NETGEAR®

User Manual

8-Port Multi-Gigabit/10G Ethernet (Ultra60 PoE++) Smart Managed Pro Switch with 2 SFP+ Ports

MS510TXM
MS510TXUP

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1

Get Started

This user manual describes how you can use the device user interface (UI) to configure and operate the following switches:

- **MS510TXM**: NETGEAR 8-Port Multi-Gigabit/10G Ethernet Smart Managed Pro Switch with 2 SFP+ Ports

  This high-speed model provides four 100M/1000M/2.5G ports, four 100M/1000M/2.5G/5G/10G ports, and two dedicated 1G/10G SFP+ fiber uplink ports.

- **MS510TXUP**: NETGEAR 8-Port Multi-Gigabit/10G Ethernet Ultra60 PoE++ Smart Managed Pro Switch with 2 SFP+ Ports

  This high-speed PoE++ (802.3bt) model provides four 100M/1000M/2.5G Ultra60 PoE++ ports, four 100M/1000M/2.5G/5G/10G Ultra60 PoE++ ports, and two dedicated 1G/10G SFP+ fiber uplink ports.

  Each PoE++ port can deliver up to 60W, while the maximum PoE power budget across all active PoE++ ports is 295W.

The manual describes the software configuration procedures and explains the options that are available within those procedures.

This chapter contains the following sections:

- Available publications
- Switch management options and default management mode
- About managing the switch with the device UI
- About on-network and off-network access
- Access the switch on-network and connected to the Internet
- Access the switch off-network
- Credentials for the device UI
- Register the switch
- Change the language of the device UI
- Change the management mode of the switch
- Use the Device View of the device UI

- Configure interface settings
- Access the NETGEAR support website
- Access the user manual online

Note: For more information about the topics covered in this manual, visit the support website at netgear.com/support.

Note: Firmware updates with new features and bug fixes are made available from time to time at netgear.com/support/download/. Some products can regularly check the site and download new firmware, or you can check for and download new firmware manually. If the features or behavior of your product does not match what is described in this guide, you might need to update your firmware.

Available publications

The following information is available at netgear.com/support/download/:

- *Installation Guide*
- *Hardware Installation Guide*
- *Product Data Sheet*

For information about the NETGEAR Insight app and Insight Cloud portal, visit netgear.com/insight and netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

Switch management options and default management mode

If you prefer, you can use the switch as a plug-and-play device, so you do not need to set up a custom configuration. Just connect power, connect to your network and to your other devices, and you're done.

The switch provides administrative management options that let you configure, monitor, and control the network. The device UI is enabled by default, allowing you to configure the switch and the network from a web browser. You can also choose to manage the switch by using the NETGEAR Insight app on a smartphone or tablet. Or, if you are an Insight Premium or Pro subscriber, you can choose to manage the switch from the Insight Cloud portal that is available from a web browser on your Windows-based computer, Mac, or tablet.

The switch provides the following management options that let you discover the switch on the network and configure, monitor, and control the switch:

- **Device UI**: By default, the management mode of the switch is set to Directly Connect to Web Browser Interface, which lets you access the device UI. In this mode, you can change all settings of the switch.
- **NETGEAR Insight app and Insight Cloud portal**: If you set the management mode of the switch to NETGEAR Insight Mobile App and Insight Cloud Portal, you can use the following applications to manage the switch remotely:
  - **NETGEAR Insight app**. With the NETGEAR Insight app, you can discover the switch on the network and add the switch to the NETGEAR Insight app so that you can set up the switch in the network and manage and monitor the switch remotely from your smartphone or tablet. You can choose from four methods to add the switch to the NETGEAR Insight app: You can scan your network for the switch, scan the QR code or the barcode of the switch, or add the serial number of the switch.
  - **Insight Cloud portal**: As an Insight Premium or Insight Pro subscriber, you can use the NETGEAR Insight Cloud portal to set up the switch in the network, perform advanced remote setup, configuration, and management, monitor the switch, analyze the switch and network usage, and, if necessary, troubleshoot the switch and the network. A free trial is available for new customers.

  For more information about NETGEAR Insight, visit netgear.com/insight and netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

To use the NETGEAR Insight app or Insight Cloud portal methods, you must change the management method to NETGEAR Insight Mobile App and Insight Cloud Portal. After you do so, you can also change the management method back to Directly Connect to Web Browser Interface and use the device UI. For more information, see Change the management mode of the switch on page 37.

About managing the switch with the device UI

This manual describes how to use the device UI to manage and monitor the switch.

For information about using the NETGEAR Insight app and Insight Cloud portal to manage the switch, visit netgear.com/insight and netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

Software requirements for the device UI

To access the switch by using a web browser, the browser must meet the following software requirements:

- HTML version 4.0, or later
- HTTP version 1.1, or later

Supported web browsers for the device UI

The following browsers were tested and support the device UI. Later browser versions might function fine but were not tested.

The supported web browsers include the following:

- Mozilla Firefox version 67
- Chrome version 78
- Microsoft Edge
- Microsoft Internet Explorer (IE) version 11
- Safari on MAC OS X version 13.0.3
- Safari on Windows OS versions 5.1.7

Navigation tabs, configuration menus, and page menu

The System Information page is the start page in the device UI. The following figure shows the System Information page for model MS510TXUP.

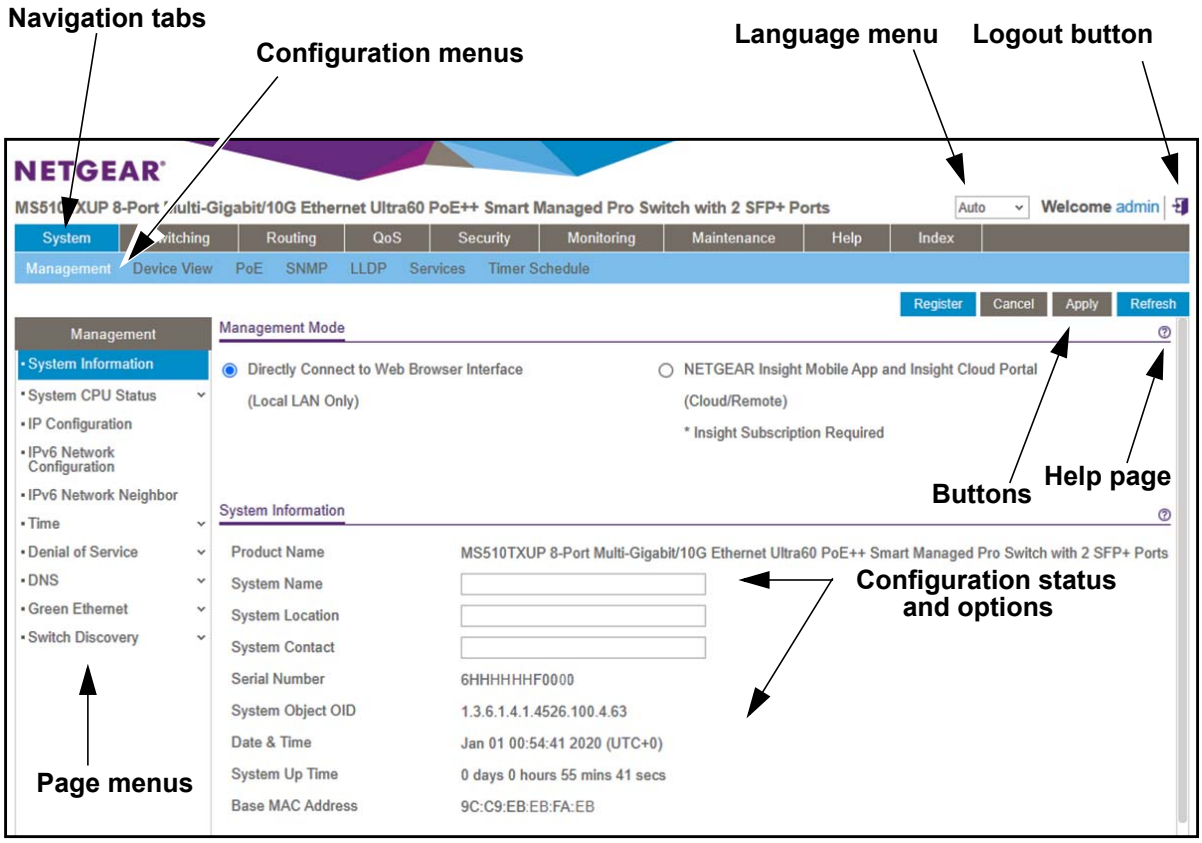


Figure 1. Switch navigation tabs, configuration menus, and page menu

The navigation tabs along the top of the device UI give you quick access to the various switch functions. The tabs are always available and remain constant, regardless of which feature you configure.

When you select a tab, the features for that tab appear as menus directly under the tabs. The configuration menus in the blue bar change according to the navigation tab that is selected.

The configuration pages for each feature are available as submenu links in the page menu on the left side of the page. Some items in the menu expand to reveal multiple submenu links, as the following figure shows.

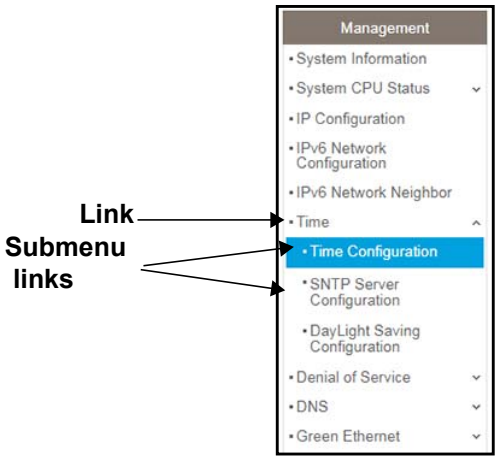


Figure 2. Switch page menu link and submenu links

Configuration and status options

The area directly under the configuration menus and to the right of the links displays the configuration information or status for the page you select. On pages that contain configuration options, you might be able to enter information into fields, select options from menus, select check boxes, and select radio buttons.

Each page contains access to the HTML-based help that explains the fields and configuration options for the page.

Buttons in the device UI

Each page also contains command buttons. The following table shows the command buttons that are used throughout the pages in the device UI:

Table 1. Command buttons in the device UI

Button	Function
Add	Clicking the **Add** button adds the new item configured in the heading row of a table.
Apply	Clicking the **Apply** button to save your settings. Configuration changes take effect immediately.
Cancel	Clicking the **Cancel** button cancels the configuration on the page and resets the data on the page to the previous values of the switch.
Clear	Clicking the **Clear** button clears all the counters and resets the switch summary and detailed statistics to default values.
Delete	Clicking the **Delete** button removes the selected item.
Refresh	Clicking the **Refresh** button refreshes the page with the latest information from the device.

User-defined fields

User-defined fields can contain 1 to 159 characters, unless otherwise noted on the configuration web page. All characters can be used except for the ones stated in the following table (unless specifically noted in a procedure for a feature).

Table 2. Invalid characters for user-defined fields

Invalid characters for user-defined fields
\	/ < > * ?

Context-sensitive help

When you log in to the switch, every page contains a link to the online help (?) that contains information to assist in configuring and managing the switch. The online help pages are context sensitive. For example, if the IP Configuration page is open, the help topic for that page displays if you click the link to the online help.

About on-network and off-network access

You can access the switch either on-network or off-network:

- **On-network and connected to the Internet**: When you use the device UI, for easiest access, we recommend that you cable the switch to a network that is connected to the Internet and that includes a router or DHCP server that assigns IP addresses, power on the switch, and then use a computer that is connected to the same network as the switch to connect to the device UI. We refer to this setup as *on-network* or online.

  For more information, see Access the switch on-network and connected to the Internet on page 19).

- **Off-network and not connected to the Internet**: You can also configure the switch connected directly only to the computer that you are using to configure it. That is, the switch is not connected to the network and the Internet. We refer to this setup as *off-network* or offline.

  For more information, see Access the switch off-network on page 28.

Note: We recommend that you register the switch to activate your warranty. For more information, see Register the switch on page 31.

Access the switch on-network and connected to the Internet

The DHCP client on the switch is enabled by default, allowing a DHCP server or router on the network to assign an IP address to the switch.

If the switch is on-network, connected to a DHCP server, and connected to the Internet, you can use a Windows-based computer to access the device UI. We also recommend that you register the switch with NETGEAR to activate your warranty. For more information about accessing the device UI, see Use a Windows-based computer to access the switch on-network on page 20.

If you use a Mac, or if you do *not* know the IP address of the switch, use one of the following tools to discover the IP address of the switch on the network:

- **NETGEAR Insight mobile app**: You can install the NETGEAR Insight mobile app on an iOS or Android mobile device and discover the IP address of the switch. See Use the NETGEAR Insight mobile app to only discover the IP address of the switch on page 21.
- **NETGEAR Switch Discovery Tool (NSDT)**: If you use a Windows-based computer or Mac, you can use the NSDT to discover the switch on your network. See Use the NETGEAR Switch Discovery Tool to discover the IP address of the switch on page 22.
- **NETGEAR Smart Control Center (SCC)**: You can install the SCC on a Windows-based computer. See one of the following sections:
  - Discover the switch in a network with a DHCP server using the Smart Control Center on page 24
  - Discover the switch in a network without a DHCP server using the Smart Control Center on page 25
- **Other tools**: You can also get the IP address of the switch from the DHCP server in the network or use a third-party IP scanner utility. See Use other options to discover the switch IP address on page 27.

When you know the IP address, you can configure the switch in the following ways:

- **Device UI**: For configuration of all switch features, access the switch over the device UI. See Access the switch on-network when you know the switch IP address on page 27.
- **NETGEAR Smart Control Center (SCC)**: For configuration of a limited number of switch features, use the SCC on a Windows-based computer. By default, you can use the SCC utility to discover the IP address of the switch, but you cannot use the utility to perform any actions on the switch. If you enable the configuration option of the SCC utility, you can use it to configure the switch. See Smart Control Center on page 338.

  For more information, see the SCC user manual, which you can download from netgear.com/support/product/SCC.
- **NETGEAR Insight app and Insight Cloud portal**: You can change the management mode of the switch so that you can use the NETGEAR Insight app and Insight Cloud portal to manage the switch remotely. For more information, see Change the management mode of the switch on page 37.

Use a Windows-based computer to access the switch on-network

To use a Windows-based computer to determine the switch IP address and access the switch on-network:

1. Cable the switch to a network with a router or DHCP server that manages IP addresses.
2. Power on the switch.

   The DHCP server assigns the switch an IP address.
3. Connect your computer to the same network as the switch.

   You can use a WiFi or wired network connection.
4. Open Windows Explorer.
5. Click the **Network** link.
6. If prompted, enable the Network Discovery feature.
7. Under Network Infrastructure, locate the switch model number.

   The model number is either MS510TXM or MS510TXUP.
8. Double-click either **MS510TXM-XXXXXX** or **MS510TXUP-XXXXXX**, in which XXXXXX represents the last six digits of the switch MAC address.

   The page that displays depends on whether your browser is connected to the Internet, whether the switch is connected to the Internet, and whether you activated the warranty.
9. Enter your credentials, which depend on the page that displays:
   - **Register to activate your warranty page displays**: If the switch is online and you did not yet activate your warranty, the Register to activate your warranty page displays.
     - **Register Your Device**: To activate your warranty, click the **Register Your Device** button, and follow the directions onscreen to register the switch with your NETGEAR email address and password. After you activated your warranty, you are no longer prompted to register the switch.

       If you do not have a NETGEAR account, you can create one.
     - **Enter Registration Key**: If you obtained a registration key, enter it. For more information, see Register the switch with your NETGEAR account and get a registration key for offline access on page 32.
     - **Skip Registration & Access the UI**: You do not need to register the switch to activate your warranty, but if you do not activate your warranty within 30 days of purchase, your warranty entitlement might be affected.

       If you do not activate your warranty, the Register to activate your warranty page continues to display when you log in.

- **Device UI login page displays**: If you previously registered the switch with NETGEAR to activate your warranty, the Device UI login page displays. Enter one of the following credentials:
  - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password for greater security.
  - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)

  For information about the credentials, see Credentials for the device UI on page 30.

10. Click the **Go** button.
11. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

    The System Information page displays. You can now configure the switch.

Use the NETGEAR Insight mobile app to only discover the IP address of the switch

If the switch is connected to a WiFi router or access point, and the switch is connected to the Internet, the NETGEAR Insight mobile app lets you discover the IP address of the switch in your network.

If you do not use the Netgear Insight app to claim the switch by adding it to an Insight network location, the switch is not registered and your warranty is not activated.

Using the Netgear Insight app to discover the IP address of the switch is not the same as managing the switch with the Insight app or the Insight Cloud Portal.

Note: The default management mode of the switch is the device UI. If you want to use the Insight app or the Insight Cloud Portal to manage the switch, you first must change the management mode (see Change the management mode to NETGEAR Insight Mobile App and Insight Cloud Portal on page 38). After you do so, you can manage the switch with Insight and add the switch to an Insight network location.

To use the NETGEAR Insight app to discover the IP address of the switch in your network:

1. On your mobile device, go to the app store, search for NETGEAR Insight, and download the latest version of the app.

2. Connect your mobile device to the WiFi network of the WiFi router or access point to which the switch is connected.
3. Open the NETGEAR Insight mobile app.
4. If you did not set up a NETGEAR account, tap **Create NETGEAR Account** and follow the onscreen instructions.
5. Enter the email address and password for your account and tap **LOG IN**.

   After you log in to your account, the IP address of the switch displays in the device list.
6. Write down the switch IP address.

   You can use this IP address to access the switch directly from a web browser. For information about how to access the device UI of the switch, see Access the switch on-network when you know the switch IP address on page 27.

Use the NETGEAR Switch Discovery Tool to discover the IP address of the switch

For easiest access, we recommend that you cable the switch to a network with a router or DHCP server that assigns IP addresses, power on the switch, and then use a computer that is connected to the same network as the switch.

The NETGEAR Switch Discovery Tool (NSDT) lets you discover the switch in your network and access the device UI of the switch from a Mac or a Windows-based computer.

To install the NSDT, discover the switch in your network, and either register the switch to activate your warranty or access the switch:

1. Download the NSDT by visiting netgear.com/support/product/netgear-switch-discovery-tool.aspx.

   Depending on the computer that you are using, download either the Mac version or the Windows version.
2. Temporarily disable the firewall, Internet security, antivirus programs, or all of these on the computer that you use to configure the switch.

3. Unzip the NSDT files, and click or double-click the **.exe** file (for example, NSDT-1.2.102.exe) to install the program on your computer.

   You might see the tool icon appear on your Mac dock or Windows desktop.

4. Reenable the security services on your computer.
5. Power on the switch.

   The DHCP server assigns the switch an IP address.

6. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection. The computer and the switch must be on the same Layer 2 network.

7. Open the Switch Discovery Tool.

   To open the program, double-click the **NETGEAR Switch Discovery Too**l icon on your dock on desktop.

   The initial page displays a menu and a button.

8. From the **Choose a connection** menu, select the network for this switch.
9. Click the **Start Searching** button.

   The NSDT displays the IP addresses of the switches that it discovers.

10. Save the switch IP address for later use.
11. To access the switch from the NSDT, do the following:
    a. Click the **ADMIN PAGE** button next to your switch.

       The page that displays depends on whether your network is connected to the Internet and whether you activated the warranty.

    b. Enter your credentials, which depend on the page that displays:
       - **Register to activate your warranty page displays**: If the switch is online and you did not yet activate your warranty, the Register to activate your warranty page displays.
         - **Register Your Device**: To activate your warranty, click the **Register Your Device** button, and follow the directions onscreen to register the switch with your NETGEAR email address and password. After you activate your warranty, you are no longer prompted to register the switch.

           If you do not have a NETGEAR account, you can create one.
         - **Enter Registration Key**: If you obtained a registration key, enter it. For more information, see Register the switch with your NETGEAR account and get a registration key for offline access on page 32.
         - **Skip Registration & Access the UI**: You do not need to register the switch to activate your warranty, but if you do not activate your warranty within 30 days of purchase, your warranty entitlement might be affected.

           If you do not activate your warranty, the Register to activate your warranty page continues to display when you log in.

- **Device UI login page displays**: If you previously registered the switch with NETGEAR to activate your warranty, the Device UI login page displays. Enter one of the following credentials:
  - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.
  - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)

  For information about the credentials, see Credentials for the device UI on page 30.

c. If you enter a password, click the **Go** button; If you enter a registration key, click the **Submit** button.

d. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

The System Information page displays. You can now configure the switch.

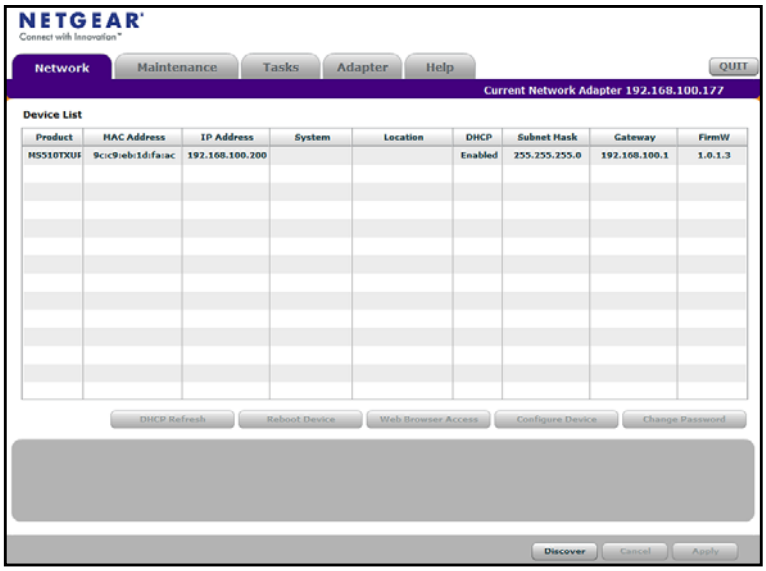
Discover the switch in a network with a DHCP server using the Smart Control Center

This section describes how to set up your switch in a network that includes a DHCP server. The DHCP client on the switch is enabled by default. When you connect the switch to your network, the DHCP server automatically assigns an IP address to the switch. Use the Smart Control Center (SCC) to discover the IP address automatically assigned to the switch.

For information about the SCC, visit netgear.com/support/product/SCC.

To install the switch in a network with a DHCP server:

1. Connect the switch to a network with a DHCP server.
2. Power on the switch by connecting its power cord.
3. Install the SCC on your computer.
4. Start the SCC.
5. Click the **Discover** button for the SCC to discover all the devices in the subnet.



6. Write down the switch IP address assigned by the DHCP server.

For information about how to access the device UI of the switch, see Access the switch on-network when you know the switch IP address on page 27.

Discover the switch in a network without a DHCP server using the Smart Control Center

This section describes how to use the Smart Control Center (SCC) to set up your switch in a network without a DHCP server. If your network does not include a DHCP service, you must assign a static IP address to your switch.

If you prefer, you can assign the switch a static IP address even if your network does include a DHCP server.

As an offline option, if you connect your computer directly to the switch using an Ethernet cable (that is, offline), you can also use the SCC to assign a static IP address to your switch. After you do so, you can connect your switch to the network.

For information about the SCC, visit netgear.com/support/product/SCC.

To assign a static IP address:

1. Connect the switch to your existing network or directly to your computer using an Ethernet cable.

   Note: If you connect your computer directly to the switch using an Ethernet cable, the IP address settings of your computer do not need to be in the same IP subnet as the switch. The SCC can detect the IP address settings of the switch even if they are in a different subnet.

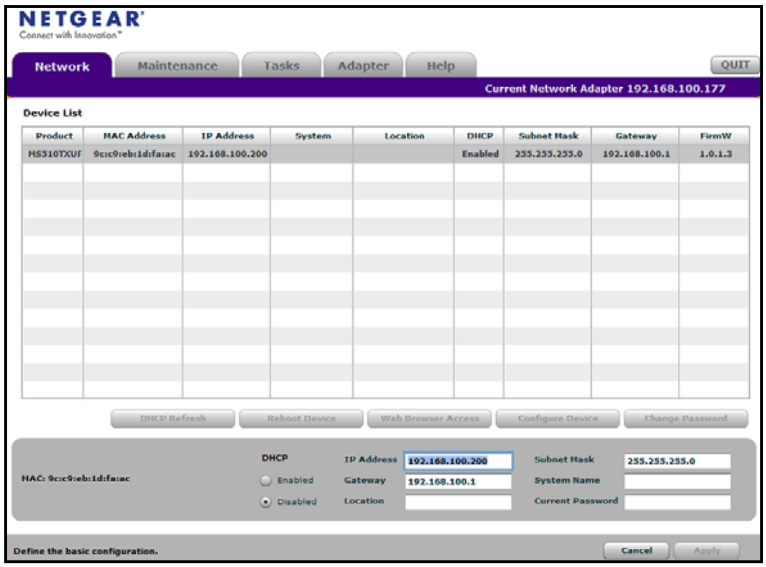
2. Power on the switch by connecting its power cord.
3. Install the SCC on your computer.

4. Start the SCC.
5. Click the **Discover** button for the SCC to find your switch.

   The utility broadcasts Layer 2 discovery packets within the broadcast domain to discover the switch.
6. Select the switch, and then click the **Configure Device** button.

   The page expands to display additional fields at the bottom.
7. Select the **Disabled** radio button.

   DHCP is disabled.
8. Enter the static switch IP address, gateway IP address, and subnet mask that you want to assign for the switch.



9. Type the device admin password to continue with the configuration change.

   You must enter the device admin password each time that you use the SCC to update the switch settings. The default device admin password is **password**.
10. Click the **Apply** button.

    Your settings are saved.

For information about how to access the device UI of the switch, see Access the switch on-network when you know the switch IP address on page 27.

Use other options to discover the switch IP address

If the switch is on-network, you can use one of the following options to determine the switch IP address:

- **Access the DHCP server**: You can access the DHCP server (or router that functions as a DHCP server) in your network and view the IP address that is assigned to the switch. For more information, see the documentation for your DHCP server (or router).
- **Use an IP scanner utility**: IP scanner utilities are available free of charge on the Internet. An IP scanner utility lets you discover the IP address that is assigned to the switch.

For information about how to access the device UI of the switch, see Access the switch on-network when you know the switch IP address on page 27.

Access the switch on-network when you know the switch IP address

If the switch is on-network and you know the switch IP address, you can access the device UI.

For the following procedure, the network must provide Internet access.

To access the switch on-network when you know the switch IP address:

1. Launch a web browser.
2. In the address field of your web browser, enter the IP address of the switch.

   The page that displays depends on whether your browser is connected to the Internet, whether the switch is connected to the Internet, and whether you activated the warranty.
3. Enter your credentials, which depend on the page that displays:
   - **Register to activate your warranty page displays**: If the switch is online and you did not yet activate your warranty, the Register to activate your warranty page displays.
     - **Register Your Device**: To activate your warranty, click the **Register Your Device** button, and follow the directions onscreen to register the switch with your NETGEAR email address and password. After you activate your warranty, you are no longer prompted to register the switch.

       If you do not have a NETGEAR account, you can create one.
     - **Enter Registration Key**: If you obtained a registration key, enter it. For more information, see Register the switch with your NETGEAR account and get a registration key for offline access on page 32.
     - **Skip Registration & Access the UI**: You do not need to register the switch to activate your warranty, but if you do not activate your warranty within 30 days of purchase, your warranty entitlement might be affected.

       If you do not activate your warranty, the Register to activate your warranty page continues to display when you log in.

- **Device UI login page displays**: If you previously registered the switch with NETGEAR to activate your warranty, the Device UI login page displays. Enter one of the following credentials:
  - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.
  - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)

  For information about the credentials, see Credentials for the device UI on page 30.

4. If you enter a password, click the **Go** button; If you enter a registration key, click the **Submit** button.
5. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

   The System Information page displays. You can now configure the switch.

Access the switch off-network

The default IP address of the switch is 192.168.0.239. The IP address of the computer that you use to access the switch off-network must in the same subnet as the default IP address of the switch.

To access the switch off-network and not connected to the Internet:

1. Change the IP settings of your computer to be in the same subnet as the IP settings of the switch.

   If the DHCP client of the switch is enabled and you remove the switch from the network with the DHCP server, the IP address reverts to the default IP address of 192.168.0.239 with a subnet of 255.255.255.0. If you already disabled the DHCP client and assigned a static IP address to the switch, change the IP settings of your computer to be in the same subnet as the static IP address.

   For more information about changing the IP settings on your computer, see one of the following knowledge base articles at the NETGEAR website:

   - **Windows-based computer**: See the following article: https://kb.netgear.com/27476/How-to-set-a-static-IP-address-in-Windows
   - **Mac**: See the following article: https://kb.netgear.com/000037250/Setting-a-static-IP-address-on-your-network-adapter-in-Mac-OS-for-direct-access-to-an-access-point

(The Mac article is written for an access point but is also valid for a switch.)

2. Connect your computer to the switch using an Ethernet cable.
3. Power on the switch by connecting its power cord.
4. Launch a web browser.
5. Open a web browser, and enter **http://192.168.0.239**.

   This is the default IP address of the switch. If you already disabled the DHCP client and assigned a static IP address to the switch, enter the static IP address of the switch.

   The Enter Registration Key page displays.
6. Do one of the following:
   - **Enter a registration key**. If you obtained a registration key, do the following:
     a. Type or paste the key.

        For more information, see Register the switch with your NETGEAR account and get a registration key for offline access on page 32.

     b. Click the **Submit** button.
   - **Do not register at this time and access the device UI**: Do the following:
     a. Click the **Skip Registration & Access the UI** button.

        The Device UI login page displays.

     b. Enter one of the following credentials:
        - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.
        - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)

        For information about the credentials, see Credentials for the device UI on page 30.
7. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

   The System Information page displays. You can now configure the switch.
8. After you complete the configuration of the switch, reconfigure the computer that you used for this process to its original TCP/IP settings.

   You can now connect your switch to your network using an Ethernet cable.

Credentials for the device UI

The information in this section applies to accessing the switch device UI in either management mode. That is, it does *not* apply to accessing the NETGEAR Insight app and Cloud portal.

To access the device UI, and depending on your situation, use one of the following credentials:

- **NETGEAR account credentials**:

  You can register the switch online to activate your warranty by entering your NETGEAR account credentials (see Register the switch with your NETGEAR account and access the switch online on page 31). If you do not have a NETGEAR account, you can create one.

  Alternatively, you can obtain a registration key and enter the key when the switch is offline so that you are no longer prompted to activate your warranty (see Register the switch with your NETGEAR account and get a registration key for offline access on page 32).

- **Device admin password**:

  You can access the device UI with your device admin password.

  The first time that you access the device UI, enter the default device admin password (**password**), after which you are required to customize the password for greater security. Subsequent times that you log in to the device UI, use your customized device admin password.

- **NETGEAR Insight network location password**:

  NETGEAR Insight can affect how you access the switch device UI. After you add the switch to an Insight network location and change the management mode of the switch so that you can use the NETGEAR Insight app and Insight Cloud portal to manage the switch remotely (see Change the management mode of the switch on page 37), the Insight network location password replaces the switch device admin password. To access the device UI, you must enter the Insight network location password.

  For information about how the Insight network password functions, visit netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

The following table lists the essential credential options for access to the device UI.

Table 3. Credentials for access to the device UI

Management mode	Added to an Insight network	Credentials	Device UI menu
Default mode: Direct Connect Web Browser Interface (Local LAN Only)	No	Device admin password	Full device UI menu
	Yes	Insight network password	
NETGEAR Insight Mobile App and Insight Cloud Portal (Cloud/Remote)	No	Device admin password	Limited device UI menu because management is through NETGEAR Insight
	Yes	Insight network password	

Register the switch

You can register the switch online or offline to activate your warranty, after which you are no longer prompted to activate your warranty when you log in:

- **Online registration for on-network access**: If your switch is on-network or connected to the Internet, you can register the switch with your NETGEAR account credentials and activate your warranty. During the registration process, the switch contacts a NETGEAR server. For more information, see Register the switch with your NETGEAR account and access the switch online on page 31.
- **Registration for off-network access**: You can register your switch from any device that is connected to the Internet and get a registration key. If the switch is off-network or not connected to the Internet, you can enter the registration key. After you do so, the Register to activate your warranty page no longer displays when you log in. For more information, see Register the switch with your NETGEAR account and get a registration key for offline access on page 32.

Register the switch with your NETGEAR account and access the switch online

For registration and activation of your warranty with your NETGEAR account, the switch must be connected to the Internet so that it can communicate with a NETGEAR server.

If you do not have a NETGEAR account, you can create one during the registration process.

To register and access the switch online over the device UI with your NETGEAR account:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   For information about finding the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Register to activate your warranty page displays.

4. Click the **Register Your Device** button and follow the directions onscreen to register the switch with your NETGEAR email address and password and activate the warranty.

   You are only prompted to do this once to confirm registration of your switch.

   If you did not yet create a NETGEAR account, click the **Create account** link, follow the directions onscreen to create an account, and register the switch with your NETGEAR email address and password.

   For information about the credentials, see Credentials for the device UI on page 30.

5. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

   The System Information page displays. You can now configure the switch.

Register the switch with your NETGEAR account and get a registration key for offline access

Note: If you register your switch with your NETGEAR account and then access the switch online or connected to the Internet, you do not need a registration key because the Device UI login page displays. That is, you are no longer prompted to activate your warranty.

After you register your switch with your NETGEAR account, you can get a registration key, access the switch offline or not connected to the Internet, and either before or after you log in to the device UI, enter the registration key. After you enter the registration key, you are no longer prompted to activate your warranty. Instead, the Device UI login page displays.

You can visit mynetgear.com, log in to your NETGEAR account, register the switch using its serial number, and get a registration key.

You can also use the NETGEAR Insight app to get a registration key. NETGEAR Insight Premium or Pro subscribers can use the Insight Cloud Portal to get a registration key. For information about how the registration key functions with Insight, visit netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

To register the switch with your NETGEAR account and get a registration key:

1. From a computer or mobile device that is connected to the Internet, go to mynetgear.com.
2. Log in to your NETGEAR account.

   If you do not own a free NETGEAR account, you can create one.
3. From the menu on the left, select **Register a Product**.

   The page adjusts.
4. In the Serial Number field, enter the serial number of the switch.

   The serial number consists of 13 digits. The serial number is usually printed on a label on the bottom or the back panel of the switch.
5. Click the **Register** button.

   The switch is registered with NETGEAR.
6. If the My Products does not display, click **My Products** from the menu.

   The page adjusts.
7. Select the radio button for the newly registered switch, and click the **Get Registration Key** button.

   The registration key is displayed, and an email with the registration key is sent to your NETGEAR account email address.

Access the switch offline with a registration key

After you get a registration key, you can access the switch offline and enter the registration key. For more information, see one of the following sections:

- Access the switch offline and enter the registration key before you log in on page 33
- Access the switch offline and enter the registration key after you log in on page 35

After you enter the registration key, you are no longer prompted to activate your warranty when you log in. Instead, the Device UI login page displays.

Access the switch offline and enter the registration key before you log in

If you obtain a registration key, you can access the switch offline and enter the key before you log in to the device UI.

To access the switch offline and enter the registration key before you log in to the device UI:

1. Change the IP settings of your computer to be in the same subnet as the IP settings of the switch.

   If the DHCP client of the switch is enabled and you remove the switch from the network with the DHCP server, the IP address reverts to the default IP address of 192.168.0.239 with a subnet of 255.255.255.0. If you already disabled the DHCP client and assigned a

static IP address to the switch, change the IP settings of your computer to be in the same subnet as the static IP address.

For more information about changing the IP settings on your computer, see one of the following knowledge base articles at the NETGEAR website:

- **Windows-based computer**: See the following article: https://kb.netgear.com/27476/How-to-set-a-static-IP-address-in-Windows
- **Mac**: See the following article: https://kb.netgear.com/000037250/Setting-a-static-IP-address-on-your-network-adapter-in-Mac-OS-for-direct-access-to-an-access-point

  (The Mac article is written for an access point but is also valid for a switch.)

2. Connect your computer to the switch using an Ethernet cable.
3. Power on the switch by connecting its power cord.
4. Launch a web browser.
5. Open a web browser, and enter **http://192.168.0.239**.

   This is the default IP address of the switch. If you already disabled the DHCP client and assigned a static IP address to the switch, enter the static IP address of the switch.

   The Enter Registration Key page displays.
6. Enter the registration key.
7. Click the **Submit** button.

   The registration takes effect on the switch and you are no longer prompted to activate your warranty when you log in.

   The Device UI login page displays.
8. Enter one of the following credentials:
   - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.
   - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)
9. Click the **Go** button.
10. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

    The System Information page displays. You can now configure the switch.
11. After you complete the configuration of the switch, reconfigure the computer that you used for this process to its original TCP/IP settings.

    You can now connect your switch to your network using an Ethernet cable.

Access the switch offline and enter the registration key *after* you log in

If you access the switch offline and obtain a registration key afterwards, you can enter the key on a page in the device UI.

To access the switch offline and enter the registration key *after* you log in to the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Register to activate your warranty page displays.

4. Click the **Skip Registration & Access the UI** button.

   The Device UI login page displays.

5. Enter one of the following credentials:

   - **Device admin password**: Enter the device admin password. The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.
   - **Insight network password**: If you previously logged in to the device UI, you changed the management mode to NETGEAR Insight, and you added the switch to an Insight network location, enter the Insight network password to access the device UI. (In such a situation, the Insight network password replaces the switch device admin password.)

6. Click the **Go** button.
7. If the Change Default Password page displays, specify and confirm a new device admin password, click the **Submit** button, and log in again with your new password.

   The System Information page displays. You can now configure the switch.

8. Select **Maintenance > Registration Key**.

   The Registration Key page displays.

9. In the field, type or paste the registration key.
10. Click the **Submit** button.

    The registration takes effect on the switch and you are no longer prompted to activate your warranty when you log in.

Change the language of the device UI

By default, the language is set to Auto. You can set the language to a specific one.

To change the language of the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. At the top of the page, to the left of *Welcome*, select a language from the language menu.

   A confirmation pop-up window displays.
7. Click the **OK** button.

   You are logged out. The language of the device UI is set to the language that you selected.
8. To continue configuring the switch, log in again.

Change the management mode of the switch

By default, the management mode on the switch is Directly Connect to Web Browser Interface (which is the same as the device UI). You can also change the management mode to NETGEAR Insight Mobile App and Insight Cloud Portal.

About changing the management mode

The following applies to changing the management mode:

- **Changing to the NETGEAR Insight Mobile App and Insight Cloud Portal mode**:
  - The first time that you enable this mode, the switch is reset to its factory default settings so that you can create the switch configuration and network topology using the Insight app or the Insight Cloud portal.
  - If you previously added the switch to a network location on the Insight app or Insight Cloud portal, all Insight-manageable device settings are returned to the last configuration saved on the cloud server, including the switch device admin password (that is, the password is reset to the Insight network location password).
  - If you use the Insight app or the Insight Cloud portal, you can temporarily change the management mode of the switch back to Directly Connect to Web Browser Interface. You can then access the device UI for settings that are not Insight-manageable, for complex tasks such as integrating with an existing network of devices that are not managed through Insight, and for debugging purposes. When you are done, you can change the management mode back to NETGEAR Insight Mobile App and Insight Cloud Portal.
- **Changing back to Directly Connect to Web Browser Interface mode**:

  After you change the management mode, back up your configuration. Then, reset the switch to factory defaults. Finally, restore your configuration and reboot the switch. For more information, see Change the management mode back to Directly Connect to Web Browser Interface on page 39.

  After you change the management mode, the follow occurs:

  - The NETGEAR Insight Mobile App and Insight Cloud Portal management mode is disabled and the current Insight-manageable device settings are saved to the cloud server.
  - Any changes that you make using the Directly Connect to Web Browser Interface management mode are not saved to the cloud server.
  - All configuration menus and options are available in the device UI.

Change the management mode to NETGEAR Insight Mobile App and Insight Cloud Portal

To change the management mode of the switch to NETGEAR Insight Mobile App and Insight Cloud portal:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select the **NETGEAR Insight Mobile App and Insight Cloud Portal** radio button.

   An Alert pop-up window displays.

7. Read the text, and click the **OK** button.

   The pop-up window closes.

8. Click the **Apply** button.

   Another pop-up window displays.

9. Click the **OK** button.

   The pop-up window closes, the System Information page closes, and your settings are saved.

   The following occurs:

   - The first time that you enable this mode, the switch is reset to its factory default settings.
   - The switch connects to the cloud server.

- If you previously added the switch to a network on the Insight app or Insight Cloud portal, all Insight-manageable device settings are returned to the last configuration saved on the cloud server, including the switch password (that is, the password is reset to the Insight network password).
- The Device UI login page might displays again. (You can close the page.)

You can now manage the switch using the Insight mobile app or Insight Cloud portal.

For more information about NETGEAR Insight, visit netgear.com/insight and netgear.com/support/product/Insight.aspx. For knowledge base articles about NETGEAR Insight, visit netgear.com/support.

Change the management mode back to Directly Connect to Web Browser Interface

To change the management mode of the switch back to Directly Connect to Web Browser Interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select the **Directly Connect to Web Browser Interface** radio button.

   An Alert pop-up window displays.

7. Read the text, and click the **OK** button.

   The pop-up window closes.

8. Click the **Apply** button.

   Another pop-up window displays.

9. Click the **OK** button.

   The pop-up window closes, the System Information page closes, and your settings are saved. Any current Insight-manageable device settings are saved to the cloud server.

   The Device UI login page displays.

10. Log in again.

    The System Information page displays.

    Note: The following step uses an HTTP session to back up the configuration. For information about using a TFTP session, see Use TFTP to export a file from the switch to a TFTP server on page 461.

11. Back up the configuration:
    a. Select **Maintenance > Export > HTTP File Export**.

       The HTTP File Export page displays.

    b. From the **File Type** menu, select **Text Configuration**.
    c. Click the **Apply** button.

       A pop-up window displays.

    d. Navigate to a location on your computer and save the file.

       The file transfer begins. The page displays information about the file transfer progress.

12. Reset the switch to factory default settings:
    a. Select **Maintenance > Reset > Factory Default**.

       The Default Settings page displays.

    b. Select the **Reset configuration to factory default (EXCEPT registered device status), and clear device logs** radio button.

       This option resets the switch to its factory default settings but does not change its registration status with NETGEAR.

    c. Click the **Apply** button.

       An Alert pop-up window displays.

    d. Click the **OK** button.

       All configuration settings are reset to their factory default values. The DHCP client on the switch is enabled. Your device admin password is reset to the default password (**password**). This process takes about 135 seconds.

       The Device UI login page displays.

In the unlikely situation that the Device UI page does not display and you cannot log in, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

e. Enter the device admin password.

The default device admin password is **password**. The first time that you enter the default device admin password, the Change Default Password page displays, requiring you to customize the device admin password.

The System Information page displays.

Note: The following step uses an HTTP session to restore the configuration. For information about using a TFTP session, see Use TFTP to download a file to the switch or update the software image on page 464.

13. Restore the configuration that you saved in Step 11:

a. Select **Maintenance > Update > HTTP Firmware/File Update**.

The HTTP Firmware/File Update page displays.

b. From the **File Type** menu, select **Text Configuration**.

c. Click the **Browse** button and locate and select configuration file that you saved in Step 11.

d. Click the **Apply** button.

The file transfer begins. The page displays information about the progress of the file transfer. The switch applies the configuration automatically.

14. Reboot the switch:

a. Select **Maintenance > Reset > Device Reboot**.

The Device Reboot page displays.

b. Select the check box.

c. Click the **Apply** button.

An Alert pop-up window displays.

d. Click the **OK** button to confirm.

The switch reboots.

The Device UI login page displays.

15. Log in again.

The System Information page displays. You can now configure the switch using all options in the device UI.

Use the Device View of the device UI

The Device View displays the ports on the switch. This graphic tool provides an alternate way to navigate to configuration and monitoring options. The graphic tool also provides information about device ports, configuration and status, tables, and feature components.

To use the Device View:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Device View**.

   The Device View page displays.

   The following figure shows the Device View page of model MS510TXUP.

   The Device View shows system LEDs and port LEDs:

   - **Power LED**: The Power LED serves as an indicator of power and management mode status:
     - **Solid green**: The switch is powered on and operating normally. If you changed the management mode of the switch to NETGEAR Insight, the switch is not yet

added to an Insight managed network or not yet connected to the Insight cloud management server.

- **Solid blue**: The management mode of the switch is NETGEAR Insight, the switch is added to an Insight managed network, and the switch is connected to the Insight cloud management server. You can manage and monitor the switch using the NETGEAR Insight app or Insight Cloud portal

The physical Power LED on the switch can be blinking green while the switch is booting but this does not apply to the Device View. (If the switch is off or booting, you cannot access the Device View.)

- **Fan LED**: The Fan LED serves as an indicator of the fan status:
  - **Solid green**: The fans are operating normally.
  - **Solid yellow**: A problem occurred with the fans.
- **PoE Max LED** (Model MS510TXUP only): The PoE Max LED indicates the following status:
  - **Off**: Sufficient (more than 7W of) PoE power is available.
  - **Solid amber**: Less than 7W of PoE power is available.
- **Port LEDs 1–8**: The Ethernet ports 1–8 provide a left LED that functions as the combined link, speed, and activity LED, as described in the following table.

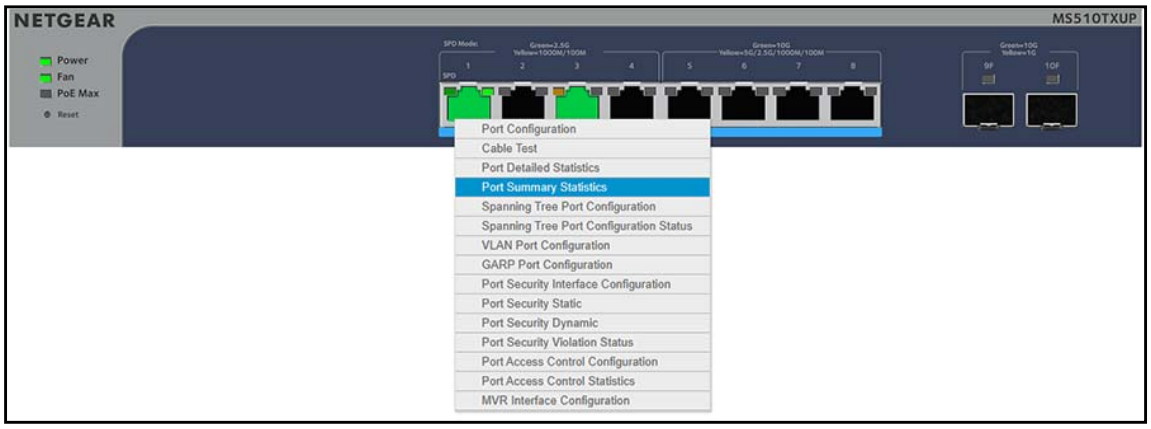
  For model MS510TXUP only, in addition to a left LED, the Ethernet PoE++ ports 1–8 provide a right LED that indicates the PoE status, as described in the following table.
- **Ports 9 and 10**: The SFP+ fiber uplink ports each provide a single LED that functions as the combined link, speed, and activity LED, as described in the following table.

LED	Description
RJ-45 left LED Link, speed, and activity for Ethernet ports 1 to 4	• **Black**: No link is established. • **Solid green**: A valid link at a speed of 2.5 Gbps is established. • **Blinking green**: The port is transmitting or receiving packets at 2.5 Gbps. • **Solid yellow**: A valid link at a speed of 100 Mbps or 1000 Mbps is established. • **Blinking yellow**: The port is transmitting or receiving packets at 100 Mbps or 1000 Mbps.
RJ-45 left LED Link, speed, and activity for Ethernet ports 5 to 8	• **Black**: No link is established. • **Solid green**: A valid link at a speed of 10 Gbps is established. • **Blinking green**: The port is transmitting or receiving packets at 10 Gbps. • **Solid yellow**: A valid link at a speed of 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps is established. • **Blinking yellow**: The port is transmitting or receiving packets at 5 Gbps, 2.5 Gbps, 1000 Mbps, or 100 Mbps.

LED	Description
Model MS510TXUP only: RJ-45 right LED PoE status for Ethernet ports 1 to 8	• **Black**: The port is not delivering PoE power. • **Solid green**: The port is delivering PoE power. • **Solid amber**: A PoE fault occurred.
Link/ACT LED Link, speed, and activity for SFP fiber uplink ports 9F and 10F	• **Black**: No module is installed in the SFP+ port or no link is established on the SFP+ port. • **Solid green**: The module in the SFP+ port established a valid link at a speed of 10 Gbps. • **Blinking green**: The module in the SFP+ is transmitting or receiving packets at 10 Gbps. • **Solid yellow**: The module in the SFP+ port established a valid link at a speed of 1 Gbps. • **Blinking yellow**: The module in the SFP+ is transmitting or receiving packets at 1 Gbps.

7. To see a menu that displays statistics and configuration options, right-click on a port.

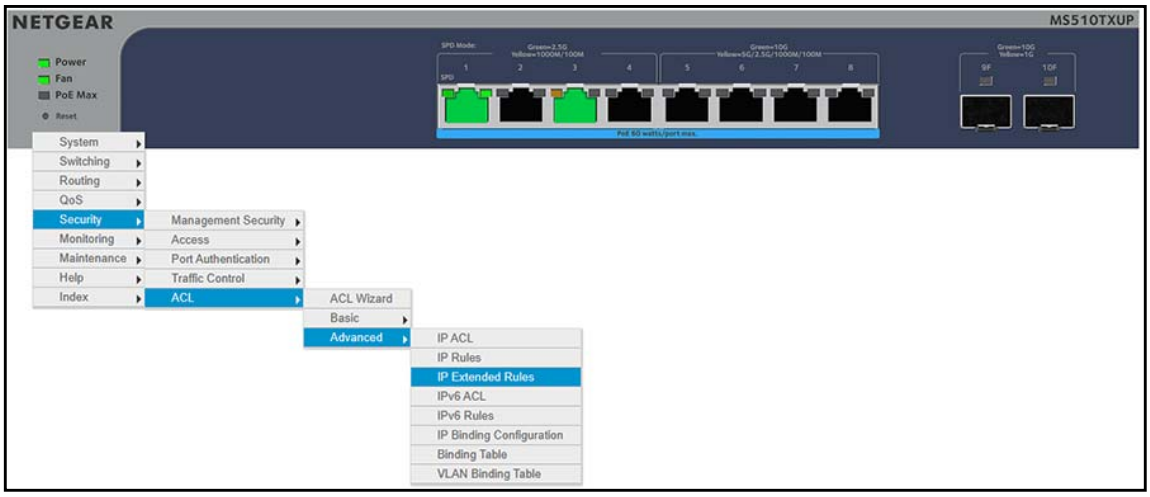
   The following figure shows the Device View page of model MS510TXUP.



   If you select an option from the menu, the associated page opens.

8. To display the main menu that contains the same options as the navigation menu at the top of the page, right-click the graphic without clicking a specific port.

   The following figure shows the Device View page of model MS510TXUP.



If you select an option from the menu, the associated page opens.

9. To return to the Device View page, select **System > Device View**.

Configure interface settings

The switch supports physical and logical interfaces. Interfaces are identified by their type and the interface number. The physical ports are multispeed and high-speed Ethernet interfaces and SFP+ ports and are numbered on the front panel. You configure the logical interfaces by using the device UI.

The following table describes the naming convention for all interfaces available on the switch.

Table 4. Naming conventions for interfaces

Interface	Description	Example
Physical Ethernet ports 1–4	The physical ports are multispeed Ethernet interfaces and are numbered from 1 to 4.	mg1, mg2, mg3, and mg4
Physical Ethernet ports 5–8	The physical ports are high-speed and multispeed Ethernet interfaces and are numbered from 5 to 8.	xmg5, xmg6, xmg7, and xmg8
Physical SFP+ ports 9F and 10F	The physical ports are SPF+ ports in which you can insert transceiver modules and are numbered 9 and 10	xg9 and xg10
Link aggregation group (LAG)	LAG interfaces are logical interfaces that are used only for bridging functions. They are numbered from 1 to 8.	l1, l2, and l3 through l8
CPU management interface	This is the internal switch interface for the switch base MAC address. The interface is not configurable and is always listed in the MAC Address Table.	c1

For some features that allow you to configure interface settings, you can apply the same settings simultaneously to any of the following:

- A single port
- Multiple ports
- All ports
- A single LAG
- Multiple LAGs
- All LAGs
- Multiple ports and LAGs
- All ports and LAGs

Many of the pages that allow you to configure or view interface settings include links to display all ports, all LAGs, or all ports and LAGs on the page.

Use these links as follows:

- To display all ports, click the **1** link.
- To display all LAGs, click the **LAG** link.
- To display all ports and LAGs, click the **All** link.

The procedures in this section describe how to select the ports and LAGs to configure. The procedures assume that you are already logged in to the switch. If you do not know how to log in to the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

To configure a single port by using the Go To Interface field:

1. Ensure that the page is displaying all ports, and not only the LAGs.
2. In the **Go To Interface** field, type the port number.

   For example, type **g4**.

   For more information, see Table 4, Naming conventions for interfaces on page 45.
3. Click the **Go** button.

   The check box associated with the interface is selected, the row for the selected interface is highlighted, and the interface number displays in the heading row.
4. Configure the desired settings.
5. Click the **Apply** button.

   Your settings are saved.

To configure a single LAG by using the Go To Interface field:

1. Click the **LAG** link or the **All** link to display the LAGs.
2. In the **Go To Interface** field, type the LAG number, for example l3.

   For information, see Table 4, Naming conventions for interfaces on page 45.
3. Click the **Go** button.

   The check box associated with the interface is selected, the row for the selected interface is highlighted, and the interface number appears in the heading row.
4. Configure the desired settings.
5. Click the **Apply** button.

   Your settings are saved.

To configure a single port:

1. Ensure that the page is displaying all ports, and not only the LAGs.
2. Select the check box next to the port number.

   The row for the selected interface is highlighted, and the interface number appears in the heading row.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure a single LAG:

1. Click the **LAG** link or the **All** link to display the LAGs.
2. Select the check box next to the LAG number.

   The row for the selected interface is highlighted, and the interface number appears in the heading row.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure multiple ports:

1. Ensure that the page is displaying all ports, and not only the LAGs.
2. Select the check box next to each port to configure.

   The row for each selected interface is highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure multiple LAGs:

1. Click the **LAG** link or the **All** link to display the LAGs.
2. Select the check box next to each LAG to configure.

   The check box associated with each interface is selected, and the row for each selected interface is highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure all ports:

1. Ensure that the page is displaying only ports, and not LAGs.
2. Select the check box in the heading row.

   The check boxes for all ports are selected and the rows for all ports are highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure all LAGs:

1. Click the **LAG** link to display only the LAG interfaces.
2. Select the check box in the heading row.

   The check box associated with every LAG is selected, and the rows for all LAGs are highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure multiple ports and LAGs:

1. Click the **All** link to display all ports and LAGs.
2. Select the check box associated with each port and LAG to configure.

   The rows for the selected ports and LAGs are highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

To configure all ports and LAGs:

1. Click the **All** link to display all ports and LAGs.
2. Select the check box in the heading row.

   The check box associated with every port and LAG is selected, and the rows for all ports and LAGs are highlighted.
3. Configure the desired settings.
4. Click the **Apply** button.

   Your settings are saved.

Access the NETGEAR support website

From the device UI, you can access the NETGEAR support website at netgear.com/support.

To access the support website from the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Help > Support**.

   The Support page displays.
7. To access the NETGEAR support site for the switch, click the **Apply** button.

Access the user manual online

The user manual (the guide you are now reading) is available at the NETGEAR download center at netgear.com/support/download/.

To access the user manual online from the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Help > Online Help > User Guide**.

   The User Guide page displays.
7. To access the NETGEAR download center, click the **Apply** button**.**
8. Enter the model number of the switch.
9. Locate the user manual on the product support web page.

2

Configure System Information

This chapter contains the following sections:

- Switch system information
- Management access IP network and VLAN
- Time and SNTP
- Denial of service
- Domain Name System
- Green Ethernet
- Power over Ethernet (model MS510TXUP)
- PoE timer schedules
- SNMPv1, SNMPv2, and SNMPv3
- Link Layer Discovery Protocol
- DHCP Layer 2 relay
- DHCP snooping
- Dynamic ARP inspection

Switch system information

You can view or define system information, view temperature information, view fan information, and view software information.

View or define system information

When you log in, the System Information page displays. You can configure and view general device information.

To view or define system information:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Define the following fields:
   - **System Name**: Enter the name to identify this switch. You can use up to 255 alphanumeric characters. The default is blank.
   - **System Location**: Enter the location of this switch. You can use up to 255 alphanumeric characters. The default is blank.
   - **System Contact**: Enter the contact person for this switch. You can use up to 255 alphanumeric characters. The default is blank.
7. Click the **Apply** button.

   Your settings are saved.

The following table describes the status information that the System Information page displays.

Table 5. System Information

Field	Description
Product Name	The product name of this switch.
Serial Number	The serial number of the switch.
System Object OID	The base object ID for the switch's enterprise MIB.
Date & Time	The current date and time.
System Up Time	The time in days, hours, and minutes since the last switch reboot.
Base Mac Address	Universally assigned hardware address of the switch.

View the temperature and fan status

You can view the temperature and fan status.

The fans remove the heat generated by the power, CPU, and other components, and allow the switch to function normally.

To view the temperature and fan status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Scroll down to the Temperature Sensors and Fans sections.
7. To refresh the page, click the **Refresh** button.

The following table describes the nonconfigurable temperature and fan status information.

Table 6. Temperature and fan status

Field	Description
Temperature Sensors	
Sensor	The temperature sensor index used to detect the temperature.
Description	The description of the temperature sensor.
Temp (C)	The current temperature in Celsius.
State	The temperature state.
Max Temp (C)	The maximum measured temperature in Celsius.
Fans	
FAN	The fan index used to identify the fan for the switch.
Description	The description of the fan temperature sensor.
Type	Specifies whether the fan module is fixed or removable.
Speed	The fan speed.
Duty level(%)	The duty level of the fan.
State	Specifies whether the fan is operational.

View the software versions

You can view the software versions that are running on the switch.

To view the software versions:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Scroll down to the Versions section.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed in the Versions section of the System Information page.

Table 7. Versions information

Field	Description
Model Name	The model name of the switch.
Boot Version	The version of the bootloader software of the switch.
Software Version	The version number of the software that is running on the switch.

View the system CPU status

You can monitor the CPU, memory resources, and utilization patterns across various intervals to assess the performance, load, and stability settings of the switch.

To view the system CPU status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > System CPU Status > System CPU Status**.

   The CPU Utilization section shows the memory information, task-related information, and percentage of CPU utilization per task.

The following table describes CPU Memory Status information.

Table 8. CPU Memory Status information

Field	Description
Total System Memory	The total memory of the switch in KBytes.
Available Memory	The available memory space for the switch in KBytes.

Configure the CPU thresholds

The CPU Utilization Threshold notification feature allows you to configure thresholds that, when exceeded, trigger a notification. The notification occurs through SNMP trap and syslog messages.

To configure the CPU thresholds:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > System CPU Status > CPU Threshold**.

   The CPU Threshold page displays.

7. Specify the thresholds:
   - **Rising Threshold**: Notification is generated when the total CPU utilization exceeds this threshold value over the configured time period. The range is 1 to 100.
   - **Rising Interval**: This utilization monitoring time period can be configured from 5 to 86400 seconds in multiples of 5 seconds.
   - **Falling Threshold**: Notification is triggered when the total CPU utilization falls below this level for a configured period of time.

     The falling utilization threshold must be equal to or less than the rising threshold value. The falling utilization threshold notification is sent only if a rising threshold notification was sent previously. Configuring the falling utilization threshold and time period is optional. If the Falling CPU utilization settings are not configured, the switch uses the same values as the values that are used for the Rising CPU utilization. The range is 1 to 100.
   - **Falling Interval**: The utilization monitoring time period can be configured from 5 seconds to 86400 seconds in multiples of 5 seconds.
   - **Free Memory Threshold**: The free memory threshold value for the CPU in KB.

8. Click the **Apply** button.

   Your settings are saved.

Management access IP network and VLAN

You can configure network information for the device UI, which is the logical interface used for in-band connectivity with the switch through any of the switch's front-panel ports. The settings associated with the device UI do not affect the configuration of the front panel ports through which traffic is switched or routed.

Configure the IPv4 network and VLAN settings for the device UI

You can configure the IPv4 network information for the device UI, which is the logical interface used for in-band connectivity with the switch through any of the switch's ports.

To configure the IPv4 network and VLAN settings for the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > IP Configuration**.

   The IP Configuration page displays.
7. Select one of the following radio buttons to specify how the network information for the switch must be configured:
   - **Static IP Address**: Specifies that the IP address, subnet mask, and default gateway must be manually configured. Enter this information in the fields below this radio button.
   - **Dynamic IP Address (BOOTP)**: Specifies that the switch must obtain the IP address through a BootP server.
   - **Dynamic IP Address (DHCP)**: Specifies that the switch must obtain the IP address through a DHCP server. This is the default setting.
8. If you select the **Static IP Address** radio button, configure the following network information:
   - **IP Address**: The IP address of the network interface. The default value is 192.168.0.239. Each part of the IP address must start with a number other than zero. For example, IP addresses 001.100.192.6 and 192.001.10.3 are not valid.
   - **Subnet Mask**: The IP subnet mask for the interface. The default value is 255.255.255.0.
   - **Default Gateway**: The default gateway for the IP interface. The default value is 192.168.0.254.
9. In the **Management VLAN ID** field, leave the default value or specify the VLAN ID for the management VLAN.

   The management VLAN is used to establish an IP connection to the switch from a computer that is connected to a port in the same VLAN. If not specified, the active management VLAN ID is 1 (default), which allows an IP connection to be established through any port.

When you change the management VLAN, an IP connection can be made only through a port that is part of the management VLAN. Also, the port VLAN ID (PVID) of the port to be connected in that management VLAN must be the same as the management VLAN ID.

Note: Make sure that the VLAN that must be the management VLAN exists. Also make sure that the PVID of at least one port in the VLAN is the same as the management VLAN ID. For information about creating VLANs and configuring the PVID for a port, see VLANs on page 156.

The following requirements apply to the management VLAN:

- Only one management VLAN can be active at a time.
- When a new management VLAN is configured, connectivity through the existing management VLAN is lost.
- The management station must be reconnected to the port in the new management VLAN.

10. Click the **Apply** button.

    Your settings are saved.

Configure the IPv6 network settings for the device UI

You can configure IPv6 network information for the device UI, which is the logical interface used for in-band connectivity with the switch through any of the switch's front-panel ports.

To access the switch over an IPv6 network, you must initially configure the switch with IPv6 information (an IPv6 prefix, prefix length, and default gateway). You can configure IPv6 using one of the following options:

- IPv6 auto-configuration
- DHCPv6

When in-band connectivity is established, IPv6 information can be changed using SNMP-based management or web-based management.

To configure the IPv6 network settings for the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > IPv6 Network Configuration**.

   The IPv6 Network Configuration page displays.
7. Make sure that the Admin Mode **Enable** radio button is selected.
8. Determine how the switch acquires an IPv6 address:
   - **IPv6 Address Auto Configuration Mode**: When this mode is enabled, the network interface can acquire an IPv6 address through IPv6 Neighbor Discovery Protocol (NDP) and through the use of router advertisement messages. When this mode is disabled, the network interface does not use the native IPv6 address auto-configuration features to acquire an IPv6 address. Auto-configuration can be enabled only when DHCPv6 is not enabled on any of the management interfaces.
   - **DHCPv6**: Next to Current Network Configuration Protocol, select the **DHCPv6** radio button to enable the DHCPv6 client on the interface. The switch attempts to acquire network information from a DHCPv6 server. Selecting the **None** radio button disables the DHCPv6 client on the network interface.

     When DHCPv6 is enabled, the DHCPv6 Client DUID field displays the client identifier used by the DHCPv6 client (if enabled) when sending messages to the DHCPv6 server.
9. In the **IPv6 Gateway** field, specify the default gateway for the IPv6 network interface.

   The gateway address is in IPv6 global or link-local address format.
10. To configure one or more static IPv6 addresses for the management interface, do the following:
    a. In the **IPv6 Prefix/Prefix Length** field, specify the static IPv6 prefix and prefix to the IPv6 network interface.

       The address is in the global address format.
    b. In the **EUI64** menu, select **True** to enable the Extended Universal Identifier (EUI) flag for IPv6 address, or select **False** to omit the EUI flag.
    c. Click the **Add** button.
11. Click the **Apply** button.

    Your settings are saved.

View the IPv6 network neighbors

You can view information about the IPv6 neighbors that the switch discovered through the network interface by using the Neighbor Discovery Protocol (NDP).

To view the IPv6 Network Neighbor Table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > IPv6 Network Neighbor**.

   The IPv6 Network Neighbor page displays.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.

   The following table describes the information the IPv6 Network Neighbor page displays about each IPv6 neighbor that the switch discovered.

Table 9. IPv6 network interface neighbor table information

Field	Description
IPv6 Address	The IPv6 address of the neighbor that was detected by the switch.
MAC Address	The MAC address of the neighbor.
IsRtr	• **true (1)**: The neighbor is a router. • **false (2)**: The neighbor is not a router.

Table 9. IPv6 network interface neighbor table information (continued)

Field	Description
Neighbor State	The state of the neighboring switch: • **reachable (1)**: The neighbor is reachable by th3 switch. • **stale (2)**: Information about the neighbor is scheduled for deletion. • **delay (3)**: No information was received from the neighbor during the delay period. • **probe (4)**: The switch is attempting to probe for the neighbor. • **unknown (5)**: The status is unknown.
Last Updated	The last time that the neighbor information was updated.

Time and SNTP

The switch supports the Simple Network Time Protocol (SNTP). As its name suggests, it is a less complicated version of Network Time Protocol, which is a system for synchronizing the clocks of networked computer systems, primarily when data transfer is handled through the Internet. You can also set the system time manually.

Configure the time settings manually

You can view and adjust date and time settings manually.

To manually configure the time setting:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

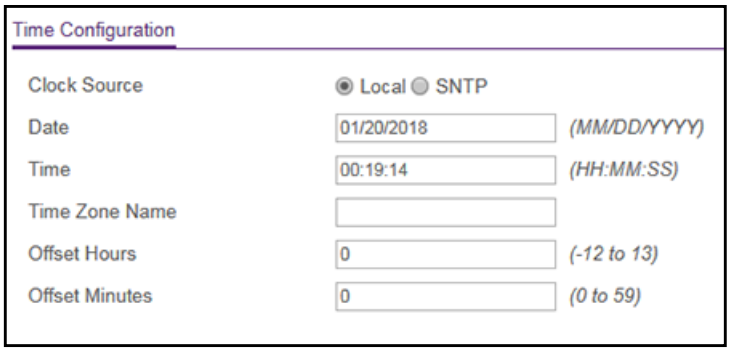
   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Time > Time Configuration**.



7. Select the Clock Source **Local** radio button.
8. In the **Date** field, specify the current date by entering the month, day, and year (MM/DD/YYYY).
9. In the **Time** field, specify the current time by entering in hours, minutes, and seconds (HH:MM:SS).

   Note: If you do not enter a date and time, the switch calculates the date and time using the CPU's clock cycle.

10. In the **Time Zone Name** field, specify the acronym for a time zone.

    You can also specify the number of hours and number of minutes that the time zone is different from the Coordinated Universal Time (UTC). The time zone can affect the display of the current system time. The default value is UTC.

11. In the **Offset Hours** field, specify the number of hours that the time zone is different from the UTC.

    For more information see the description for Time Zone Name in Step 10. The allowed range is –12 to 13. The default value is 0.

12. In the **Offset Minutes** field, specify the number of minutes that the time zone is different from UTC.

    For more information see the description for Time Zone Name in Step 10. The allowed range is 0 to 59. The default value is 0.

