: Description of Router's LEDs

PWR	Off when the device is powered off. Solid green when the device is powered on and booted. Flashing green when the device is booting up.
DIAG	Off when the system is on track to bootup. Slow blinking red (1Hz) when the firmware upgrade is in progress. Fast blinking red (3Hz) when the firmware upgrade is failing. Solid red when the system failed to boot-up with both active and inactive images or in rescue mode.
LINK/ACT of WAN1, WAN2 and LAN 1-4	Off when there is no Ethernet connection. Solid green when the GE Ethernet link is on. Flashing green when the GE is sending or receiving data.
GIGABIT of WAN1, WAN2 and LAN 1-4	Solid green when at 1000M speed. Off when at non-1000M speed.
DMZ	Solid green when the DMZ is enabled. Off when the DMZ is disabled.
VPN	Off when no VPN tunnel is defined, or all defined VPN tunnels have been disabled. Solid green when at least one VPN tunnel is up. Flashing green when sending or receiving data over VPN tunnel. Solid amber when no enabled VPN tunnel is up.
USB1 and USB2	Off when no USB device is connected, or is inserted but not recognized. Solid green when the USB dongle is connected to the ISP successfully. USB storage is recognized. Flashing green when sending or receiving data. Solid amber when the USB dongle is recognized but fails to connect to ISP (no IP address is assigned). The USB storage access has errors.

RESET	To reboot the router, press the reset button with a paper clip or pen tip for less than 10 seconds. To reset the router to factory default settings, press and hold the reset button for 10 seconds.

Launch Setup Wizard

From the Launch Setup Wizard page, you can follow the instructions that guide you through the process for configuring the device.

To open this page, select Launch Setup Wizard in the navigation tree and follow the on-screen instructions to proceed. Refer to your ISP for the information required to setup your Internet connection.

Launch Setup Wizard

Initial Setup Wizard	Directs you to the **Initial Setup Wizard**.
VPN Setup Wizards	Directs you to the **VPN Status Wizard**.
Application Control Wizard	Directs you to the **Application Control Wizard**.

Initial Configurations

Change Administrator Password	Directs you to the **User Accounts** page where you can change the administrator password and set up a guest account.
Configure WAN Settings	Directs you to the **WAN Settings** page where you can modify the WAN parameters.
Configure USB Settings	Directs you to the **Mobile Network** page where you can modify the USB configurations.
Configure LAN Settings	Directs you to the **VLAN Membership** page where you can configure the VLAN.

Quick Access

Upgrade Router Firmware	Directs you to the **File Management** page where you can update the device firmware.
Configure Remote Management Access	Directs you to the **FireWall >Basic Settings** page where you can enable the basic features of the device.

Backup Device Configuration	Directs you to the **Config Management** page where you can manage the router's configuration.

Device Status

System Summary	Directs you to the **System Summary** page that displays the IPv4 and IPv6 configuration, and firewall status on the device.
VPN Status	Directs you to the **VPN Status** page that displays the status of the VPNs managed by this device.
Port Statistics	Directs you to the **Port Traffic** page which displays the device's port status and port traffic.
Traffic Statistics	Directs you to the **TCP/IP Services** page which displays the device's port listen status and the established connection status.
View System Log	Directs you to the **View Logs** page which displays the logs on the device.

Troubleshooting Tips

If you have trouble connecting to the Internet or the web-based web interface:

- Verify that your web browser is not set to work offline.
- Check the local area network connection settings for your Ethernet adapter. The PC should obtain an IP address through DHCP. Alternatively, the PC can have a static IP address in the 192.168.1.x range with the default gateway set to 192.168.1.1 (the default IP address of the device).
- Verify that you entered the correct settings in the Wizard to set up your Internet connection.
- Reset the modem and the device by powering off both devices. Next, power on the modem and let it sit for about 2 minutes. Then, power on the device. You should now receive a WAN IP address.
- If you have a DSL modem, ask your ISP to put the DSL modem into bridge mode.

User Interface

The user interface is designed to make it easy for you to set up and manage your device.

Navigation

The major modules of the web interface are represented by buttons in the left navigation pane. Click a button to view more options. Click an option to open a page.

Popup windows

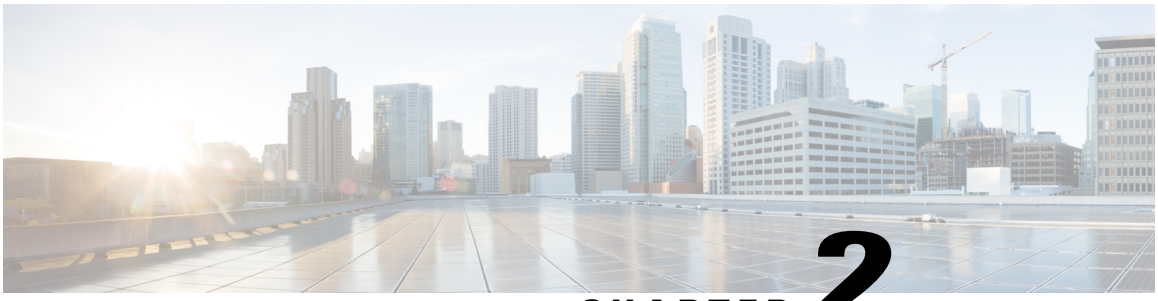
Some links and buttons launch popup windows that display more information or related configuration pages. If your web browser displays a warning message about the popup window, allow the blocked content.

Help

To view information about the selected configuration page, click **Help** at the top right corner of the web interface. If your web browser displays a warning message about the popup window, allow the blocked content.

Logout

To exit the web interface, click **Logout** near the top right corner of the web interface. The **sign-in** page appears.



CHAPTER 2

Status and Statistics

This section provides information on the various configuration settings of your device and contains the following topics:

System Summary

The System Summary provides a snapshot of the settings on your device. It displays your device's firmware, serial number, port traffic, routing status, mobile networks, and VPN server settings. To view this System Summary, click **Status and Statistics> System Summary**.

System Information

- **Host Name –** Name of host.
- **Serial Number –** Serial number of the device.
- **System Up Time –** Length of time in yy-mm-dd, hours, and minutes that the device has been active.
- **Current Time –** Current time and date.

- **PID VID –** Version number of the hardware.

Firmware Information

- **Firmware Version –** Version number of the installed firmware.
- **Firmware MD5 Checksum –** A value used for file validation.

Port Status

- **Port ID –** Defined name and number of the port.
- **Interface –** Name of the port used for the connection.
- **Enabled –** Status of the port.
- **Speed –** The speed (in Mbps) of the device after auto negotiation.

IPv4 and IPv6

- **Interface –** Name of the interface.
- **IP Address –** IP address assigned to the interface.
- **Default Gateway –** Default gateway for the interface.
- **DNS –** IP address of the DNS server.
- **Dynamic DNS –** IP address of the DDNS for the interface: Disabled or Enabled.
- **Renew –** Click to renew the IP address.
- **Release –** Click to release the interface.

VPN Status

- **Type –** Type of the VPN tunnel.
- **Active –** Is **Enabled** or **Disabled**.
- **Configured –** VPN tunnel's status whether it is configured or not.
- **Max Supported Sessions –** The maximum number of tunnels supported on the device.
- **Connected Session –** Status of the tunnel.

Firewall Setting Status

- **Stateful Packet Inspection (SPI) –** also known as dynamic packet filtering, monitors the state of active connections and uses this information to determine which network packets are allowed through the firewall.
- **Denial of Service (Dos) –** Status of the Dos filter service is enabled (On) or disabled (Off). A DoS attack is an attempt to make a machine or network resource unavailable to its intended users.

- **Block WAN Request –** Makes it difficult for outside users to work their way into your network by hiding the network ports from Internet devices and preventing the network from being detected by other Internet users.
- **Remote Management –** Indicates that a remote connection for managing the device is allowed or denied.
- **Access Rule –** Number of access rules that have been set.

Log Setting Status

- **Syslog Server –** Status of system logs.
- **Email Log –** Status of logs to send using email.

TCP/IP Services

The TCP/IP Services page displays the statistics of the protocol, port, and IP address. To view the TCP/IP Services, click **Status and Statistics > TCP/IP Services**.

Port Listen Status

- **Protocol –** Type of protocol used for communication.
- **Listen IP Address –** The listening IP address on the device.
- **Listen Port –** The listening port on the device.

Established Connection Status

- **Protocol –** Type of protocol used for communication.
- **Local IP Address –** IP address of the system.
- **Local Port –** Listening ports on different services.
- **Foreign Address –** IP address of the device connected.
- **Foreign Port –** Port of the device connected.
- **Status –** Connection status of the session.

Port Traffic

The Port Traffic page displays the statistics and status of the interfaces of the device. To view the device's Port Traffic page, click **Status and Statistics >Port Traffic**.

Port Traffic

- **Port ID –** Defined name and number of the port.
- **Link Status –** Status of the interface.
- **Rx Packets –** Number of packets received on the port.

- **Rx Bytes –** Number of packets received, measured in bytes.
- **Tx Packets –** Number of packets sent on the port.
- **Tx Bytes –** Number of packets sent and measured in bytes.
- **Packet Error –** Details about the error packets.
- **Refresh –** To refresh the displayed statistics.
- **Reset Counters –** To reset all values to zero.

Port Status

- **Port ID –** Defined name and number of the port.
- **Link Status –** Status of the interface.
- **Port Activity –** Status of the port (example: port enabled or disabled or connected).
- **Speed Status –** The speed (in Mbps) of the device after auto negotiation.
- **Duplex Status –** Duplex mode: Half or Full.
- **Auto Negotiation –** Status of the auto negotiation parameter. When enabled (**On**), it detects the duplex mode, and if the connection requires a crossover, automatically chooses the MDI or MDIX configuration that matches the other end of the link.

WAN QoS Statistics

The WAN QoS Statics page displays the statistics of the outbound and inbound WAN QoS. To view the device's WAN QoS Statics page, click **Status and Statistics > WAN QoS Statistics**.

- **Interface –** Name of the interface.
- **Policy Name –** Name of the policy.
- **Description –** Description of the WAN QoS statistics.
- **Clear Counters –** Click to clear the counters.

Outbound QoS Statistics

- **Queue –** Number of outbound queues.
- **Traffic Class –** Name of traffic class assigned to queue.
- **Packets Sent –** Number of outbound packets of the traffic class sent.
- **Packets Dropped –** Number of outbound packets dropped.

Inbound QoS Statistics

- **Queue –** Number of inbound queues.
- **Traffic Class –** Name of traffic class assigned to queue.

- **Packets Sent –** Number of traffic class inbound packets sent.
- **Packets Dropped –** Number of inbound packets dropped.

Application Statistics

The Application Statistics displays the usage data of the router. To view the Application Statistics page, click **Status and Statistics > Applications Statistics**.

- **Clear Counters –** To reset all the table statistics.

Top Applications by Category

- **Category –** List of application categories accessed.
- **Traffic Volume –** Traffic volume in megabytes.

Top Applications by Name

- **Applications –** List of applications accessed.
- **Traffic Volume –** Traffic volume in megabytes.

Top Talkers

- **Talkers –** List of IP addresses accessed.
- **Traffic Volume –** Traffic volume in megabytes.

Top Talkers by Device Type

- **Device –** List of devices accessed.
- **Traffic Volume –** Traffic volume in megabytes.

Top Talkers by OS Type

- **OS –** List of operating systems used.
- **Traffic Volume –** Traffic volume in megabytes.

Note A pop-up stating AVC disabled or license expired may appear if the AVC is disabled or the license is expired.

Connected Devices

The Connected Devices page lists all the connected devices on the router. To view this Connected Devices page, click **Status and Statistics > Connected Devices**.

IPv4

- **Hostname –** Name of the connected device.
- **IPv4 Address –** Connected device's IP Address.
- **MAC Address –** MAC address of the connected device.
- **Type –** Type of device IP address.
- **Interface –** The interface it is connected to.

IPv6

- **IPv6 Address –** The IPv6 address of the connected device.
- **MAC Address –** MAC address of the connected device.

Routing Status

Routing is the process of moving packets across a network from one host to a another. The Routing Status of this process is displayed on a routing table. The routing table contains information about the topology of the network immediately around it. To view the device's Routing Status for IPv4 and IPv6, click **Status and Statistics > Routing Status**.

IPv4 and IPv6 Routes

- **Destination –** IP Address and subnet mask of the connection.
- **Next Hop –** IP address of the next hop. Maximum number of hops (the maximum is 15 hops) that a packet passes through.
- **Metric –** Number of routing algorithms when determining the optimal route for sending network traffic.
- **Interface –** Name of the interface to which the route is attached to.
- **Source –** Source of the route.

DHCP Bindings

The DHCP Bindings page displays the statistics of the DHCP client information such as IP address, MAC address, Lease Expire Time and Type of Binding (static or dynamic). To view the device's DHCP Bindings, click **Status and Statistics > DHCP Bindings**.

In the DHCP Binding Table, the following is displayed:

- **IPv4 Address –** Assigned IP address.
- **MAC Address –** The MAC address of the clients' assigned IP address.
- **Lease Expires –** Lease time for the client's system.
- **Type –** Status of the connection (**Static** or **Dynamic**).

Mobile Network

Mobile networks enables a router and its subnets to be mobile while continuing to maintain IP connectivity transparent to the IP hosts connecting to the network through this mobile router. To view the router's mobile network, click **Status and Statistics > Mobile Network**. Next, select the Interfaces from the drop-down list (**USB1** or **USB2**). Click **Refresh** to refresh mobile network status.

Connection

- **Internet IP Address –** IP address served by the service provider.
- **Subnet Mask –** Mask served by the service provider.
- **Default Gateway –** Default gateway served by the service provider.
- **Connection Up Time –** Time duration of connected device.
- **Current Dial-Up Session Usage –** Data usage per session.
- **Monthly Usage –** Monthly data usage.

Data Card Status

- **Manufacturer –** Manufacturer of the device.
- **Card Firmware –** Firmware version provided by the manufacturer.
- **SIM Status –** Status of the SIM.
- **IMSI –** Unique number of the device.
- **Carrier –** Name or type of data carrier.
- **Service Type –** Data service type.
- **Signal Strength –** Strength of data signal.
- **Card Status –** Card status disconnected or connected.

VPN Status

The VPN Status displays the tunnel status of the Site-to-Site, Client-to-Site, SSL VPN, PPTP, L2TP, and Teleworker VPN Client. To view the device's VPN status, click **Status and Statistics > VPN Status**.

Site-to-Site Tunnel Status

- **Tunnel(s) Used –** VPN tunnels in use.
- **Tunnel(s) Available –** Available VPN tunnels.
- **Tunnel(s) Enabled –** VPN tunnels enabled.
- **Tunnel(s) Defined –** Defined VPN tunnels.

In the Connection Table, you can add, edit, delete, or refresh a tunnel. (See Site-to-Site, on page 80). You can also click on **Column Display Selection** to select the column headers displayed in the Connection Table.

Client-to-Site Tunnel Status

In this mode, the client from Internet connects to the server to access the corporate network/LAN behind the server. For a secure connection, you can implement a client-to-site VPN. You can view all the Client-to-Tunnel connections, add, edit, or delete the connections in the Connection Table. (See Client to Site, on page 85).

The **Connection Table** displays the following:

- **Group or Tunnel Name –** Name of the VPN tunnel. This is for reference purposes only and does not match the name used at the other end of the tunnel.
- **Connections –** Status of the connection.
- **Phase2 Encryption/Auth/Group –** Phase 2 encryption type (NULL/DES/3DES/AES-128/AES-192/AES-256), authentication method (NULL/MD5/SHA1), and DH group number (1/2/5).
- **Local Group –** IP address and subnet mask of the local group.

SSL VPN Status

A Secure Sockets Layer virtual private network (SSLVPN) allows users to establish a secure, remote-access VPN tunnel to this device by using a web browser. SSL VPN provides secure, easy access to a broad range of web resources and web-enabled applications from almost any computer on the Internet. Here, you can view the status of the SSL VPN tunnels.

- **Tunnel(s) Used –** SSL VPN Tunnels used for connection.
- **Tunnel(s) available –** Available tunnels for the SSL VPN connection.

The **Connection Table** shows the status of the established tunnels. You can also add edit or delete connections.

- **Policy Name –** Name of the policy applied on the tunnel.
- **Session –** Number of sessions.

You can also add, edit or delete a SSL VPN. (See SSL VPN, on page 93).

PPTP Tunnel Status

Point-to-Point Tunneling Protocol has the capability to encrypt data with 128-bit. It is used to ensure that messages sent from one VPN node to another are secure.

- **Tunnel(s) Used –** PPTP Tunnels used for the VPN connection.

- **Tunnel(s) Available –** Available tunnels for the PPTP connection.

The **Connection Table –** shows the status of the established tunnels. You can also connect or disconnect these connections.

- **Session ID –** Session ID of the proposed or current connection.
- **Username –** Name of the connected user.
- **Remote Access –** IP address of the remotely connected or proposed connection.
- **Tunnel IP –** IP address of the tunnel.
- **Connect Time –** Time of the tunneling time.
- **Action –** Connect or disconnect the tunnel.

L2TP Tunnel Status

Layer 2 Tunneling Protocol is the method used to enable Point-to-Point sessions by using the Internet at Layer 2. You can find the status of L2TP Tunnel Status.

- **Tunnel(s) Used –** L2TP tunnels used for the VPN connection.
- **Tunnel(s) available –** Available tunnels for the L2TP connection.

The **Connection Table –** Shows the status of the established tunnels. You can also connect or disconnect these connections.

- **Session ID –** Session ID of the proposed or current connection.
- **Username –** Name of the connected user.
- **Remote Access –** IP address of the remotely connected or proposed connection.
- **Tunnel IP –** IP address of the tunnel.
- **Connect Time –** Time of the tunneling time.
- **Action –** Connect or disconnect the tunnel.

View Logs

The View Logs page displays all of the device's logs. You can filter these logs based on category, severity, or keyword. You can also refresh, clear, and export these logs to a PC or USB. To view the device's logs, follow these steps:

Step 1 Click **Status and Statistics > View Logs**.

Step 2 Under Logs Filtered By, select the appropriate option.

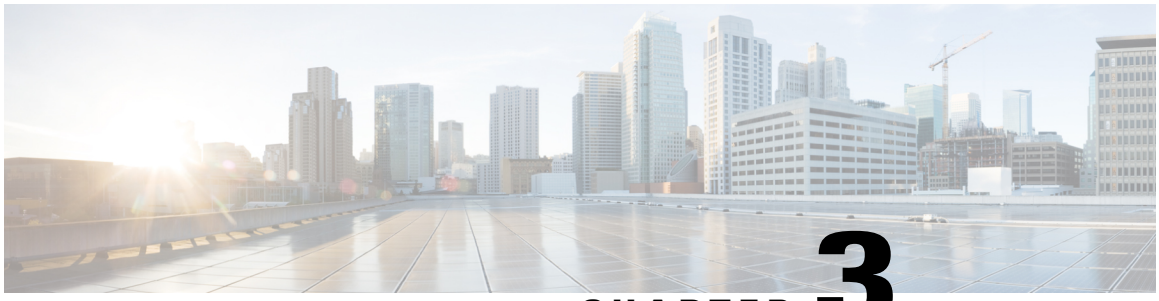
Category	Click any of the following to view logs: • **All –** Displays all the logs. • **Category –** Displays the selected category logs.
Severity	Select one of the options displayed to view the logs based on the severity.
Keyword	Enter a keyword to display the logs based on the keyword.

Step 3 Click **Show Logs**.

Note To configure log settings, see Log, on page 28.

Step 4 Click any of the following options:

- **Refresh –** Click to refresh logs.
- **Clear Logs –** Click to clear logs.
- **Export Logs to PC –** Click to export logs to PC.
- **Export Logs to USB –** Click to export logs on to a USB storage device.



CHAPTER 3

Administration

This section describes the device's administration features and contains the following topics:

Reboot

The Reboot allows users to restart the device with active or inactive images.

To access Reboot page, follow these steps:

Step 1 Click **Administration >Reboot.**

Step 2 In the Active Image after Reboot section, select an option (**Active Image x.x.xx.xx or Inactive Image x.x.xx.xx**) from the drop-down list.

Step 3 Select the preferred reboot option.

- Reboot the device.
- Return to factory default settings after reboot.
- Return to factory default settings including certificates after reboot.

Step 4 Click **Reboot** to reboot device.

File Management

The File Management provides a snapshot of your device. To view the File Management info, follow these steps:

Step 1 Click **Administration> File Management.** to see the following information:

System Information

- **Device Model –** Model number of the device.
- **PID VID–** PID and VID number of the router.
- **Current Firmware Version –** Current firmware version.
- **Latest Updated –** Date of last firmware update.
- **Latest Version Available on Cisco.com –** Latest firmware version.
- **Last Checked –** Date when last checked.

Signature

- **Current Signature Version –** Version of the signature.
- **Last Update –** Last date of when an update was performed.
- **Latest Version Available on Cisco.com –** Latest signature version.
- **Last Checked –** Date when last checked.

Language Package

- **Current Language Package Version –** Version of the language package.
- **Last Update –** Date when last updated.
- **Latest Version Available on Cisco.com –** Latest language package version.
- **Last Checked –** Date when last checked.

Manual Upgrade

In the Manual Upgrade section, you can upload and upgrade to a newer version of the firmware, signature file, USB dongle driver or language file.

Caution During a firmware upgrade, do not try to go online, turn off the device, shut down the PC, or interrupt the process in any way until the operation is complete. This process takes about a minute, including the reboot process. Interrupting the upgrade process at specific points when the flash memory is being written to may corrupt it and render the router unusable.

Step 2 If you select to upgrade from the USB drive, the router will search the USB flash drive for a firmware image file whose name has one or more of the following: PID, MAC address, and Serial Number. If there are multiple firmware files in the USB flash drive, the router will check the one with the most specific name, i.e. priority from high to low.

Manual Upgrade

To update the router with a newer version of the firmware.

Step 1 Select **Administration > File Management.**

Step 2 In the Manual Upgrade section, select the file type (**Firmware Image, Signature File, USB Dongle Driver or Language File**).

Step 3 In the Upgrade From section, select an option (**Cisco.com, PC, or USB**) and click **Refresh.**

Step 4 Check **Reset all configuration/setting to factory defaults** to reset all the configuration and apply factory defaults.

Step 5 Click **Upgrade** to upload the selected image to the device.

Auto Update

The router supports loading a firmware from USB flash drive if the USB stick is present during the system bootup. The router will search the USB flash drive for a firmware image file whose name has one or more of the following: PID, MAC address, and Serial Number. If there are multiple firmware files in the USB flash drive, the router will check the one with the most specific name, i.e. priority from high to low.

- PID-MAC-SN.IMG
- PID-SN.IMG
- PID-MAC.IMG
- PID.IMG

The files with other names will be ignored. If the version is higher than the current version, it will be upgraded to this image and the DUT will reboot. After that, the upgrade process will start again.

If it does not find a more recent image in the USB1, then it will check the USB2 using the same logic.

The router also supports loading a configuration file from a USB flash drive during the system bootup.

- The behavior only happens when the router is in factory default and attached with a USB flash drive before it is

  powered on.
- The router will search the USB flash drive for a config file whose name has one or more of the following: PID,

  MAC address, and Serial Number. If there are multiple firmware files in the USB flash drive, the router will check

  the one with the most specific name, i.e. priority from high to low.

  - PID-MAC-SN.xml
  - PID-SN.xml
  - PID-MAC.xml

- PID.xml

The files with the other names will be ignored.

Firmware Auto Fallback Mechanism

The device includes two firmware images in the flash to provide an Auto Fallback Mechanism so that the device can automatically switch to the secondary firmware when the active firmware is corrupted or cannot boot up successfully after five trials.

The Auto Fallback Mechanism operates as follows:

1. The device first boots up with the active firmware.
2. If the firmware is corrupted, it will switch to the secondary firmware automatically after the active firmware has failed to boot up after 5 times. If the router gets stuck does not reboot automatically, you can turn off the power, power on, wait for 30 seconds, then turn off the power, for 5 times to switch to the secondary or inactive firmware.
3. After booting up with the secondary or inactive firmware, please check to see if anything is wrong with the active firmware.
4. Reload the new firmware again if necessary.

Diagnostic

Your device provides several diagnostic tools to help you with troubleshooting network issues. Use the following diagnostic tools to monitor the overall health of your network.

Using Ping or Trace

You can use the Ping or Trace utility to test connectivity between this router and another device on the network. To use Ping or Trace, follow these steps:

Step 1 Select **Administration > Diagnostic**.

Step 2 In the Ping or Trace an IP Address section, in the IP Address/Domain Name field, enter an IP address or domain name.

Step 3 Click **Ping**. The ping results appear. This tells you if the device is accessible. Or click **Traceroute**. The traceroute results appear.

Step 4 To perform a DNS lookup, enter the IP address or domain name in the Perform a DNS Lookup>IPAddress/Domain Name field and click **Lookup**.

License

Cisco Smart Licensing is a cloud-based approach to licensing. It simplifies the licensing experience by rendering it easier to purchase, deploy, track and renew Cisco software. When you start the router for the first time, you will be in evaluation mode. Your Cisco product must registered and managed through Cisco Smart Licensing.

To register and manage your new Cisco product click **Smart Licensing Manager** and register for a Cisco Smart account if you don't have one.

To access the License page, select **Administration > License**.

A pop-up will appear stating if you are in Evaluation Mode. You must register your Cisco Product with the Cisco Smart Software Licensing. To register your product, follow these steps:

- Ensure that the product has access to the internet. This might require to edit the Transport Settings. To edit the Transport Settings, click **Transport** and enter the Contact Email and Proxy. Next, click **Apply**.
- Log in to your Smart Account in Smart Licensing Manager.
- Navigate to the Virtual Account containing the licenses to be used in this product instance.
- Generate a Product Instance Registration Token (this identifies your Smart Account) and copy or save it,
- Click **Register** and paste the Token into the window that appears.

In the License section, you can configure the licenses or register the router. It simplifies the Cisco software experience and helps you understand how the Cisco software is used.

Request a Smart Account

A Smart Account provides a repository for Smart enabled Cisco devices and enables Users to manage their Cisco licenses. Users can activate and monitor their license usage as well as track any future Cisco purchases. You will need to create a Customer Smart Account to fully utilize the license management features of the device.

To request a Customer Smart Account, log into Cisco Software Central (CSC). If you do not have a CCO ID, go to www.cisco.com and click **Register** now.

Step 1 Access Cisco Software Central.

Step 2 Go to Administration and then click on **Request Smart Account**.

Step 3 Select "**Yes, I have the authority to represent my company**" and you will authorize the Smart Account activation. Select "**No, the person specified below should be notified to authorize activation**" if you do not have the authority or prefer not to authorize the Smart Account.

Step 4 Next, enter the account name and click **Continue**.
Optional — Edit the account domain identifier if needed by following these steps:

Step 5 In the Edit Account Identifier, change the Domain Identifier by editing the domain or adding a prefix.

Step 6 Click OK to confirm the new domain ID.

Step 7 Verify the account name and edit if required.

Step 8 Click **Continue** to proceed with the Smart Account request.

Note If you edit the Account Domain Identifier at the time of the Smart Account request, Cisco will contact you to complete the approval process.

Step 9 Optional — Enter company information. If you selected the option **No** under account authorization, you must provide the company name and address by completing the required fields.

Step 10 Optional — Nominate users for administrative access by entering the email ID of the users you select for administrative access.

Step 11 Verify the Smart Account information and the users who requested administrative access. Next, click **Submit Request**. After submitting the Smart Account request, you will receive a confirmation message that account request has been completed. The request is pending until it is authorized by the specified person.

Note A provisional Smart account will be created after submitting the request. Orders can be assigned to a provisional Smart Account but items purchased cannot be used until the Smart Account is activated.

Smart Software Licensing Status

The Smart Software Licensing Status section displays your device's license information.

Registration Status — Registered or Unregistered, and date of registration.

License Authorization Status — Authorized or Evaluation Mode or Out of Compliance or Authorization Expired or Evaluation Period Expired and the date of license authorization.

Export-Controlled Functionality — Not allowed by default.

Smart License Usage

You can select the Smart License to be used for the router. Make sure that you have enough of licenses in the virtual account for the router, otherwise it is not compliant.

To configure the Smart License, follow these steps:

Step 1 Under Smart License Usage, click **Choose Licenses**.

Step 2 Check the applicable licenses and enter a number under **Count**.

Step 3 Click **Save**.

Step 4 A License Authorization Renewal pop-up will appear, click **OK**.

Certificate

Certificates are important in the communication process. The certificate signed by a trusted Certificate Authority (CA), ensures that the certificate holder is really who he claims to be. Without a trusted signed certificate, data may be encrypted, however, the party you are communicating with may not be the one whom you think.

A list of certificates with the certificate details are displayed on this page. You can export a Self signed, local, and CSR certificate. Or, you can import a CA, Local, or PKCS#12 certificate. You can also import a certificate file (from PC/USB) to a new certificate.

If a device certificate is imported, it replaces its corresponding CSR certificate.

On Certificate Table, the certificates that are associated to the router are displayed. You can you delete, export, view the details, or import a certificate that is listed in the Certificate Table.

Import Certificate

To import a certificate, follow these steps:

Step 1 Click **Import Certificate**.

Step 2 Select the type of certificate to import from the drop-down list:

- Local Certificate
- CA Certificate
- PKCS#12 encoded file.

Step 3 Enter a certificate name. (For PKCS#12, you must enter a password).

Step 4 Check **Import from PC** and click **Choose File** to upload and import the certificate from a specific location.

Step 5 Check **Import From USB** and click **Refresh** to upload and import the certificate from a USB key.

Step 6 Click **Upload**.

Generate CSR/Certificate

Step 1 Click **Generate CSR/Certificate**.

Step 2 Select the type of certificate to generate from the drop-down list.

Step 3 Enter the following information:

Certificate Name	Enter a name for certificate. Certificate name should not contain spaces or special characters.
Subject Alternative Name	Enter a name and select one of the following: **IP Address, FQDN, or Email**.
Country Name	Select a country from the drop-down list.
State or Province Name	Enter a State or Province.
Locality Name	Enter a locality name.
Organization Name	Enter the name of the organization.
Organization Unit Name	Enter the name of the organization unit.
Common Name	Enter a common name.

Email Address	Enter the email address.
Key Encryption Length	Select the Key Encryption Length from the drop-down menu. It should be 512, or 2048.
Valid Duration	Enter the number of days (**Range 1-10950, Default: 360**).

Step 4 Click **Generate**.

Config Management

Config Management page provides details on the router's file configurations.

Configuration File Name

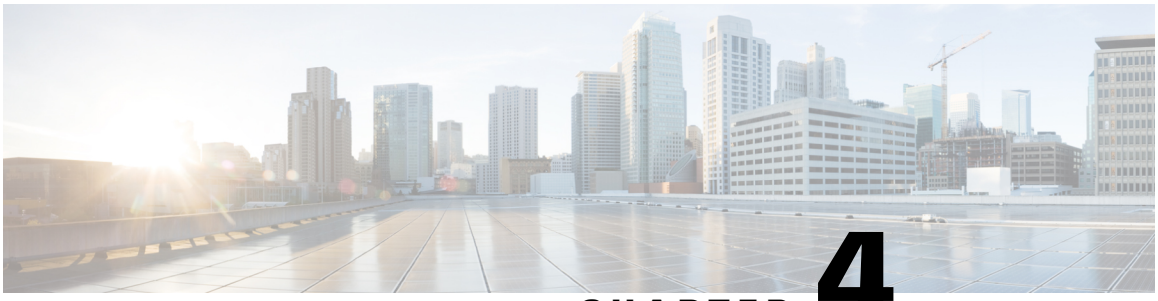
The Configuration File Name displays the last changed time details on the following:

- Running Configuration
- Startup Configuration
- Mirror Configuration
- Backup Configuration

Copy/Apply Configuration

The Copy/Apply Configuration section displays the default configuration of the device uses the running configuration file, which is unstable and does not retain the settings between reboots. You can save this running configuration file to the startup configuration file.

- **Source File Name –** Select the source file name from the drop-down list.
- **Destination File Name –** Select the destination file name from the drop-down list.
- **Save Icon Blinking –** Indicates whether an icon blinks when there is unsaved data. To disable/enable this feature, click **Disable Save Icon Blinking.**



CHAPTER 4

System Configuration

The System Configuration Wizard provides guidance when installing and configuring the router. This section contains the following topics:

Initial Setup Wizard

You can check the connection and configure the basic router settings on the Initial Setup Wizard page. From the **Run Setup Wizard** page, you can follow the instructions that guide you through the process for configuring the device.

Step 1 Click **System Configuration > Initial Setup Wizard**.

Step 2 Click **Next** to go to Check Connection page. If your router has detected a connection, the connection details are displayed on this page.

Step 3 Select Interface from the drop-down list.

Step 4 Click **Next**.

Step 5 Under **Configure Router Select Connection Type**, select your internet connection type.

Step 6 If you select **Dynamic IP** or **DHCP**, click **Next**.

Step 7 If you select **Static IP Address**, click **Next** and configure the settings below.

Static IP Address	Enter the static IP address.
Subnet Mask	Enter the subnet mask.
Gateway IP	Enter the gateway IP.
DNS	Enter the IP address of the DNS.

Step 8 If you select **PPPoE**, click **Next** and configure the settings below.

Account Name	Enter the account name.
Password	Enter the password.
Confirm Password	Confirm the password.

Step 9 If you select **PPTP** or **L2TP**, click **Next** and configure the settings below.

Account Name	Enter the account name.
Password	Enter the password.
Confirm Password	Confirm the password.
Static IP Address	Enter the static IP address.
Subnet Mask	Enter the subnet mask.
Gateway IP	Enter the gateway IP.
Remote Server	Enter the remote server.
DNS	Enter the IP address of the DNS.

Step 10 Select the router's time zone from the Time Zone drop down list.

Step 11 Select one of the following:

- **Enable Network Time Protocol Synchronization** to set the date and time automatically.
- **Set the date and time manually** to set the date and time manually. Enter the date and time.

Step 12 Click **Next**.

Step 13 In the Choose a MAC address section, select one of the options below:

- Use Default Address (Recommended).
- Use this computer's address.
- Use this address — Enter a MAC address.

Step 14 Click **Next**.

Step 15 In the Summary section, review your settings and click **Submit**.

System

Your ISP may assign a hostname and a domain name to identify your device or require you to specify the same. In the former case, the default values can be changed as needed. Follow these steps to assign a host and domain name.

Step 1 Click **System Configuration > System**.

Step 2 In the Host Name field, enter a host name.

Step 3 In the Domain Name field, enter a domain name.

Step 4 Click **Apply**.

Time

Setting the time is critical for a network device so that every system log and error message is timestamped for accurate tracking and synchronizing the data transfer with other network devices.

You can configure the time zone, adjust for daylight savings time if necessary, and select the Network Time Protocol (NTP) server to synchronize the date and time.

To configure the time and NTP server settings, follow these steps;

Step 1 Click **System Configuration > Time**.

Step 2 Set **Time Zone–** Select your time zone relative to Greenwich Mean Time (GMT).

Step 3 **Set Date and Time –** Select **Auto** or **Manual**.

a) **Auto –** Check **Default** or **User Defined** and enter a qualified NTP Server name.

b) **Manual –** Enter the date and time.

Step 4 Set **Daylight Savings Time–**Check to enable daylight savings time. You can choose the Daylight Saving Mode **– By Date** or **Recurring** and enter the start dates and end dates. You can also specify the Daylight Saving Offset in minutes.

Step 5 Click **Apply**.

Log

One of the basic settings of a network device is its system log (Syslog), which is used to log the device data. You can define the instances that should generate a log. Whenever such defined instance occurs, a log is generated with the time and event and sent to a syslog server or sent in an email. Syslog can then be used to analyze and troubleshoot a network and to increase the network security.

Configure Log Settings

To configure the log settings, follow these steps:

Step 1 Click **System Configuration > Log**.

Step 2 Under **Log Setting**, in the Log section, check **Enable**.

Step 3 In the **Log Buffer** field, enter the number of KB (Range 1 KB to 4096 KB, Default is 1024 KB).

Step 4 **Severity**- select the appropriate log severity level from the drop down list. They are listed from the highest to the lowest.

Emergency	Level 0, which means that the system is unusable.
Alert	Level 1, which indicates that immediate action is needed.
Critical	Level 2, which indicates that the system is in critical condition.
Error	Level 3, which indicates that there is an error in the device, such as a single port being off-line.
Warning	Level 4, which indicates that a warning message is logged when the device is functioning properly, but an operational problem has occurred.
Notification	Level 5, which indicates a normal but significant condition. A notification log is logged when the device is functioning properly, but a system notice has occurred.
Information	Level 6, which indicates a condition that is not a condition error, but requires special handling.

Debugging	Level 7, which indicates that the debugging messages contain information normally of use only when debugging a program.

Step 5 **Category** - check **All** or any of the required event categories that you want logged on the device.

Kernel	Logs involving kernel code.
License	Logs involving license violations.
System	Logs related to user-space applications such as NTP, Session, and DHCP.
Web Filter	Logs related to events that triggered web filtering.
Firewall	Logs related to firewall rules, attacks, and content filtering.
Application Control	Logs related to application control.
Network	Logs related to routing, DHCP, WAN, LAN, and QoS.
Users	Logs related to users activities.
VPN	VPN-related logs including instances like VPN tunnel establishment failure, VPN gateway failure, and so on.
3G/4G	Logs from the 3G/4G dongles which are plugged into the router.
SSLVPN	Logs related to SSLVPN.

Step 6 In **Save to USB Automatically**, check **Enable** to save the logs automatically.

Email Server

The email server can be configured to your email account. The email server logs are periodically sent to specific email address, so that the administrator is always up to date on the network. The router supports

SMTP mail account configuration such as email addresses, password, message digest; optional parameters, SMTP server port number, SSL, TLS.

Step 1 In the **Email Server** section, check **Email Syslogs** to enable the router to send email alerts when events are logged.

Step 2 In the **Email Settings** section, click **Link to Email Setting** page to configure your email settings.

Step 3 In the **Email Subject** section, enter the subject.

Step 4 In the **Severity** section, select the severity level from the drop-down list.

Step 5 In the **Log Queue Length** section, enter a range from 1 to 1000. The default is 50.

Step 6 In the **Log Time Threshold** section, select the time threshold from the drop-down list.

Step 7 In the **Real Time Email Alerts** section, check All or any of the e-mail alerts categories that you want logged on the device.

Remote Syslog Server

A remote syslog server allows you to separate the software that generates the messages and events from the system that stores and analyzes them. When enabled, the network driver sends messages to a syslog server on the local Intranet or Internet through a VPN tunnel. The syslog server can be configured by specifying the name or IP address.