13. Click the **Apply** button.

    Your settings are saved.

Configure the time settings with SNTP and configure the global SNTP settings

To configure the time by using SNTP and configure the global SNTP settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

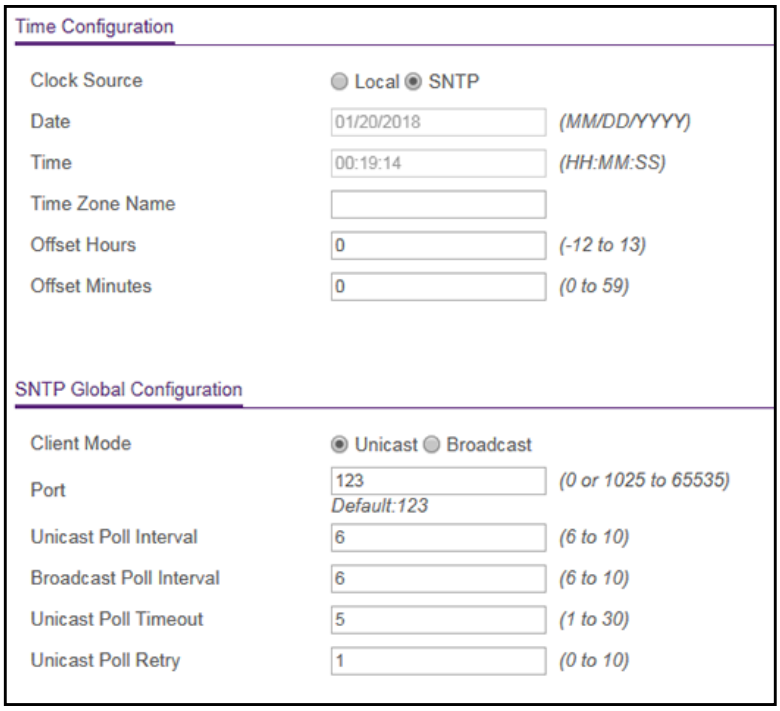
   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Time > Time Configuration**.

   The Time Configuration page displays.
7. Select the Clock Source **SNTP** radio button.



The local clock can be set to SNTP only if the following two conditions are met:

- An SNTP server is configured.
- The switch can contact the SNTP server.

8. Next to Client Mode, select the mode of operation of the SNTP client:
   - **Unicast**: SNTP operates in a point-to-point fashion. A unicast client sends a request to a designated server at its unicast address and expects a reply from which it can determine the time and, optionally, the round-trip delay and local clock offset relative to the server.
   - **Broadcast**: SNTP operates in the same manner as multicast mode but uses a local broadcast address instead of a multicast address. The broadcast address provides a single-subnet scope while a multicast address provides an Internet-wide scope.

   The default value is Unicast.
9. If the SNTP client mode is **Unicast**, use the SNTP Server Configuration page to add the IP address or DNS name of one or more SNTP servers for the switch to poll.

   For more information, see Configure an SNTP server on page 68.
10. In the **Port** field, specify the local UDP port that the SNTP client receives server packets on.

    The allowed range is 1025 to 65535 and 123. The default value is 123. When the default value is configured, the actual client port value used in SNTP packets is assigned by the switch.
11. In the **Unicast Poll Interval** field, specify the number of seconds between unicast poll requests expressed as a power of 2. The allowed range is 6 to 10. The default value is 6.

12. In the **Broadcast Poll Interval** field, specify the number of seconds between broadcast poll requests expressed as a power of 2.

    Broadcasts received prior to the expiry of this interval are discarded. The allowed range is 6 to 10. The default value is 6.

13. In the **Unicast Poll Timeout** field, specify the number of seconds to wait for an SNTP response to a unicast poll request.

    The allowed range is 1 to 30. The default value is 5.

14. In the **Unicast Poll Retry** field, specify the number of times to retry a unicast poll request to an SNTP server after the first time-out before the switch attempts to use the next configured server.

    The allowed range is 0 to 10. The default value is 1.

15. In the Time Configuration section (above the SNTP Global Configuration section), configure the following settings:

    a. In the **Time Zone Name** field, specify the acronym for a time zone.

       You can also specify the number of hours and number of minutes that the time zone is different from the Coordinated Universal Time (UTC). The time zone can affect the display of the current system time. The default value is UTC.

       Note: When using SNTP/NTP time servers to update the switch's clock, the time data received from the server is based on the UTC, which is the same as Greenwich Mean Time (GMT). This might not be the time zone in which the switch is located.

    b. In the **Offset Hours** field, specify the number of hours that the time zone is different from the UTC.

       For more information see the description for Time Zone Name in Step a. The allowed range is –12 to 13. The default value is 0.

    c. In the **Offset Minutes** field, specify the number of minutes that the time zone is different from UTC.

       For more information see the description for Time Zone Name in Step a. The allowed range is 0 to 59. The default value is 0.

16. Click the **Apply** button.

    Your settings are saved.

View the SNTP global status

When you select the SNTP option as the clock source, you can view the SNTP global status.

To view the SNTP global status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Time > Time Configuration**.

   The Time Configuration page displays.
7. Make sure that the Clock Source **SNTP** radio button is selected.

   The SNTP Global Status section displays below the SNTP Global Configuration section.
8. Click the **Refresh** button to update the page with the latest information about the switch.

The following table displays the nonconfigurable SNTP Global Status information.

Table 10. SNTP Global Status information

Field	Description
Version	The SNTP version that the client supports.
Supported mode	The SNTP modes that the client supports. Multiple modes can be supported by a client.
Last Update Time	The local date and time (UTC) that the SNTP client last updated the system clock.
Last Attempt Time	The local date and time (UTC) of the last SNTP request or receipt of an unsolicited message.

Table 10. SNTP Global Status information (continued)

Field	Description
Last Attempt Status	The status of the last SNTP request or unsolicited message for both unicast and broadcast modes. If no message was received from a server, a status of **Other** is displayed. These values are appropriate for all operational modes. • **Other**: The status of the last request is unknown. • **Success**: The SNTP operation was successful and the system time was updated. • **Request Timed Out**: After an SNTP request was sent to an SNTP server, the response timer expired before a response from the server was received. • **Bad Date Encoded**: The time provided by the SNTP server is not valid. • **Version Not Supported**: The SNTP version supported by the server is not compatible with the version supported by the client. • **Server Unsynchronized**: The SNTP server is not synchronized with its peers. This is indicated by the leap indicator field in the SNTP message.
Server IP Address	The IP address of the server for the last received valid packet. If no message was received from any server, an empty string is shown.
Address Type	The address type of the SNTP server address for the last received valid packet.
Server Stratum	The claimed stratum of the server for the last received valid packet.
Reference Clock ID	The reference clock identifier of the server for the last received valid packet.
Server mode	The mode of the server for the last received valid packet.
Unicast Server Max Entries	The maximum number of unicast server entries that can be configured on this client.
Unicast Server Current Entries	The number of current valid unicast server entries configured for this client.
Broadcast Count	The number of unsolicited broadcast SNTP messages that were received and processed by the SNTP client since the last reboot.

Configure an SNTP server

SNTP assures accurate network device clock time synchronization up to the millisecond. Time synchronization is performed by a network SNTP server. The switch operates only as an SNTP client and cannot provide time services to other systems.

Time sources are established by strata. Strata define the accuracy of the reference clock. The higher the stratum (where zero is the highest), the more accurate the clock. The device receives time from Stratum 1 and above since it is itself a Stratum 2 device.

The following is an example of strata:

- **Stratum 0**: A real-time clock is used as the time source, for example, a GPS system.
- **Stratum 1**: A server that is directly linked to a Stratum 0 time source is used. Stratum 1 time servers provide primary network time standards.

- **Stratum 2**: The time source is distanced from the Stratum 1 server over a network path. For example, a Stratum 2 server receives the time over a network link, through NTP, from a Stratum 1 server.

Information received from SNTP servers is evaluated based on the time level and server type.

SNTP time definitions are assessed and determined by the following time levels:

- **T1**: Time that the original request was sent by the client.
- **T2**: Time that the original request was received by the server.
- **T3**: Time that the server sent a reply.
- **T4**: Time that the client received the server's reply.

The device can poll unicast server types for the server time.

Polling for unicast information is used for polling a server for which the IP address is known. SNTP servers that were configured on the device are the only ones that are polled for synchronization information. T1 through T4 are used to determine server time. This is the preferred method for synchronizing device time because it is the most secure method. If this method is selected, SNTP information is accepted only from SNTP servers defined on the device using the SNTP Server Configuration page.

The device retrieves synchronization information, either by actively requesting information or at every poll interval.

You can view and modify information for adding and modifying Simple Network Time Protocol SNTP servers.

Add an SNTP server

To add an SNTP server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Time > SNTP Server Configuration**.

   The SNTP Server Configuration page displays.

7. From the **Server Type** menu, select the type of SNTP address to enter in the address field.

   The address can be an IPv4 address, IPv6 address, or host name (DNS).

8. In the **Address** field, specify the IP address or the host name of the SNTP server.

   This is a text string of up to 64 characters, containing the encoded unicast IP address or host name of an SNTP server. Unicast SNTP requests are sent to this address. If this address is a DNS host name, then that host name is resolved into an IP address each time an SNTP request is sent to it.

9. If the UDP port on the SNTP server to which SNTP requests are sent is not the standard port (123), specify the port number in the **Port** field.

   The range is from 1 to 65535. The default value is 123.

10. In the **Priority** field, specify the priority order which to query the servers.

    The SNTP client on the device continues sending SNTP requests to different servers until a successful response is received, or all servers are exhausted. The priority indicates the order in which to query the servers. The request is sent to an SNTP server with a priority value of 1 first, then to a server with a priority value of 2, and so on. If any servers are assigned the same priority, the SNTP client contacts the servers in the order that they appear in the table. The range is from 1 to 3. The default value is 1.

11. In the **Version** field, specify the NTP version running on the server.

    The range is 1 to 4. The default value is 4.

12. Click the **Add** button.

    The SNTP server entry is added.

13. Repeat the previous steps to add additional SNTP servers.

    You can configure up to three SNTP servers.

The SNTP Server Status table displays status information about the SNTP servers configured on your switch. The following table describes the SNTP Server Global Status information.

Table 11. SNTP Server Status information

Field	Description
Address	All the existing server addresses. If no server configuration exists, a message stating that no SNTP server exists displays on the page.
Last Update Time	The local date and time (UTC) that the response from this server was used to update the system clock.
Last Attempt Time	The local date and time (UTC) that this SNTP server was last queried.
Last Attempt Status	The status of the last SNTP request or unsolicited message for both unicast and broadcast modes. If no message was received from a server, a status of Other is displayed. These values are appropriate for all operational modes: • **Other**: The status of the last request is unknown, or no SNTP responses were received. • **Success**: The SNTP operation was successful and the system time was updated. • **Request Timed Out**: After an SNTP request was sent to an SNTP server, the response timer expired before a response from the server was received. • **Bad Date Encoded**: The time provided by the SNTP server is not valid. • **Version Not Supported**: The SNTP version supported by the server is not compatible with the version supported by the client. • **Server Unsynchronized**: The SNTP server is not synchronized with its peers. This is indicated by the leap indicator field on the SNTP message. • **Server Kiss Of Death**: The SNTP server indicated that no further queries were to be sent to this server. This is indicated by a stratum field equal to 0 in a message received from a server.
Requests	The number of SNTP requests made to this server since last agent reboot.
Failed Requests	The number of failed SNTP requests made to this server since the last reboot.

Change the settings for an existing SNTP server

To change the settings for an existing SNTP server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Time > SNTP Server Configuration**.

   The SNTP Server Configuration page displays.
7. Select the check box next to the configured server.
8. Specify new values in the available fields.
9. Click the **Apply** button.

   Your settings are saved.

Remove an SNTP server

To remove an SNTP server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Time > SNTP Server Configuration**.

   The SNTP Server Configuration page displays.

7. Select the check box next to the configured server to remove.
8. Click the **Delete** button.

   The entry is removed, and the device is updated.

Configure daylight saving time settings

You can configure settings for summer time, which is also known as daylight saving time. Used in some countries around the world, summer time is the practice of temporarily advancing clocks during the summer months. Typically clocks are adjusted forward one or more hours near the start of spring and are adjusted backward in autumn.

To configure the daylight saving time settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Time > DayLight Saving Configuration**.

   The DayLight Saving Configuration page displays.
7. Select a Daylight Saving (DST) radio button:
   - **Disable**: Disable daylight saving time.
   - **Recurring**: Daylight saving time occurs at the same time every year. The start and end times and dates for the time shift must be manually configured.
   - **Recurring EU**: The system clock uses the standard recurring summer time settings used in countries in the European Union. When this option is selected, the rest of the applicable fields on the page are automatically populated and cannot be edited.

- **Recurring USA**: The system clock uses the standard recurring daylight saving time settings used in the United States. When this option is selected, the rest of the applicable fields on the page are automatically populated and cannot be edited.
- **Nonrecurring**: Daylight saving time settings are in effect only between the start date and end date of the specified year. When this option is selected, the summer time settings do not repeat on an annual basis.

8. Depending on your selection, configure the additional fields:
   - If you select the DayLight Saving (DST) **Recurring**, **Recurring EU**, or **Recurring USA** radio button, the fields in the following table are visible and you must configure them.

Table 12. Daylight saving setting is Recurring, Recurring EU, or Recurring USA

Field	Description
Begins At	These fields are used to configure the start values of the date and time. • **Week**: Configure the start week in the month. • **Day**. Configure the start day in the week. • **Month**: Configure the start month. • **Hours**. Configure the start hour. • **Minutes**. Configure the start minutes.
Ends At	These fields are used to configure the end values of date and time. • **Week**: Configure the end week in the month. • **Day**: Configure the end day in the week. • **Month**: Configure the end month. • **Hours**: Configure the end hour. • **Minutes**: Configure the end minutes.
Offset	Configure recurring offset in minutes. The range is from 1 to 1440 minutes.
Zone	Configure the time zone.

   - If you select the DayLight Saving (DST) **Nonrecurring** radio button, the fields in the following table are visible and you must configure them.

Table 13. Daylight saving setting is Nonrecurring

Field	Description
Begins At	These fields are used to configure the start values of the date and time. • **Month**: Configure the start month. • **Date**: Configure the start date in the month. • **Year**: Configure the start year. • **Hours**: Configure the start hour. • **Minutes**: Configure the start minutes.

Table 13. Daylight saving setting is Nonrecurring (continued)

Field	Description
Ends At	These fields are used to configure the end values of date and time. • **Month**: Configure the end month. • **Date**: Configure the end date in the month. • **Year**: Configure the end year. • **Hours**: Configure the end hour. • **Minutes**: Configure the end minutes.
Offset	Specify the number of minutes to shift the summer time from the standard time. The range is from 1 to 1440 minutes.
Zone	Specify the acronym associated with the time zone when summer time is in effect. This field is not validated against an official list of time zone acronyms.

9. Click the **Apply** button.

   Your settings are saved.

View the daylight saving time status

The Daylight Saving (DST) Status section shows information about the summer time settings and whether the time shift for summer time is currently in effect.

To view the daylight saving time status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Time > DayLight Saving Configuration**.

   The DayLight Saving Configuration page displays.

7. To refresh the page, click the **Refresh** button.

The following table displays the nonconfigurable daylight saving status information.

Table 14. Daylight Saving (DST) Status information

Field	Description
Daylight Saving (DST)	The Daylight Saving value, which is one of the following: • **Disable** • **Recurring** • **Recurring EU** • **Recurring USA** • **Nonrecurring**
Begins At	The start date of daylight saving time. This field is not displayed when daylight saving time is disabled.
Ends At	The end date of daylight saving time. This field is not displayed when daylight saving time is disabled.
Offset (in Minutes)	The offset value in minutes.This field is not displayed when daylight saving time is disabled.
Zone	The zone acronym. This field is not displayed when daylight saving time is disabled.
Daylight Saving (DST) in Effect	Indicates whether daylight saving time is in effect.

Denial of service

You can configure the denial of service (DoS) settings for the switch. The switch provides support for classifying and blocking specific types of DoS attacks.

Configure Auto-DoS

You can automatically enable all the DoS features available on the switch, except for the L4 Port attack. For information about the types of DoS attacks the switch can monitor and block, see Configure denial of service on page 77.

To enable the Auto-DoS feature:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Denial of Service > Auto-DoS Configuration**.

   The Auto-DoS Configuration page displays.

7. Select the Auto-DoS Mode **Enable** radio button.

   When an attack is detected, a warning message is logged to the buffered log and is sent to the syslog server. At the same time, the port is shut down and can be enabled only manually by the admin user.

8. Click the **Apply** button.

   Your settings are saved.

Configure denial of service

You can select which types of denial of service (DoS) attacks the switch monitors and blocks.

To configure individual DoS settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Denial of Service > Denial of Service Configuration**.

   The Denial of Service Configuration page displays.
7. Select the types of DoS attacks for the switch to monitor and block and configure any associated values:
   - **Denial of Service Min TCP Header Size**: Specify the minimum TCP header size allowed. If you select the **Denial of Service TCP Fragment** radio button, the switch drops the first TCP fragment with a TCP payload packet for which the minimum TCP header size is larger than the IP payload length minus the IP header size. The range for the minimum TCP header size is from 0 to 31. The default value is 20.
   - **Denial of Service Max ICMP Packet Size**: Specify the maximum ICMPv4 packet size allowed. If ICMPv4 DoS prevention or ICMPv6 DoS prevention is enabled, the switch drops ICMPv4 or ICMPv6 ping packets with a size greater than the configured value. The range is from 0 to 16376. The default value is 512.
   - **Denial of Service ICMPv4**: Enabling ICMPv4 DoS prevention causes the switch to drop ICMPv4 packets with a type set to ECHO_REQ (ping) and a size greater than the configured ICMPv4 packet size.
   - **Denial of Service ICMPv6**: Enabling ICMPv6 DoS prevention causes the switch to drop ICMPv6 packets with a type set to ECHO_REQ (ping) and a size greater than the configured ICMPv6 packet size.
   - **Denial of Service Ping of Death**: Enabling Ping of Death DoS prevention causes the switch to drop ICMP ping packets that are larger than 65535 bytes.
   - **Denial of Service IPv6 Fragment**: Enabling IPv6 Fragment DoS prevention causes the switch to drop IPv6 packets that contain a fragment header with the more flag set to 1 and for which the payload length less than 1240.
   - **Denial of Service ICMP Fragment**: Enabling ICMP Fragment DoS prevention causes the switch to drop ICMP fragmented packets.
   - **Denial of Service Smurf**: Enabling Smurf DoS prevention causes the switch to drop broadcast ICMP echo request packet.
   - **Denial of Service SIP=DIP**: Enabling SIP=DIP DoS prevention causes the switch to drop packets with a source IP address equal to the destination IP address.
   - **Denial of Service SMAC=DMAC**: Enabling SMAC=DMAC DoS prevention causes the switch to drop packets with a source MAC address equal to the destination MAC address.

- **Denial of Service TCP FIN&URG&PSH**: Enabling TCP FIN & URG & PSH DoS prevention causes the switch to drop packets with TCP flags FIN, URG, and PSH set and the TCP sequence number equal to 0.
- **Denial of Service TCP Flag&Sequence**: Enabling TCP Flag DoS prevention causes the switch to drop packets with TCP control flags set to 0 and the TCP sequence number set to 0.
- **Denial of Service TCP Fragment**: Enabling TCP Fragment DoS prevention causes the switch to drop packets with a TCP payload for which the IP payload length minus the IP header size is less than the minimum allowed TCP header size.
- **Denial of Service TCP Offset**: Enabling TCP Offset DoS prevention causes the switch to drop packets with a TCP header offset set to 1.
- **Denial of Service TCP Port**: Enabling TCP Port DoS prevention causes the switch to drop packets for which the TCP source port is equal to the TCP destination port.
- **Denial of Service TCP Source Port**: Enabling TCP Source Port DoS prevention causes the switch to drop packets for which the TCP source port number is lower than 1024.
- **Denial of Service TCP SYN&FIN**: Enabling TCP SYN & FIN DoS prevention causes the switch to drop packets with TCP flags SYN and FIN set.
- **Denial of Service TCP SYN&RST**: Enabling TCP SYN & RST DoS prevention causes the switch to drop packets with TCP flags SYN and RST set.
- **Denial of Service UDP Port**: Enabling UDP Port DoS prevention causes the switch to drop packets for which the UDP source port is equal to the UDP destination port.

8. Click the **Apply** button.

   Your settings are saved.

Domain Name System

You can configure information about Domain Name System (DNS) servers that the network uses and how the switch operates as a DNS client.

Configure the global DNS settings and add a DNS server

You can configure the global DNS settings and DNS server information.

To configure the global DNS settings and add a DNS server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > DNS > DNS Configuration**.

   The DNS Configuration page displays.
7. Select the **Disable** or **Enable** radio button to specify whether to disable or enable the administrative status of the DNS client.
   - **Enable**: Allows the switch to send DNS queries to a DNS server to resolve a DNS domain name. The DNS is enabled by default.
   - **Disable**: Prevents the switch from sending DNS queries.
8. In the **DNS Default Name** field, enter the default DNS domain name to include in DNS queries.

   When the system is performing a lookup on an unqualified host name, this field is provides the domain name (for example, if default domain name is netgear.com and the user enters test, then test is changed to test.netgear.com to resolve the name). The name must not be longer than 255 characters.
9. In the **DNS Server** field, specify the IPv4 address to which the switch sends DNS queries.
10. Click the **Add** button.

    The server is added to the list. You can specify up to eight DNS servers. The Preference field displays the server preference order. The preference is set in the order in which preferences were entered.
11. Click the **Apply** button.

    Your settings are saved.

The following table displays DNS Server Configuration information.

Table 15. DNS Server Configuration information

Field	Description
ID	The identification of the DNS Server.
Preference	Shows the preference of the DNS server. The preferences are determined by the order in which they were entered.

Remove a DNS server

You can remove a DNS server that you no longer need.

To remove a DNS server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > DNS > DNS Configuration**.

   The DNS Configuration page displays.
7. In the DNS Server Configuration table, select the check box for the DNS server.

   Note: If you do not select a DNS server, all the DNS servers are removed after you click the **Delete** button.
8. Click the **Delete** button.

   The DNS server is removed.

Configure and view host name-to-IP address information

You can manually map host names to IP addresses or view dynamic host mappings.

Add a static entry to the dynamic host mapping table

To add a static entry to the local dynamic host mapping table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > DNS > Host Configuration**.

   The Host Configuration page displays.
7. In the **Host Name (1 to 255 characters)** field, specify the static host name to add.

   Its length cannot exceed 255 characters and it is a required field.
8. In the **IPv4/IPv6 Address** field, enter the IP address to associate with the host name.
9. Click the **Add** button.

   Your settings are saved. The entry displays in the Dynamic Host Mapping table.

Remove an entry from the dynamic host mapping table

To remove an entry from the dynamic host mapping table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > DNS > Host Configuration**.

   The Host Configuration page displays.
7. Select the check box next to the entry to remove.
8. Click the **Delete** button.

   The entry is removed from the Dynamic Host Mapping table.

Change the host name or IP address in an entry of the dynamic host mapping table, view all entries, or clear all entries

To change the host name or IP address in an entry of the dynamic host mapping table, view all entries, or clear all entries:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > DNS > Host Configuration**.

   The Host Configuration page display.
7. Select the check box next to the entry to update.
8. Enter the new information in the appropriate field.
9. Click the **Apply** button.

   Your settings are saved.
10. To clear all the dynamic host name entries from the list, click the **Clear** button.

The dynamic host mapping table shows host name-to-IP address entries that the switch learned. The following table describes the dynamic host fields.

Table 16. Dynamic Host Mapping information

Field	Description
Host	Lists the host name that you assign to the specified IP address.
Total	Time since the dynamic entry was first added to the table.
Elapsed	Time since the dynamic entry was last updated.
Type	The type of the dynamic entry.
IPv4/IPv6 Addresses	Lists the IP address associated with the host name.

Green Ethernet

You can configure the green Ethernet features to reduce power consumption.

Configure the global green Ethernet settings

You can configure the global green Ethernet settings.

To configure the global green Ethernet settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Management > Green Ethernet > Green Ethernet Configuration**.

   The Green Ethernet Configuration page displays.
7. Select the EEE Mode **Disable** or **Enable** radio button.

   By default, this mode is disabled. Energy Efficient Ethernet (EEE) combines the MAC with a family of physical layers that support operation in a low power mode. It is defined by the IEEE 802.3az standard. Lower power mode enables both the send and receive sides of the link to disable some functionality for power savings when the load is light. Transition to low power mode does not change the link status. Frames in transit are not dropped or corrupted in transition to and from low power mode. Transition time is transparent to upper layer protocols and applications.
8. Click the **Apply** button.

   Your settings are saved.

Configure green Ethernet interface settings

You can configure green Ethernet settings for individual interfaces.

To configure the green Ethernet interface settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Green Ethernet > Green Ethernet Interface Configuration**.

   The Green Ethernet Interface Configuration page displays.

7. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.

8. From the **EEE mode** menu, select **Enable** or **Disable**.

   By default, this mode is disabled for the port. Energy Efficient Ethernet (EEE) combines the MAC with a family of physical layers that support operation in a low power mode. It is defined by the IEEE 802.3az standard. Lower power mode enables both the send and receive sides of the link to disable some functionality for power savings when the load is light. Transition to low power mode does not change the link status. Frames in transit are

not dropped or corrupted in transition to and from low power mode. Transition time is transparent to upper layer protocols and applications.

9. Click the **Apply** button.

   Your settings are saved.

Manage switch discovery with UPnP and SSDP

By default, Universal Plug and Play (UPnP) and Simple Service Discovery Protocol (SSDP) are enabled on the switch. UPnP and SSDP allow the switch to be discovered in your network, for example on Windows-based computers and mobile devices on the NETGEAR Insight app is installed. For greater security you can disable UPnP and SSDP.

You cannot manage the settings for these protocols independently.

To manage switch discovery with UPnP and SSDP:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Management > Switch Discovery > UPnP / SSDP**

   The UPnP / SSDP page displays.

7. Select the **Enable** or **Disable** radio button.

By default, the **Enable** radio button is selected so that both UPnP and SSDP are enabled and the switch can be discovered in the network.

8. Click the **Apply** button.

   Your settings are saved.

   The UPnP / SSDP Administrative Mode field shows the status of UPnP and SSDP.

Power over Ethernet (model MS510TXUP)

You can configure the global Power over Ethernet (PoE) configuration settings and the PoE settings for each Ethernet port of model MS510TXUP.

PoE concepts

The PoE++ ports on model MS510TXUP support IEEE 802.3bt PoE. This model is also compatible with PoE+ (IEEE 802.3at) and PoE (IEEE 802.3af) and can support non-PoE devices.

The maximum PoE power budget across all active PoE++ ports is 295W. The maximum PoE power that an individual PoE++ port can supply is 60W.

Device class power requirements

PoE++, PoE+, and PoE use Ethernet cables to supply power to PoE-capable devices on the network, such as WiFi 6 PoE+ and other access points, pan–tilt–zoom (PTZ) cameras, IP cameras, VoIP phones, LED lighting, PoE speakers, and AV encoders. The switch is compliant with the IEEE 802.3bt standard (PoE++) and backward compatible with the IEEE IEEE 802.3at (PoE+) and 802.3af (PoE) standards. The switch can pass power through to any powered device (PD) that supports these standards and lets you power such a device without the need for a separate power supply.

The switch supports a plug-and-play process by which it detects the type of device that is connected to one of its PoE++ ports and whether that device needs power and how much so that the switch can provide the correct power to the device.

During the plug-and-play process, the connected device can provide its PoE class response to the switch in many ways, depending on how the vendor programmed the device.

The following table shows the device classes for PoE, PoE+, and PoE++ devices adhering to the IEEE 802.3at standard.

Table 17. PoE, PoE+, and PoE++ device class power allocation

Device class	Compatible PoE standard	Minimum output power allocated by the port	Range of power delivered to the powered device
0	PoE, PoE+, and PoE++	15.4W	0.44W–13.0W
1	PoE, PoE+, and PoE++	4.0W	0.44W–3.84W
2	PoE, PoE+, and PoE++	7.0W	3.84W–6.49W
3	PoE, PoE+, and PoE++	15.4W	6.49W–13.0W
4	PoE+ and PoE++	30.0W	13.0W–25.5W
5	PoE++	45.0W	25.5W–40.0W
6–8[1]	PoE++	60.0W	40.0W–51.0W

1. The switch can support a Class 7 or Class 8 device up to 60W.

The previous table shows the standard power ranges, calculated with the maximum cable length of 328 feet (100 meters). If a powered device (PD) receives insufficient PoE power from the switch, consider using a shorter cable.

Power allocation and power budget concepts

The switch is a smart switch in that it can allocate the required power to a connected device by using a prioritization scheme: By default, power is supplied in ascending port order (that is, lower port numbers are served first) until the power budget is consumed and insufficient power remains to allocate to the next device. When less than 7W of PoE power is available on a port, the port PoE LED lights yellow, and the attached device does not receive power from the port. However, the switch continues to send data through the port connection.

The switch is also a smart switch in that it can override the IEEE power classification of a powered device (PD): If the PD consumes less power than required by its power classification, the switch provides only the power that the PD consumes instead of the power that is required by the PD's power classification.

If some PoE++ ports are in use and deliver power, you can calculate the available power budget for the other PoE+ ports by subtracting the consumed (that is, delivered power) from the total available power budget. (For information about the total available power budget, see PoE concepts on page 88.)

An example:
Port 1 delivers 4.4W to a PD. The available power budget is 290.6W (295W–4.4W).

Another example:
A Class 3 PD is attached to Port 1, a Class 6 PD to Port 2, and another Class 6 PD to Port 3. However, the PDs consume less power than defined by their classes: The PD attached to Port 1 consumes 7.3W, the PD attached to Port 2 consumes 44.7W, and the PD attached to

Port 3 consumes 46.9W. So even though the switch provides power to two Class 6 devices and one Class 3 device, the available power budget is 196.1W (295W–7.3–44.7–46.9W).

To determine the delivered power by a PoE++ port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

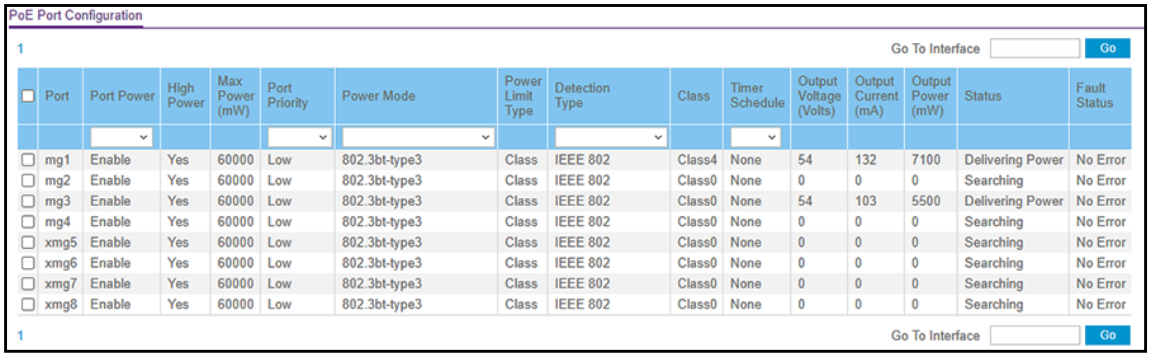
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. **Select System > PoE > Advanced > PoE Port Configuration**.



   The delivered power is stated in the Output Power (mW) column.

Configure the global PoE settings

To configure the global PoE settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > PoE > Basic > PoE Configuration**.

   The PoE Configuration page displays.

7. In the **System Usage Threshold** field, enter a number from 1 to 99 to set the threshold level at which a trap is sent if the consumed power exceeds the threshold power. The default setting is 95 percent.
8. From the **Power Management Mode** menu, select the power management algorithm that the switch uses to deliver power to the requesting powered devices (PDs):
   - **Static**: Specifies that the power allocated for each port depends on the type of power threshold configured on the port.
   - **Dynamic**: Specifies that the power consumption on each port is measured and calculated in real time. The default setting is Dynamic.
9. To active the PoE traps, from the **Traps** menu, select **Enable**.

   Selecting **Disable** deactivates the PoE traps. The default setting is Enable.

10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable fields on the page.

Table 18. PoE Configuration fields

Field	Description
Firmware Version	The firmware version of the PoE firmware component.
Power Status	The power status.
Total Power Available Watts	The maximum amount of power in watts that the switch can deliver to all ports.
Threshold Power Watts	If the consumed power is below the threshold power, the switch can power up another port. The consumed power can be between the nominal and threshold power. The threshold power is displayed in watts. **Note:** The threshold power value is determined by the value that you enter in the **System Usage Threshold** field.
Consumed Power Watts	The total amount of power in watts that is being delivered to all ports.

Manage the uninterrupted PoE feature

By default, the uninterrupted PoE feature is disabled, causing the switch to stop providing PoE power while it is rebooting. If you enable the uninterrupted PoE feature, the switch continues to provide PoE power to any attached PDs while the switch is rebooting, even if it is rebooting after a regular firmware update.

However, note the following situations during which the switch temporarily stops providing PoE:

- The switch reboots because you reset it to factory default settings.
- The switch reboots because you upgrade the switch firmware with a change in the configuration structure, an update to the chip driver, or a change to the default PoE settings.

To manage the uninterrupted PoE feature:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > PoE > Basic > PoE Configuration**.

   The PoE Configuration page displays.
7. To enable or disenable uninterrupted PoE feature, select one of the following radio buttons:
   - **Disable**: The uninterrupted PoE feature is disabled. The default setting is Disabled.
   - **Enable**: The uninterrupted PoE feature is enabled.
8. Click the **Apply** button.

   Your settings are saved.

Configure the PoE port settings

To configure the PoE port settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

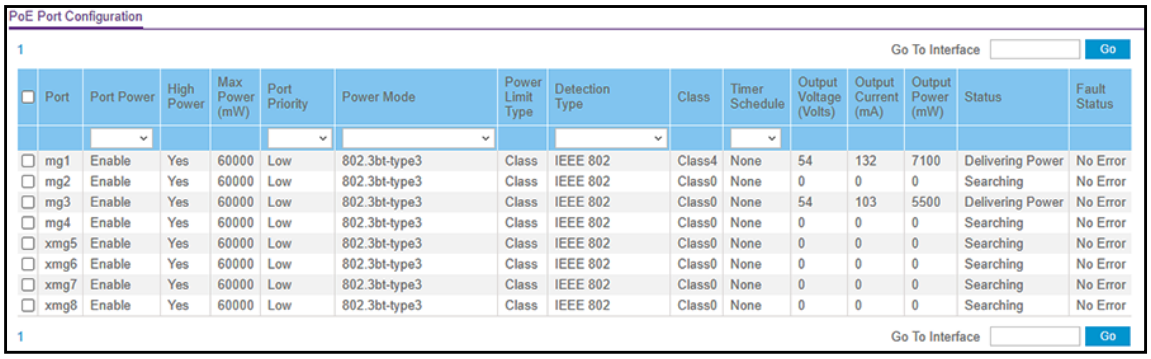
   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **System > PoE > Advanced > PoE Port Configuration**.



7. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
8. From the **Port Power** menu, select the PoE mode of the port:
   - **Enable**: The port's capacity to deliver power is enabled. This is the default setting.
   - **Disable**: The port's capacity to deliver power is disabled.
9. From the **Port Priority** menu, select the priority for the port in relation to other ports if the total power that the switch is capable of delivering exceeds the total power budget:
   - **Low**: Low priority. This is the default setting.
   - **Medium**: Medium priority.
   - **High**: High priority.
   - **Critical**: Critical priority.

   The port priority determines which ports can still deliver power if the total power delivered by the switch exceeds the total power budget. In such a situation, the switch might not be able to deliver power to all connected powered devices (PDs). If the same priority applies to two ports, the lower-numbered port receives higher priority.
10. From the **Power Mode** menu, select the PoE mode that the port must function in:
    - **802.3af**: The port is powered in and limited to the IEEE 802.3af mode. A PD that requires IEEE 802.3at or IEEE 802.3bt does not receive power if the port functions in IEEE 802.3af mode.
    - **Legacy**: The port is powered using high-inrush current, which is used by legacy PDs that require more than 15W to power up.
    - **Pre-802.3at**: The port is initially powered in the IEEE 802.3af mode and, before 75 msec pass, is switched to the high power IEEE 802.3at mode. Select this mode if the PD does not perform Layer 2 classification or if the switch performs 2-event Layer 1 classification.

- **802.3at**: The port is powered in the IEEE 802.3at mode and is backward compatible with IEEE 802.3af. In this mode, if the switch detects that the attached PD requests more power than IEEE 802.3af but is not an IEEE 802.3at Class 4 device, the PD does not receive power from the switch.
- **Pre-802.3bt**. The port supports Class 4 devices that use 4-pair PoE (4PPoE) to receive power higher than 30W (up to the maximum power of 60W) but that are not compliant with IEEE 802.3bt. The port also supports the IEEE 802.3at and IEEE 802.3af modes.
- **Pre-802.3bt (max power)**: The port supports Class 4 devices that use 4-pair PoE (4PPoE) to receive power higher than 30W (up to the maximum power of 60W) but that are not compliant with IEEE 802.3bt. In this mode, the port allocates the maximum power of 60W to the device. The port also supports the IEEE 802.3at and IEEE 802.3af modes.
- **802.3bt-type3**: The port supports the IEEE 802.3bt Type 3 mode, the IEEE 802.3atmode, and the IEEE 802.3af mode. The 802.3bt-type3 mode is the default mode.

11. From the **Detection Type** menu, select how the port detects the attached PD:
    - **IEEE 802**: The port performs a 4-point resistive detection. This is the default setting.
    - **4ptdot3af+legacy**: The port performs a 4-point resistive detection, and if required, continues with legacy detection.
    - **Legacy**: The port performs legacy detection.
12. From the **Timer Schedule** menu, select a timer schedule or select **None**, which is the default selection.

    For information about setting up and configuring PoE timer schedules, see PoE timer schedules on page 97.
13. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable fields on the page.

Table 19. PoE Port Configuration

Field	Description
High Power	All ports supports high power mode.
Max Power (mW)	The maximum power in milliwatts that can be provided by the port.

Table 19. PoE Port Configuration (continued)

Field	Description
Class	The class defines the range of power that a powered device (PD) is drawing from the switch. The class definitions are as follows: • **0**: 0.44–16.2W • **1**: 0.44–4.2W • **2**: 0.44–7.4W • **3**. 0.44–16.2W • **4**: 0.44–31.6W • **5**: 0.44–45.0W • **6**: 0.44–60.0W • **7**: 0.44–60.0W • **8**: 0.44–60.0W • **Unknown**: The class cannot be detected, or no PD is attached to the port.
Power Limit Type	The port power limit is equal to the class of the attached PD.
Output Voltage (Volts)	The voltage that is delivered to the PD in volts.
Output Current (mA)	The current that is delivered to the PD in mA.
Output Power (mW)	The power that is delivered to the PD in milliwatts.
Status	The operational status of the port: • **Disabled**: No power is delivered. • **Delivering Power**: Power is being drawn by the PD. • **Requesting Power**: The port is requesting power. • **Fault**: A problem occurred with the power. • **Test**: The port is in test mode. • **Other Fault**: The port is idle because of an error condition. • **Searching**: The port is not in one of the other states in this list.
Fault Status	The error description when the PoE port is in a fault state: • **No Error**: The port is not in any error state and can provide power. • **MPS Absent**: The port detected the absence of the main power supply, preventing the port from providing power. • **Short**: The port detected a short circuit condition, preventing the port from providing power. • **Overload**: The PD that is connected to the port attempts to draw more power than allowed by the port's settings, preventing the port from providing power at all. • **Power Denied**: The port was denied power because of a shortage of power or because of an administrative condition. In this condition, the port cannot provide power.

PoE timer schedules

You can define multiple timer schedules (each with a unique name) that you can use for PoE power delivery to attached powered devices (PDs).

After you create a timer schedule, you can associate it with one or more PoE ports (see Configure the PoE port settings on page 93). You can use a separate timer schedule for each PoE port.

IMPORTANT:

After you associate a timer schedule with a PoE port, the start date and time force the PoE port to *stop* delivering power and the stop date and time enable the PoE port to *start* delivering power.

You can create absolute timer schedules, which apply to specific dates and times, and you can create recurring timer schedules. For each timer schedule, you can add multiple entries that apply to the selected timer schedule only.

Create a PoE timer schedule

The maximum number of timer schedules that you can add is 100.

To create a PoE timer schedule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

The System Information page displays.

6. Select **System > Timer Schedule > Basic > Global Configuration**.

   The Global Configuration page displays.

7. In the **Timer Schedule Name** field, specify the name for a timer schedule.
8. Click the **Add** button.

   The timer schedule is added to the table on the Timer Schedule Name page and is assigned an ID.

Specify the settings for an absolute PoE timer schedule

An absolute timer schedule applies to specific dates and times. The schedule is executed once only.

To specify the settings for a PoE timer schedule that uses specific dates and times:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Timer Schedule > Advanced > Timer Schedule Configuration**.

   The Timer Schedule Configuration page displays.

7. In the Timer Schedule Selection section, make your selections from the following menus:
   a. **Timer Schedule Name**. Select the name of the timer schedule that you want to configure.

You can select only names of schedules that you created (see Create a PoE timer schedule on page 97).

b. **Timer Schedule Type**. Select **Absolute**.

The fields in the Timer Schedule Configuration section might adjust to let you configure a timer schedule for specific dates and times.

c. **Timer Schedule Entry**. To add a new entry, select **new**.

Selecting an existing entry lets you make changes to that entry.

8. In the Timer Schedule Configuration section, specify the times and dates:
   a. In the **Time Start** field, enter the time of day in the HH:MM format to specify when the timer schedule must start.
   b. In the **Time End** field, enter the time of day in the HH:MM format to specify when the timer schedule must stop.
   c. Next to the **Date Start** field, click the calendar icon and use the menus in the pop-up window to enter the date in the DD-Mon-YYY format to specify when the timer schedule must start.
   d. Next to the **Date End** field, click the calendar icon and use the menus in the pop-up window to enter the date in the DD-Mon-YYY format to specify when the timer schedule must stop.
9. Click the **Add** button.

The entry for the timer schedule is added.

Specify the settings for a recurring PoE timer schedule

A recurring schedule allows you to set up a single schedule that starts at a particular date and that recurs either with a specific end date or indefinitely.

For a single recurring PoE timer schedule, you can add a daily, weekly, and monthly schedule configuration. That is, these schedule configurations are not mutually exclusive but complement each other.

To specify the settings for a PoE timer schedule that uses a recurring pattern:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Timer Schedule > Advanced > Timer Schedule Configuration**.

   The Timer Schedule Configuration page displays.
7. In the Timer Schedule Selection section, make your selections from the following menus:
   a. **Timer Schedule Name**. Select the name of the timer schedule that you want to configure.

      You can select only names of schedules that you created (see Create a PoE timer schedule on page 97).

   b. **Timer Schedule Type**. Select **Periodic**.

      The fields in the Timer Schedule Configuration section might adjust to let you configure a timer schedule with a recurrence pattern.

   c. **Timer Schedule Entry**. To add a new entry, select **new**.

      Selecting an existing entry lets you make changes to that entry.
8. In the Timer Schedule Configuration section, specify the recurrence pattern:
   a. In the **Time Start** field, enter the time of day in the HH:MM format to specify when the timer schedule must start.
   b. In the **Time End** field, enter the time of day in the HH:MM format to specify when the timer schedule must stop.
   c. Next to the **Date Start** field, click the calendar icon and use the menus in the pop-up window to enter the date in the DD-Mon-YYY format to specify when the timer schedule must start.
   d. Either select the **No End Date** radio button or select the **End Date** radio button, and next to the **End Date** field, click the calendar icon and use the menus in the pop-up window to enter the date in the DD-Mon-YYY format to specify when the timer schedule must stop.
   e. From the **Recurrence Pattern** menu, select the pattern:
      - **Daily**: The timer schedule works with daily recurrence. The fields adjust.

        Either select the **Every Weekday** radio button to let the schedule operate from Monday through Friday or select the **Every Day(s)** radio button and enter a number from 0 to 255 in the field.

In the latter case, the schedule is triggered every specified number of days. If the number of days is not specified, or if you enter 0, then the schedule is triggered only once.

- **Weekly**: The timer schedule works with weekly recurrence. The fields adjust.

  In the **Every Week(s)** field, enter a number from 0 to 255 to specify that the schedule must be triggered every specified number of weeks. If the number of weeks is not specified, or if you enter 0, then the schedule is triggered only once.

  Select a single **Week Day** check box, multiple check boxes, or all check boxes to specify the day or days of the week that the schedule must operate.

- **Monthly**: The timer schedule works with monthly recurrence. The fields adjust.

  In the **Day** field, enter a number from 1 to 31 to specify the day of the month when the schedule must be triggered.

  In the **Every Month(s)** field, enter a number from 0 to 99 to specify that the schedule must be triggered every specified number of months. If the number of months is not specified, or if you enter 0, then the schedule is triggered only once.

9. Click the **Add** button.

   The entry for the timer schedule is added.

Change the settings for a recurring PoE timer schedule entry

You can change the settings for an existing recurring PoE timer schedule entry. (You cannot do this for an existing absolute PoE timer schedule.)

To change the settings for an existing recurring PoE timer schedule entry:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Timer Schedule > Advanced > Timer Schedule Configuration**.

   The Timer Schedule Configuration page displays.

7. From the **Timer Schedule Name** menu, select the schedule name.
8. From the **Timer Schedule Type** menu, select the schedule type.
9. From the **Timer Schedule Entry** menu, select the schedule entry.
10. Make the changes to the schedule entry.

    For more information, see Specify the settings for a recurring PoE timer schedule on page 99.

11. Click the **Apply** button.

    Your settings are saved.

Delete a PoE timer schedule entry

You can delete a PoE timer schedule entry that you no longer need.

To delete a PoE timer schedule entry:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Timer Schedule > Advanced > Timer Schedule Configuration**.

   The Timer Schedule Configuration page displays.

7. From the **Timer Schedule Name** menu, select the schedule name.
8. From the **Timer Schedule Type** menu, select the schedule type.
9. From the **Timer Schedule Entry** menu, select the schedule entry.
10. Click the **Delete** button.

    The entry is deleted.

Delete a PoE timer schedule

You can delete a PoE timer schedule that you no longer need. All entries that are part of the PoE timer schedule are also deleted.

To delete a PoE timer schedule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Timer Schedule > Basic > Global Configuration**.

   The Global Configuration page displays.

7. Select the check box for the schedule that you want to delete.

8. Click the **Delete** button.

   The schedule is deleted.

SNMPv1, SNMPv2, and SNMPv3

You can configure SNMP settings for SNMPv1, SNMPv2, and SNMPv3. The switch software supports the configuration of SNMP groups and users that can manage traps that the SNMP agent generates.

The switch uses both standard public MIBs for standard functionality and private MIBs that support additional switch functionality. All private MIBs begin with a hyphen (-) prefix. The main object for interface configuration is in -SWITCHING-MIB, which is a private MIB. Some interface configurations also involve objects in the public MIB, IF-MIB.

Configure the SNMPv1 and SNMPv2 community

Only the communities that you define can access to the switch using the SNMP V1 and SNMP V2 protocols. Only those communities with read/write level access can be used to change the configuration using SNMP.

Add an SNMP community:

To add an SNMP community:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

The System Information page displays.

6. Select **System > SNMP > SNMP V1/V2 > Community Configuration**.

   The Community Configuration page displays.

7. In the **Management Station IP** field, specify the IP address of the management station.
8. In the **Management Station IP Mask** field, specify the subnet mask to associate with the management station IP address.

   Together, the management station IP address and the management station IP mask denote a range of IP addresses from which SNMP clients can use that community to access this device. If either the management station IP address or management station IP mask value is 0.0.0.0, access is allowed from any IP address. Otherwise, every client's address is ANDed with the mask, as is the management station IP address. If the values are equal, access is allowed.

   For example, if the management station IP address and management station IP mask settings are 192.168.1.0/255.255.255.0, any client with an IP address in the range from 192.168.1.0 to 192.168.1.255 (inclusive) is allowed access. To allow access from only one station, use a management station IP mask value of 255.255.255.255, and use that computer's IP address as the client address.

9. In the **Community String** field, specify a community name.
10. From the **Access Mode** menu, select the access level for this community, which is either **ReadOnly** or **ReadWrite**.
11. From the **Status** menu, select to enable or disable the community.

    If you select **Enable**, the community name must be unique among all valid community names or the set requests are rejected. If you select **Disable**, the community name becomes invalid.

12. Click the **Add** button.

    The selected community is added.

Modify an existing SNMP community

To modify an existing SNMP community:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > SNMP > SNMP V1/V2 > Community Configuration**.

   The Community Configuration page displays.
7. Select the check box next to the community.
8. Update the desired fields.
9. Click the **Apply** button.

   Your settings are saved.

Delete an SNMP community

To delete an SNMP community:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **System > SNMP > SNMP V1/V2 > Community Configuration**.

   The Community Configuration page displays.

7. Select the check box next to the community to remove.
8. Click the **Delete** button.

   The community is removed.

Configure SNMPv1 and SNMPv2 trap settings

You can configure settings for each SNMPv1 or SNMPv2 management host that must receive notifications about traps generated by the device. The SNMP management host is also known as the SNMP trap receiver.

Add an SNMP trap receiver

To add an SNMP trap receiver:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > SNMP > SNMP V1/V2 > Trap Configuration**.

   The Trap Configuration page displays.

7. In the **Recipients IP** field, enter the IPv4 address at which the SNMP traps from the switch must be received.

8. From the **Version** menu, select the trap version to be used by the SNMP trap receiver.
   - **SNMPv1**: The switch uses SNMPv1 to send traps to the receiver. The default setting is SNMPv1.
   - **SNMPv2**: The switch uses SNMPv2 to send traps to the receiver.
9. In the **Community String** field, specify the name of the SNMP community that includes the SNMP management host and the SNMP agent on the device.

   This name can be up to 16 characters and is case-sensitive.
10. From the **Status** menu, select **Enable** to send traps to the receiver or select **Disable** to prevent the switch from sending traps to the receiver.
11. Click the **Add** button.

    The receiver configuration is added.

Modify information about an existing SNMP trap recipient

To modify information about an existing SNMP trap recipient:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > SNMP > SNMP V1/V2 > Trap Configuration**.

   The Trap Configuration page displays.
7. Select the check box next to the recipient.
8. Change the fields as necessary.

9. Click the **Apply** button.

   Your settings are saved.

Delete an SNMP trap recipient

To delete an SNMP trap recipient:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > SNMP > SNMP V1/V2 > Trap Configuration**.

   The Trap Configuration page displays.
7. Select the check box next to the recipient to remove.
8. Click the **Delete** button.

   The trap recipient is removed.

Configure SNMPv1 and SNMPv2 trap flags

You can enable or disable traps that the switch can send to an SNMP manager. When the condition identified by an active trap is encountered by the switch, a trap message is sent to any enabled SNMP trap receivers, and a message is written to the trap log.

To configure the trap flags:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > SNMP > SNMP V1/V2 > Trap Flags**.

   The Trap Flags page displays.

7. Enable or disable the following system traps:
   - **Authentication**: When enabled, SNMP traps are sent when events involving authentication occur, such as when a user attempts to access the switch device UI and does not provide a valid user name and password. The default is Enable.
   - **Link Up/Down**: When enabled, SNMP traps are sent when the administrative or operational state of a physical or logical link changes. The default is Enable.
   - **Spanning Tree**. When enabled, SNMP traps are sent when various spanning tree events occur. The default is Enable.
   - **PoE**. When enabled, SNMP traps are sent when various PoE events occur. The default is Enable.
   - **Fan Failure**: When enabled, SNMP traps are sent when a fan failure occurs. The default is Enable.
8. Click the **Apply** button.

   Your settings are saved.

View the supported MIBs

You can view a list of all MIBs that are supported on the switch.

To view the supported MIBs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > SNMP > SNMP V1/V2 > Supported MIBs**.

   The Supported MIBs page displays.

The following table describes the SNMP Supported MIBs Status fields.

Table 20. SNMP supported MIBs

Field	Description
Name	The RFC number if applicable and the name of the MIB.
Description	The RFC title or MIB description.

Configure SNMPv3 users

Any user can connect to the switch using the SNMPv3 protocol, but for authentication and encryption, the switch supports only one user (admin). Therefore, you can create or modify only one profile.

To configure authentication and encryption settings for the SNMPv3 admin profile by using the web interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > SNMP > SNMPv3 > User Configuration**.

   The User Configuration page displays.

   The SNMPv3 Access Mode field is a read-only field that shows the access privileges for the user account. Access for the admin account is always Read Write. Access for all other accounts is Read Only.

7. To enable authentication, select an Authentication Protocol radio button.

   You can select the **MD5** radio button or the **SHA** radio button. With either of these options, the user login password is used as SNMPv3 authentication password. For information about how to configure the login password, see Device admin password on page 320.

8. To enable encryption:

   a. Select the Encryption Protocol **DES** radio button to encrypt SNMPv3 packets using the DES encryption protocol.

   b. In the **Encryption Key** field, enter an encryption code of eight or more alphanumeric characters.

9. Click the **Apply** button.

   Your settings are saved.

Link Layer Discovery Protocol

The IEEE 802.1AB-defined standard, Link Layer Discovery Protocol (LLDP), allows stations on an 802 LAN to advertise major capabilities and physical descriptions. A network manager can view this information to identify system topology and detect bad configurations on the LAN.

LLDP is a one-way protocol without any request/response sequences. Information is advertised by stations implementing the transmit function, and is received and processed by stations implementing the receive function. The transmit and receive functions can be enabled or disabled separately per port. By default, both transmit and receive are disabled on all ports. The application is responsible for starting each transmit and receive state machine appropriately, based on the configured status and operational state of the port.

The Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) is an enhancement to LLDP with the following features:

- Autodiscovery of LAN policies (such as VLAN, Layer 2 priority, and DiffServ settings), enabling plug and play networking.
- Device location discovery for creation of location databases.
- Extended and automated power management of Power over Ethernet endpoints.
- Inventory management, enabling network administrators to track their network devices and determine their characteristics (manufacturer, software and hardware versions, serial/asset number).

Configure LLDP global settings

You can specify the global LLDP and LLDP-MED settings that are applied to the switch.

To configure global LLDP settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

3. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

4. Click the **Go** button.

   The System Information page displays.

5. Select **System > LLDP > Basic > LLDP Configuration**.

   The LLDP Configuration page displays.

6. To configure nondefault values for the following LLDP properties, specify the following options:
   - **TLV Advertised Interval**: The number of seconds between transmissions of LLDP advertisements. The default is 30 seconds.
   - **Hold Multiplier**: The transmit interval multiplier value, where transmit hold multiplier × transmit interval = the time to live (TTL) value that the device advertises to neighbors. The default is 4seconds.
   - **Re-initializing Delay**: The number of seconds to wait before attempting to re-initialize LLDP on a port after the LLDP operating mode on the port changes. The default is 2 seconds.
   - **Transmit Delay**: The minimum number of seconds to wait between transmissions of remote data change notifications to one or more SNMP trap receivers configured on the switch. The default is 5 seconds.
7. To configure a nondefault value for LLDP-MED, enter a value in the **Fast Start Duration** field.

   This value sets the number of times that LLDP packets sent when the LLDP-MED fast start mechanism is initialized, which occurs when a new endpoint device links with the LLDP-MED network connectivity device. The default is 3 times.

8. Click the **Apply** button.

   Your settings are saved.

Configure LLDP port settings

You can specify LLDP settings for a port.

To configure LLDP settings for a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > LLDP > Advanced > LLDP Port Settings**.

   The LLDP Port Settings page displays.
7. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
8. Use the following menus to configure the LLDP settings for the selected ports:
   - **Admin Status**: Select the status for transmitting and receiving LLDP packets:
     - **Tx Only**: Enable only transmitting LLDP PDUs on the selected ports.
     - **Rx Only**: Enable only receiving LLDP PDUs on the selected ports.
     - **Tx and Rx**: Enable both transmitting and receiving LLDP PDUs on the selected ports.
     - **Disabled**: Do not transmit or receive LLDP PDUs on the selected ports.

     The default is Tx and Rx.
   - **Management IP Address**: Choose whether to advertise the management IP address from the interface. The possible field values are as follows:
     - **Stop Advertise**: Do not advertise the management IP address from the interface.
     - **Auto Advertise**: Advertise the current IP address of the device as the management IP address.

     The default is Auto Advertise.
   - **Notification**: When notifications are enabled, LLDP interacts with the trap manager to notify subscribers of remote data change statistics. The default is Disable.

- **Optional TLVs**: Enable or disable the transmission of optional type-length value (TLV) information from the interface. The default is Enable. The TLV information includes the system name, system description, system capabilities, and port description.

  For information about how to configure the system name, see Switch system information on page 52. For information about how to configure the port description, see Port settings and maximum frame size on page 148.

9. Click the **Apply** button.

   Your settings are saved.

View the LLDP-MED network policy

You can display information about the LLPD-MED network policy TLV transmitted in the LLDP frames on the selected local port.

To view the LLDP-MED network policy information for a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > LLDP > Advanced > LLDP-MED Network Policy**.

   The LLDP-MED Network Policy page displays.

7. From the **Interface** menu, select the interface for which you want to view the information.

   Note: The menu includes only the interfaces on which LLDP is enabled. If no interfaces are enabled for LLDP, the **Interface** menu does not display.

The page refreshes and displays the data transmitted in the network policy TLVs for the interface.

The following table describes the LLDP-MED network policy information that displays on the page.

Table 21. LLDP-MED network policy information

Field	Description
Network Policy Number	The policy number.
Application	The media application type associated with the policy, which can be one of the following: • unknown • voicesignaling • guestvoice • guestvoicesignaling • softphonevoice • videoconferencing • streamingvideo • videosignaling A port can receive multiple application types. The application information is displayed only if a network policy TLV was transmitted from the port.
VLAN ID	The VLAN ID associated with the policy.
VLAN Type	Indicates whether the VLAN associated with the policy is tagged or untagged.
User Priority	The priority associated with the policy.
DSCP	The DSCP associated with a particular policy type.

Configure the LLDP-MED port settings

You can enable the LLDP-MED mode on a port and configure its properties.

To configure the LLDP-MED settings for a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > LLDP > Advanced > LLDP-MED Port Settings**.

   The LLDP-MED Port Settings page displays.
7. From the **Port** menu, select the port to configure.
8. Use the following menus to enable or disable the following LLDP-MED settings for the selected port:
   - **LLDP-MED Status**. The administrative status of LLDP-MED on the interface. When LLDP-MED is enabled, the transmit and receive function of LLDP is effectively enabled on the interface.
   - **Notification**: When Notification is enabled, the port sends a topology change notification if a device is connected or removed.
   - **MED Capabilities**: When MED Capabilities is enabled, the port transmits the capabilities type length values (TLVs) in the LLDP PDU frames.
   - **Network Policy**: When Network Policy is enabled, the port transmits the network policy TLV in LLDP frames.
   - **Extended MDI-PSE**: When Extended MDI-PSE is enabled, the port transmits the extended power sourcing equipment (PSE) TLV in LLDP frames.
9. Click the **Apply** button.

   Your settings are saved.

View the local information advertised through LLDP

You can view the data that each port advertises through LLDP.

To view the local LLDP information:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > LLDP > Advanced > Local Information**.

   The Local Information page displays.

   The page includes the interfaces on which LLDP is enabled.

   The following table describes the LLDP device information and port summary information.

Field	Description
Device Information	
Chassis ID Subtype	The type of information used to identify the switch in the Chassis ID field.
Chassis ID	The hardware platform identifier for the switch.
System Name	The user-configured system name for the switch.
System Description	The switch description, which includes information about the product model and platform.
System Capabilities	The primary functions that the switch supports.
Port Information	
Interface	The interface associated with the rest of the data in the row.
Port ID Subtype	The type of information used to identify the interface in the Port ID field.
Port ID	The port number.
Port Description	The user-defined description of the port.
Advertisement	The TLV advertisement status of the port.

7. To view additional details about a port, click the name of the port in the Interface column of the Port Information table.

The following table describes the detailed local information that displays for the selected port.

Field	Description
Managed Address	
Address SubType	The type of address the management interface uses, such as an IPv4 address.
Address	The address used to manage the device.
Interface SubType	The port subtype.
Interface Number	The number that identifies the port.
MAC/PHY Details	
Autonegotiation Supported	Indicates whether the interface supports port speed autonegotiation. The option is True (enabled) or False (disabled).
Autonegotiation Enabled	The port speed autonegotiation support status. The option is True (enabled) or False (disabled).
Autonegotiation Advertised Capabilities	The port speed autonegotiation capabilities such as 1000BASE-T full-duplex mode or 100BASE-TX full-duplex mode.
Operational MAU Type	The Medium Attachment Unit (MAU) type. The MAU performs physical layer functions, including digital data conversion from the Ethernet interface collision detection and bit injection into the network.
MED Details	
Capabilities Supported	The MED capabilities enabled on the port.
Current Capabilities	The TLVs advertised by the port.
Device Class	Network Connectivity indicates that the device is a network connectivity device.
Network Policies	
Application Type	The media application type associated with the policy.
VLAN ID	The VLAN ID associated with the policy.
VLAN Type	Specifies whether the VLAN associated with the policy is tagged or untagged.
User Priority	The priority associated with the policy.
DSCP	The DSCP associated with a particular policy type.

View the LLDP neighbors information

You can view the data that a specific port received from other LLDP-enabled systems.

To view the LLDP information received from a neighbor device:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > LLDP > Advanced > Neighbors Information**.

   The Neighbors Information page displays.

   If no information was received from a neighbor device, or if the link partner is not LLDP-enabled, no information displays.

   The following table describes the information that displays for all LLDP neighbors that were discovered.

Field	Description
MSAP Entry	The Media Service Access Point (MSAP) entry number for the remote device.
Local Port	The interface on the local system that received LLDP information from a remote system.
Chassis ID Subtype	The type of data displayed in the Chassis ID field on the remote system.
Chassis ID	The remote 802 LAN device's chassis.
Port ID Subtype	The type of data displayed in the remote system's Port ID field.

Field	Description
Port ID	The physical address of the port on the remote system from which the data was sent.
System Name	The system name associated with the remote device. If the field is blank, the name might not be configured on the remote system.

7. To view additional information about the remote device, click the link in the MSAP Entry column.

   A pop-up window displays information for the selected port.

   The following table describes the information transmitted by the neighbor.

Field	Description
Port Details	
Local Port	The interface on the local system that received LLDP information from a remote system.
MSAP Entry	The Media Service Access Point (MSAP) entry number for the remote device.
Basic Details	
Chassis ID Subtype	The type of data displayed in the Chassis ID field on the remote system.
Chassis ID	The remote 802 LAN device's chassis.
Port ID Subtype	The type of data displayed in the remote system's Port ID field.
Port ID	The physical address of the port on the remote system from which the data was sent.
Port Description	The user-defined description of the port.
System Name	The system name associated with the remote device.
System Description	The description of the selected port associated with the remote system.
System Capabilities	The system capabilities of the remote system.
Managed Addresses	
Address SubType	The type of the management address.
Address	The advertised management address of the remote system.
Interface SubType	The port subtype.
Interface Number	The port number on the remote device that sent the information.

Field	Description
MAC/PHY Details	
Autonegotiation Supported	Specifies whether the remote device supports port-speed autonegotiation. The option is True (enabled) or False (disabled).
Autonegotiation Enabled	The port speed autonegotiation support status. The option is True (enabled) or False (disabled).
Autonegotiation Advertised Capabilities	The port speed autonegotiation capabilities.
Operational MAU Type	The Medium Attachment Unit (MAU) type. The MAU performs physical layer functions, including digital data conversion from the Ethernet interface collision detection and bit injection into the network.
MED Details	
Capabilities Supported	The supported capabilities that were received in MED TLV from the device.
Current Capabilities	The advertised capabilities that were received in MED TLV from the device.
Device Class	The LLDP-MED endpoint device class. The possible device classes are as follows: • Endpoint Class 1 indicates a generic endpoint class, offering basic LLDP services. • Endpoint Class 2 indicates a media endpoint class, offering media streaming capabilities as well as all Class 1 features. • Endpoint Class 3 indicates a communications device class, offering all Class 1 and Class 2 features plus location, 911, Layer 2 switch support, and device information management capabilities.
PoE Device Type	The port PoE type. For example, Powered.
PoE Power Source	The port's power source.
PoE Power Priority	The port's power priority.
PoE Power Value	The port's power value.
Hardware Revision	The hardware version advertised by the remote device.
Firmware Revision	The firmware version advertised by the remote device.
Software Revision	The software version advertised by the remote device.
Serial Number	The serial number advertised by the remote device.
Model Name	The model name advertised by the remote device.
Asset ID	The asset ID advertised by the remote device.

Field	Description
Location Information	
Civic	The physical location, such as the street address, that the remote device advertised in the location TLV, for example, 123 45th St. E. The field value length range is 6–160 characters.
Coordinates	The location map coordinates that the remote device advertised in the location TLV, including latitude, longitude, and altitude.
ECS ELIN	The Emergency Call Service (ECS) Emergency Location Identification Number (ELIN) that the remote device advertised in the location TLV. The field range is 10–25.
Unknown	The unknown location information for the remote device.
Network Policies	
Application Type	The media application type associated with the policy advertised by the remote device.
VLAN ID	The VLAN ID associated with the policy.
VLAN Type	Specifies whether the VLAN associated with the policy is tagged or untagged.
User Priority	The priority associated with the policy.
DSCP	The DSCP associated with a particular policy type.
LLDP Unknown TLVs	
Type	The unknown TLV type field.
Value	The unknown TLV value field.

The DHCP Snooping Global Configuration page displays. The page also shows the VLAN Configuration section.

DHCP Layer 2 relay

If you enable and configure a DHCP relay agent on the switch, some Layer 2 (L2) devices do not need to connect to a DHCP server on the physical network. A relay agent automatically populates the gateway IP address (giaddr) field and adds the Relay Agent Information option to DHCP messages. A DHCP server uses this option for IP addresses and other assignment policies. A DHCP relay agent is usually an IP routing-aware device, which is also referred to as a Layer 3 relay agent. In some network configurations, L2 devices must append the Relay Agent Information option because they are closer to the end hosts.

An L2 device can operate as a bridge only for a network and might not include an IPv4 address on the network. If an L2 device lacks an IPv4 source address, the device cannot relay packets directly to a DHCP server that is located on another network. In that situation, the L2 device can append the Relay Agent Information option and broadcast the DHCP message.

Enable the DHCP L2 relay for the switch

You can globally enable the DHCP L2 relay for the switch.

To globally enable the DHCP L2 relay for the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP L2 Relay > DHCP L2 Relay Global Configuration**.

   The DHCP L2 Relay Global Configuration page displays.
7. Select the Admin mode **Disable** or **Enable** radio button to disable or enable the DHCP L2 relay on the switch.

   The default is Disable.
8. Click the **Apply** button.

   Your settings are saved.

Enable the DHCP L2 relay for a VLAN

To enable the DHCP L2 relay for a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Global Configuration**.

   The Global Configuration page displays.

   The table lists the VLANs that are configured on the switch.
7. Select the check box for the VLAN.
8. Configure the following settings:
   - **Admin Mode**: Enable or disable the DHCP L2 relay on the VLAN.
   - **Circuit ID Mode**: Enable or disable the circuit ID suboption of DHCP Option-82.
   - **Remote ID String**: If the DHCP server that you are using requires a remote ID, specify the remote ID string of up to 32 characters.
9. Click the **Apply** button.

   Your settings are saved.

Configure an interface as a DHCP L2 relay

You can configure an interface as a DHCP L2 relay

To configure an interface as a DHCP L2 relay:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP L2 Relay > DHCP L2 Relay Interface Configuration**.