Step 1 In the **Syslog Server** section, check **Enable** to enable sending system logs to a remote server.

Step 2 In the **Syslog Server1** field, enter the IP address of a syslog server to which the log messages should be sent.

Step 3 In the **Syslog Server2** field, enter the IP address of a syslog server to which the log messages should be sent.

Step 4 Click **Apply**.

Email

You can configure your device's email server to your specifications.

Configuring Email
To configure the email server, follow these steps.

Step 1 Select **System Configuration > Email**.

Step 2 Under **Email Server**, enter the following:

SMTP Server	Enter the address of the SMTP server.
SMTP Port	Enter the SMTP port.

Email Encryption	Select **None** or **TLS/SSL** as the email encryption method.
Authentication	Select the type of authentication from the drop-down list: **None, Login, Plaintext** or **MD5**.
Send Email to 1	Enter an email address to send to.
Send Email to 2	Enter an email address to send to (optional).
From Email Address	Enter an email address to send from.

Step 3 Click **Test Connectivity to Email Server** to test connectivity.

Step 4 Click **Apply**.

User Accounts

You can create, edit, and delete local users and authenticate them using local database for various services like PPTP, VPN Client, Web GUI login, and SSLVPN. This enables the administrators to control and allow only the local users access the network.

To create local users and determine the password complexity, follow these steps:

Step 1 Select **System Configuration > User Accounts**.

Step 2 Under **Local Users Password Complexity**, check **Enable** to enable the password complexity.

Step 3 Configure the password complexity settings.

Minimal password length	Enter the minimum length of the password to create a new password (Range 0 to 64, Default 8).
Minimal number of character classes	Enter the minimum number of character classes that should be used for the new password (Range 0 to 4, Default 3). Compose a password using three of these four classes: (Uppercase, letters, lower case letters, numbers or special characters).
The new password must be different than the current one	Enable to require the user to enter a different password when the current password expires.

Step 4 In the **Local Users Membership List** table, click Add to add a user on the router.

Step 5 In the **Add User Account** page, enter the following information:

Username	Enter a username.
New Password	Enter a password.
New Password Confirm	Confirm the password.

Password Strength Meter	Displays password strength.
Group	Select a group (admin or guest) from the drop-down list.

Step 6 Click **Apply**.

Step 7 Click **Edit** or **Delete** to edit or delete an existing user.

Step 8 In the **Edit User Account** page, enter the following information:

Old Password	Enter the old password.
New Password	Enter the new password.
New Password Confirm	Confirm the password.
Group	Select a group (admin or guest) from the drop-down list.

Step 9 Click **Apply**.

Step 10 Click **Import** and then **Choose File** to import a username and password CSV file.

Step 11 Click **Download User Template** to download the user template.

Remote Authentication Service

To enable external user authentication using RADIUS and LDAP, use the Remote Authentication Service.

Step 1 Under the **Remote Authentication Service Table**, click **Add** and enter the following information:

Name	Specify a name for the domain.
Authentication Type	Select an authentication type from the drop-down list: • **RADIUS –** a networking protocol that provides centralized Authentication, Authorization, and Accounting (AAA) management for users who connect and use a network service. • **Active Directory –** a Windows OS directory service that facilitates working with interconnected, complex and different network resources in a unified manner. • **LDAP –** a Lightweight Directory Access Protocol.
Primary Server	Enter the IP address of the primary server. **Port –** Enter the primary port of the server.
Backup Server	Enter the IP address of the backup server. **Port –** Enter the backup port of the server.

Preshared-Key	If you have selected RADIUS as the Authentication Type, enter the preshared key of the RADIUS server.
Confirm Preshared-Key	Reenter the preshared key of the RADIUS server to confirm it.

Step 2 Click **Apply** to save the settings. Click **Edit** or **Delete** to edit or delete an existing domain.

Note The external database priority is always RADIUS/LDAP/AD/Local. If you add the Radius server on the router, the Web Login Service and other services will use the RADIUS external database to authenticate the user. There is no option to enable an external database for Web Login Service alone and configure another database for another service. Once RADIUS is created and enabled on the router, the router will use the RADIUS service as an external database for Web Login, Site to Site VPN, EzVPN/3rd Party VPN, SSL VPN, PPTP/L2TP VPN, 802.1x.

User Groups

The administrator can create user groups for a collection of users that share the same set of services. Such user groups can be authorized to access multiple services like Web Login, PPTP, L2TP, and EzVPN.

To create user groups, follow these steps:

Step 1 Select **System Configuration > User Groups**.

Step 2 Under the User Groups Table, click **Add** to create a new user group.

Step 3 In the Group Name field, enter a name for the group.

Step 4 Under the Local User Membership List, check the desired check boxes in the Join column to attach the list of users to the group.

Step 5 Under Services, select the services the user groups should have access to and enter the following information.

Web Login	Specify the web login permissions granted to the users attached to the group: • **Disabled –** No member of the user group can login to the Configuration Utility using a web browser. • **Read Only –** The members of the user group can only read the system status after they login. They cannot edit any settings. • **Administrator –** All members of the user group have full privileges to configure and read the system status.
Site to Site VPN	Check **Permit in this group** to enable access to a site-to-site VPN policy. • Click **Add** to open the **Add Feature List** pop up. • Select a profile from the drop down list and click **Add.**

EzVPN/3rd Party	Check **Permit in this group** to enable access to a site-to-site VPN policy. • Click **Add** to open the **Add Feature List** pop up. • Select a profile from the drop down list and click **Add.**
SSL VPN	Select a profile drop down list.
PPTP VPN	Check **Permit** to enable PPTP authentication.
L2TP	Check **Permit** to enable L2TP authentication.
802.1x	Check **Permit** to enable 802.1x authentication.

Step 6 Click **Apply**.

Note The 802.1x only supports RADIUS authentication. The PPTP/L2TP support RADIUS and local database. If you choose local database, only the Password Authentication Protocol (PAP) is supported for local authentication.

IP Address Group

In order to configure and manage the application control policies and web filtering, you must set up the IP address groups. To configure the IP address groups, follow these steps:

Step 1 Click **System Configuration> IP Address Group**.

Step 2 In the **IP Address Group Table**, click **Add** to add a group and enter a name. To delete a group click **Delete**.

Step 3 Click **Add** and enter the following information.

Protocol	Select either IPv4 or IPv6 from the drop down list.
Type and Address Details	Select the type of group from the drop-down list, and enter the address details: • **IP Address –** Enter an IP address in the IP Address field. • **IP Address Subnet –** Enter an IP address in the IP Address filed and its subnet mask in the Mask field. • **IP Address Range –** Enter the Start IP Address and End IP Address.

Step 4 Click **Apply**.

SNMP

Simple Network Management Protocol (SNMP) is an Internet-standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behavior.

Step 1 To configure SNMP for your router, enter the following information:

SNMP Enable	Check to enable SNMP.
Allow user access from Internet	Check to allow user from the Internet.
Allow user access from VPN	Check to allow user access from VPN.
Version	Select the version from the drop-down list.
System Name	Enter a system name.
System Contact	Enter a system contact.
System Location	Enter a system location.
Get Community	Enter a name for the community.
Set Community	Enter a name for the community.

Trap Configuration

Using Trap configurations, you can set the source address of every SNMP trap packet sent by the router to a single address regardless of the outgoing interface.

Step 2 To configure the SNMP trap, enter the following information.

Trap Receiver IP Address	Enter the IP address.
Trap Receiver Port	Enter the port number.

Step 3 Click **Apply.**

Discovery Bonjour

Bonjour is a service discovery protocol that locates network devices such as computers and servers on your LAN. When this feature is enabled, the device periodically multicasts Bonjour service records to the LAN to advertise its existence.

Note For discovery of Cisco Small Business products, Cisco provides a utility that works through a simple toolbar on the web browser called FindIt. This utility discovers Cisco devices in the network and displays basic information, such as serial numbers and IP addresses. For more information and to download the utility, visit www.cisco.com/go/findit.

To enable Discovery Bonjour, follow these steps:

Step 1 Select **System Configuration > Discovery-Bonjour**.

Step 2 Check **Enable**, to enable Discovery-Bonjour globally. (It is enabled by default).

Step 3 Check **Apply**.

LLDP

The Link Layer Discovery Protocol (LLDP) is a vendor-neutral protocol in the Internet Protocol Suite used by network devices for advertising their identity, capabilities, and neighbors on an IEEE 802 local area network. The LLDP information is sent by the device's interface at a fixed interval, in the form of an Ethernet frame. Each frame contains one LLDP Data Unit (LLDPDU). Each LLDPDU is a sequence of type-length-value (TLV) structure.

To configure LLDP, follow these steps:

Step 1 Select **System Configuration > LLDP**.

Step 2 In the LLDP section, check **Enable**. (It is enabled by default).

Step 3 In the **LLDP Port Setting Table**, check **Enable LLDP** to enable LLDP on an interface.

Step 4 Click **Apply**.

Step 5 In the **LLDP Neighbors Setting Table**, the following information is displayed:

- **Local Port –** Port identifier.
- **Chassis ID Subtype –** Type of chassis ID (for example, MAC address).
- **Chassis ID –** Identifier of the chassis. Where the chassis ID subtype is a MAC address, the MAC address of the device is displayed.
- **Port ID Subtype –** Type of the port identifier.
- **Port ID –** Port identifier.
- **System Name –** Name of the device.
- **Time to Live –** Rate in seconds at which LLDP advertisement updates are sent.

Step 6 To view details about an LLDP port, select the Local Port and click **Detail**.

Step 7 To refresh the LLDP Neighbors Setting Table, click **Refresh**.

Automatic Updates

Upgrading to the latest firmware can help fix bugs and other intermittent issues on the router. For this purpose, the router can be configured to send you email notifying you of important firmware updates for your device. The information can be configured to be sent at specified intervals and for specific types of network events. Before you can configure these notifications, the email server should be configured.

To configure the Automatic Updates, follow these steps:

Step 1 Select **System Configuration > Automatic Updates**.

Step 2 From the **Check Every** drop-down list, choose how often the device should automatically check (**Never, Week**, or **Month**) for possible firmware revisions. Click **Check Now** to check immediately.

Step 3 In the **Notify** via field, check Email to and enter the email address. The notifications are sent to a configured email address. If you haven't configured an email server, you should click the link in the note given beside the email field and configure the email server.

Step 4 Under **Automatically Update**, select **Notify** to receive notifications for updates.

Step 5 Select the time from the drop-down list of when the firmware is automatically updated. You can select to receive notifications and configure the updates for the following:

- System Firmware
- USB Modem Firmware
- Security Signature

Step 6 Click **Apply**.

Service Management

The Service Management section displays information on the system configuration. You can add a new entry to the Service Management list or to change an entry. To configure the Service Management follow these steps.

Step 1 Click **System Configuration > Service Management**.

Step 2 In the Service Table, click **Add**.

Step 3 In the **Application Name** field, enter a name for identification and management purposes.

Step 4 In the Protocol field, select the Layer 4 protocol that the service uses from the drop-down list: (**TCP & UDP, TCP, UDP, IP, ICMP**).

Step 5 In the **Port Start/ICMP Type/IP Protocol**, enter the port number, ICMP type, or IP protocol.

Step 6 In the **Port End** field, enter port number.

Step 7 Click **Apply**.

Step 8 To edit an entry, select the entry and click **Edit**. Make your changes, and then click **Apply**.

Schedule

The network devices should be protected against intentional attacks and viruses that could compromise confidentiality or result in data corruption or denial of service. Schedules can be created to apply firewall or port forwarding rules on specific days or time of day.

To configure the schedule follow these steps.

Step 1 Select **System Configuration > Schedule.**

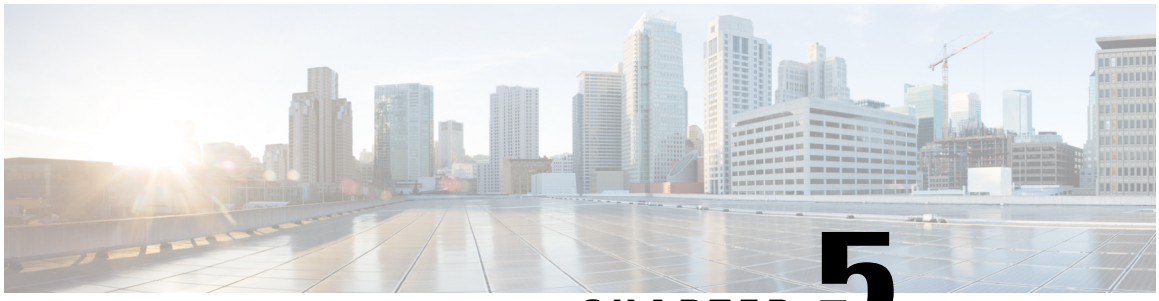
Step 2 In the **Schedule Table**, click **Add** to create a new schedule. You can edit an existing schedule by selecting it and clicking **Edit**.

Step 3 Enter a name to identify the schedule in the **Name** column.

Step 4 Enter the desired **Start Time** and **End Time** for the schedule.

Step 5 Check **Everyday** to apply the schedule to all the days of the week. Leave it unchecked if you want it to only apply to certain days. If so, then check the desired days of the week you want to apply the schedule to. You can also choose **Weekdays** or **Weekends**.

Step 6 Click **Apply**.



CHAPTER 5

WAN

This section covers the wide area network (WAN) and contains the following topics:

WAN Settings

There are two physical WAN and VLAN interfaces which can be configured on the router. To configure the WAN settings, follow these steps:

Step 1 Select **WAN > WAN Settings**.

Step 2 In the **WAN Table**, click **Add** .

Step 3 Select the Interface (**WAN1 or WAN 2**). Based on the interface selected, a subinterface name will appear just below. Add this subinterface to the Multi-WAN table to forward the default route traffic, or it will only forward the connected route traffic based on the routing table.

Step 4 Enter the **VLAN ID**.

Step 5 Configure the settings for the IPv4, IPv6, or Advanced.

Step 6 Click **Apply**.

IPv4 and IPv6 Connections

Step 7 For an IPv4 connection, click the **IPv4** tab.

Step 8 Select the connection type from the list:

When the IPv4 or IPv6 connection uses DHCP

In the DHCP Settings, enter the following information:

DNS Server	Select **Use DHCP Provided DNS Server** or **Use DNS as Below**.
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
DHCP-PD (IPv6 only)	Check to enable and enter a prefix name.

When the IPv4 or IPv6 connection uses Static IP

In the **Static IP Settings**, enter the following information:

WAN IP Address	Enter the IP address.
Netmask	Enter the netmask.
Default Gateway	Enter the IP address of the default gateway. Default Gateway is needed on this interface to participate in the load balance and failover (Multi-WAN).
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
DHCP-PD (IPv6 only)	Check to enable and enter a prefix name.

When the IPv4 or IPv6 connection uses PPPoE

In the PPPoE Settings section, enter the following information:

Username	The username assigned to you by the ISP.
Password	The password assigned to you by the ISP.
DNS Server	Select **Use PPPoE Provided DNS Server** or **Use DNS**.
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
Connect Mode	Select **Connect on Demand** if your ISP charges when connected. Enter the maximum idle time, in seconds, to wait before terminating the connection due to inactivity. Default is 5 minutes. Select **Keep Alive** to periodically check the connection, and to re-establish the connection when it is disconnected.
Authentication Type	Select the authentication type from the drop-down list (**Auto, PAP, CHAP, MS-CHAP, MS-CHAPv2**).
Service Name	Enter the name of the service.
DHCP-PD (IPv6 only)	Check to enable and enter a prefix name.

Note Some service providers do not allow to ping the default gateway, especially for the PPPoE connection. Please go to Multi-WAN page to disable the “Network Service Detection” feature or choose a valid host to detect. Otherwise, the traffic will not be forwarded by the device.

When the IPv4 connection is through PPTP

In the PPTP section, enter the following:

IP Assignment	For DCHP, select this option to enable DHCP to provide an IP address. For Static IP, select this option and provide an IP address, netmask, and the IP address of the default gateway.
PPTP Server IP/FQDN	Enter the name of the server.
Username	The username assigned to you by the ISP.
Password	The password assigned to you by the ISP.
DNS Server	Select **Use PPTP Provided DNS Server** or **Use DNS**.
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
Connect Mode	Select **Connect on Demand** if your ISP charges when connected. Enter the maximum idle time, in seconds, to wait before terminating the connection due to inactivity. Default is 5 minutes. Select **Keep Alive** to periodically check the connection, and to re-establish the connection when it is disconnected. .
Authentication Type	Select the authentication type from the drop-down list (**Auto, PAP, CHAP, MS-CHAP, MS-CHAPv2**).
MPPE Encryption	Check to enable MPPE encryption.

When the IPv4 connection uses L2TP

In the L2TP Settings section, enter the following information.

IP Assignment	For DCHP, select this option to enable DHCP to provide an IP address. For Static IP, select this option and provide an IP address, netmask, and the IP address of the default gateway.
L2TP Server IP/FQDN	Enter the name of the server.
Username	The username assigned to you by the ISP.
Password	The password assigned to you by the ISP.
DNS Server	Select **Use L2TP Provided DNS Server** or **Use DNS**.
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
Connect Mode	Select **Connect on Demand** if your ISP charges when connected. Enter the maximum idle time, in seconds, to wait before terminating the connection due to inactivity. Default is 5 minutes. Select **Keep Alive** to periodically check the connection, and to re-establish the connection when it is disconnected.
Authentication Type	Select the authentication type from the drop-down list (**Auto, PAP, CHAP, MS-CHAP, MS-CHAPv2**).

When the IPv6 connection uses Bridge

Bridge Settings

Bridge to	VLAN1 is the default.
IP Address	Enter the IP address.
Netmask	Enter the netmask.
Default Gateway	Enter the default gateway.
Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.

When the IPv6 connection uses SLAAC

In the SLAAC Settings section, enter the following information:

Static DNS 1 & 2	Enter the IP address of the primary and or secondary Static DNS in the fields.
DHCP-PD (IPv6 only)	Check to enable and enter a prefix name.

Step 9 Click **Apply**.

For Advanced

Step 10 Click the Advanced tab and configure the following:

MTU – Maximum Transmission Unit	Select **Auto** to set the size automatically. To set the MTU size manually, select **Manual** and enter the MTU size. (The size in bytes of the largest protocol data unit that the layer can pass.)
MAC Address Clone	Check **MAC Address Clone** and enter the MAC address. Click Clone **My PC's MAC** to use the MAC address of your computer as the clone MAC address for the device.

Note When MAC Address Clone is enabled, the port mirroring does not work.

Step 11 Click **Apply**.

Note Add any of these sub-interfaces to the Multi-WAN table to forward the default route traffic. Or it will only forward the connected route traffic based on the routing table.

Multi-WAN

WAN failover and load balancing features provide efficient utilization of multiple WAN interfaces. Based on the configuration, this feature can be used to distribute traffic among the interfaces. The Multi-WAN feature provides the outbound WAN traffic, and load balancing over multiple WAN interfaces (WAN & USB) based on a numeric weight assignment. It also monitors each WAN connection using repeated ping tests and automatically routes outbound traffic to another WAN interface if connectivity is lost. The specific outbound traffic rules can also be configured because of 5-tuple of a connection. Outgoing network load-balancing is performed on a per IP connection basis; it is not channel-bonding, where a single connection uses multiple

WAN connections simultaneously. The VLAN interfaces of WAN can also be configured for load balance or failover.

To configure the multi WAN settings, follow theses steps:

Step 1 Select **WAN > Multi-WAN**.

Step 2 In the Interface Setting Table, configure the following:

- **Interface –** WAN interface name to apply the load balance and failover configuration. Select and check the desired interface (**WAN1, WAN2, USB1**, or **USB2**).
- **Precedence (for Failover) –** Enter the priority value for the interface to bring up another connection on another interface.
- **Weighted by Percentage or Weighted by Bandwidth (for Load-Balance) –** Enter the weight percentage or value for each connection. The interface routes traffic to the secondary connection if the primary connection's is overloaded in an effort to balance the bandwidth load. To ensure full utilization of both connections, the ratio between the connections' load balancing weights should reflect the ratio between the connections' bandwidths.

Step 3 Click **Advanced Configuration** and configure the following:

a) **Enable Network Service Detection –** Check to allow the device to detect network connectivity by pinging specified devices and enter the settings as described here.

- **Retry Count –** Number of times to ping a device. The range is 1 to 10 and the default is 3.
- **Retry Timeout –** Number of seconds to wait between the pings. The range is 1 to 300 and the default is 5 seconds.
- **Detect Destination –** Select **Default Gateway** or **Remote Host –** If choosing the remote host, enter the host.

Step 4 Click **Apply**.

Step 5 **Enable Policy Based Routing –** Check to enable.

Step 6 Next, click **Add** or **Edit** and configure the following:

Priority	Enter a number for the priority.
Source IP	Enter the source IP address.
Destination IP	Enter the destination IP address.
Services	Select a service from the drop-down list. If a service is not listed, you can click **Service Management** to add it.
Outgoing Interface	Select the outgoing interface (**WAN1, WAN2, USB1**, or **USB2**) from the drop-down list.
Failover to backup WAN	Select **On** or **Off** from the Failover to back up WAN drop-down list. **Note** If you select **Off**, the traffic is dropped when the binding interface goes off line or down.
Status	Select **Enable** or **Disable** to enable or disable the status of the policy.

Step 7 You can also edit or delete a configuration by clicking **Edit** or **Delete**.

Step 8 Click **Apply**.

Note Some service providers do not allow to ping the default gateway. Please choose a valid remote host to detect the network connectivity or simply disable the detection. Otherwise, the traffic will not be forwarded by the device.

Mobile Network

A mobile broadband modem is a type of modem that allows a laptop, a personal computer, or a router to receive Internet access using a mobile broadband connection instead of using phone or cable lines.

To configure the Mobile Network, follow these steps:

Step 1 Select **WAN > Mobile Network**.

Step 2 In the Global Settings section, select the interface (USB1 or USB2) to apply the settings.

Step 3 In the Card Status section, click **Connect** to establish the connection.

Step 4 In the Service Type, select the type of service from the drop-down list.

Mobile Network Setup

To configure the Mobile Network Setup, follow these steps:

Step 1 In the Configuration Mode, select **Auto** to connect to the network automatically.

Step 2 Enter the **SIM PIN** - the pin code associated with your SIM card.

Step 3 Or, select **Manual** and to connect to the network manually and configure the following:

- **Access Point Name –** Enter the access point name provided by your mobile network service provider.
- **Dial Number –** Enter the number provided by your mobile network service provider for the Internet connection.
- **Username and Password –** Enter the username and password provided by your mobile network service provider.
- **SIM PIN –** Enter the PIN code associated with your SIM card.
- **Server Name –** Enter the name of the server.
- **Authenticate –** Select the option to authenticate.

Step 4 Select one for the following for the Connect Mode.

- **Connect on Demand –** It specifies the connection timers after which the connection is terminated if there is inactivity. Enter the Max Idle Time, in seconds, to wait before terminating the connection due to inactivity. Default is 5 minutes.
- **Keep Alive –** It checks the connection with router periodically, to re-establish the connection when disconnected. In the Redial Period, enter the time in seconds for the router to check the connection automatically. Default period is 30 seconds.

Bandwidth Cap Setting

The Bandwidth Cap Tracking limits the transfer of specified amount of data over a period. It is also known as a band cap or data cap. To configure the Bandwidth Cap Setting, follow these steps:

Step 1 Check **Bandwidth Cap Tracking** and enter the following:

- **Monthly Renewal Date –** Select number of days to apply the bandwidth cap settings.
- **Monthly Bandwidth Cap –** Enter the size of the data.
- **Send an email to administrator if 3G/4G usage has reached percentage of monthly bandwidth cap –** Select the percentage of data for monthly bandwidth cap. When the cap is reached, an email alert is sent to the administrator.

Step 2 Click **Apply.**

Dynamic DNS

Dynamic Domain Name System (DDNS) is a method of keeping a domain name linked to a changing IP address since not all computers use static IP addresses. D DNS automatically updates a server in the DNS with the active configuration of its hostnames, addresses, or other information. DDNS assigns a fixed domain name to a dynamic WAN IP address. Hence, you can host your own web FTP, or another type of TCP/IP server on your LAN. There are several DDNS services to choose from, most of which are free, or available at a nominal cost. The most popular is DynDNS.

To configure dynamic DNS policies, follow these steps:

Step 1 Select **WAN > Dynamic DNS**.
Step 2 In the Dynamic DNS Table, select the interface (**WAN1, WAN2, USB1**, or **USB2**) to add to the Dynamic DNS policy.
Step 3 Click **Edit**.
Step 4 Check **Enable this Dynamic DNS policy** to enable the policy configuration.
Step 5 Select the name of service provider from the Provider drop-down list.
Step 6 Enter a **Username** and **Password** for the DDNS account.
Step 7 Enter the full name of the device including the domain name in Fully Qualified Domain Name.
Step 8 Check **Enable** to receive updates to Dynamic DNS provider and select the periodicity.
Step 9 Click **Apply**.
Step 10 Click **Refresh** to refresh the Dynamic DNS Table.

Hardware DMZ

A Demilitarized Zone (DMZ) accepts all incoming traffic and allows all outgoing traffic. A DMZ is a subnetwork that is open to the public but behind the firewall. A DMZ allows you to redirect packets entering your WAN port to a specific IP address. You can configure the firewall rules to allow access to specific services and ports in the DMZ from both the LAN and WAN. If there is an attack on any of the DMZ nodes, the LAN is not necessarily vulnerable. We recommend that you place hosts that must be exposed to the WAN (such as web or email servers) in the DMZ network.

To configure the hardware DMZ configuration, follow these steps:

Step 1 Select **WAN > Hardware DMZ**.
Step 2 Click **Enable** to change the LAN4 to DMZ port.
Step 3 Select **Subnet** to identify a subnetwork for DMZ services and enter the **DMZ IP Address** and **Subnet Mask**.
Step 4 Select **Range** (DMZ & WAN within the same subnet) and enter the IP range.
Step 5 Click **Apply**.

IPv6 Transition

For migrating from IPv4 to IPv6, you can use an Internet transition mechanism called 6in4. The 6in4 uses tunneling to encapsulate IPv6 traffic over configured IPv4 links. The 6in4 traffic is sent over the IPv4, in which the IPv4 packet header. This is followed by the IPv6 packet whose IP headers have the IP protocol number set to 41.

To configure the IPv6 transition, follow these steps:

Step 1 Select **WAN > IPv6 Transition**.
Step 2 In the Tunnel Table, select the interface to be configured and click **Edit**.
Step 3 Check **Enable**.
Step 4 Enter the description.
Step 5 Select the Local Interface from the drop-down list (**WAN1** or **WAN 2**).
Step 6 Local IPv4 Address displays the address of the selected interface.

IPv6 in IPv4 Tunnel (6in4)

To add IPv4 Tunnel (6in4), enter the following information:

Step 1 Click the **IPv6 in IPv4 Tunnel (6in4)** tab.
Step 2 Enter the **Remote IPv4 Address**.
Step 3 Enter the **Local IPv6 Address**.
Step 4 Enter the **Remote IPv6 Address**.
Step 5 Click **Apply.**

IPv6 Rapid Deployment (6rd)

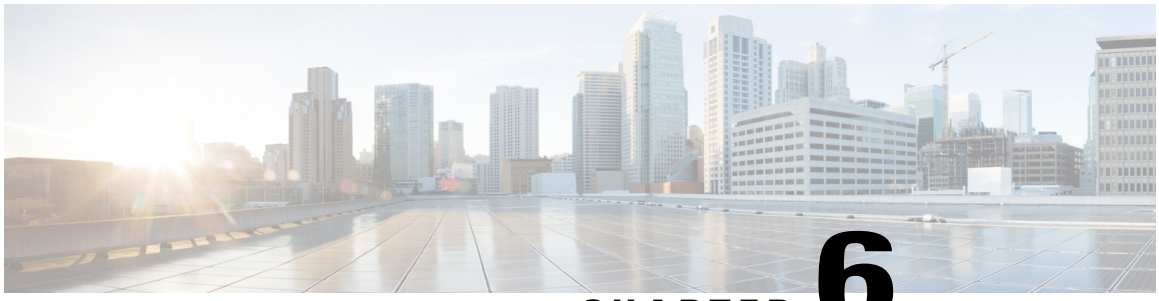
In IPv6 Rapid Deployment (6rd), each ISP uses one of its own IPv6 prefixes instead of the special 2002::/16 prefix standardized for 6to4. Hence, a provider is guaranteed for its 6rd hosts availability from all native IPv6 hosts that can reach their IPv6 network.

To add IPv6 Rapid Deployment (6rd), enter the following information:

Step 1 Click the IPv6 Rapid Deployment (6rd) tab.
Step 2 Click **Automatically from DHCP** to use the DHCP (option 212) to obtain 6rd Prefix, Relay IPv4 Address, and IPv4 Mask Length.
Step 3 Or, select **Manual** and set the following 6rd parameters.
a) Enter the **IPv4 Address of Relay** .
b) Enter the **IPv4 Common Prefix Length**.

c) Enter the **IPv6 Prefix/Length**. The IPv6 network (subnetwork) is identified by the prefix. All hosts in the network have the identical initial bits for their IPv6 address. Enter the number of common initial bits in the network addresses. Default is 64.

Step 4 Click **Apply**.



CHAPTER 6

QoS

This section describes the Quality of service (QoS), which is used to optimize network traffic in order to improve the user experience. QoS controls and manages network resources by setting priorities for specific types of data (video, audio, files) on the network. It is exclusively applied to network traffic generated for video on demand, IPTV, VoIP, streaming media, videoconferencing, and on-line gaming. This section contains the following topics;

Traffic Classes

Traffic classes channel Internet traffic to a desired queue based on the service. The service can be Layer 4 TCP or UDP port application, Source or Destination IP Address, DSCP, Receive interface, OS, and Device type.

To configure the Traffic Classes, follow these steps:

Step 1 Click **QoS > Traffic Classes.**

Step 2 In the Traffic Table, click **Add** (or select the row and click **Edit**) and enter the following:

- **Class Name –** Enter the name of the defined class.
- **Description –** Enter the description of the class.
- **In Use –** Traffic class record is being used by a queuing policy.

Step 3 In the Service Table, click **Add** (or select the row and click **Edit**) and enter the following information:

Service Name	Enter the name of the service.
Receive Interface	Select an interface (**WAN1, WAN2, USB1, USB2, LAN1, LAN2, LAN3, LAN4, or VLAN1**) from the drop-down list.
IP Version	Select **IPv4, IPv6, or Either** (if you do not know the version of the traffic).
Source IP	Enter the source IP address of the traffic.
Destination IP	Enter the destination IP address of the traffic.
Service/Application	• **Service**: Select the name of the service to apply on the traffic record. Provide the source and destination ports. • **Application**: Select the application to apply on the traffic record. Select the application behavior and category. **Note** The Application rules can not be configured until the user enables the Application Control in the Security/Application Control page.
Device Type	Select the type of device from the drop-down list, from which the traffic is initiated.
OS Type	Select the Operating System of the device from the drop-down list, from which the traffic is initiated.
Match DSCP	The DSCP matches the traffic class value in the IPv6 header for the IPv6 traffic. The traffic class value is 4 times the configured value. For example, if the user configures the matched DSCP as 10, then rewrite the DSCP as 18. The rule matches the IPv6 flows with the traffic class value 40 and rewrites the DSCP to 72. Select the DSCP value from the drop-down list, to be matched with the DSCP value in the incoming packets.
Rewrite DSCP	Select the DSCP value from the drop-down list, to be replaced with, in incoming packets.

Step 4 Click **Apply**.

WAN Queuing

Net traffic coming from the LAN-to-WAN can be managed in three modes (Rate Control, Priority, and Low Latency) which are mutually exclusive.

To configure WAN Queuing, follow these steps:

Step 1 Click **QoS > WAN Queuing**.

Step 2 Above the WAN Queuing Table, select the desired Queuing Engine (**Priority, Rate-control, or Low-latency**).

Step 3 In the WAN Queuing Table, click **Add** and enter a name for the policy and provide a description.

Step 4 If Priority Queuing was selected, in the Queuing Priority Table, select the Traffic Class for each queue from the drop-down list.

Step 5 If Rate Control Queuing was selected, in the Queuing Rate-Control Table, select the Traffic Class and enter the Minimum and Maximum Rate for each queue.

Step 6 If Low-latency Queuing was selected, in the Queuing Low-Latency Table, select the Traffic Class and configure the bandwidth share value for each queue.

Step 7 Click **Apply**.

WAN Policing

In WAN Policing, the rate-control mode supports eight queues. Each queue can be configured with a maximum rate.

To configure the WAN Policing page, follow these steps:

Step 1 Click **QoS > WAN Policing**.

Step 2 Check **Enable policing of traffic on WAN interfaces**.

Step 3 In the Policy Class Table, configure the following for each queue:

Traffic class	Select **Unspecified or Default.**
Maximum Rate	Enter the queue's maximum rate of bandwidth in percentages to limit the incoming traffic from WAN to LAN.

Step 4 Click **Apply**.

WAN Bandwidth Management

WAN interfaces can be configured with the maximum bandwidth provided by the ISP. When the value (transfer rate in KBP/S) is configured, the traffic entering the interface is shaped in defined rate.

To configure the WAN Bandwidth Management, follow these steps:

Step 1 Click **QoS > WAN Bandwidth Management**.

Step 2 In the WAN Bandwidth Management Table, select the Interface and configure the following:

Upstream (kb/s)	Enter the upstream traffic rate in kb/s.
Downstream (kb/s)	Enter the downstream traffic rate in kb/s. *You will need to enable WAN policing for Downstream Bandwidth, otherwise the downstream bandwidth will not take effect.
Outbound Queuing Policy	Select the outbound queuing policy to be applied to the WAN interface.

Step 3 Click **Apply**.

Switch Classification

In QoS modes such as Port-based, DSCP-based, and CoS-based, packets are sent out.

To configure Switch Classification, click **QoS > Switch Classification** and follow these steps:

Step 1 Select the desired Switch QoS Mode (**Port-based, DSCP-based** or **CoS-based**).

Port-based	The incoming packets on each LAN port which are mapped to specific queues, based on the mappings. • **LAN Port Queue —** Select the LAN Port Queue to map the traffic coming on the individual LAN ports. • **LAG Port Queue —** When LAG is enabled, all traffic entering this LAG interface is mapped using a configured queue.
DSCP-based	For IPv6 traffic, the DSCP matches the traffic class value in the IPv6 header and places it in different queues. The traffic class value is 4 times the DSCP value. For example, if the user configures the DSCP as 10 mapping to Queue 1, then the IPv6 flows with traffic class value 40 will be put into Queue 1. The switch must use the DSCP field of the incoming packets and schedule the packet for prioritization into a particular queue using the mapping table. • Based on the DSCP value of the incoming packet, map the traffic to the different queues.

CoS-based	The switch uses the incoming packet priority 'CoS; bits and classifies the packet to user configured queue. • Based on the CoS value of the incoming packet, map the traffic to the different queues by selecting the queues from the drop-down list.

Step 2 Click **Apply**.

Switch Queuing

In Switch Queuing, the queue weight for all the four queues per port can be configured by assigning weights to each queue. The range of weights can be from 1 to 100. When LAG is enabled, the user can define the queue weights for all four queues.

Note If the weight is 0, this means that the queue is in highest priority queue.

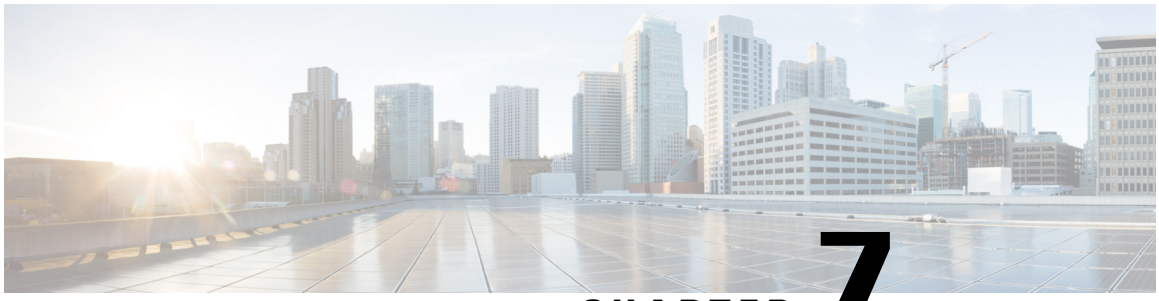
To configure LAN Port Queue Weight, click QoS > Switch Queuing and complete the following steps:

Step 1 In LAN Port Queue Weight, select the appropriate weight for each of the queues.

Step 2 Click **Apply**.

Step 3 Click **Restore Defaults** to restore system default settings.

Step 4 In the LAG Port Queue Weight table, the LAG ports and their queue weights are displayed.



CHAPTER 7

LAN

This section describes the local area network (LAN), which is a computer network that spans within a relatively small area, such as in an office building, a school, or a home. This section contains the following topics:

Port Settings

The Port Settings page displays the ports for EEE, Flow Control, Mode, Port Mirror, and Link Aggregation.

To configure the port settings for the LAN, follow these steps:

Step 1 Select **LAN > Port Settings**.

Step 2 In the Basic Per Port Configuration table, configure the following:

Port	Lists the ports currently available on the router.
Enabled	Check to enable the port to allow the settings. When this check box is disabled, all settings on the port are lost.
EEE (Energy Efficient on Ethernet)	Check to allow port to consume less power during period of low data activity.
Flow Control	Check to enable to symmetric flow control. Flow control is used to send pause frames and respecting pause frames to and from the LAN PC connected to the device.

Mode	Select the port setting mode from the drop-down list.

Step 3 In the Port Mirror Configuration section, enter the following information:

Enable	Check **Enable** to enable port mirror configuration.
Destination Port	Select anyone of the LANs **(LAN1 to LAN4)** from the drop-down list.
Monitored Port	The port to monitor the traffic sending for mirroring. Select anyone of the LANs **(LAN1 to LAN4)** from the drop-down list.

Step 4 In the Link Aggregation Configuration Table, enter the following information:

Group Name	Lists the name of the link group.
Unassigned	Select to remove the port from the LAG group. Select anyone of the LANs **(LAN2 to LAN4)** from the drop-down list.
LAG1	Select to apply link aggregation on appropriate port for traffic. Select anyone of the LANs **(LAN2 to LAN4)** from the drop-down list.

Warning All the existing configurations on the ports (which are going to be part of LAG) are lost.

Step 5 Click **Apply**.

VLAN Settings

Traffic on the port can be tagged by applying a specified VLAN. This tagging can help in differentiating the traffic and forwarding it. There are only 32 VLANs in the system. If there are few VLANs used by WAN, then LAN can use rest of them.