   The DHCP L2 Relay Interface Configuration displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the interface, or type the interface number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Admin mode** menu, select to enable or disable the DHCP L2 relay on the interface.

   The default is Disable.
10. From the **82 Option Trust Mode** menu, select to enable or disable the interface as a trusted interface for Relay Agent Information option (Option 82).
11. Click the **Apply** button.

    Your settings are saved.

Display the DHCP L2 relay interface statistics

To display the DHCP L2 relay interface statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP L2 Relay > DHCP L2 Relay Interface Statistics**.

   The DHCP L2 Relay Interface Statistics page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **VLANS**: Only VLANs are displayed.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. To refresh the information on the page, click the **Refresh** button.

The following table describes the nonconfigurable fields on the page.

Table 22. DHCP L2 relay interface statistics information

Field	Description
Interface	The interface from which the DHCP message is received.
Untrusted Server Messages With Opt82	The number of DHCP messages with Option 82 received from an untrusted server.
Untrusted Client Messages With Opt82	The number of DHCP messages with Option 82 received from an untrusted client.
Trusted Server Messages Without Opt82	The number of DHCP messages without Option 82 received from a trusted server.
Trusted Client Messages Without Opt82	The number of DHCP messages without Option 82 received from a trusted client.

DHCP snooping

DHCP snooping is a feature that provides security by filtering untrusted DHCP messages and by building and maintaining a DHCP snooping binding table. An untrusted message is a message that is received from outside the network or firewall and that can cause traffic attacks within your network. The DHCP snooping binding table contains the MAC address, IP address, lease time, binding type, VLAN number, and interface information that corresponds to the local untrusted interfaces of a switch. An untrusted interface is an interface that is configured to receive messages from outside the network or firewall. A trusted interface is an interface that is configured to receive only messages from within the network.

DHCP snooping acts like a firewall between untrusted hosts and DHCP servers. It also provides way to differentiate between untrusted interfaces connected to the end user and trusted interfaces connected to the DHCP server or another switch.

Enable DHCP snooping for the switch

You can globally enable DHCP snooping for the switch.

To globally enable DHCP snooping for the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Global Configuration**.

   The Global Configuration page displays.
7. Select the DHCP Snooping Mode **Enable** radio button.

   The default is Disable.
8. To enable the verification of the sender's MAC address for DHCP snooping, leave the MAC Address Validation **Enable** radio button selected.

   The default is Enable.

   When MAC address validation is enabled, the device checks packets that are received on an untrusted interface to verify that the MAC address and the DHCP client hardware address match. If the addresses do not match, the device drops the packet.
9. Click the **Apply** button.

   Your settings are saved.

Enable DHCP snooping for a VLAN

To enable DHCP snooping for a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Global Configuration**.

   The Global Configuration page displays.

   The table lists the VLANs.
7. Select the check box for the VLAN.
8. From the **DHCP Snooping Mode** menu, select **Enable**.
9. Click the **Apply** button.

   Your settings are saved.

Configure DHCP snooping interface settings

You can view and configure each port as a trusted or untrusted port. Any DHCP responses received on a trusted port are forwarded. If a port is configured as untrusted, any DHCP (or BootP) responses received on that port are discarded.

To configure DHCP snooping interface settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Services > DHCP Snooping > Interface Configuration**.

   The Interface Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Trust Mode** menu, select the trust mode:
   - **Disabled**: The interface is considered to be untrusted and could potentially be used to launch a network attack. DHCP server messages are checked against the bindings database. On untrusted ports, DHCP snooping enforces the following security rules:
     - DHCP packets from a DHCP server (DHCPOFFER, DHCPACK, DHCPNAK, DHCPRELEASEQUERY) are dropped.
     - DHCPRELEASE and DHCPDECLINE messages are dropped if the MAC address is in the snooping database but the binding's interface is other than the interface where the message was received.
     - DHCP packets are dropped if the source MAC address does not match the client hardware address and if MAC address validation is globally enabled.
   - **Enabled**: The interface is considered to be trusted and forwards DHCP server messages without validation.
10. From the **Invalid Packets** menu, select the packet logging mode.

    When enabled, the DHCP snooping feature generates a log message when an invalid packet is received and dropped by the interface.

11. In the **Rate Limit (pps)** field, specify the rate limit value for DHCP snooping purposes.

    If the incoming rate of DHCP packets per second exceeds the configured burst interval per second, the port shuts down. If the rate limit is None (which is the default), the burst interval is also not applicable, and rate limiting is disabled.

12. In the **Burst Interval (secs)** field, specify the burst interval in seconds for rate limiting on the interface.

If the rate limit is N/A, the burst interval is not applicable.

13. Click the **Apply** button.

    Your settings are saved.

Add a static DHCP binding and display dynamic DHCP bindings

You can add a static bindings in the DHCP snooping bindings database and display or clear the dynamic bindings in the bindings table.

To add a static DHCP binding and display or clear the dynamic bindings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Binding Configuration**.

   The Binding Configuration page displays.
7. From the **Interface** menu, select the interface.
8. In the **MAC Address** field, specify the MAC address for the binding to be added.

   This is the key to the binding database.
9. From the **VLAN ID** menu, select the ID of the VLAN.
10. In the **IP Address** field, specify the IP address for the binding to be added.
11. Click the **Add** button.

The DHCP snooping binding entry is added to the database.

The Dynamic Binding Configuration table shows information about the DHCP bindings that were learned on each interface on which DHCP snooping is enabled. The following table describes the dynamic bindings information.

Table 23. DHCP Dynamic Configuration information

Field	Description
Interface	The interface on which the DHCP client message was received.
MAC Address	The MAC address associated with the DHCP client that sent the message. This is the key to the binding database.
VLAN ID	The VLAN ID of the client interface.
IP Address	The IP address assigned to the client by the DHCP server.
Lease Time	The remaining IP address lease time for the client.

Remove a static DHCP binding

You remove a static binding from the DHCP snooping bindings database.

To remove a static DHCP binding:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Binding Configuration**.

The Binding Configuration page displays.

7. In the Static Binding Configuration table, select the check box for the static binding.
8. Click the **Delete** button.

   The DHCP snooping binding entry is removed from the database.

Configure DHCP snooping persistent settings

You can configure the persistent location of the DHCP snooping bindings database. The bindings database can be stored locally on the switch or on a remote device in the network. The switch must be able to reach the IP address of the remote device to send bindings to a remote database.

To configure DHCP snooping persistent settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **System > Services > DHCP Snooping > Persistent Configuration**.

   The Persistent Configuration page displays.
7. Specify where the DHCP snooping bindings database is located.
   - **Local**: The binding table is stored locally on the switch.
   - **Remote**: The binding table is stored on a remote TFTP server.

     If the database is stored on a remote server, specify the following information:

     - **Remote IP Address**: Specify the IP address of the TFTP server.

- **Remote File Name**: Specify the file name of the DHCP snooping bindings database in which the bindings are stored.

8. In the **Write Delay** field, specify the time that the switch must wait after writing binding information to persistent storage.

   The delay allows the switch to collect as many entries as possible (new and removed) before writing them to the persistent file. You can specify from 15 to 86400 seconds. By default, the delay is 300 seconds.

9. Click the **Apply** button.

   Your settings are saved.

View or clear DHCP snooping statistics

You can view and clear per-interface statistics about the DHCP messages filtered by the DHCP snooping feature on untrusted interfaces.

To view or clear the DHCP snooping statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **System > Services > DHCP Snooping > Statistics**.

   The Statistics page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Click the **Clear** button to clear all interfaces statistics.

The following table describes the DHCP snooping statistics.

Table 24. DHCP Snooping Statistics information

Field	Description
MAC Verify Failures	The number of DHCP messages that were dropped because the source MAC address and client hardware address did not match. MAC address verification is performed only if it is globally enabled.
Client Ifc Mismatch	The number of packets that were dropped by DHCP snooping because the interface and VLAN on which the packet was received do not match the client's interface and VLAN information stored in the binding database.
DHCP Server Msgs	The number of DHCP server messages (such as DHCPOFFER, DHCPACK, DHCPNAK, and DHCPRELEASEQUERY messages) that were dropped on an untrusted port.

Dynamic ARP inspection

Dynamic ARP inspection (DAI) is a security feature that rejects invalid and malicious ARP packets. The feature prevents a class of man-in-the-middle attacks, where an unfriendly station intercepts traffic for other stations by poisoning the ARP caches of its unsuspecting neighbors. The unfriendly station sends ARP requests or responses mapping another station's IP address to its own MAC address.

DAI relies on DHCP snooping. DHCP snooping listens to DHCP message exchanges and builds a bindings database of valid MAC addresses, IP addresses, VLAN interfaces, and so on.

If DAI is enabled and if a sender MAC address and sender IP address do not match an entry in the DHCP snooping bindings database, the switch drops the ARP packet if. However, you can also create static mappings in the DHCP snooping bindings database. Static mappings are useful when hosts configure static IP addresses, the switch cannot run DHCP snooping, or other switches in the network do not run dynamic ARP inspection. A static mapping associates an IP address to a MAC address on a VLAN.

You can configure DAI VLANs, interfaces, and access control lists (ACLs) with associated rules.

Configure the global DAI settings

You can configure the global dynamic ARP inspection (DAI) settings.

To configure the global DAI settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Control > Dynamic ARP Inspection > DAI Configuration**.

   The DAI Configuration page displays.
7. Select the Validate Source MAC **Disable** or **Enable** radio button.

   This settings specifies the DAI source MAC validation mode for the switch. If you select **Enable**, the sender MAC validation for the ARP packets is enabled. The default is Disable.
8. Select the Validate Destination MAC **Disable** or **Enable** radio button

   This setting specifies the DAI destination MAC validation mode for the switch. If you select **Enable**, the destination MAC validation for the ARP response packets is enabled. The default is Disable.
9. Select the Validate IP **Disable** or **Enable** radio button.

   This setting specifies the DAI IP validation mode for the switch. If you select **Enable**, IP address validation for the ARP packets is enabled. The default is Disable.
10. Click the **Apply** button.

    Your settings are saved.

Configure DAI VLANs

You can configure one or more dynamic ARP inspection (DAI) VLANs.

To configure one or more DAI VLANs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Control > Dynamic ARP Inspection > DAI VLAN Configuration**.

   The DAI VLAN Configuration page displays.

   The table lists the VLANs.
7. Select the check box for the VLAN.
8. From the **Admin Mode** menu, select **Enable** or **Disable** to specify if DAI is enabled for the VLAN.

   The default is Disable.
9. From the **Invalid Packets** menu, select **Enable** or **Disable** to specify if DAI logging is enabled for the VLAN.

   The default is Enable.
10. In the **ARP ACL Name** field, specify a name of an existing ARP ACL (see Create a DAI access control list on page 141).

    The ARP ACL is used for ARP packet validation. To remove an existing ARP ACL name from the **ARP ACL Name** field, enter **N/A**.

11. From the **Static Flag** menu, select **Enable** or **Disable** to specify if the ARP packet must be validated using the DHCP snooping database if the ARP ACL rule does not match.

    If enabled, the ARP packet is validated by the ARP ACL rule only. If disabled, the ARP packet needs further validation by using the DHCP snooping database. The default is Disable.

12. Click the **Apply** button.

    Your settings are saved.

Configure DAI interfaces

You can configure one or more dynamic ARP inspection (DAI) interfaces.

To configure one ore more DAI interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Control > Dynamic ARP Inspection > DAI Interface Configuration**.

   The DAI Interface Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.

- **All**: Both physical interfaces and LAGs are displayed.

8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. Form the **Trust Mode** menu, specify if the interface is trusted for DAI.

   If enabled, the interface is trusted and ARP packets entering the interface are forwarded without checking. If disabled, the interface is not trusted and ARP packets entering the interface are subjected to DAI. The default is Disable.
10. In the **Rate Limit (pps)** field, specify the rate limit value for DAI.

    If the incoming rate of ARP packets exceeds the specified value for consecutive burst interval seconds, ARP packets are dropped. If you specify N/A, no limit exists. The range is from 0 to 300. The default is 15 packets per second (pps).
11. In the **Burst Interval (secs)** field, specify the burst interval value for rate limiting on the interface. If you specify N/A, the burst interval is not effective. The range is from 1 to 15. The default is 1 second.
12. Click the **Apply** button.

    Your settings are saved.

Create a DAI access control list

You can create a dynamic ARP inspection (DAI) access control list (ACL) to which you then can add rules.

To create a DAI ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:

- Enter your device admin password.
- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Control > Dynamic ARP Inspection > DAI ACL Configuration**.

   The DAI ACL Configuration page displays.

7. In the **Name** field, specify a name of up to 31 characters.
8. Click the **Add** button.

   The DAI ACL is added.

Configure a rule for an existing DAI ACL

After you add a DAI ACL (see Create a DAI access control list on page 141), you can configure a rule for it.

To configure a rule for an existing DAI ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Control > Dynamic ARP Inspection > DAI ACL Rule Configuration**.

The DAI ACL Rule Configuration page displays.

7. From the **ACL Name** menu, select the DAI ACL for which you want to configure the rule.
8. From the **Action** menu, select the action that must occur if a packet matches the rule's criteria:
   - **Permit**: The packet is permitted and forwarded.
   - **Deny**: The packet is denied and dropped.
9. In the **Source IP Address** field, enter the source IP address that must be used as a match for the rule.
10. In the **Source MAC Address** field, enter the source MAC address that must be used as a match for the rule.
11. Click the **Add** button.

    The rule is added.

Delete a rule from an existing DAI ACL

You can delete a rule from an existing DAI ACL.

To delete a rule from an existing DAI ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Control > Dynamic ARP Inspection > DAI ACL Rule Configuration**.

   The DAI ACL Rule Configuration page displays.

7. From the **ACL Name** menu, select the DAI ACL from which you want to delete a rule.
8. Select the check box for the rule.
9. Click the **Delete** button.

   The rule is removed.

Delete a DAI access control list

You can delete a dynamic ARP inspection (DAI) access control list (ACL) that you no longer need.

To delete a DAI ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Control > Dynamic ARP Inspection > DAI ACL Configuration**.

   The DAI ACL Configuration page displays.
7. Select the check box for the ACL.
8. Click the **Delete** button.

   The DAI ACL is removed.

Display the DAI statistics

To display the DAI statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Control > Dynamic ARP Inspection > DAI Statistics**.

   The DAI Statistic page displays.
7. To refresh the page with the latest information on the switch, click the **Refresh** button.
8. To clear the DAI statistics, click the **Clear** button.

The following table describes the nonconfigurable information displayed on the page.

Table 25. DAI Statistics information

Field	Description
VLAN	The VLAN ID.
DHCP Drops	The number of ARP packets that were dropped by DAI because no matching DHCP snooping binding entry exists.
DHCP Permits	The number of ARP packets that were forwarded by DAI because a matching DHCP snooping binding entry exists.
ACL Drops	The number of ARP packets that were dropped by DAI because no matching ARP ACL rule exists for the VLAN and the static flag is set on the VLAN.
ACL Permits	The number of ARP packets that were permitted by DAI because a matching ARP ACL rule exists for the VLAN.

Table 25. DAI Statistics information (continued)

Field	Description
Bad Source MAC	The number of ARP packets that were dropped by DAI because the sender MAC address in the ARP packets did not match the source MAC address in the Ethernet header.
Bad Dest MAC	The number of ARP packets that were dropped by DAI because the target MAC address in the ARP reply packets did not match the destination MAC address in the Ethernet header.
Invalid IP	The number of ARP packets that were dropped by DAI because the sender IP address in the ARP packets or the target IP address in the ARP reply packets is invalid. Invalid addresses include 0.0.0.0, 255.255.255.255, IP multicast addresses, class E addresses (240.0.0.0/4), and loopback addresses (127.0.0.0/8).
Forwarded	The number of valid ARP packets forwarded by DAI.
Dropped	The number of invalid ARP packets dropped by DAI.

3

Configure Switching

This chapter contains the following sections:

- Port settings and maximum frame size
- Link aggregation groups
- VLANs
- Auto-VoIP
- Auto-VLAN
- Spanning Tree Protocol
- Multicast
- IGMP snooping
- MLD snooping
- Multicast VLAN registration
- MAC address table
- Layer 2 loop protection

Port settings and maximum frame size

You can configure the ports and display port information on the switch. You can also set the maximum frame size.

To configure the port settings and maximum frame size:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Ports > Port Configuration**.

   The Port Configuration page displays.
7. In the **Frame Size** field, specify the maximum Ethernet frame size that each interface can support.

   The frame size includes the Ethernet header, CRC, and payload. The range is from 1522 to 10000. The default maximum frame size is 1522.
8. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.

9. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
10. In the **Description** field, enter the description string to be attached to a port.

    The string can be up to 64 characters in length.
11. From the **Admin Mode** menu, select **Enable** or **Disable**.

    This selection specifies the administrative mode for port control. You must select **Enable** in order for the port to participate in the network. The default is Enable.
12. From the **Speed** menu, select the speed for the port:
    - **Auto**: The supported speed is automatically set by the port negotiation process.
    - **100M Full Duplex**.
    - **1G Full Duplex**.
    - **2.5G Full Duplex**.
    - **5G Full Duplex**.

    Note: After you change the speed for a port, the switch might be inaccessible for a number of seconds while the new settings take effect.
13. From the **Link Trap** menu, select **Enable** or **Disable** to specify if the port must send a trap when the link status changes.

    By default, the settings is Enable and the switch sends a link trap. If you select **Disable**, the switch does not send a link trap.
14. From the **Flow Control** menu, select the configuration for IEEE 802.3 flow control:
    - **Disable**: If the port buffers become full, the switch does not send pause frames, and data loss could occur. This is the default setting.
    - **Symmetric**: If the port buffers become full, the switch sends pause frames to stop traffic.

      Flow control helps to prevent data loss when the port cannot keep up with the number of frames being switched. When you enable flow control, the switch can send a pause frame to stop traffic on the port if the amount of memory used by the packets on the port exceeds a preconfigured threshold and responds to pause requests from partner devices. The paused port does not forward packets for the time that is specified in the pause frame. When the pause frame time elapses, or the utilization returns to a specified low threshold, the switch enables the port to again transmit frames. The switch also honors incoming pause frames by temporarily halting transmission.

- **Asymmetric**: If the port buffers become full, the switch does not send pause frames, and data loss could occur. However, the switch does honor incoming pause frames by temporarily halting transmission.

15. Click the **Apply** button.

Your settings are saved.

The following table describes the nonconfigurable data that is displayed.

Table 26. Port Configuration information

Field	Description
Port Type	For normal ports this field is blank. Otherwise, the options are as follows: • **Mirrored**: The port is a mirrored port on which all the traffic is copied to the probe port. • **Probe**: Use the port to monitor a mirrored port. • **Trunk Member**: The port is a member of a link aggregation trunk. Look at the LAG pages for more information.
Physical Status	The port speed and duplex mode.
Link Status	Indicates whether the link is up or down.
Frame Size (1522 to 10000)	The maximum Ethernet frame size that each interface can support. The frame size depends on your selection from the **Frame Size** menu above the table and applies to each interface.
MAC Address	The address of the interface.
PortList Bit Offset	The bit offset value that corresponds to the port when the MIB object type PortList is used to manage in SNMP.
ifIndex	The ifIndex of the interface table entry associated with the port.

Link aggregation groups

Link aggregation groups (LAGs), which are also known as port channels, allow you to combine multiple full-duplex Ethernet links into a single logical link. Network devices treat the aggregation as if it were a single link, which increases fault tolerance and provides load sharing. You assign the LAG VLAN membership after you create a LAG. By default, the LAG becomes a member of the default management VLAN (that is, VLAN 1).

A LAG interface can be either static or dynamic, but not both. All members of a LAG must participate in the same protocols. A static port channel interface does not require a partner system to be able to aggregate its member ports.

The switch supports static LAGs. When a port is added to a LAG as a static member, the port neither transmits nor receives LACPDUs.

The switch supports eight LAGs.

Configure LAG settings

You can group one or more full-duplex Ethernet links to be aggregated together to form a link aggregation group, which is also known as a port channel. The switch treats the LAG as if it were a single link.

To configure LAG settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

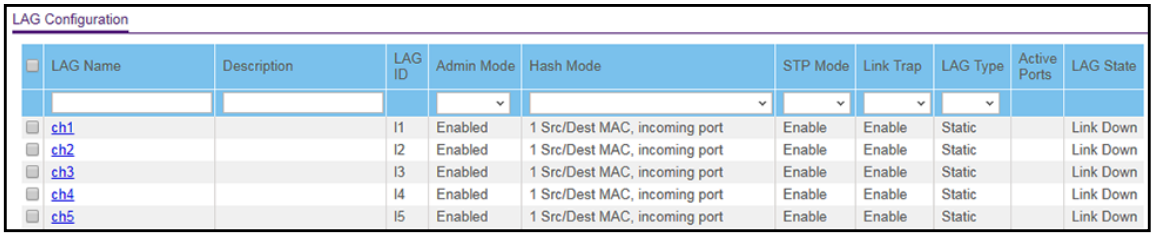
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > LAG > Basic > LAG Configuration**.



7. To change the default name of the LAG, in the **LAG Name** field, enter a name for the LAG.

   You can enter any string of up to 15 alphanumeric characters.

   By default, the LAGs are named ch1, ch2, ch3, and so on through ch8.

8. In the **Description** field, enter the description string to be attached to a LAG.

   The description can be up to 64 characters in length.

9. From the **Admin Mode** menu, select **Enable** or **Disable**.

When the LAG is disabled, no traffic flows and LACPDUs are dropped, but the links that form the LAG are not released. The default is Enable.

10. From the **Hash Mode** menu, select the load-balancing mode for a port channel (LAG):
    - **1 Src/Dest MAC, incoming port**: This mode uses the source MAC address, destination MAC address, and incoming port that are associated with the packet.
    - **2 Src/Dest IP and TCP/UDP Port Fields**: This mode uses the source and destination IP addresses and source and destination TCP or UDP port values that are associated with the packet.

    Note: The switch balances traffic on a port channel (LAG) by selecting one of the links in the channel over which packets must be transmitted. The switch selects the link by creating a binary pattern from selected fields in a packet and associating that pattern with a particular link.

11. From the **STP Mode** menu, select the Spanning Tree Protocol (STP) administrative mode associated with the LAG:
    - **Disable**: Spanning tree is disabled for this LAG.
    - **Enable**: Spanning tree is enabled for this LAG. Enable is the default.
12. From the **Link Trap** menu, select **Enable** or **Disable** to specify whether to send a trap when the link status changes.

    The default is Enable, which allows the trap to be sent.
13. From the **LAG Type** menu, select **Static** or **LACP**:
    - **Static**: Disables Link Aggregation Control Protocol (LACP) on the selected LAG. The LAG is configured manually. The default is Static.
    - **LACP**: Enables LACP on the selected LAG. The LAG is configured automatically.
14. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 27. LAG Configuration information

Field	Description
LAG ID	The identifier of the LAG.
Active Ports	The ports that are members of the LAG.
LAG State	Indicates if the link is up or down.

Configure LAG membership

You can select two or more full-duplex Ethernet links to be aggregated together to form a link aggregation group (LAG), which is also known as a port channel. The switch can treat the port channel as a single link.

To configure LAG membership:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

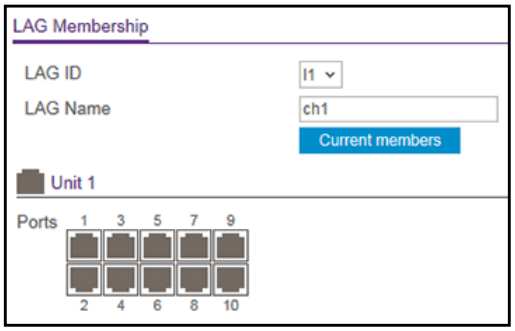
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > LAG > Basic > LAG Membership**.



7. From the **LAG ID** menu, select the LAG ID.
8. In the **LAG Name** field, enter the name to be assigned to the LAG.

   You can enter any string of up to 15 alphanumeric characters. You can also use the default name.

9. In the Ports table, click each port that you want to include as a member of the selected LAG.

   A selected port is displayed by a check mark.

10. Click the **Apply** button.

    Your settings are saved.

Set the LACP system priority

You can set the LACP system priority that applies to all LAGs on the switch.

To set the LACP system priority:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > LAG > Advanced > LACP Configuration**.

   The LACP Configuration page displays.

7. In the **LACP System Priority** field, specify the switch's link aggregation priority relative to the devices at the other ends of the links on which link aggregation is enabled.

   A higher value indicates a lower priority. You can change the setting globally by specifying a priority from 1 to 65535. The default value is 32768.

8. Click the **Apply** button.

   Your settings are saved.

Set the LACP port priority settings

You can configure the LACP priority value and administrative LACP time-out value for a port.

To configure LACP port priority settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > LAG > Advanced > LACP Port Configuration**.

   The LACP Port Configuration page displays.

7. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
8. In the **LACP Priority** field, specify the LACP priority value for the selected interface.

   This value specifies the interface's link aggregation priority relative to the devices at the other ends of the links on which link aggregation is enabled. A higher value indicates a lower priority. The range is 1 to 65535. The default value is 128.

9. In the **Timeout** field, configure the administrative LACP time-out value:
   - **Long**: Specifies a long time-out value.
   - **Short**: Specifies a short time-out value.

10. Click the **Apply** button.

Your settings are saved.

VLANs

Adding virtual LAN (VLAN) support to a Layer 2 switch offers some of the benefits of both bridging and routing. Like a bridge, a VLAN switch forwards traffic based on the Layer 2 header, which is fast, and like a router, it partitions the network into logical segments, which provides better administration, security, and management of multicast traffic.

By default, all ports on the switch are in the same broadcast domain. VLANs electronically separate ports on the same switch into separate broadcast domains so that broadcast packets are not sent to all the ports on a single switch. When you use a VLAN, users can be grouped by logical function instead of physical location.

Each VLAN in a network is assigned an associated VLAN ID, which appears in the IEEE 802.1Q tag in the Layer 2 header of packets transmitted on a VLAN. An end station can omit the tag, or the VLAN portion of the tag, in which case the first switch port to receive the packet can either reject it or insert a tag using its default VLAN ID. A port can handle traffic for more than one VLAN, but it can support only one default VLAN ID.

You can define VLAN groups stored in the VLAN membership table. The switch supports up to 256 VLANs.

The following VLANs are preconfigured on the switch and you cannot delete them:

- **VLAN 1**: The default VLAN of which all ports are members.
- **VLAN 4086**: The default Auto-WIFi VLAN.
- **VLAN 4087**: The Auto-Camera VLAN.
- **VLAN 4088**: The default Auto-VoIP VLAN.
- **VLAN 4089**: The Auto-Video VLAN.

By default, VLANs 4086, 4087, 4088, and 4089 do not include any members but you can manually add members.

Configure VLAN settings

You can configure the various VLAN settings.

Add a VLAN

To add a VLAN:

1. Connect your computer to the same network as the switch.

You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Basic > VLAN Configuration**.

   The VLAN Configuration page displays.
7. In the **VLAN ID** field, specify the VLAN identifier for the new VLAN.

   The range of the VLAN ID can be from 2 to 4093, excluding 4086, 4087, 4088, and 4089. (The default VLANs are 1, 4086, 4087, 4088, and 4089).
8. In the **VLAN Name** field, specify a name for the VLAN.

   The VLAN name can be up to 32 alphanumeric characters long, including blanks. You cannot change the names of the default VLANs.
9. The VLAN Type field displays the type of the VLAN that you are configuring.

   You cannot change the type of the default VLANs. When you manually create a VLAN, its type is static. A VLAN that is created by the Generic VLAN Registration Protocol (GVRP) initially uses a type of dynamic. You can change the type of a dynamic VLAN to static.
10. Click the **Add** button.

    The VLAN is added to the switch.

Delete a VLAN

To delete a VLAN from the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Basic > VLAN Configuration**.

   The VLAN Configuration page displays.
7. In the **VLAN ID** field, specify the VLAN identifier.

   Note: You cannot delete VLANs 1, 4086, 4087, 4088, and 4089, all of which are predefined.
8. Click the **Delete** button.

   The VLAN is removed.

Reset the VLAN configuration on the switch to the default settings

If you reset the VLAN configuration on the switch to the default settings, all VLANs that you added are deleted. (The predefined VLANS are not deleted).

The VLAN default values are as follows:

- All ports are assigned to the default VLAN of 1.
- All ports are configured with a PVID of 1.
- All ports are configured to an Acceptable Frame Types value of Admit All Frames.
- All ports are configured with ingress filtering disabled.
- All ports are configured to transmit only untagged frames.
- GVRP is disabled on all ports and all dynamic entries are cleared.

To reset the VLAN configuration on the switch to the default settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Basic > VLAN Configuration**.

   The VLAN Configuration page displays.
7. Select the **Reset Configuration** check box.
8. Click the **Apply** button.

   Your settings are saved. Except for the predefined default VLANs, all VLANs are deleted.

Configure VLAN membership

To configure VLAN membership:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

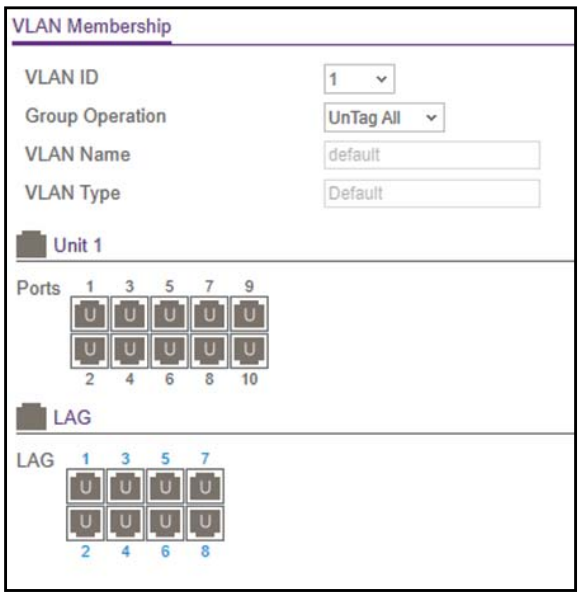
   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Advanced > VLAN Membership**.



7. In the **VLAN ID** menu, select the VLAN ID.

   You can select a VLAN that is predefined or that you added (see Add a VLAN on page 156).
8. In the **Group Operation** menu, select one of the following options, which applies to all ports in the VLAN:
   - **Untag All**: For all ports and LAGs that are members of the VLAN, tags are removed from all egress packets.
   - **Tag All**: For all ports and LAGs that are members of the VLAN, all egress packets are tagged.
   - **Remove All**: All ports and LAGs are removed from the VLAN, including the ports and LAGs that were dynamically registered through GVRP.

9. In the Ports table, click each port once, twice, or three times to configure one of the following modes or reset the port to the default mode:
   - **T (Tagged)**: Selects the port as a tagged port in the VLAN. All frames transmitted on the port are tagged for this VLAN.
   - **U (Untagged)**: Selects the port as an untagged port in the VLAN. All frames transmitted on the port are untagged for this VLAN.
   - **Blank**: The port is excluded from the VLAN.

   By default, the selection is blank and none of the ports are a member of the VLAN. (VLAN 1 is an exception. By default, all ports are untagged members of VLAN 1.)

   However, ports can be dynamically registered (autodetected) in the VLAN through GVRP.
10. In the LAG table, click each LAG once, twice, or three times to configure one of the following modes or reset the LAG to the default mode:
    - **T (Tagged)**: Selects the LAG as a tagged LAG in the VLAN. All frames transmitted on the LAG are tagged for this VLAN.
    - **U (Untagged)**: Selects the LAG as an untagged LAG in the VLAN. All frames transmitted on the LAG are untagged for this VLAN.
    - **Blank**. The LAG is excluded from the VLAN.

    By default, the selection is blank and none of the LAGs are a member of the VLAN. (VLAN 1 is an exception. By default, all LAGs are untagged members of VLAN 1.)

    However, LAGs can be dynamically registered (autodetected) in the VLAN through GVRP.
11. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 28. Advanced VLAN membership

Field	Definition
VLAN Name	The name for the VLAN that you selected. It can be up to 32 alphanumeric characters long, including blanks. The names for the following VLANs are predefined: • **VLAN 1**: Default. • **VLAN 4085**: Auto-WiFi. • **VLAN 4087**: Auto-Camera. • **VLAN 4088**: Auto-VoIP. • **VLAN 4089**. Auto-Video.
VLAN Type	The type of the VLAN you selected: • **Default** (VLAN ID = 1): Always present. • **Static**: A VLAN that you configured. • **Dynamic**: A VLAN that is created through GVRP registration, that you did not convert to a static VLAN, and that GVRP can therefore remove.

View the VLAN status

You can view the status of all currently configured VLANs.

To view the VLAN status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Advanced > VLAN Status**.

   The VLAN Status page displays.

The following table describes the nonconfigurable information displayed on the page.

Table 29. VLAN status

Field	Definition
VLAN ID	The VLAN identifier (VID) of the VLAN. The range of the VLAN ID is from 1 to 4093.
VLAN Name	The name of the VLAN.

Table 29. VLAN status (continued)

Field	Definition
VLAN Type	The VLAN type: • **Default** (VLAN ID = 1): Always present. • **Auto-WiFi** (VLAN ID = 4086): Always present. • **Auto-Camera** (VLAN ID = 4087): Always present. • **Auto-VoIP** (VLAN ID = 4088): Always present. • **Auto-VIdeo** (VLAN ID = 4089): Always present. • **Static**: A VLAN that you configured. • **Dynamic**: A VLAN that is created through GVRP registration, that you did not convert to a static VLAN, and that GVRP can therefore remove.
Routing Interface	If VLAN routing is configured for the VLAN, the interface that is associated with the VLAN.
Member Ports	The ports, LAGs, or both that are included in the VLAN.

Configure the PVID settings for an interface

You can assign a port VLAN ID (PVID) to an interface. The following requirements apply to a PVID:

- By default, the PVID for each port is 1.
- If you do not specify another value, the default VLAN PVID is used.
- To change the port's default PVID, you must first create a VLAN that includes the port as a member (see Configure VLAN membership on page 159).

To configure PVID settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > VLAN > Advanced > Port PVID Configuration**.

   The Port PVID Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. In the **PVID** field, specify the VLAN ID to assign to untagged or priority-tagged frames received on the port.

   The default is 1.

10. In the **VLAN Member** field, specify the VLAN ID or list of VLANs of a member port.

    VLAN IDs range from 1 to 4093. The default is 1. Use a hyphen (-) to specify a range or a comma (,) to separate VLAN IDs in a list. Spaces and zeros are not permitted.

11. In the **VLAN Tag** field, specify the VLAN ID or list of VLANs of a tagged port.

    VLAN IDs range from 1 to 4093. Use a hyphen (-) to specify a range or a comma (,) to separate VLAN IDs in a list. Spaces and zeros are not permitted. You can specify port tagging for the VLAN only if the port that you want to add as a tagged port is also member of the VLAN. To reset the VLAN tag configuration to the defaults, use the **None** keyword.

12. From the **Acceptable Frame** menu, specify one if the following types of frames that can be received on the port:
    - **Admit All**: Untagged frames or priority-tagged frames that are received on the port are accepted and assigned the value of the port VLAN ID for the port. This is the default selection.
    - **VLAN Only**: Untagged frames or priority-tagged frames that are received on the port are discarded.
    - **Admit Untagged Only**: Untagged frames that are received on the port are accepted.

    With the **Admit All** and **VLAN Only** selections, VLAN-tagged frames are forwarded in accordance to the 802.1Q VLAN specification.

13. From the **Ingress Filtering** menu, select one of the following options:
    - **Enable**: The frame is discarded if the port is not a member of the VLAN with which this frame is associated. In a tagged frame, the VLAN is identified by the VLAN ID in the tag. In an untagged frame, the VLAN is the port VLAN ID specified for the port that received this frame.
    - **Disable**: All frames are forwarded in accordance with the 802.1Q VLAN bridge specification. The default is Disable.
14. In the **Port Priority** field, specify the default 802.1p priority assigned to untagged packets arriving at the port.

    You can enter a number from 0 to 7.
15. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable fields on the page.

Table 30. PVID Configuration information

Field	Description
Current Ingress Filtering	Indicates whether ingress filtering is enabled for the interface.
Untagged VLANs	The number of untagged VLANs for the interface.
Tagged VLANs	The number of tagged VLANs for the interface.
Forbidden VLANs	The number of forbidden VLANs for the interface.
Dynamic VLANs	The number of dynamically added VLANs for the interface.

Configure a MAC-based VLAN

The MAC-Based VLAN feature allows incoming untagged packets to be assigned to a VLAN and thus classify traffic based on the source MAC address of the packet.

You define a MAC-to-VLAN mapping by configuring an entry in the MAC-to-VLAN table. An entry is specified through a source MAC address and a VLAN ID. The MAC-to-VLAN configurations are shared across all ports of the switch (that is, a system-wide table exists with MAC address–to–VLAN ID mappings).

When untagged or priority-tagged packets arrive at the switch and entries exist in the MAC-to-VLAN table, the source MAC address of the packet is looked up. If an entry is found, the corresponding VLAN ID is assigned to the packet. If the packet is already priority-tagged, it maintains this value. Otherwise, the priority is set to zero. The assigned VLAN ID is verified against the VLAN table. If the VLAN is valid, ingress processing on the packet continues. Otherwise, the packet is dropped. This implies that you can configure a MAC address mapping to a VLAN that you did not yet create on the switch.

Add a MAC-based VLAN

To add a MAC-based VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Advanced > MAC Based VLAN**.

   The MAC Based VLAN Configuration page displays.
7. In the **MAC Address** field, enter a MAC address to be bound to a VLAN ID.

   This field is configurable only when a MAC-based VLAN is created.
8. In the **VLAN ID** field, specify a VLAN ID in the range from 1 to 4093.
9. Click the **Add** button.

   The MAC address is added to the VLAN mapping.

Delete a MAC address from the VLAN mapping

To delete a MAC address from the VLAN mapping:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Advanced > MAC Based VLAN**.

   The MAC Based VLAN page displays.
7. Select the check box for the MAC-to-VLAN mapping.
8. Click the **Delete** button.

   The entry is removed from the MAC-to-VLAN mapping table.

Configure protocol-based VLAN groups

You can use a protocol-based VLAN to define filtering criteria for untagged packets. By default, if you do not configure any port-based (IEEE 802.1Q) or protocol-based VLANs, untagged packets are assigned to VLAN 1. You can override this behavior by defining either port-based VLANs or protocol-based VLANs, or both. Tagged packets are always handled according to the IEEE 802.1Q standard and are not included in protocol-based VLANs.

If you assign a port to a protocol-based VLAN for a specific protocol, untagged frames that arrive on that port for that protocol are assigned the protocol-based VLAN ID. Untagged frames that arrive on the port for other protocols are assigned the port VLAN ID, either the default PVID (1) or a PVID you specifically assigned to the port (see Configure the PVID settings for an interface on page 163).

You define a protocol-based VLAN by creating a group. Each group forms a one-to-one relationship with a VLAN ID, can include one to three protocol definitions, and can include multiple ports. When you create a group, you specify a name and a group ID is assigned automatically.

To configure a protocol-based VLAN group:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > VLAN > Advanced > Protocol Based VLAN Group Configuration**.

   The Protocol Based VLAN Group Configuration page displays.
7. In the **Group ID** field, enter a number to identify the group.

   The number must be in the range from 1 to 128.
8. In the **Group Name** field, enter a name for the new group.

   You can enter up to 16 characters.
9. In the **Protocol** field, enter one or more protocols that must be associated with the group.

   You can enter keywords such as arp, ip, and ipx. Separate keywords with a comma. You can also enter hexadecimal or decimal values in the range from 0x0600 (1536) to 0xFFFF (65535).
10. In the **VLAN ID** field, enter the VLAN ID.

    The ID can be any number in the range from 1 to 4093. All the ports in the group assign this VLAN ID to untagged packets received for the protocols that you included in this group.
11. Click the **Add** button.

    The protocol-based VLAN group is added to the switch.

    The Ports field displays all the member ports that belong to the group.

Configure protocol-based VLAN group membership

To configure protocol-based VLAN group membership:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

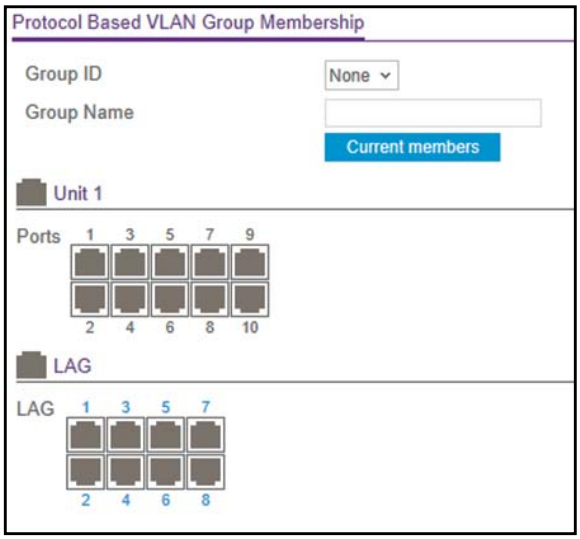
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > VLAN > Advanced > Protocol Based VLAN Group Membership**.



7. From the **Group ID** menu, select the protocol-based VLAN group ID.

   The Group Name field shows the name that is associated with the group.

8. In the Ports table and LAG table, click each port and LAG that you want to include in the protocol-based VLAN group.

   A protocol-based VLAN group can include both port and LAGs. A selected port or LAG is displayed by a check mark.

9. Click the **Apply** button

   Your settings are saved.

10. To display the current numbers in the selected protocol-based VLAN group, click the **Current Members** button.

Configure a voice VLAN

You can configure the settings for a voice VLAN.

To configure a voice VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > VLAN > Advanced > Voice VLAN Configuration**.

   The Voice VLAN Configuration page displays.

7. Select the Admin Mode **Disable** or **Enable** radio button.

   This selection specifies the administrative mode for the voice VLAN for the switch. The default is Disable.

8. Select the interface by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Interface Mode** menu, select the voice VLAN mode for selected interfaces:
   - **Disable**: The interface is not configured as a voice VLAN. This is the default setting.
   - **None**: Allows the IP phone to use its own configuration to send untagged voice traffic.
   - **VLAN ID**: Configures the phone to send tagged voice traffic. You must enter the VLAN ID in the **Value** field (see the next step).
   - **Dot1p**: Configures voice VLAN 802.1p priority tagging for voice traffic. You must enter the dot1p value in the **Value** field (see the next step).
   - **Untagged**: Configures the phone to send untagged voice traffic.
10. In the **Value** field, enter the VLAN ID or dot1p value.

    This field is enabled only if you select **VLAN ID** or **Dot1p** from the **Interface Mode** menu.
11. In the **CoS Override Mode** field, select **Disable** or **Enable**.

    The default is Disable.
12. In the **Authentication Mode** field, select **Enable** or **Disable**.

    The default is Enable. When the authentication mode is enabled, voice traffic is allowed on an unauthorized voice VLAN port. When the authentication mode is disabled, devices are authorized through dot1x.

    Note: Authentication through dot1x is possible only if dot1x is enabled.
13. In the **DSCP Value** field, configure the Voice VLAN DSCP value for the port.

    The range is from 0 to 64. The default value is 0.
14. Click the **Apply** button.

    Your settings are saved.

    The Operational State field displays the operational status of the voice VLAN on an interface.

Configure the GARP switch settings

The Generic Attribute Registration Protocol (GARP) is used to exchange information between GARP participants to register and deregister attribute values within a bridged LAN. When a GARP participant declares or withdraws a given attribute, the attribute value is recorded with the applicant state machine for that attribute, for the port from which the declaration or withdrawal was made.

- Registration occurs only on ports that receive the GARP PDU containing a declaration or withdrawal.
- Deregistration occurs only if all GARP participants connected to the same LAN segment as the port withdraw the declaration.

GARP is part of the IEEE 802.1p extension to its 802.1D (spanning tree) specification. It includes the following:

- **GARP Information Declaration (GID)**: The part of GARP that generates data.
- **GARP Information Propagation (GIP)**: The part of GARP that distributes data.

Note: It can take up to 10 seconds for GARP configuration changes to take effect.

To configure the GARP switch settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > VLAN > Advanced > GARP Switch Configuration**.

   The GARP Switch Configuration page displays.

7. Select the GVRP Mode **Disable** or **Enable** radio button.

   This selection specifies the global administrative mode for GARP on the switch. The default is Disable, which causes the protocol to be inactive.

8. Click the **Apply** button.

   Your settings are saved.

Configure GARP ports

Note: It can take up to 10 seconds for GARP configuration changes to take effect.

To configure GARP ports:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > VLAN > Advanced > GARP Port Configuration**.

   The GARP Port Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **GVRP Mode** menu, select **Enable** or **Disable**.

   This selection specifies the administrative mode for GARP on the port. The default is Disable, which causes the protocol to be inactive and the port settings to be without any effect.
10. In the **Join Timer** field, specify the time in centiseconds between the transmission of GARP PDUs registering (or reregistering) membership for a VLAN or multicast group.

    Enter a number between 10 and 100 (0.1 to 1.0 seconds). The default is 20 centiseconds (0.2 seconds). An instance of this timer exists for each GARP participant for each port.
11. In the **Leave Timer** field, specify the time in centiseconds to wait after receiving an unregister request for a VLAN or multicast group before deleting the associated entry.

    This allows time for another station to assert registration for the same attribute to maintain uninterrupted service. Enter a number between 20 and 600 (0.2 to 6.0 seconds). The default is 60 centiseconds (0.6 seconds). An instance of this timer exists for each GARP participant for each port.
12. In the **Leave All Timer field**, specify how frequently (in centiseconds) LeaveAll PDUs are generated.

    A LeaveAll PDU indicates that all registrations will be deregistered soon. To maintain registration, participants must rejoin. The leave all period timer is set to a random value in the range of LeaveAllTime to 1.5 * LeaveAllTime. The timer is specified in centiseconds. Enter a number between 200 and 6000 (2 to 60 seconds). The default is 1000 centiseconds (10 seconds). An instance of this timer exists for each GARP participant for each port.
13. Click the **Apply** button.

    Your settings are saved.

Auto-VoIP

Voice over Internet Protocol (VoIP) enables telephone calls over a data network. Because voice traffic is typically more time-sensitive than data traffic, the Auto-VoIP feature provides a classification for voice packets so that they can be prioritized above data packets, allowing the switch to provide better Quality of Service (QoS). With the Auto-VoIP feature, voice prioritization is provided based on the SIP call-control protocol or OUI bits.

Configure the Auto-VoIP protocol-based settings

To prioritize time-sensitive voice traffic over data traffic, protocol-based Auto-VoIP checks for packets carrying the Session Initiation Protocol (SIP) VoIP protocol.

VoIP frames that are received on ports that for which the Auto-VoIP feature is enabled are marked with the specified CoS traffic class value.

To configure the Auto-VoIP protocol-based settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Auto-VoIP > Protocol-based > Port Settings**.

   The Port Settings page displays.
7. In the Protocol Based Global Settings section, specify the following global settings:
   a. From the **Prioritization Type** menu, select **Traffic Class** or **Remark**.

This specifies the type of prioritization.

b. From the **Class Value** menu, specify the CoS class value to be reassigned for packets that the voice VLAN receives.

8. In the Protocol Based Global Settings section, specify the Auto VoIP Mode settings:
   a. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
      - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
      - **LAG**: Only LAGs are displayed.
      - **All**: Both physical interfaces and LAGs are displayed.
   b. Select one or more interfaces by taking one of the following actions:
      - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
      - To configure multiple interfaces with the same settings, select the check box associated with each interface.
      - To configure all interfaces with the same settings, select the check box in the heading row.
   c. From the **Auto VoIP Mode** menu, select to enable or disable the Auto VoIP mode for the interface or interfaces.
9. Click the **Apply** button.

   Your settings are saved.

   The Operational State field displays the operational VoIP status on an interface.

Configure the Auto-VoIP OUI-based properties

With Organizationally Unique Identifier (OUI)–based Auto-VoIP, voice prioritization is provided based on OUI bits.

To configure the Auto-VoIP OUI-based properties:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Auto-VoIP > OUI-based > Properties**.

   The Properties page displays.
7. In the **Auto-VoIP VLAN ID** field, enter the VoIP VLAN ID of the switch.

   The default Auto-VoIP VLAN ID is 4088. You can use that VLAN ID or create another VLAN ID for Auto-VoIP.
8. From the **OUI-based priority** menu, select the OUI-based priority of the switch, from 0 to 7.

   The default value is 7.
9. Click the **Apply** button.

   Your settings are saved.

Configure the VoIP OUI-based port settings

You can configure the VoIP OUI port settings.

To configure VoIP OUI-based port settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Auto-VoIP > OUI-based > Port Settings**.

   The Port Settings page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Auto VoIP Mode** menu, select **Disable** or **Enable**.

   Auto-VoIP is disabled by default.

10. Click the **Apply** button.

    Your settings are saved.

    The Operational State field displays the operational VoIP status on an interface.

Manage the VoIP OUI table

Device hardware manufacturers can include an OUI in a network adapter to help identify a hardware device. The OUI is a unique 24-bit number assigned by the IEEE registration authority. The switch comes preconfigured with the following OUIs that identify the IP phone manufacturer:

- 00:01:E3: SIEMENS
- 00:03:6B: CISCO1
- 00:12:43: CISCO2
- 00:60:B9: NITSUKO
- 00:D0:1E: PINTEL
- 00:E0:75: VERILINK
- 00:E0:BB: 3COM
- 00:04:0D: AVAYA1
- 00:1B:4F: AVAYA2

You can select an existing OUI or add a new OUI and description to identify the IP phones on the network.

Add OUIs to the OUI table for the Auto-VoIP VLAN

To add an OUI to the OUI table for the Auto-VoIP VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Auto-VoIP > OUI-based > OUI Table**.

   The OUI Table page displays.
7. In the **Telephony OUI(s)** field, specify the VoIP OUI prefix to be added in the format AA:BB:CC.

   You can configure up to 32 OUIs.
8. In the **Description** field, enter the description for the OUI.

   The maximum length of description is 32 characters.
9. Click the **Add** button.

   The telephony OUI entry is added.

Delete one or more OUI prefixes from the OUI table for the Auto-VoIP VLAN

To delete one or more OUI prefixes from the OUI table for the AUto-VoIP VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Auto-VoIP > OUI-based > OUI Table**.

   The OUI Table page displays.
7. Select the check box next to each OUI prefix to be removed.
8. Click the **Delete** button.

   The telephony OUI entries are removed.

Display the Auto-VoIP status

You can display the Auto-VoIP status.

To view the Auto-VoIP status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Auto-VoIP > Auto-VoIP Status**.

   The Auto-VoIP Status page displays.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable Auto-VoIP status information.

Table 31. Auto-VoIP status

Field	Description
Auto-VoIP VLAN ID	The Auto-VoIP VLAN ID. (The default VLAN ID is 4088.)
Maximum Number of Voice Channels Supported	The maximum number of voice channels supported (32).
Number of Voice Channels Detected	The number of VoIP channels prioritized successfully.

Auto-VLAN

The Auto-VLAN feature consists of Auto-WiFi and Auto-camera features, which provide a classification for respectively WiFi and digital camera packets so that they can be automatically placed in a VLAN and then be prioritized above other packets, allowing the switch to provide better Quality of Service (QoS). With the Auto-VLAN feature, traffic prioritization is based on the organizationally unique identifier (OUI) bits of a WiFi device or camera.

Configure the Auto-VLAN properties

By default, the Auto-WiFi VLAN is VLAN ID 4086 and the Auto-Camera VLAN is VLAN ID 4087. You can change these VLAN IDs. By default, an OUI-based priority value of 7 is assigned to the traffic in these VLANs. For each VLAN independently, you can change the priority to another value.

To configure the Auto-VLAN properties:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Auto-VLAN > Properties**.

   The Properties page displays.

7. In the **Auto-WiFi VLAN ID** field, specify the VLAN ID for the Auto-WiFi VLAN.

   The default Auto-WiFi VLAN ID is 4086. You can use that VLAN ID or specify another VLAN ID.

8. From the **Auto-WiFi priority** menu, select the OUI-based priority for the Auto-WiFi VLAN from 0 to 7.

   The default value is 7.

9. In the **Auto-Camera VLAN ID** field, specify the ID for the Auto-Camera VLAN.

   The default Auto-Camera VLAN ID is 4087. You can use that VLAN ID or specify another VLAN ID.

10. From the **Auto-Camera priority** menu, select the OUI-based priority for the Auto-Camera VLAN from 0 to 7.

    The default value is 7.

11. Click the **Apply** button.

    Your settings are saved.

Configure the Auto-VLAN port settings

For each interface, you can enable the Auto-WiFi VLAN, the Auto-Camera VLAN, or both VLANs. Depending on the OUI of the WiFi device or camera, traffic on the interface can then automatically be added to the Auto-WiFi VLAN or Auto-Camera VLAN and prioritized accordingly.

To configure the Auto-VLAN port settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Auto-VLAN > Port Settings**.

   The Port Settings page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.

- To configure all interfaces with the same settings, select the check box in the heading row.

9. From the **Auto WiFi Mode** menu, select to enable or disable the Auto-WiFi VLAN mode for the interface or interfaces.
10. From the **Auto Camera Mode** menu, select to enable or disable the Auto-Camera VLAN mode for the interface or interfaces.
11. Click the **Apply** button.

    Your settings are saved.

    The Operational State fields display the operational status of the Auto-WiFi and Auto-Camera VLANs on an interface.

Manage the OUI table for Auto-WiFi and Auto-Camera VLANs

Device hardware manufacturers can include an organizationally unique identifier (OUI) in a network adapter to help identify a hardware device. The OUI is a unique 24-bit number assigned by the IEEE registration authority.

For the WiFI devices and cameras in your network, you can add an OUI and description to identify the devices on the network and enable them to be automatically added to a VLAN for traffic prioritization

Add OUIs to the OUI table for the Auto-WiFi and Auto-Camera VLANs

To add an OUI to the OUI table for Auto-WiFi and Auto-Camera VLANs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Auto-VLAN > OUI Table**.

   The OUI Table page displays.

7. In the **OUIs** field, specify the WiFi device or camera OUI prefix to be added in the format AA:BB:CC.

   You can configure up to 32 OUIs.

8. In the **Description** field, enter the description for the OUI.

   The maximum length of description is 32 characters.

9. From the **Auto-VLAN Type** menu, select **Auto-WiFi** or **Auto-Camera**, depending on the type of device for which you are adding an OUI.

10. Click the **Add** button.

    The OUI entry is added.

Delete one or more OUI prefixes from the OUI table for Auto-WiFi and Auto-Camera VLANs

To delete one or more OUI prefixes from the OUI table for Auto-WiFi and Auto-Camera VLANs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Auto-VLAN > OUI Table**.

The OUI Table page displays.

7. Select the check box next to each OUI prefix to be removed.
8. Click the **Delete** button.

   The OUI entries are removed.

Spanning Tree Protocol

The Spanning Tree Protocol (STP) provides a tree topology for any arrangement of network devices. STP also provides one path between end stations on a network, eliminating loops. STP (also referred to as “classic” STP) provides a single path between end stations, avoiding and eliminating loops. For information about configuring the global STP settings for the switch, see Configure the STP settings and view the STP status on page 187.

The switch support the following spanning tree versions:

- **CST**: Common STP. For information on configuring CST, see Configure the CST settings on page 189 and Configure the CST port settings on page 190.
- **MSTP**: Multiple Spanning Tree Protocol (MSTP, also referred to as MST) supports multiple instances of spanning tree to efficiently channel VLAN traffic over different interfaces. For information on configuring MSTP, see Manage the MST settings on page 195 and Configure and view the port settings for an MST instance on page 198.
- **RSTP**: Rapid STP. Each instance of the spanning tree behaves in the manner specified in IEEE 802.1w, Rapid Spanning Tree (RSTP), with slight modifications in the working but not the end effect (chief among the effects is the rapid transitioning of the port to the forwarding state). For information on viewing the RSTP state, see View the Rapid STP information on page 194.

  The difference between the RSTP and the traditional STP (IEEE 802.1D) is the ability to configure and recognize full-duplex connectivity and ports that are connected to end stations, resulting in rapid transitioning of the port to the forwarding state and the suppression of Topology Change Notification. These features are represented by the parameters pointtopoint and edgeport. MSTP is compatible with both RSTP and STP. It behaves in a way that is appropriate for STP and RSTP bridges. An MSTP bridge can be configured to behave entirely as an RSTP bridge or an STP bridge.

Note: For two bridges to be in the same region, the force version must be 802.1s and their configuration names, digest keys, and revision levels must match. For additional information about regions and their effect on network topology, refer to the IEEE 802.1Q standard.

Configure the STP settings and view the STP status

You can configure the STP settings and view the STP status on the switch.

To configure the STP settings and view the STP status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Basic > STP Configuration**.

   The STP Configuration page displays.
7. Configure the following global settings for the switch:
   a. **Spanning Tree State**: Enable or disable the spanning tree operation on the switch.

      By default, spanning tree operation is disabled.
   b. **STP Operation Mode**: Specify the STP version for the switch.

      The options are **STP**, **RSTP**, and **MSTP**: The default is RSTP.
   c. **Configuration Name**: Specify a name to identify the STP, RSTP, or MSTP configuration.

      The name can be up to 32 alphanumeric characters.
   d. **Configuration Revision Level**: Specify an identifier to identify the STP, RSTP, or MSTP configuration.

      The values can be from 0 to 65535. The default value is 0.

e. **Forward BPDU while STP Disabled**: Enable or disable the bridge protocol data unit (BPDU) flood.

   This setting specifies whether spanning tree BPDUs are forwarded while spanning tree is disabled on the switch.

8. Click the **Apply** button.

   Your settings are saved.

The following table describes the nonconfigurable fields on the page.

Table 32. STP Configuration status

Field	Description
Global Settings	
Configuration Digest Key	The identifier used to identify the configuration currently being used.
STP Status	
Bridge Identifier	The bridge identifier for the CST. It is made up using the bridge priority and the base MAC address of the bridge.
Time Since Topology Change	The time in day-hour-minute-second format since the topology of the CST last changed.
Topology Change Count	The number of times that the topology changed for the CST.
Topology Change	The value of the topology change setting for the switch that indicates if a topology change is in progress on any port assigned to the CST. The option is True or False.
Designated Root	The bridge identifier of the root bridge. It consists of the bridge priority and the base MAC address of the bridge.
Root Path Cost	The path cost to the designated root for the CST.
Root Port	The port to access the designated root for the CST.
Max Age (secs)	The maximum age timer controls the maximum length of time in seconds that passes before a bridge port saves its configuration BPDU information.
Forward Delay (secs)	The derived value of the Root Port Bridge Forward Delay setting.
Hold Time (secs)	The minimum time in seconds between the transmission of configuration BPDUs.
CST Regional Root	The priority and base MAC address of the CST regional root.
CST Path Cost	The path cost to the CST tree regional root.

Configure the CST settings

You can configure a common spanning tree (CST) and internal spanning tree on the switch.

To configure the CST settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > STP > Advanced > CST Configuration**.

   The CST Configuration page displays.

7. Specify the CST options:
   - **Bridge Priority**: When switches or bridges are running STP, each is assigned a priority. After exchanging BPDUs, the switch with the lowest priority value becomes the root bridge. Specify the bridge priority value for the Common and Internal Spanning Tree (CST). The range is from 0 to 61440. The bridge priority is a multiple of 4096. If you specify a priority that is not a multiple of 4096, the priority is automatically set to the next lowest priority that is a multiple of 4096. For example, if you set the priority to any value between 0 and 4095, the switch automatically sets the value to 0. The default value is 32768.
   - **Bridge Max Age (secs)**: The bridge maximum age time for the Common and Internal Spanning Tree (CST), which indicates the time in seconds a bridge must wait before implementing a topological change. The range is from 6 to 40, and the value must be less than or equal to (2 * Bridge Forward Delay) – 1 and greater than or equal to 2 * (Bridge Hello Time +1). The default value is 20.

- **Bridge Hello Time (secs)**: The bridge hello time for the Common and Internal Spanning Tree (CST), which indicates the time in seconds a root bridge must wait between configuration messages. The value is fixed at 2 seconds. The value must be less than or equal to (Bridge Max Age / 2) – 1.
- **Bridge Forward Delay (secs)**: The bridge forward delay time, which indicates the time in seconds a bridge must remains in a listening and learning state before forwarding packets. The value must be greater or equal to (Bridge Max Age / 2) + 1. The time range is from 4 seconds to 30 seconds. The default value is 15 seconds.
- **Spanning Tree Maximum Hops**: The maximum number of bridge hops the information for a particular CST instance can travel before being discarded. The range is from 6 to 40. The default is 20 hops.

8. Click the **Apply** button.

   Your settings are saved.

The following table describes the MSTP Status information that is displayed.

Table 33. STP advanced CST configuration, MSTP status

Field	Description
MST ID	The MST instances (including the CST) and the corresponding VLAN IDs associated with each of them.
VID ID	The VLAN IDs (VIDs) and the corresponding filtering IDs (FIDs) associated with each of them.
FID ID	The FIDs and the corresponding VLAN IDs associated with each of them.

Configure the CST port settings

You can configure a common spanning tree (CST) and internal spanning tree on a specific port on the switch.

A port can become diagnostically disabled (D-Disable) if a severe DOT1S error condition occurs. The most common cause is that BPDU flooding occurs for DOT1S, for example, if DOT1S receives more than 15 BPDUs during 3 seconds. Other causes for DOT1S D-Disable are rare.

To configure the CST port settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > CST Port Configuration**.

   The CST Port Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **STP Status** menu, select the option to enable or disable the spanning tree administrative mode associated with the port or LAG.

   The option is **Enable** or **Disable**. The default value is Enable.
10. From the **Fast Link** menu, select whether the specified port is an edge port within the CST.

    The option is **Enable** or **Disable**. The default value is Disable.
11. From the **BPDU Forwarding** menu, configure BPDU forwarding.

    The option is **Enable** or **Disable**. The default value is Disable. When BPDU forwarding is enabled, the switch forwards the BPDU traffic arriving on the port when STP is disabled on the port.
12. From the **Auto Edge** menu, specify if the port is allowed to become an edge port if it does not detect BPDUs for some time.

    The option is **Enable** or **Disable**. The default value is Enable.
13. In the **Path Cost** field, set the path cost to a new value for the specified port in the common and internal spanning tree.

Specify a value in the range from 0 to 200000000. The default is 0. When the path cost is set to 0, the value is updated with the external path cost from an incoming STP packet.

14. In the **Priority** field, specify the priority for a particular port within the CST.

    The port priority is set in multiples of 16. For example if you attempt to set the priority to any value between 0 and 15, it is set to 0. If you try to set it to any value between 16 and (2*16 – 1), it is set to 16, and so on. The range is 0 to 240. The default value is 128.

15. In the **External Port Path Cost** field, set the external path cost to a new value for the specified port in the spanning tree.

    The value range is 0 to 200000000. The default is 0.

16. Click the **Apply** button.

    Your settings are saved.

17. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 34. CST port configuration

Field	Description
Port State	The forwarding state of the port. The default is Disabled.
Port ID	The port identifier for the specified port within the CST. It is made up from the port priority and the interface number of the port.
Hello Timer	The value of the setting for the CST. The default is 2 seconds.

View the CST port status

You can display the common spanning tree (CST) and internal spanning tree for a specific port on the switch.

To view the CST port status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > CST Port Status**.

   The CST Port Status page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the CST Status information displayed on the page.

Table 35. CST port status information

Field	Description
Interface	The physical port or LAG that is associated with the CST.
Port Role	Each MST bridge port that is enabled is assigned a port role for each spanning tree. The port role can be Root, Designated, Alternate, Backup, Master, or Disabled.
Designated Root	The root bridge for the CST. It is made up using the bridge priority and the base MAC address of the bridge.
Designated Cost	The path cost offered to the LAN by the designated port.
Designated Bridge	The identifier of the bridge with the designated port. It is made up using the bridge priority and the base MAC address of the bridge.
Designated Port	The port identifier on the designated bridge that offers the lowest cost to the LAN. It is made up from the port priority and the interface number of the port.
Topology Change Acknowledge	Identifies whether the topology change acknowledgement flag is set for the next BPDU to be transmitted for the port. It is either True or False.
Edge port	Indicates whether the port is enabled as an edge port. It is either Enabled or Disabled.
Point-to-Point MAC	The derived value of the point-to-point status.
CST Regional Root	The bridge identifier of the CST regional root. It is made up using the bridge priority and the base MAC address of the bridge.

Table 35. CST port status information (continued)

Field	Description
CST Path Cost	The path cost to the CST regional root.
Port Forwarding State	The forwarding state of the port.

View the Rapid STP information

You can view information about the Rapid Spanning Tree (RSTP) port status.

To view information about RSTP:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > RSTP**.

   The RSTP page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the Rapid STP Status information displayed on the page.

Table 36. Rapid STP status information

Field	Description
Interface	The physical or port channel interfaces associated with VLANs associated with the CST.
Role	Each MST bridge port that is enabled is assigned a port role for each spanning tree. The port role can be Root, Designated, Alternate, Backup Master, or Disabled.
Mode	Specifies the spanning tree operation mode. Different modes are STP, RSTP, and MSTP.
Fast Link	Indicates whether the port is enabled as an edge port.
Status	The forwarding state of the port.

Manage the MST settings

You can configure a multiple spanning tree (MST) on the switch.

Configure an MST instance

To configure an MST instance:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > MST Configuration**.

   The MST Configuration page displays.

7. Configure the MST values:
   - **MST ID**: Specify the ID of the MST. The range is from 1 to 15.
   - **Priority**: The bridge priority value for the MST. When switches or bridges are running STP, each is assigned a priority. After exchanging BPDUs, the switch with the lowest priority value becomes the root bridge. The bridge priority is a multiple of 4096. If you specify a priority that is not a multiple of 4096, the priority is automatically set to the next lowest priority that is a multiple of 4096. For example, if you set the priority to any value between 0 and 4095, the switch automatically sets the value to 0. The default value is 32768. The range is from 0 to 61440.
   - **VLAN ID**: The menu includes all VLANs that are configured on the switch. You can select VLANs that must be associated with the MST instance or clear VLANs that are already associated with the MST instance.
8. Click the **Add** button.

   The MST is added.

For each configured instance, the information described in the following table displays on the page.

Table 37. MST configuration

Field	Description
Bridge Identifier	The bridge identifier for the selected MST instance. It is made up using the bridge priority and the base MAC address of the bridge.
Last TCN	The time in the format “day:hour:minute:second” since the topology of the selected MST instance last changed.
Topology Change Count	The number of times that the topology changed for the selected MST instance.
Topology Change	The value of the topology change settings for the switch, indicating if a topology change is in progress on any port assigned to the selected MST instance. It is either True or False.
Designated Root	The bridge identifier of the root bridge. It is made up from the bridge priority and the base MAC address of the bridge
Root Path Cost	The path cost to the designated root for this MST instance.
Root Port	The port to access the designated root for this MST instance.

Modify an MST instance

To modify an MST instance:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > MST Configuration**.

   The MST Configuration page displays.
7. Select the check box next to the instance.

   You can select multiple check boxes to apply the same setting to all selected ports.
8. Update the settings as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete an MST instance

To delete an MST instance:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > STP > Advanced > MST Configuration**.

   The MST Configuration page displays.

7. Select the check box for the instance.
8. Click the **Delete** button.

   The MST instance is removed.

Configure and view the port settings for an MST instance

You can configure and display the port setting for a Multiple Spanning Tree (MST) on the switch.

A port can become diagnostically disabled (D-Disable) if a severe DOT1S error condition occurs. The most common cause is that BPDU flooding occurs for DOT1S, for example, if DOT1S receives more than 15 BPDUs during 3 seconds. Other causes for DOT1S D-Disable are rare.

To configure and view the port settings for an MST instance:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

The System Information page displays.

6. Select **Switching > STP > Advanced > MST Port Configuration**.

   The MST Port Configuration page displays.

   Note: If no MST instances are configured on the switch, the page displays a "No MSTs Available" message.

7. From the **Select MST** menu, select the MST instance.

   You can select only instances that you added to the switch (see Configure an MST instance on page 195).

8. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
9. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
10. Configure the MST values for the selected interfaces:
    - **Port Priority**: The priority for a particular port within the selected MST instance. The port priority is set in multiples of 16. If you specify a value that is not a multiple of 16, the priority is set to the priority is automatically set to the next lowest priority that is a multiple of 16. For example, if you set a value between 0 and 15, the priority is set to 0. If you specify a number between 16 and 31, the priority is set to 16. Specify a value in the range from 0 to 240.
    - **Port Path Cost**: Set the path cost to a new value for the specified port in the selected MST instance. Specify a value in the range from 0 to 200000000.
11. Click the **Apply** button.

    Your settings are saved.

12. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 38. MST port status information

Field	Description
Auto Calculated Port Path Cost	Indicates whether the path cost is automatically calculated (Enabled) or not (Disabled). Path cost is calculated based on the link speed of the port if the configured value for Port Path Cost is zero.
Port ID	The port identifier for the specified port within the selected MST instance. It is made up from the port priority and the interface number of the port.
Port Up Time Since Counters Last Cleared	The time since the counters were last cleared, displayed in days, hours, minutes, and seconds.
Port Mode	The Spanning Tree Protocol administrative mode that is associated with the port or port channel. The option is Enable or Disable.
Port Forwarding State	The current STP state of a port. If enabled, the port state determines what forwarding action is taken on traffic. The options are as follows: • **Disabled**: STP is currently disabled on the port. The port forwards traffic while learning MAC addresses. • **Discarding**: The port is currently blocked. The port cannot forward traffic nor can it learn MAC addresses. • **Manual Forwarding**: STP is currently disabled on the port. The port forwards traffic while learning MAC addresses. • **Learning**: The port is currently in the learning mode. The port cannot forward traffic. However, it can learn new MAC addresses. • **Forwarding**: The port is currently in the forwarding mode. The port can forward traffic and learn new MAC addresses.
Port Role	Each MST bridge port that is enabled is assigned a port role for each spanning tree. The port role can be Root, Designated, Alternate, Backup, Master, or Disabled.
Designated Root	The root bridge for the selected MST instance. It is made up using the bridge priority and the base MAC address of the bridge.
Designated Cost	The cost of the port participating in the STP topology. Ports with a lower cost are less likely to be blocked if STP detects loops.
Designated Bridge	The bridge identifier of the bridge with the designated port. It is made up using the bridge priority and the base MAC address of the bridge.
Designated Port	The port identifier on the designated bridge that offers the lowest cost to the LAN. It is made up from the port priority and the interface number of the port.

Display the STP statistics

You can view information about the number and type of bridge protocol data units (BPDUs) transmitted and received on each port.

To display the spanning tree statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > STP > Advanced > STP Statistics**.

   The STP Statistics page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 39. STP Statistics information

Field	Description
Interface	The physical port or LAG on the switch.
STP BPDUs Received	The number of STP BPDUs received at the selected port.
STP BPDUs Transmitted	The number of STP BPDUs transmitted from the selected port.
RSTP BPDUs Received	The number of RSTP BPDUs received at the selected port.
RSTP BPDUs Transmitted	The number of RSTP BPDUs transmitted from the selected port.
MSTP BPDUs Received	The number of MSTP BPDUs received at the selected port.
MSTP BPDUs Transmitted	The number of MSTP BPDUs transmitted from the selected port.

Multicast

Multicast IP traffic is traffic that is destined to a host group. Host groups for IPv4 multicast are identified by class D IP addresses, which range from 224.0.0.0 to 239.255.255.255.

View, search, or clear the MFDB table

The Multicast Forwarding Database (MFDB) holds the port membership information for all active multicast forwarding address entries. The key for an entry consists of a VLAN ID and MAC address pair. Entries can contain data for more than one protocol.

To view, search, or clear the MFDB table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > MFDB > MFDB Table**.

   The MFDB Table page displays.

7. In the **Search by MAC Address** field, enter a MAC address.

   Enter six two-digit hexadecimal numbers separated by colons, for example 00:01:23:43:45:67.

8. Click the **Go** button.

   If the address exists, the entry is displayed. An exact match is required.

9. To refresh the page with the latest information about the switch, click the **Refresh** button.
10. To clear all multicast forwarding address entries, click the **Clear** button.

The following table describes the nonconfigurable information displayed on the page.

Table 40. MFDB table information

Field	Description
MAC Address	The multicast MAC address for which you requested data.
VLAN ID	The VLAN ID to which the multicast MAC address is related.
Component	The component that is responsible for this entry in the Multicast Forwarding Database. The options are IGMP snooping, GMRP, Static Filtering, and MLD snooping.
Type	The type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.
Description	The text description of this multicast table entry. The options are Management Configured, Network Configured, and Network Assisted.
Interfaces	The interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).
Forwarding Interfaces	The resultant forwarding list is derived from combining all the forwarding interfaces and removing the interfaces that are listed as the static filtering interfaces.

Display the MFDB statistics

To display the MFDB statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MFDB > MFDB Statistics**.

   The MFDP Statistics page displays.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 41. MFDB Statistics information

Field	Description
Max MFDB Table Entries	The maximum number of entries that the Multicast Forwarding Database table can hold (512 entries).
Most MFDB Entries Since Last Reset	The largest number of entries that were present in the Multicast Forwarding Database table since last reset. This value is also known as the MFDB high-water mark.
Current Entries	The current number of entries in the Multicast Forwarding Database table.

Configure the auto-video multicast settings

You can configure the auto-video multicast settings.

To configure auto-video multicast settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > Auto-Video > Auto-Video Configuration**.

   The Auto-Video Configuration page displays.

7. Select one of the following radio buttons:
   - Select the **Disable** radio button to globally disable Auto-Video administrative mode for the switch. This is the default setting.
   - Select the **Enable** radio button to globally enable Auto-Video administrative mode for the switch.

8. Click the **Apply** button.

   Your settings are saved.

   The Auto-Video VLAN field displays the Auto-Video VLAN ID that is configured on the switch. By default, this VLAN ID is 4089.

IGMP snooping

Internet Group Management Protocol (IGMP) snooping is a feature that allows a switch to forward IPv4 multicast traffic intelligently. Multicast IPv4 traffic is traffic that is destined to a host group. Host groups are identified by class D IP addresses, which range from 224.0.0.0 to 239.255.255.255. Based on the IGMP query and report messages, the switch forwards traffic only to the ports that request the multicast traffic. This prevents the switch from broadcasting the traffic to all ports and possibly affecting network performance.

A traditional Ethernet network can be separated into different network segments to prevent placing too many devices onto the same shared media. Bridges and switches connect these segments. When a packet with a broadcast or multicast destination address is received, the switch forwards a copy to each of the remaining network segments in accordance with the

IEEE MAC Bridge standard. Eventually, the packet is made accessible to all nodes connected to the network.

This approach works well for broadcast packets that are intended to be detected or processed by all connected nodes. For multicast packets, this approach could lead to a less efficient use of the network bandwidth, particularly when the packets are intended for a small number of nodes only. Packets are flooded into network segments where no node is receptive to the packet. Although nodes rarely incur any processing overhead to filter packets addressed to unrequested group addresses, the nodes cannot transmit new packets onto the shared media while the multicast packets are being flooded. Such as waste of bandwidth is even worse when the LAN segment is not shared, for example in full-duplex links.

Allowing switches to snoop IGMP packets can solve this problem. While the IGMP packets are being forwarded throughout the network, the switch uses the information in the packets to determine which segments must receive packets that are directed to the group address.

Configure IGMP snooping

You can configure the settings for IGMP snooping, which is used to build forwarding lists for multicast traffic.

To configure IGMP snooping:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > IGMP Snooping > IGMP Snooping Configuration**.

   The IGMP Snooping Configuration page displays.

7. Select the IGMP Snooping Status **Enable** or **Disable** radio button.

   This selection specifies the administrative mode for IGMP snooping for the switch. The default is Disable.

8. Select the Validate IGMP IP header **Enable** or **Disable** radio button.

   When IGMP IP header validation is enabled, any IGMP IP header must include the Router Alert, ToS, and TTL information. Otherwise, the IGMP packet is discarded. The default value is Enable.

9. Click the **Apply** button.

   Your settings are saved.

10. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 42. IGMP Snooping Configuration information

Field	Description
Multicast Control Frame Count	The number of multicast control frames that are processed by the switch.
Interfaces Enabled for IGMP Snooping	The interfaces that are enabled for IGMP snooping.
VLAN IDs Enabled For IGMP Snooping	The IDs of the VLANs that are enabled for IGMP snooping.
VLAN IDs Enabled For IGMP Snooping Querier	The IDs of the VLANs that are enabled for IGMP snooping querier.

Configure IGMP snooping for interfaces

To configure IGMP snooping for interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping > IGMP Snooping Interface Configuration**.

   The IGMP Snooping Interface Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Admin Mode** menu, select **Disable** or **Enable**.

   This selection specifies the interface mode for the selected interface for IGMP snooping for the switch. The default is Disable.

10. In the **Host Timeout** field, specify the time that the switch must wait for a report for a particular group on a particular interface before it deletes that interface from the group.

    Enter a value between 1 and 3600 seconds. The default is 260 seconds.

11. In the **Max Response Time** field, specify the time that the switch must wait after sending a query on an interface because it did not receive a report for a particular group on that interface.

    Enter a value greater or equal to 1 and less than the group membership interval in seconds. The default is 10 seconds. The configured value must be less than the group membership interval.

12. In the **MRouter Timeout** field, specify the time that the switch must wait to receive a query on an interface before removing it from the list of interfaces with multicast routers attached.

    Enter a value between 0 and 3600 seconds. The default is 0 seconds. A value of zero indicates an infinite time-out, that is, no expiration.

13. From the **Fast Leave Mode** menu, select whether fast leave mode is enabled.

The option are **Enable** and **Disable**. The default is Disable. If Fast Leave is enabled, the interface can be immediately removed from the Layer 2 forwarding table when the switch receives an IGMP leave message for a multicast group without first sending MAC-based general queries.

14. Click the **Apply** button.

    Your settings are saved.

View, search, or clear the IGMP snooping table

You can view and clear all entries in the Multicast Forwarding Database that were created for IGMP snooping.

To view, search, or clear the IGMP snooping table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping > IGMP Snooping Table**.

   The IGMP Snooping Table page displays.

7. In the **Search By MAC Address** field, specify the MAC address whose MFDB table entry you want to view.

   Enter six two-digit hexadecimal numbers separated by colons, for example 00:01:23:43:45:67.

8. Click the **Go** button.

If the address exists, the entry is displayed. An exact match is required.

9. To refresh the page with the latest information about the switch, click the **Refresh** button.
10. To clear all multicast forwarding address entries that were created for IGMP snooping, click the **Clear** button.

The following table describes the nonconfigurable information displayed on the page.

Table 43. IGMP Snooping Table information

Field	Description
MAC Address	The multicast MAC address for which the switch holds forwarding and/or filtering information. The format is six two-digit hexadecimal numbers that are separated by colons, for example, 01:00:5e:45:67:89.
VLAN ID	The VLAN ID for which the switch holds forwarding and filtering information.
Type	The type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.
Description	The text description of this multicast table entry. The options are Management Configured, Network Configured, and Network Assisted.
Interface	The interfaces that are designated for forwarding (Fwd) and filtering (Flt) for the associated address.

Configure IGMP snooping for VLANs

To configure IGMP snooping for VLANs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping > IGMP Snooping VLAN Configuration**.

   The IGMP Snooping VLAN Configuration page displays.

7. Select the check boxes for one or more VLANs.

   If you select the check box for a single VLAN, the VLAN ID displays in the VLAN ID field.

8. Configure the IGMP snooping values for the selected VLAN or VLANs:
   - **Admin Mode**: Enable or disable IGMP snooping for the specified VLAN ID. The default is Disable.
   - **Fast Leave Mode**: Enable or disable the IGMP snooping Fast Leave mode for the specified VLAN ID. If Fast Leave is enabled, the VLAN can be immediately removed from the Layer 2 forwarding table when the switch receives an IGMP leave message for a multicast group without first sending MAC-based general queries. The default is Disable.
   - **Host Timeout**: Set the value for group membership interval of IGMP snooping for the specified VLAN ID. The range is from the value for the Maximum Response Time plus 1 to 3600 seconds. The default is 260 seconds.
   - **Maximum Response Time**: Set the value for the maximum response time of IGMP snooping for the specified VLAN ID. The range is from 1 to the Host Timeout value minus 1. This value must be greater than group membership interval value. The default is 10 seconds.
   - **MRouter Timeout**: Set the value for multicast router expiry time of IGMP snooping for the specified VLAN ID. The range is from 0 to 3600 seconds. The default is 0 seconds.
   - **Report Suppression Mode**: Enable or disable IGMP snooping report suppression mode for the specified VLAN ID. IGMP snooping report suppression allows the suppression of the IGMP reports sent by the multicast hosts by building a Layer 3 membership table. The results is that only the most essential reports are sent to the IGMP routers so that the routers can continue to receive the multicast traffic.The default is Disable.
   - **Querier Mode**: Enable or disable the IGMP querier mode. The default is Disable.
   - **Query Interval**: Set the IGMP query interval for the specified VLAN ID. The range is from 1 to 1800 seconds. The default is 60 seconds.

9. Click the **Apply** button.

   Your settings are saved.

Disable IGMP snooping on a VLAN

To disable IGMP snooping on a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > IGMP Snooping > IGMP Snooping VLAN Configuration**.

   The IGMP Snooping VLAN Configuration page displays.
7. Select the check box next to the VLAN ID.
8. From the **Admin Mode** menu, select **Disable**.
9. Click the **Apply** button.

   Your settings are saved.

Configure one or more IGMP multicast router interfaces

You can configure an interface as the designated interface to which a multicast router is connected. All IGMP packets snooped by the switch are forwarded to the multicast router reachable from the interface. Configuring a multicast router interface is usually not required because the switch automatically detects the multicast router and forwards IGMP packets accordingly. This configuration is required only if you want to make sure that the multicast router always receives IGMP packets from the switch in a complex network.

To configure one or more IGMP multicast router interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > IGMP Snooping > Multicast Router Configuration**.

   The Multicast Router Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Multicast Router** menu, select **Enable** or **Disable**.
10. Click the **Apply** button.

    Your settings are saved.

Configure an IGMP multicast router VLAN

You can configure an interface to forward only snooped IGMP packets from a specific VLAN to the multicast router connected to the interface. This configuration is usually not required because the switch automatically detects a multicast router and forwards the IGMP packets accordingly. This configuration is required only in a complex network if you want to make sure that the multicast router always receives IGMP packets from the switch.

To configure an IGMP multicast router VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > IGMP Snooping > Multicast Router VLAN Configuration**.

   The Multicast Router VLAN Configuration page displays.
7. From the **Interface** menu, select the interface.
8. In the **VLAN ID** field, enter the VLAN ID.
9. From the **Multicast Router** menu, select **Enable** or **Disable**.
10. Click the **Apply** button.

    Your settings are saved.

IGMP snooping querier overview

IGMP snooping requires that one central switch or router periodically queries all end-devices on the network to announce their multicast memberships. This central device is the IGMP querier. The IGMP query responses, known as IGMP reports, keep the switch updated with the current multicast group membership on a port-by-port basis. If the switch does not receive updated membership information in a timely fashion, it stops forwarding multicasts to the port where the end device is located.

You can configure and display information about IGMP snooping queriers on the network and, separately, on VLANs.

Configure an IGMP snooping querier

You can configure the settings for an IGMP snooping querier.

To configure the settings for an IGMP snooping querier:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > IGMP Snooping Querier > Querier Configuration**.

   The Querier Configuration page displays.
7. Configure the following settings:
   - **Querier Admin Mode**: Enable or disable IGMP snooping for the switch. The default is Disable.

- **Snooping Querier IP Address**: Enter the snooping querier IP address to be used as the source address in periodic IGMP queries. This address is used when no address is configured on the VLAN on which a query is being sent.
- **IGMP Version**: Specify the IGMP protocol version used in periodic IGMP queries. The range is 1 to 2. The default is 2.
- **Query Interval (secs)**: Specify the interval in seconds between periodic queries sent by the snooping querier. The query interval must be in the range from 1 to 1800. The default is 60 seconds.
- **Querier Expiry Interval (secs)**: Specify the interval in seconds after which the last querier information is removed. The querier expiry interval must be in the range from 60 to 300. The default is 125 seconds.

8. Click the **Apply** button.

   Your settings are saved.

Configure an IGMP snooping querier for a VLAN

You can configure an IGMP snooping querier for use with a VLAN on the network.

To configure am IGMP snooping querier for a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping Querier > Querier VLAN Configuration**.

   The Querier VLAN Configuration page displays.

7. Either specify a new VLAN or change an existing VLAN:
   - **Specify a new VLAN**: Do the following:
     a. From the **VLAN ID** menu, select **New Entry**.
     b. In the **VLAN ID** field, enter the ID for a VLAN for which the IGMP snooping querier is not yet enabled.
   - **Change an existing VLAN**. From the VLAN ID menu, select the check box for a VLAN for which the IGMP snooping querier is already enabled.
8. Configure the following settings:
   - **Querier Election Participate Mode**: Enable or disable the querier mode:
     - **Disable**: Upon seeing another querier of the same version in the VLAN, the snooping querier moves to the non-querier state.
     - **Enable**: The snooping querier participates in querier election, in which the lowest IP address operates as the querier in that VLAN. The other querier moves to non-querier state.
   - **Snooping Querier VLAN Address**: Specify the snooping querier IP address to be used as the source address in periodic IGMP queries that are sent to the VLAN.
9. Click the **Apply** button.

   Your settings are saved.

Remove the IGMP snooping querier from a VLAN

You can remove the IGMP snooping querier from a VLAN.

To remove the IGMP snooping querier from a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping Querier > Querier VLAN Configuration**.

   The Querier VLAN Configuration page displays.

7. Select the VLAN for which you want to remove the IGMP snooping querier.
8. Click the **Delete** button.

   Your settings are saved. (The VLAN itself is not deleted.)

Display the status of the IGMP snooping querier VLANs

To display the status of the IGMP snooping querier VLANs:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > IGMP Snooping Querier > Querier VLAN Status**.

   The Querier VLAN Status page displays.

7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 44. Querier VLAN Status information

Field	Description
VLAN ID	The VLAN ID on which IGMP snooping querier is administratively enabled and the VLAN exists in the VLAN database.
Operational State	The operational state of the IGMP snooping querier on a VLAN. It can be in any of the following states: • **Querier**: The snooping switch is the querier in the VLAN. The snooping switch sends out periodic queries with a time interval equal to the configured querier query interval. If the snooping switch finds a better querier in the VLAN, it moves to non-querier mode. • **Non-Querier**: The snooping switch is in non-querier mode in the VLAN. If the querier expiry interval timer expires, the snooping switch moves into querier mode. • **Disabled**: The snooping querier is not operational on the VLAN. The snooping querier moves to disabled mode when IGMP snooping is not operational on the VLAN or when the querier address is not configured or the network management address is also not configured.
Operational Version	The operational IGMP protocol version of the querier.
Last Querier Address	The IP address of the last querier from which a query was snooped on the VLAN.
Last Querier Version	The IGMP protocol version of the last querier from which a query was snooped on the VLAN.
Operational Max Response Time	The maximum response time to be used in the queries that are sent by the snooping querier.

MLD snooping

In IPv6 networks, Multicast Listener Discovery (MLD) snooping performs a similar function as IGMP does in IPv4 networks. With MLD snooping, IPv6 multicast data is selectively forwarded to ports that are configured to receive the data, instead of being flooded to all ports in a VLAN. The ports are determined by snooping IPv6 multicast control packets.

A multicast listener is a device that is configured to receive IPv6 multicast packets. MLD is used by IPv6 multicast routers to discover the presence of multicast listeners on its directly-attached links and to discover which multicast packets are of interest to neighboring devices.

The MLD protocol is derived from IGMP. MLD version 1 (MLDv1) is equivalent to IGMPv2, and MLD version 2 (MLDv2) is equivalent to IGMPv3. MLD is a subprotocol of Internet Control Message Protocol version 6 (ICMPv6), and MLD messages are a subset of ICMPv6 messages, identified in IPv6 packets by a preceding Next Header value of 58.

Enable MLD snooping

You can enable MLD snooping, which is used to build forwarding lists for multicast traffic.

To enable MLD snooping:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > MLD Snooping > Configuration**.

   The Configuration page displays.

7. Select the MLD Snooping Admin Mode **Enable** radio button.

   By default, the **Disable** radio button is selected.

8. Click the **Apply** button.

   Your settings are saved.

9. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable MLD Snooping Configuration fields.

Table 45. MLD Snooping Configuration information

Field	Definition
Multicast Control Frame Count	The number of multicast control frames that were processed by the CPU.
Interfaces Enabled for MLD Snooping	The interfaces on which MLD snooping is administratively enabled. MLD snooping must be enabled globally and on an interface for the interface to be able to snoop MLD packets to determine which segments must receive multicast packets directed to the group address.
VLAN IDs Enabled For MLD Snooping	The VLANs on which MLD snooping is administratively enabled.

Configure MLD snooping for interfaces

To configure MLD snooping for interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MLD Snooping > Interface Configuration**.

   The Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.

- **LAG**: Only LAGs are displayed.
- **All**: Both physical interfaces and LAGs are displayed.

8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Admin Mode** menu, select to enable or disable the interface mode for the selected interface for MLD snooping for the switch.

   The default is Disable.
10. In the **Membership Interval** field, specify the time that the switch must wait for a report for a particular group on a particular interface before it deletes that interface from the group.

    The valid range is from 2 to 3600 seconds. The configured value must be greater than the maximum response time. The default is 260 seconds.
11. In the **Max Response Time in seconds** field, specify the time that the switch must wait after sending a query on an interface because it did not receive a report for a particular group on that interface.

    Enter a value greater than or equal to 1 and less than the group membership interval in seconds. The default is 10 seconds. The configured value must be less than the group membership interval.
12. In the **Expiration Time** field, specify the time that the switch must wait to receive a query on an interface before removing the interface from the list of interfaces with multicast routers attached.

    Enter a value between 0 and 3600 seconds. The default is 0 seconds. A value of zero indicates an infinite time-out, that is, no expiration.
13. From the **Fast Leave** menu, select to enable or disable Fast Leave on the interface.

    If Fast Leave is enabled, the interface can be immediately removed from the Layer 2 forwarding table when the switch receives an MLD leave message for a multicast group without first sending MAC-based general queries. The default is Disable.
14. Click the **Apply** button.

    Your settings are saved.

Configure the MLD VLAN settings

To configure the MLD VLAN settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > MLD Snooping > MLD VLAN Configuration**.

   The MLD VLAN Configuration page displays.

7. In the **VLAN ID** field, enter the ID for a VLAN that must be configured for MLD snooping.
8. From the **Fast Leave** menu, select to enable or disable the MLD snooping Fast Leave mode for the specified VLAN ID.

   If Fast Leave is enabled, the VLAN can be immediately removed from the Layer 2 forwarding table when the switch receives an MLD leave message for a multicast group without first sending MAC-based general queries.

9. In the **Membership Interval** field, set the value for the group membership interval of MLD snooping for the specified VLAN ID.

   The valid range is Maximum Response Time + 1 to 3600.

10. In the **Maximum Response Time** field, set the value for the maximum response time of MLD snooping for the specified VLAN ID.

    The valid range is 1 to Group Membership Interval –1. This value must be less than the group membership interval value.

11. In the **Multicast Router Expiry Time** field, set the value for the multicast router expiry time of MLD snooping for the specified VLAN ID.

The valid range is 0 to 3600.

12. Click the **Add** button.

    Your settings are saved. MLD snooping is enabled on the specified VLAN.

Modify the MLD snooping settings for a VLAN

To the modify MLD snooping settings for a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MLD Snooping > MLD VLAN Configuration**.

   The MLD VLAN Configuration page displays.
7. Select the check box next to the VLAN ID.
8. Change the settings.
9. Click the **Apply** button.

   Your settings are saved.

Remove MLD snooping from a VLAN

To remove MLD snooping from a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MLD Snooping > MLD VLAN Configuration**.

   The MLD VLAN Configuration page displays.
7. Select the check box next to the VLAN ID.
8. Click the **Delete** button.

   MLD snooping is removed from the VLAN.

Configure one or more MLD multicast router interfaces

To configure one or more MLD multicast router interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MLD Snooping > Multicast Router Configuration**.

   The Multicast Router Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Multicast Router** menu, select to enable or disable the multicast router for the selected interfaces.
10. Click the **Apply** button.

    Your settings are saved.

Configure an MLD multicast router VLAN

To configure an MLD multicast router VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Multicast > MLD Snooping > Multicast Router VLAN Configuration**.

   The Multicast Router VLAN Configuration page displays.

7. From the **Interface** menu, select the interface for which you want the multicast router to be enabled.
8. In the **VLAN ID** field, specify the VLAN ID.
9. From the **Multicast Router** menu, select to enable or disable the multicast router for the VLAN ID.
10. Click the **Apply** button.

    Your settings are saved.

Configure an MLD snooping querier

You can configure the settings for an MLD snooping querier.

To configure an MLD snooping querier:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

3. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
4. Click the **Go** button.

   The System Information page displays.
5. Select **Switching > Multicast > MLD Snooping > Querier Configuration**.

   The Querier Configuration page displays.
6. Configure the following settings:
   - **Querier Admin Mode**: Enable or disable MLD snooping for the switch. The default is Disable.
   - **Querier Address**: Specify the snooping querier IP address that must be used as the source address in periodic MLD queries. This address is used when no address is configured on the VLAN on which a query is being sent. The supported IPv6 formats are x:x:x:x:x:x:x:x and x::x.
   - **MLD Version**: The MLD protocol version used in periodic MLD queries is version 1. This field is fixed.
   - **Query Interval (secs)**: Specify the interval in seconds between periodic queries sent by the snooping querier. The query interval must be a value in the range of 1 to 1800. The default value is 60.
   - **Querier Expiry Interval (secs)**: Specify the interval in seconds after which the last querier information is removed. The querier expiry interval must be a value in the range of 60 to 300. The default value is 60.
7. Click the **Apply** button.

   Your settings are saved.

   The page displays VLAN IDs enabled for the MLD snooping querier.

Configure the MLD snooping querier VLAN settings

To configure the MLD snooping querier VLAN settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Multicast > MLD Snooping > Querier VLAN Configuration**.

   The Querier VLAN Configuration page displays.
7. In the **VLAN ID** field, specify the VLAN ID on which the MLD snooping querier is administratively enabled and for which a VLAN exists in the VLAN database.
8. From the **Querier Election Participate Mode** menu, select to enable or disable the querier participation election mode for MLD snooping.

   When this mode is disabled, on detecting another querier of same version in the VLAN, the snooping querier moves to a non-querier state. When this mode is enabled, the snooping querier participates in querier election where the lowest IP address wins the querier election and operates as the querier in that VLAN. The other querier moves to non-querier state.
9. In the **Querier VLAN Address** field, specify the snooping querier address to be used as the source address in periodic MLD queries sent on the specified VLAN.
10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 46. MLD Snooping Querier VLAN Configuration information

Field	Description
Operational State	The operational state of the MLD snooping querier on a VLAN. It can be in any of the following states: • **Querier**: The snooping switch is the querier in the VLAN. The snooping switch sends out periodic queries with a time interval equal to the configured querier query interval. If the snooping switch sees a better querier in the VLAN, it moves to non-querier mode. • **Non-Querier**: The snooping switch is in non-querier mode in the VLAN. If the querier expiry interval timer is expired, the snooping switch moves into querier mode. • **Disabled**: The snooping querier is not operational on the VLAN. The snooping querier moves to disabled mode when MLD snooping is not operational on the VLAN or when the querier address is not configured or the network management address is also not configured.
Operational Version	The operational MLD protocol version of the querier.
Last Querier Address	The IP address of the last querier from which a query was snooped on the VLAN.
Last Querier Version	The MLD protocol version of the last querier from which a query was snooped on the VLAN.
Operational Max Response Time (sec)	The maximum response time in the queries that are sent by the snooping querier.

Multicast VLAN registration

IGMP and MLD snooping help to limit multicast traffic when member ports are in the same VLAN. However, when ports belong to different VLANs, a copy of the multicast stream is sent to each VLAN with member ports in the multicast group. Multicast VLAN registration (MVR) eliminates the need to duplicate the multicast traffic when multicast group member ports belong to different VLANs.

MVR uses a dedicated multicast VLAN to forward multicast traffic over the L2 network. You can configure one multicast source VLAN (MVLAN) only on the switch. Such an MVLAN is used only for certain multicast traffic, such as traffic from an IPTV application, to prevent duplication of multicast streams for clients in different VLANs. Clients can dynamically join or leave the MVLAN without interfering with their membership in other VLANs.

MVR, like IGMP and MLD snooping, allows a Layer 2 switch to listen to IGMP and MLD messages to learn about multicast group membership.

You can configure global, group, interface, and group membership settings.

Configure the global MVR settings

You can configure the global MVR settings that apply to the switch.

To configure the global MVR settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > MVR > Basic > MVR Configuration**.

   The MVR Configuration page displays.

7. From the **MVR Running** menu, select **Enable** or **Disable** to specify if MVR is globally enabled or disabled on the switch

   The default is Disable.

8. In the **MVR Multicast VLAN** field, specify the VLAN on which MVR multicast data is received.

   All source ports belong to this VLAN. The range is from 1 to 4093. The default 1.

9. In the **MVR Global Query Response Time** field, set the period that the switch must wait for an IGMP group membership report from an interface before removing the interface as a member from the multicast group.

   This period applies only to the removal of the interface from the receiver port on the switch. When an IGMP query is sent from a receiver port, the switch waits for the default or configured MVR query time for an IGMP group membership report before removing the interface as a member from the multicast group. The period is equal to a tenths of a second. The range is from 1 to 100 tenths. The default is 5 tenths or one-half.

10. From the **MVR Mode** menu, select **Compatible** or **Dynamic** as the MVR mode of operation:
    - **Compatible**: The switch cannot learn existing multicast groups by snooping the queries from source ports. The default is Compatible.
    - **Dynamic**: The switch can learn existing multicast groups by snooping the queries from source ports and forward the reports from the hosts on the multicast VLAN.
11. Click the **Apply** button.

    Your settings are saved.
12. To refresh the page, click the **Refresh** button.

The following table describes the nonconfigurable fields on the page.

Table 47. MVR configuration information

Field	Definition
MVR Max Multicast Groups	The maximum number of multicast groups that MVR supports.
MVR Current Multicast Groups	The number of the MVR groups allocated.

Configure an MVR group

You can configure an MVR group. After you configure interfaces for MVR, you can add them as members to the MVR group.

To configure an MVR group:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > MVR > Advanced > MVR Group Configuration**.

   The MVR Group Configuration page displays.

7. In the **MVR Group IP** field, specify the IP address for the new MVR group.
8. In the **Count** field, specify the number of contiguous MVR groups.

   This number helps you to create multiple MVR groups through a single click of the **Add** button. If the field is empty, then clicking the button creates only one new group. The field is displayed as empty for each particular group. The range is from 1 to 256.

9. Click the **Add** button.

   The MVR group is added.

The following table describes the nonconfigurable fields on the page.

Table 48. MVR group configuration information

Field	Definition
Status	The status of the specific MVR group.
Members	The list of interfaces that participate in the MVR group.

Remove an MVR group

You can remove an MVR group that you no longer need.

To remove an MVR group:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > MVR > Advanced > MVR Group Configuration**.

   The MVR Group Configuration page displays.

7. Select the check box for the MVR group.
8. Click the **Delete** button.

   The MVR group is removed.

Configure an MVR interface

We recommend that you first configure and MVR interface before you add it as a member to an MVR group.

To configure an MVR interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > MVR > Advanced > MVR Interface Configuration**.

   The MVR Interface Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1**: Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the interface, or type the interface number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Admin Mode** menu, specify whether MVR is enabled on the interface by selecting **Enable** or **Disable**.

   The default is Disable.
10. From the **Type** menu, specify whether the interface is an MVR receiver or an MVR source by selecting **receiver** or **source**.

    The default port type is none.
11. From the **Immediate Leave** menu, specify whether the Immediate Leave feature is enabled by selecting **Enable** or **Disable**.

    The default is Disable.
12. Click the **Apply** button.

    Your settings are saved.
13. To refresh the page, click the **Refresh** button.

    The Status field shows the status for each interface.

Configure the interface members of an MVR group

You can add or remove interfaces as members of an MVR group.

To configure the interface members of an MVR group:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > MVR > Advanced > MVR Group Membership**.

   The MVR Group Membership page display.
7. From the **MVR Group IP** menu, select the IP address of the MVR group.
8. In the Ports table and LAG table, click each port and LAG that you want to make a member of the MVR group.

   A selected port or LAG is shown by a check mark.
9. Click the **Apply** button.

   Your settings are saved.

Display the MVR statistics

You can display MVR statistics for the switch. These statistics are associated with IGMP.

To display the MVR statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > MVR > Advanced > MVR Statistics**.

   The MVR Statistics page displays.

7. To refresh the page, click the **Refresh** button.

The following table describes the nonconfigurable fields on the page.

Table 49. MVR statistics information

Field	Definition
IGMP Query Received	The number of received IGMP queries.
IGMP Report V1 Received	The number of received IGMP V1 reports.
IGMP Report V2 Received	The number of received IGMP V2 reports.
IGMP Leave Received	The number of received IGMP leaves.
IGMP Query Transmitted	The number of transmitted IGMP queries.
IGMP Report V1 Transmitted	The number of transmitted IGMP V1 reports.
IGMP Report V2 Transmitted	The number of transmitted IGMP V2 reports.
IGMP Leave Transmitted	The number of transmitted IGMP leaves.
IGMP Packet Receive Failures	The number of IGMP packet receive failures.
IGMP Packet Transmit Failures	The number of IGMP packet transmit failures.

MAC address table

You can view or configure the MAC address table. This table contains information about unicast entries for which the switch holds forwarding or filtering information. This information lets the transparent bridging function determine how an incoming frame must be propagated.

If you clear the MAC address entries in the MAC address table, only the dynamic entries are removed.

View, search, or clear the MAC address table

To view, search, or clear the MAC address table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Address Table > Basic > Address Table**.

   The Address Table page displays.

7. Use the **Search** menu and field to search for a VLAN ID, MAC address, or interface number:
   - **VLAN ID**: From the **Search** menu, select **VLAN ID**, and enter the VLAN ID, for example, 100. Then click the **Go** button.
   - **MAC Address**: From the **Search** menu, select **MAC Address**, and enter the 6-byte hexadecimal MAC address in two-digit groups separated by colons, for example, 01:23:45:67:89:AB. Then click the **Go** button.

     If the address exists, that entry is displayed as the first entry followed by the remaining (higher) MAC addresses. An exact match is required.

   - **Interface**: From the **Search** menu, select **Interface**, and enter the interface ID using the respective interface naming convention (for example, g1 or l1). Then click the **Go** button.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.
9. To clear all dynamic MAC address entries in the table, click the **Clear** button.

The following table describes the nonconfigurable information displayed on the page.

Table 50. MAC address table information

Field	Description
Total MAC Address	The number of MAC addresses learned or configured.
VLAN ID	The VLAN ID associated with the MAC address.
MAC Address	The unicast MAC address for which the switch holds forwarding and/or filtering information. The format is a 6-byte MAC address that is separated by colons, for example 01:23:45:67:89:AB.
Interface	The interface upon which this address was learned.
Status	The status of this entry. The meanings of the values are as follows: • **Static**: The value of the corresponding instance was added by the system or a user and cannot be relearned. • **Learned**. The value of the corresponding instance was learned, and is being used. • **Management**: The value of the corresponding instance is also the value of an existing instance of dot1dStaticAddress.

Set the dynamic address aging interval

You can set the address aging interval for the forwarding database. This is the time-out period in seconds for aging out dynamically learned forwarding information.

To set the address aging interval:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

The System Information page displays.

6. Select **Switching > Address Table > Advanced > Dynamic Addresses**.

   The Dynamic Addresses page displays.

7. In the **Address Aging Timeout (seconds)** field, specify the time-out period in seconds for aging out dynamically learned forwarding information.

   The value can be any number between 10 and 1000000 seconds. The default is 300 seconds.

8. Click the **Apply** button.

   Your settings are saved.

Add a static MAC address to the MAC address table

To add a static MAC address to the MAC address table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Switching > Address Table > Advanced > Static MAC Address**.

   The Static MAC Address page displays.

7. From the **Interface** menu, select the interface or LAG to which you are adding a static MAC address.
8. In the **Static MAC Address** field, enter the static MAC address.

9. From the **VLAN ID** menu, select the VLAN ID that must be associated with the MAC address.
10. Click the **Add** button.

    The static MAC address is added to the switch.

Remove a static MAC address from the MAC address table

You can remove a static MAC address that you no longer need.

To remove a static MAC address from the MAC address table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > Address Table> Advanced > Static MAC Address**.

   The Static MAC Address page displays.
7. From the **Interface** menu, select the interface or LAG on which the static MAC address is configured.
8. Select the check box for the MAC address.
9. Click the **Delete** button.

   The static MAC address is removed from the MAC address table.

Layer 2 loop protection

Loops inside a network are costly because they consume resources and reduce the performance of the network. Detecting loops manually can be cumbersome.

The switch can automatically identify loops in the network. You can enable loop protection per port or globally.

If loop protection is enabled, the switch sends predefined PDU packets to a Layer 2 broadcast destination address (FF:FF:FF:FF:FF:FF) on all ports for which the feature is enabled. You can selectively disable PDU packet transmission for loop protection on specific ports even while port loop protection is enabled. If the switch receives a packet with the previously mentioned broadcast destination address, the source MAC address in the packet is compared with the MAC address of the switch. If the MAC address does not match, the packet is forwarded to all ports that are members of the same VLAN, just like any other broadcast packet. The packet is not forwarded to the port from which it was received.

If the source MAC address matches the MAC address of the switch, the switch can perform one of the following actions, depending on how you configure the action:

- The port is shut down.
- A log message is generated. (If a syslog server is configured, the log message can be sent to the syslog server.)
- The port is shut down and a log message is generated.

Loop protection is not intended for ports that serve as uplinks between spanning tree–aware switches. It is intended for unmanaged switches that drop spanning tree BPDUs. Loop protection detects physical and logical loops between Ethernet ports on a device. You must enable loop protection globally before you can enable and configure it at the interface level. Loop protection is supported on physical interfaces and static LAG interfaces, but not on dynamic LAG interfaces.

Configure global Layer 2 loop protection

Before you can configure loop protection for individual ports, you must globally enable and configure loop protection.

To configure L2 loop protection globally:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > L2 Loop Protection > L2 Loop Protection Configuration**.

   The L2 Loop Protection Configuration page displays.
7. To enable or disable loop protection feature, select the Admin Mode **Enable** or **Disable** radio button.

   The default is Enable.
8. From the **Transmit Interval** menu, select the time in seconds between transmission of loop packets.

   The default transmit interval is 5 seconds. The selected interval applies to all ports and LAGs for which you enable loop protection
9. From the **Max PDU Receive** menu, select the maximum number of packets that a port or LAG can receive before an action is taken.

   The default setting is 1 packet. The selected number of packets applies to all ports and LAGs for which you enable loop protection.

   The default is 1.
10. In the **Disable Timer** field, enter the time in seconds after which a port or LAG is disabled when a loop is detected.

    The range is from 0 to 604800 seconds. The default is 0 seconds. The selected time applies to all ports and LAGs for which you enable loop protection.
11. Click the **Apply** button.

    Your settings are saved.

Configure the loop protection settings for ports and display the loop protection state

Before you can configure loop protection for individual ports, you must globally enable loop protection.

To view and configure L2 loop protection on a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Switching > L2 Loop Protection > L2 Loop Protection Configuration**.

   The L2 Loop Protection Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.

- To configure all interfaces with the same settings, select the check box in the heading row.

9. From the **Keep Alive** menu, select **Enable** or **Disable** to specify whether keep-alives are enabled on an interface.

   The default is Enable.

10. From the **RX Action** menu, select the action that occurs when the switch detects a loop on an interface:
    - **Log**: The switch logs a message.
    - **Disable**: The switch disables the interface. This is the default action.
    - **Both**: The switch both logs a message and disables the interface.
11. Click the **Apply** button.

    Your settings are saved.

12. To clear all the statistics in the table, click the **Clear** button.
13. Click the **Refresh** button to update the page to show the latest information.

The following table describes the nonconfigurable information displayed on the page.

Table 51. L2 Loop Protection Interface information

Field	Description
Loop Detected	Shows whether a loop is detected on the interface. If the interface is disabled and then reenabled, the status changes to No again.
Loop Count	The number of packets that were received after the loop was detected.
Time Since Last Loop	The time that elapsed since the loop was detected.
Port Status	The status of the interface (Enabled, Disabled, or D-Disabled, which stands for diagnostically disabled).

4

Configure Routing

This chapter contains the following sections:

- Routing concepts
- IPv4 routing
- IPv6 routing
- VLAN routing
- Router discovery for a VLAN routing interface
- Routes and the routing table
- Address Resolution Protocol

Routing concepts

The switch supports IP routing. When a packet enters the switch, the switch checks the destination MAC address to determine if it matches any of the configured routing interfaces. If it does, the switch searches the host table for a matching destination IP address. If a matching entry is found, the packet is routed to the host. If no matching entry is found, the switch performs a longest prefix match on the destination IP address. If a matching entry is found, the packet is routed to the next hop. If no matching entry is found, the packet is routed to the next hop that is specified in the default route. If no default route exists, the packet is are dropped.

The routing table can include static entries that you added manually. The host table can include static entries that were manually added and entries that were dynamically added through ARP.

IPv4 routing

You can enable or disable the routing mode and display IP routing data.

Manage the IPv4 routing mode

You can enable or disable the global IPv4 routing mode for the switch.

The switch allows routing through any of its interfaces only after you enable routing on the switch. Separately, you can enable routing on VLANs (see VLAN routing on page 268).

To manage the global IPv4 routing mode on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IP > IP Configuration**.

   The IP Configuration page displays.

7. Do one of the following:
   - **Enable the IPv4 routing mode**: Select the Routing Mode **Enable** radio button.
   - **Disable the IPv4 routing mode**: Select the Routing Mode **Disable** radio button. This is the default is selection.
8. Click the **Apply** button.

   Your settings are saved.

The following table describes the IP configuration information displayed on the page.

Table 52. Global IP status information

Field	Description
Default Time to Live	The default value inserted into the Time-To-Live field of the IP header of datagrams originated by the switch, if a TTL value is not supplied by the transport layer protocol. The default value is 64.
Maximum Next Hops	The maximum number of hops supported by the switch. This is a compile-time constant. The default value is 1.

View the IPv4 routing statistics

You can view the IP routing statistics as specified in RFC 1213.

To view the IPv4 routing statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IP > Statistics**.

   The Statistics page displays.

The following table describes the nonconfigurable information displayed on the page.

Table 53. IP Statistics information

Field	Description
IpInReceives	The total number of input datagrams received from interfaces, including those received in error.
IpInHdrErrors	The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on.
IpInAddrErrors	The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported classes (Class E). For entities that are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
IpForwDatagrams	The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities that do not act as IP gateways, this counter includes only those packets that were source-routed through this entity, and the source-route option processing was successful.
IpInUnknownProtos	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
IpInDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but that were discarded (for lack of buffer space). This counter does not include any datagrams discarded while awaiting re-assembly.
IpInDelivers	The total number of input datagrams successfully delivered to IP user protocols (including ICMP).
IpOutRequests	The total number of IP datagrams that local IP user protocols (including ICMP) supplied to IP in requests for transmission. This counter does not include any datagrams counted in ipForwDatagrams.

Table 53. IP Statistics information (continued)

Field	Description
IpOutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but that were discarded for reasons such as lack of buffer space. This counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.
IpOutNoRoutes	The number of IP datagrams discarded because no route could be found to transmit them to their destination. This counter includes any packets counted in ipForwDatagrams that meet this no-route criterion. This includes any datagrams that a host cannot route because all of its default gateways are down.
IpReasmTimeout	The maximum number of seconds for which received fragments are held while they are awaiting reassembly at this entity.
IpReasmReqds	The number of IP fragments received that were reassembled at this entity.
IpReasmOKs	The number of IP datagrams successfully reassembled.
IpReasmFails	The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, and so on). This is not necessarily a count of discarded IP fragments since some algorithms can lose track of the number of fragments by combining them as they are received.
IpFragOKs	The number of IP datagrams that were fragmented at this entity.
IpFragFails	The number of IP datagrams that were discarded because they needed to be fragmented at this entity but could not be, for reasons such as their Don't Fragment flag was set.
IpFragCreates	The number of IP datagram fragments that were generated as a result of fragmentation at this entity.
IcmpInMsgs	The total number of ICMP messages that the entity received. This counter includes all those counted by icmpInErrors.
IcmpInErrors	The number of ICMP messages that the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, and so on).
IcmpInDestUnreachs	The number of ICMP destination unreachable messages received.
IcmpInTimeExcds	The number of ICMP time exceeded messages received.
IcmpInParmProbs	The number of ICMP parameter problem messages received.
IcmpInSrcQuenchs	The number of ICMP source quench messages received.
IcmpInRedirects	The number of ICMP redirect messages received.
IcmpInEchos	The number of ICMP echo (request) messages received.
IcmpInEchoReps	The number of ICMP echo reply messages received.
IcmpInTimestamps	The number of ICMP timestamp (request) messages received.
IcmpInTimestampReps	The number of ICMP timestamp reply messages received.

Table 53. IP Statistics information (continued)

Field	Description
IcmpInAddrMasks	The number of ICMP address mask request messages received.
IcmpInAddrMaskReps	The number of ICMP address mask reply messages received.
IcmpOutMsgs	The total number of ICMP messages that this entity attempted to send. This counter includes all those counted by icmpOutErrors.
IcmpOutErrors	The number of ICMP messages that this entity did not send due to problems discovered within ICMP such as a lack of buffers. This value does not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there might be no types of error that contribute to this counter's value.
IcmpOutDestUnreachs	The number of ICMP destination unreachable messages sent.
IcmpOutTimeExcds	The number of ICMP time exceeded messages sent.
IcmpOutParmProbs	The number of ICMP parameter problem messages sent.
IcmpOutSrcQuenchs	The number of ICMP source quench messages sent.
IcmpOutRedirects	The number of ICMP redirect messages sent. For a host, this is always zero, since hosts do not send redirects.
IcmpOutEchos	The number of ICMP echo (request) messages sent.
IcmpOutEchoReps	The number of ICMP echo reply messages sent.
IcmpOutTimestamps	The number of ICMP timestamp (request) messages.
IcmpOutTimestampReps	The number of ICMP timestamp reply messages sent.
IcmpOutAddrMasks	The number of ICMP address mask request messages sent.

IPv6 routing

After you enable IPv6 routing, it is supported on VLAN interfaces only, not on physical ports.

Manage the IPv6 routing mode

You can enable or disable the global IPv6 routing mode for the switch.

To manage the global IPv6 routing mode on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IPv6 > Basic > Global Configuration**.

   The Global Configuration page displays.

7. Do one of the following:
   - **Enable the IPv6 routing mode**: Select the IPv6 Unicast Routing **Enable** radio button.
   - **Disable the IPv6 routing mode**: Select the IPv6 Unicast Routing **Disable** radio button. This is the default is selection.

8. Click the **Apply** button.

   Your settings are saved.

Display the IPv6 route table

To display the IPv6 route table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IPv6 > Basic > Route Table**.

   The Route Table displays.
7. From the **Routes Displayed** menu, select one of the following options:
   - **All Routes**: Displays all active IPv6 routes.
   - **Best Routes Only**: Displays the best active routes only.
   - **Configured Routes Only**: Displays the manually configured routes only.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable data that is displayed.

Table 54. IPv6 Route Table information

Field	Description
Number of Routes	The total number of active routes in the route table.
IPv6 Prefix	The network prefix for the active route.
Prefix Length	The prefix length for the active route.
Protocol	The type of protocol for the active route.
Next Hop Interface	The interface over which the route is active. For a reject route, the next hop would be a *Null0* interface.
Next Hop IP Address	The next hop IPv6 address for the active route.
Preference	The route preference of the configured route.

Configure the IPv6 VLAN interface settings

Before you can configure the IPv6 VLAN interface settings, you must configure at least one routing VLAN (see VLAN routing on page 268).

To configure the IPv6 VLAN interface settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IPv6 > Advanced > VLAN Configuration**.

   The VLAN Configuration page displays.

7. Select one or more VLANs by taking one of the following actions:
   - To configure a single VLAN, select the check box associated with the VLAN, or type the VLAN number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple VLANs with the same settings, select the check box associated with each VLAN.
   - To configure all VLANs with the same settings, select the check box in the heading row.

8. From the **IPv6 Mode** menu, select **Enable** or **Disable**.

   When IPv6 mode is enabled, the VLAN is capable of IPv6 operation without a global address. In this case, an EUI-64-based link-local address is used. The default value is Disable.

9. From the **DHCPv6 Client Mode** menu, select to enable or disable the DHCPv6 client mode on the VLAN.

   Only one VLAN can function as a client. The default value is Disable.

10. From the **Stateless Address AutoConfig Mode** menu, select to enable or disable the stateless address autoconfiguration mode on the VLAN.

    The default value is Disable.

11. From the **Admin Mode** menu, select to enable or disable the IPv6 mode on the VLAN.

    The default is Disable. When the IPv6 mode is enabled, the VLAN is capable of IPv6 operation without a global address. In that situation, an EUI-64-based link-local address is used.

12. In the **Duplicate Address Detection Transmits** field, specify the number of duplicate address detection (DAD) transmits on the VLAN.

    The DAD transmits value must be in the range 0 to 600.

13. In the **Life Time Interval** field, specify the router advertisement life time interval that is sent from the VLAN.

    This value must be greater than or equal to the maximum advertisement interval. 0 means do not use the switch as the default router. The range of the router life time is from 0 to 9000.

14. In the **Adv NS Interval** field, specify the retransmission time of the router advertisements sent from the VLAN.

    A value of 0 means the interval is not specified for the switch. The range of the neighbor solicit interval is from 1000 to 4294967295.

15. In the **Adv Reachable Interval** field, specify the interval during which a remote IPv6 device is considered reachable after receipt of a neighbor discovery confirmation message.

    The range of reachable time is from 0 to 3600000.

16. In the **Adv Interval** field, specify the maximum time allowed between sending router advertisements from the VLAN.

    The range of the maximum advertisement interval is from 4 to 1800. The default value is 600.

17. From the **Adv Managed Config Flag** menu, specify the setting for the router advertisement “managed address configuration flag.”

    When the selection is **Enable**, end nodes use DHCPv6. When the selection is **Disable**, end nodes autoconfigure addresses. The default value is Disable.

18. From the **Adv Other Config Flag** menu, select to enable or disable the router advertisement “other stateful configuration flag.”

    The default value is Disable.

19. From the **Router Preference** menu, specify the router preference advertisement on the VLAN.

    The default value is Medium.

20. From the **Adv Suppress Flag** menu, select to enable or disable the router advertisement suppression on the VLAN.

    The default value is Disable.

21. From the **Destination Unreachables** menu, select to enable or disable the transmission of ICMPv6 destination unreachable messages on the VLAN.

    If this option is disabled, the VLAN does not send ICMPv6 destination unreachable messages. By default, the IPv6 destination unreachables option is enabled.

22. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable data that is displayed.

Table 55. IPv6 VLAN Configuration information

Field	Description
Routing Mode	The routing mode of the VLAN routing interface.
Operational Mode	The operational state of the VLAN. The default value is Disable.
Link State	Indicates whether the link is up or down.

Configure prefix settings for an IPv6 routing VLAN

You can add or change one or more prefixes and associated settings for an IPv6 routing VLAN.

To add or change prefix settings for an IPv6 routing VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IPv6 > Advanced > Prefix Configuration**.

   The Prefix Configuration page displays.
7. From the **Interface** menu, select the routing VLAN.
8. In the **IPv6 Prefix** field, specify the IPv6 prefix.
9. In the **Prefix Length** field, specify the IPv6 prefix length.

10. From the **EUI64** menu, select **Enable** or **Disable** to specify if the specified 64-bit unicast prefix is enabled.
11. In the **Valid Life Time** field, specify the router advertisement per prefix time.

    This is the time allowed to consider the prefix valid for the purpose of on-link determination. The valid life time is 0 to 4294967295.
12. In the **Preferred Life Time** field, specify the router advertisement per prefix time.

    An autoconfigured address generated from this prefix is preferred. The preferred life time must be in the range 0 to 4294967295.
13. From the **OnLink Flag** menu, select **Enable** or **Disable** to specify if the selected prefix can be used for on-link determination.

    The default is Enable.
14. From the **Autonomous Flag** menu, select **Enable** or **Disable** to specify whether the selected prefix can be used for autonomous address configuration.

    The default value is Enable.

    The Current State field displays the state of the IPv6 address. The state is TENT if routing is disabled or DAD fails. The state is Active if the interface is active and DAD is successful.
15. Click the **Add** button.

    The IPv6 address is added to the interface.

Delete a prefix setting from an IPv6 routing VLAN

You can delete a prefix and associated settings that you no longer need for an IPv6 routing VLAN.

To a delete prefix settings from an IPv6 routing VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IPv6 > Advanced > Prefix Configuration**.

   The Prefix Configuration page displays.

7. From the **Interface** menu, select the routing VLAN.
8. Select the check box for the prefix.
9. Click the **Delete** button.

   Your settings are saved. The prefix is removed.

Display the IPv6 and ICMPv6 statistics for an IPv6 routing VLAN

You can display the IPv6 and ICMPv6 statics for an IPv6 routing VLAN.

To display the IPv6 and ICMPv6 statistics for an IPv6 routing VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IPv6 > Advanced > Statistics**.

The Statistics page display.

7. From the **Interface** menu, select the routing VLAN.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable IPv6 data that is displayed.

Table 56. IPv6 Statistics information

Field	Description
Ip6InReceives	The total number of input datagrams received, including those received in error.
Ip6InHdrErrors	The number of input datagrams discarded due to errors in their IPv6 headers, including version number mismatch, other format errors, hop count exceeded, errors discovered in processing their IPv6 options, and so on.
Ip6InTooBigErrors	The number of input datagrams that could not be forwarded because their size exceeded the link MTU of the outgoing interface.
Ip6InNoRoutes	The number of input datagrams discarded because no route could be found to transmit them to their destination.
Ip6InAddrErrors	The number of input datagrams discarded because the IPv6 address in their IPv6 header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (for example, ::0) and unsupported addresses (such as addresses with unallocated prefixes). For entities that are not IPv6 routers and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
Ip6InUnknownProtos	The number of locally addressed datagrams received successfully but discarded because of an unknown or unsupported protocol. This counter is incremented at the interface to which these datagrams were addressed, which might not be the input interface for some of the datagrams.
Ip6InTruncatedPkts	The number of input datagrams discarded because datagram frame did not carry enough data.
Ip6InDiscards	The number of input IPv6 datagrams for which no problems were encountered to prevent their continued processing, but that were discarded for reasons such as lack of buffer space. This counter does not include any datagrams discarded while awaiting reassembly.
Ip6InDelivers	The total number of datagrams successfully delivered to IPv6 user-protocols (including ICMP). This counter is incremented at the interface to which these datagrams were addressed, which might not be the input interface for some of the datagrams.
Ip6OutForwDatagrams	The number of output datagrams that this entity received and forwarded to their final destinations. In entities that do not act as IPv6 routers, this counter includes only those packets that were source-routed through this entity, and the source-route processing was successful. For a successfully forwarded datagram the counter of the outgoing interface is incremented.

Table 56. IPv6 Statistics information (continued)

Field	Description
Ip6OutRequests	The number of IPv6 datagrams that local IPv6 user protocols (including ICMP) supplied to IPv6 in requests for transmission. This counter does not include any datagrams that are also included in ipv6IfStatsOutForwDatagrams.
Ip6OutDiscards	The number of output IPv6 datagrams for which no problems were encountered to prevent their continued processing, but that were discarded for reasons such as lack of buffer space. This counter can include datagrams that are also counted in ipv6IfStatsOutForwDatagrams.
Ip6OutNoRoutes	The number of output datagrams that were discarded because no route could be found to transmit them to their destination.
Ip6ReasmTimeout	The number of output datagrams for which a reassembly time-out occurred.
Ip6ReasmReqds	The number of IPv6 fragments received that needed to be reassembled. This counter is incremented at the interface to which these fragments were addressed, which might not be the input interface for some of the fragments.
Ip6ReasmOKs	The number of IPv6 datagrams successfully reassembled. This counter is incremented at the interface to which these datagrams were addressed, which might not be necessarily the input interface for some of the fragments.
Ip6ReasmFails	The number of failures detected by the IPv6 reassembly algorithm (for whatever reason: timed out, errors, and so on). This is not necessarily a count of discarded IPv6 fragments since some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received. This counter is incremented at the interface to which these fragments were addressed, which might not be the input interface for some of the fragments.
Ip6FragOKs	The number of IPv6 datagrams that were successfully fragmented.
Ip6FragFails	The number of output datagrams that were discarded because they could not be fragmented.
Ip6FragCreates	The number of output datagram fragments that were generated as a result of fragmentation.
Ip6InMcastPkts	The number of multicast packets received.
Ip6OutMcastPkts	The number of multicast packets transmitted.
Ip6InOctets	The total number of bytes for the received input datagrams.
Ip6OutOctets	The total number of bytes for the transmitted output datagrams.
Ip6InMcastOctets	The number of multicast bytes received.
Ip6OutMcastOctets	The number of multicast bytes transmitted.
Ip6InBcastOctets	The number of broadcast bytes received.
Ip6OutBcastOctets	The number of broadcast bytes transmitted.

Table 56. IPv6 Statistics information (continued)

Field	Description
Ip6InNoECTPkts	The number of non-ECT packets received.
Ip6InECT1Pkts	The number of ECT1 packets received.
Ip6InECT0Pkts	The number of ECT0 packets received.
Ip6InCEPkts	The number of CE packets received.

The following table describes the nonconfigurable ICMPv6 data that is displayed.

Table 57. ICMPv6 Statistics information

Field	Description
Icmp6InMsgs	The number of ICMP messages received, which includes all those counted by IPv6IfIcmpInErrors. This counter is incremented at the interface to which these ICMP messages were addressed, which might not be the input interface for the messages.
Icmp6InError	The number of ICMP messages received that included ICMP-specific errors (bad ICMP checksums, bad length, and so on).
Icmp6OutMsgs	The number of ICMP messages sent. This counter includes all those counted by icmpOutErrors.
Icmp6OutErrors	The number of ICMP messages not sent because of problems discovered within ICMP, such as a lack of buffers. This number does not include errors discovered outside the ICMP layer such as the inability of IPv6 to route the resulting datagram.
Icmp6InCsumErrors	The number of ICMP messages received that included checksum errors.
Icmp6InDestUnreachs	The number of ICMP Destination Unreachable messages received.
Icmp6InPktTooBigs	The number of ICMP Packet Too Big messages received.
Icmp6InTimeExcds	The number of ICMP Time Exceeded messages received.
Icmp6InParmProblems	The number of ICMP Parameter Problem messages received.
Icmp6InEchos	The number of ICMP Echo (request) messages received.
Icmp6InEchoReplies	The number of ICMP Echo Reply messages received.
Icmp6InGroupMembQueries	The number of ICMPv6 Group Membership Query messages received.
Icmp6InGroupMembResponses	The number of ICMPv6 Group Membership Response messages received.
Icmp6InGroupMembReductions	The number of ICMPv6 Group Membership Reduction messages received.
Icmp6InRouterSolicits	The number of ICMP Router Solicit messages received.
Icmp6InRouterAdvertisements	The number of ICMP Router Advertisement messages received.
Icmp6InNeighborSolicits	The number of ICMP Neighbor Solicit messages received.

Table 57. ICMPv6 Statistics information (continued)

Field	Description
Icmp6InNeighborAdvertisements	The number of ICMP Neighbor Advertisement messages received.
Icmp6InRedirects	The number of ICMPv6 Redirect messaged received.
Icmp6InMLDv2Reports	The number of ICMPv6 MLDv2 Report messages received.
Icmp6OutDestUnreachs	The number of ICMP Destination Unreachable messages sent.
Icmp6OutPktTooBigs	The number of ICMP Packet Too Big messages sent.
Icmp6OutTimeExcds	The number of ICMP Time Exceeded messages sent.
Icmp6OutParmProblems	The number of ICMP Parameter Problem messages sent.
Icmp6OutEchos	The number of ICMP Echo (request) messages sent.
Icmp6OutEchoReplies	The number of ICMP Echo Reply messages sent.
Icmp6OutGroupMembQueries	The number of ICMPv6 Group Membership Query messages sent.
Icmp6OutGroupMembResponses	The number of ICMPv6 Group Membership Response messages sent.
Icmp6OutGroupMembReductions	The number of ICMPv6 Group Membership Reduction messages sent.
Icmp6OutRouterSolicits	The number of ICMP Neighbor Solicitation messages sent.
Icmp6OutRouterAdvertisements	The number of ICMP Router Advertisement messages sent.
Icmp6OutNeighborSolicits	The number of ICMP Neighbor Solicitation messages sent.
Icmp6OutRedirects	The number of Redirect messages sent. For a host, this number is always zero because hosts do not send Redirect messages.
Icmp6OutMLDv2Reports	The number of ICMPv6 MLDv2 Report messages sent.
Icmp6InType134	The number of ICMPv6 Type 134 messages received.
Icmp6InType135	The number of ICMPv6 Type 135 messages received.
Icmp6InType136	The number of ICMPv6 Type 136 messages received.
Icmp6OutType1	The number of ICMPv6 Type 1 messages sent.
Icmp6OutType133	The number of ICMPv6 Type 133 messages sent.
Icmp6OutType135	The number of ICMPv6 Type 135 messages sent.
Icmp6OutType136	The number of ICMPv6 Type 136 messages sent.
Icmp6OutType143	The number of ICMPv6 Type 143 messages sent.

Display the IPv6 neighbor table or clear IPv6 neighbor entries

You can display the IPv6 neighbor devices that the switch detects or clear IPv6 neighbor entries from the neighbor table.

To display the IPv6 neighbor table or clear IPv6 neighbor entries:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IPv6 > Advanced > Neighbor Table**.

   The Neighbor Table page displays.
   - **IPv6 Address**: Enter the 128-byte hexadecimal IPv6 address in four-digit groups separated by colons, for example, 2001:231F:::1. Then click the **Go** button. If the address exists, that entry is displayed. An exact match is required.
   - **Interface**: Enter the VLAN ID. Then click the **Go** button. If the address exists, that entry is displayed.
7. To clear the IPv6 neighbors that display, click the **Clear** button.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable data that is displayed.

Table 58. IPv6 Neighbor Table information

Field	Description
Interface	The interface for which settings are displayed.
IPv6 Address	The IPv6 address of the neighbor or interface.
MAC Address	The MAC address associated with an interface.
isRtr	Displays if the neighbor is a router. If the neighbor is a router, the value is True. If the neighbor is not a router, the value is False.
Neighbor State	The state of the neighbor cache entry. Following are the states for dynamic entries in the IPv6 neighbor discovery cache: • **Incmp**: Address resolution is being performed on the entry. A neighbor solicitation message was sent to the solicited-node multicast address of the target, but the corresponding neighbor advertisement message is not yet received. • **Reach**: Positive confirmation was received within the last Reachable Time milliseconds that the forward path to the neighbor was functioning properly. While in REACH state, the device takes no special action as packets are sent. • **Stale**: More than Reachable Time milliseconds elapsed since the last positive confirmation was received that the forward path was functioning properly. While in STALE state, the device takes no action until a packet is sent. • **Delay**: More than Reachable Time milliseconds elapsed since the last positive confirmation was received that the forward path was functioning properly. A packet was sent within the last DELAY_FIRST_PROBE_TIME seconds. If no reachability confirmation is received within DELAY_FIRST_PROBE_TIME seconds of entering the DELAY state, send a neighbor solicitation message and change the state to PROBE. • **Probe**: Seeks a reachability confirmation by resending neighbor solicitation messages every Retrans Timer milliseconds until a reachability confirmation is received.
Last Updated	The time since the address was confirmed to be reachable.

Configure an IPv6 static route

You can add or change a static IPv6 route.

To add or change a static IPv6 route:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > IPv6 > Advanced > Static Route Configuration**.

   The Static Route Configuration page displays.

7. If you are changing en existing route, select the check box for the route.

   The only field you can change is the preference for the route.

8. If you are adding a new route, in the **IPv6 Prefix** field, specify the IPv6 prefix for the route.
9. If you are adding a new route, in the **Prefix Length** field, specify the IPv6 prefix length for the route.
10. If you are adding a new route, from the **Next Hop IPv6 Address Type** menu, select one of the following options:
    - **Global**: Create a global IPv6 route by specifying the VLAN routing interface for the route.
    - **Link-Local**: Create a link-local IPv6 address by specifying the VLAN routing interface and the next hop address for the route.
    - **Static-Reject**: Create a static-reject route for a destination prefix. You cannot specify a VLAN routing interface or a next hop address for the route.
11. If you are adding a new route and selected **Global** or **Link-Local** from the **Next Hop IPv6 Address Type** menu, specify the IPv6 address for the next hop in the **Next Hop IPv6 Address** field.
12. If you are adding a new route and selected **Link-Local** from the **Next Hop IPv6 Address Type** menu, select the VLAN routing interface from the **Interface** menu.

    This is the VLAN routing interface this must be used for the route.

13. In the **Preference** field, specify the preference for the route.

    The range is from 1 to 255. You can add the preference for a new route or change the preference for an existing route.

14. Do one of the following:
    - If you are adding a new route, click the **Add** button.

      Your settings are saved. The route is added.
    - If you are changing an existing route, click the **Apply** button.
15. Your settings are saved.

    The route is added.

Note: For information about viewing routes in the IPv6 route table, see Display the IPv6 route table on page 252.

Delete an IPv6 static route

You can delete an IPv6 static route that you no longer need.

To delete an IPv6 static route:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IPv6 > Advanced > Static Route Configuration**.

   The Static Route Configuration page displays.
7. Select the check box for the route.

8. Click the **Delete** button.

   Your settings are saved. The route is removed.

Configure the IPv6 route preference for the switch

You can configure the default preference for the switch, which is a value in the range from 1 to 255 and is independent of route metrics. Most routing protocols use a route metric to determine the shortest path known to the protocol, independent of any other protocol. The best route to a destination is automatically selected by determining the route with the lowest preference value. If multiple routes to a destination exist, the preference value is used to determine the preferred route. If a tie occurs, the route with the best route metric is selected.

Configure the IPv6 route preference for the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > IPv6 > Advanced > Route Preference**.

   The Route Preference page displays.
7. In the **Static** field, specify the static route preference value for the router.

   The range is 1 to 255. The default value is 1.
8. Click the **Apply** button.

   Your settings are saved. The Local field displays the local preference.

VLAN routing

You can configure the switch to allow traffic on a VLAN to be treated as if the VLAN were a router port. In such a situation, we call the VLAN a VLAN routing interface or a routed VLAN.

When a port is enabled for bridging (the default setting) rather than routing, all normal bridge processing is performed for an inbound packet, which is then associated with a VLAN. Its MAC destination address (MAC DA) and VLAN ID are used to search the MAC address table. If routing is enabled for the VLAN, and the MAC DA of an inbound unicast packet is that of the internal bridge-router interface, the packet is routed. An inbound multicast packet is forwarded to all ports in the VLAN. If a routed VLAN receives the multicast packet, the packet is also forwarded on the internal bridge-router interface.