To configure the VLAN settings, enter the following information:

Step 1 Select **LAN > VLAN Settings**.

Step 2 In the VLAN Table, click **Add**.

Step 3 Enter the VLAN ID. (Range is 1-4093).

Step 4 Check to enable the Inter-VLAN.

Step 5 Enter the IPv4 address.

Step 6 Enter the Prefix, Prefix Length, and Interface Identifier.

Step 7 Click **Edit** or **Delete** to edit or delete the VLAN table configurations.

Step 8 In the VLANs to Port Table, click **Edit** to assign a VLAN to a LAN port. Specify the following information for each of the VLAN listed in the table.

- **Untagged –** Select **Untagged** from the drop-down list to untag the port.
- **Tagged –** Select **Tagged** from the drop-down list, to include the port as a member for the selected VLAN. Packets sent from this port destined to the chosen VLAN will have the packets tagged with the VLAN ID. If there are no untagged VLANs on a port, the interface automatically joins the VLAN1.
- **Excluded –** Select **Excluded** from the drop-down list, to exclude the port from the selected VLAN. When the untagged VLANs are excluded from a port, the port automatically joins the default VLAN.

Step 9 Click **Apply**.

LAN/DHCP Settings

DHCP setup configures the DHCP server for relay or Option 82 (DHCP relay agent information option) for LAN clients to obtain IP addresses. DHCP server maintains local pools and leases. It also allows LAN clients to connect to a remote server for obtaining IP address.

Option 82 enables a DHCP relay agent to include information about itself when forwarding client-originated DHCP packets to a DHCP server. The DHCP server can use this information to implement IP addressing or other parameter-assignment policies.

To configure the LAN/DHCP settings, follow these steps:

Step 1 Select **LAN > LAN/DHCP Settings**.

Step 2 In the LAN/DHCP Settings Table click **Add.**

Step 3 If you choose **Interface**, select a VLAN from the drop-down list and click **Next**.

Step 4 To configure the DHCP for IPv4, select the DHCP type for IPv4.

Disabled	Disables the DHCP server for IPv4 on this device. There are no additional parameters to complete.
Server	The DHCP server assigns addresses to clients from their respective pools.

Relay	Sends the DHCP requests and replies from another DHCP server through the device. Enter the remote DHCP server IPv4 address to configure DHCP relay agent.

Configuring DHCP for IPv4

Step 5 Click **Next** and configure the following:

Client Lease Time	Amount of time (in minutes) that a network user is allowed to connect to the router with the current IP address. Valid values are 5 to 43,200 minutes. The default is 1440 minutes (equal to 24 hours).
Range Start and Range End	The range start and end of IP addresses that can be assigned dynamically. The range can be up to the maximum number of IP addresses that the server can assign without overlapping the PPTP and SSL VPN.
DNS Server	DNS service type; where the DNS server IP address is acquired.
Static DNS 1 and Static DNS 2	Static IP address of a DNS Server. (Optional) If you enter a second DNS server, the device uses the first DNS server to respond to a request.
WINS Server	Optional IP address of a Windows Internet Naming Service (WINS) server that resolves NetBIOS names to IP addresses. Default is 0.0.0.0.
DHCP Options	• **Option 66 –** Enter the IP address or the hostname of a single TFTP server. • **Option 150 –** Enter the IP addresses of a list of TFTP servers. • **Option 67 –** Enter the boot filename.

Configuring DHCP type for IPv6

Step 6 To configure the DHCP Mode for IPv6, enter the following:

Disable	Disables the DHCP on this device. There are no additional parameters to complete
Server	DHCP server that assigns addresses to clients from their respective pools.

Step 7 Click **Next** and configure the following:

Client Lease Time	Amount of time that a network user is allowed to connect to the router with the current IP address. Enter the amount of time in minutes. Valid values are 5 to 43,200 minutes. Default is 1460 minutes (24 hours). For example, if the router uses the default LAN IP address, 192.168.1.1, the starting value must be 192.168.1.2 or greater.
Range Start	Starting address of the IPv6 address pool.
Range End	Ending address of the IPv6 address pool.
DNS Server	Type of DNS (server static), proxy, or the DNS server provided by your ISP.

Static DNS1 and DNS2	(Optional) IP address of a DNS server. If you enter a second DNS server, the device uses the first DNS server to respond. Specifying a DNS server can provide faster access than using a DNS server that is dynamically assigned. Default is 0.0.0.0.

Configuring Option 82 Circuit

Step 8 To configure the Option 82 Circuit enter the following information.

Description	Enter description for option 82 client.
Circuit ID	Enhances the validation security to determine about the information which is provided in the Option 82 Circuit ID. Enter the circuit ID and its format.

Step 9 Click **Next** and enter the following:

IP Address & Subnet Mask	Enter the IP address and subnet mask of the device.

Step 10 Click **Next**.

Step 11 To add a new DHCP Configuration, configure the following:

Client Lease Time	Amount of time that a network user is allowed to connect to the router with the current IP address. Enter the amount of time in minutes. Valid values are 5 to 3200 minutes. Default is 1460 minutes (24 hours).
Range Start and **Range End**	The range start and end of IP addresses that can be assigned dynamically. The range can be up to the maximum number of IP addresses that the server can assign without overlapping the PPTP and SSL VPN. For example, if the router uses the default LAN IP address, 192.168.1.1, the starting value must be 192.168.1.2 or greater.
DNS Server	DNS service type; where the DNS server IP address is acquired.
Static DNS 1 and Static DNS 2	Static IP address of a DNS Server. (Optional) if you enter a second DNS server, the device uses the first DNS server to respond to a request.
WINS Server	Optional IP address of a Windows Internet Naming Service (WINS) server that resolves NetBIOS names to IP addresses. Default is 0.0.0.0.
DHCP Options	• **Option 66 –** Enter the IP address or the hostname of a single TFTP server. • **Option 150 –** Enter the IP addresses of a list of TFTP servers. • **Option 67 –** Enter the boot filename.

Step 12 Click **Ok**, then click **Apply**.

Static DHCP

Static DHCP allows an IPv4 address to the defined MAC.

To configure static DHCP follow these steps:

Step 1 Select **LAN > Static DHCP**.

Step 2 Click **Add**.

Step 3 In the Static DHCP Table, enter a name in the Name field.

Step 4 Enter the IPv4 and MAC addresses in the respective fields.

Step 5 Check **Enable.**

Step 6 Click **Apply**.

802.1X Configuration

The IEEE 802.1X port-based authentication prevents unauthorized devices (clients) from gaining access to the network. This network access control uses the physical access characteristics of the IEEE 802 LAN infrastructures to authenticate and authorize devices attached to a LAN port, that has point-to-point connection characteristics. A port in this context is a single point of attachment to the LAN infrastructure.

The device supports multiple-hosts mode. In this mode, only one of the attached hosts must be successfully authorized for all hosts to be granted network access. If the port becomes unauthorized (re-authorization fails or an EAPOL-logoff message is received), all attached clients are denied access to the network.

To configure port-based authentication:

Step 1 Select **LAN > 802.1X Configuration**.

Step 2 Check **Enable Port-Based Authentication** to enable the feature.

Note 802.1X requires the use of RADIUS for authentication. Ensure that the RADIUS server is defined in User Accounts, on page 31.

Step 3 Select the Administration Status in the 802.1X Configuration Table from the drop-down list.

- **Force Authorized –** Authorization is not needed. At least one LAN port must be force authorized.
- **Auto –** Enables port-based authentication. The interface moves between an authorized or unauthorized state based on the authentication exchange between the device and the client.

Step 4 Click **Apply.**

Note Ensure that the respective configuration is active and correct before enabling a Port-based authentication.

DNS Local Database

A local Domain Name Service (DNS) server, is used for accelerated DNS service response. DNS matches a domain name to its routable IP address. For commonly used domain names a DNS local database which acts as a local DNS server can give faster results than using an external DNS server. If a requested domain name is not found in the local database, the request is forwarded to the DNS server that is specified on the Setup.

To configure DNS Local Database, follow these steps:

Step 1 Select **LAN > DNS Local Database**.

Step 2 Click **Add** and enter the host name and IPv4 or IPv6 address. You can also edit or delete DNS:

Step 3 Click **Apply**.

Router Advertisement

The Router Advertisement Daemon (RADVD) is used for defining interface settings, prefixes, routes, and announcements. Hosts rely on the routers on their local networks to facilitate communication to all other hosts except those on the local network. The routers send and respond to the Router Advertisement messages regularly. By enabling this feature, messages are sent by the router periodically and in response to solicitations. A host uses the information to learn the prefixes and parameters for the local network. Disabling this feature effectively disables auto configuration, requiring manual configuration of the IPv6 address, subnet prefix, and default gateway on each device.

To configure the Router Advertisement, follow these steps:

Step 1 Select **LAN > Router Advertisement**.

Step 2 Select the VLAN ID from the drop-down list.

Step 3 Check **Enable** to enable router advertisement and configure the following:

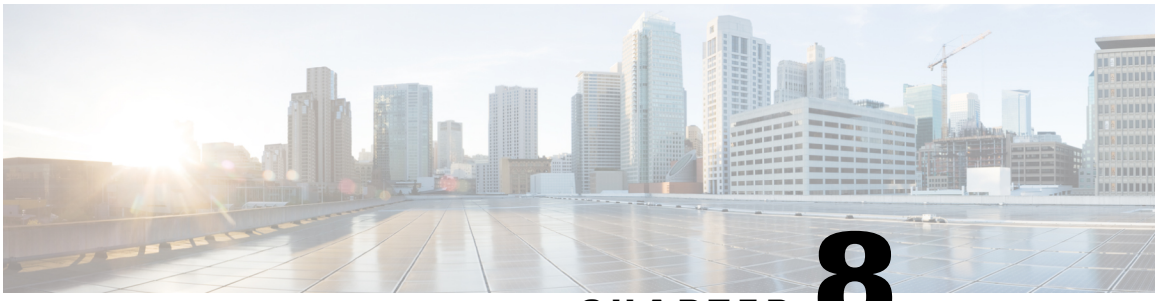
Advertisement Mode	Select the advertisement mode from the drop-down list (**Unicast or Unsolocited Multicast**).
Advertisement Interval	Enter the time interval between 10 and 1800 (Default is 30 seconds) at which the router advertisement messages are sent.
RA Flags	Determines whether hosts can use DHCPv6 to obtain IP addresses and related information. Select and check one of the following: • **Managed –** Hosts use an administered, stateful configuration protocol (DHCPv6) to obtain stateful addresses and other information through DHCPv6. • **Other –** Uses an administered, stateful configuration protocol (DHCPv6) to obtain other, non-address information, such as DNS server address.

Router Preference	Preference metric used in a network topology where multi-homed hosts have access to multiple routers. Router Preference helps a host to choose an appropriate router. There are three preferences to choose from, such as **High, Medium**, or **Low**. The default setting is High. Select the preference from the drop-down list.
Maximum Transmission Unit (MTU)	The MTU is the size of the largest packet that can be sent over the network. It is used in the router advertisement messages to ensure that all nodes on the network use the same MTU value when the LAN MTU is not well-known. The default setting is 1500 bytes, which is the standard value for Ethernet networks. For PPPoE connections, the standard is 1492 bytes. Unless your ISP requires a different setting, this setting should not be changed. Enter a value between 1280 and 1500.
Router Lifetime	Enter the time in seconds for the router advertisement messages to exist on the route. The default is 3600 seconds.

Step 4 In the Prefix Table, click **ADD** and enter a name for the prefix.

Step 5 Enter the prefix length and the lifetime in the Prefix Length and Lifetime fields.

Step 6 Click **Apply**.



CHAPTER 8

Routing

This section describes routing, which is the process of selecting the best paths in a network. Dynamic routing is a networking technique that provides optimal data routing. Dynamic routing enables routers to select paths according to real-time logical network layout changes. The router's routing protocol is responsible for the creation, maintenance, and updating of the dynamic routing table in the dynamic routing. This section contains the following topics:

IGMP Proxy

The Internet Group Management Protocol (IGMP) is used by hosts and routers on an IP network to create multicast group memberships. IGMP can be used for resources of web and support applications like online streaming for videos and games. The IGMP proxy enables the router to issue IGMP messages on behalf of the clients behind it.

To enable the IGMP proxy follow these steps:

Step 1 Select **Routing > IGMP Proxy**.

Step 2 Check **Enable IGMP Proxy** to allow the router and the nodes to communicate with each other.

Step 3 Select the **Upstream Interface** from the drop-down list.

- **WAN-Auto –** The router can support multi-WAN. If selecting the WAN auto mode, the router will select the active WAN as the upstream port. If multiple WANs are up and work in load balance mode, the WAN port with the lowest port number will be the upstream port. For example, if WAN1 and WAN2 are in load-balance mode, the WAN1 will be the upstream port. If WAN1 is down, the WAN 2 will be the upstream port.
- **Fixed Interface –** The fixed interface will always use the selected port as the upstream port even if it is down. For example, if WAN1 and WAN2 are in load balance mode, and you select WAN 2 as the upstream port, the WAN1 will not receive the multicast traffic regardless of whether the WAN2 is up or down. If selecting the **Fixed Interface**, make sure to also choose between **WAN 1**, **WAN 2** or **VLAN1**.

Step 4 Select the Downstream Interface, **WAN** or **VLAN1.**

Step 5 Click **Apply**.

RIP

Routing Information Protocol (RIP) is the standard IGP that is used on Local Area Networks (LAN). RIP ensure a higher degree of network stability by quickly rerouting network packets if one of the network connections goes off-line. When RIP is active, users experience little to no service interruptions due to single router, switch, or server outages if there are sufficient network resources available.

To configure RIP, follow these steps:

Step 1 Select **Routing > RIP**.

Step 2 To enable RIP, check **IPv4** or **IPv6** or both and configure the following:

Interface	Check **Enable** in the corresponding Interface to allow routes from upstream to be received. **Note** Checking **Enable** for an interface automatically checks RIP version 1, RIP version 2, RIPng (IPv6), and Authentication for that interface. Similarly, unchecking **Enable** unchecks all.
RIP version 1	This protocol uses classful routing and does not include subnet information or authentication. • Check **Enable** to enable sending and receiving routing information on RIP version 1. • Check **Passive** to disable routing information from being sent on RIP version 1. **Note** Passive configuration is activated only when **Enable** is checked.
RIP version 2	This is a classless protocol that uses multicast and has a password authentication. • Check **Enable** to enable sending and receiving routing information on RIP version 2. • Check **Passive** to disable routing information from being sent on RIP version 2. **Note** Passive configuration is activated only when **Enable** is checked.

RIPng (IPv6)	Routing Information Protocol next generation (RIPng) uses User Datagram Packets (UDP) to send routing information. This is based on RIP version 2 but used for IPv6 routing. • Check **Enable** to enable RIP IPv6 routing. • Check **Passive** to disable sending RIPng version. **Note** Passive configuration is activated only when **Enable** is checked.
Authentication	This is a security feature that forces authentication of RIP packets before routes are exchanged with other routers. This is not available for RIPv1. • Check **Enable** to enable authentication so that routes are exchanged only with trusted routers on the network. • **Password**: Select the authentication type **— Plain** (common method of authentication) or **MD5** (challenge-response authentication mechanism) **—** and enter the password.

Step 3 Click **Apply**.

Static Routing

Static Routing is a manually configured fixed pathway that a packet must travel to reach a destination. If there is no communication between the routers on the current network topology, static routing can be configured to communicate between the routers. Static Routing uses less network resources than dynamic routing because they do not constantly calculate the next route to take.

To configure static routing, follow these steps:

Step 1 Select **Routing > Static Routing**.

Step 2 For IPv4 Routes, in the Route Table, click **Add** or **Edit** and configure the following:

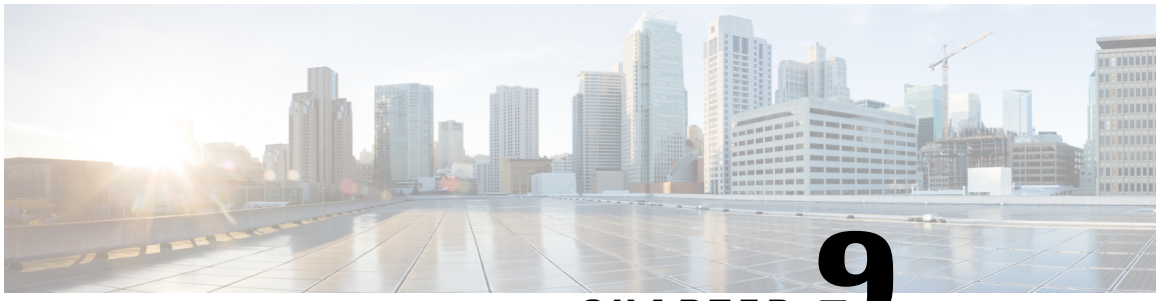
Network	Enter the destination subnetwork IP address to which you want to assign a static route to.
Mask	Enter the subnet mask of the destination address.
Next Hop	Enter the IP address of the router of the last resort.
Metric	The value in the Metric field represents the number of routers between your network and the destination. This is a direct connection, so it can be set to the minimum value of 1.
Interface	Choose the interface to use for this static route from the drop-down list.

Step 3 Click **Apply.**

Step 4 For IPv6 Routes, in the Route Table, click **Add** or **Edit** and configure the following:

Prefix	Enter the IPv6 prefix.
Length	Enter the number of prefix bits of the IP address.
Next Hop	Enter the IP address of the router of the last resort.
Metric	The value in the Metric field represents the number of routers between your network and the destination. This is a direct connection, so it can be set to the minimum value of 1.
Interface	Choose the interface to use for this static route from the drop-down list.

Step 5 Click **Apply**.



CHAPTER 9

Firewall

This section describes a firewall, which is a method designed to keep a network secure from intruders. The firewall examines traffic and filters the transmissions that do not meet the specified security criteria. The firewall decides which packets that are allowed or denied into or out of a network. This section contains the following topics:

Basic Settings

On the Basic Settings page, you can enable and configure the basic settings. You can also add trusted domains to this list. To configure the basic settings, follow these steps:

Step 1 Click Firewall > Basic Settings, and enter the following information:

Firewall	Check Enable to enable the firewall settings; uncheck **Enable** to disable.
DoS (Denial-of-service)	Check **Enable** to enable DoS. DoS blocks Ping of Death, SYN Flood Detect Rate [max/sec], IP Spoofing, Echo Storm, ICMP Flood, UDP Flood, and TCP Flood attacks.
Block WAN Request	Check **Enable** to block the ICMP echo requests to WAN.
LAN/VPN Web Management	Select **HTTP** or **HTTPS**.

Remote Web Management	Check **Enable** to enable remote web management and enter the Port (**Default 443, Range 1025-65535**). • Select **HTTP** or **HTTPS**.
Allowed Remote IP Address	Check **Any IP Address** or enter a range of IP addresses for remote access.
SIP ALG (Session Initiation Protocol Application-layer gateway)	Check **Enable** to allow SIP ALG. This embeds messages of the SIP passing through a configured device with Network Address Translation (NAT) to be translated and encoded back to the packet. This application-layer gateway (ALG) is used with NAT to translate the SIP or Session Description Protocol (SDP) messages.
FTP ALG Port	Enter the port number. The default value is 21. FTP ALG port translates the FTP packets.
UPnP (Universal Plug and Play	Check **Enable** to enable universal plug and play.
Restrict Web Features	Check to restrict the following web features: • **Java**: Blocks Web Java feature. • **Cookies**: Blocks cookies. • **ActiveX**: Blocks ActiveX. • **Access to HTTP Proxy Server**: Blocks HTTP proxy servers.
Exception	Check **Enable** to allow only the selected web features such as Java, Cookies, ActiveX, or Access to HTTP Proxy Servers and restrict all others.