Because you can configure a port to belong to more than one VLAN, VLAN routing might be enabled for all of the VLANs on the port, or for a subset. You can use VLAN routing to allow more than one physical port to reside on the same subnet. You can also use VLAN routing if a VLAN spans multiple physical networks, or if you require additional segmentation or security. A port can either be a VLAN port or a router port, but not both. However, a VLAN port can be part of a VLAN that is itself a router port.

Create a routing interface with the VLAN Static Routing Wizard

The VLAN Static Routing Wizard lets you create a VLAN routing interface, configure the IP address and subnet mask for the interface, and add ports, LAGs, or both to the VLAN. With this wizard, you can do the following:

- Create a VLAN.
- Add ports to the newly created VLAN and remove selected ports from the default VLAN.
- Add ports to a LAG and add the LAG to the newly created VLAN.
- Enable tagging on selected ports if the port is in another VLAN. Disable tagging if a selected port does not exist in another VLAN.
- Exclude ports from the VLAN.
- Enable routing on the VLAN and specify an IP address and subnet mask for routing.

To create a routing VLAN with the VLAN static routing wizard:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

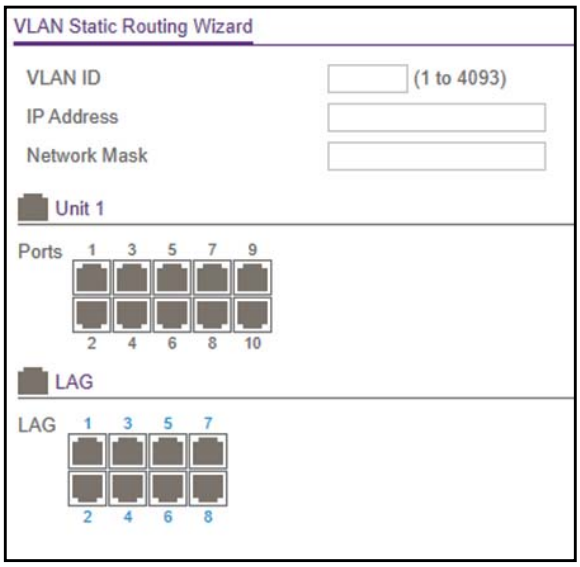
The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > VLAN > VLAN Routing Wizard**.



7. In the **VLAN ID** field, specify the VLAN ID that is associated with the VLAN.

   The range of the VLAN ID is 1 to 4093.
8. In the **IP Address** field, specify the IP address of the VLAN interface.
9. In the **Network Mask** field, specify the subnet mask of the VLAN interface.
10. In the Ports table, click each port once, twice, or three times to configure one of the following modes or reset the port to the default settings:
    - **T (Tagged)**: Selects the port as a tagged port in the VLAN. All frames transmitted on the port are tagged for this VLAN.
    - **U (Untagged)**: Selects the port as an untagged port in the VLAN. All frames transmitted on the port are untagged for this VLAN.

- **Excluded member**: By default, the selection is blank, which means that the port is excluded from the VLAN. A port that is excluded can still be dynamically added to the VLAN through GVRP.

11. In the LAG table, click each LAG once, twice, or three times to configure one of the following modes or reset the LAG to the default settings:
    - **T (Tagged)**: Selects the LAG as a tagged LAG in the VLAN. All frames transmitted on the LAG are tagged for this VLAN.
    - **U (Untagged)**: Selects the LAG as an untagged LAG in the VLAN. All frames transmitted on the LAG are untagged for this VLAN.
    - **Excluded member**: By default, the selection is blank, which means that the LAG is excluded from the VLAN. A LAG that is excluded can still be dynamically added to the VLAN through GVRP.
12. Click the **Apply** button.

    Your settings are saved.

Manage a VLAN routing interface

You can add and manage an existing VLAN (see Configure VLAN settings on page 156) as a new VLAN routing interface. You can also manage an existing VLAN routing interface that you added with the wizard (see Create a routing interface with the VLAN Static Routing Wizard on page 268),

To add or change a VLAN routing interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

The System Information page displays.

6. Select **Routing > VLAN > VLAN Routing Configuration**.

   The VLAN Routing Configuration page displays.

7. If you are changing an existing routing VLAN, select the check box for the VLAN.
8. If you are adding a new routing VLAN, from the **VLAN ID** menu, select the VLAN ID.

   This menu displays the IDs of all VLANs that are configured on the switch, that is, regular VLANs and routing VLANs.

9. In the **IP Address** field, enter the IP address that to be assigned to the VLAN routing interface.
10. In the **Subnet Mask** field, enter the subnet mask to be assigned to the VLAN routing interface.
11. Do one of the following:
    - **New routing VLAN interface**: If you configure a regular VLAN as a new VLAN routing interface, click the **Add** button.

      The VLAN routing interface is added for the selected VLAN ID. The entry in the MAC Address field is automatically entered.

    - **Changed routing VLAN interface**: If you change an existing routing VLAN interface, click the **Apply** button.

      You changes are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 59. VLAN Routing Configuration information

Field	Description
Port	The VLAN that is the VLAN routing interface.
MAC Address	The MAC address that is assigned to the VLAN routing interface.
Routing Mode	Indicates whether routing is enabled for the VLAN routing Interface.

Remove the routing function from a VLAN

You can remove the routing function from a VLAN. That is, you can remove the routing IP address and subnet mask from the VLAN. The VLAN itself is not removed.

To a remove the routing function from a VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > VLAN > VLAN Routing Configuration**.

   The VLAN Routing Configuration page displays.
7. Select the check box for the VLAN routing interface.
8. Click the **Delete** button.

   Your settings are saved. The routing function is removed but the VLAN itself is not removed. For information about removing the VLAN, see Delete a VLAN on page 157.

Router discovery for a VLAN routing interface

By default, a VLAN routing interface does not send router advertisements. You can enable the router advertisements for a VLAN routing interface and configure the setting for the router advertisements.

To configure router discovery for a VLAN routing interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > Router Discovery > Router Discovery Configuration**.

   The Router Discovery Configuration page displays.
7. Select the check box for the VLAN routing interface.
8. From the **Advertise Mode** menu, select **Enable** or **Disable**.

   This selection enables or disables the transmission of router advertisements on the interface. The default is Disable.
9. In the **Advertise Address** field, specify the IPv4 address that the interface must use for router advertisements
10. In the **Maximum Advertise Interval** field, specify the maximum period in seconds that is allowed between router advertisements that are sent from the interface.

    The period must be in the range from 4 to 1800. Default value is 600.
11. In the **Minimum Advertise Interval** field, specify the minimum period in seconds that is allowed between router advertisements that are sent from the interface.

    The period must be in the range from 3 to 1800. The default is 450.
12. In the **Advertise Lifetime** field, specify the period in seconds that the address that is advertised by the interface is considered a valid router address by hosts.

    The period must be in the range from 4 to 9000. Default is 1800.
13. In the **Preference Level** field, specify the preference level of the router interface as a default router relative to other routers on the same subnet.

    A higher number means that the advertized address receives a higher preference. The default is 0.
14. Click the **Apply** button.

    Your settings are saved.

Routes and the routing table

The routing table collects routes from multiple sources: static routes and local routes. The routing table can learn multiple routes to the same destination from multiple sources. The routing table lists all routes.

Manually add a route and display the routing table

To manually add a default route or static route and display the routing table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > Routing Table > Route Configuration**.

   The Route Configuration page displays.

7. From the **Route Type** menu, select one of the following route types.
   - **DefaultRoute**: Creates a default route. You must specify the next hop address and preference. The **Network Address** and **Subnet Mask** fields are masked out.
   - **Static**: Creates a static route. You must specify the network address, subnet mask, next hop address, and preference.

   Depending on the type of route that you are creating, specify the following information:

   - In the **Network Address** field, specify the IP interface address that identifies the attached network.

- In the **Subnet Mask** field, specify the subnet mask that identifies the attached network.
- In the **Next Hop IP Address** field, specify the outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination.

  The next router is always one of the adjacent neighbors or the IP address of the local interface for a directly attached network.
- In the **Preference** field, specify the preference, which is an integer value from 1 to 255.

  You can specify the preference value (sometimes called administrative distance) of an individual static route. Among routes to the same destination, the route with the lowest preference value is the route entered into the forwarding database. By specifying the preference of a static route, you control whether a static route is more or less preferred than routes from dynamic routing protocols. The preference also controls whether a static route is more or less preferred than other static routes to the same destination.

8. In the **Description** field, enter a description for the route.

   The description must consist of alphanumeric, hyphen, or underscore characters and can be up to 31 characters in length.
9. Click the **Add** button.

   The static route is added to the switch.
10. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable data that is displayed.

Table 60. Learned Routes information

Field	Description
Network Address	The IP route prefix for the destination.
Subnet Mask	The portion of the IP interface address that identifies the attached network (also referred to as the subnet or network mask).
Protocol	The protocol that created the specified route. The possibilities are one of the following: • Local • Static
Route Type	The route type can be Connected, Static, or Dynamic, depending on the protocol.
Next Hop Interface	The outgoing router interface to use when forwarding traffic to the destination.
Next Hop Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path toward the destination. The next router is always one of the adjacent neighbors or the IP address of the local interface for a directly attached network.

Table 60. Learned Routes information (continued)

Field	Description
Preference	The preference is an integer value from 0 to 255. You can specify the preference value (sometimes called administrative distance) of an individual static route. Among routes to the same destination, the route with the lowest preference value is the route entered into the forwarding database. By specifying the preference of a static route, you control whether a static route is more or less preferred than routes from dynamic routing protocols. The preference also controls whether a static route is more or less preferred than other static routes to the same destination.
Metric	The administrative cost of the path to the destination. If no value is entered, the default is 1. The range is 0–255.

Modify a route

You can modify an existing route.

To modify an existing route:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > Routing Table > Route Configuration**.

   The Configure Routes page displays.
7. Select the check box for the route that you want to modify.
8. Modify the settings.

For more information, see Manually add a route and display the routing table on page 274.

9. Click the **Apply** button.

   Your settings are saved.

Delete a route

You can delete a route that you no longer need.

To delete a route:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > Routing Table > Route Configuration**.

   The Configure Routes page displays.

7. Select the check box for the route that you want to delete.
8. Click the **Delete** button.

   The route is deleted.

Address Resolution Protocol

The Address Resolution Protocol (ARP) associates a Layer 2 MAC address with a Layer 3 IPv4 address. ARP is a part of the Internet Protocol (IP) and is used to translate an IP address to a media (MAC) address, defined by a LAN such as an Ethernet LAN.

The switch supports both dynamic and manual ARP configurations. With a manual ARP configuration, you can statically add entries to the ARP table.

A device that sends an IP packet must learn the MAC address of the IP destination, or, if the destination is not on the same subnet, of the next hop router. The device broadcasts an ARP request packet, to which the intended recipient responds with a unicast ARP reply that contains its MAC address. The device then uses the MAC address in the destination address field of the Layer 2 header that is prepended to the IP packet and sent to the recipient. Each device in a network maintains its ARP cache locally.

The switch learns ARP cache entries by examining the source information in the ARP packet payload fields, regardless of whether it is an ARP request or a response. In that way, when an ARP request is broadcast to all stations on a LAN segment or VLAN, each recipient can store the sender's IP and MAC address in its ARP cache. Normally, only the requestor receives an ARP response (a unicast message) and stores the sender's information in its ARP cache. The most recent information always replaces existing content in the ARP cache.

A device can be moved in a network, which means that the device's IP address that was associated with one MAC address is now associated with another MAC address. A device can also disappear from the network altogether (for example, it was reconfigured, disconnected, or powered off). These situations cause stale information in the ARP cache. Therefore, entries are updated or periodically refreshed to determine if an address still exists. If an entry was identified as a sender of an ARP packet, the entry can be removed from the ARP cache. You can configure an age-out interval that determines how long an entry that is not updated remains in the ARP cache.

Display the ARP cache

You can display ARP entries in the ARP cache. The ARP cache is a table that lists the remote connections that were recently detected by the switch.

To display entries in the ARP cache:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > ARP > Basic > ARP Cache**.

   The ARP Cache page display.
7. Navigate through the table by doing the following:
   - From the **Rows per page** menu, select how many table entries are displayed per page.

     Possible values are **20**, **50**, **100**, **200**, and **All**. If you select **All**, the browser might be slow to display the information.
   - Click the **<** button to display the previous page of the table data entries.
   - Click the **>** button to display the next page of the table data entries.
8. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable information displayed on the page.

Table 61. ARP cache information

Field	Description
Management VLAN ARP Cache	
IP Address	The IP address associated with the device's MAC address. This must be the IP address of a device on a subnet attached to one of the switch's existing routing interfaces.
Port	The associated interface of the connection.
MAC Address	The unicast MAC address of the device. The address is six two-digit hexadecimal numbers separated by colons, for example, 00:06:29:32:81:40.
Routing VLANs ARP Cache	
IP Address	The IP address. This must be the IP address of a device on a subnet attached to one of the switch's existing routing interfaces.
Interface	The routing interface associated with the ARP entry.
MAC Address	The unicast MAC address of the device. The address is six two-digit hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.

Table 61. ARP cache information (continued)

Field	Description
Type	The type of ARP entry: • **Local**: An ARP entry associated with one of the switch's routing interface's MAC addresses. • **Gateway**: A dynamic ARP entry for which the IP address is that of a router. • **Static**: An ARP entry that was configured manually. • **Dynamic**: An ARP entry that was learned by the switch.
Age	The time in seconds since the entry was last refreshed in the ARP cache.

Add or change a static entry in the ARP table

You can add a new static entry to the ARP table or change an existing entry that you manually added.

To add a new static entry or change an existing entry in the ARP table:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > ARP > Advanced > ARP Create**.

   The ARP Create page displays.
7. If you are changing an existing ARP entry, select the check box for the entry.
8. In the **IP Address** field, specify an IP address.

This must be the IP address of a device on a subnet attached to one of the switch's existing routing interfaces.

9. In the **MAC Address** field, specify the unicast MAC address of the device.

   Enter the address as six two-digit hexadecimal numbers separated by colons, for example, 00:06:29:32:81:40.

10. Do one of the following:
    - If you are adding a new ARP entry, click the **Add** button.

      Your settings are saved. The ARP entry is added.
    - If you are changing an existing ARP entry, click the **Apply** button.

      Your settings are saved.

    For information about viewing the new entry and other entries in the ARP cache, see Display the ARP cache on page 278.

Delete a static ARP entry

You can delete a static ARP entry that you no longer need.

To delete a static ARP entry:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > ARP > Advanced > ARP Create**.

The ARP Create page displays.

7. Select the check box for the entry.
8. Click the **Delete** button.

   Your settings are saved. The entry is removed.

Configure the ARP table settings

You can change the configuration settings for the ARP table.

To configure the ARP table settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Routing > ARP > Advanced > Global ARP Configuration**.

   The Global ARP Configuration page displays.
7. In the **Age Time** field, enter the time, in seconds, that a dynamic ARP entry remains in the ARP table before aging out.

   The range is from 15 to 21600 seconds. The default is 1200 seconds.
8. In the **Response Time** field, enter the time, in seconds, that the device waits for an ARP response to an ARP request that it sends. The range is from 1 to 10 seconds. The default is 1 second.
9. In the **Retries** field, enter the maximum number of times an ARP request is retried after an ARP response is not received.

The number includes the initial ARP request. The range is from 0 to 10. The default is 4.

10. In the **Cache Size** field, specify the maximum number of entries allowed in the ARP table.

    This number includes all static and dynamic ARP entries.The range for this field is from 79 to 512. The default is 512.

11. Select the Dynamic Renew **Enable** or **Disable** radio button.

    When enabled, the ARP component automatically attempts to renew dynamic ARP entries when they age out. The default setting is Enable.

12. Click the **Apply** button.

    Your settings are saved.

Remove ARP entries from the ARP cache

You can remove entries from the ARP cache.

To remove entries from the ARP cache:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - After initial login, enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Routing > ARP > Advanced > ARP Entry Management**.

   The ARP Entry Management page displays.

7. From the **Remove From Table** menu, select the type of ARP entry to be deleted:
   - **All Dynamic Entries**
   - **All Dynamic and Gateway Entries**
   - **Specific Dynamic/Gateway Entry**: Lets you specify the IP address to be removed.
   - **Specific Static Entry**: Lets you specify the IP address to be removed.
8. If you select **Specific Dynamic/Gateway Entry** or **Specific Static Entry**, in the **Remove IP Address** field, enter the IP address to be removed.
9. Click the **Apply** button.

   Your settings are saved.

5

Configure Quality of Service

This chapter contains the following sections:

- Quality of Service concepts
- Class of Service
- Differentiated Services

Quality of Service concepts

In a switch, each physical port consists of one or more queues for transmitting packets on the attached network. Multiple queues per port are often provided to give preference to certain packets over others based on user-defined criteria. When a packet is queued for transmission in a port, the rate at which it is serviced depends on how the queue is configured and possibly the amount of traffic present in the other queues of the port. If a delay is necessary, packets are held in the queue until the scheduler authorizes the queue for transmission. As queues become full, packets can no longer be held for transmission and are dropped by the switch.

Quality of Service (QoS) is a means of providing consistent, predictable data delivery by distinguishing packets with strict timing requirements from those that are more tolerant of delay. Packets with strict timing requirements are given special treatment in a QoS-capable network. With this in mind, all elements of the network must be QoS capable. The presence of at least one node that is not QoS capable creates a deficiency in the network path, and the performance of the entire packet flow is compromised.

Class of Service

The Class of Service (CoS) queueing feature lets you directly configure certain aspects of switch queueing. This provides the desired QoS behavior for different types of network traffic when the complexities of DiffServ are not required. The priority of a packet arriving at an interface can be used to steer the packet to the appropriate outbound CoS queue through a mapping table. CoS queue characteristics that affect queue mapping, such as minimum guaranteed bandwidth or transmission rate shaping, are user configurable at the queue (or port) level.

Eight queues per port are supported.

CoS configuration concepts

You can set the Class of Service trust mode for an interface. Each port on the switch can be configured to trust one of the packet fields (802.1p or IP DSCP), or to not trust any packet's priority designation (untrusted mode). If the port is set to a trusted mode, it uses a mapping table appropriate for the trusted field being used. This mapping table indicates the CoS queue to which the packet must be forwarded on the appropriate egress port. Of course, the trusted field must exist in the packet for the mapping table to be of any use. If this is not the case, default actions are performed. These actions involve directing the packet to a specific CoS level configured for the ingress port as a whole, based on the existing port default priority as mapped to a traffic class by the current 802.1p mapping table.

Alternatively, when a port is configured as untrusted, it does not trust any incoming packet priority designation and uses the port default priority value instead. All packets arriving at the

ingress of an untrusted port are directed to a specific CoS queue on the appropriate egress ports, in accordance with the configured default priority of the ingress port. This process is also used for cases where a trusted port mapping cannot be honored, such as when a non-IP packet arrives at a port configured to trust the IP DSCP value.

Configure the global CoS settings

A global configuration setting is automatically applied to all interfaces on the switch.

To configure the CoS trust mode settings on all interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > CoS > Basic > CoS Configuration**.

   The CoS Configuration page displays.
7. Either configure the same CoS trust mode settings for all CoS-configurable interfaces or configure CoS settings per interface.

   By default, the **Global** radio button is selected.
   - To configure the same CoS trust mode settings for all CoS configurable interfaces, do the following:
     a. Select the **Global** radio button.
     b. From the **Global Trust Mode** menu, select one of the following trust mode options for ingress traffic on the switch:
        - **Untrusted**: Do not trust any CoS packet marking at ingress.

- **802.1p**: The eight priority tags that are specified in IEEE 802.1p are p0 to p7. The QoS setting lets you map each of the eight priority levels to one of eight internal hardware priority queues. The default mode is 802.1p.
- **DSCP**: The six most significant bits of the DiffServ field are called the Differentiated Services Code Point (DSCP) bits.

- To configure CoS settings per interface, do the following:
  a. Select the **Interface** radio button.
  b. From the **Interface Trust Mode** menu, select one of the following trust mode options:
     - **Untrusted**: Do not trust any CoS packet marking at ingress.
     - **802.1p**: The eight priority tags that are specified in IEEE 802.1p are p0 to p7. The QoS setting lets you map each of the eight priority levels to one of seven internal hardware priority queues. The default mode is 802.1p.
     - **DSCP**: The six most significant bits of the DiffServ field are called the Differentiated Services Code Point (DSCP) bits.

8. Click the **Apply** button.

   Your settings are saved.

Configure the CoS settings for an interface

You can configure the trust mode for one or more interfaces and apply an interface shaping rate to all interfaces or to a specific interface.

To configure the CoS settings for an interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > CoS > Advanced > CoS Interface Configuration**.

   The CoS Interface Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Interface Trust Mode** menu, select one of the following trust mode options for ingress traffic on the selected interfaces:
   - **Untrusted**: Do not trust any CoS packet marking at ingress.
   - **802.1p**: The eight priority tags that are specified in IEEE 802.1p are p0 to p7. The QoS setting lets you map each of the eight priority levels to one of seven internal hardware priority queues. The default value is 802.1p.
   - **DSCP**: The six most significant bits of the DiffServ field are called the Differentiated Services Code Point (DSCP) bits.
10. In the **Interface Shaping Rate** field, specify the maximum outbound transmission rate bandwidth in kbps.

    This setting is used to shape the outbound transmission rate in increments of 1 percent in a range of 0–100. This value is controlled independently of any per-queue maximum bandwidth configuration. It is effectively a second-level shaping mechanism. The default value is 0. The value 0 means that the maximum is unlimited.

    The expected shaping at egress interface is calculated as follows:

    frameSize × shaping/(frameSize + IFG), where IFG (Inter frame gap) is 20 bytes, frameSize is configured frame size, and shaping is configured traffic shaping.

    For example, if 64 bytes frame size and 64 kbps shaping are configured, the expected shaping is approximately 48 kbps.

11. In the **Interface Ingress Rate Limit** field, specify the maximum inbound transmission rate bandwidth in kbps.

This setting is used to shape the inbound transmission rate in increments of 1 percent in a range of 0–100. The interface discards traffic that arrives at a bandwidth in excess of the specified limit.

12. Click the **Apply** button.

    Your settings are saved.

Configure the CoS queue settings for an interface

You can define what a particular queue does by configuring switch egress queues. You can control how much bandwidth is used by the queue, the queue depth during times of congestion, and the scheduling of packet transmission from all queues on a port. Each port contains its own CoS queue-related configuration.

For information about configuring CoS queue settings globally, see Configure the global CoS settings on page 287.

To configure the CoS queue settings for an interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > CoS > Advanced > Interface Queue Configuration**.

   The Interface Queue Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Queue ID** menu, select the queue to be configured.

   You can select a queue from **0** to **7**.
10. From the **Scheduler Type** menu, select one of the following options:
    - **Strict**: The interface services traffic with the highest priority on a queue first.
    - **Weighted**: The interface uses weighted round robin to associate a weight to each queue. This is the default setting.
11. Click the **Apply** button.

    Your settings are saved.

    The Queue Management Type field displays the queue depth management technique that is used for queues on the interface. By default, this method is Taildrop, irrespective of your selection from the **Scheduler Type** menu.

Map 802.1p priorities to queues

You can view or change which internal traffic classes are mapped to the 802.1p priority class values in Ethernet frames that the device receives. The priority-to-traffic class mappings can be applied globally or per interface. The mapping allows the switch to group various traffic types (for example, data or voice) based on their latency requirements and give preference to time-sensitive traffic.

To map 802.1p priorities to queues:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > CoS > Advanced > 802.1p to Queue Mapping**.

   The 802.1p to Queue Mapping page displays.
7. In the 802.1p to Queue Mapping table, map each of the eight 802.1p priorities to a queue (internal traffic class) from **0** to **7**.

   The 802.1p Priority row contains traffic class selectors for each of the eight 802.1p priorities to be mapped. The priority goes from low (0) to high (7). For example, traffic with a priority of 0 is for most data traffic and is sent using best effort. Traffic with a higher priority, such as 7, might be time-sensitive traffic, such as voice or video.

   Table 62. Default values for 802.1p to queue mapping

802.1p priority	0	1	2	3	4	5	6	7
Default queue	1	0	0	1	2	2	3	3

   The values in the menu under each priority represent the traffic class. The traffic class is the hardware queue for a port. Higher traffic class values indicate a higher queue position. Before traffic in a lower queue is sent, it must wait for traffic in higher queues to be sent.
8. Click the **Apply** button.

   Your settings are saved.

Map DSCP values to queues

You can map an internal traffic class to a DSCP value.

To map DSCP values to queues:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > CoS > Advanced > DSCP to Queue Mapping**.

   The DSCP to Queue Mapping page displays.

7. For each DSCP value, select from the corresponding **Queue** menu which internal traffic class must be mapped to the DSCP value.

   The traffic class is the hardware queue for a port. Higher traffic class values indicate a higher queue position. Before traffic in a lower queue is sent, it must wait for traffic in higher queues to be sent.

   The allowed Per Hop Behavior (PHBs) values, besides other DSCP experimental values, are as follows:

   - **Class Selector (CS) PHB**: These values are based on IP precedence.
   - **Assured Forwarding (AF) PHB**: These values define four main levels to sort and manipulate some flows within the network.
   - **Expedited Forwarding (EF) PHB**: These values are used to prioritize traffic for real-time applications. In many situations, if the network exceeded traffic and you need some bandwidth guaranteed for an application, the EF traffic must receive this rate independently of the intensity of any other traffic attempting to transit the node.

The Other DSCP Values (Local/Experimental Use) section allows you to set non-default values for advanced settings.

8. Click the **Apply** button.

   Your settings are saved.

Differentiated Services

The QoS feature contains Differentiated Services (DiffServ) support that allows traffic to be classified into streams and given certain QoS treatment in accordance with defined per-hop behaviors.

Standard IP-based networks provide best-effort data delivery service. Best-effort service implies that the network delivers the data in a timely fashion, although there is no guarantee. If congestion occurs, packets might be delayed, sent sporadically, or dropped. For typical Internet applications, such as email and file transfers, a slight degradation in service is acceptable and in many cases unnoticeable. However, any degradation of service can negatively affect applications with strict timing requirements, such as voice and multimedia.

Defining DiffServ

To use DiffServ for QoS, you must first define the following categories and their criteria:

1. **Class**: Create classes and define class criteria.
2. **Policy**: Create policies, associate classes with policies, and define policy statements.
3. **Service**: Add a policy to an inbound interface.

Packets are classified and processed based on defined criteria. The classification criteria are defined by a class. The processing is defined by a policy’s attributes. Policy attributes can be defined on a per-class instance basis, and it is these attributes that are applied when a match occurs. A policy can contain multiples classes. When the policy is active, the actions taken depend on which class matches the packet.

Note the following about the DiffServ process:

- Packets are filtered and processed based on defined criteria. The filtering criteria is defined by a class. The processing is defined by a policy's attributes. Policy attributes can be defined on a per-class instance basis, and it is these attributes that are applied when a match occurs.
- The configuration process begins with defining one or more match criteria for a class. Then one or more classes are added to a policy. Policies are then added to interfaces.
- Packet processing begins by testing the match criteria for a packet. The *All* class type option specifies that each match criteria within a class must evaluate to true for a packet to match that class. The *Any* class type option specifies that at least one match criteria must evaluate to true for a packet to match that class. Classes are tested in the order in which they were added to the policy. A policy is applied to a packet when a class match within that policy is found.

Configure the DiffServ mode and display the entries in the DiffServ private MIB tables

You can enable or disable DiffServ and display the current and maximum number of rows in each of the main DiffServ private MIB tables.

To configure the DiffServ mode and display the entries in the DiffServ private MIB tables:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > DiffServ Configuration**.

   The DiffServ Configuration page displays.
7. Select the administrative mode for DiffServ:
   - **Enable**: Differentiated services are active. This is the default setting.
   - **Disable**: Differentiated services is inactive. An existing DiffServ configuration is retained and can be changed but is not active.
8. Click the **Apply** button.

   Your settings are saved.

The following table describes the information displayed in the Status table on the DiffServ Configuration page.

Table 63. DiffServ Status information

Field	Description
Class Table	The number of configured DiffServ classes out of the total allowed on the switch.
Class Rule table	The number of configured class rules out of the total allowed on the switch.
Policy table	The number of configured policies out of the total allowed on the switch.
Policy Instance Table	The number of configured policy class instances out of the total allowed on the switch.
Policy Attributes Table	The number of configured policy attributes (attached to the policy class instances) out of the total allowed on the switch.
Service Table	The number of configured services (attached to the policies on specified interfaces) out of the total allowed on the switch.

Configure a DiffServ class

You can add a new DiffServ class name, or rename or delete an existing class. You can also define the criteria to associate with a DiffServ class. As packets are received, these DiffServ classes are used to prioritize packets. You can set up multiple match criteria in a class. The logic is a Boolean logical AND for this criteria. After creating a class, click the class link to the Class page.

Add and configure a DiffServ class

To add and configure a DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > Class Configuration**.

   The Class Name page displays.

7. In the **Class Name** field, enter a class name.

   The **Class Name** field also lists all existing DiffServ class names, from which you can select one for modification or deletion. The class name can be 1 to 31 alphanumeric characters in length.

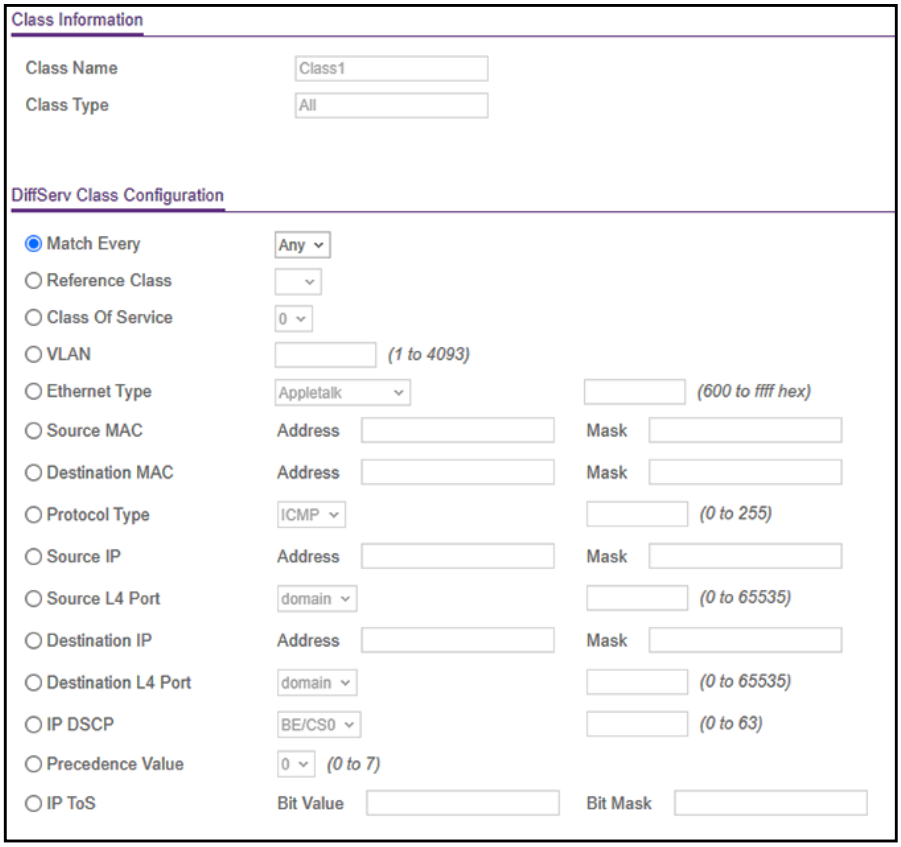
   The switch supports only the class type value All, which means that all the various match criteria defined for the class are satisfied for a packet match. All signifies the logical AND statement of all the match criteria. For any class that you add, the class type is All.

8. Click the **Add** button.

   The new class is added.

9. After creating the class, click the class name.

   The class name is a hyperlink to the page on which you can define the class configuration (see the following figure).



10. Define the criteria that must be associated with the DiffServ class by selecting *one* of the following radio buttons:
    - **Match Every**: Select this radio button to add a match condition that considers all packets to belong to the class. The only selection from the **Match Every** menu is **Any**.
    - **Reference Class**: Select this radio button to reference another class for criteria. The match criteria defined in the reference class function as match criteria in addition to the match criteria that you define for the selected class. After you select the radio button, the classes that can be referenced are displayed. Select the class to reference. A class can reference only one other class of the same type.
    - **Class of Service**: Select this radio button to require the Class of Service (CoS) value in an Ethernet frame header to match the specified CoS value. This option lists all the values for the Class of Service match criterion in the range 0 to 7 from which you can select one.
    - **VLAN**: Select this radio button to require a packet's VLAN ID to match a VLAN ID. The VLAN value is in the range from 1 to 4093.
    - **Ethernet Type**: Select this radio button to require the EtherType value in the Ethernet frame header to match the specified EtherType value. After you select the radio button, select the EtherType keyword from the menu of common protocols that are mapped to their Ethertype value. You can also select **User Value** from the menu and enter a value in the hexadecimal range from 600 to ffff.
    - **Source MAC**: Select this radio button to require a packet's source MAC address to match the specified MAC address. After you select this radio button, use the following fields to configure the source MAC address match criteria:
        - **Address**: The source MAC address to match. The source MAC address is specified as six two-digit hexadecimal numbers separated by colons.
        - **Mask**: The MAC mask, which specifies the bits in the source MAC address to compare against the Ethernet frame. Use Fs and zeros to configure the MAC mask. An F means that the bit is checked, and a zero in a bit position means that the data is not significant. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is ff:ff:00:00:00:00, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number). Note that this is not a wildcard mask, which ACLs use.
    - **Destination MAC**: Select this radio button to require a packet's destination MAC address to match the specified MAC address. After you select the radio button, use the following fields to configure the destination MAC address match criteria:
        - **Address**: The destination MAC address to match. The destination MAC address is specified as six two-digit hexadecimal numbers separated by colons.
        - **Mask**: The MAC mask, which specifies the bits in the destination MAC address to compare against an Ethernet frame. Use Fs and zeros to configure the MAC mask. An F means that the bit is checked, and a zero in a bit position means that the data is not significant. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is ff:ff:00:00:00:00, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number). Note that this is not a wildcard mask, which ACLs use.

- **Protocol Type**: Select this radio button to require a packet's Layer 4 protocol to match the specified protocol, which you must select from the menu. You can also select **Other** from the menu and enter a protocol number from 0 to 255.
- **Source IP**: Select this radio button to require a packet's source IP address to match the specified IP address. After you select the radio button, use the following fields to configure the source IP address match criteria:
  - **Address**: The source IP address format to match in dotted-decimal.
  - **Mask**: The bit mask in IP dotted-decimal format indicating which parts of the source IP address to use for matching against packet content.
- **Source L4 Port**: Select this radio button to require a packet's TCP/UDP source port to match the specified protocol, which you must select from the menu. You can also select **Other** from the menu and enter a port number from 0 to 65535.
- **Destination IP**: Select this radio button to require a packet's destination IP address to match the specified IP address. After you select the radio button, use the following fields to configure the destination IP address match criteria:
  - **Address**: The destination IP address format to match in dotted-decimal.
  - **Mask**: The bit mask in IP dotted-decimal format indicating which parts of the destination IP address to use for matching against packet content.
- **Destination L4 Port**: Select this radio button to require a packet's TCP/UDP destination port to match the specified protocol. You can also select **Other** from the menu and enter a port number from 0 to 65535.
- **IP DSCP**: Select this radio button to require the packet's IP DiffServ Code Point (DSCP) value to match the specified IP DSCP keyword code, which you must select from the menu. You can also select **Other** from the menu and enter an IP DSCP value from 0 to 63. The DSCP value is defined as the high-order 6 bits of the Service Type octet in the IP header.
- **Precedence Value**: Select this radio button to require the packet's IP precedence value to match the specified number from 0 to 7, which you must select from the menu. The IP Precedence field in a packet is defined as the high-order 3 bits of the Service Type octet in the IP header.
- **IP ToS**: Select this radio button to require the packet's Type of Service (ToS) bits in the IP header to match the specified value. The IP ToS field in a packet is defined as all 8 bits of the service type octet in the IP header. After you select the radio button, use the following fields to configure the ToS match criteria:
  - **Bits Value**: Enter a two-digit hexadecimal number octet value in the range from 00 to ff to match the bits in a packet's ToS field.
  - **Bit Mask**: Specify the bit positions that are used for comparison against the IP ToS field in a packet.

11. Click the **Apply** button.

Your settings are saved.

The following table describes the nonconfigurable information displayed in the Class Summary section at the bottom of the DiffServ Class Configuration page.

Table 64. DiffServ Class Configuration, Class Summary information

Field	Description
Match Criteria	The configured match criteria for the specified class.
Values	The values of the configured match criteria.

Rename an existing DiffServ class

To rename an existing DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Class Configuration**.

   The Class Name page displays.
7. Select the check box next to the class name.
8. In the **Class Name** field, specify the new name.
9. Click the **Apply** button.

   Your settings are saved.

Change the criteria for an existing DiffServ class

To change the criteria for an existing DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Class Configuration**.

   The Class Name page displays.
7. Click the class name, which is a hyperlink.

   The page on which you can change the class configuration displays.
8. Change the class configuration as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete a DiffServ class

To delete a DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Class Configuration**.

   The Class Name page displays.
7. Select the check box next to the class name.
8. Click the **Delete** button.

   The class is removed.

Configure IPv6 DiffServ class settings

The switch supports QoS ACL and DiffServ functionality for IPv6 by providing support for IPv6 packet classification. An IPv6 ACL serves the same purpose as an IPv4 ACL.

An Ethernet IPv6 packet is distinguished from an IPv4 packet by its unique Ethertype value, so all IPv6 classifiers include the Ethertype field, even though you cannot configure its value on the switch.

The destination and source IPv6 addresses use a prefix length value instead of an individual mask to qualify them as a subnet addresses or a host addresses. Packets that match an IPv6 classifier can be marked with the IP DSCP field in the traffic class octet.

You can also assign an IPv6 ACL with a DiffServ assignment to LAG interfaces.

Create and configure an IPv6 DiffServ class

To create and configure an IPv6 DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > IPv6 Class Configuration**.

   The IPv6 Class Configuration page displays.

7. Enter a class name in the **Class Name** field.

   The **Class Name** field also lists all the existing IPv6 class names, from which one can be selected for modification or deletion.

8. From the **Class Type** menu, select the class type.

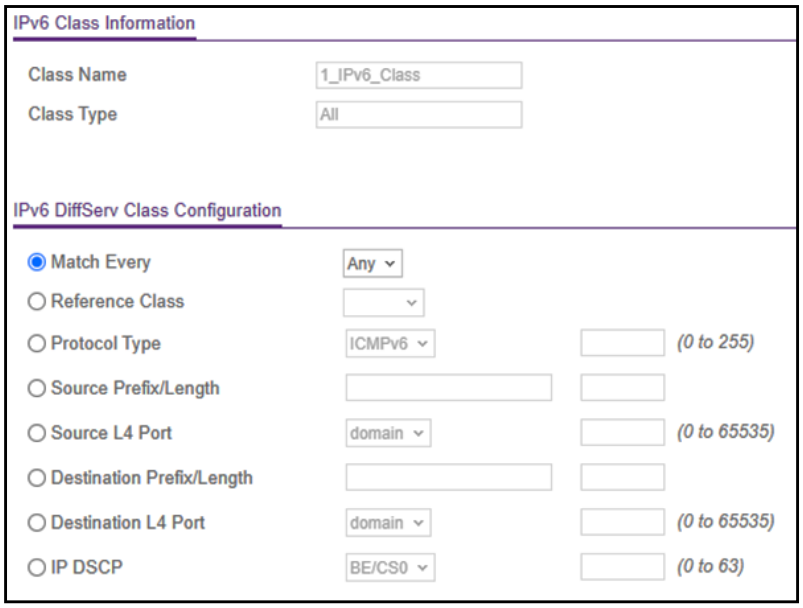
   The switch supports only the class type value **All**, which means that all the various match criteria defined for the class are satisfied for a packet match. **All** signifies the logical AND statement of all the match criteria. You can select the class type only when you are creating a new class. After the class is created, the **Class Type** field becomes nonconfigurable.

9. Click the **Add** button.

   The new class is added.

10. After creating the class, click the class name.

    The class name is a hyperlink to the page on which you can define the class configuration (see the following figure).



11. Define the criteria that must be associated the IPv6 DiffServ class:
    - **Match Every**: Select this radio button to add a match condition that considers all packets to belong to the class. The only selection from the **Match Every** menu is **Any**.
    - **Reference Class**: Select this radio button to reference another class for criteria. The match criteria defined in the reference class function as match criteria in addition to the match criteria that you define for the selected class. After selecting this option, the classes that can be referenced are displayed. Select the class to reference. A class can reference one other class of the same type.
    - **Protocol Type**: Select this radio button to require a packet's Layer 4 protocol to match the specified protocol, which you must select from the menu. The menu includes **Other** as a selection, which lets you enter a protocol number from 0 to 255.
    - **Source Prefix/Length**: Select this radio button to require a packet's source prefix and prefix length to match the specified source IPv6 prefix and prefix length. Prefix must always be specified with the prefix length. The prefix can be in the hexadecimal range from 0 to FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF and the prefix length can be in the range from 0 to 128.
    - **Source L4 Port**: Select this radio button to require a packet's TCP/UDP source port to match the specified protocol, which you must select from the menu. The range is 0 to 65535. The menu includes **Other** as an option for unnamed ports.
    - **Destination Prefix/Length**: Select this radio button to require a packet's destination prefix and prefix length to match the specified source IPv6 prefix and prefix length. Prefix must always be specified with the prefix length. The prefix can be in the hexadecimal range from 0 to FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF and the prefix length can be in the range from 0 to 128.
    - **Destination L4 Port**: Select this radio button to require a packet's TCP/UDP destination port to match the specified protocol, which you must select from the menu. The range is 0 to 65535. The menu includes **Other** as an option for unnamed ports.

- **IP DSCP**: Select this radio button to require the packet's IP DiffServ Code Point (DSCP) value to match the specified IP DSCP keyword code, which you must select from the menu. The menu includes **Other** as a selection, which lets you enter an IP DSCP value from 0 to 63. The DSCP value is defined as the high-order 6 bits of the Service Type octet in the IP header.

12. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information that is displayed in the Class Summary section.

Table 65. IPv6 DiffServ class configuration class summary

Field	Description
Match Criteria	The configured match criteria for the specified class.
Values	The values of the configured match criteria.

Rename an existing IPv6 DiffServ class

To rename an existing IPv6 DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > IPv6 Class Configuration**.

   The Class Name page displays.

7. Select the check box next to the class name.
8. In the **Class Name** field, specify the new name.
9. Click the **Apply** button.

   Your settings are saved.

Change the criteria for an existing IPv6 DiffServ class

To change the criteria for an existing IPv6 DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > IPv6 Class Configuration**.

   The Class Name page displays.
7. Click the class name, which is a hyperlink.

   The page on which you can change the class configuration displays.
8. Change the class configuration as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete an IPv6 DiffServ class

To delete an IPv6 DiffServ class:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > IPv6 Class Configuration**.

   The Class Name page displays.
7. Select the check box next to the class name.
8. Click the **Delete** button.

   The class is removed.

Configure a DiffServ policy

You can associate a collection of classes with one or more policies.

Create and configure a DiffServ policy

To create and configure a DiffServ policy:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > Policy Configuration**.

   The Policy Configuration page displays.

7. Enter a policy name in the **Policy Name** field.

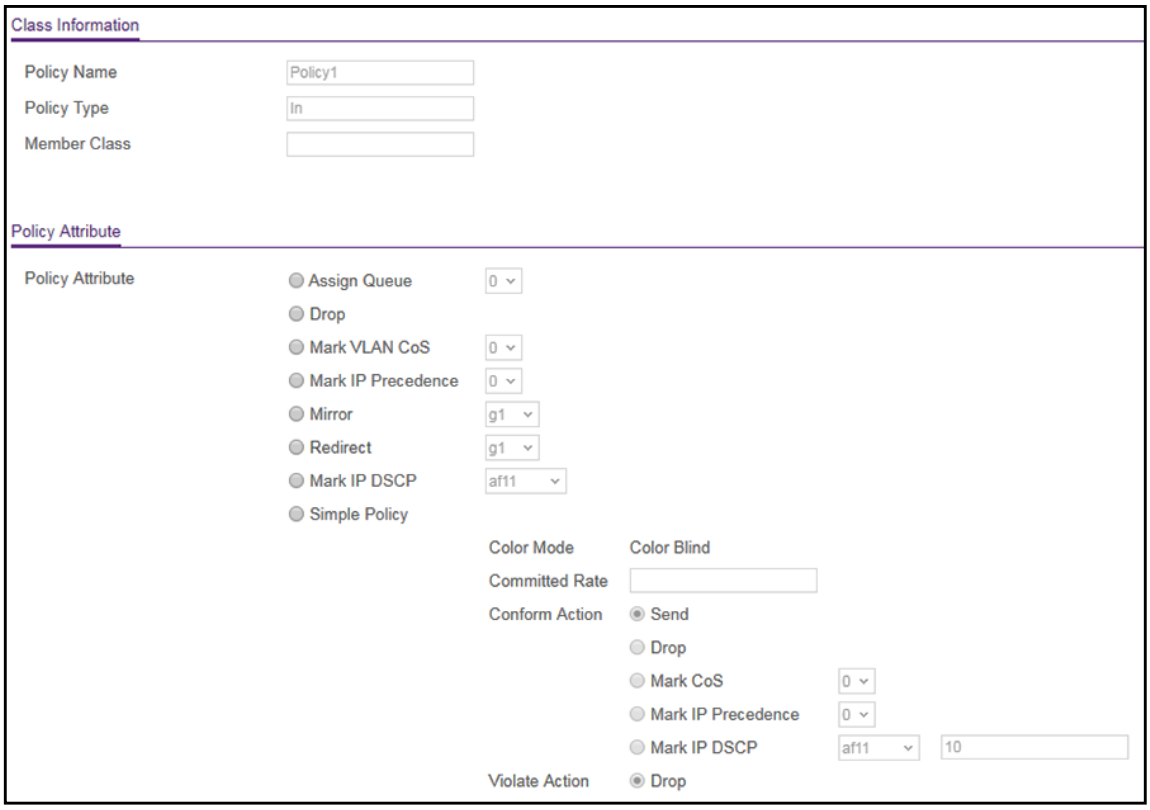
   You cannot specify the policy type. By default, the policy type is In, indicating that the policy applies to ingress packets.

8. From the **Member Class** menu, select an existing class that you want to associate with the new policy.
9. Click the **Add** button.

   The new policy is added.

10. After creating the policy, click the policy name.

    The policy name is a hyperlink to the page on which you can define the policy attributes (see the following figure).



11. Configure the policy attributes by selecting *one* of the following radio buttons:
    - **Assign Queue**: Select this radio button to specify that traffic must be assigned to a queue, which you must select from the menu. The queue is expressed as a value in the range from 0 to 7.
    - **Drop**: Select this radio button to require each inbound packet to be dropped.
    - **Mark VLAN CoS**: Select this radio button to specify the VLAN priority, which you must select from the menu. The VLAN priority is expressed as a value in the range from 0 to 7.
    - **Mark IP Precedence**: Select this radio button to require packets to be marked with an IP precedence value before being forwarded. You must select an IP precedence value from 0 to 7 from the menu.
    - **Mirror**: Select this radio button to require packets to be mirrored to an interface or LAG, one of which you must select from the menu.
    - **Redirect**: Select this radio button to require packets to be redirected to an interface or LAG, one of which you must select from the menu.
    - **Mark IP DSCP**: Select this radio button to require packet to be marked with an IP DSCP keyword code, which you must select from the menu. The DSCP value is defined as the high-order 6 bits of the Service Type octet in the IP header.
    - **Simple Policy**: Select this radio button to define the traffic policing style for the class. By default, this simple policy is color blind, and color classes do not apply. A simple policy supports a single data rate and results in one of two outcomes: conform or violate. Packets that violate the policy are always dropped, that is, the **Violate Action**

radio button is selected. (You cannot specify any other action for packets that violate the policy.)

You must specify a policy action for packets that conform to the policy.

- **Committed Rate**: Enter the committed rate that is applied to conforming packets by specifying a value in the range from 16 to 1000000 Kbps.
- In the Conform Action section, select *one* of the following radio buttons:
  - **Send**: Packets are forwarded unmodified. This is the default confirming action.
  - **Drop**: Packets are dropped.
  - **Mark CoS**: Packets are marked by DiffServ with the specified CoS value before being forwarded. This selection requires that the Mark CoS field is set. You must select a CoS value from 0 to 7 from the menu.
  - **Mark IP Precedence**: These packets are marked by DiffServ with the specified IP Precedence value before being forwarded. This selection requires that the Mark IP Precedence field is set. You must select an IP precedence value from 0 to 7 from the menu.
  - **Mark IP DSCP**: Packets are marked by DiffServ with the specified DSCP value before being forwarded. This selection requires that the DSCP field is set. You must either select a DSCP code from the menu or enter an IP DSCP value from 0 to 63 in the field next to the menu. A value that you enter in the field overrides any selection from the menu.
    The DSCP value is defined as the high-order six bits of the Service Type octet in the IP header.

12. Click the **Apply** button.

    Your settings are saved.

Rename an existing DiffServ policy

To rename an existing DiffServ policy:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > Policy Configuration**.

   The Policy Configuration page displays.

7. Select the check box next to the policy name.
8. In the **Policy Name** field, specify the new name.
9. Click the **Apply** button.

   Your settings are saved.

Change the policy attributes for an existing DiffServ policy

To change the policy attributes for an existing DiffServ policy:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > Policy Configuration**.

   The Policy Configuration page displays.

7. Click the policy name, which is a hyperlink.

   The page on which you can change the policy attributes displays.

8. Change the policy attributes as needed.
9. Click the **Apply** button.

   Your settings are saved.

Change or remove a class from an existing DiffServ policy

To change or remove a class from an existing DiffServ policy:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Policy Configuration**.

   The Policy Configuration page displays.
7. Select the check box next to the policy name.
8. Do one of the following:
   - To change the class, select another class rom the **Member Class** menu.
   - To remove the class, select **None**, from the **Member Class** menu.
9. Click the **Apply** button.

   Your settings are saved.

Delete a DiffServ policy

To delete a DiffServ policy:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Policy Configuration**.

   The Policy Configuration page displays.
7. Select the check box next to the policy name.
8. Click the **Delete** button.

   The policy is removed.

Configure the DiffServ service interface

You can assign (attach) a policy to an interface.

Attach a DiffServ policy to an interface

To attach a DiffServ policy to an interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **QoS > DiffServ > Advanced > Service Configuration**.

   The Service Configuration page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. From the **Policy In Name** menu, select a policy name.
10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 66. Service Interface Configuration information

Field	Description
Direction	The traffic direction of the policy on the service interface. The direction is always inbound (In).
Operational Status	The operational status of this service interface (either Up or Down). The operational status is shown as Up if all of the following conditions are true: • The attached class is valid and includes at least one matching rule. • The attached policy is valid and includes at least one attribute. • The port is enabled, that is, the physical link of the port is in the *up* state.

Change the DiffServ policy for an interface

To change the DiffServ policy for an interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Service Configuration**.

   The Service Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.

- **LAG**: Only LAGs are displayed.
- **All**: Both physical interfaces and LAGs are displayed.

8. Select the check box for the interface.
9. From the **Policy In Name** menu, select another policy name.
10. Click the **Apply** button.

    Your settings are saved.

Remove a DiffServ policy from an interface

To remove a DiffServ policy from an interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Service Configuration**.

   The Service Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select the check box for the interface.
9. From the **Policy In Name** menu, select **None**.

10. Click the **Apply** button.

    Your settings are saved.

Display DiffServ service statistics

You can display service-level statistical information about all interfaces to which DiffServ policies are attached.

To display DiffServ service statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **QoS > DiffServ > Advanced > Service Statistics**.

   The Service Statistics page displays.
7. Click the **Refresh** button to refresh the page with the latest information about the switch.

The following table describes the nonconfigurable information displayed on the page.

Table 67. DiffServ Service Statistics information

Field	Description
Interface	All valid port numbers on the switch with a DiffServ policy that is attached in the inbound direction.
Direction	The traffic direction of interface is inbound (In). This field shows only the direction for which a DiffServ policy is attached.

Table 67. DiffServ Service Statistics information (continued)

Field	Description
Policy Name	The name of the policy that is currently attached to the specified interface and direction.
Operational Status	The operational status of the policy that is attached to the specified interface and direction. The value is either Up or Down.
Member Classes	All DiffServ classes that are defined as members of the selected policy name. Select a member class name to display its statistics. If no class is associated with the selected policy, then the list is empty.

6

Manage Device Security

This chapter contains the following sections:

- Device admin password
- RADIUS servers
- TACACS+ servers
- Authentication lists
- Smart Control Center
- HTTP and HTPPS management access
- Management access profiles and rules
- Port authentication
- MAC filters for traffic control
- Storm control
- Port security
- Protected ports
- Private VLANs
- Access control lists

Device admin password

You can change the device admin password for the default user with the user name admin. This password applies to device UI access.

To change the device admin password for the device UI:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > User Configuration > Change Password**.

   The Change Password page displays.
7. In the **Current Password** field, enter the current password.

   The default password is **password**. The password is displayed in dots.
8. In the **New Password** field, specify the new password.

   The password must be between 8 and 20 characters in length and must include at least one uppercase letter, one lowercase letter, and one number. The password is case-sensitive.

   The password is displayed in dots.
9. In the **Confirm Password** field, enter the password again to confirm that you entered it correctly.

   The password is displayed in dots.

10. Click the **Apply** button.

    Your settings are saved.

RADIUS servers

RADIUS servers provide additional security for networks. The RADIUS server maintains a user database, which contains per-user authentication information. The switch passes information to the configured RADIUS server, which can authenticate a user name and password before authorizing use of the network. RADIUS servers provide a centralized authentication method for the following:

- Web access
- Port access control (802.1X)

Configure the global RADIUS server settings

You can add information about one or more RADIUS servers on the network.

If you configure multiple RADIUS servers, consider the maximum delay time when you specify the maximum number of retransmissions (that is, the value that you enter in the **Max Number of Retransmits** field in the following procedure) and the time-out period (that is, the value that you enter in the **Timeout Duration** field in the following procedure) for RADIUS:

For one RADIUS server, a retransmission does not occur until the configured time-out period expires without a response from the RADIUS server. In addition. the maximum number of retransmissions for one RADIUS server must pass before the switch attempts the next RADIUS server.

Therefore, the maximum delay in receiving a RADIUS response on the switch equals the maximum number of retransmissions multiplied by the time-out period multiplied by the number of configured RADIUS servers. If the RADIUS request was generated by a user login attempt, all user interfaces are blocked until the switch receives a RADIUS response.

To configure the global RADIUS server settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > RADIUS > Global Configuration**.

   The Global Configuration page displays.

   The Current Server IP Address field is blank if no servers are configured (see Configure a RADIUS authentication server on the switch on page 323). The switch supports up to three RADIUS servers. If more than one RADIUS server is configured, the current server is the server configured as the primary server. If no server is configured as the primary server, the current server is the most recently added RADIUS server.

CAUTION:

The maximum delay in receiving a RADIUS response on the switch equals the maximum number of retransmissions multiplied by the time-out period multiplied by the number of configured RADIUS servers. If the RADIUS request was generated by a user login attempt, all user interfaces are blocked until the switch receives a RADIUS response.

7. In the **Max Number of Retransmits** field, specify the maximum number of times a request packet is retransmitted to the RADIUS server.

   The range is from 1 to 15. The default value is 4.
8. In the **Timeout Duration** field, specify the time-out value, in seconds, for request retransmissions.

   The range is from 1 to 30. The default value is 5.
9. From the **Accounting Mode** menu, select **Enable** or **Disable** to specify RADIUS accounting on the server.

   The default is Disable, which means that accounting is disabled on the RADIUS server.
10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable fields displayed on the page.

Table 68. RADIUS Configuration information

Field	Description
Current Server IP Address	The IP address of the current server. This field is blank if no servers are configured.
Number of Configured Servers	The number of configured authentication RADIUS servers. The value can range from 0 to 3.

Configure a RADIUS authentication server on the switch

You can display and configure various settings for a RADIUS server configured on the switch.

Add a primary RADIUS authentication server to the switch

To add a primary RADIUS authentication server to the switch and display or reset the RADIUS authentication server statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > RADIUS > Server Configuration**.

   The Server Configuration page displays.
7. In the **Server Address** field, specify the IP address of the RADIUS server.

8. In the **Authentication Port** field, specify the UDP port number that the server uses to verify the RADIUS server authentication.

   The range is from 1 to 65535. The default value is 1812.

9. From the **Secret Configured** menu, select **Yes**.

   You must select **Yes** before you can configure the RADIUS secret. After you add the RADIUS server, this field indicates whether the shared secret for this server was configured.

10. In the **Secret** field, type the shared secret text string used for authenticating and encrypting all RADIUS communications between the switch and the RADIUS server.

    This secret must match the one that is configured on the RADIUS server.

11. From the **Active** menu, select **Primary**.
12. From the **Message Authenticator** menu, select **Enable** or **Disable** to specify whether the message authenticator attribute for the selected server is enabled.

    The message authenticator adds protection to RADIUS messages by using an MD5 hash to encrypt each message. The shared secret is used as the key, and if the message fails to be verified by the RADIUS server, it is discarded.

13. Click the **Add** button.

    The server is added to the switch.

14. To reset the authentication server and RADIUS statistics to their default values, click the **Clear Counters** button.

The following table describes the RADIUS server statistics displayed on the page.

Table 69. RADIUS authentication server statistics information

Field	Description
Server Address	The address of the RADIUS server or the name of the RADIUS server for which the statistics are displayed.
Round Trip Time	The time interval, in hundredths of a second, between the most recent access-reply/access-challenge and the access-request that matched it from this RADIUS authentication server.
Access Requests	The number of RADIUS access-request packets sent to this server. This number does not include retransmissions.
Access Retransmissions	The number of RADIUS access-request packets retransmitted to this server.
Access Accepts	The number of RADIUS access-accept packets, including both valid and invalid packets, that were received from this server.
Access Rejects	The number of RADIUS access-reject packets, including both valid and invalid packets, that were received from this server.
Access Challenges	The number of RADIUS access-challenge packets, including both valid and invalid packets, that were received from this server.

Table 69. RADIUS authentication server statistics information (continued)

Field	Description
Malformed Access Responses	The number of malformed RADIUS access-response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included in malformed access-responses.
Bad Authenticators	The number of RADIUS access-response packets containing invalid authenticators or signature attributes received from this server.
Pending Requests	The number of RADIUS access-request packets destined for this server that did not yet time out or receive a response.
Timeouts	The number of authentication time-outs to this server.
Unknown Types	The number of RADIUS packets of unknown type that were received from this server on the authentication port.
Packets Dropped	The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

Modify the settings for a RADIUS authentication server on the switch

To modify the settings for a RADIUS authentication server on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > RADIUS > Server Configuration**.

   The Server Configuration page displays.

7. Select the check box next to the server IP address.
8. Modify the configuration for the selected server.
9. Click the **Apply** button.

   Your settings are saved.

Remove a RADIUS authentication server from the switch

To remove a RADIUS authentication server from the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > RADIUS > Server Configuration**.

   The Server Configuration page displays.
7. Select the check box next to the IP address of the server to remove.
8. Click the **Delete** button.

   The RADIUS server is removed.
9. Click the **Apply** button.

   Your settings are saved.

Configure a RADIUS accounting server

You can display and configure various settings for a RADIUS accounting server on the network.

Add a RADIUS accounting server to the switch

To add a RADIUS accounting server to the switch and display or clear the RADIUS accounting server statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > RADIUS > Accounting Server Configuration**.

   The Accounting Server Configuration page displays.

7. In the **Accounting Server Address** field, specify the IP address of the RADIUS accounting server to add.
8. In the **Port** field, specify the UDP port number that the server uses to verify the RADIUS accounting server authentication.

   The default UDP port number is 1813.

9. From the **Secret Configured** menu, select **Yes** to add a RADIUS secret in the next field.

   You must select **Yes** before you can configure the RADIUS secret. After you add the RADIUS accounting server, this field indicates whether the shared secret for this server was configured.

10. In the **Secret** field, type the shared secret to use with the specified accounting server.

11. From the **Accounting Mode** menu, select **Enable** to enable the RADIUS accounting mode.
12. Click the **Apply** button.

    Your settings are saved.
13. To reset the accounting server and RADIUS statistics to their default values, click the **Clear Counters** button.

The following table describes the RADIUS server statistics displayed on the page.

Table 70. RADIUS accounting server statistics information

Field	Description
Accounting Server Address	The accounting server associated with the statistics.
Round Trip Time (secs)	The time interval, in hundredths of a second, between the most recent accounting-response and the accounting-request that matched it from this RADIUS accounting server.
Accounting Requests	The number of RADIUS accounting-request packets sent not including retransmissions.
Accounting Retransmissions	The number of RADIUS accounting-request packets retransmitted to this RADIUS accounting server.
Accounting Responses	The number of RADIUS packets received on the accounting port from this server.
Malformed Accounting Responses	The number of malformed RADIUS accounting-response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.
Bad Authenticators	The number of RADIUS accounting-response packets that contained invalid authenticators received from this accounting server.
Pending Requests	The number of RADIUS accounting-request packets sent to this server that did not yet time out or receive a response.
Timeouts	The number of accounting time-outs to this server.
Unknown Types	The number of RADIUS packets of unknown type that were received from this server on the accounting port.
Packets Dropped	The number of RADIUS packets that were received from this server on the accounting port and dropped for some other reason.

Modify the settings for a RADIUS accounting server on the switch

To modify the settings for a RADIUS accounting server on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > RADIUS > Accounting Server Configuration**.

   The Accounting Server Configuration page displays.

7. Modify the configuration for the accounting server.
8. Click the **Apply** button.

   Your settings are saved.

Remove a RADIUS accounting server from the switch

To remove a RADIUS accounting server from the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > RADIUS > Accounting Server Configuration**.

   The Accounting Server Configuration page displays.

7. Remove the server IP address from the **Accounting Server Address** field.

   Leave the field blank.

8. Click the **Apply** button.

   Your settings are saved. The RADIUS accounting server is removed.

TACACS+ servers

TACACS+ provides a centralized user management system, while still retaining consistency with RADIUS and other authentication processes. TACACS+ provides the following services:

- **Authentication**. Provides authentication during login and through user names and user-defined passwords.
- **Authorization**. Performed at login. When the authentication session is completed, an authorization session starts using the authenticated user name. The TACACS+ server checks the user privileges.

The TACACS+ protocol ensures network security through encrypted protocol exchanges between the device and TACACS+ server.

Configure the global TACACS+ settings

You can configure the global TACACS+ settings for communication between the switch and a TACACS+ server.

To configure the global TACACS+ settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > TACACS+ > TACACS+ Configuration**.

   The TACACS+ Configuration page displays.
7. In the **Key String** field, specify the authentication and encryption key for TACACS+ communications between the switch and the TACACS+ server.

   The range is from 0 to 128. The key must match the key configured on the TACACS+ server.
8. In the **Connection Timeout** field, specify the maximum number of seconds allowed to establish a TCP connection between the switch and the TACACS+ server.

   The range is from 1 to 30 seconds. The default is 5 seconds.
9. Click the **Apply** button.

   Your settings are saved.

Add a TACACS+ server to the switch

You can add up to three TACACS+ servers with which the switch can communicate.

To add a TACACS+ server to the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security> TACACS+ > TACACS+ Server Configuration**.

   The TACACS+ Server Configuration page displays.
7. In the **TACACS+ Server** field, enter the TACACS+ server IP address.
8. In the **Priority** field, specify the priority for the TACACS+ server.

   The priority determines the order in which the TACACS+ servers are contacted when attempting to authenticate a user. A value of 0 is the highest priority. The range is from 0 to 65535.
9. In the **Port** field, specify the authentication port number for TACAS+ server sessions.

   The value must be in the range from 0 to 65535. If you do not specify a value, the switch uses the standard TCP port 49 for sessions with the server.
10. In the **Key String** field, specify the authentication and encryption key for TACACS+ communications between the device and the TACACS+ server.

    The key can be from 0 to 128 characters. The key must match the key used on the TACACS+ server.
11. In the **Connection Timeout** field, specify the time that passes before the connection between the device and the TACACS+ server times out.

    The range is from 1 to 30. If you do not specify a value, the switch uses a default value of 5 seconds.
12. Click the **Add** button.

    The server is added to the switch.

Modify the settings for a TACACS+ server on the switch

To modify the settings for a TACACS+ server on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security> TACACS+ > TACACS+ Server Configuration**.

   The TACACS+ Server Configuration page displays.
7. Select the check box next to the server IP address.
8. Modify the configuration for the selected TACACS+ server.
9. Click the **Apply** button.

   Your settings are saved.

Remove a TACACS+ server from the switch

To remove a TACACS+ server from the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security> TACACS+ > TACACS+ Server Configuration**.

   The TACACS+ Server Configuration page displays.

7. Select the check box next to the server IP address.
8. Click the **Delete** button.

   The TACACS+ server is removed.

Authentication lists

An authentication login list specifies one or more authentication methods to validate switch or port access for the admin user. You can configure a default login list.

Note: The admin user is assigned to a preconfigured list that is named defaultList and that you cannot delete.

Configure an HTTP authentication list

You can configure the default HTTP login list.

To change the HTTP authentication method for the default list:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > Authentication List > HTTP Authentication List**.

   The HTTP Authentication List page displays.

7. Select the check box next to the httpList name.
8. From the menu in the 1 column, select the authentication method that must be used first in the selected authentication login list.

   If you select a method that does not time out as the first method, such as **Local**, no other method is tried, even if you specified more than one method. User authentication occurs in the order the methods are selected. Possible methods are as follows:

   - **Local**. The user's locally stored ID and password are used for authentication. Since the Local method does not time out, if you select this option as the first method, no other method is tried, even if you specified more than one method. This is the default method. This is the default selection for Method 1.
   - **RADIUS**. The user's ID and password are authenticated using the RADIUS server. If you select **RADIUS** or **Tacacs+** as the first method and an error occurs during the authentication, the switch uses Method 2 to authenticate the user.
   - **Tacacs+**. The user's ID and password are authenticated using the TACACS+ server. If you select **RADIUS** or **Tacacs+** as the first method and an error occurs during the authentication, the switch attempts user authentication Method 2.
   - **None**. The authentication method is unspecified, that is, no authentication is required.

9. From the menu in the 2 column, select the authentication method, if any, that must be used second in the selected authentication login list.

   This is the method that is used if the first method times out. If you select a method that does not time out as the second method, the third method is not tried.

10. From the menu in the 3 column, select the authentication method, if any, that must be used third in the selected authentication login list.
11. From the menu in the 4 column, select the method, if any, that must be used fourth in the selected authentication login list.

    This is the method that is used if all previous methods time out.

12. Click the **Apply** button.

    Your settings are saved.

Configure an HTTPS authentication list

You can configure the default login list for secure HTTP (HTTPS).

To configure an HTTPS authentication list:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > Authentication List > HTTPS Authentication List**.

   The HTTPS Authentication List page displays.

7. Select the check box next to the httpsList name.
8. From the menu in the 1 column, select the authentication method that must be used first in the selected authentication login list.

   If you select a method that does not time out as the first method, such as **Local**, no other method is tried, even if you specified more than one method. This setting does not display when you first create a new login list. User authentication occurs in the order the methods are selected. Possible methods are as follows:

   - **Local**: The user's locally stored ID and password are used for authentication. Since the Local method does not time out, if you select this option as the first method, no other method is tried, even if you specified more than one method. This is the default selection for Method 1.

- **RADIUS**: The user's ID and password are authenticated using the RADIUS server. If you select **RADIUS** or **Tacacs+** as the first method and an error occurs during the authentication, the switch uses Method 2 to authenticate the user.
- **Tacacs+**: The user's ID and password are authenticated using the TACACS+ server. If you select **RADIUS** or **Tacacs+** as the first method and an error occurs during the authentication, the switch attempts user authentication Method 2.
- **None**: The authentication method is unspecified, that is, no authentication is required.

9. From the menu in the 2 column, select the authentication method, if any, that must be used second in the selected authentication login list.

   This is the method that is used if the first method times out. If you select a method that does not time out as the second method, the third method is not tried.

10. From the menu in the 3 column, select the authentication method, if any, that must be used third in the selected authentication login list.
11. From the menu in the 4 column, select the method, if any, that must be used fourth in the selected authentication login list.

    This is the method that is used if all previous methods time out.

12. Click the **Apply** button.

    Your settings are saved.

Configure the dot1x authentication list

The dot1x authentication list defines the IEEE 802.1X authentication method used for the default list. The default list is dot1xList.

To configure the dot1x authentication list:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Management Security > Authentication List > Dot1x Authentication List**.

   The Dot1x Authentication List page displays.

7. Select the check box next to dot1xList.
8. From the menu in the 1 column, select the method that must be used first in the selected authentication login list.

   The options are as follows:

   - **Radius**: The user's ID and password are authenticated using the RADIUS server instead of locally.
   - **None**: The user is not authenticated.

9. Click the **Apply** button.

   Your settings are saved.

Smart Control Center

By default, the configuration option of the Smart Control Center (SCC) utility is disabled. You still can use the SCC utility to discover the IP address of the switch, but you cannot use the utility to perform any actions on the switch. If you enable the configuration option of the SCC utility, you *can* use it to configure the switch.

For more information about the SCC utility, see Discover the switch in a network with a DHCP server using the Smart Control Center on page 24 and Discover the switch in a network without a DHCP server using the Smart Control Center on page 25.

Note: The switch administrator password is contained in each NETGEAR Switch Discovery Protocol (NSDP) packet. Therefore, to increase the switch security, the configuration option of the SCC utility is disabled by default.

To enable or disable the configuration option of the SCC:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Management Security > SCC Control**.

   The NETGEAR Smart Control Center (SCC) Utility page displays.
7. Select the one of the following SCC Admin Mode radio buttons:
   - **Enable**: The SCC utility can discover the switch and perform actions on the switch.
   - **Disable**: The SCC utility can discover the switch but cannot perform any actions on the switch. This is the default setting.
8. Click the **Apply** button.

   Your settings are saved.

HTTP and HTPPS management access

You can configure the global settings for HTTP and secure HTTP (HTTPS) access to the switch's device UI. You can also configure access control profiles and access rules.

Configure HTTP access settings

You can configure the HTTP access settings on the switch. If you access the switch device UI, HTTP is the default access method.

To configure the HTTP access settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > HTTP > HTTP Configuration**.

   The HTTP Configuration page displays.

7. In the **HTTP Session Soft Timeout** field, specify the number of minutes an HTTP session can be idle before a time-out occurs.

   The value must be in the range from 0 to 60 minutes. The default value is 5 minutes.

   After the session is inactive for the configured time, you are automatically logged out and must reenter the password to access the device UI. A value of zero means that the session does not time out.

8. In the **HTTP Session Hard Timeout** field, specify the hard time-out for HTTP sessions.

   This time-out is unaffected by the activity level of the session. The value must be in the range from 0 to 168 hours. A value of zero means that the session does not time out. The default value is 24 hours.

9. In the **Maximum Number of HTTP Sessions** field, specify the maximum number of HTTP sessions that can exist at the same time.

   The range is from 1 to 4 sessions. The default is 4 sessions.

10. Click the **Apply** button.

    Your settings are saved.

Configure HTTPS access settings

Secure HTTP (HTTPS) enables the transmission of HTTP over an encrypted Secure Sockets Layer (SSL) or Transport Layer Security (TLS) connection. When you manage the switch over the device UI, HTTPS can help ensure that communication between the management system and the switch is protected from eavesdroppers and man-in-the-middle attacks. The hash algorithms that SSL uses are MD5 and SHA-1.

To configure HTTPS access settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > HTTPS > HTTPS Configuration**.

   The HTTPS Configuration page displays.

7. Select the Admin Mode **Enable** or **Disable** radio button.

   This selection enables or disables HTTPS. The default value is Enable.

   Note: You can download SSL certificates only when HTTPS is disabled.

8. In the **HTTPS Port** field, type the HTTPS port number.

   The range is from 1025 to 65535. The default is port 443.

9. In the **HTTPS Session Soft Timeout (Minutes)** field, enter the inactivity time-out for HTTPS sessions.

   The range is from 1 to 60 minutes. The default value is 5 minutes.

10. In the **HTTPS Session Hard Timeout (Hours)** field, set the hard time-out for HTTPS sessions.

    This time-out is unaffected by the activity level of the session. The range is from 1 to 168 hours. The default is 24 hours.

11. In the **Maximum Number of HTTPS Sessions** field, enter the maximum allowable number of HTTPS sessions.

    The range is from 1 to 4 sessions. The default is 4 sessions.

12. Click the **Apply** button.

    Your settings are saved.

Browser security message with HTTPS access

After you enable HTTPS access (see Configure HTTP access settings on page 339) and you attempt to access the device UI, your browser might display a security message that your connection is not private or not secure, or that a problem with the security certificate occurred.

If such as security message displays, you cannot proceed but must take one of the following actions, depending on the browser that you are using:

- **Google Chrome**: If Google Chrome displays a *Your connection is not private* message, click the **ADVANCED** link. Then, click the **Proceed to x.x.x.x (unsafe)** link, in which **x.x.x.x** represents the IP address of the switch.
- **Apple Safari**: If Apple Safari displays a *This connection is not private message*, click the **Show Details** button. Then, click the **visit this website** link. If a warning pop-up window displays, click the **Visit Website** button. If another pop-up window displays to let you confirm changes to your certificate trust settings, enter your Mac user name and password and click the **Update Setting** button.
- **Mozilla Firefox**: If Mozilla Firefox displays a *Your connection is not secure* message, click the **ADVANCED** button. Then, click the **Add Exception** button. In the pop-up window that displays, click the **Confirm Security Exception** button.
- **Microsoft Internet Explorer**: If Microsoft Internet Explorer displays a *There is a problem with this website's security certificate* message, click the **Continue to this website (not recommended)**.
- **Microsoft Edge**: If Microsoft Edge displays a *There is a problem with this website's security certificate message* or a similar warning, select **Details > Go on to the webpage**.

Note: For information about installing a specific security certificate on the switch, see Manage certificates for HTTPS access on page 343 and Use an HTTP session to download and install an SSL security certificate file on the switch on page 468.

Manage certificates for HTTPS access

You can manage certificates for HTTPS access.

Generate an SSL certificate

Note: Before you can generate a certificate, you must disable HTTPS (see Configure HTTPS access settings on page 341) and log back in to the device UI over an HTTP session. After you generate the certificate, you can reenable HTTPS and log back in to the device UI over an HTTPS session.

To generate an SSL certificate:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Access > HTTPS > Certificate Management**.

   The Certificate Management page displays.

   The Certificate Present field displays whether a certificate is present on the switch.
7. In the Certificate Management section, select the **Generate Certificates** radio button.
8. Click the **Apply** button.

   The switch generates an SSL certificate.

   The Certificate Generation Status field shows progress information.

Delete an SSL certificate

Note: Before you can delete a certificate, you must disable HTTPS (see Configure HTTPS access settings on page 341) and log back in to the device UI over an HTTP session. After you delete the certificate, you can reenable HTTPS and log back in to the device UI over an HTTPS session.

To delete an SSL certificate:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > HTTPS > Certificate Management**.

   The Certificate Present field displays Yes.

7. In the Certificate Management section, select **Delete Certificates** radio button.
8. Click the **Apply** button.

   The certificate is removed.

Transfer an existing HTTPS certificate from a TFTP server to the switch

You can transfer a certificate file to the switch.

Note: For information about downloading and installing an SSL certificate over an HTTP session, see Use an HTTP session to download and install an SSL security certificate file on the switch on page 468.

For the switch to accept HTTPS connections from a device, the switch requires a public key certificate. You can generate a certificate externally (for example, offline) and transfer it to the switch.

Before you transfer a file from a TFTP server to the switch, the following conditions must be true:

- The file that you transfer from a TFTP server is on the server in the appropriate directory.
- The file is in the correct format.
- The switch contains a path to the TFTP server.

Note: Before you can transfer a certificate, you must disable HTTPS (see Configure HTTPS access settings on page 341) and log back in to the device UI over an HTTP session. After you transfer the certificate, you can reenable HTTPS and log back in to the device UI over an HTTPS session.

To transfer an HTTPS certificate to the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > HTTPS > Certificate Update**.

   The Certificate Update page displays.

7. From the **File Type** menu, select the type of SSL certificate to download, which can be one of the following:
   - **SSL Trusted Root Certificate PEM File**: SSL Trusted Root Certificate file (PEM Encoded)
   - **SSL Server Certificate PEM File**: SSL Server Certificate File (PEM Encoded)
   - **SSL DH Weak Encryption Parameter PEM File**: SSL Diffie-Hellman Weak Encryption Parameter file (PEM Encoded)
   - **SSL DH Strong Encryption Parameter PEM File**: SSL Diffie-Hellman Strong Encryption Parameter File (PEM Encoded)
8. From the **Server Address Type** menu, select **IPv4** or **DNS** to indicate the format for the TFTP Server IP field.

   The default is IPv4.

9. In the **TFTP Server IP** field, specify the address or host name of the TFTP server.

   The address can be an IP address in standard x.x.x.x format or a host name. The host name must start with a letter of the alphabet.

10. In the **Remote File Path** field, enter the path of the file to download.

    You can enter up to 96 characters. The default is blank.

11. In the **Remote File Name** field, enter the name of the file on the TFTP server to download.

    You can enter up to 32 characters. The default is blank.

12. Select the **Start File Transfer** check box.
13. Click the **Apply** button.

    The file transfer starts. A status message displays during the transfer and upon successful completion of the transfer.

Management access profiles and rules

Access control allows you to configure an access control profile and set rules for access to the device UI, access by SNMP stations, and client access to a TFTP server. We refer to an access control profile as an access profile. You can add a single access profile, which you can configure, activate, or deactivate.

CAUTION:

If you configure a security access profile incorrectly and you activate the access profile, you might no longer be able to access the switch's device UI. If that situation occurs, you must reset the switch to factory default settings (see Reset to factory default settings on page 458).

Add an access profile

You can set up a single security access profile with which you can associate an access rule configuration.

To add an access profile:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Access > Access Control > Access Profile Configuration**.

   The Access Profile Configuration page displays.
7. In the **Access Profile Name** field, enter the name of the access profile to be added.

   The maximum length is 32 characters.
8. Click the **Apply** button.

   Your settings are saved. By default, the access profile is deactivated. After you add rules, you can activate the access profile.

Add a rule to the access profile

After you add the access profile, you can add one or more security access rules to the access profile.

If you access the switch from a computer, make sure that you add a permit rule for the type of service that you use (for example, HTTPS), your computer's IP address, and your computer's subnet mask.

CAUTION:

You must add a permit rule for your device and access method, otherwise you are locked out from the switch after you activate the access profile. If that situation occurs, you must reset the switch to factory default settings (see Reset to factory default settings on page 458).

To add a rule to the access profile:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > Access Control > Access Rule Configuration**.

   The Access Rule Configuration page displays.

7. From the **Rule Type** menu, select **Permit** or **Deny** to permit or deny access when the selected rules are matched.

A Permit rule allows access from a device that matches the rule criteria. A Deny rule blocks a device that matches the rule criteria.

8. From the **Service Type** menu, select the access method to which the rule is applied.

   The policy is restricted by the selected access method. Possible access methods are **TFTP**, **HTTP, Secure HTTP (SSL)**, and **SNMP**.

9. In the **Source IP Address** field, enter the source IP address from which the management traffic originates.
10. In the **Mask** field, specify the subnet mask from which the management traffic originates.
11. In the **Priority** field, assign a priority to the rule.

    The rules are validated against the incoming management request in ascending order of their priorities. If a rule matches, the action is performed and subsequent rules below that rule are ignored. For example, if a source IP address 10.10.10.10 is configured with priority 1 to permit, and the same source IP address 10.10.10.10 is also configured with priority 2 to deny, then access is permitted if the profile is active, and the second rule is ignored.

12. Click the **Add** button.

    The access rule is added.

Activate the access profile

After you add rules to the access profile, you can activate the access profile.

CAUTION:

If you configure a security access profile incorrectly and you activate the access profile, you might no longer be able to access the switch's device UI. If that situation occurs, you must reset the switch to factory default settings (see Reset to factory default settings on page 458).

To activate the access profile:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Access > Access Control > Access Profile Configuration**.

   The Access Profile Configuration page displays. The **Deactivate Profile** check box is selected.
7. Select the **Activate Profile** check box.
8. Click the **Apply** button.

   Your settings are saved and the access profile is now active.

Display the access profile summary and the number of filtered packets

After you added rules to the active profile, you can display the entries in the summary. If the access profile is active, you can also display the number of filtered packets.

To display the access profile summary and the number of filtered packets:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > Access Control > Access Profile Configuration**.

   The Access Profile Configuration page displays.

   The Packets Filtered field displays the number of packets filtered.

7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the nonconfigurable data that is displayed.

Table 71. Access profile configuration profile summary

Field	Description
Rule Type	The action performed when the rules match.
Service Type	The service type selected. The policy is restricted by the selected service type.
Source IP Address	The source IP address of the client originating the management traffic.
Mask	The subnet mask of the IP Address.
Priority	The priority of the rule.

Deactivate an access profile

You can deactivate an access profile.

To deactivate an access profile:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > Access Control > Access Profile Configuration**.

   The Access Profile Configuration page displays. The **Activate Profile** check box is selected.

7. Select the **Deactivate Profile** check box.
8. Click the **Apply** button.

   Your settings are saved and the access profile is now deactivated.

Remove an access profile

You can remove an access profile that you no longer need. Before you can remove the access profile, you must deactivate it (see Deactivate an access profile on page 351).

To remove an access profile:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Access > Access Control > Access Profile Configuration**.

   The Access Profile Configuration page displays. The **Deactivate Profile** check box is selected.

7. Select the **Remove Profile** check box.

8. Click the **Apply** button.

   The access profile is removed.

Port authentication

With port-based authentication, when 802.1X is enabled globally and on the port, successful authentication of any one supplicant attached to the port results in all users being able to use the port without restrictions. At any time, only one supplicant is allowed to attempt authentication on a port in this mode. Ports in this mode are under bidirectional control. This is the default authentication mode. 802.1X is also referred to as dot1x.

An 802.1X network includes three components:

- **Authenticator**: The port that is authenticated before access to system services is permitted.
- **Supplicant**: The host that is connected to the authenticated port requesting access to the system services.
- **Authentication Server**: The external server, for example, the RADIUS server that performs the authentication on behalf of the authenticator, and indicates whether the supplicant is authorized to access system services.

Configure the global 802.1X settings

You can configure global port access control settings on the switch.

To globally enable the 802.1X features:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Port Authentication > Basic > 802.1X Configuration**.

   The 802.1X Configuration page displays.

7. Configure the following port authentication settings:
   - **Port Based Authentication State**: This selection specifies the 802.1X administrative mode on the switch. The default value is Disable.
     - **Enabled**: If 802.1X is enabled, authentication is performed by a RADIUS server. This means that the primary authentication method must be RADIUS. To set the method, select **Security > Management Security > Authentication List** and select **RADIUS** as method 1 for defaultList. For more information, see Authentication lists on page 334.
     - **Disabled**: When port-based authentication is globally disabled, the switch does not check for 802.1X authentication before allowing traffic on any ports, even if the ports are configured to allow only authenticated users.
   - **VLAN Assignment Mode**: This selection specifies whether a port can be placed in a particular VLAN. The default value is Disable.

     When enabled, this feature allows a port to be placed into a particular VLAN based on the result of the authentication or type of 802.1X authentication a client uses when it accesses the device. The authentication server can provide information to the device about which VLAN to assign the supplicant.

   - **Dynamic VLAN Creation Mode**: This selection specifies whether a VLAN can be dynamically created. The default value is Disable.

     If RADIUS-assigned VLANs are enabled, the RADIUS server includes the VLAN ID in the 802.1X tunnel attributes of its response message to the device. If dynamic VLAN creation is enabled on the device and the RADIUS-assigned VLAN does not exist, the assigned VLAN is dynamically created. This means that the client can connect from any port and is assigned to the appropriate VLAN. This feature gives flexibility for clients to move around the network without much additional configuration required.

   - **EAPOL Flood Mode**: This selection specifies whether Extensible Authentication Protocol (EAP) over LAN (EAPoL) flood support is enabled on the switch. The default value is Disable.

8. Click the **Apply** button.

   Your settings are saved.

Manage port authentication on individual ports

You can enable and configure port access control on one or more physical ports.

Configure 802.1X settings for a port

To configure 802.1X settings for a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Port Authentication > Advanced > Port Authentication**.

   The Port Authentication page displays.
7. Use the horizontal scroll bar at the bottom of the page to view all the fields.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. Specify the following settings:
   - **Port Control**: Defines the port authorization state. The control mode is set only if the link status of the port is link up. Select one of the following options:

  - **Auto**: The switch automatically detects the mode of the interface. This is the default setting.
  - **Authorized**: The switch places the interface into an authorized state without being authenticated. The interface sends and receives normal traffic without client port-based authentication.
  - **Unauthorized**: The switch denies the selected interface system access by moving the interface into unauthorized state. The switch cannot provide authentication services to the client through the interface.
  - **MAC Based**: This mode allows multiple supplicants connected to the same port to each authenticate individually. Each host connected to the port must authenticate separately in order to gain access to the network. The hosts are distinguished by their MAC addresses.
- **MAB**: Specify whether to enable or disable MAC-based Authentication Bypass (MAB) for 802.1x-unaware clients at the specified port. MAB only functions if the selection from the **Port Control** menu is **MAC Based**. By default, MAB is disabled.
- **Guest VLAN ID**: Specify the VLAN ID for the guest VLAN. The range is from 0 to 4093. The default value is 0. Enter 0 to reset the guest VLAN ID on the interface. The guest VLAN allows the port to provide a distinguished service to unauthenticated users, after three authentication failures. This feature provides a mechanism to allow users access to hosts on the guest VLAN.
- **Guest VLAN Period**: Specify the time in seconds that the selected port remains in the quiet state following a failed authentication exchange. The guest VLAN time-out must be a value in the range from 1 to 300. The default value is 90 seconds.
- **Unauthenticated VLAN ID**: Specify the VLAN ID of the unauthenticated VLAN for the selected port. The range is from 0 to 4093. The default value is 0. Hosts that fail the authentication might be denied access to the network or placed on a VLAN created for unauthenticated clients. This VLAN might be configured with limited network access.
- **Periodic Reauthentication**: Select **Enable** to allow periodic reauthentication of the supplicant for the specified port. If you select **Disable**, connected clients are not forced to reauthenticate periodically. The default is Disable.
- **Reauthentication Period**: Specify the time in seconds after which reauthentication of the supplicant occurs. The reauthentication period must be a value in the range from 1 to 65535. The default value is 3600 seconds.
- **Quiet Period**: Specify the time in seconds that the port remains in the quiet state following a failed authentication exchange. While in the quite state, the port does not attempt to acquire a supplicant. The quite state period must be a value in the range from 0 to 65535. A value of 0 means that the port remains in the quiet state and never attempts to acquire a supplicant. The default value is 60 seconds.
- **Resending EAP**: Specify the EAP retransmit period for the selected port. The transmit period is the time in seconds, after which an EAPoL EAP Request/Identify frame is resent to the supplicant. The retransmit period must be a value in the range from 1 to 65535. The default value is 30 seconds.

- **MAX EAP Requests**: Specify the maximum number of EAP requests for the selected port. The value is the maximum number of times an EAPoL EAP Request/Identity message is retransmitted before the supplicant times out. The maximum number of EAP requests must be a value in the range from 1 to 10. The default value is 2.
- **Supplicant Timeout**: Specify the supplicant time-out for the selected port. The supplicant time-out is the time in seconds after which the supplicant times out. The supplicant time-out period must be a value in the range from 1 to 65535. The default value is 30 seconds.
- **Server Timeout**: Specify the time in seconds that elapses before the switch resends a request to the authentication server. The server time-out period must be a value in the range from 1 to 65535. The default value is 30 seconds.

10. Click the **Apply** button.

Your settings are saved.

The following table describes the port authentication status information available on the page.

Table 72. Port authentication status information

Field	Description
Control Direction	The control direction for the specified port, which is always Both. The control direction dictates the degree to which protocol exchanges take place between supplicant and authenticator.The unauthorized controlled port exerts control over communication in both directions (disabling both incoming and outgoing frames).
Protocol Version	The protocol version associated with the selected port. The only possible value is 1, corresponding to the first version of the 802.1X specification.
PAE Capabilities	The port access entity (PAE) functionality of the selected port. The option is Authenticator or Supplicant.
Authenticator PAE State	The current state of the authenticator PAE state machine. The options are as follows: • Initialize • Disconnected • Connecting • Authenticating • Authenticated • Aborting • Held • ForceAuthorized • ForceUnauthorized
Backend State	The current state of the backend authentication state machine. The options are as follows: • Request • Response • Success • Fail • Timeout • Initialize • Idle

Initialize 802.1X on a port

To initialize 802.1X on a port:

Connect your computer to the same network as the switch.

You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

11. Launch a web browser.
12. In the address field of your web browser, enter the IP address of the switch.

    If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

    The Device UI login page displays.

    If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

13. Enter one of the following passwords:
    - Enter your device admin password.
    - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

    For information about the credentials, see Credentials for the device UI on page 30.

14. Click the **Go** button.

    The System Information page displays.

15. Select **Security > Port Authentication > Advanced > Port Authentication**.

    The Port Authentication page displays.

16. Select the check box for the port.
17. Click the **Initialize** button.

    802.1X on the selected interface is reset to the initialization state. Traffic sent to and from the port is blocked during the authentication process. This button is available only if the control mode is auto. When you click this button, the action is immediate. You do not need to click the **Apply** button for the action to occur.

Restart the 802.1X authentication process on a port

To restart the 802.1X authentication process on a port:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Port Authentication > Advanced > Port Authentication**.

   The Port Authentication page displays.
7. Select the check box for the port.
8. Click the **Reauthenticate** button.

   The selected port is forced to restart the authentication process.This button is available only if the control mode is auto. If the button is not selectable, it is grayed out. When you click this button, the action is immediate. You do not need to click the **Apply** button for the action to occur.

Display the port summary

You can display summary information about the port-based authentication settings for each port.

To display the port summary:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Port Authentication > Advanced > Port Summary**.

   The Port Summary page displays.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.

The following table describes the fields on the Port Summary page.

Table 73. Port summary

Field	Description
Port	The port whose settings are displayed in the current table row.
Control Mode	This field indicates the configured control mode for the port. The options are as follows: • **Force Unauthorized**: The authenticator port access entity (PAE) unconditionally sets the controlled port to unauthorized. • **Force Authorized**: The authenticator PAE unconditionally sets the controlled port to authorized. • **Auto**: The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator, and the authentication server. • **MAC Based**: The authenticator PAE sets the controlled port mode to reflect the outcome of authentication exchanges between a supplicant, an authenticator, and an authentication server on a per supplicant basis.
Operating Control Mode	The control mode under which the port is actually operating. The options are as follows: • ForceUnauthorized • ForceAuthorized • Auto • MAC Based • N/A: If the port is in detached state, the value is N/A because the port cannot participate in port access control.
Reauthentication Enabled	Indicates if reauthentication of the supplicant is allowed. If the value is True, reauthentication is allowed. Otherwise, reauthentication is not allowed.
Port Status	The authorization status of the specified port. The options are Authorized, Unauthorized, and N/A. If the port is in detached state, the value is N/A because the port cannot participate in port access control.

Display the client summary

You can display information about supplicant devices that are connected to the local authenticator ports. If no active 802.1X sessions exist, the table is empty.

To display the client summary:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Port Authentication > Advanced > Client Summary**.

   The Client Summary page displays.

The following table describes the fields on the Client Summary page.

Table 74. Client Summary information

Field	Description
Port	The port to be displayed.
User Name	The user name representing the identity of the supplicant device.
Supplicant Mac Address	The supplicant's device MAC address.
Session Time	The time since the supplicant logged in seconds.
Filter ID	The policy filter ID assigned by the authenticator to the supplicant device.
VLAN ID	The VLAN ID assigned by the authenticator to the supplicant device.
VLAN Assigned	The reason for the VLAN ID assigned by the authenticator to the supplicant device.

Table 74. Client Summary information (continued)

Field	Description
Session Timeout	The session time-out imposed by the RADIUS server on the supplicant device.
Termination Action	The termination action imposed by the RADIUS server on the supplicant device.

MAC filters for traffic control

You can create MAC filters that limit the traffic allowed into and out of specified ports on the switch. The traffic limitations are based on MAC addresses.

Create a MAC filter

If a packet with a MAC address and VLAN ID that you specify for a filter is received on a port that is not part of the inbound filter, the packet is dropped.

A packet with a MAC address and VLAN ID that you specify for a filter can be transmitted only from a port that is part of the outbound filter.

To create a MAC filter:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

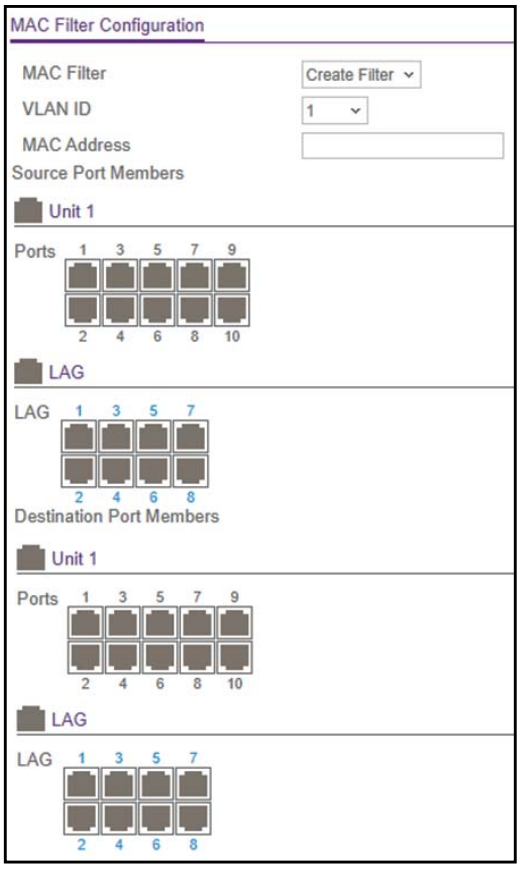
   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Traffic Control > MAC Filter > MAC Filter Configuration**.



7. From the **MAC Filter** menu, select **Create Filter**.

   If you did not configure any filters, this is the only option available.

8. From the **VLAN ID** menu, select the VLAN that must be used with the MAC address.
9. In the **MAC Address** field, specify the MAC address of the filter in the format XX:XX:XX:XX:XX:XX.

   You cannot define filters for the following MAC addresses:

   - 00:00:00:00:00:00
   - 01:80:C2:00:00:00 to 01:80:C2:00:00:0F
   - 01:80:C2:00:00:20 to 01:80:C2:00:00:21
   - FF:FF:FF:FF:FF:FF

10. In the Port and LAG tables in the Source Port Members section, select the ports and LAGs that must be included in the inbound filter.

    If a packet with the MAC address and VLAN ID that you specify is received on a port that is not part of the inbound filter, the packet is dropped.

11. In the Port and LAG tables in the Destination Port Members section, select the ports and LAGs that must be included in the outbound filter.

A packet with the MAC address and VLAN ID that you specify can be transmitted only from a port that is part of the outbound filter.

Note: Destination ports can be included only in a multicast filter. A multicast filter is determined by the MAC address that you enter in the **MAC Address** field.

12. Click the **Apply** button.

    Your settings are saved.

Delete a MAC filter

You can remote an existing MAC filter that you no longer need.

To delete a MAC filter:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > MAC Filter > MAC Filter Configuration**.

   The MAC Filter Configuration page displays.
7. From the **MAC Filter** menu, select the MAC filter.
8. Click the **Delete** button.

   The filter is removed.

Display the MAC filter summary

You can display the MAC filters that are configured on the switch.

To display the MAC filter summary:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > MAC Filter > MAC Filter Summary**.
7. The MAC Filter Summary page displays.

The following table describes the information displayed on the page.

Table 75. MAC Filter Summary information

Field	Description
MAC Address	The MAC address of the filter in the format XX:XX:XX:XX:XX:XX.
VLAN ID	The VLAN ID used with the MAC address to fully identify packets you want filtered.
Source Port Members	The ports to be used for filtering inbound packets.
Destination Port Members	The ports to be used for filtering outbound packets.

Storm control

A broadcast storm is the result of an excessive number of broadcast messages simultaneously transmitted across a network by a single port. Forwarded message responses can overload network resources, cause the network to time out, or do both.

The switch measures the incoming packet rate per port for broadcast, multicast, unknown, and unicast packets and discards packets if the rate exceeds the defined value. You enable storm control per interface, by defining the packet type and the rate at which the packets are transmitted.

Configure global storm control settings

The global storm control settings apply to all ports. After you configure the global settings, you can specify storm control settings for one or more ports.

To configure global storm control settings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Storm Control**.

   The Storm Control page displays.

7. In the Storm Control section, from the **Ingress Control Mode** menu, select one of the following modes for storm control:
   - **Disabled**: Storm control is disabled. This is the default setting.
   - **Unknown Unicast**: If the rate of incoming unknown Layer 2 unicast traffic (that is, traffic for which a destination lookup failure occurs) increases beyond the configured threshold on an interface, the traffic is dropped.
   - **Multicast**: If the rate of incoming Layer 2 multicast traffic increases beyond the configured threshold on an interface, the traffic is dropped.
   - **Broadcast**: If the rate of incoming Layer 2 broadcast traffic increases beyond the configured threshold on an interface, the traffic is dropped.
8. If the selection from the **Ingress Control Mode** menu is *not* **Disabled**, specify whether the ingress control mode is enabled by selecting **Enable** or **Disable** from the **Status** menu.
9. In the **Threshold** field, specify the maximum rate at which unknown packets are forwarded.

   The range is a percent of the total threshold between 0 and 100%. The default is 5%.
10. From the **Control Action** mode menu, select one of the following options:
    - **None**: No action is taken. This is the default setting.
    - **Trap**: If the configured threshold of the broadcast storm is exceeded, a trap is sent.
    - **Shutdown**: If the configured threshold of the broadcast storm is exceeded, the port is shut down.
11. Click the **Apply** button.

    Your settings are saved.

Configure storm control settings for one or more ports

After you configure the global settings, you can specify storm control settings for one or more ports.

To configure storm control settings for one or more ports:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Storm Control**.

   The Storm Control page displays.

   The default settings in the Port Settings section depends on the global storm control settings (see Configure global storm control settings on page 366), which apply to all ports.
7. In the Port Settings section, select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
8. From the **Status** menu, specify whether the ingress control mode is enabled for the port by selecting **Enable** or **Disable**.
9. In the **Threshold** field, specify the maximum rate at which unknown packets are forwarded for the port.

   The range is a percent of the total threshold between 0 and 100%. The default is 5%.
10. From the **Control Action** mode menu, select one of the following options for the port:
    - **None**: No action is taken. This is the default setting.
    - **Trap**: If the threshold of the configured broadcast storm is exceeded, a trap is sent.
    - **Shutdown**: If the threshold of the configured broadcast storm is exceeded, the port is shut down.
11. Click the **Apply** button.

    Your settings are saved.

Port security

Port security lets you lock one or more ports on the switch. When a port is locked, the port can only forward packets with a source MAC addresses that you specifically allowed. The port discards all other packets.

Configure the global port security mode

To configure the global port security mode:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Port Security > Port Security Configuration**.

   The Port Security Configuration page displays.

   The page also shows the Port Security Violations table.
7. To enable port security on the switch, select the Port Security Mode **Enable** radio button.

   The default is Disable.
8. Click the **Apply** button.

   Your settings are saved.

   By default, port security is disabled for individual ports.

Note: After you enable port security for individual ports (see Configure a port security interface on page 370), you can return to this page and click the **Refresh** button to refresh the page with the latest information about the ports.

The Port Security Violations table shows information about violations that occurred on ports that are enabled for port security.

The following table describes the fields in the Port Security Violations table.

Table 76. Port Security Violations information

Field	Description
Port	The physical interface.
Last Violation MAC	The source MAC address of the last packet that was discarded at a locked port.
VLAN ID	The VLAN ID corresponding to the last MAC address violation.

Configure a port security interface

A MAC address can be defined as allowed on a port by one of two methods: dynamically or statically. Both methods can occur concurrently when a port is locked.

Dynamic locking implements a first arrival mechanism for port security. You specify how many addresses can be learned on the locked port. If the limit is not reached, a packet with an unknown source MAC address is learned and forwarded normally. If the limit is reached, no more addresses are learned on the port. Any packets with source MAC addresses that were not already learned are dropped.

Static locking allows you to specify a list of MAC addresses that are allowed on a port. The behavior of packets is the same as for dynamic locking: only packets with an allowable source MAC address can be forwarded.

To configure a port security interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Port Security > Interface Configuration**.

   The Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. Specify the following settings:
   - **Port Security**: Enable or disable the port security feature for the selected interfaces The default is Disable.
   - **Max Learned MAC Address**: Specify the maximum number of dynamically learned MAC addresses on the selected interfaces. The default is 4096. If you specify 0, the interface does not learn any MAC addresses.
   - **Max Static MAC Address**: Specify the maximum number of statically locked MAC addresses on the selected interfaces. The default is 48.
   - **Enable Violation Shutdown**: Enable or disable shutdown of the selected interfaces if a packet with a disallowed MAC address is received. The default value is No, which means that the option is disabled.
   - **Enable Violation Traps**: Enable or disable the sending of new violation traps if a packet with a disallowed MAC address is received. The default value is No, which means that the option is disabled.
10. Click the **Apply** button.

    Your settings are saved.

Display learned security MAC addresses and convert them to static MAC addresses

After you enable port security globally (see Configure the global port security mode on page 369) and enable port security for specific interfaces (see Configure a port security interface on page 370), you can convert a dynamically learned MAC address to a statically locked address.

To display learned MAC addresses for an individual interface or LAG and convert these MAC addresses to static MAC addresses:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Port Security > Security MAC Address**.

   The Security MAC Address page displays.
7. From the **Port List** menu, select the interface.

   Port security must be enabled on the selected interface.

   The Dynamic MAC Address table displays the MAC addresses and their associated VLANs that were learned on the selected interface.

Field	Description
VLAN ID	The VLAN ID corresponding to the MAC address.
MAC Address	The MAC addresses learned on a specific interface.

8. To convert the dynamically learned MAC address to a statically locked addresses, select the **Convert Dynamic Address to Static** check box.
9. Click the **Apply** button.

   The dynamic MAC address entries are converted to static MAC address entries in a numerically ascending order until the static limit is reached.

   The Number of Dynamic MAC Addresses Learned field displays the number of dynamically learned MAC addresses on a specific port.
10. To refresh the page with the latest information about the switch, click the **Refresh** button.

Protected ports

If you configure a port as protected, it does not forward traffic to any other protected port on the switch, but it does forward traffic to unprotected ports. You can configure the ports as protected or unprotected. By default, all ports are unprotected.

To configure protected ports:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Protected Port**.

   The Protected Port page displays.
7. In the Ports table, click each port that you want to configure as a protected port.

Protected ports are marked with a check mark. No traffic forwarding is possible between two protected ports.

8. Click the **Apply** button.

   Your settings are saved.

Private VLANs

A private VLAN separates a regular VLAN domain into two or more subdomains. Each subdomain is defined (represented) by a primary VLAN and a secondary VLAN:

- **Primary VLAN**: The primary VLAN ID is the same for all subdomains that belong to a private VLAN.
- **Secondary VLAN**: The secondary VLAN ID differentiates subdomains from each other and provides Layer 2 isolation between ports of the same private VLAN.

A private VLAN contains switch ports that cannot communicate with each other, but can access another network. These ports are called private ports. Each private VLAN contains one or more private ports and a single uplink port or uplink aggregation group. Note that all traffic between private ports is blocked at all layers, not just Layer 2 traffic, but also traffic such as FTP, HTTP, and Telnet.

Within a private VLAN, three types of VLANs can exist:

- **Primary VLAN**: The VLAN forwards traffic from promiscuous ports to isolated ports, community ports, and other promiscuous ports in the same private VLAN. In a private VLAN, you can configure one primary VLAN only. All ports in a private VLAN share the same primary VLAN.
- **Isolated VLAN**: The VLAN is a secondary VLAN that carries traffic from isolated ports to promiscuous ports. In a private VLAN, you can configure one isolated VLAN only.
- **Community VLAN**: The VLAN is a secondary VLAN that forwards traffic between ports that belong to the same community and to the promiscuous ports. IN a private VLAN, you can configure multiple community VLANs.

Within a private VLAN, the switch supports three types of port designations:

- **Promiscuous port**: The port is a member of a primary VLAN (within the private VLAN) and can communicate with all types of ports in the private VLAN, including other promiscuous ports, community ports, and isolated ports.
- **Community port**: The port is a host port that is a member of a community VLAN (a secondary VLAN within the private VLAN) and that can communicate with other community ports and promiscuous ports.
- **Isolated port**: The port is a host port that is a member of an isolated VLAN (a secondary VLAN within the private VLAN) and that can communicate with promiscuous ports only.

Configure a private VLAN type

To configure a private VLAN type:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Traffic Control > Private VLAN > Private VLAN Type Configuration**.

   The Private VLAN Type Configuration page displays.

7. Select the check box for the VLAN.
8. From the **Private VLAN Type** menu, select the type of private VLAN:
   - **Unconfigured**: The VLAN is not a private VLAN. This the default setting.
   - **Primary**: The VLAN forwards traffic from promiscuous ports to isolated ports, community ports, and other promiscuous ports in the same private VLAN. In a private VLAN, you can configure one primary VLAN only. All ports in a private VLAN share the same primary VLAN.
   - **Isolated**: The VLAN is a secondary VLAN that carries traffic from isolated ports to promiscuous ports. In a private VLAN, you can configure one isolated VLAN only.
   - **Community**: The VLAN is a secondary VLAN that forwards traffic between ports that belong to the same community and to the promiscuous ports. In a private VLAN, you can configure multiple community VLANs.
9. Click the **Apply** button.

   Your settings are saved.

Configure a private VLAN association with a primary and secondary VLAN

To configure a private VLAN association with a primary and secondary VLAN:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Private VLAN > Private VLAN Association Configuration**.

   The Private VLAN Association Configuration page displays.
7. If you are changing an existing private VLAN association, select the check box for the private VLAN association.
8. Form the **Primary VLAN** menu, select the primary VLAN ID for the private VLAN.

   This selection specifies the primary VLAN within the private VLAN. You can associate secondary VLANs in the private VLAN with this primary VLAN.

   For information about configuring a primary VLAN for the private VLAN, see Configure a private VLAN type on page 375.
9. In the **Secondary VLANs** field, specify one or more secondary VLANs for the private VLAN.

   This selection specifies secondary VLANs (isolated VLANs, community VLANs, or a combination of both) within the private VLAN. The secondary VLANs are associated with the primary VLAN in the private VLAN.

You can specify a single VLAN ID, a range of VLAN IDs, or a combination of both in sequence separated by a comma (,):

- You can specify individual VLAN ID, such as 10.
- You can specify the VLAN range values separated by a hyphen, for example, 10-13.
- You can specify the combination of both separated by commas, for example: 12,15,40–43,1000–1005, 2000.

For information about configuring an isolated or community VLAN for the private VLAN, see Configure a private VLAN type on page 375.

10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 77. Private VLAN Association

Field	Description
Isolated VLAN	The isolated VLAN associated with the selected primary VLAN.
Community VLAN(s)	The list of community VLANs associated with the selected primary VLAN.

Remove an existing private VLAN association

You can remove a private VLAN association that you no longer need.

To remove a private VLAN association:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Traffic Control > Private VLAN > Private VLAN Association Configuration**.

   The Private VLAN Association Configuration page displays.

7. Select the check box for the private VLAN association.
8. Click the **Delete** button.

   Your settings are saved. The private VLAN association is removed.

Configure the private VLAN port mode

The private plan port mode determines if a port (or LAG) can function in Host mode for a primary or secondary VLAN (within a private VLAN) or in Promiscuous mode for a promiscuous VLAN (within a private VLAN).

To configure the private VLAN port mode:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Traffic Control > Private VLAN > Private VLAN Port Mode Configuration**.

   The Private VLAN Port Mode Configuration page displays.

7. From the **Port VLAN Mode** menu, select the private VLAN port mode:
   - **General**: The port functions in general mode and not as a port in a private VLAN. This is the default setting.
   - **Host**: The port functions in host mode in a private VLAN. In this mode, the port can be member of a community VLAN or isolated VLAN:
     - **Community VLAN**: The port is a member of a secondary VLAN (within the private VLAN) and can communicate with other community ports and promiscuous ports.
     - **Isolated VLAN**: The port is a member of a secondary VLAN (within the private VLAN) and can communicate only with promiscuous ports.

     To configure a host port to be a member of specific VLANs, see Configure primary and secondary VLANs on a private VLAN host interface on page 379.
   - **Promiscuous**: The port functions in promiscuous mode in a private VLAN. In this mode, the port can communicate with all types of ports in the private VLAN, including other promiscuous ports, community ports, and isolated ports.

     To configure a promiscuous port to be a member of specific VLANs, see Configure primary and secondary VLANs on a private VLAN promiscuous interface on page 382.
8. Click the **Apply** button.

   Your settings are saved.

Configure primary and secondary VLANs on a private VLAN host interface

If you configure the private VLAN port mode of an interface as Host (see Configure the private VLAN port mode on page 378), you can configure a specific primary and secondary VLAN on the interface.

To configure a primary and secondary VLANs on a private VLAN host interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Private VLAN > Private VLAN Host Interface Configuration**.

   The Private VLAN Host Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. In the **Host Primary VLAN** field, specify a primary VLAN ID.

   You can select a VLAN for which you configured the type as Primary (see Configure a private VLAN type on page 375).
10. In the **Host Secondary VLAN** field, specify a secondary VLAN ID.

    You can select a VLAN for which you configured the type as Isolated or Community, both of which are secondary VLAN types within a private VLAN (see Configure a private VLAN type on page 375).
11. Click the **Apply** button.

    Your settings are saved.

    The Operational VLAN fields shows the primary and secondary VLANs that operate on the host interface. In this context, an operational VLAN means a fully and correctly configured VLAN that can process traffic.

Remove primary and secondary VLANs from a private VLAN host interface

You can remove primary and secondary VLANs that you no longer need on a private VLAN host interface.

To remove primary and secondary VLANs from a private VLAN host interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Private VLAN > Private VLAN Host Interface Configuration**.

   The Private VLAN Host Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.

- To configure all interfaces with the same settings, select the check box in the heading row.

9. Click the **Delete** button.

   Your settings are saved. The primary and secondary VLANs are removed. The VLANs themselves are not deleted.

Configure primary and secondary VLANs on a private VLAN promiscuous interface

If you configure the private VLAN port mode of an interface as Promiscuous (see Configure the private VLAN port mode on page 378), you can configure a specific primary VLAN and one or more secondary VLANs on the interface.

To configure primary and secondary VLANs on a private VLAN promiscuous interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > Traffic Control > Private VLAN > Private VLAN Promiscuous Interface Configuration**.

   The Private VLAN Promiscuous Interface Configuration page displays.

7. In the **Promiscuous Primary VLAN** field, specify a primary VLAN ID.

   You can select a VLAN for which you configured the type as Primary (see Configure a private VLAN type on page 375).

8. In the **Promiscuous Secondary VLAN IDs** field, specify one or more secondary VLAN IDs.

   You can select VLANs for which you configured the type as Isolated or Community, both of which are secondary VLAN types within a private VLAN (see Configure a private VLAN type on page 375).

   You can specify a single VLAN ID, a range of VLAN IDs, or a combination of both in sequence separated by a comma (,):

   - You can specify individual VLAN ID, such as 10.
   - You can specify the VLAN range values separated by a hyphen, for example, 10-13.
   - You can specify the combination of both separated by commas, for example: 12,15,40–43,1000–1005, 2000.

   Note: The VLAN IDs that you specify overwrites the secondary VLANs that you configured on the Private VLAN Association Configuration page (see Configure a private VLAN association with a primary and secondary VLAN on page 376).

9. Click the **Apply** button.

   Your settings are saved.

   The Operational VLAN fields shows the primary and secondary VLANs that operate on the promiscuous interface. In this context, an operational VLAN means a fully and correctly configured VLAN.

Remove primary and secondary VLANs from a private VLAN promiscuous interface

You can remove primary and secondary VLANs that you no longer need on a private VLAN promiscuous interface.

To remove primary and secondary VLANs from a private VLAN promiscuous interface:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > Traffic Control > Private VLAN > Private VLAN Promiscuous Interface Configuration**.

   The Private VLAN Promiscuous Interface Configuration page displays.
7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To configure a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To configure multiple interfaces with the same settings, select the check box associated with each interface.
   - To configure all interfaces with the same settings, select the check box in the heading row.
9. Click the **Delete** button.

   Your settings are saved. The primary and secondary VLANs are removed. The VLANs themselves are not deleted.

Access control lists

Access control lists (ACLs) ensure that only authorized users can access specific resources while blocking any unwarranted attempts to reach network resources. ACLs are used to provide traffic flow control, restrict contents, decide which types of traffic are forwarded or blocked, and provide security for the network. The switch supports a total of 100 ACLs, which can be a combination of MAC ACLs, basic IPv4 ACL, extended IPv4 ACLs, and IPv6 ACLs.

To configure an ACL:

1. Create an IPv4-based, IPv6-based, or MAC-based ACL ID.
2. Create a rule and assign it to a unique ACL ID.

3. Define the rules, which can identify protocols, source, and destination IP and MAC addresses, and other packet-matching criteria.
4. Use the ID number to assign the ACL to a port or to a LAG.

To view ACL configuration examples, see Access control lists (ACLs) on page 485.

Use the ACL Wizard to create a simple ACL

The ACL Wizard helps you create a simple ACL and apply it to the selected ports easily and quickly. First, select an ACL type to use when you create an ACL. Then add an ACL rule to this ACL and apply this ACL on the selected ports.

Note: The steps in the following procedure describe how you can create an ACL based on the destination MAC address. If you select a different type of ACL (or example, an ACL based on a source IPv4), the page displays different information.

Use the ACL Wizard to create an ACL

To use the ACL Wizard to create an ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

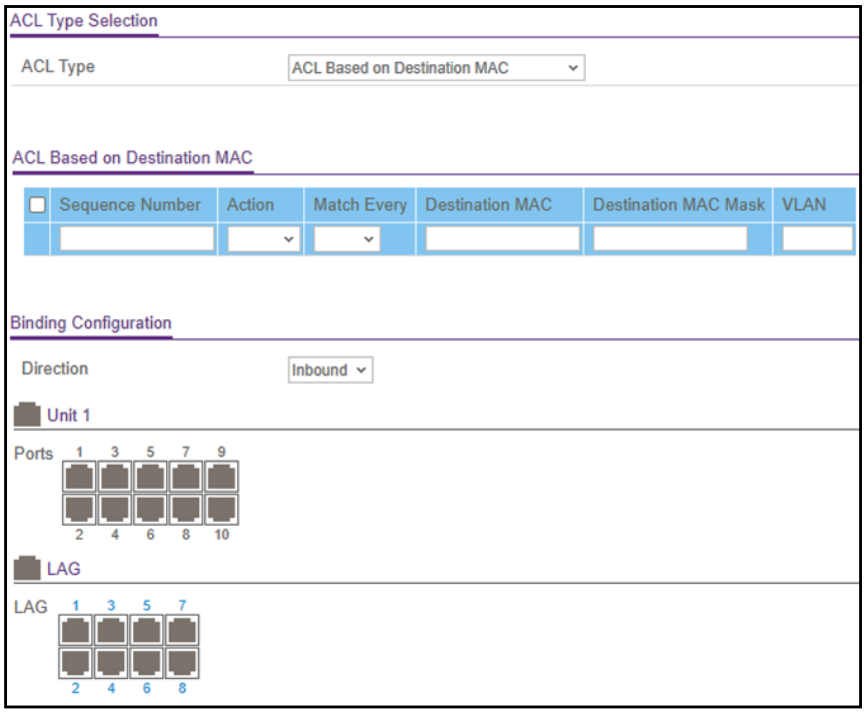
   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > ACL Wizard**.



7. From the **ACL Type** menu, select the type of ACL.

   You can select from the following ACL types:

   - **ACL Based on Destination MAC**: Creates an ACL based on the destination MAC address, destination MAC mask, and VLAN.
   - **ACL Based on Source MAC**: Creates an ACL based on the source MAC address, source MAC mask, and VLAN.
   - **ACL Based on Destination IPv4**: Creates an ACL based on the destination IPv4 address and IPv4 address mask.
   - **ACL Based on Source IPv4**: Creates an ACL based on the source IPv4 address and IPv4 address mask.
   - **ACL Based on Destination IPv6**: Creates an ACL based on the destination IPv6 prefix and IPv6 prefix length.
   - **ACL Based on Source IPv6**: Creates an ACL based on the source IPv6 prefix and IPv6 prefix length.
   - **ACL Based on Destination IPv4 L4 Port**: Creates an ACL based on the destination IPv4 Layer 4 port number.
   - **ACL Based on Source IPv4 L4 Port**: Creates an ACL based on the source IPv4 Layer 4 port number.
   - **ACL Based on Destination IPv6 L4 Port**: Creates an ACL based on the destination IPv6 Layer 4 port number.
   - **ACL Based on Source IPv6 L4 Port**: Creates an ACL based on the source IPv6 Layer 4 port number.

Note: For L4 port options, two rules are created (one for TCP and one for UDP).

8. In the **Sequence Number** field, enter a whole number in the range from 1 to 2147483647 that is used to identify the rule.
9. From the **Action** menu, select **Permit** or **Deny** to specify the action that must be taken if a packet matches the rule's criteria.
10. From the **Match Every** menu, select one of the following options:
    - **False**: Packets do not need to match the selected ACL and rule. With this selection, you can add a destination MAC address, destination MAC mask, and VLAN.
    - **True**: All packets must match the selected ACL and rule and are either permitted or denied. In this case, since all packets match the rule, the option of configuring other match criteria is not offered.
11. Specify the additional match criteria for the selected ACL type.

    The rest of the rule match criteria fields available for configuration depend on the selected ACL type. For information about the possible match criteria fields, see the following table.

ACL Based On	Fields
Destination MAC	• **Destination MAC**: Specify the destination MAC address to compare against an Ethernet frame. The format is xx:xx:xx:xx:xx:xx. The BPDU keyword might be specified using a destination MAC address of 01:80:C2:xx:xx:xx. • **Destination MAC Mask**: Specify the destination MAC address mask, which represents the bits in the destination MAC address to compare against an Ethernet frame. The format is xx:xx:xx:xx:xx:xx. The BPDU keyword might be specified using a destination MAC mask of 00:00:00:ff:ff:ff. • **VLAN**: Specify the VLAN ID to match within the Ethernet frame.
Source MAC	• **Source MAC**: Specify the source MAC address to compare against an Ethernet frame. The format is xx:xx:xx:xx:xx:xx. • **Source MAC Mask**: Specify the source MAC address mask, which represents the bits in the source MAC address to compare against an Ethernet frame. The format is (xx:xx:xx:xx:xx:xx). • **VLAN**: Specify the VLAN ID to match within the Ethernet frame.
Destination IPv4	• **Destination IP Address**: Specify the destination IP address. • **Destination IP Mask**: Specify the destination IP address mask.
Source IPv4	• **Source IP Address**: Specify the source IP address. • **Source IP Mask**: Specify the source IP address mask.
Destination IPv6	• **Destination Prefix**: Specify the destination prefix. • **Destination Prefix Length**: Specify the destination prefix length.
Source IPv6	• **Source Prefix**: Specify the source destination prefix. • **Source Prefix Length**: Specify the source prefix length.
Destination IPv4 L4 Port	• **Destination L4 port (protocol)**: Specify the destination IPv4 L4 port protocol. • **Destination L4 port (value)**: Specify the destination IPv4 L4 port value.

ACL Based On	Fields
Source IPv4 L4 Port	• **Source L4 port (protocol)**: Specify the source IPv4 L4 port protocol. • **Source L4 port (value)**: Specify the source IPv4 L4 port value.
Destination IPv6 L4 Port	• **Destination L4 port (protocol)**: Specify the destination IPv6 L4 port protocol. • **Destination L4 port (value)**: Specify the destination IPv6 L4 port value.
Source IPv6 L4 Port	• **Source L4 port (protocol)**: Specify the source IPv6 L4 port protocol. • **Source L4 port (value)**: Specify the source IPv6 L4 port value.

12. As a sample, the following steps describe how you can create an ACL based on the destination MAC address:
    a. In the **Destination MAC** field, specify the destination MAC address that must be compared against the information in an Ethernet frame.

       The format is xx:xx:xx:xx:xx:xx. The BPDU keyword can be specified using a destination MAC address of 01:80:C2:xx:xx:xx.

    b. In the **Destination MAC Mask** field, specify the destination MAC address mask that must be compared against the information in an Ethernet frame.

       The format is xx:xx:xx:xx:xx:xx. The BPDU keyword can be specified using a destination MAC mask of 00:00:00:ff:ff:ff.

    c. In the **VLAN ID** field, specify which VLAN must be compared against the information in an Ethernet frame.

       The range is from 1 to 4093. Either a VLAN range or VLAN can be configured.
13. In the Binding Configuration section, from the **Direction** menu, select the packet filtering direction for the ACL.

    Only the inbound direction is valid.
14. In the Ports and LAG tables in the Binding Configuration section, select the ports and LAGs to which the ACL must be applied.
15. Click the **Add** button.

    The rule is added to the ACL.
16. Click the **Apply** button.

    Your settings are saved.

Modify an ACL rule that you created with the ACL Wizard

To modify an ACL rule that you created with the ACL Wizard:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.

3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > ACL Wizard**.

   The ACL Wizard page displays.

7. Select check box that is associated with the rule.
8. Update the match criteria as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete an ACL rule that you created with the ACL Wizard

To delete an ACL rule that you created with the ACL Wizard:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.

- If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > ACL Wizard**.

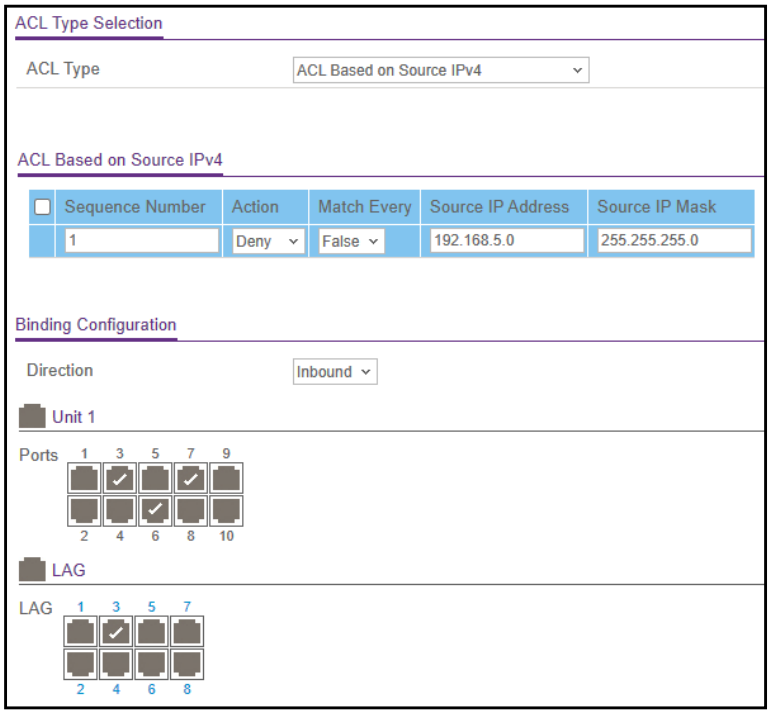
   The ACL Wizard page displays.

7. Select check box that is associated with the rule.
8. Click the **Delete** button.

   The rule is removed.

ACL Wizard example

In the following figure, the ACL rule is configured to check for packet matches on ports 3, 6, and 7 and on LAG 3. Only the Inbound option is valid. Packets that include a source address in the 192.168.5.0/24 network are permitted to be forwarded by the interfaces. All other packets are dropped because every ACL includes an implicit *deny all* rule as the last rule.



For information about the ACL Wizard, see Use the ACL Wizard to create a simple ACL on page 385.

Configure a MAC ACL

A MAC ACL consists of a set of rules that are matched sequentially against a packet. When a packet meets the match criteria of a rule, the specified rule action (Permit or Deny) is taken, and the additional rules are not checked for a match.

Multiple steps are involved in defining a MAC ACL and applying it to the switch:

1. Create a MAC ACL ID (see Add a MAC ACL on page 391).
2. Create a MAC rule (see Configure MAC ACL rules on page 393).
3. Associate the MAC ACL with one or more interfaces (see Configure MAC bindings on page 397).

You can display or delete MAC ACL configurations in the MAC binding table (see Display or delete MAC ACL bindings in the MAC binding table on page 399.

Add a MAC ACL

To add a MAC ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Basic > MAC ACL**.

   The MAC ACL page displays.

   The MAC ACL Table displays the number of ACLs currently configured on the switch and the maximum number of ACLs that can be configured. The current size is equal to the number of configured IPv4 and IPv6 ACLs plus the number of configured MAC ACLs.

7. In the **Name** field, specify a name for the MAC ACL.

   The name string can include alphabetic, numeric, hyphen, underscore, or space characters only. The name must start with an alphabetic character.

8. Click the **Add** button.

   The MAC ACL is added.

   Each configured ACL displays the following information:

   - **Rules**: The number of rules currently configured for the MAC ACL.
   - **Direction**: The direction of packet traffic affected by the MAC ACL, which can be Inbound or blank. (If the ACL is not bound to an interface, the direction is blank.)

Change the name of a MAC ACL

To change the name of a MAC ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Basic > MAC ACL**.

   The MAC ACL page displays.

7. Select check box that is associated with the MAC ACL.
8. In the **Name** field, specify the new name.
9. Click the **Apply** button.

   Your settings are saved.

Delete a MAC ACL

To delete a MAC ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Basic > MAC ACL**.

   The MAC ACL page displays.
7. Select check box that is associated with the MAC ACL.
8. Click the **Delete** button.

   The MAC ACL is removed.

Configure MAC ACL rules

You can define rules for MAC-based ACLs. The access list definition includes rules that specify whether traffic matching the criteria is forwarded normally or discarded. A default *deny all* rule is the last rule of every list.

Add a rule to a MAC ACL

To add a rule to a MAC ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Basic > MAC Rules**.

   The MAC Rules page displays.
7. From the **ACL Name** menu, select the MAC ACL.
8. In the **Sequence Number** field, enter a whole number in the range from 1 to 2147483647 to identify the rule.
9. From the **Action** menu, select the action that must be taken if a packet matches the rule's criteria:
   - **Permit**: Forwards packets that meet the ACL criteria.
   - **Deny**: Drops packets that meet the ACL criteria.
10. In the **Assign Queue** field, specify the hardware egress queue identifier that must be used to handle all packets matching this ACL rule.

    The range for the queue ID is from 0 to 7.
11. From the **Mirror Interface** menu, select the specific egress interface to which the matching traffic stream must be copied, in addition to being forwarded normally by the switch.

    This field cannot be set if a redirect interface is already configured for the ACL rule. This field is visible for a Permit action.
12. From the **Redirect Interface** menu, select the egress interface to which the matching traffic stream must be redirected, bypassing any forwarding decision normally performed by the switch.

    This field cannot be set if a mirror interface is already configured for the ACL rule.
13. From the **Match Every** menu, select whether each Layer 2 MAC packet must be matched against the rule:
    - **True**: Each packet must match the selected ACL rule.

- **False**: Not all packets need to match the selected ACL rule.

14. In the **CoS** field, specify the 802.1p priority that must be compared against the information in an Ethernet frame.

    The range for the priority is from 0 to 7.

15. In the **Destination MAC** field, specify the destination MAC address that must be compared against the information in an Ethernet frame.

    The format is xx:xx:xx:xx:xx:xx. The BPDU keyword can be specified using a destination MAC address of 01:80:C2:xx:xx:xx.

16. In the **Destination MAC Mask** field, specify the destination MAC address mask that must be compared against the information in an Ethernet frame.

    The format is xx:xx:xx:xx:xx:xx. The BPDU keyword can be specified using a destination MAC mask of 00:00:00:ff:ff:ff.

17. From the **EtherType Key** menu, select the EtherType value that must be compared against the information in an Ethernet frame.

    The values are as follows:

    - **Apple Talk**
    - **IBM SNA**
    - **IPv4**
    - **IPv6**
    - **IPX**
    - **MPLS Multicast**
    - **MPLS Unicast**
    - **NetBios**
    - **Novell**
    - **PPPOE**
    - **RARP**
    - **User Value**

18. If you select **User Value** from the **EtherType Key** menu, in the **EtherType User Value** field, specify the customized EtherType value that must be used.

    This value must be compared against the information in an Ethernet frame. The range is from 0x0600 to 0xFFFF.

19. In the **Source MAC** field, specify the source MAC address that must be compared against the information in an Ethernet frame.

    The format is xx:xx:xx:xx:xx:xx.

20. In the **Source MAC Mask** field, specify the source MAC address mask that must be compared against the information in an Ethernet frame.

    The format is xx:xx:xx:xx:xx:xx.

21. In the **VLAN** field, specify the VLAN ID that must be compared against the information in an Ethernet frame.

    The range is from 1 to 4093. You can configure either a single VLAN or a VLAN range.

22. From the **Logging** menu, select whether to enable or disable logging.

    If you select **Enable**, logging is enabled for this ACL rule (subject to resource availability on the switch):

23. Click the **Add** button.

    The rule is added.

Change the match criteria for a MAC rule

To change the match criteria for a MAC rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Basic > MAC Rules**.

   The MAC Rules page displays.

7. Select the check box that is associated with the rule.
8. Modify the fields as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete a rule for a MAC ACL

To delete a rule for a MAC:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Basic > MAC Rules**.

   The MAC Rules page displays.
7. Select the check box that is associated with the rule.
8. Click the **Delete** button.

   The rule is removed.

Configure MAC bindings

When an ACL is bound to an interface, all the rules that are defined are applied to the selected interface. You can assign MAC ACLs to interfaces and LAGs.

To configure MAC bindings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

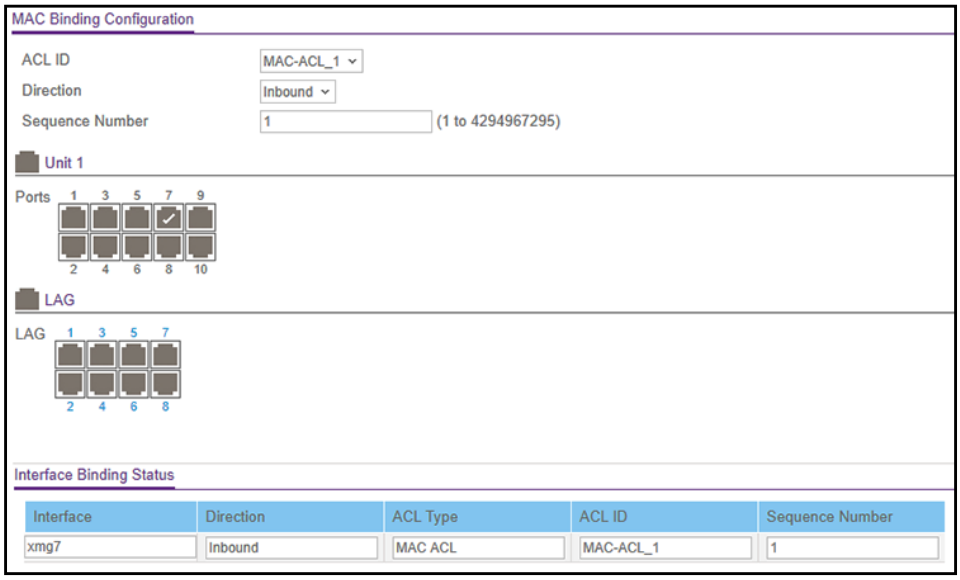
The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Basic > MAC Binding Configuration**.



7. From the **ACL ID** menu, select an ACL.

   The fixed selection from the **Direction** menu is **Inbound**, which means that MAC ACL rules are applied to traffic entering the interface.
8. In the **Sequence Number** field, optionally specify a number to indicate the order of the access list relative to other access lists already assigned to the interface and direction.

   A low number indicates high precedence order. If a sequence number is already in use for the interface and direction, the specified access list replaces the currently attached access list using that sequence number. If you do not specify the sequence number, a sequence number that is one number greater than the highest sequence number currently in use for the interface and direction is used. The range is from 1 to 4294967295.

9. To add the selected ACL to a port or LAG, in the Ports table or LAG table, click the port or LAG so that a check mark displays.

   You can add the ACL to several ports and LAGs.

   The Ports and LAG tables display the available interfaces for ACL bindings.

10. Click the **Apply** button.

    Your settings are saved.

The following table describes the information displayed in the Interface Binding Status table.

Table 78. Interface Binding Status table

Field	Description
Interface	The interface of the ACL assigned.
Direction	The selected packet filtering direction for the ACL.
ACL Type	The type of ACL assigned to the selected interface and direction.
ACL ID	The ACL name identifying the ACL assigned to the selected interface and direction.
Sequence Number	The sequence number signifying the order of the specified ACL relative to other ACLs assigned to the selected interface and direction.

Display or delete MAC ACL bindings in the MAC binding table

You can display or delete the MAC ACL bindings in the MAC binding table.

To display or delete MAC ACL bindings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Basic > Binding Table**.

   The Binding Table page displays. This table displays the MAC ACL-to-interface bindings.

7. To delete a MAC ACL-to-interface binding, do the following:
   a. Select the check box next to the interface.
   b. Click the **Delete** button.

   The binding is removed.

The following table describes the information that is displayed in the MAC binding table.

Table 79. MAC Binding Table

Field	Description
Interface	The interface of the ACL assigned.
Direction	The selected packet filtering direction for the ACL.
ACL Type	The type of ACL assigned to the selected interface and direction.
ACL ID	The ACL name identifying the ACL assigned to the selected interface and direction.
Sequence Number	The sequence number signifying the order of the specified ACL relative to other ACLs assigned to the selected interface and direction.

Configure a basic or extended IPv4 ACL

An IPv4 ACL consists of a set of rules that are matched sequentially against a packet. When a packet meets the match criteria of a rule, the specified rule action (Permit or Deny) is taken, and the additional rules are not checked for a match. You must specify the interfaces to which an IPv4 ACL applies, as well as whether it applies to inbound or outbound traffic.

Multiple steps are involved in defining an IPv4 ACL and applying it to the switch:

1. Add an IPv4 ACL ID (see Add an IPv4 ACL on page 401).

   The differences between a basic IPv4 ACL and an extended IPv4 ACL are as follows:

   - **Numbered ACL from 1 to 99**: Creates a basic IPv4 ACL, which allows you to permit or deny traffic from a source IP address.
   - **Numbered ACL from 100 to 199**: Creates an extended IPv4 ACL, which allows you to permit or deny specific types of Layer 3 or Layer 4 traffic from a source IP address to a destination IP address. This type of ACL provides more granularity and filtering capabilities than the basic IP ACL.
   - **Named IP ACL**: Create an extended IPv4 ACL with a name string that is up to 31 alphanumeric characters in length. The name must start with an alphabetic character.