Step 2 In the **Trusted Domains Table**, check **Domain Name** to edit the existing domain settings.

Step 3 Click **Add, Edit** or **Delete** to add, edit or delete a domain.

Step 4 Click **Apply**.

Access Rules

To configure the access rules, follow these steps:

Step 1 Select **Firewall > Access Rules**. In the **Access Rules Table**, enter the following information:

Step 2 Click **Add** or select the row and click **Edit** and enter the following:

Rule Status	Check **Enable** to enable the specific access rule. Uncheck to disable.
Action	Choose **Allows** or **Denies** from the drop-down list.

Services	• **IPv4 –** Select the service to apply IPv4 rule. • **IPv6 –** Select the service to apply IPv6 rule. • **Services –** Select the service from the drop-down list.
Log	Select **True** or **Never** from the drop-down list. • **True –** Matches the rules. • **Never –** No log required.
Source Interface	Select the source interface (**WAN1, WAN2, USB1, USB2, VLAN1 or Any**), from the drop-down list.
Source Address	Select the source IP address to which the rule is applied and enter the following: • **Any** • **Single IP –** Enter an IP address. • **IP Range –** Enter the range of IP addresses. • **Subnet –** Enter a subnet of a network.
Destination Interface	Select the source interface (**WAN1, WAN2, USB1, USB2, VLAN1 or Any**), from the drop-down list.
Destination Address	Select the source IP address to which the rule is applied and enter the following: • **Any** • **Single IP –** Enter an IP address. • **IP Range –** Enter the range of IP addresses. • **Subnet –** Enter a subnet of a network.
Schedule Name	Select **Business, Evening hours, Marketing,** or **Work** from the drop-down list to apply the firewall rule. Then, click on the link to configure the schedules.

Step 3 Click **Apply**.

Step 4 Click **Restore to Default Rules**, to restore the default rules.

Step 5 Click **Service Management** to configure the services.

Step 6 To add a service, click **Add**. To edit or delete a service, select the row and click **Edit** or **Delete**.

Step 7 Configure the following:

- **Application Name –** Name of the service or application.
- **Protocol –** Required protocol. Refer to the documentation for the service that you are hosting.

- **Port Start/ICMP Type/IP Protocol –** Range of port numbers reserved for this service.
- **Port End –** Last number of the port, reserved for this service.

Step 8 Click **Apply**.

Network Address Translation

Network address translation (NAT) enables private IP networks with unregistered IP addresses to connect to the network. NAT translates the private addresses of the internal network to public addresses before packets are forwarded to the public network.

To configure NAT, follow these steps:

Step 1 Click **Firewall > Network Address Translation**.

Step 2 In the **NAT Table**, check **Enable NAT** for each interface on the Interface list to enable.

Step 3 Click **Apply**.

Static NAT

Static NAT is used to protect the LAN devices from discovery and attack. Static NAT creates a relationship that maps a valid WAN IP address to LAN IP addresses that are hidden from the WAN (Internet) by NAT.

Step 1 Click **Firewall > Static NAT**.

Step 2 Click **Add** (or select the row and click **Edit**) and enter the information.

Private IP Range Begin	Enter the starting IP address of the internal IP address range to map to the public range.
Public IP Range Begin	Enter the starting IP address of the public IP address range provided by ISP. **Note** Do not include the router WAN IP address in this range.
Range Length	Enter the number of IP addresses in the range. **Note** The range length must not exceed the number of valid IP addresses. To map a single address, enter 1.
Services	Select the name of the service, from the drop-down list, to apply for the Static NAT.
Interfaces	Select the name of the interface from the drop-down list.
Active	Check **Active** to enable.

Step 3 Click **Service Management**.

Step 4 To add a service, click **Add** under the Service table. To edit or delete a service, select the row and click **Edit or Delete**. The fields open for modification.

Step 5 Configure the following services:

- **Application Name –** Name of the service or application.
- **Protocol –** Enter the protocol.
- **Port Start/ICMP Type/IP Protocol –** Enter a range of port numbers reserved for this service.
- **Port End –** Enter the last number of the port, reserved for this service.

Step 6 Click **Apply**.

Port Forwarding

Port forwarding allows public access to services on network devices on the LAN by opening a specific port or port range for a service.

To configure the port forwarding, follow these steps:

Step 1 Click **Firewall > Port Forwarding**.

Step 2 In the **Port Forwarding Table**, click **Add** or select the row and click **Edit**) and configure the following:

External Service	Select an external service from the drop-down list. (If a service is not listed, you can add or modify the list by following the instructions in the Service Management section.)
Internal Service	Select an internal service from the drop-down list. (If a service is not listed, you can add or modify the list by following the instructions in the Service Management section.)
Internal IP Address	Enter the internal IP addresses of the server.
Interfaces	Select the interface from the drop-down list, to apply port forwarding on.
Status	Enable or disable the port forwarding rule.

Step 3 Click **Service Management**.

Step 4 In the **Service Table**, click **Add** or select a row and click **Edit** and configure the following:

- **Application Name –** Name of the service or application.
- **Protocol –** Required protocol. Refer to the documentation for the service that you are hosting.
- **Port Start/ICMP Type/IP Protocol –** Range of port numbers reserved for this service.
- **Port End –** Last number of the port, reserved for this service.

Step 5 Click **Apply**.

Note The port forwarding rules for UPnP are dynamically added by the UPnP application.

Step 6 In the **UPnP Port Forwarding Table**, click **Refresh** to refresh the UPnP listing.

Port Triggering

Port triggering allows a specified port or port range to open for inbound traffic after user sends outbound traffic through the trigger port. Port triggering allows the device to monitor outgoing data for specific port numbers. The device recalls the client's IP address that sent the matching data. When the requested data returns through the device, the data is sent to the proper client using the IP addressing and port mapping rules.

To add or edit a service to the port triggering table, configure the following:

Step 1 Click **Add** (or select the row and click **Edit**) and enter the information:

Application Name	Enter the name of the application.
Trigger Service	Select a service from the drop-down list. (If a service is not listed, you can add or modify the list by following the instructions in the Service Management section.)
Incoming Service	Select a service from the drop-down list. (If a service is not listed, you can add or modify the list by following the instructions in the Service Management section.)
Interfaces	Select the interface from the drop-down list.
Status	Enable or disable the port triggering rule.

Step 2 Click **Service Management**, to add or edit an entry on the Service list.

Step 3 In the **Service Table**, click **Add** or **Edit** and configure the following:

- **Application Name –** Name of the service or application.
- **Protocol –** Required protocol. Refer to the documentation for the service that you are hosting.
- **Port Start/ICMP Type/IP Protocol –** Range of port numbers reserved for this service.
- **Port End –** Last number of the port, reserved for this service.

Step 4 Click **Apply**.

Session Timeout

With the session timeout feature, you can configure the session time-out and maximum concurrent connections for TCP/UDP/ICMP flows. The session timeout is the time it takes for the TCP or UDP session to time out after a period of idleness.

To configure the Session Timeout, follow these steps:

Step 1 Click **Firewall > Session Timeout**.

Step 2 Enter the following:

TCP Session Timeout	Enter the timeout value in seconds for TCP sessions. Inactive TCP sessions are removed from the session table after this duration.
UDP Session Timeout	Enter the timeout value in seconds for UDP sessions. Inactive UDP sessions are removed from the session table after this duration.
ICMP Session Timeout	Enter the timeout value in seconds for ICMP sessions. Inactive ICMP sessions are removed from the session table after this duration.
Maximum Concurrent Connection	Enter the maximum number of concurrent connections allowed.
Current Connections	Displays the number of current connections.
Clear Connections	Click to clear the current connections.

Step 3 Click **Apply**.

DMZ Host

DMZ is a subnetwork that is open to the public but behind the firewall. With DMZ, the packets, which enter the WAN port, can be redirected to a specific IP address on the LAN.

DMZ Host allows one host on the LAN to be exposed to the Internet to use services such as Internet gaming, video conferencing, web, or email servers. Access to the DMZ Host from the Internet can be restricted by using firewall access rules. We recommend that you place hosts that must be exposed to the WAN for services in the DMZ network.

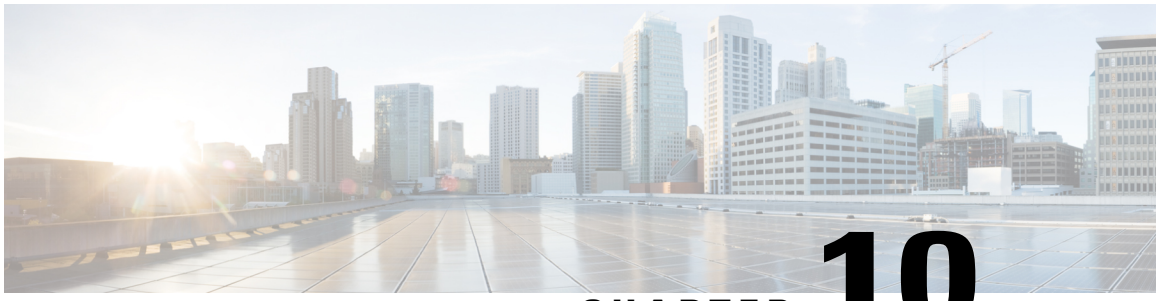
To configure the DMZ follow these steps:

Step 1 Choose **Firewall > DMZ**.

Step 2 In **DMZ Host**, check **Enable**.

Step 3 Enter the **DMZ Host IP Address**.

Step 4 Click **Apply**.



CHAPTER 10

VPN

This section describes a Virtual Private Network (VPN), which is used to establish an encrypted connection over a less secure network. Virtual private networks ensure secure connections to an underlying network infrastructure. A tunnel establishes a private network that can send data securely using encryption and authentication. This section contains the following topics:

VPN Setup Wizard

The VPN allows a remote host to act as if they were located on the same local network. The router supports 50 tunnels. The VPN Setup Wizard guides in configuring a secure connection for site-to-site IPSec tunnel. This simplifies the configuration by avoiding complex and optional parameters, so any user can set up the IPSec tunnel in a fast and efficient manner.

To start the VPN Setup Wizard, click **VPN > VPN Setup Wizard**. Follow the steps below to configure the Wizard.

Step 1 In the Getting Started section, enter a connection name in the **Give this connection a name** box.

Step 2 Select an interface (**WAN1, WAN2, USB1, or USB2**) from the drop-down list.

Step 3 Click **Next**.

Step 4 In the Remote Router Settings section, select the **Remote Connection Type** from the drop-down list. If you select **IP Address**, enter the IP Address, or if you select a fully qualified domain name (**FQDN**), enter the name.

Step 5 Click **Next**, to move to the next screen.

Step 6 In the Local and Remote Networks section, under Local Traffic Selection, select the Local IP (**IP Address or Subnet**) from the drop-down list. If you select **IP Address**, enter the IP address, or if you select **Subnet**, enter the IP address and subnet mask.

Step 7 Under Remote Traffic Selection, select the Remote IP (**IP Address or Subnet**) from the drop-down list. If you select **IP Address**, enter the IP address or if you select **Subnet**, then enter the IP address and subnet mask.

Step 8 Click **Next**.

Step 9 In the IPSec Profile, select the IPSec profile from the drop-down list.

Step 10 If you select **Default**, then click **Next**.

Step 11 If you select **New Profile**, configure the following:
Phase 1 Options

Diffie-Hellman (DH) Group	Select a DH group (**Group 2 or Group 5**) from the drop-down list. DH is a key exchange protocol, with two groups of different prime key lengths: Group 2 has up to 1,024 bits, and Group 5 has up to 1,536 bits. For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected by default.
Encryption	Select an encryption option (**3DES, AES-128, AES-192, or AES-256**) from the drop-down list. This method determines the algorithm used to encrypt or decrypt ESP/ISAKMP packets.
Authentication	The authentication method determines how the Encapsulating Security Payload Protocol (ESP) header packets are validated. The MD5 is a one-way hashing algorithm that produces a 128-bit digest. The SHA1 is a one-way hashing algorithm that produces a 160-bit digest. The SHA1 is recommended because it is more secure. Make sure that both ends of the VPN tunnel use the same authentication method. Select an authentication (**MD5, SHA1 or SHA2-256**).
SA Lifetime (Sec)	Amount of time an IKE SA is active in this phase. The default value for Phase 1 is 28,800 seconds.
Perfect Forward Secrecy (PFS)	Check **Enable** to enable PFS and enter the lifetime in seconds, or uncheck **Enable** to disable. When the PFS is enabled, the IKE Phase 2 negotiation generates a new key for the IPSec traffic encryption and authentication. Enabling this feature is recommended.

Pre-Shared Key	Pre-shared key to use to authenticate the remote IKE peer. You can enter up to 30 keyboard characters or hexadecimal values, such as My_@123 or 4d795f40313233. Both ends of the VPN tunnel must use the same Pre-shared Key. We recommend that you change the Pre-shared Key periodically to maximize VPN security.

Phase 2 Options

Diffie-Hellman (DH) Group	Select a DH group (**Group 2 or Group 5**) from the drop-down list. DH is a key exchange protocol, with two groups of different prime key lengths: Group 2 has up to 1,024 bits, and Group 5 has up to 1,536 bits. For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected by default. **Note** This is enabled only when Perfect Forward secrecy is enabled under Phase I Options.
Protocol Selection	Select a protocol from the drop-down list. • **ESP**: Select ESP for data encryption and enter the encryption. • **AH**: Select this for data integrity in situations where data is not secret but must be authenticated.
Encryption	Select an encryption option (**3DES, AES-128, AES-192, or AES-256**) from the drop-down list. This method determines the algorithm used to encrypt or decrypt ESP/ISAKMP packets.
Authentication	Select an authentication (**MD5, SHA1 or SHA2-256**).
SA Lifetime (Sec)	Amount of time a VPN tunnel (IPSec SA) is active in this phase. The default value for Phase 2 is 3600 seconds.

Step 12 Click **Next** to see the summary of all configurations.

Step 13 Click **Submit**.

IPSec Profiles

The IPSec profiles contain information related to the algorithms such as encryption, authentication, and DH group for Phase I and II negotiations in auto mode. These profiles also contain keys for corresponding algorithms in case keying mode is manual. The IPSec profiles are referred in any of IPSec VPN records like site-to-site, client-to-site, or Teleworker VPN client

To configure the IPSec Profiles, follow these steps:

Step 1 Select **VPN > IPSec Profiles**.

Step 2 In the IPSec Profiles Table, click **Add**.

Step 3 Under Add a New IPSec Profile, enter a name in the Profile Name section.

Step 4 Select the Keying Mode.

Step 5 For **Auto Keying Mode,** configure the following:

Phase 1 Options

Diffie-Hellman (DH) Group	Select a DH group (**Group 2 or Group 5**) from the drop-down list. DH is a key exchange protocol, with two groups of different prime key lengths: Group 2 has up to 1,024 bits, and Group 5 has up to 1,536 bits. For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected by default.
Encryption	Select an encryption option (**3DES, AES-128, AES-192, or AES-256**) from the drop-down list. This method determines the algorithm used to encrypt or decrypt ESP/ISAKMP packets.
Authentication	The authentication method determines how the Encapsulating Security Payload Protocol (ESP) header packets are validated. The MD5 is a one-way hashing algorithm that produces a 128-bit digest. The SHA1 is a one-way hashing algorithm that produces a 160-bit digest. The SHA1 is recommended because it is more secure. Make sure that both ends of the VPN tunnel use the same authentication method. Select an authentication (**MD5, SHA1 or SHA2-256**).
SA Lifetime (Sec)	Amount of time an IKE SA is active in this phase. The default value for Phase 1 is 28,800 seconds.
Perfect Forward Secrecy (PFS)	Check **Enable** to enable PFS and enter the lifetime in seconds, or uncheck **Enable** to disable. When the PFS is enabled, the IKE Phase 2 negotiation generates a new key for the IPSec traffic encryption and authentication. Enabling this feature is recommended.

Phase 2 Options

Protocol Selection	Select a protocol from the drop-down list. • **ESP**: Select ESP for data encryption and enter the encryption. • **AH**: Select this for data integrity in situations where data is not secret but must be authenticated.
Encryption	Select an encryption option (**3DES, AES-128, AES-192, or AES-256**) from the drop-down list. This method determines the algorithm used to encrypt or decrypt ESP/ISAKMP packets.
Authentication	Select an authentication (**MD5, SHA1 or SHA2-256**).

SA Lifetime (Sec)	Amount of time a VPN tunnel (IPSec SA) is active in this phase. The default value for Phase 2 is 3600 seconds.
Diffie-Hellman (DH) Group	Select a DH group (**Group 2 or Group 5**) from the drop-down list. DH is a key exchange protocol, with two groups of different prime key lengths: Group 2 has up to 1,024 bits, and Group 5 has up to 1,536 bits. For faster speed and lower security, choose Group 2. For slower speed and higher security, choose Group 5. Group 2 is selected by default.

Step 6 For **Manual Keying Mode**, configure the following:

IPsec Configurations

Security Parameter Index (SPI) Incoming	Enter a number (Range 100 - FFFFFFFF, Default 100). The SPI is an identification tag added to the header while using IPsec for tunneling the IP traffic. This tag helps the kernel discern between the two traffic streams where different encryption rules and algorithms may be in use.
SPI Outgoing	Enter a number (Range 100 - FFFFFFFF, Default 100).
Encryption	Select an encryption option (**3DES, AES-128, AES-192, or AES-256**) from the drop-down list. This method determines the algorithm used to encrypt or decrypt ESP/ISAKMP packets.
Key-In	Enter a number (Hex, 48 characters). Key for decrypting ESP packets received in hex format.
Key-Out	Enter a number (Hex, 48 characters). Key for encrypting the plain packets in hex format.
Authentication	The authentication method determines how the Encapsulating Security Payload Protocol (ESP) header packets are validated. The MD5 is a one-way hashing algorithm that produces a 128-bit digest. The SHA1 is a one-way hashing algorithm that produces a 160-bit digest. The SHA1 is recommended because it is more secure. Make sure that both ends of the VPN tunnel use the same authentication method. Select an authentication (**MD5, SHA1 or SHA2-256**).
SA Lifetime (Sec)	Amount of time an IKE SA is active in this phase. The default value for Phase 1 is 28,800 seconds.
Key-In	Enter a number (Hex, 32 characters). Key for decrypting ESP packets received in hex format.
Key-Out	Enter a number (Hex, 32 characters). Key for encrypting the plain packets in hex format.

Step 7 Select an IPsec profile and click **Edit** or **Delete**.

Step 8 To clone an exiting profile, select a profile and click **Clone**.

Step 9 Click **Apply**.

Site-to-Site

In a site-to-site VPN, the local router at one location connects to a remote router through a VPN tunnel. Client devices can access network resources as if they were all at the same site. This model can be used for multiple users at a remote location.

A successful connection requires that at least one of the routers to be identifiable by a static IP address or a Dynamic DNS hostname. If one router has only a dynamic IP address, you can use any email address (user FQDN) or FQDN as an identification to establish the connection.

The two LAN subnets on either side of the tunnel cannot be on the same network. For example, if the Site A LAN uses the 192.168.1.x/24 subnet, Site B can use 192.168.2.x/24.

To configure a tunnel, enter corresponding settings (reversing local and remote) when configuring the two routers. Assume that this router is identified as Router A. Enter its settings in the Local Group Setup section; enter the settings for the other router (Router B) in the Remote Group Setup section. When you configure the other router (Router B), enter its settings in the Local Group Setup section, and enter the Router A settings in the Remote Group Setup section.

To configure the Site-to-Site VPN, follow these steps:

Step 1 Click **VPN > Site-to-Site**.

Step 2 In the Site to Site table, the following will be displayed:

Connection Name	The name of the VPN tunnel connection created using VPN Setup Wizard. It does not have to match the name used at the other end of the tunnel.
Remote Endpoint	IP Address of the remote endpoint to where the VPN connection is intended. This can be an FQDN or an IP address.
Interface	Interface used for the tunnel.
IPSec Profile	IPSec profile used for the VPN tunnel.
Local Traffic Selection	Traffic selectors from which traffic is originating.
Remote Traffic Selection	Traffic selectors to which traffic is destined.
Status	Status of the tunnel.
Actions	• **Edit –** Click to edit the connection, it navigates to Site to Site - Add or Edit a New Connection page. • **Delete –** Click to delete the connection. • **Connect –** Click to connect and establish the tunnel. • **Disconnect –** Click to disconnect the connection.
Create a site-to-site VPN	Click to create a new site-to-site tunnel.
Create a secure GRE tunnel	Click to create a new GRE tunnel.

Create a Site-to-Site VPN Connection

Step 1 On the Basic Settings tab, provide the following information:

Enable	Click **Enable** to enable the configuration.
Connection Name	Enter a connection name for the VPN tunnel. This description is for reference purposes; it does not have to match the name used at the other end of the tunnel.
IPSec Profile	**Default** - Auto Profile is already chosen.
Interface	Select the interface (**WAN1, WAN2, USB1, or USB2**) from the drop-down list to use for this tunnel.
Remote Endpoint	Select **Static IP**, or **FQDN** from the drop-down list.

IKE Authentication Method

Preshared Key	IKE peers authenticate each other by computing and sending a keyed hash of data that includes the pre-shared key. If the receiving peer is able to create the same hash independently using its Pre-shared key, it knows that both peers must share the same secret, thus authenticating the other peer. Pre-shared keys do not scale well because each IPSec peer must be configured with the Pre-shared key of every other peer with which it establishes a session. Enter the Pre-shared Key, and click **Enable** to enable the Minimum Pre-shared Key Complexity.
Certificate	The digital certificate is a package that contains information such as a certificate bearer's identity: name or IP address, the certificate's serial number, the certificate's expiration date, and a copy of the certificate bearer's public key. The standard digital certificate format is defined in the X.509 specification. X.509 version 3 defines the data structure for certificates. Select the certificate from the drop-down list.

For Local Group Setup

Local Identifier Type	Select Local WAN IP, Local FQDN, or Local User FQDN from the drop-down list
Local Identifier	Enter the identifier name or IP Address based on your selection
Local IP Type	Select **IP address** or **Subnet** from the drop-down list.
IP Address	Enter the IP address of the device that can use this tunnel.
Subnet Mask	Enter the subnet mask.

Remote Group Setup

Remote Identifier Type	Select Local WAN IP, Local FQDN, or Local User FQDN from the drop-down list.
Remote Identifier	Enter the identifier name or IP Address based on your selection
Remote IP Type	Select **IP address** or **Subnet** from the drop-down list.
IP Address	Enter the IP address of the device that can use this tunnel.
Subnet Mask	Enter the subnet mask.

Step 2 On the Advanced Settings tab, provide the following:

Aggressive Mode	There are two modes of IKE SA negotiation – **Main Mode** and **Aggressive Mode**. Main mode is recommended when the network's security is preferred. If network speed is preferred, Aggressive Mode is recommended. Check **Enable** to enable Aggressive Mode, or uncheck **Enable** to use the Main Mode. If the Remote Security Gateway Type is one of the Dynamic IP types, Aggressive Mode is required. The box is checked automatically, and this setting cannot be changed.
Compress	A protocol that reduces the size of IP datagrams. Check Compress to enable the router to propose compression when it starts a connection. If the responder rejects this proposal, then the router does not implement compression. When the router is the responder, it accepts compression, even if compression is not enabled. If you enable this feature for this router, also enable it on the router at the other end of the tunnel.
NetBIOS Broadcast	Broadcast messages used for name resolution in Windows networking to identify resources such as computers, printers, and file servers. These messages are used by some software applications and Windows features such as Network Neighborhood. LAN broadcast traffic is typically not forwarded over a VPN tunnel. However, you can check this box to allow NetBIOS broadcasts from one end of the tunnel to be rebroadcast to the other end.
Keep-Alive	Attempts to re-establish the VPN connection in regular intervals of time.
Dead Peer Detection (DPD) Enable	Click **DPD** to enable DPD. It sends periodic HELLO/ACK messages to check the status of the VPN tunnel. DPD option must be enabled on both ends of the VPN tunnel. Specify the interval between HELLO/ACK messages in the Interval field by entering the following: • **Delay Time**: Enter the time delay between each Hello message. • **Detection Timeout**: Enter the timeout to declare that the peer is dead. • **Delay Action**: Action to be taken after DPD timeout. Select **Clear** or **Restart** from the drop-down list.
Extended Authentication	Check **Extended Authentication** to enable. For a single user, select **User** and enter the username and password. For a group, select **Group Name**, and select **admin** or **guest** from the drop-down list.

Split DNS	Check **Split DNS** to enable. Splits the DNS server and other DNS requests to another DNS server, based on specified domain names. When the router receives an address resolution request, it inspects the domain name. If the domain name matches a domain name in the Split DNS settings, it passes the request to the specified DNS server. Otherwise, the request is passed to the DNS server that is specified in the WAN interface settings. **DNS Server 1 and DNS Server 2 –** Enter the IP address of the DNS server to use for the specified domains. Optionally, specify a secondary DNS server in the DNS Server 2 field. **Domain Name 1 to 6 –** Enter the domain names for the DNS servers. Requests for the domains are passed to the specified DNS server.

Step 3 To enable the Site-to-Site Failover, the Keep-Alive should be enabled on the Advanced Settings tab. Next, on the Failover tab, provide the following information:

Tunnel Backup	Check **Tunnel Backup** to enable. When the primary tunnel is down, this feature enables the router to re-establish the VPN tunnel by using either an alternate IP address for the remote peer or an alternate local WAN interface. This feature is available only if DPD is enabled.
Remote Backup IP Address	Enter the IP address for the remote peer, or reenter the WAN IP address that was already set for the remote gateway.
Local Interface	Select the local interface (**WAN1, WAN2, USB1, or USB2**) from the drop-down list.

Note To enable the Site-to-Site failover, you must enable the Keep-Alive on the Advanced settings.

Step 4 Click **Apply**.

Creating a Secure GRE Tunnel

Generic Routing Encapsulation (GRE) is one of the available tunneling mechanisms which uses an IP as the transport protocol and carries many different passenger protocols. The tunnels behave as virtual point-to-point links that have two endpoints identified by the tunnel source and tunnel destination addresses at each endpoint.

Step 1 Click **Create a secure GRE tunnel**.

Step 2 Click **Enable** to enable the configuration and complete the following:

For GRE Tunnel Information

Interface Name	Enter the name of the interface to connect to tunnel.
Tunnel Source	Select the tunnel source **(WAN1, WAN2, USB1, or USB2**) from the drop-down list.

Tunnel Destination	Select the tunnel destination (**Static IP or FQDN**) from the drop-down list.
IP Address of GRE tunnel	Enter the IP address of the tunnel which carries the transport protocol.
Subnet Mask	Enter the subnet mask of the GRE tunnel.

For IPSec Tunnel

Connection Name	Name of the connection.
IPSec Profile	Select the IPSec profile (**Default, IPSecProfileAuto, IPSecProfileManual, Manual 1, or Auto**) from the drop-down list.
Local Identifier Type	Select Local WAN IP, Local FQDN, or Local User FQDN from the drop-down list.
Local Identifier	Enter the identifier name or IP Address based on your selection.
Remote Identifier Type	Select **Local WAN IP, Local FQDN,** or **Local User FQDN** from the drop-down list.
Remote Identifier	Enter the identifier name or IP Address based on your selection.

For IKE Authentication Method

Pre-shared Key	IKE peers authenticate each other by computing and sending a keyed hash of data that includes the pre-shared key. If the receiving peer is able to create the same hash independently using its Pre-shared key, it knows that both peers must share the same secret, thus authenticating the other peer. Pre-shared keys do not scale well because each IPSec peer must be configured with the Pre-shared key of every other peer with which it establishes a session. Enter the Pre-shared Key, and click **Enable** to enable the Minimum Pre-shared Key Complexity.
Certificate	The digital certificate is a package that contains information such as a certificate bearer's identity: name or IP address, the certificate's serial number, the certificate's expiration date, and a copy of the certificate bearer's public key. The standard digital certificate format is defined in the X.509 specification. X.509 version 3 defines the data structure for certificates. Select the certificate from the drop-down list.

For Routing Protocol

Static Routing	Check Static Routing to enable the static routing and select the following from the drop-down list. • **Split Tunneling –** Allows a mobile user to access dissimilar security domains like a public network and a local LAN or WAN simultaneously, using the same or different network connections. • **Tunnel all traffic –** To allow all the traffic through the tunnel.
IP Address	Click **Add** and enter the IP Address. You can also edit or delete the existing record by clicking **Edit** or **Delete**.

Netmask	Enter the netmask.
Multicast forwarding	Select **Multicast forwarding** to allow the router forward multicast traffic to networks where other multicast devices are receptive. Multicast forwarding prevents the forwarding of multicast traffic to networks where there are receptive no nodes. Click the link to configure the IGMP proxy interface.
Aggressive Mode	Click to enable aggressive mode.

Step 3 Click **Apply**.

Client to Site

Clients from the Internet can connect to the server to access the corporate network or a LAN behind the server. This feature creates a new VPN tunnel to allow teleworkers and business travelers to access your network by using third-party VPN client software.

To configure the Client-to-Site, follow these steps:

Step 1 Click **VPN > Client-to-Site**.

Step 2 Click **Add** and the IPsec Client-to-Site Groups table will be displayed.

Step 3 To add a Client to Site connection, click **Add**.

Step 4 In the **Add a New Group** section, select an option (**Cisco VPN Client or 3rd Party Client)**.

Step 5 For Cisco VPN Client, configure the following:

Enable	Click **Enable** to enable the configuration.
Group Name	Enter a group name. This is used as an identifier for all the members of this group during IKE negotiations.
Interface	Select the interface (**WAN1, WAN2, USB1, or USB2**) from the drop-down list.

IKE Authentication Method	Authentication method to be used in IKE negotiations in IKE-based tunnels. • **Pre-shared Key**: IKE peers authenticate each other by computing and sending a keyed hash of data that includes the Pre-shared Key. If the receiving peer is able to create the same hash independently using its Pre-shared key, it knows that both peers must share the same secret, thus authenticating the other peer. Pre-shared keys do not scale well because each IPSec peer must be configured with the Pre-shared key of every other peer with which it establishes a session. Enter the Pre-shared Key, and click **Enable** to enable the Minimum Pre-shared Key Complexity. • **Certificate**: The digital certificate is a package that contains information such as a certificate bearer's identity: name or IP address, the certificate's serial number, the certificate's expiration date, and a copy of the certificate bearer's public key. The standard digital certificate format is defined in the X.509 specification. X.509 version 3 defines the data structure for certificates. Select the certificate from the drop-down list.
User Group	Click **Group Name** and select the user group (**admin or guest**).Click **Add or Delete** to modify the User Group.
Mode	Select the mode from the options. • **Client –** Client request for IP address and server supplies the IP addresses from the configured address range. Select **Client** and enter the start and end IP addresses for client's LAN. • **Network Extension Mode (NEM) –** Clients propose their subnet for which VPN services need to be applied on traffic between LAN behind server and subnet proposed by client.
Pool Range for Client LAN	**Start IP –** Enter the start IP address for the pool range.**End IP** - Enter the end IP address for the pool range.

For Mode Configuration

Primary DNS	Enter the IP address of the primary DNS server.
Secondary DNS	Enter the IP address of the secondary DNS server.
Primary Windows Internet Name Service (WINS) Server	Enter the IP address of the primary WINS.
Secondary WINS Server	Enter the IP address of the secondary WINS.
Default Domain	Enter the name of the default domain to be used in remote network.

Back Server 1, 2, & 3	Enter the IP address or domain name of the back servers 1, 2 and 3. When the connection to the primary IPSec VPN server fails, the security appliance can start the VPN connection to the backup servers. The backup server 1 has the highest priority and the backup server 3 has the lowest priority.
Split Tunnel	Check to enable split tunnel. Then click **Add**, to enter an IP address and netmask for the split tunnel. You can add, edit, or delete a split tunnel.
Split DNS	Check to enable split DNS. Then click **Add,** to enter an domain name for the split DNS. You can add, edit, or delete a split tunnel.

For a 3rd Party Client

Step 6 In the Basic Settings tab, configure the following:

Enable	Click **Enable** to enable the configuration.
Tunnel Name	Name of the VPN tunnel. This description is for your reference. It does not have to match the name used at the other end of the tunnel
Interface	Select the interface (WAN1, WAN2, USB1, or USB2) from the drop-down list.
IKE Authentication Method	Authentication method to be used in IKE negotiations in IKE-based tunnels. • **Pre-shared Key**: IKE peers authenticate each other by computing and sending a keyed hash of data that includes the Pre-shared key. If the receiving peer is able to create the same hash independently using its Pre-shared key, it knows that both peers must share the same secret, thus authenticating the other peer. Pre-shared keys do not scale well because each IPSec peer must be configured with the Pre-shared key of every other peer with which it establishes a session. Enter the Pre-shared Key, and click Enable to enable the Minimum Pre-shared Key Complexity. • **Certificate**: The digital certificate is a package that contains information such as a certificate bearer's identity: name or IP address, the certificate's serial number, the certificate's expiration date, and a copy of the certificate bearer's public key. The standard digital certificate format is defined in the X.509 specification. X.509 version 3 defines the data structure for certificates. Select the certificate from the drop-down list.
Local Identifier	Select the local identifier type (**IP Address, FQDN, or User FQDN**) from the drop-down list and enter the identifier.
Remote Identifier	Select the remote identifier **(Remote IP, FQDN, or User FQDN**) from the drop-down list and enter the identifier.
Extended Authentication	Check **Extended Authentication** to enable. Click **Add** to add an extended authentication and select **admin** or **guest**.
Pool Range for Client LAN	**Start IP** - Enter the start IP address for the pool range.**End IP** - Enter the end IP address for the pool range.

Step 7 In the Advanced Settings tab, configure the following:

IPSec Profile	Set to Default.
Remote Endpoint	Select the remote endpoint (**Static IP, FQDN, or Dynamic IP**) from the drop-down list.

For Local Group Setup

Local IP Type	Select the local IP type (**IP address or Subnet**) from the drop-down list.
IP Address	Enter the IP Address of the device.
Subnet Mask	Enter the subnet mark.

For Mode Configuration

Primary DNS	Enter the IP address of the primary DNS server.
Secondary DNS	Enter the IP address of the secondary DNS server.
Primary Windows Internet Name Service (WINS) Server	Enter the IP address of the primary WINS.
Secondary WINS Server	Enter the IP address of the secondary WINS.
Default Domain	Enter the name of the default domain to be used in remote network.
Back Server 1, 2, & 3	Enter the IP address or domain name of the back servers 1, 2 and 3. When the connection to the primary IPSec VPN server fails, the security appliance can start the VPN connection to the backup servers. The backup server 1 has the highest priority and the backup server 3 has the lowest priority.
Split Tunnel	Check to enable split tunnel. Then click **Add**, to enter an IP address and netmask for the split tunnel. You can add, edit, or delete a split tunnel.
Split DNS	Check to enable split DNS. Then click **Add,** to enter an domain name for the split DNS. You can add, edit, or delete a split tunnel.

Additional Settings

Aggressive Mode	Check **Aggressive Mode** to enable. The Aggressive Mode feature allows you to specify RADIUS tunnel attributes for an IP security (IPsec) peer and to initiate an Internet Key Exchange (IKE) aggressive mode negotiation with the tunnel attributes.
Compress (Support IP Payload compression Protocol (IP Comp))	Check **Compress** to enable the router to propose compression when it starts a connection. If the responder rejects this proposal, then the router does not implement compression. When the router is the responder, it accepts compression, even if compression is not enabled. If you enable this feature for this router, also enable it on the router at the other end of the tunnel.

Step 8 Click **Apply.**

Teleworker VPN Client

The Teleworker VPN Client feature minimizes the configuration requirements at remote locations by allowing the device to work as a Cisco VPN hardware client. When the Teleworker VPN Client starts the VPN connection, the IPSec VPN server pushes the IPSec policies to the Teleworker VPN Client and creates the corresponding tunnel.

To configure the Teleworker VPN Client, follow these steps:

Step 1 Click **VPN > Teleworker VPN Client** and configure the following:

Teleworker VPN Client	Check **On** or **Off.**Only one Teleworker VPN Client can have an active connection at startup.If you enable one Teleworker VPN Client on startup, it will disable this option on other client rules.
Auto Initiation Retry	Check **On** or **Off.**
Retry Interval	Enter the time in seconds (Range 120 to 1800).
Retry Limit	Enter the maximum number of retries (Range 0 to 16).

Step 2 Click **Apply**.

Step 3 In the Teleworkers VPN Client table, click **Add**.

Step 4 Provide the following information in the Basic Settings section:

Name	Enter a name for the profile.
Server (Remote Address)	Enter the remote server's IP address.
Active Connection on Startup	To start connection on startup. At any point, only one profile can be in On state to start negotiations at startup

IKE Authentication Method	Authentication method to be used in IKE negotiations in IKE-based tunnels. • **Pre-shared Key**: IKE peers authenticate each other by computing and sending a keyed hash of data that includes the Pre-shared Key. If the receiving peer is able to create the same hash independently using its Pre-shared key, it knows that both peers must share the same secret, thus authenticating the other peer. Pre-shared keys do not scale well because each IPSec peer must be configured with the Pre-shared key of every other peer with which it establishes a session. Check **Pre-shared Key**, and enter a group name and password in the designated fields. • **Certificate**: The digital certificate is a package that contains information such as a certificate bearer's identity: name or IP address, the certificate's serial number, the certificate's expiration date, and a copy of the certificate bearer's public key. The standard digital certificate format is defined in the X.509 specification. The X.509 version 3 defines the data structure for certificates. Check **Certificate** and select **Default**.
Mode	• **Client —** Client request for IP address and server supplies the IP addresses from the configured address range. Select **Client** and enter the username and password. • **Network Extension Mode (NEM) —** Clients propose their subnet for which VPN services need to be applied on traffic between LAN behind server and subnet proposed by client. The ezvpn client NEM mode only supports LAN IP 10.0.0.0/8, 172.16.0.0/12, or 192.168.0.0/16. Also, the LAN behind the server and client should be in a different subnet when in NEM mode. Select **NEM** and select VLANs from the drop-downs and enter the username and password.
VLAN	Select a VLAN.
User Name	Enter a user name.
User Password	Enter a password.
Confirm User Password	Confirm password.