2. Create an IPv4 rule (see Configure rules for a basic IPv4 ACL on page 404 or Configure rules for an extended IPv4 ACL on page 408).
3. Associate the IPv4 ACL with one or more interfaces (see Configure IP ACL interface bindings on page 424).

You can display or delete IPv4 ACL configurations in the IP ACL Binding table (see Display or delete IP ACL bindings in the IP ACL binding table on page 426.

Add an IPv4 ACL

To add an IPv4 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IP ACL**.

   The IP ACL page displays.

   The IP ACL page shows the current size of the ACL table compared to the maximum size of the ACL table. The current size is equal to the number of configured IPv4 ACLs plus the number of configured MAC ACLs and IPv6 ACLs. The maximum number of ACLs on the switch is 100.

   The Current Number of ACL field displays the current number of all ACLs configured on the switch.

   The Maximum ACL field displays the maximum number of ACLs that you can configure on the switch.

7. In the **IP ACL ID** field, specify the ACL ID or IP ACL name, which depends on the IP ACL type. The IP ACL ID is an integer in the following range:
   - **1–99**: Creates a basic IP ACL, which allows you to permit or deny traffic from a source IP address.
   - **100–199**: Creates an extended IP ACL, which allows you to permit or deny specific types of Layer 3 or Layer 4 traffic from a source IP address to a destination IP address. This type of ACL provides more granularity and filtering capabilities than the standard IP ACL.
   - **IP ACL Name**: Create an extended IP ACL with a name string that is up to 31 alphanumeric characters in length. The name must start with an alphabetic character.

   Each configured ACL displays the following information:

   - **Rules**: The number of rules currently configured for the IPv4 ACL.
   - **Type**: Identifies the ACL as a basic IP ACL (with ID from 1 to 99), extended IP ACL (with ID from 100 to 199 or a name).
8. Click the **Add** button.

   The IP ACL is added.

Change the number or name of an IPv4 ACL

To change the number or name of an IPv4 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Advanced > IP ACL**.

   The IP ACL Configuration page displays.

7. Select the check box that is associated with the IP ACL.
8. In the **IP ACL** field, specify the new number or name.
9. Click the **Apply** button.

   Your settings are saved.

Delete an IPv4 ACL

To delete an IPv4 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Advanced > IP ACL**.

   The IP ACL Configuration page displays.

7. Select the check box that is associated with the IP ACL.
8. Click the **Delete** button.

   The IP ACL is removed.

Configure rules for a basic IPv4 ACL

You can define rules for IP-based standard ACLs (basic ACLs). The access list definition includes rules that specify whether traffic matching the criteria is forwarded normally or discarded.

Note: An implicit *deny all* rule is included at the end of an ACL list. This means that if an ACL is applied to a packet, and if none of the explicit rules match, then the final implicit *deny all* rule applies and the packet is dropped.

Add a rule for a basic IPv4 ACL

To add a rule for a basic IPv4 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Advanced > IP Rules**.

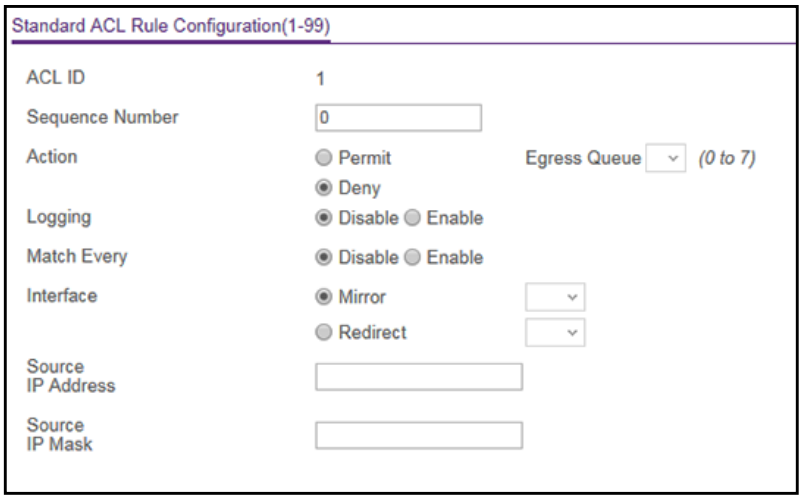
   The IP Rules page displays.

   If no rules exist, the Basic ACL Rule Table might show the message *No rules were configured for this ACL*. If one or more rules exist for the ACL, the rules display in the Basic ACL Rule Table.

7. From the **ACL ID** menu, select the IP ACL for which you want to add a rule.

   For basic IP ACLs, this must be an ID in the range from 1 to 99.

8. Click the **Add** button.



9. Specify the following match criteria for the rule:
   - **Sequence Number**: Enter an ACL sequence number in the range from 1 to 2147483647 that is used to identify the rule. An IP ACL can contain up to 50 rules.
   - **Action**: Select the ACL forwarding action, which is one of the following:
     - **Permit**: Forward packets that meet the ACL criteria.

       Egress Queue: If the selection form the **Action** menu is **Permit**, you can specify the hardware egress queue identifier that is used to handle all packets matching this IP ACL rule. The range of queue IDs is from 0 to 7.

     - **Deny**: Drop packets that meet the ACL criteria.

       Logging: If the selection from the **Action** menu is **Deny**, you can enable logging for the ACL by selecting the **Enable** radio button. (Logging is subject to resource availability on the switch.)

   - **Match Every**: Select one of the radio buttons to specify whether all packets must match the selected IP ACL rule:
     - **Enable**: All packets must match the selected IP ACL rule and are either permitted or denied.
     - **Disable**: Not all packets need to match the selected IP ACL rule.
   - **Interface**: Select one of the radio buttons to specify whether all packets must be mirrored or redirected:
     - **Mirror**: From the menu, select the specific egress interface to which the matching traffic stream must be copied, in addition to being forwarded normally by the switch.
     - **Redirect**: From the menu, select the egress interface to which the matching traffic stream must be redirected, bypassing any forwarding decision normally performed by the switch.

- **Source IP Address**: Enter an IP address using dotted-decimal notation to be compared to a packet's source IP address as a match criterion for the selected IP ACL rule.
- **Source IP Mask**: Specify the IP mask in dotted-decimal notation to be used with the source IP address.

10. Click the **Apply** button.

    Your settings are saved.

Modify the match criteria for a basic IPv4 ACL rule

To modify the match criteria for a basic IPv4 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Advanced > IP Rules**.

   The IP Rules page displays.

7. From the **ACL ID** menu, select the ACL that includes the rule that you want to modify.
8. In the Basic ACL Rule Table, click the rule.

   The rule is a hyperlink. The Standard ACL Rule Configuration page displays.

9. Modify the basic IP ACL rule criteria.
10. Click the **Apply** button.

    Your settings are saved.

Delete a basic IPv4 ACL rule

To delete a basic IPv4 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IP Rules**.

   The IP Rules page displays.
7. From the **ACL ID** menu, select the ACL that includes the rule that you want to modify.
8. In the Basic ACL Rule Table, select the check box that is associated with the rule.
9. Click the **Delete** button.

   The rule is removed.

Configure rules for an extended IPv4 ACL

You can define rules for extended IPv4 ACLs. The access list definition includes rules that specify whether traffic matching the criteria is forwarded normally or discarded.

Note: An implicit *deny all* rule is included at the end of an ACL list. This means that if an ACL is applied to a packet and if none of the explicit rules match, then the final implicit *deny all* rule applies and the packet is dropped.

Add a rule for an extended IPv4 ACL

To add a rule for an extended IPv4 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

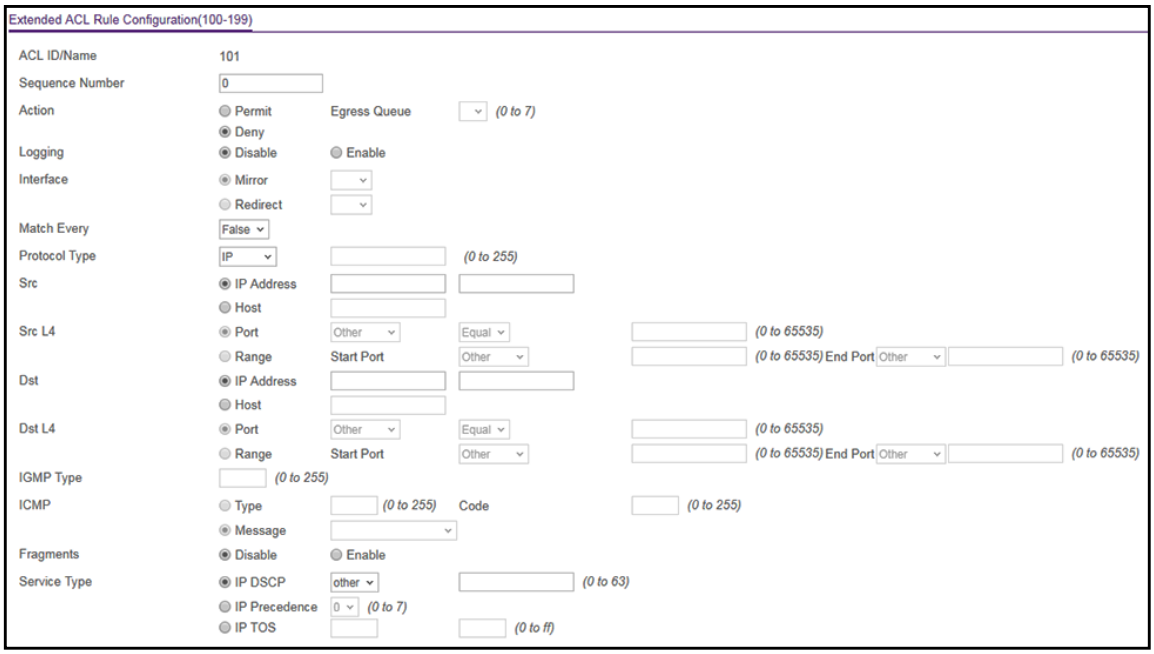
   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IP Extended Rules**.

   The IP Extended Rules page displays.

   If no rules exists, the Extended ACL Rule Table might show the message *No rules were configured for this ACL*. If one or more rules exist for the ACL, the rules display in the Extended ACL Rule Table.
7. From the **ACL ID** menu, select the IP ACL for which you want to add a rule.

   For extended IP ACLs, this must be an ID in the range from 101 to 199 or a name.
8. Click the **Add** button.



9. Configure the following match criteria for the rule:
   - **Sequence Number**: Enter a number in the range from 1 to 2147483647 that is used to identify the rule. An extended IP ACL can contain up to 50 rules.
   - **Action**: Select the ACL forwarding action, which is one of the following:
     - **Permit**: Forward packets that meet the ACL criteria.

       Egress Queue: If the selection from the **Action** menu is **Permit**, select the hardware egress queue identifier that is used to handle all packets matching this IP ACL rule. The range of queue IDs is 0 to 7.

     - **Deny**: Drop packets that meet the ACL criteria.

       Logging: If the selection form the **Action** menu is **Deny**, you can enable logging for the ACL by selecting the **Enable** radio button. (Logging is subject to resource availability in the device.)

   - **Interface**: For a Permit action, use either a mirror interface or a redirect interface:
     - Select the **Mirror** radio button and use the menu to specify the egress interface to which the matching traffic stream is copied, in addition to being forwarded normally by the device.
     - Select the **Redirect** radio button and use the menu to specify the egress interface to which the matching traffic stream is forced, bypassing any forwarding decision normally performed by the device.
   - **Match Every**: Select one of the radio buttons to specify whether all packets must match the selected IP ACL rule:
     - **False**: Not all packets need to match the selected IP ACL rule. You can configure other match criteria on the page.

- **True**: All packets must match the selected IP ACL rule and are either permitted or denied. In this case, you cannot configure other match criteria on the page.

- **Protocol Type**: From the menu, select a protocol that a packet's IP protocol must be matched against: **IP**, **ICMP**, **IGMP**, **TCP**, **UDP**, **EIGRP**, **GRE**, **IPINIP**, **OSPF**, **PIM**, or **Other**. If you select **Other**, enter a protocol number from 0 to 255.
- **Src**: In the **Src** field, enter a source IP address, using dotted-decimal notation, to be compared to a packet's source IP address as a match criterion for the selected IP ACL rule:
  - If you select the **IP Address** radio button, enter an IP address or an IP address range. You can enter a relevant wildcard mask to apply this criteria. If this field is left empty, it means *any*.
  - If you select the **Host** radio button, the wildcard mask is configured as 0.0.0.0. If this field is left empty, it means *any*.

  The wildcard mask determines which bits are used and which bits are ignored. A wildcard mask of 0.0.0.0 indicates that *none* of the bits are important. A wildcard of 255.255.255.255 indicates that *all* of the bits are important.
- **Src L4**: The options are available only if the selection from the **Protocol Type** menu is **TCP** or **UDP**. Use the source L4 port option to specify relevant matching conditions for L4 port numbers in the extended ACL rule.

  You can select either the **Port** radio button or the **Range** radio button:

  - **Port**: If you select the **Port** radio button, you can either enter the port number yourself or select one of the following protocols from the menu:
    - The source IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
    - The source IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

    Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

    Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

    The only relevant matching condition for L4 port numbers is **Equal**. This means that an IP ACL rule matches only if the Layer 4 source port number is equal to the specified port number or port protocol.
  - **Range**: If you select the **Range** radio button, the IP ACL rule matches only if the Layer 4 source port number is within the specified port range. The starting port, ending port, and all ports in between are a part of the Layer 4 port range.

    The **Start Port** and **End Port** fields identify the first and last ports that are part of the port range. The values can range from 0 to 65535.

You can either enter the port range yourself or select one of the following protocols from the menu:

- The source IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
- The source IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

Each of these values translates into its equivalent port number, which is used as both the start and end of the port range. Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

The wildcard mask determines which bits are used and which bits are ignored. A wildcard mask of 0.0.0.0 indicates that *none* of the bits are important. A wildcard of 255.255.255.255 indicates that *all* of the bits are important.

- **Dst**: In the **Dst** field, enter a destination IP address, using dotted-decimal notation, to be compared to a packet's destination IP address as a match criterion for the selected IP ACL rule:
  - If you select the **IP Address** radio button, enter an IP address with a relevant wildcard mask to apply this criteria. If this field is left empty, it means *any*.
  - If you select the **Host** radio button, the wildcard mask is configured as 0.0.0.0. If this field is left empty, it means *any*.

  The wildcard mask determines which bits are used and which bits are ignored. A wildcard mask of 0.0.0.0 indicates that *none* of the bits are important. A wildcard of 255.255.255.255 indicates that *all* of the bits are important.

- **Dst L4**: The options are available only if the selection from the **Protocol Type** menu is **TCP** or **UDP**. Use the destination L4 port option to specify relevant matching conditions for L4 port numbers in the extended ACL rule.

  You can select either the **Port** radio button or the **Range** radio button:

  - **Port**. If you select the **Port** radio button, you can either enter the port number yourself or select one of the following protocols from the menu.
    - The destination IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
    - The destination IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

    Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

    Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

    The only relevant matching condition for L4 port numbers is **Equal**. This means that an IP ACL rule matches only if the Layer 4 source port number is equal to the specified port number or port protocol.

- **Range**: If you select the **Range** radio button, the IP ACL rule matches only if the Layer 4 destination port number is within the specified port range. The starting port, ending port, and all ports in between are a part of the Layer 4 port range.

  The **Start Port** and **End Port** fields identify the first and last ports that are part of the port range. They values can range from 0 to 65535.

  You can either select the enter the port range yourself or select one of the following protocols from the menu:

  - The destination IP TCP port range names are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
  - The destination IP UDP port range names are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

  Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

  Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

  The wildcard mask determines which bits are used and which bits are ignored. A wildcard mask of 0.0.0.0 indicates that *none* of the bits are important. A wildcard of 255.255.255.255 indicates that *all* of the bits are important.

- **IGMP Type**: If your selection from the **Protocol Type** menu is **IGMP** and you specify the IGMP type, the IP ACL rule matches the specified IGMP message type. The range is from 0 to 255. If this field is left empty, it means *any*.
- **ICMP**: If your selection from the **Protocol Type** menu is **ICMP**, you can select either the **Type** or **Message** radio button:
  - If you select the **Type** radio button, note the following:
    - The **Type** and **Code** fields are enabled only if the protocol is ICMP. Use these fields to specify a match condition for ICMP packets:
    - If you specify information in the **Type** field, the IP ACL rule matches the specified ICMP message type. The type number can be from 0 to 255.
    - If you specify information in the **Code** field, the IP ACL rule matches the specified ICMP message code. The code can be from 0 to 255.
    - If these fields are left empty, it means *any*.
  - If you select the **Message** radio button, from the menu, select the type of the ICMP message to match with the selected IP ACL rule. Specifying a type of message implies that both the ICMP type and ICMP code are specified. The ICMP message is decoded into the corresponding ICMP type and ICMP code within the ICMP type.

    The IPv4 ICMP message types are **echo**, **echo-reply**, **host-redirect**, **mobile-redirect**, **net-redirect**, **net-unreachable**, **redirect**, **packet-too-big**, **port-unreachable**, **source-quench**, **router-solicitation**, **router-advertisement**, **ttl-exceeded**, **time-exceeded**, and **unreachable**.

- **Fragments**: Either select the **Enable** radio button to allow initial fragments (that is, the fragment bit is asserted) or leave the default **Disable** radio button selected to prevent initial fragments from being used.

  This option is not valid for rules that match L4 information such as a TCP port number, because that information is carried in the initial packet.

- **Service Type**: Select a service type match condition for the extended IP ACL rule.

  The possible options are **IP DSCP**, **IP precedence**, and **IP TOS**, which are alternative methods to specify a match criterion for the same service type field in the IP header. Each method uses a different user notation. After you make a selection, you can specify the appropriate values:

  - **IP DSCP**: This is an optional configuration. Specify the IP DiffServ Code Point (DSCP) field. The DSCP is defined as the high-order 6 bits of the service type octet in the IP header. Enter an integer from 0 to 63. To select the IP DSCP, select one of the DSCP keywords from the menu. To specify a numeric value, select **Other** and a field displays in which you can enter numeric value of the DSCP.
  - **IP Precedence**: This is an optional configuration. The IP precedence field in a packet is defined as the high-order 3 bits of the service type octet in the IP header. Enter a number from 0 to 7.
  - **IP TOS**: This is an optional configuration. The IP ToS field in a packet is defined as all 8 bits of the service type octet in the IP header. The ToS bits value is a hexadecimal number that is composed of numbers 00 to 09 and AA to FF. The ToS mask value is a hexadecimal number that is composed of numbers 00 to FF. The ToS mask denotes the bit positions in the ToS bits value that are used for comparison against the IP ToS field in a packet.

    For example, to check for an IP ToS value for which bit 7 is set and is the most significant value, for which bit 5 is set, and for which bit 1 is cleared, use a ToS bits value of 0xA0 and a ToS mask of 0xFF.

10. Click the **Apply** button.

    Your settings are saved.

Modify the match criteria for an extended IPv4 ACL rule

To modify the match criteria for an existing extended IPv4 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IP Extended Rules**.

   The IP Extended Rules page displays.
7. From the **ACL ID** menu, select the ACL that includes the rule that you want to modify.
8. In the Extended ACL Rule Table, click the rule.

   The rule is a hyperlink. The Extended ACL Rule Configuration page displays.
9. Modify the extended IP ACL rule criteria.
10. Click the **Apply** button.

    Your settings are saved.

Delete an extended IPv4 ACL rule

To delete an extended IPv4 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL > Advanced > IP Extended Rules**.

   The IP Extended Rules page displays.

7. From the **ACL ID** menu, select the ACL that includes the rule that you want to delete.
8. In the Extended ACL Rule Table, select the check box that is associated with the rule.
9. Click the **Delete** button.

   The rule is removed.

Configure an IPv6 ACL

An IPv6 ACL consists of a set of rules that are matched sequentially against a packet. When a packet meets the match criteria of a rule, the specified rule action (Permit or Deny) is taken, and the additional rules are not checked for a match. You must specify the interfaces to which an IPv6 ACL applies, as well as whether it applies to inbound or outbound traffic.

Multiple steps are involved in defining an IPv6 ACL and applying it to the switch:

1. Add an IPv6 ACL ID (see Add an IPv6 ACL on page 415).

   An IPv6 ACL must start with a name string that is up to 31 alphanumeric characters in length. The name must start with an alphabetic character.

2. Create an IPv6 rule (see Configure rules for an IPv6 ACL on page 418).
3. Associate the IPv6 ACL with one or more interfaces (see Configure IP ACL interface bindings on page 424).

You can display or delete IPv6 ACL configurations in the IP ACL Binding table (see Display or delete IP ACL bindings in the IP ACL binding table on page 426.

Add an IPv6 ACL

To add an IPv6 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 ACL**.

   The IPv6 ACL page displays.
7. In the **IPv6 ACL** field, specify a name to identify the IPv6 ACL.

   This is the IPv6 ACL name string, which includes up to 31 alphanumeric characters only. The name must start with an alphabetic character.
8. Click the **Add** button.

   The IPv6 ACL is added.

The following table describes the nonconfigurable information displayed on the page.

Table 80. IPv6 Configuration and IPv6 ACL Table information

Field	Description
Current Number of ACL	The current number of ACLs configured on the switch.
Maximum ACL	The maximum number of ACLs that can be configured on the switch.
Rules	The number of the rules associated with the IPv6 ACL.
Type	The type is IPv6 ACL.

Change the name of an IPv6 ACL

To change the name of an IPv6 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 ACL**.

   The IPv6 ACL page displays.
7. Select the check box that is associated with the IPv6 ACL.
8. In the **IPv6 ACL** field, specify the new name.
9. Click the **Apply** button.

   Your settings are saved.

Delete an IPv6 ACL

To delete an IPv6 ACL:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 ACL**.

   The IPv6 ACL page displays.

7. Select the check box that is associated with the IPv6 ACL.
8. Click the **Delete** button.

   The IPv6 ACL is removed.

Configure rules for an IPv6 ACL

You can define rules for IPv6 ACLs. The access list definition includes rules that specify whether traffic matching the criteria is forwarded normally or discarded.

Add a rule for an IPv6 ACL

Add a rule for an ACL IPv6:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

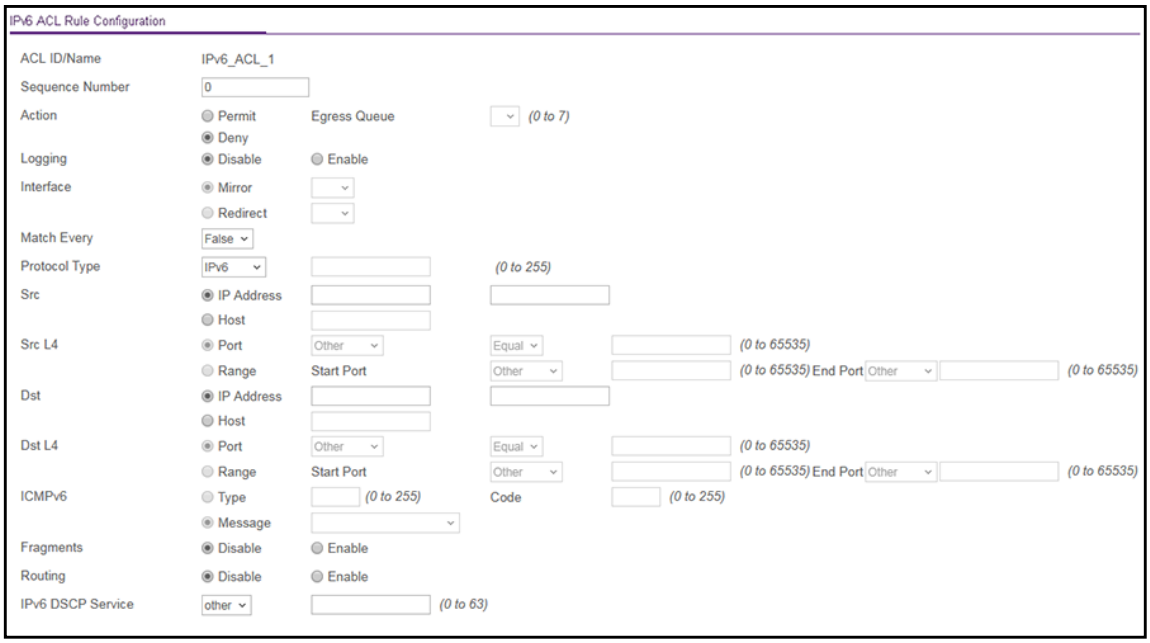
   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 Rules**.

   The IPv6 Rules page displays.

   If no rules exists, the IPv6 ACL Rule Table might show the message *No rules were configured for this ACL*. If one or more rules exist for the ACL, the rules display in the IPv6 Rules table.
7. From the **ACL Name** menu, select the IPv6 ACL for which you want to add a rule.

   An IPv6 ACL can contain up to 50 rules.
8. Click the **Add** button.



9. Configure the following match criteria for the rule:
   - **Action**: Select the ACL forwarding action by selecting one of the following radio buttons:
     - **Permit**: Forward packets that meet the ACL criteria.
     - **Deny**: Drop packets that meet the ACL criteria.
   - **Egress Queue**: If you select the **Permit** radio button, select the hardware egress queue identifier that is used to handle all packets matching this IPv6 ACL rule. The range of queue IDs is 0 to 7.
   - **Logging**: If you select the **Deny** radio button, you can enable logging for the ACL by selecting the **Enable** radio button. (Logging is subject to resource availability in the device.)

     If the access list trap flag is also enabled, periodic traps are generated, indicating the number of times this rule was evoked during the report interval. A fixed five-minute report interval is used for the switch. A trap is not issued if the ACL rule hit count is zero for the current interval.
   - **Interface**: If you select the **Permit** radio button, use either a mirror interface or a redirect interface:
     - Select the **Mirror** radio button and use the menu to specify the egress interface to which the matching traffic stream is copied, in addition to being forwarded normally by the device.
     - Select the **Redirect** radio button and use the menu to specify the egress interface to which the matching traffic stream is forced, bypassing any forwarding decision normally performed by the device.

- **Match Every**: Select whether all packet must match the selected IPv6 ACL rule:
  - **False**: Not all packets need to match the selected IPv6 ACL rule. You can configure other match criteria on the page.
  - **True**: All packets must match the selected IPv6 ACL rule and are either permitted or denied. In this case, you cannot configure other match criteria on the page.
- **Protocol Type**: Specify the IPv6 protocol type in one of the following ways:
  - From the **Protocol Type** menu, select **IPv6**, **ICMPv6**, **TCP**, or **UDP**.
  - From the **Protocol Type** menu, select **Other**, and in the associated field, specify an integer ranging from 0 to 255. This number represents the IPv6 protocol.
- **Src**: In the **Src** field, enter a source IPv6 address or source IPv6 address range to be compared to a packet's source IPv6 address as a match criterion for the selected IPv6 ACL rule:
  - If you select the **IPv6 Address** radio button, enter an IPv6 address or IPv6 range to apply this criteria. If this field is left empty, it means *any*.
  - If you select the **Host** radio button, enter a host source IPv6 address to match the specified IPv6 address. If this field is left empty, it means *any*.

  The source IPv6 address argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal numbers using 16-bit values between colons.
- **Src L4**: The options are available only if the selection from the **Protocol Type** menu is **TCP** or **UDP**. Use the source L4 port option to specify relevant matching conditions for L4 port numbers in the IPv6 ACL rule.

  You can select either the **Port** radio button or the **Range** radio button:

  - **Port**: If you select the **Port** radio button, you can either enter the port number yourself or select one of the following protocols from the menu:
    - The source IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
    - The source IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

    Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

    Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

    The only relevant matching condition for L4 port numbers is **Equal**. This means that an IPv6 ACL rule matches only if the Layer 4 source port number is equal to the specified port number or port protocol.
  - **Range**: If you select the **Range** radio button, the IPv6 ACL rule matches only if the Layer 4 source port number is within the specified port range. The starting port, ending port, and all ports in between are a part of the Layer 4 port range.

The **Start Port** and **End Port** fields identify the first and last ports that are part of the port range. They values can range from 0 to 65535.

You can either enter the port range yourself or select one of the following protocols from the menu:

- The source IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
- The source IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

Select **Other** from the menu to enter port numbers. If you select **Other** from the menu but leave the fields blank, it means *any*.

- **Dst**: In the **Dst** field, enter a destination IPv6 address to be compared to a packet's destination IPv6 address as a match criterion for the selected IPv6 ACL rule:
  - If you select the **IPv6 Address** radio button, enter an IPv6 address to apply this criteria. If this field is left empty, it means *any*.
  - If you select the **Host** radio button, enter a host source IPv6 address to match the specified IPv6 address. If this field is left empty, it means *any*.

  The source IPv6 address argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal numbers using 16-bit values between colons.
- **Dst L4**: The options are available only if the selection from the **Protocol Type** menu is **TCP** or **UDP**. Use the destination L4 port option to specify relevant matching conditions for L4 port numbers in the IPv6 ACL rule.

  You can select either the **Port** radio button or the **Range** radio button:

  - **Port**: If you select the **Port** radio button, you can either enter the port number yourself or select one of the following protocols from the menu:
    - The destination IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
    - The destination IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

    Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

    Select **Other** from the menu to enter a port number. If you select **Other** from the menu but leave the field blank, it means *any*.

    The only relevant matching condition for L4 port numbers is **Equal**. This means that an IPv6 ACL rule matches only if the Layer 4 destination port number is equal to the specified port number or port protocol.

- **Range**: If you select the **Range** radio button, the IPv6 ACL rule matches only if the Layer 4 destination port number is within the specified port range. The starting port, ending port, and all ports in between are a part of the Layer 4 port range.

  The **Start Port** and **End Port** fields identify the first and last ports that are part of the port range. They values can range from 0 to 65535.

  You can either enter the port range yourself or select one of the following protocols from the menu:

  - The destination IP TCP port protocols are **domain**, **echo**, **ftp**, **ftpdata**, **www-http**, **smtp**, **telnet**, **pop2**, **pop3**, and **bgp**.
  - The destination IP UDP port protocols are **domain**, **echo**, **snmp**, **ntp**, **rip**, **time**, **who**, and **tftp**.

  Each of these values translates into its equivalent port number, which is used as both the start and end of the port range.

  Select **Other** from the menu to enter port numbers. If you select **Other** from the menu but leave the fields blank, it means *any*.

- **ICMPv6**: The **Type** and **Message** fields are enabled only if the protocol is ICMPv6. Use these fields to specify a match condition for ICMPv6 packets. Select either the **Type** or **Message** radio button:
  - If you select the **Type** radio button, note the following:
    - The **Type** and **Code** fields are enabled only if the protocol is ICMPv6. Use these fields to specify a match condition for ICMPv6 packets:
    - If you specify information in the **Type** field, the IPv6 ACL rule matches the specified ICMPv6 message type. The type number can be from 0 to 255.
    - If you specify information in the **Code** field, the IPv6 ACL rule matches the specified ICMPv6 message code. The code can be from 0 to 255.
    - If these fields are left empty, it means *any*.
  - If you select the **Message** radio button, note the following:
    - Select the type of the ICMPv6 message to match with the selected IPv6 ACL rule. Specifying a type of message implies that both the ICMPv6 type and ICMPv6 code are specified. The ICMPv6 message is decoded into the corresponding ICMPv6 type and ICMPv6 code within the ICMP type.
    - The ISMPv6 message types are **destination-unreachable**, **echo-reply**, **echo-request**, **header**, **hop-limit**, **mld-query**, **mld-reduction**, **mld-report**, **next-header**, **no-admin**, **no-route**, **packet-too-big**, **port-unreachable**, **router-solicitation**, **router-advertisement**, **router-renumbering**, **unreachable**, **time-exceeded**, **nd-na**, and **nd-ns**.
- **Fragments**: Either select the **Enable** radio button to allow initial fragments (that is, the fragment bit is asserted) or leave the default Disable radio button selected to prevent initial fragments from being used.

  This option is not valid for rules that match L4 information such as TCP port number, because that information is carried in the initial packet.

- **Routing**: Either select the **Enable** radio button to match packets that include a routing extension header or leave the default Disable radio button selected to ignore the routing extension headers in packets.
- **IPv6 DSCP Service**: Specify the IP DiffServ Code Point (DSCP) field. This is an optional configuration.

  The DSCP is defined as the high-order 6 bits of the service type octet in the IPv6 header. Enter an integer from 0 to 63. To select the IPv6 DSCP, select one of the DSCP keywords. To specify a numeric value, select **Other** and enter the numeric value of the DSCP.

10. Click the **Apply** button.

    Your settings are saved.

Modify the match criteria for an IPv6 ACL rule

To modify the match criteria for an IPv6 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 Rules**.

   The IPv6 Rules page displays.
7. From the **ACL Name** menu, select the ACL that includes the rule that you want to modify.
8. In the IPv6 ACL Rule Table, click the rule.

   The rule is a hyperlink. The IPv6 ACL Rule Configuration page displays.

9. Modify the IPv6 ACL rule criteria.
10. Click the **Apply** button.

    Your settings are saved.

Delete an IPv6 ACL rule

To delete an IPv6 ACL rule:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IPv6 Rules**.

   The IPv6 Rules page displays.
7. From the **ACL Name** menu, select the ACL that includes the rule that you want to delete.
8. In the IPv6 ACL Rule Table, select the check box that is associated with the rule.
9. Click the **Delete** button.

   The rule is removed.

Configure IP ACL interface bindings

When you bind a basic IPv4, extended IPv4, or IPv6 ACL to an interface, all the rules that you defined for the IP ACL are applied to the selected interface.

If resources on the switch are insufficient, an attempt to bind an ACL to an interface fails.

To bind an IP ACL to one or more interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

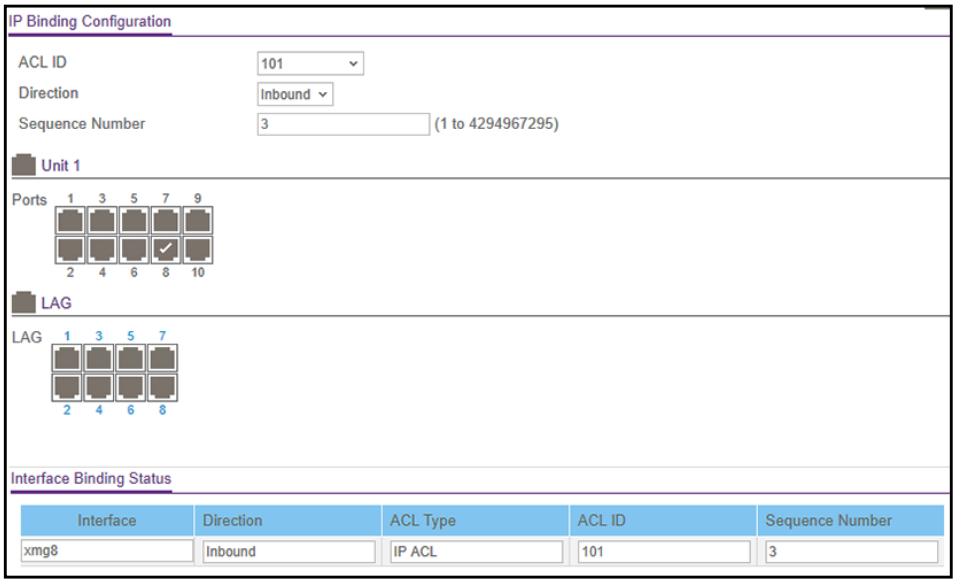
   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > IP Binding Configuration**.



7. From the **ACL ID** menu, select the existing IP ACL for you which you want to add an IP ACL interface binding.

   The fixed selection from the **Direction** menu is **Inbound**, which means that IP ACL rules are applied to traffic entering the interface.

8. In the **Sequence Number** field, optionally specify a number to indicate the order of the access list relative to other access lists already assigned to the interface and direction.

   A low number indicates high precedence order. If a sequence number is already in use for the interface and direction, the specified access list replaces the currently attached access list using that sequence number. If you do not specify the sequence number (meaning that the value is 0), a sequence number that is one number greater than the highest sequence number currently in use for the interface and direction is used. The range is from 1 to 4294967295.

9. To add the selected ACL to a port or LAG, in the Ports table or LAG table, click the port or LAG so that a check mark displays.

   You can add the ACL to several ports and LAGs.

   The Ports and LAG tables display the available interfaces for ACL bindings.

10. Click the **Apply** button.

    Your settings are saved.

The following table describes the nonconfigurable information displayed on the page.

Table 81. Interface Binding Status information

Field	Description
Interface	The selected interface.
Direction	The selected packet filtering direction for the ACL, which is always Inbound.
ACL Type	The type of ACL assigned to the selected interface and direction.
ACL ID	The ACL number or name identifying the ACL assigned to the selected interface and direction.
Sequence Number	The sequence number signifying the order of specified ACL relative to other ACLs assigned to the selected interface and direction.

Display or delete IP ACL bindings in the IP ACL binding table

You can display or delete bindings for basic IPv4, extended IPv4, and IPv6 ACLs.

To display or delete IP ACL bindings:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL > Advanced > Binding Table**.

   The Binding Table page displays. This table displays the IP ACL-to-interface bindings.
7. To delete an IP ACL-to-interface binding, do the following:
   a. Select the check box next to the interface.
   b. Click the **Delete** button.

      The binding is removed.

The following table describes the information displayed in the IP ACL binding table.

Table 82. IP ACL Binding Table

Field	Description
Interface	The interface.
Direction	The selected packet filtering direction for the ACL, which is always Inbound.
ACL Type	The type of ACL assigned to the selected interface and direction.
ACL ID	The ACL number or name identifying the ACL assigned to the selected interface and direction.
Sequence Number	The sequence number signifying the order of the specified ACL relative to other ACLs assigned to the selected interface and direction.

Configure VLAN ACL bindings

You can associate a MAC ACL, any type of IPv4 ACL, or an IPv6 ACL with a VLAN. When you do so, the ACL is applied to all interfaces that are members of the VLAN.

Add a VLAN ACL binding

To add a VLAN ACL binding:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Security > ACL> Advanced > VLAN Binding Configuration**.

   The VLAN Binding Configuration page displays.
7. In the **VLAN ID** field, enter the VLAN ID to which the binding must apply.

   The direction for packet filtering is always inbound.
8. In the **Sequence Number** field, enter an optional sequence number.

   You can specify an optional sequence number to indicate the order of this access list relative to other access lists that are already assigned to the VLAN ID and selected direction. A lower number indicates a higher precedence order. If a sequence number is already in use for the VLAN ID and selected direction, the specified access list replaces the currently attached ACL using that sequence number. If you do not specify a sequence number (the value is 0), a sequence number that is one greater than the highest sequence number currently in use for the VLAN ID and selected direction is used.The range is from 1 to 4294967295.

9. From the **ACL Type** menu, select the type of ACL.

   You can select a MAC ACL, IP ACL, or IPv6 ACL.

10. From the **ACL ID** list, select the ID or name of the ACL that must be bound to the specified VLAN.
11. Click the **Add** button.

    The VLAN ACL binding is added.

Remove a VLAN ACL binding

To remove a VLAN ACL binding:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Security > ACL> Advanced > VLAN Binding Configuration**.

   The VLAN Binding Configuration page displays.

7. Select the check box for the VLAN binding that you want to remove.
8. Click the **Delete** button.

   The VLAN ACL binding is removed.

7

Monitor the Switch and the Traffic

This chapter contains the following sections:

- Monitor the switch and the ports
- Logs
- Port mirroring

Monitor the switch and the ports

You can display and clear port and switch statistics and perform a cable test.

Display or clear switch statistics

You can display detailed statistical information about the traffic that the switch processes.

To display or clear the switch statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Switch Statistics**.

   The Switch Statistics page displays.
7. Click the **Refresh** button to refresh the page with the latest information about the switch.
8. To clear all the statistics counters, click the **Clear** button.

   Clearing resets all switch summary and detailed statistics to default values. However, the discarded packets count cannot be cleared.

The following table describes the switch statistics displayed on the page.

Table 83. Switch statistics

Field	Description
ifIndex	The interface index of the interface table entry associated with the processor of this switch.
Octets Received	The total number of octets of data received by the processor (excluding framing bits, but including FCS octets).
Packets Received Without Errors	The total number of packets (including broadcast packets and multicast packets) received by the processor.
Unicast Packets Received	The number of subnetwork-unicast packets delivered to a higher-layer protocol.
Multicast Packets Received	The total number of packets received that were directed to a multicast address. This number does not include packets directed to the broadcast address.
Broadcast Packets Received	The total number of packets received that were directed to the broadcast address. This does not include multicast packets.
Receive Packets Discarded	The number of inbound packets that were chosen to be discarded, even though no errors were detected, in order to prevent their being delivered to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Octets Transmitted	The total number of octets transmitted out of the interface, including framing characters.
Packets Transmitted Without Errors	The total number of packets transmitted out of the interface.
Unicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Multicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a multicast address, including those that were discarded or not sent.
Broadcast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to the broadcast address, including those that were discarded or not sent.
Transmit Packets Discarded	The number of outbound packets that were chosen to be discarded, even though no errors were detected, in order to prevent their being delivered to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Most Address Entries Ever Used	The highest number of Forwarding Database Address Table entries that were learned by this switch since the most recent reboot.
Address Entries in Use	The number of learned and static entries in the Forwarding Database Address Table for this switch.
Maximum VLAN Entries	The maximum number of VLANs allowed on this switch.

Table 83. Switch statistics (continued)

Field	Description
Most VLAN Entries Ever Used	The largest number of VLANs that were active on this switch since the last reboot.
Static VLAN Entries	The number of active VLAN entries on this switch that were created statically.
VLAN Deletes	The number of VLANs on this switch that were created and then deleted since the last reboot.
Time Since Counters Last Cleared	The elapsed time, in days, hours, minutes, and seconds, since the statistics for this switch were last cleared.

Display port statistics

You can display a summary of per-port traffic statistics on the switch.

To display port statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Port Statistics**.

   The Port Statistics page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.

The following table describes the per-port statistics displayed on the page.

Table 84. Port statistics

Field	Description
Interface	The interface or LAG.
Total Packets Received Without Errors	The total number of packets received that were without errors.
Packets Received With Error	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Broadcast Packets Received	The total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
Packets Transmitted Without Errors	The number of frames without errors that were transmitted by the port.
Transmit Packet Errors	The number of outbound packets that could not be transmitted because of errors.
Collision Frames	The best estimate of the total number of collisions on this Ethernet segment.
Link Down Events	The total number of link down events on a physical port.
Time Since Counters Last Cleared	The elapsed time in days, hours, minutes, and seconds since the statistics for the port were last cleared.

Reset the counters for all interfaces on the switch

To reset the counters for all interfaces on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Port Statistics**.

   The Port Statistics page displays.
7. Select the check box in the heading of the table.
8. Click the **Clear** button.

   All counters are reset to 0.

Reset the counters for one or more interfaces

To reset the counters for one or more interfaces:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Port Statistics**.

   The Port Statistics page displays.

7. Select whether to display physical interfaces, LAGs, or both by clicking one of the following links above the table heading:
   - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
   - **LAG**: Only LAGs are displayed.
   - **All**: Both physical interfaces and LAGs are displayed.
8. Select one or more interfaces by taking one of the following actions:
   - To reset a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
   - To reset multiple interfaces, select the check box associated with each interface.
9. Click the **Clear** button.

   The counters for the interface are reset to 0.

Display and manage detailed port statistics

You can display a variety of per-port traffic statistics.

To display or clear detailed port statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Port Detailed Statistics**.

   The Port Detailed Statistics page displays.

7. From the **Interface** menu, select the interface (a physical port or LAG) for which you want to display the statistics.
8. From the **MST ID** menu, select the MST ID associated with the interface (if available).
9. To refresh the page with the latest information about the switch, click the **Refresh** button.
10. To clear all the counters, click the **Clear** button.

    All statistics for the port are reset to the default values.

The following table describes the detailed port information that displays for a particular port.

Table 85. Detailed port statistics

Field	Description
ifIndex	The interface or LAG.
Port Type	For normal ports, this field is displayed as blank. Otherwise, the options are as follows: • **Mirrored**: The port is a participating in port mirroring as a mirrored port. • **Probe**: The port is a participating in port mirroring as the probe port. • **Port Channel**: The port is a member of a LAG.
Port Channel ID	If the port is a member of a port channel (LAG), the port channel's interface ID and name are shown. Otherwise, Disable is shown.
Port Role	Each MST bridge port that is enabled is assigned a port role for each spanning tree. The port role is one of the following values: Root, Designated, Alternate, Backup, Master, or Disabled.
STP Mode	The Spanning Tree Protocol administrative mode that is associated with the port or port channel. The options are as follows: • **Enable**: Spanning tree is enabled for the port. • **Disable**: Spanning tree is disabled for the port.
STP State	The port's current Spanning Tree state. This state controls what action a port takes on receipt of a frame. If the bridge detects a malfunctioning port, it places that port into the broken state. The states are defined in IEEE 802.1D: • Disabled • Blocking • Listening • Learning • Forwarding • Broken
Admin Mode	The port control administration state. The port must be enabled for it to be allowed into the network. The default is Enabled.
Flow Control Mode	Indicates whether flow control is enabled or disabled for the port. This field does not apply to LAGs.
LACP Mode	Indicates the Link Aggregation Control Protocol administrative state. The mode must be enabled for the port to participate in link aggregation.
Physical Mode	Indicates the port speed and duplex mode. In autonegotiation mode the duplex mode and speed are set from the autonegotiation process.

Table 85. Detailed port statistics (continued)

Field	Description
Physical Status	Indicates the port speed and duplex mode for physical interfaces.
Link Status	Indicates whether the link is up or down.
Link Trap	Indicates whether or not the port sends a trap when link status changes.
Packets RX and TX 64 Octets	The total number of packets (including bad packets) received or transmitted that were 64 octets in length (excluding framing bits but including FCS octets).
Packets RX and TX 65-127 Octets	The total number of packets (including bad packets) received or transmitted that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
Packets RX and TX 128-255 Octets	The total number of packets (including bad packets) received or transmitted that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
Packets RX and TX 256-511 Octets	The total number of packets (including bad packets) received or transmitted that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
Packets RX and TX 512-1023 Octets	The total number of packets (including bad packets) received or transmitted that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
Packets RX and TX 1024-1518 Octets	The total number of packets (including bad packets) received or transmitted that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
Octets Received	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of Ethernet utilization. If you need greater precision, the etherStatsPkts and etherStatsOctets objects must be sampled before and after a common interval.
Packets Received 64 Octets	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
Packets Received 65-127 Octets	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Received 128-255 Octets	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Received 256-511 Octets	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Received 512-1023 Octets	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Table 85. Detailed port statistics (continued)

Field	Description
Packets Received 1024-1518 Octets	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Received > 1518 Octets	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
Total Packets Received Without Errors	The total number of packets received that were without errors.
Unicast Packets Received	The number of subnetwork-unicast packets delivered to a higher-layer protocol.
Multicast Packets Received	The total number of good packets received that were directed to a multicast address. This number does not include packets directed to the broadcast address.
Broadcast Packets Received	The total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
Receive Packets Discarded	The number of inbound packets that were discarded even though no errors were detected to prevent their being delivered to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Total Packets Received with MAC Errors	The total number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Jabbers Received	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and included either a bad frame check sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (alignment error). This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.
Fragments Received	The total number of packets received that were less than 64 octets in length with ERROR CRC (excluding framing bits but including FCS octets).
Undersize Received	The total number of packets received that were less than 64 octets in length with GOOD CRC (excluding framing bits but including FCS octets).
Alignment Errors	The total number of packets received with a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but included a bad frame check sequence (FCS) with a nonintegral number of octets.
Rx FCS Errors	The total number of packets received with a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but included a bad frame check sequence (FCS) with an integral number of octets.
Total Received Packets Not Forwarded	The number of valid frames received that were discarded (that is, filtered) by the forwarding process.

Table 85. Detailed port statistics (continued)

Field	Description
802.3x Pause Frames Received	The number of MAC control frames received on the interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.
Total Packets Transmitted (Octets)	The total number of octets of data (including those in bad packets) transmitted on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of Ethernet utilization. If yo need greater precision, the etherStatsPkts and etherStatsOctets objects must be sampled before and after a common interval.
Packets Transmitted 64 Octets	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
Packets Transmitted 65-127 Octets	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Transmitted 128-255 Octets	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Transmitted 256-511 Octets	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Transmitted 512-1023 Octets	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Transmitted 1024-1518 Octets	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
Packets Transmitted > 1518 Octets	The total number of packets transmitted that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed. This counter supports a maximum increment rate of 815 counts per sec at 10 Mb/s.
Maximum Frame Size	The maximum Ethernet frame size the interface supports or is configured to use, including Ethernet header, CRC, and payload. The possible range is 1522 to 10000. The default maximum frame size is 1522.
Total Packets Transmitted Successfully	The number of frames that were transmitted successfully by the port.
Unicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Multicast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to a multicast address, including those that were discarded or not sent.
Broadcast Packets Transmitted	The total number of packets that higher-level protocols requested be transmitted to the broadcast address, including those that were discarded or not sent.

Table 85. Detailed port statistics (continued)

Field	Description
Transmit Packets Discarded	The number of outbound packets which were chosen to be discarded even though no errors were detected to prevent them from being delivered to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Total Transmit Errors	The sum of single, multiple, and excessive collisions.
Total Transmit Packets Discarded	The sum of single collision frames discarded, multiple collision frames discarded, and excessive frames discarded.
Single Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.
Multiple Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.
Excessive Collision Frames	The number of frames for which transmission on a particular interface fails due to excessive collisions.
Dropped Transmit Frames	The number of transmit frames discarded at the selected port.
STP BPDUs Received	The number of STP BPDUs received at the selected port.
STP BPDUs Transmitted	The number of STP BPDUs transmitted from the selected port.
RSTP BPDUs Received	The number of RSTP BPDUs received at the selected port.
RSTP BPDUs Transmitted	The number of RSTP BPDUs transmitted from the selected port.
MSTP BPDUs Received	The number of MSTP BPDUs received at the selected port.
MSTP BPDUs Transmitted	The number of MSTP BPDUs transmitted from the selected port.
802.3x Pause Frames Transmitted	The number of MAC control frames transmitted on the interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.
EAPOL Frames Received	The number of valid EAPoL frames of any type that were received by this authenticator.
EAPOL Frames Transmitted	The number of EAPoL frames of any type that were transmitted by this authenticator.
Time Since Counters Last Cleared	The elapsed time in days, hours, minutes, and seconds since the statistics for the port were last cleared.

Display or clear EAP and EAPoL statistics

You can display information about Extensible Authentication Protocol (EAP) and EAP over LAN (EAPoL) packets that are received on physical ports.

To display or clear EAP and EAPoL statistics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > EAP Statistics**.

   The EAP Statistics page displays.
7. To refresh the page with the latest information about the switch, click the **Refresh** button.
8. To clear the counters, which resets the EAP and EAPoL statistics to default values, take one of the following actions:
   - To clear the counters for a specific port, select the check box associated with the port, and click the **Clear** button.
   - To clear the counters for multiple ports, select the check boxes associated with the ports, and click the **Clear** button.
   - To clear all counters for all ports, select the check box in the row heading, and click the **Clear** button.

The following table describes the EAP statistics displayed on the page.

Table 86. EAP statistics

Field	Description
Port	The port number.
EAPOL Frames Received	The number of valid EAPoL frames of any type that were received by this authenticator.
EAPOL Frames Transmitted	The number of EAPoL frames of any type that were transmitted by this authenticator.
EAPOL Start Frames Received	The number of EAPoL start frames that were received by this authenticator.
EAPOL Logoff Frames Received	The number of EAPoL logoff frames that were received by this authenticator.
EAPOL Last Frame Version	The protocol version number carried in the most recently received EAPoL frame.
EAPOL Last Frame Source	The source MAC address carried in the most recently received EAPoL frame.
EAPOL Invalid Frames Received	The number of EAPoL frames that were received by this authenticator in which the frame type is not recognized.
EAPOL Length Error Frames Received	The number of EAPoL frames that were received by this authenticator in which the frame type is not recognized.
EAP Response/ID Frames Received	The number of EAP response/identity frames that were received by this authenticator.
EAP Response Frames Received	The number of valid EAP response frames (other than resp/ID frames) that were received by this authenticator.
EAP Request/ID Frames Transmitted	The number of EAP request/identity frames that were transmitted by this authenticator.
EAP Request Frames Transmitted	The number of EAP request frames (other than request/identity frames) that were transmitted by this authenticator.

Perform a cable test

You can test and display information about the cables that are connected to switch ports.

To perform a cable test:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Ports > Cable Test**.

   The Cable Test page displays.
7. Select the check boxes that are associated with the physical ports for which you want to test the cables.
8. Click the **Apply** button.

   A cable test is performed on all selected ports. The cable test might take up to two seconds to complete. If the port forms an active link with a device, the cable status is always Normal. The test returns a cable length estimate if this feature is supported by the PHY for the current link speed. Note that if the link is down and a cable is attached to a 10/100 Ethernet adapter then the cable status might be Open or Short because some Ethernet adapters leave unused wire pairs unterminated or grounded.

The following table describes the nonconfigurable information displayed on the page.

Table 87. Cable Test information

Field	Description
Cable Status	Indicates the cable status: • **Normal**: The cable is working correctly. • **Open**: The cable is disconnected or a faulty connector exists. • **Short**: An electrical short exists in the cable. • **Cable Test Failed**: The cable status could not be determined. The cable might in fact be working. • **No cable**: The cable is not present or too short to test. • **Untested**: The cable is not yet tested. • **Port Disabled**: The port is disabled.
Cable Length	The estimated length of the cable in meters. The length is displayed as a range between the shortest estimated length and the longest estimated length. Unknown is displayed if the cable length could not be determined. The cable length is displayed only if the cable status is Normal.

Table 87. Cable Test information (continued)

Field	Description
Failure Location	The estimated distance in meters from the end of the cable to the failure location. The failure location is displayed only if the cable status is Open or Short.

Logs

The switch generates messages in response to events, faults, or errors occurring on the platform as well as changes in configuration or other occurrences. These messages are stored locally and can be forwarded to one or more centralized points of collection for monitoring purposes or long-term archival storage. Local and remote configuration of the logging capability includes filtering of messages logged or forwarded based on severity and generating component.

Manage and display the memory log

The memory log stores messages in memory based upon the settings for message component and severity. You can set the administrative status and behavior of logs in the system buffer. These log messages are cleared when the switch reboots.

To manage and display the memory log:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Monitoring > Logs > Memory Log**.

   The Memory Log page displays.

7. Select one of the following Admin Status radio buttons:
   - **Enable**: Enable system logging. This is the default setting.
   - **Disable**: Prevent the system from logging messages.
8. From the **Behavior** menu, specify the behavior of the log when it is full:
   - **Wrap**: When the buffer is full, the oldest log messages are deleted as the system logs new messages.
   - **Stop on Full**: When the buffer is full, the system stops logging new messages and preserves all existing log messages.
9. From the **Severity Filter** menu, select the logging level for messages that must be logged.

   Log messages with the selected severity level and all log messages of greater severity are logged. For example, if you select **Warning**, the logged messages include Warning, Error, Critical, Alert, and Emergency. The default severity level is Informational (6).

   The severity can be one of the following levels:

   - **Emergency**: Level 0, the system is unusable.
   - **Alert**: Level 1, action must be taken immediately.
   - **Critical**: Level 2, critical conditions occurred.
   - **Error**: Level 3, error conditions occurred.
   - **Warning**: Level 4, warning conditions occurred.
   - **Notice**: Level 5, normal but significant conditions occurred.
   - **Informational**: Level 6, informational messages are generated. This is the default setting.
   - **Debug**: Level 7, debug-level messages are generated.

   Note: A log records messages equal to or above a configured severity threshold.

10. Click the **Apply** button.

    Your settings are saved.

    The Memory Log table displays on the Memory Log page.

    The Total number of Messages field displays the number of messages the system logged in memory. Up to 450 of the most recent entries can be displayed.

    The rest of the page displays the Memory Log messages. The format of the log message is the same for messages that are displayed for the message log, persistent log, or console log. Messages logged to a collector or relay through syslog support the same format as well.

The following example shows the standard format for a log message:

```
*Jan 05 2021 00:00:18: AAA-5-CONNECT: New http connection for user
admin, source 192.168.1.111 ACCEPTED
```

The message was generated by component AAA on January 5, 2021 at 00:00:18 a.m. with severity 5 (Notice). The message indicates that the administrator logged on to the HTTP management interface from a host with IP address 192.168.1.111.

11. To refresh the page with the latest information about the switch, click the **Refresh** button.
12. To clear the messages from the buffered log in the memory, click the **Clear** button.

Manage and display the flash log

The flash log is a persistent log, that is, is a log that is stored in persistent storage. Persistent storage survives across platform reboots. The first log type is the system startup log. The system startup log stores the first 32 messages received after system reboot. The second log type is the system operation log. The system operation log stores messages received during system operation.

To manage and display the flash log:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Logs > FLASH Log**.

   The FLASH Log Configuration page displays.

7. Select one of the following Admin Status radio buttons:
   - **Enable**. A log that is enabled logs messages.
   - **Disable**. A log that is disabled does not log messages.
8. From the **Severity Filter** menu, select the logging level for messages that must be logged.

   Log messages with the selected severity level and all log messages of greater severity are logged. For example, if you select **Warning**, the logged messages include Warning, Error, Critical, Alert, and Emergency. The default severity level is Error (level 3).

   The severity can be one of the following levels:

   - **Emergency**: Level 0, the highest warning level. If the device is down, or not functioning properly, an emergency log message is saved to the device.
   - **Alert**: Level 1, the second-highest warning level. An alert log message is saved if a serious device malfunction occurs, such as all device features being down. Action must be taken immediately.
   - **Critical**: Level 2, the third-highest warning level. A critical log message is saved if a critical device malfunction occurs, for example, two device ports are not functioning, while the rest of the device ports remain functional.
   - **Error**: Level 3, a device error occurred, such as a port being offline. This is the default setting.
   - **Warning**: Level 4, the lowest level of a device warning.
   - **Notice**: Level 5, normal but significant conditions. Provides the network administrators with device information.
   - **Informational**: Level 6, provides device information.
   - **Debug**: Level 7, provides detailed information about the device.
9. From the **Logs to be Displayed** menu, select one of the following options:
   - **Current Logs**. The log messages for the current switch session are displayed. This is the default setting.
   - **Previous Logs**. The previous log messages are displayed, that is, the log messages that are still in the flash memory from before the switch was rebooted.
10. Click the **Apply** button.

    Your settings are saved.

    The Total Number of Messages field shows is the total number of persistent log messages that are stored on the switch. The maximum number of persistent log messages displayed on the switch is 64.

    ```
    *Jan 05 2021 00:00:18: AAA-5-CONNECT: New http connection for user
    admin, source 192.168.1.111 ACCEPTED
    ```

    The message was generated by component AAA on January 5, 2021 at 00:00:18 a.m. with severity 5 (Notice). The message indicates that the administrator logged on to the HTTP management interface from a host with IP address 192.168.1.111.

Manage the server log

You can let the switch send log messages to remote logging hosts. A remote log server is the same as a remote syslog host.

You must enable the server log on the switch and specify one or more remote syslog hosts.

Enable the server log and add a remote syslog host

To enable the server log and add a remote syslog host:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Logs > Server Log**.

   The Server Log page displays.
7. In the Server Log Configuration section, select one of the following Admin Status radio buttons:
   - **Enable**: Send log messages to all configured hosts (syslog collectors or relays) using the values configured for each host.
   - **Disable**: Stop logging to all syslog hosts. **Disable** means no messages are sent to any collector or relay.
8. Click the **Apply** button.

   Your settings are saved.

9. In the Server Configuration section, specify the following settings:
   - **IP Address Type**: Specify the IP address type of the host, which can be **IPv4**, **IPv6**, or **DNS**.
   - **Host Address**: Specify the IP address or host name of the syslog host.
   - **Port**: Specify the port on the host to which syslog messages must be sent. The default port number is 514.
   - **Severity Filter**: Use the menu to select the severity of the logs that must be sent to the logging host. Logs with the selected severity level and all logs of greater severity are sent to the host. For example, if you select **Error**, the logged messages include Error, Critical, Alert, and Emergency. The severity can be one of the following levels:
     - **Emergency**: Level 0, the highest warning level. If the device is down or not functioning properly, an emergency log is saved to the device.
     - **Alert**: Level 1, the second-highest warning level. An alert log is saved if a serious device malfunction occurs, such as all device features being down.
     - **Critical**: Level 2, the third-highest warning level. A critical log is saved if a critical device malfunction occurs, for example, two device ports are not functioning, while the rest of the device ports remain functional.
     - **Error**: Level 3, a device error occurred, such as a port being offline.
     - **Warning**: Level 4, the lowest level of a device warning.
     - **Notice**: Level 5, provides the network administrators with device information.
     - **Informational**: Level 6, provides device information.
     - **Debug**: Level 7, provides detailed information about the log.
10. Click the **Add** button.

    The remote syslog host is added.

    The Status field in the Server Configuration table shows whether the remote logging host is currently active.

Modify the settings for a remote syslog host

To modify the settings for a remote syslog host:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Logs > Server Log**.

   The Server Log Configuration page displays.
7. Select the check box that is associated with the host.
8. Change the information as needed.
9. Click the **Apply** button.

   Your settings are saved.

Delete the settings for a remote syslog host

To delete the settings for a remote syslog host:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Monitoring > Logs > Server Log**.

   The Server Log Configuration page displays.

7. Select the check box that is associated with the host.
8. Click the **Delete** button.

   The host is removed.

Display or clear the trap logs and the counters

You can display information about the SNMP traps generated on the switch.

You can also display information about the traps that were sent.

To display or clear the trap logs and the counters:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Monitoring > Logs > Trap Logs**.

   The Trap Logs page displays.

7. To refresh the page with the latest information about the switch, click the **Refresh** button.
8. To clear the messages from the trap logs in the memory and clear the counters, click the **Clear** button.

The following table describes the Trap Log information that is displayed on the page.

Table 88. Trap Logs information

Field	Description
Number of Traps Since Last Reset	The number of traps that occurred since the switch last rebooted.
Trap Log Capacity	The maximum number of traps stored in the log. If the number of traps exceeds the capacity, the entries overwrite the oldest entries.
Number of Traps since log last viewed	The number of traps that occurred since the traps were last displayed. Displaying the traps by any method (terminal interface display, web display, upload file from switch, and so on) causes this counter to be cleared to 0.
Log	The sequence number of the trap.
System Up Time	The time when this trap occurred, expressed in days, hours, minutes, and seconds, since the last reboot of the switch.
Trap	Information describing the trap.

Port mirroring

Port mirroring lets you select the network traffic of specific switch ports for analysis by a network analyzer. You can select many switch ports as source ports but a single switch port only as the destination port. You can configure how traffic is mirrored on a source port by selecting packets that are received, transmitted, or both.

A packet that is copied to the destination port is in the same format as the original packet. This means that if the mirror is copying a received packet, the copied packet is VLAN-tagged or untagged as it was received on the source port. If the mirror is copying a transmitted packet, the copied packet is VLAN-tagged or untagged as it is being transmitted on the source port.

To globally enable port mirroring, specify the destination port, and specify one or more source ports:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Monitoring > Mirroring > Port Mirroring**.

   The Port Mirroring page displays.
7. Select an Admin Mode radio button:
   - **Disable**. Port mirroring is disabled. This is the default setting.
   - **Enabled**: Port mirroring is enabled.
8. From the **Destination Port** menu, select the physical destination port to which port traffic must be copied.

   You can configure one destination port only. The port functions as a probe port and receives traffic from all configured source ports. If no port is configured, None is displayed. The default is None.
9. Click the **Apply** button.

   Your settings are saved.

   In the Source Interface Configuration section, perform the following steps.
10. Select whether to display physical interfaces, LAGs, the CPU, or al by clicking one of the following links above the table heading:
    - **1** (the unit ID of the switch): Only physical interfaces are displayed. This is the default setting.
    - **LAG**: Only LAGs are displayed.
    - **CPU**: Only the CPU is displayed.
    - **All**: The physical interfaces, LAGs, and CPU are displayed.
11. Select one or more interfaces by taking one of the following actions:
    - To select a single interface, select the check box associated with the port, or type the port number in the **Go To Interface** field and click the **Go** button.
    - To select multiple interfaces, select the check box associated with each interface.

    Traffic from the selected ports will be sent to the destination port.
12. From the **Direction** menu, specify the direction of the traffic that must be mirrored from the selected source ports:
    - **None**: No traffic direction is selected. This is the default setting.

- **Tx and Rx**: Monitors both transmitted and received packets.
- **Rx**: Monitors received (ingress) packets only.
- **Tx**: Monitors transmitted (egress) packets only.

13. Click the **Apply** button.

    Your settings are saved.

    The Status field indicates the interface status. The destination port is listed as Probe. The source ports are listed as Mirrored.

8

Maintain or Troubleshoot the Switch

This chapter contains the following sections:

- Reboot from the device UI
- Reset to factory default settings
- Export a file from the switch
- Update software or download a file
- Manage software images
- Diagnostics and troubleshooting

Reboot from the device UI

You can reboot the switch from the device UI.

Note: If you can physically access the switch, you can reboot the switch by pressing the multi-function **Reset** button on the front panel for less than 5 seconds. (Do not press the button for more than 5 seconds!)

To reboot the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Reset > Device Reboot**.

   The Device Reboot page displays.
7. Select the check box.
8. Click the **Apply** button.

   An Alert pop-up window displays.
9. Click the **OK** button to confirm.

   The switch reboots.

Reset to factory default settings

You can reset the system configuration to the factory default values. All changes that you made are lost. If the IP address changes, your web session might disconnect.

Note: If you reset the switch to the default configuration, the IP address is reset to 192.168.0.239, and the DHCP client is enabled. If you lose network connectivity after you reset the switch to the factory defaults, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

If you reset the switch to factory default settings, you can select to either maintain the NETGEAR registration status or reset the NETGEAR registration status. In the latter situation, you must reregister the switch with NETGEAR.

Reset the switch to factory default settings but maintain the registration status

Note: If you can physically access the switch, you can reset the switch to factory default settings but maintain the registration status by pressing the multi-function **Reset** button on the front panel for more than 5 seconds but less than 10 seconds. (Do not press the button for more than 10 seconds!)

To reset the switch to factory default settings but maintain the registration status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Reset > Factory Default**.

   The Default Settings page displays.
7. Select the **Reset configuration to factory default (EXCEPT registered device status), and clear device logs** radio button.

   This option resets the switch to its factory default settings but does not change its registration status with NETGEAR.
8. Click the **Apply** button.

   An Alert pop-up window displays.
9. Click the **OK** button.

   All configuration settings are reset to their factory default values. All changes that you made are erased, even if you saved the configuration. This process takes about 135 seconds.

Reset the switch to factory default settings and reset the registration status

This option can be useful if you want to register the switch under a different name or account. This option requires you to first contact NETGEAR support at netgear.com/support so that the NETGEAR registration status on the NETGEAR server can be reset. Then, you can use this option to erase all settings, reset the switch to factory defaults, go through the initial log-in process again, and reregister the switch with NETGEAR.

Note: If you can physically access the switch, you can reset the switch to factory default settings and reset the registration status by pressing the multi-function **Reset** button on the front panel for more than 10 seconds.

To reset the switch to factory default settings and reset the registration status:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Reset > Factory Default**.

   The Default Settings page displays.
7. Select the **Reset and erase everything including registered device status** radio button.

   This option requires you to first contact NETGEAR support at netgear.com/support so that the NETGEAR registration status on the NETGEAR server can be reset.

   After the switch reboots, you can reregister the switch using your NETGEAR account credentials. If you previously obtained a registration key, you can reenter the registration key. For more information, see Register the switch on page 31.