For Advanced Settings

Backup Server 1, 2 and 3	Enter the IP address or domain name of the back servers 1, 2 and 3. When the connection to the primary IPSec VPN server fails, the security appliance can start the VPN connection to the backup servers. The backup server 1 has the highest priority and the backup server 3 has the lowest priority.
Peer Timeout	Enter the time in seconds (Range 30 to 480).

Step 5 Click **Apply**.

PPTP Server

The Point-to-Point Tunneling Protocol (PPTP) is a method for implementing virtual private networks. PPTP uses a control channel over TCP and a GRE tunnel operating to encapsulate PPP packets. Up to 25 PPTP (Point-to-Point Tunneling Protocol) VPN tunnels can be enabled for users who are running PPTP client software. In the Wizard, the user selects the option to create a connection to the workplace by using a VPN connection.

To configure the PPTP Server, follow these steps.

Step 1 Click **VPN > PPTP Server**, and provide the following:

PPTP Server	Select **On** or **OFF** to enable or disable PPTP server.
Start and End IP Address	If PPTP has been enabled, enter start and end IP addresses.
DNS1 and 2 IP Addresses	Enter the IP address of the primary and secondary DNS server.
User Authentication	Select the user authentication (**Admin or Default**).
Microsoft Point-to-Point (MPPE) Encryption	The MPPE encrypts data in PPP-based dial-up connections or PPTP VPN connections. 128-bit key MPPE encryption schemes are supported. Select the MPPE encryption (**None or 128 bits**) from the drop-down list.

Step 2 Click **Apply**.

Note The RV340/RV345/RV345P PPTP Server currently only supports PAP as local database authentication method. In order to support Microsoft Point-to-Point (MPPE) Encryption with MS-CHAPv2, it will require an external authentication server.

L2TP Server

Layer Two Tunneling Protocol (L2TP) is an extension of the PPTP used by an Internet service provider (ISP) to enable VPN over the Internet. L2TP does not provide encryption for the data it tunnels. Instead, they rely on other security protocols, such as IPsec, to encrypt their data.

The L2TP tunnel is established between the L2TP Access Concentrator (LAC) and the L2TP Network Server (LNS). An IPsec tunnel is also established between these devices and all L2TP tunnel traffic is encrypted using IPsec.

To configure the L2TP Server, follow these steps:

Step 1 Click **VPN > L2TP Server**.

Step 2 Provide the following information:

L2TP Server	Check **On** or **Off** to enable or disable the L2TP server.

Maximum Transmission Unit	The size of the largest packet that can be sent over L2TP tunnel. If L2TP has been enabled, enter the size of a packet (Range 128-1400, Default 1400).
User Authentication	Select the user authentication (**Group Name or admin**).
Address Pool	• **Start IP Address —** Enter the start IP address. • **End IP Address —** Enter the end IP address.
DNS1 and 2 IP Addresses	Enter the primary and secondary IP addresses of the DNS1 and 2 servers.
IPSec	Check **On** to enable IPSec security for the L2TP tunnel.
IPSec Profile	Default
Pre-shared Key	Enter the Pre-shared Key to use to authenticate the remote IKE peer. You can enter up to 30 keyboard characters or hexadecimal values, such as My_@123 or 4d795f40313233. Both ends of the VPN tunnel must use the same Pre-shared Key. We recommend that you change the Pre-shared Key periodically to maximize VPN security.
Confirm Pre-shared Key	Re-enter the Pre-shared Key for confirmation.

Step 3 Click **Apply**.

Setup L2TP Over IPSec Server

When the device acts as L2TP/PPTP server, you can use an external radius server or local database to authenticate users. The local database authentication only supports PAP.

Step 1 Configure the User Groups as outlined in the User Groups, on page 33 section. Permit L2TP service for this group.

Step 2 Create the L2TP users as outlined in the User Accounts, on page 31 section.

Step 3 Create a new IPSec profile as outlined in the IPSec Profiles, on page 77 section. The IPSec profiles is used to match the IPSec/IKE proposal from clients. Different OS may use different proposals. The following IPSec profile can match Windows 10.

Phase I Options

DH Group: Group 2-1024
Encryption: 3DES
Authentication: SHA1
PFS: disable

Phase II Options

Protocol: ESP

Encryption: 3DES
Authentication: SHA1

Step 4 Configure the L2TP server as outlined in the L2TP Server, on page 91 section. Enable the IPSec option and choose the new IPSec profile created in the previous step.

Step 5 On Windows 10, create a new VPN connection. Go to Control Panel>Network, then Internet>Network and Sharing Center>Set up a new connection or network, create a VPN connection. Edit the property of this connection, choose L2TP/IPSec, maximum strength encryption or require encryption option. Choose PAP and disable the CHAP/MS-CHAPv2.

Step 6 In the Advanced Settings, configure the preshared key with the same configuration as outlined in Step 4. Then the L2TP over IPSec connection can be established.

Note If using an external radius, there are no PAP/CHAP limitations. FreeRadius, Cisco ACS, ISE, etc. can work well with the device.

Note MAC OS does not use PAP by default. The configuration settings below are needed to pass the PAP authentication (tried on MAC OS 10.12.6). We suggest to setup an external Radius server to bypass the PAP limitation.

#vim/etc/ppp/options (or create this file if it does not exist)

refuse-chap
refuse-mschap
refuse-mschap-v2

SSL VPN

The Secure Sockets Layer Virtual Private Network (SSLVPN) allows users to remotely access restricted networks, using a secure and authenticated pathway by encrypting the network traffic. The router supports Cisco AnyConnect VPN client which can be downloaded at [http://www.cisco.com/go/anyconnect/]. The router supports 2 SSL VPN tunnels by default, and the user can register a license to support up to 50 tunnels. Once installed and activated, the SSL VPN will establish a secure, remote-access VPN tunnel.

Note In addition, a Cisco AnyConnect Secure Mobility Client license is required to install and use the Cisco AnyConnect Secure Mobility Client on your device. Information on how to order the Cisco AnyConnect Secure Mobility User Licenses can be found here http://www.cisco.com/c/dam/en/us/products/collateral/security/anyconnect-og.pdf. We do recommend the AnyConnect Plus License for 25-99 users.

To configure the SSL VPN, follow these steps:

Step 1 Click **VPN>SSL VPN**.

Step 2 On the General Configuration Server tab, provide the following information:

Cisco SSL VPN Server	Select **On** or **Off** to enable or disable the server.

Mandatory Gateway Settings

Gateway Interface	Select the gateway interface (**WAN1, WAN2, USB1 or USB2**) from the drop-down list.
Gateway Port	Enter the port number of the gateway (**Range 1 to 65535**).
Certificate File	Default.
Client Address Pool	Enter the IP address of the client address pool.
Client Netmask	Enter the client netmask.
Client Domain	Enter the client domain name.
Login Banner	Enter the text to appear as login banner.

Optional Gateway Settings

Idle Timeout	Enter the idle timeout in seconds (**Range 60 to 86,400**).
Session Timeout	Time it takes for the TCP or UDP session to time out after a period of idleness. Enter the session timeout in seconds (**Range 60 to 1,209,600**).
Client DPD Timeout	Sends periodic HELLO/ACK messages to check the status of the VPN tunnel. This feature must be enabled on both ends of the VPN tunnel. Specify the interval between HELLO/ACK messages in the Interval field. Enter the client DPD timeout in seconds (**Range 0 to 3600**).
Gateway DPD Timeout	Sends periodic HELLO/ACK messages to check the status of the VPN tunnel. This feature must be enabled on both ends of the VPN tunnel. Specify the interval between HELLO/ACK messages in the Interval field. Enter the gateway DPD timeout in seconds (**Range 0 to 3600**).
Keep Alive	Ensures that your router is always connected to the Internet. Attempts to re-establish the VPN connection if it is dropped. Enter the Keep Alive time in seconds (**Range 0 to 600**).
Lease Duration	Enter the time in seconds during the tunnel to be connected (**Range 600 to 1,209,600**).
Max MTU	Enter the size in bytes of a packet that can be sent over the network (**Range 576 to 1406**).
Relay Interval	Enter the relay interval time in seconds (**Range 0 to 43,200**).

Step 3 Click **Apply**.

Step 4 On the Group Policies Server tab, click **Add** and provide the following information.

Basic Settings

Policy Name	Enter the policy name. Group policies that apply whole sets of attributes to a group of users, rather than having to specify each attribute individually for each user.
Primary DNS	Enter the IP address of the primary DNS server.
Secondary DNS	Enter the IP address of the secondary DNS server.

Primary WINS	Enter the IP address of the primary WINS.
Secondary WINS	Enter the IP address of the secondary WINS.
Description	Enter a description.

IE Proxy Settings

IE Proxy Policy	Internet Explorer proxy settings to establish VPN tunnel. Select the IE Proxy Policy (**None, Auto, Bypass-Local, or Disabled**) from the drop-down list. If you select **Auto** or **Bypass-Local** enter the following: • **Address —** IP address or domain name. • **Port —** Enter a port number (**Range 1 to 65,535**).

Step 5 In the IE Exception Proxy Table, click **Add, Edit** or **Delete** to add, edit or delete IE exceptions.

Split Tunneling Settings

Enable Split Tunneling	Check **Enable Split Tunneling** to allow Internet destined traffic to be sent unencrypted directly to the Internet. Full Tunneling sends all traffic to the end device where it is then routed to destination resources (eliminating the corporate network from the path for web access).
Split Selection	Select **Include Traffic** to include traffic or **Exclude Traffic** when applying the split tunneling.

Step 6 In the Split Network Table, click **Add, Edit** or **Delete** to add, edit or delete split DNS exceptions.

Step 7 Configure the IP and Netmask.

Step 8 Click **Apply**.

VPN Passthrough

The VPN Passthrough allows VPN clients to pass through this router and connect to a VPN endpoint. It is enabled by default.

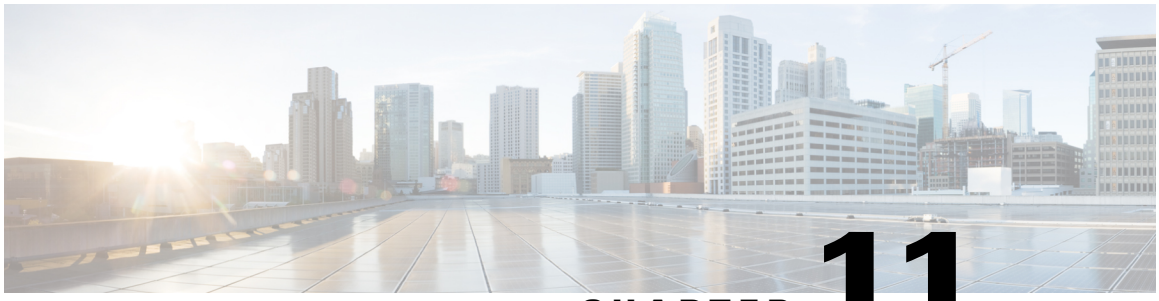
To configure the VPN Passthrough, follow these steps:

Step 1 Select **VPN > VPN Passthrough**.

Step 2 To enable VPN Passthrough, check **Enable** for each of the approved protocols:

- **IPSec Passthrough –** Internet Protocol Security (IPSec) is a suite of protocols used to implement secure exchange of packets at the IP layer.
- **PPTP Passthrough –** Point-to-Point Tunneling Protocol (PPTP) allows the Point-to-Point Protocol (PPP) to be tunneled through an IP network.
- **L2TP Passthrough –** Layer 2 Tunneling Protocol is the method used to enable Point-to-Point sessions by using the Internet at Layer 2.

Step 3 Click **Apply**.



CHAPTER 11

Security

This section describes the network security, which consists of the policies adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and contains the following topics:

Application Control Wizard

To add, configure, or modify the application control policies, follow these steps:

Step 1 Click **Security > Application Control Wizard**.

Step 2 On the Application Control page, select **On** and enter a name for the policy.

Step 3 Click **Next,** and above the Application List Table, click **Edit** to configure the application names to be filtered (blocked or logged etc). Click **Apply**, once you have selected the content you wish to filter.

Step 4 Click **Next** and select the schedule to block the application from the drop-down list.

Step 5 Click **Submit**.

Application Control

To add, configure, or modify the application control policies, follow these steps:

Step 1 Click **Security > Application Control**.

Step 2 On the Application Control page, select **On** and click **Apply**.

Step 3 To create a new application control policy, click **Add** under the Application Control Policies table.

Step 4 On the Policy Profile-Add/Edit section, specify the following information;

Policy Name	Enter a name.
Description	Enter a description.
Enable	Check to enforce the application control policy.
Application	Click **Edit** and select the content to be filtered (blocked or logged etc) from the list and click **Apply.**
Application List Table	Lists the Category, Application and Behavior of the configured filters.
Device Type	Select the device type from the drop-down list.
OS Type	Select the OS from the drop-down list.
IP Groups	Select an IP Group from the drop-down list to apply the policy.
Exclusion List Table	Under Exclusion List Table, click **Add** and configure the following: • **Type** (Select Mac or IP Group) • **IP/ MAC –** Enter MAC address • **Device Type –** Select device type • **OS Type –** Select OS type
Schedule	To specify when the Application Control policy should be active, select the schedule from the drop down list or **Click Always On** to apply web filtering.

Step 5 Click **Apply.**

Web Filtering

Web filtering is a feature that allows you to manage access to inappropriate websites. It can screen a client's web access requests to determine whether to allow or deny that website. To enable and configure web filtering, follow these steps:

Step 1 Click **Security > Web Filtering**.

Step 2 On the Web Filtering section, select **On or Off** and click **Apply**.

Step 3 In the Web Filtering Policies table, click **Add**. To edit an existing policy and click **Edit** to modify it.

Step 4 On the Web Filtering — Add/Edit Policy page, enter the following information:

Policy Name	Specify a name for the web filtering policy you are creating.
Description	Enter a short description for the policy.
Enable	Check **Enable** to activate the policy.
Category	• Click **Edit** and select the desired Filtering Level (select the appropriate web categories to be filtered). Choose **High, Medium, Low or Custom** to define the filtering extent. You can also choose the items from the Adult/Mature Content, business/Investment, Entertainment, Illegal/Questionable, IT Resources, Lifestyle/Culture, Other and Security categories. The incoming URL belonging to the selected items are blocked. • Click **Apply** to go back to Web Filtering - Add/Edit Policy page. You can see the selected web content listed in the Application List Table under Category. • Click **Restore to Default Categories** to restore default settings.
Device Type	Select the device type from the drop down list, to which the policy should be applicable.
OS Type	Select the OS from the drop down list, to which the policy should be applicable.
Web Reputation	Check to enable the web reputation analysis.
Applied on IP Group	Select an IP group from the drop down list to which this policy should be applied.
Exception List	Click **Edit**, then **Add** and define the following: • **White List —** Click **Add** to define the Domain Name or Keyword to bypass this policy. • **Black List —** Click **Add** to define the Domain Name or Keyword that should be blocked. • **Exclusion List —** Click **Add** to specify the IP Address that is excluded from this policy. Click **Apply**.

Schedule	Select the desired schedule from the drop down list. Click **Always On**, to apply web filtering.

Step 5 Click **OK** to save the configuration.

Content Filtering

Content filtering enables you to restrict access to clients from certain designated unwanted websites. It can block access to websites based on the domain names and keywords. It is also possible to schedule when the content filtering should be active.

To configure and enable content filtering, follow these steps:

Step 1 Click **Security > Content Filtering**.

Step 2 Check **Enable Content Filtering** to enable.

Step 3 Select the desired radio button.

Block Matching URLs	Check **Block Matching URLs** to block specific domains and keywords.
Allow Only Matching URLs	Check **Allow Only Matching URLs** to allow only the specified domains and keywords.

Step 4 Under Filter by Domain table, click **Add**.

Step 5 Enter a domain you want to filter/allow in the Domain Name column.

Step 6 To specify when the content filtering rules are active, select the schedule from the Schedule drop down list.

Step 7 Under Filter by Keyword, click **Add**.

Step 8 Enter the keywords to be blocked/allowed in the Keyword Name column.

Step 9 To specify when the content filtering rules are active, select the schedule from the Schedule drop down list. You can modify an existing domain name or keyword name by selecting the same and clicking **Edit**.

Step 10 Click **Apply**.

IP Source Guard

The IP Source Guard is a security feature that restricts IP traffic on untrusted IPs and MAC addresses by filtering traffic based on the configured IP MAC bindings. It is a filter that permits traffic on LAN ports only when the IP address and MAC address of each packet matches entries in the IP-MAC Binding table. This feature helps prevent IP spoofing attacks when a host tries to spoof and use the IP address of another host.

To configure the IP source guard, follow these steps:

Step 1 Click **Security > IP Source Guard**.

Step 2 Check **Enable IP Source Guard** if IP and MAC binding are required.

Step 3 Check **Block Unknown MAC Address**, if only the MAC address requires filtering irrespective of the IP Address.

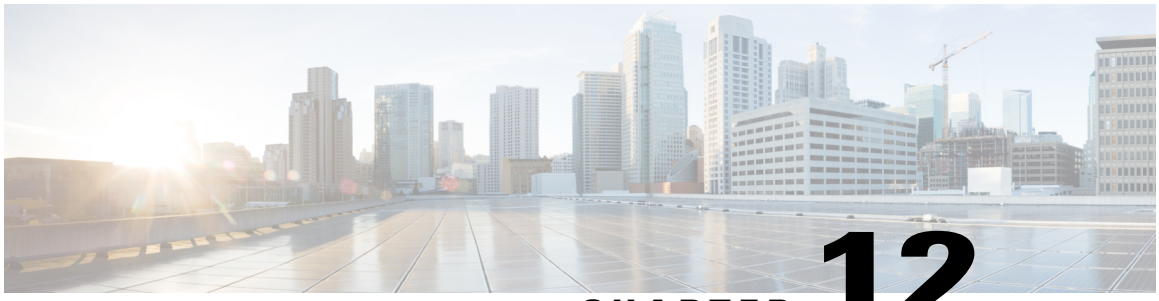
Step 4 In the IP & MAC Binding Table, click **Add** and enter the Static IPv4 address and MAC address for binding.

Step 5 Click **Apply**.

Step 6 Click **Edit** or **Delete** to edit or delete and existing address.

Note The DHCP Lease Table list all available Static DHCP and Dynamic leases from the DHCP server/relay. Click **Add to IP & MAC Binding Table** to add the available leases to the binding table.

You must manually add the DHCP leased entries to the IP & MAC Binding Table. Only the entries in the IP & MAC Binding Table will work.



CHAPTER 12

Where To Go From Here

This section contains the following topics:

Where To Go From Here

Support

Cisco Support Community	http://www.cisco.com/go/smallbizsupport
Cisco Support and Resources	http://www.cisco.com/go/smallbizhelp
Phone Support Contacts	http://www.cisco.com/c/en/us/support/web/tsd-cisco-small-business-support-center-contacts.html
Cisco Firmware Downloads	http://www.cisco.com/go/smallbizfirmware Select a link to download the firmware for your Cisco product. No login is required.
Cisco Open Source Requests	If you wish to receive a copy of the source code to which you are entitled under the applicable free/open source license(s) (such as the GNU Lesser/General Public License), please send your request to: external-opensource-requests@cisco.com. In your requests please include the Cisco product name, version, and the 18 digit reference number (for example: 7XEEX17D99-3X49X08 1) found in the product open source documentation.
Cisco Partner Central (Partner Login Required)	http://www.cisco.com/c/en/us/partners.html
Cisco RV340 Router	http://www.cisco.com/en/US/products/ps9923/tsd_products_support_series_home.html

Where To Go From Here