   Note: If you do not first contact NETGEAR, after you reset the switch to factory default settings, the Device UI login page displays rather than the Register to activate your warranty page. However, your device admin password is reset to the default password (**password**).
8. Click the **Apply** button.

   An Alert pop-up window displays.
9. Click the **OK** button.

   All configuration settings are reset to their factory default values. All changes that you made are erased, even if you saved the configuration. This process takes about 135 seconds.

Export a file from the switch

You can export configuration (ASCII) or log (ASCII log) files from the switch to a file server by using TFTP or to a computer by using HTTP.

Use TFTP to export a file from the switch to a TFTP server

You can upload (export) configuration (ASCII or log ASCII) files from the switch to a TFTP server on the network.

To export a file from the switch to a TFTP server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Export > TFTP File Export**.

   The TFTP File Export page displays.
7. From the **File Type** menu, select the type of file:
   - **Text Configuration**: A text-based configuration file enables you to edit a configured text file (`startup-config`) offline as needed. The most common usage of text-based configuration is to upload a working configuration from a device, edit it offline to personalize it for another similar device (for example, change the device name or IP address), and download it to that device. This is the default setting.
   - **Trap Log**: The trap log with the switch trap records.

- **Buffered Log**: The switch buffered (in-memory) log.
- **Tech Support**: The tech support file is a text-based file that contains a variety of hardware, software, and configuration information that can assist in device and network troubleshooting.
- **Crash Logs**: The switch crash logs, if any are available.

8. From the **Server Address Type** menu, select the format for the **Server Address** field:
   - **IPv4**: Indicates that the TFTP server address is an IP address in dotted-decimal format. This is the default setting.
   - **DNS**: Indicates that the TFTP server address is a host name.
9. In the **Server Address** field, enter the IP address of the server in accordance with the format indicated by the server address type.

   The default is the IPv4 address 0.0.0.0.
10. In the **Transfer File Path** field, specify the path on the TFTP server where you want to save the file.

    You can enter up to 160 characters. Include the backslash at the end of the path. A path name with a space is not accepted. Leave this field blank to save the file to the root TFTP directory.
11. In the **Transfer File Name** field, specify a destination file name for the file to be uploaded.

    You can enter up to 32 characters. The transfer fails if you do not specify a file name.
12. Select the **Start File Transfer** check box.
13. Click the **Apply** button.

    The file transfer begins.

    The page displays information about the file transfer progress. The page refreshes automatically when the file transfer completes.

Use HTTP to export a file from the switch to a computer

You can upload (export) files of various types from the switch to a computer through an HTTP session by using your web browser.

To export a file from the switch to a computer by using HTTP:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Export > HTTP File Export**.

   The HTTP File Export page displays.
7. From the **File Type** menu, select the type of file:
   - **Text Configuration**: A text-based configuration file enables you to edit a configured text file (`startup-config`) offline as needed. The most common usage of text-based configuration is to upload a working configuration from a device, edit it offline to personalize it for another similar device (for example, change the device name or IP address), and download it to that device.
   - **Tech Support**: The tech support file is a text-base file that contains a variety of hardware, software, and configuration information that can assist in device and network troubleshooting.
   - **Crash Logs**: The switch crash logs, if any are available.
8. Click the **Apply** button.

   A pop-up window displays.
9. Navigate to a location on the computer and save the file.

   The file transfer begins.

   The page displays information about the file transfer progress. The page refreshes automatically when the file transfer completes.

Update software or download a file

You can manually check for the latest software version (also referred to as firmware version) through the device UI of the switch, download the firmware, and upload the firmware to the switch. If firmware release notes are available with new firmware, read the release notes to find out if you must reconfigure the switch after updating.

You can download system files from a remote system to the switch by using either TFTP or HTTP. In this context, downloading is also referred to as updating.

Use TFTP to download a file to the switch or update the software image

You can download a software (firmware) image, configuration files, and SSL files from a TFTP server to the switch.

Before you download a file to the switch, the following conditions must be true:

- The file to download from the TFTP server is on the server in the appropriate directory.
- The file is in the correct format.
- The switch contains a path to the TFTP server.

You can also download files by using HTTP (see Use HTTP to download a file to the switch or update the software image on page 466).

To download a file to the switch from a TFTP server:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:

   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Maintenance > Update > TFTP Firmware/File Update**.

   The TFTP Firmware/File Update page displays.

7. From the **File Type** menu, select the type of file:
   - **Software**: The system software image, which is saved in one of two flash sectors called images (image1 and image2). The active image stores the active copy, while the other image stores a second copy. The device boots and runs from the active image. If the active image is corrupted, the system automatically boots from the

nonactive image. This is a safety feature for faults occurring during the boot upgrade process. This is the default setting.

- **Text Configuration**: A text-based configuration file enables you to edit a configured text file (`startup-config`) offline as needed. The most common usage of text-based configuration is to upload a working configuration from a device, edit it offline to personalize it for another similar device (for example, change the device name or IP address), and download it to that device.
- **X.509 Public Certificate PEM**: SSL Trusted Root Certificate File (PEM Encoded).
- **X.509 Certificate Private Key PEM**: SSL Server Certificate File (PEM Encoded).
- **SSL DH Weak Encryption Parameter PEM File**: SSL Diffie-Hellman Weak Encryption Parameter File (PEM Encoded).
- **SSL DH Strong Encryption Parameter PEM File**: SSL Diffie-Hellman Strong Encryption Parameter File (PEM Encoded).

8. If the selection from the **File Type** menu is **Software**, the **Image Name** menu is displayed and you must select the software image that must be downloaded to the switch:
   - **Image1**: Select image1 to upload image1.
   - **Image2**: Select image2 to upload image2.

   Note: We recommended that you do not overwrite the active image.

9. From the **Server Address Type** menu, select the format for the **TFTP Server IP** field:
   - **IPv4**: Indicates that the TFTP server address is an IP address in dotted-decimal format. This is the default setting.
   - **DNS**: Indicates that the TFTP server address is a host name.
10. In the **TFTP Server IP** field, enter the IP address of the TFTP server indicated by the server address type.

    The default is the IPv4 address 0.0.0.0.
11. In the **Transfer File Path** field, specify the path on the TFTP server where the file is located.

    Enter up to 160 characters. Include the backslash at the end of the path. A path name with a space is not accepted. Leave this field blank to save the file to the root TFTP directory.
12. In the **Remote File Name** field, specify the name of the file to download from the TFTP server.

    You can enter up to 32 characters. A file name with a space is not accepted.
13. Select the **Start File Transfer** check box to initiate the file upload.
14. Click the **Apply** button.

    The file transfer begins.

    The page displays information about the progress of the file transfer. The page refreshes automatically when the file transfer completes.

Note: After you download a text configuration file, the switch applies the configuration automatically.

15. After you download a software image file, if you want the switch to run the software image, do the following:
    a. Select the new software image file (see Change the software image that loads when the switch starts or reboots on page 471).
    b. Reboot the switch (see Reboot from the device UI on page 457).

Use HTTP to download a file to the switch or update the software image

You can download a software (firmware) image, configuration files, and SSL files from a computer to the switch by using an HTTP session over a web browser.

To download a file to the switch using HTTP:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Update > HTTP Firmware/File Update**.

   The HTTP Firmware/File Update page displays.
7. From the **File Type** menu, select the type of file:
   - **Software**: The system software image, which is saved in one of two flash sectors called images (image1 and image2). The active image stores the active copy, the

other image stores a second copy. The device boots and runs from the active image. If the active image is corrupted, the system automatically boots from the nonactive image. This is a safety feature for faults occurring during the boot upgrade process. This the default setting.

- **Text Configuration**: A text-based configuration file enables you to edit a configured text file (`startup-config`) offline as needed. The most common usage of text-based configuration is to upload a working configuration from a device, edit it offline to personalize it for another similar device (for example, change the device name, serial number, IP address), and download it to that device.
- **X.509 Public Certificate PEM**: SSL Trusted Root Certificate File (PEM Encoded).
- **X.509 Certificate Private Key PEM**: SSL Server Certificate File (PEM Encoded).
- **SSL DH Weak Encryption Parameter PEM File**: SSL Diffie-Hellman Weak Encryption Parameter File (PEM Encoded).
- **SSL DH Strong Encryption Parameter PEM File**: SSL Diffie-Hellman Strong Encryption Parameter File (PEM Encoded).

8. If the selection from the **File Type** menu is **Software**, the **Image Name** menu is displayed and you must select the software image that must be downloaded to the switch:
   - **Image1**: Select image1 to upload image1.
   - **Image2**: Select image2 to upload image2.

   Note: We recommended that you do not overwrite the active image.

9. Click the **Browse** button and locate and select the file that you want to download.

   The file name can contain up to 80 characters.

10. Click the **Apply** button.

    The file transfer begins.

    The page displays information about the progress of the file transfer. After a file transfer is started, wait until the page refreshes. When the page refreshes, the option to select a file is no longer available, indicating that the file transfer is complete.

    Note: After you download a text configuration file, the switch applies the configuration automatically.

11. After you download a software image file, if you want the switch to run the software image, do the following:
    a. Select the new software image file (see Change the software image that loads when the switch starts or reboots on page 471).
    b. Reboot the switch (see Reboot from the device UI on page 457).

Use an HTTP session to download and install an SSL security certificate file on the switch

Note: You are not required to obtain an SSL certificate. The security warning that might display in your browser prompts you to confirm that the self-signed certificate of the switch is valid. Once you do so, the browser warning might no longer display when you log in.

If you obtain an SSL security certificate from a certificate authority, you can download and install the SSL security certificate through an HTTP session using your web browser.

For an SSL security certificate, you must download two Privacy Enhanced Mail (PEM) files to the switch:

- **X.509 Public Certificate PEM**: The SSL trusted root certificate PEM file, which must be in the format `xxxxCERTxxxxx.pem`.
- **X.509 Certificate Private Key PEM**: The SSL server certificate PEM file (the key file), which must be in the format `xxxxKEYxxxxx.pem`.

Before you can download and install an SSL security certificate, you must disable HTTPS on the switch.

To disable HTTPS and use an HTTP session to download and install an SSL security certificate file on the switch:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

The System Information page displays.

6. Select **Security > Access > HTTPS**.

   The HTTPS page displays.

7. Select the Admin Mode **Disable** radio button.
8. Click the **Apply** button.

   Your settings are saved. Because you changed the access mode from HTTPS to HTTP, you are logged out of the switch.

9. Wait one minute, refresh your browser, and log back in to the switch (see steps 3 through 5).
10. Select **Maintenance > Update > HTTP Firmware/File Update**.

    The HTTP Firmware/File Update page displays.

11. From the **File Type** menu, select **X.509 Public Certificate PEM**.
12. Select the Select File **Browse** button and locate the file that you want to download.

    This the certificate file, which must be in the format `xxxxCERTxxxxx.pem`.

13. Click the **Apply** button.

    The file transfer begins.

    The page displays information about the progress of the file transfer. The page refreshes automatically when the file transfer completes (or if it fails).

14. From the **File Type** menu, select **X.509 Certificate Private Key PEM**.

    This is the key file, which must be in the format `xxxxKEYxxxxx.pem`.

15. Select the Select File **Browse** button and locate the file that you want to download.

    The file name can contain up to 80 characters.

16. Click the **Apply** button.

    The file transfer begins.

    The page displays information about the progress of the file transfer. The page refreshes automatically when the file transfer completes.

Manage software images

The switch maintains two versions of the switch software in permanent storage. One image is the active image, and the second image is the backup image. The active image is loaded when the switch starts or reboots. This feature reduces switch down time when you are updating the switch software.

Note: A switch that runs an older software version might not load a configuration file that is created by a newer software version. In such a situation, the switch displays a warning.

Copy a software image

You can copy a software image from one location (primary or backup) to another.

To copy a software image:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Maintenance > File Management > Copy**.

   The Copy page display.

7. Select the Source Image **image1** or **image2** radio button to specify the image to be copied.
8. Select the Destination Image **image1** or **image2** radio button to specify the destination image.
9. Click the **Apply** button.

   Your settings are saved.

Configure dual image settings

The Dual Image feature allows the switch to retain two images in permanent storage. You can select which image must be loaded when the reboots, specify an image description, or delete an image. This feature reduces switch down time when you are upgrading or downgrading the software image.

Change the software image that loads when the switch starts or reboots

To change the image that loads during the boot process:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > File Management > Dual Image Configuration**.

   The Dual Image Configuration page displays.
7. From the **Image Name** menu, select the image that is *not* the image displayed in the Current-active field but that is the image that you want the switch to run *after* it reboots.

   The Current-active field displays the name of the active image.
8. As an option, specify a name for the selected image by entering one in the **Image Description** field.
9. Select the **Activate Image** check box.
10. Click the **Apply** button.

    Your settings are saved.

11. After activating the image, reboot the switch (see Reboot from the device UI on page 457).

    If you do not reboot the switch, it continues running the image shown in the Current-active field until the next time that the switch reboots.

Delete a software image

To delete a software image:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > File Management > Dual Image Configuration**.

   The Dual Image Configuration page displays.
7. From the **Image Name** menu, select the image that is *not* the image displayed in the Current-active field.

   The Current-active field displays the name of the active image. You cannot delete the active image.
8. Select the **Delete** Image check box.
9. Click the **Apply** button.

   The image is removed.

View the dual image status

You can view information about the active and backup images on the switch.

To view dual image status information:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > File Management > Dual Image > Dual Image Status**.

The following table describes the nonconfigurable information displayed on the page.

Table 89. Dual Image Status information

Field	Description
Image1 Ver	The version of the image1 file.
Image2 Ver	The version of the image2 file.
Current-active	The currently active image on this switch.
Next-active	The image to be used after the switch reboots.
Image1 Description	The description, if any, associated with the image1 file.
Image2 Description	The description, if any, associated with the image2 file.

Diagnostics and troubleshooting

You can send a ping or a traceroute, and you can perform a memory dump.

Ping an IPv4 address

You can configure the switch to send a ping request to a specified IPv4 address. You can use this option to check whether the switch can communicate with a particular IPv4 device. When you send a ping, the switch sends a specified number of ping requests and the results are displayed.

If a reply to the ping is received, the following message displays:

```
PING x.y.z.w (x.y.z.w): size data bytes
size bytes from x.y.z.w: seq=0 ttl=xyz
--- x.y.z.w ping statistics ---
count packets transmitted, count packets received, x% packet loss
```

If a reply to the ping is not received, the following message displays:

```
PING x.y.z.w (x.y.z.w): size data bytes
--- x.y.z.w ping statistics ---
count packets transmitted, 0 packets received, 100% packet loss
```

To ping an IPv4 address:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.

6. Select **Maintenance > Troubleshooting > Ping IPv4**.

   The Ping IPv4 page displays.

7. In the **IP Address/Host Name** field, enter the IP address or host name of the device that must be pinged.
8. In the **Count** field, enter the number of echo requests that must be sent.

   The default value is 3. The range is 1 to 15.

9. In the **Interval (secs)** field, enter the time between ping packets in seconds.

   The default value is 3 seconds. The range is 1 to 60.

10. In the **Size** field, enter the size of the ping packet. The default value is 0 bytes. The range is 0 to 13000.
11. From the **Source** menu, as an option, you can select the IP address or interface that must be used to send echo request packets:
    - **None**: The source address of the ping packet is the address of the default egress interface.
    - **IP Address**: The source IP address that must be used when echo request packets are sent. With this selection, the **IP Address** field displays and you must enter the IPv4 address that must be used as the source.
    - **Interface**: The interface that must be used when echo request packets are sent. The **Interface** menu displays, but the only available selection from the menu is **Network**.
12. Click the **Apply** button.

    The specified address is pinged. The results are displayed below the configurable data in the Results field.

Ping an IPv6 address

You can configure the switch to send a ping request to a specified IPv6 address. You can use this option to check whether the switch can communicate with a particular IPv6 device. When you send a ping, the switch sends a specified number of ping requests and the results are displayed.

If a reply to the ping is received, the following message displays:

```
PING x:y::z:w (x:y::z:w): size data bytes
size bytes from x:y::z:w: seq=0 ttl=xyz
--- x:y::z:w ping statistics ---
count packets transmitted, count packets received, x% packet loss
```

If a reply to the ping is not received, the following message displays:

```
PING x:y::z:w (x:y::z:w): size data bytes
--- x:y::z:w ping statistics ---
count packets transmitted, 0 packets received, 100% packet loss
```

To ping an IPv6 address:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Maintenance > Troubleshooting > Ping IPv6**.

   The Ping IPv6 page displays.

7. From the **Ping** menu, select the type of ping:
   - **Global**: Pings a global IPv6 address.
   - **Link Local**: Pings a link-local IPv6 address over a specified interface. With this selection, the **Interface** menu displays, and you must select the interface.
8. In the **IPv6 Address/Hostname** field, enter the IPv6 address or host name of the station that must be pinged.

   The format is xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx. The maximum number of characters is 255.

9. In the **Count** field, enter the number of echo requests that must be sent.

   The range is 1 to 15. The default value is 3.

10. In the **Interval (secs)** field, enter the time in seconds between ping packets.

    The range is 1 to 60. The default value is 3.

11. In the **Datagram Size** field, enter the datagram size.

    The valid range is 0 to 13000. The default value is 0 bytes.

12. From the **Source** menu, as an option, you can select the IP address or interface that must be used to send echo request packets:
    - **None**: The source address of the ping packet is the address of the default egress interface.
    - **IP Address**: The source IP address that must be used when echo request packets are sent. With this selection, the **IPv6 Address** field displays and you must enter the IPv6 address that must be used as the source.
    - **Interface**: The interface that must be used when echo request packets are sent. The **Interface** menu displays, but the only available selection from the menu is **Network**.
13. Click the **Apply** button.

    The specified address is pinged. The results are displayed below the configurable data in the Results field.

Send an IPv4 traceroute

You can configure the switch to send a traceroute request to a specified IPv4 address or host name. You can use this to discover the paths that packets take to a remote destination. When you send a traceroute, the switch displays the results below the configurable data.

If a reply to the traceroute is received, the following message displays:

```
traceroute to x.y.z.w (x.y.z.w), maxTTL hops max, size byte packets
initTTL x.y.z.w (x.y.z.w) 0.000 ms * 0.000 ms
initTTL+1 x.y.z.w (x.y.z.w) 0.000 ms * 0.000 ms
initTTL+2 x.y.z.w (x.y.z.w) 0.000 ms * 0.000 ms
```

To send an IPv4 traceroute:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

For information about the credentials, see Credentials for the device UI on page 30.

5. Click the **Go** button.

   The System Information page displays.

6. Select **Maintenance > Troubleshooting > Traceroute IPv4**.

   The Traceroute IPv4 page displays.

7. In the **IP Address/Hostname** field, enter the IP address or host name of the device for which the path must be discovered.
8. In the **Probes Per Hop** field, enter the number of probes per hop.

   The default value is 3. The range is 1 to 10.

9. In the **Max TTL** field, enter the maximum time to live (TTL) for the destination.

   The default value is 30. The range is 1 to 255.

10. In the **Init TTL** field, enter the initial TTL to be used.

    The default value is 1. The range is 1 to 255.

11. In the **MaxFail** field, enter the maximum number of failures allowed in the session.

    The default value is 5. The range is 1 to 255.

12. In the **Interval (secs)** field, enter the time between probes in seconds.

    The default value is 3. The range is 1 to 60.

13. In the **Port** field, enter the UDP destination port for the probe packets.

    The default value is 33434. The range is 1 to 65535.

14. In the **Size** field, enter the size of the probe packets.

    The default value is 38. The range is 38 to 32768.

15. From the **Source** menu, as an option, you can select the IP address or interface that must be used to send probe packets:
    - **None**: The source address of the probe packet is the address of the default egress interface.
    - **IP Address**: The source IP address that must be used when probe request packets are sent. With this selection, the **IP Address** field displays and you must enter the IPv4 address that must be used as the source.
    - **Interface**: The interface that must be used when probe request packets are sent. The **Interface** menu displays, but the only available selection from the menu is **Network**.
16. Click the **Apply** button.

    A traceroute request is sent to the specified IP address or host name. The results are displayed below the configurable data in the Results field.

Send an IPv6 traceroute

You can configure the switch to send a traceroute request to a specified IPv6 address or host name. You can use this to discover the paths that packets take to a remote destination. When you send a traceroute, the switch displays the results below the configurable data.

If a reply to the traceroute is received, the following message displays:

```
traceroute to x:y::z:w (x:y::z:w), maxTTL hops max, size byte packets
initTTL x:y::z:w (x:y::z:w) 0.000 ms * 0.000 ms
initTTL+1 x:y::z:w (x:y::z:w) 0.000 ms * 0.000 ms
initTTL+2 x:y::z:w (x:y::z:w) 0.000 ms * 0.000 ms
```

To send an IPv6 traceroute:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.
2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

   If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.
4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Troubleshooting > Traceroute IPv6**.

   The Traceroute IPv6 page displays.
7. In the **IPv6 Address/Host Name** field, enter the IPv6 address or host name of the device for which the path must be discovered.
8. In the **Probes Per Hop** field, enter the number of probes per hop.

   The default value is 3. The range is 1 to 10.
9. In the **Max TTL** field, enter the maximum time to live (TTL) for the destination.

   The default value is 30. The range is 1 to 255.

10. In the **Init TTL** field, enter the initial TTL to be used.

    The default value is 1. The range is 1 to 255.

11. In the **MaxFail** field, enter the maximum number of failures allowed in the session.

    The default value is 5. The range is 1 to 255.

12. In the **Interval (secs)** field, enter the time between probes in seconds.

    The default value is 3. The range is 1 to 60.

13. In the **Port** field, enter the UDP destination port for the probe packets.

    The default value is 33434. The range is 1 to 65535.

14. In the **Size** field, enter the size of the probe packets.

    The default value is 38. The range is 38 to 32768.

15. From the **Source** menu, as an option, you can select the IP address or interface that must be used to send probe packets:
    - **None**: The source address of the probe packet is the address of the default egress interface.
    - **IP Address**: The source IP address that must be used when probe request packets are sent. With this selection, the **IPv6 Address** field displays and you must enter the IPv6 address that must be used as the source.
    - **Interface**: The interface that must be used when probe request packets are sent. The **Interface** menu displays, but the only available selection from the menu is **Network**.

16. Click the **Apply** button.

    A traceroute request is sent to the specified IP address or host name. The results are displayed below the configurable data in the Results field.

Enable remote diagnostics

For enhanced security, the remote diagnostic option is disabled by default. You can enable the option to access the switch remotely. When remote access is enabled, you or technical support can perform remote diagnostics services.

To enable remote diagnostics:

1. Connect your computer to the same network as the switch.

   You can use a WiFi or wired connection to connect your computer to the network, or connect directly to a switch that is off-network using an Ethernet cable.

2. Launch a web browser.
3. In the address field of your web browser, enter the IP address of the switch.

   If you do not know the IP address of the switch, see Access the switch on-network and connected to the Internet on page 19 or Access the switch off-network on page 28.

   The Device UI login page displays.

If you did not yet activate your warranty, the Register to activate your warranty page displays. For more information, see Register the switch on page 31.

4. Enter one of the following passwords:
   - Enter your device admin password.
   - If you previously managed the switch through the Insight app or Cloud portal, enter the Insight network password for the last Insight network location.

   For information about the credentials, see Credentials for the device UI on page 30.
5. Click the **Go** button.

   The System Information page displays.
6. Select **Maintenance > Troubleshooting > Remote Diagnostics**.

   The Remote Diagnostics page displays.
7. Select the **Enable** radio button.
8. Click the **Apply** button.

   Your settings are saved.

A

Configuration Examples

This appendix contains the following sections:

- Virtual Local Area Networks (VLANs)
- Access control lists (ACLs)
- Differentiated Services (DiffServ)
- 802.1X access control
- Multiple Spanning Tree Protocol
- VLAN routing interfaces

Virtual Local Area Networks (VLANs)

A local area network (LAN) can generally be defined as a broadcast domain. Hubs, bridges, or switches in the same physical segment or segments connect all end node devices. End nodes can communicate with each other without the need for a router. Routers connect LANs together, routing the traffic to the appropriate port.

A virtual LAN (VLAN) is a local area network with a definition that maps workstations on some basis other than geographic location (for example, by department, type of user, or primary application). To enable traffic to flow between VLANs, traffic must go through a router, just as if the VLANs were on two separate LANs.

A VLAN is a group of computers, servers, and other network resources that behave as if they were connected to a single network segment—even though they might not be. For example, all marketing personnel might be spread throughout a building. Yet if they are all assigned to a single VLAN, they can share resources and bandwidth as if they were connected to the same segment. The resources of other departments can be invisible to the marketing VLAN members, accessible to all, or accessible only to specified individuals, depending on how the IT manager set up the VLANs.

VLANs present a number of advantages:

- It is easy to do network segmentation. Users who communicate most frequently with each other can be grouped into common VLANs, regardless of physical location. Each group's traffic is contained largely within the VLAN, reducing extraneous traffic and improving the efficiency of the whole network.
- They are easy to manage. The addition of nodes, as well as moves and other changes, can be dealt with quickly and conveniently from a management interface rather than from the wiring closet.
- They provide increased performance. VLANs free up bandwidth by limiting node-to-node and broadcast traffic throughout the network.
- They ensure enhanced network security. VLANs create virtual boundaries that can be crossed only through a router. So standard, router-based security measures can be used to restrict access to each VLAN.

Packets received by the switch are treated in the following way:

- When an untagged packet enters a port, it is automatically tagged with the port's default VLAN ID tag number. Each port supports a default VLAN ID setting that is configurable (the default setting is 1). The default VLAN ID setting for each port can be changed on the Port PVID Configuration page. See Configure the PVID settings for an interface on page 163.
- When a tagged packet enters a port, the tag for that packet is unaffected by the default VLAN ID setting. The packet proceeds to the VLAN specified by its VLAN ID tag number.
- If the port through which the packet enters is not a member of the VLAN as specified by the VLAN ID tag, the packet is dropped.

- If the port is a member of the VLAN specified by the packet's VLAN ID, the packet can be sent to other ports with the same VLAN ID.
- Packets leaving the switch are either tagged (T) or untagged (U), depending on the setting for that port's VLAN membership properties. A U for a port means that packets leaving the switch from that port are untagged. Inversely, a T for a port means that packets leaving the switch from that port are tagged with the VLAN ID that is associated with the port.

The example in this section comprises numerous steps to illustrate a wide range of configurations to help provide an understanding of tagged VLANs.

VLAN configuration examples

This example demonstrates several scenarios of VLAN use and describes how the switch handles tagged and untagged traffic.

In this example, you create two new VLANs, change the port membership for default VLAN 1, and assign port members to the two new VLANs:

1. On the Basic VLAN Configuration page (see VLANs on page 156), create the following VLANs:
   - A VLAN with VLAN ID 10.
   - A VLAN with VLAN ID 20.
2. On the VLAN Membership page (see Configure VLAN membership on page 159) specify the VLAN membership as follows:
   - For the default VLAN with VLAN ID 1, specify the following members: port 7 (U) and port 8 (U).
   - For the VLAN with VLAN ID 10, specify the following members: port 1 (U), port 2 (U), and port 3 (T).
   - For the VLAN with VLAN ID 20, specify the following members: port 4 (U), port 5 (T), and port 6 (U).
3. On the Port PVID Configuration page (see Configure the PVID settings for an interface on page 163), specify the PVID for ports g1 and g4 so that packets entering these ports are tagged with the port VLAN ID:
   - Port g1: PVID 10
   - Port g4: PVID 20
4. With the VLAN configuration that you set up, the following situations produce results as described:
   - If an untagged packet enters port 1, the switch tags it with VLAN ID 10. The packet can access port 2 and port 3. The outgoing packet is stripped of its tag to leave port 2 as an untagged packet. For port 3, the outgoing packet leaves as a tagged packet with VLAN ID 10.
   - If a tagged packet with VLAN ID 10 enters port 3, the packet can access port 1 and port 2. If the packet leaves port 1 or port 2, it is stripped of its tag to leave the switch as an untagged packet.

- If an untagged packet enters port 4, the switch tags it with VLAN ID 20. The packet can access port 5 and port 6. The outgoing packet is stripped of its tag to become an untagged packet as it leaves port 6. For port 5, the outgoing packet leaves as a tagged packet with VLAN ID 20.

Access control lists (ACLs)

ACLs ensure that only authorized users can access specific resources while blocking off any unwarranted attempts to reach network resources.

ACLs are used to provide traffic flow control, restrict contents of routing updates, decide which types of traffic are forwarded or blocked, and provide security for the network. ACLs are normally used in firewall routers that are positioned between the internal network and an external network, such as the Internet. They can also be used on a router positioned between two parts of the network to control the traffic entering or leaving a specific part of the internal network. The added packet processing required by the ACL feature does not affect switch performance. That is, ACL processing occurs at wire speed.

Access lists are sequential collections of permit and deny conditions. This collection of conditions, known as the filtering criteria, is applied to each packet that is processed by the switch or the router. The forwarding or dropping of a packet is based on whether or not the packet matches the specified criteria.

Traffic filtering requires the following two basic steps:

1. Create an access list definition.

   The access list definition includes rules that specify whether traffic matching the criteria is forwarded normally or discarded. Additionally, you can assign traffic that matches the criteria to a particular queue or redirect the traffic to a particular port. A default *deny all* rule is the last rule of every list.

2. Apply the access list to an interface in the inbound direction.

The switch allow ACLs to be bound to physical ports and LAGs. The switch supports MAC ACLs and IP ACLs.

MAC ACL example configuration

The following example shows how to create a MAC-based ACL that permits Ethernet traffic from the Sales department on specified ports and denies all other traffic on those ports.

1. On the MAC ACL page, create an ACL with the name Sales_ACL for the Sales department of your network (see Configure a MAC ACL on page 391).

   By default, this ACL is bound on the inbound direction, which means that the switch examines traffic as it enters the port.

2. On the MAC Rules page, create a rule for the Sales_ACL with the following settings:
   - **Sequence Number**: 1
   - **Action**: Permit

- **Assign Queue ID**: 0
- **Match Every**: False
- **CoS**: 0
- **Destination MAC**: 01:02:1A:BC:DE:EF
- **Destination MAC Mask**: 00:00:00:00:FF:FF
- **EtherType**: User Value
- **Source MAC**: 02:02:1A:BC:DE:EF
- **Source MAC Mask**: 00:00:00:00:FF:FF
- **VLAN ID**: 2

For more information about MAC ACL rules, see Configure MAC ACL rules on page 393.

3. On the MAC Binding Configuration page, assign the Sales_ACL to ports 6, 7, and 8, and then click the **Apply** button. (See Configure MAC bindings on page 397.)

   You can assign an optional sequence number to indicate the order of the access list relative to other access lists if any are already assigned to the interface and direction.

4. The MAC Binding Table displays the interface and MAC ACL binding information. (See Display or delete MAC ACL bindings in the MAC binding table on page 399.)

The ACL named Sales_ACL looks for Ethernet frames with destination and source MAC addresses and MAC masks defined in the rule. Also, the frame must be tagged with VLAN ID 2, which is the Sales department VLAN. The CoS value of the frame must be 0, which is the default value for Ethernet frames. Frames that match this criteria are permitted on interfaces 6, 7, and 8 and are assigned to the hardware egress queue 0, which is the default queue. All other traffic is explicitly denied on these interfaces. To allow additional traffic to enter these ports, you must add a new Permit rule with the desired match criteria and bind the rule to interfaces 6, 7, and 8.

Basic IPv4 ACL example configuration

The following example shows how to create an IPv4-based ACL that prevents any IP traffic from the Finance department from being allowed on the ports that are associated with other departments. Traffic from the Finance department is identified by each packet's network IP address.

1. On the IP ACL page, create a new IP ACL with an IP ACL ID of 1. (See Configure a basic or extended IPv4 ACL on page 400.)
2. On the IP Rules page, create a rule for IP ACL 1 with the following settings:
   - **Sequence Number**: 1
   - **Action**: Deny
   - **Assign Queue ID**: 0 (optional: 0 is the default value)
   - **Match Every**: False

- **Source IP Address**: 192.168.187.0
- **Source IP Mask**: 255.255.0

For additional information about IP ACL rules, see Configure rules for a basic IPv4 ACL on page 404.

3. Click the **Add** button.
4. On the IP Rules page, create a second rule for IP ACL 1 with the following settings:
   - **Sequence Number**: 2
   - **Action**: Permit
   - **Match Every**: True
5. Click the **Add** button.
6. On the IP Binding Configuration page, assign ACL ID 1 to ports 2, 3, and 4, and assign a sequence number of 1. (See Configure IP ACL interface bindings on page 424.)

   By default, this IP ACL is bound on the inbound direction, so it examines traffic as it enters the switch.
7. Click the **Apply** button.
8. On the IP Binding Table page, you can view the interfaces and IP ACL binding information. (See Display or delete IP ACL bindings in the IP ACL binding table on page 426.)

The IP ACL in this example matches all packets with the source IP address and subnet mask of the Finance department's network and deny it on interfaces 2, 3, and 4 of the switch. The second rule permits all non-Finance traffic on the ports. The second rule is required because an explicit *deny all* rule exists as the lowest priority rule.

Differentiated Services (DiffServ)

Standard IP-based networks are designed to provide *best effort* data delivery service. *Best effort* service implies that the network delivers the data in a timely fashion, although there is no guarantee that it does. During times of congestion, packets might be delayed, sent sporadically, or dropped. For typical Internet applications, such as email and file transfer, a slight degradation in service is acceptable and in many cases unnoticeable. However, any degradation of service can negatively affect applications with strict timing requirements, such as voice or multimedia.

Quality of Service (QoS) can provide consistent, predictable data delivery by distinguishing between packets with strict timing requirements from those that are more tolerant of delay. Packets with strict timing requirements are given special treatment in a QoS-capable network. With this in mind, all elements of the network must be QoS capable. If one node cannot meet the necessary timing requirements, this creates a deficiency in the network path and the performance of the entire packet flow is compromised.

Two basic types of QoS are supported:

- **Integrated Services**: Network resources are apportioned based on request and are reserved (resource reservation) according to network management policy (RSVP, for example).
- **Differentiated Services**: Network resources are apportioned based on traffic classification and priority, giving preferential treatment to data with strict timing requirements.

The switch supports DiffServ.

The DiffServ feature contains a number of conceptual QoS building blocks that you can use to construct a differentiated service network. Use these same blocks in different ways to build other types of QoS architectures.

You must configure three key QoS building blocks for DiffServ:

- Class
- Policy
- Service (the assignment of a policy to a directional interface)

Class

You can classify incoming packets at Layers 2, 3, and 4 by inspecting the following information for a packet:

- Source/destination MAC address
- EtherType
- Class of Service (802.1p priority) value (first/only VLAN tag)
- VLAN ID range (first/only VLAN tag)
- Secondary 802.1p priority value (second/inner VLAN tag)
- Secondary VLAN ID range (second/inner VLAN tag)
- IP Service Type octet (also known as: ToS bits, Precedence value, DSCP value)
- Layer 4 protocol (TCP, UDP and so on)
- Layer 4 source/destination ports
- Source/destination IP address

From a DiffServ point of view, two types of classes exist:

- DiffServ traffic classes
- DiffServ service levels/forwarding classes

DiffServ traffic classes

With DiffServ, you define which traffic classes to track on an ingress interface. You can define simple BA classifiers (DSCP) and a wide variety of multifield (MF) classifiers:

- Layer 2; Layers 3, 4 (IP only)
- Protocol-based
- Address-based

You can combine these classifiers with logical AND operations to build complex MF-classifiers (by specifying a class type of *all* or *any*, respectively). That is, within a single class, multiple match criteria are grouped together as an AND expression, depending on the defined class type. Only classes of the same type can be nested; class nesting does not allow for the negation (*exclude* option) of the referenced class.

To configure DiffServ, you must define service levels, namely the forwarding classes/PHBs identified by a DSCP value, on the egress interface. You define these service levels by configuring BA classes for each.

Create policies

Use DiffServ policies to associate a collection of classes that you configure with one or more QoS policy statements. The result of this association is referred to as a policy.

From a DiffServ perspective, two types of policies exist:

- **Traffic Conditioning Policy**: A policy applied to a DiffServ traffic class
- **Service Provisioning Policy**: A policy applied to a DiffServ service level

You must manually configure the various statements and rules used in the traffic conditioning and service provisioning policies to achieve the desired Traffic Conditioning Specification (TCS) and the Service Level Specification (SLS) operation, respectively.

Traffic conditioning policy

Traffic conditioning pertains to actions performed on incoming traffic. Several distinct QoS actions are associated with traffic conditioning:

- **Dropping**: Drop a packet upon arrival. This is useful for emulating access control list operation using DiffServ, especially when DiffServ and ACL cannot coexist on the same interface.
- **Marking IP DSCP or IP precedence**: Marking/re-marking the DiffServ code point in a packet with the DSCP value representing the service level associated with a particular DiffServ traffic class. Alternatively, the IP precedence value of the packet can be marked/re-marked.
- **Marking CoS (802.1p)**. Sets the 3-bit priority field in the first/only 802.1p header to a specified value when packets are transmitted for the traffic class. An 802.1p header is inserted if it does not already exist. This is useful for assigning a Layer 2 priority level based on a DiffServ forwarding class (such as the DSCP or IP precedence value)

definition to convey some QoS characteristics to downstream switches that do not routinely look at the DSCP value in the IP header.

- **Policing**: A method of constraining incoming traffic associated with a particular class so that it conforms to the terms of the TCS. Out-of-profile packets that are either in excess of the conformance specification or are nonconformant are dropped.
- **Counting**: Updating octet and packet statistics to keep track of data handling along traffic paths within DiffServ. In this DiffServ feature, counters are not explicitly configured by the user, but are designed into the system based on the DiffServ policy being created. For more information, see Monitor the switch and the ports on page 431.
- **Assigning QoS queue**: Directs a traffic stream to the specified QoS queue. This allows a traffic classifier to specify which one of the supported hardware queues are used for handling packets belonging to the class.
- **Redirecting**: Forces a classified traffic stream to a specified egress port (physical or LAG). This can occur in addition to any marking or policing action. It can also be specified along with a QoS queue assignment.

DiffServ example configuration

To create a DiffServ class and policy and attach them to a switch interface, follow these steps:

1. On the QoS Class Configuration page, create a new class with the following settings:
   - **Class Name**: Class1
   - **Class Type**: All

   For more information, see Configure a DiffServ class on page 296.
2. Click the **Class1** hyperlink to display the DiffServ Class Configuration page for this class.
3. Configure the following settings for Class1:
   - **Protocol Type**: UDP
   - **Source IP Address**: 192.12.1.0.
   - **Source Mask**: 255.255.255.0.
   - **Source L4 Port**: Other, and enter 4567 as the source port value.
   - **Destination IP Address**: 192.12.2.0.
   - **Destination Mask**: 255.255.255.0.
   - **Destination L4 Port**: Other, and enter 4568 as the destination port value.

   For more information, see Configure a DiffServ class on page 296.
4. Click the **Apply** button.
5. On the Policy Configuration page, create a new policy with the following settings:
   - **Policy Selector**: Policy1
   - **Member Class**: Class1

   For more information, see Configure a DiffServ policy on page 307.

6. Click the **Add** button.

   The policy is added.

7. Click the **Policy1** hyperlink to display the Policy Class Configuration page for this policy.
8. Configure the Policy attributes as follows:
   - **Assign Queue**: 3
   - **Policy Attribute**: Simple Policy
   - **Color Mode**: Color Blind
   - **Committed Rate**: 1000000 Kbps
   - **Confirm Action**: Send
   - **Violate Action**: Drop

   For more information, see Configure a DiffServ policy on page 307.

9. On the Service Configuration page, select the check box next to interfaces 7 and 8 to attach the policy to these interfaces, and then click the **Apply** button. (See Configure the DiffServ service interface on page 313.)

All UDP packet flows destined to the 192.12.2.0 network with an IP source address from the 192.12.1.0 network that include a Layer 4 Source port of 4567 and Destination port of 4568 from this switch on ports 7 and 8 are assigned to hardware queue 3.

On this network, traffic from streaming applications uses UDP port 4567 as the source and 4568 as the destination. This real-time traffic is time sensitive, so it is assigned to a high-priority hardware queue. By default, data traffic uses hardware queue 0, which is designated as a best-effort queue.

Also the *confirmed action* on this flow is to send the packets with a committed rate of 1000000 Kbps. Packets that violate the committed rate and burst size are dropped.

802.1X access control

Local area networks (LANs) are often deployed in environments that permit unauthorized devices to be physically attached to the LAN infrastructure, or permit unauthorized users to attempt to access the LAN through equipment already attached. In such environments you might want to restrict access to the services offered by the LAN to those users and devices that are permitted to use those services.

Port-based network access control makes use of the physical characteristics of LAN infrastructures to provide a means of authenticating and authorizing devices attached to a LAN port with point-to-point connection characteristics. If the authentication and authorization process fails, access control prevents access to that port. In this context, a port is a single point of attachment to the LAN, such as a port of a MAC bridge and an association between stations or access points in IEEE 802.11 wireless LANs.

The IEEE 802.11 standard describes an architectural framework within which authentication and consequent actions take place. It also establishes the requirements for a protocol

between the authenticator (the system that passes an authentication request to the authentication server) and the supplicant (the system that requests authentication), as well as between the authenticator and the authentication server.

The switch supports a guest VLAN, which allows unauthenticated users limited access to the network resources.

Note: You can use QoS features to provide rate limiting on the guest VLAN to limit the network resources that the guest VLAN provides.

Another 802.1X feature is the ability to configure a port to enable or disable EAPoL packet forwarding support. You can disable or enable the forwarding of EAPoL when 802.1X is disabled on the device.

The ports of an 802.1X authenticator switch provide the means by which it can offer services to other systems reachable through the LAN. Port-based network access control allows the operation of a switch’s ports to be controlled to ensure that access to its services is permitted only by systems that are authorized to do so.

Port access control provides a means of preventing unauthorized access by supplicants to the services offered by a system. Control over the access to a switch and the LAN to which it is connected can be desirable if you restrict access to publicly accessible bridge ports or to restrict access to departmental LANs.

Access control is achieved by enforcing authentication of supplicants that are attached to an authenticator's controlled ports. The result of the authentication process determines whether the supplicant is authorized to access services on that controlled port.

A port access entity (PAE) is able to adopt one of two distinct roles within an access control interaction:

1. **Authenticator**: A port that enforces authentication before allowing access to services available through that port.
2. **Supplicant**: A port that attempts to access services offered by the authenticator.

Additionally, a third role exists:

3. **Authentication server**: Performs the authentication function necessary to check the credentials of the supplicant on behalf of the authenticator.

All three roles are required for you to complete an authentication exchange.

The switch supports the authenticator role only, in which the PAE is responsible for communicating with the supplicant. The authenticator PAE is also responsible for submitting the information received from the supplicant to the authentication server for the credentials to be checked, which determines the authorization state of the port. The authenticator PAE controls the authorized/unauthorized state of the controlled port depending on the outcome of the RADIUS-based authentication process.

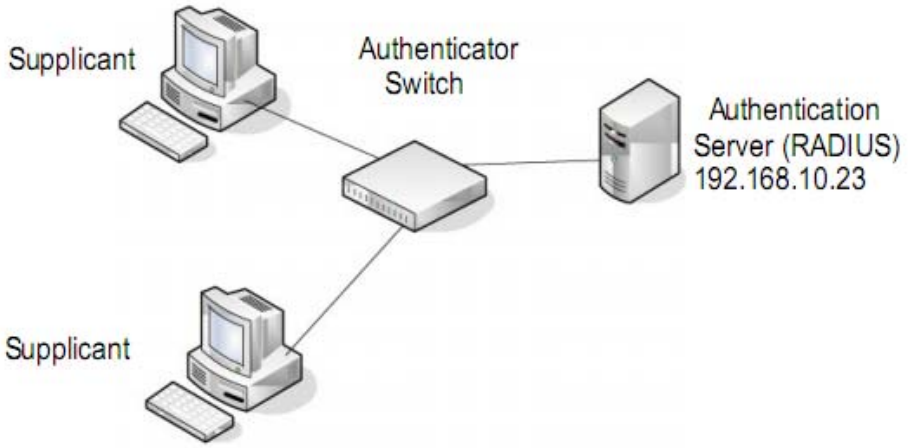


Figure 3. 802.1X authentication roles

802.1X example configuration

This example shows how to configure the switch so that 802.1X-based authentication is required on the ports in a corporate conference room (5 through 8). These ports are available to visitors and must be authenticated before access is granted to the network. The authentication is handled by an external RADIUS server. When the visitor is successfully authenticated, traffic is automatically assigned to the guest VLAN. This example assumes that a VLAN was configured with a VLAN ID of 150 and VLAN name of Guest.

1. On the Port Authentication page, select ports **5**, **6**, **7**, and **8**.
2. From the **Port Control** menu, select **Unauthorized**.

   The selection from the **Port Control** menu for all other ports on which authentication is not needed must be **Authorized**. When the selection from the **Port Control** menu is **Authorized**, the port is unconditionally put in a force-authorized state and does not require any authentication. When the selection from the **Port Control** menu is **Auto**, the authenticator PAE sets the controlled port mode.
3. In the **Guest VLAN** field for ports 5 through 8, enter **150** to assign these ports to the guest VLAN.

   You can configure additional settings to control access to the network through the ports. See Configure a port security interface on page 370 for information about the settings.
4. Click the **Apply** button.
5. On the 802.1X Configuration page, set the port based authentication state and guest VLAN mode to **Enable**, and then the **Apply** button. (See Configure the global port security mode on page 369.)

   This example uses the default values for the port authentication settings, but you can configure several additional settings. For example, the **EAPOL Flood Mode** field allows you to enable the forwarding of EAPoL frames when 802.1X is disabled on the device.

6. On the RADIUS Server Configuration page, configure a RADIUS server with the following settings:
   - **Server Address**: 192.168.10.23
   - **Secret Configured**: Yes
   - **Secret**: secret123
   - **Active**: Primary

   For more information, see RADIUS servers on page 321.
7. Click the **Add** button.
8. On the Authentication List page, configure the default list to use RADIUS as the first authentication method. (See Authentication lists on page 334.)

This example enables 802.1X-based port security on the switch and prompts the hosts connected on ports 5 through 8 for an 802.1X-based authentication. The switch passes the authentication information to the configured RADIUS server.

Multiple Spanning Tree Protocol

Spanning Tree Protocol (STP) runs on bridged networks to help eliminate loops. If a bridge loop occurs, the network can become flooded with traffic. IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) supports multiple instances of spanning tree to efficiently channel VLAN traffic over different interfaces. Each instance of the spanning tree behaves in the manner specified in IEEE 802.1w, Rapid Spanning Tree, with slight modifications in the working but not the end effect (chief among the effects is the rapid transitioning of the port to the forwarding state).

The difference between the RSTP and the traditional STP (IEEE 802.1D) is the ability to configure and recognize full-duplex connectivity and ports that are connected to end stations, resulting in rapid transitioning of the port to the Forwarding state and the suppression of Topology Change Notification. These features are represented by the parameters pointtopoint and edgeport. MSTP is compatible to both RSTP and STP. It behaves in a way that is appropriate for STP and RSTP bridges.

An MSTP bridge can be configured to behave entirely as a RSTP bridge or an STP bridge. So, an IEEE 802.1s bridge inherently also supports IEEE 802.1w and IEEE 802.1D.

The MSTP algorithm and protocol provide simple and full connectivity for frames assigned to any VLAN throughout a bridged LAN comprising arbitrarily interconnected networking devices, each operating MSTP, STP, or RSTP. MSTP allows frames assigned to different VLANs to follow separate paths, each based on an independent Multiple Spanning Tree Instance (MSTI), within Multiple Spanning Tree (MST) regions composed of LANs and or MSTP bridges. These regions and the other bridges and LANs are connected into a single Common Spanning Tree (CST). (IEEE DRAFT P802.1s/D13)

MSTP connects all bridges and LANs with a single Common and Internal Spanning Tree (CIST). The CIST supports the automatic determination of each MST region, choosing its maximum possible extent. The connectivity calculated for the CIST provides the CST for

interconnecting these regions, and an Internal Spanning Tree (IST) within each region. MSTP ensures that frames with a VLAN ID are assigned to one and only one of the MSTIs or the IST within the region, that the assignment is consistent among all the networking devices in the region, and that the stable connectivity of each MSTI and IST at the boundary of the region matches that of the CST. The stable active topology of the bridged LAN with respect to frames consistently classified as belonging to any VLAN thus simply and fully connects all LANs and networking devices throughout the network, though frames belonging to different VLANs can take different paths within any region, per IEEE DRAFT P802.1s/D13.

All bridges, whether they use STP, RSTP, or MSTP, send information in configuration messages through Bridge Protocol Data Units (BPDUs) to assign port roles that determine each port's participation in a fully and simply connected active topology based on one or more spanning trees. The information communicated is known as the spanning tree priority vector. The BPDU structure for each of these different protocols is different. An MSTP bridge transmits the appropriate BPDU depending on the received type of BPDU from a particular port.

An MST region comprises of one or more MSTP bridges with the same MST configuration identifier, using the same MSTIs, and without any bridges attached that cannot receive and transmit MSTP BPDUs. The MST configuration identifier includes the following components:

1. Configuration identifier format selector
2. Configuration name
3. Configuration revision level
4. Configuration digest: 16-byte signature of type HMAC-MD5 created from the MST Configuration Table (a VLAN ID to MSTID mapping)

Because multiple instances of spanning tree exist, an MSTP state is maintained on a per-port, per-instance basis (or on a per-port, per-VLAN basis, as any VLAN can be in one and only one MSTI or CIST). For example, port A can be forwarding for instance 1 while discarding for instance 2. The port states changed since IEEE 802.1D specification.

To support multiple spanning trees, configure an MSTP bridge with an unambiguous assignment of VLAN IDs (VIDs) to spanning trees. For such a configuration, ensure the following:

1. The allocation of VIDs to FIDs is unambiguous.
2. Each FID that is supported by the bridge is allocated to exactly one spanning tree instance.

The combination of VID to FID and then FID to MSTI allocation defines a mapping of VIDs to spanning tree instances, represented by the MST Configuration Table.

With this allocation we ensure that every VLAN is assigned to one and only one MSTI. The CIST is also an instance of spanning tree with an MSTID of 0.

VIDs might be not be allocated to an instance, but every VLAN must be allocated to one of the other instances of spanning tree.

The portion of the active topology of the network that connects any two bridges in the same MST region traverses only MST bridges and LANs in that region, and never bridges of any kind outside the region. In other words, connectivity within the region is independent of external connectivity.

MSTP example configuration

This example shows how to create an MSTP instance from the switch. The example network includes three different switches that serve different locations in the network. In he following figure, ports 1/0/1–1/0/5 are connected to host stations, so those links are not subject to network loops. Ports 1/0/6–1/0/8 are connected across switches 1, 2, and 3.

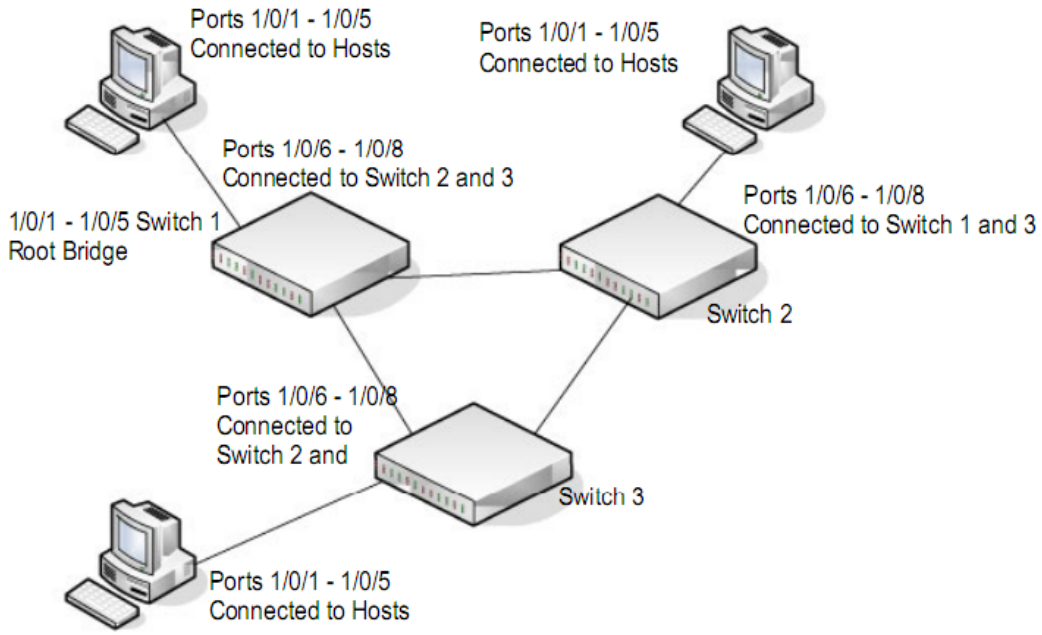


Figure 4. MSTP example configuration

Perform the following procedures on each switch to configure MSTP:

1. On the VLAN Configuration page, create VLANs 300 and 500 (see Configure VLAN settings on page 156).
2. On the VLAN Membership page, include ports 1 through 8 as tagged (T) or untagged (U) members of VLAN 300 and VLAN 500 (see Configure VLAN settings on page 156).
3. On the STP Configuration page, enable the Spanning Tree State option (see Configure the STP settings and view the STP status on page 187).

   Use the default values for the rest of the STP configuration settings. By default, the STP operation mode is MSTP and the configuration name is the switch MAC address.
4. On the CST Configuration page, set the bridge priority value for each of the three switches to force Switch 1 to be the root bridge:
   - **Switch 1**: 4096
   - **Switch 2**: 12288
   - **Switch 3**: 20480

   Note: Bridge priority values are multiples of 4096.

If you do not specify a root bridge and all switches are assigned the same bridge priority value, the switch with the lowest MAC address is elected as the root bridge (see Configure the CST settings on page 189).

5. On the CST Port Configuration page, select ports 1 through 8 and select **Enable** from the **STP Status** menu (see Configure the CST port settings on page 190).
6. Click the **Apply** button.
7. Select ports 1 through 5 (edge ports), and select **Enable** from the **Fast Link** menu.

   Because the edge ports are not at risk for network loops, ports with Fast Link enabled transition directly to the forwarding state.
8. Click the **Apply** button.

   You can use the CST Port Status page to view spanning tree information about each port.
9. On the MST Configuration page (see Manage the MST settings on page 195), create an MST instance with the following settings:
   - **MST ID**: 1
   - **Priority**: Use the default (32768)
   - **VLAN ID**: 300
10. Click the **Add** button.
11. Create a second MST instance with the following settings
    - **MST ID**: 2
    - **Priority**: 49152
    - **VLAN ID**: 500
12. Click the **Add** button.

In this example, assume that Switch 1 became the root bridge for the MST instance 1, and Switch 2 became the root bridge for MST instance 2. Switch 3 supports hosts in the sales department (ports 1, 2, and 3) and in the HR department (ports 4 and 5). Switches 1 and 2 also include hosts in the sales and HR departments. The hosts connected from Switch 2 use VLAN 500, MST instance 2 to communicate with the hosts on Switch 3 directly. Likewise, hosts of Switch 1 use VLAN 300, MST instance 1 to communicate with the hosts on Switch 3 directly.

The hosts use different instances of MSTP to effectively use the links across the switch. The same concept can be extended to other switches and more instances of MSTP.

VLAN routing interfaces

VLANs divide broadcast domains in a LAN environment. When hosts in one VLAN must communicate with hosts in another VLAN, the traffic must be routed between them. This is known as inter-VLAN routing. On the switch, it is accomplished by creating Layer 3 interfaces (switch virtual interfaces [SVI]).

When a port is enabled for bridging (the default) rather than routing, all normal bridge processing is performed for an inbound packet, which is then associated with a VLAN. Its MAC destination address (MAC DA) and VLAN ID are used to search the MAC address table. If routing is enabled for the VLAN, and the MAC DA of an inbound unicast packet is that of the internal bridge-router interface, the packet is routed. An inbound multicast packet is forwarded to all ports in the VLAN, plus the internal bridge-router interface, if it was received on a routed VLAN.

Because a port can be configured to belong to more than one VLAN, VLAN routing might be enabled for all of the VLANs on the port, or for a subset. VLAN routing can be used to allow more than one physical port to reside on the same subnet. It could also be used when a VLAN spans multiple physical networks, or when additional segmentation or security is required. A port can be either a VLAN port or a router port, but not both. However, a VLAN port can be part of a VLAN that is itself a router port.

Complete these steps to configure a switch to perform interVLAN routing:

1. Use the IP Configuration page to enable routing on the switch.

   For more information about this step, see Manage the IPv4 routing mode on page 247.

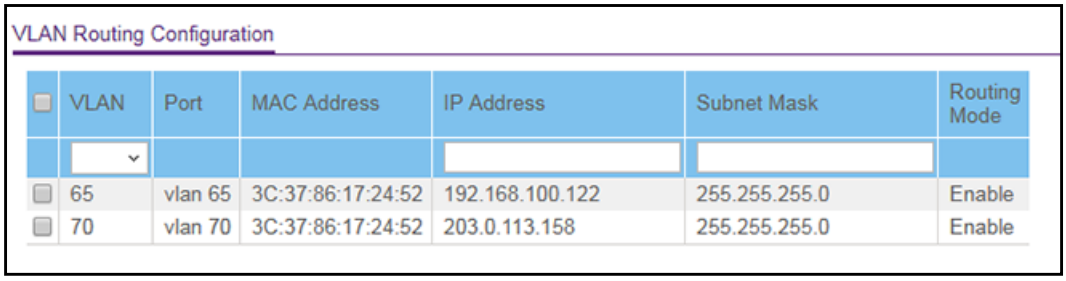
2. Determine the IP addresses that you want to assign to the VLAN interface on the switch.

   For the switch to be able to route between the VLANs, the VLAN interfaces must be configured with an IP address. When the switch receives a packet destined for another subnet/VLAN, the switch looks at the routing table to determine where to forward the packet. The packet is then passed to the VLAN interface of the destination. It is then sent to the port where the end device is attached.

3. Use the VLAN Routing Wizard page to create a routing VLAN, configure the IP address and subnet mask, and add the member ports.

   For more information about this step, see Create a routing interface with the VLAN Static Routing Wizard on page 268.

   In the following figure, VLAN 70 is a routing interface VLAN with IP address 203.0.113.118 and subnet mask 255.255.255.0. For information about viewing the member ports of the VLAN, see View the VLAN status on page 162. (The figure also shows a second routing interface VLAN with ID 65.)



B

Specifications and Default Settings

This appendix contains the following sections:

- Switch default settings
- General feature default settings
- System setup and maintenance settings
- Port characteristics
- Traffic control settings
- Quality of Service settings
- Security settings
- System management settings
- Settings for other features
- Hardware technical specifications

Switch default settings

The following table describes the switch default settings.

Table 90. Switch default settings

Feature	Default
IP address	192.168.0.239
Subnet mask	255.255.255.0
Default gateway	192.168.0.254
Protocol	DHCP client enabled
Management VLAN ID	1
IPv6 admin mode	Enabled
IPv6 address auto configuration	Disabled
DHCPv6	Disabled
Minimum length for the device admin password	Eight characters
SNTP client	Enabled
Global logging	Enabled
Memory logging	Enabled (Severity level: informational and above)
Persistent (flash) logging	Disabled
DNS	Enabled (No servers configured)
SNMP traps	Enabled
Automatic saving to the startup configuration	Enabled, but you must click the **Apply** button to save changes that you make on a page.
TACACS+	No server configured
RADIUS	No server configured
Denial of service protection	Disabled
Dot1x authentication (IEEE 802.1X)	Disabled
MAC-based port security	All ports are unlocked
Access control lists (ACL)	None configured
Protected ports	None
Private VLANs	None
Advertised port speed	Maximum capacity

Table 90. Switch default settings (continued)

Feature	Default
Broadcast storm control	Disabled
MAC table address aging	300 seconds (dynamic addresses)
Default VLAN IDs and names	**1**: Default VLAN **4086**: Auto-WiFi VLAN **4087**: Auto-Camera VLAN **4088**: Auto-VoIP VLAN **4089**: Auto-Video VLAN **Note:** All ports are members of VLAN 1. No ports are members of the Auto-WiFi, Auto-Camera, Auto-VoIP, and Auto-Video VLANs.
GARP switch configuration (GVRP)	Disabled
RADIUS-assigned VLANs	Disabled
Multiple Spanning Tree	Disabled
Link aggregation	No link aggregation groups (LAGs) configured
LACP system priority	32768
DiffServ	Enabled, no rules configured
IGMP snooping	Disabled
IGMP multicast routing	Disabled
IGMP snooping querier	Disabled
MLD snooping	Disabled
MLD multicast routing	Disabled
MLD snooping querier	Disabled
Routing mode	Disabled
Router discovery	Disabled

General feature default settings

The following table describes the general feature default settings.

Table 91. General feature default settings

Feature Name/Setting	Default
Virtual LAN (IEEE 802.1Q)	
Default VLANs	• 1 (Default). All ports are members. • 4086 (Auto-WiFi). No ports are members. • 4087 (Auto-Camera). No ports are members. • 4088 (Auto-VoIP). No ports are members. • 4089 (Auto-Video). No ports are members.
PVID	1
Acceptable frame types	Admit All
Ingress filtering	Disabled
Port priority	0
GARP	
Join timer	20 (centiseconds)
Leave timer	60 (centiseconds)
Leave all timer	1000 (centiseconds)
GVRP, Global	
GVRP mode	Disabled
GVRP, Interface	
Port GVRP mode	Disabled
Jumbo Frames	
Frame size	1522
Flow Control	
Admin mode	Disabled
802.1X	
Port-based authentication state	Disabled
VLAN assignment mode	Disabled
Dynamic VLAN creation mode	Disabled
EAPOL flood mode	Disabled

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
Port control	Auto
Unauthenticated VLAN ID	0 (none)
Periodic reauthentication	Disabled
Reauthentication period	3600
Quiet period	60
Number of EAP request resubmitted	30
Maximum number of EAP requests	2
Supplicant time-out	30
Server time-out	30
STP/RSTP/MSTP, Global	
Spanning tree state	Enabled
STP operation mode	IEEE 802.1s RSTP
Configuration name	MAC address
Configuration revision level	0
Forwarding of BPDUs while STP is disabled	Disabled
CST bridge priority	32768
CST bridge maximum age	20
CST bridge hello time	2
CST bridge forward delay	15
CST spanning tree maximum number of hops	20
MST default instance ID	0
MST instance 0 priority	32768
MST instance 0 VLAN IDs	1,4088,4089
STP/RSTP/MSTP, Interface	
CST STP status	Enabled
CST auto edge	Enabled
CST fast link	Disabled
CST BDPU forwarding	Disabled
CST path cost	0

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
CST priority	128
CST external path cost	0
Link Aggregation	
Lag name	ch<n> where n is 1 to 8
Admin mode	Enabled
Hash mode	1 Src/Dest MAC, incoming port
STP mode	Enabled
Link trap	Enabled
LAG type	Static
Local Link Discovery Protocol (LLDP), Global	
TLV advertised interval	30
Hold multiplier	4
Reinitializing delay	2
Transmit delay	5
Fast start duration	3
Local Link Discovery Protocol (LLDP), Interface	
Admin status	Tx and Rx
Management IP address	Auto advertise
Notification	Disabled
Optional TLVs	Enabled
DHCP Snooping, Global	
Admin mode	Disabled
MAC address validation	Enabled
DHCP Snooping, Interface	
Trust mode	Disabled
Logging invalid packets	Disabled
Rate limit	N/A
Burst interval	N/A

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
Persistent Configuration	
Store	Local
Write delay	300
IP Routing	
Admin mode	Disabled
Time-to-live	64
Maximum number of next hops	1
Router Discovery Protocol	
Advertise mode	Disabled
Advertise address	224.0.0.1 and 255.255.255.255
Maximum advertise interval	600
Minimum advertise interval	450
Advertise lifetime	1800
Preference level	0
ARP/ARP Aging	
Age time (seconds)	1200
Response time (seconds)	1
Retries	10
Cache size	512
Dynamic renewal	Enabled
Differentiated Services (DiffServ)	
Admin mode	Enabled
Class of Service (CoS), Global	
Trust mode	802.1p

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
802.1p to queue mapping (802.1p -> queue)	0 -> 1 1 -> 0 2 -> 0 3 -> 1 4 -> 2 5 -> 2 6 -> 3 7 -> 3 Class selector: (CS 0) 000000 -> 1 (CS 1) 001000 -> 0 (CS 2) 010000 -> 0 (CS 3) 011000 -> 1 (CS 4) 100000 -> 2 (CS 5) 101000 -> 2 (CS 6) 110000 -> 3 (CS 7) 111000 -> 3 Assured forwarding: (AF 11) 001010 -> 0 (AF 12) 001100 -> 0 (AF 13) 001110 -> 0 (AF 21) 010010 -> 0 (AF 22) 010100 -> 0 (AF 23) 010110 -> 0 (AF 31) 011010 -> 1 (AF 32) 011100 -> 1 (AF 33) 011110 -> 1 (AF 41) 100010 -> 1 (AF 42) 100100 -> 1 (AF 43) 100110 -> 1 Expedited forwarding: (EF) 101110 -> 2 Other: (1) 000001 -> 1 (2) 000010 -> 1 (3) 000011 -> 1 (4) 000100 -> 1 (5) 000101 -> 1 (6) 000110 -> 1 (7) 000111 -> 1 (9) 001001 -> 0 (11) 001011 -> 0 (13) 001101 -> 0 (15) 001111 -> 0

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
802.1p to queue mapping (802.1p -> queue) (continued)	(17) 010001 -> 0 (19) 010011 -> 0 (21) 010101 -> 0 (23) 010111 -> 0 (25) 011001 -> 1 (27) 011011 -> 1 (29) 011101 -> 1 (31) 011111 -> 1 (33) 100001 -> 2 (35) 100011 -> 2 (37) 100101 -> 2 (39) 100111 -> 2 (39) 100111 -> 2 (41) 101001 -> 2 (43) 101011 -> 2 (45) 101101 -> 2 (47) 101111 -> 2 (49) 110001 -> 3 (50) 110010 -> 3 (51) 110011 -> 3 (52) 110100 -> 3 (53) 110101 -> 3 (54) 110110 -> 3 (55) 110111 -> 3 (57) 111011 -> 3 (58) 111010 -> 3 (59) 111011 -> 3 (60) 111100 -> 3 (61) 111101 -> 3 (62) 111110 -> 3 (63) 111111 -> 3
Class of Service (CoS), Interface	
Trust mode	802.1p
Interface shaping rate	0
802.1p to queue mapping (802.1p –> queue)	0 -> 1 1 -> 0 2 -> 0 3 -> 1 4 -> 2 5 -> 2 6 -> 3 7 -> 3

Table 91. General feature default settings (continued)

Feature Name/Setting	Default
Queue minimum bandwidth	0
Queue scheduler type	Weighted
Auto-WiFi	
Admin mode	Disabled on all ports
Auto-VoIP VLAN	4086
OUI-based priority	7
Auto-Camera	
Admin mode	Disabled on all ports
Auto-VoIP VLAN	4087
OUI-based priority	7
Auto-VoIP, Protocol-Based	
Admin mode	Disabled on all ports
Prioritization type	Traffic class
Auto-VoIP traffic class	7
Auto-VoIP, OUI-Based	
Admin mode	Disabled on all ports
Auto-VoIP VLAN	4088
OUI-based priority	7
L2 Loop Protection	
Admin mode	Disabled

System setup and maintenance settings

The following table describes the system setup and maintenance settings.

Table 92. System setup and maintenance settings

Feature	Sets Supported	Default
Boot code update	1	N/A
DHCP	1	Enabled
Static IP address	1	192.168.0.239
System name configuration	1	N/A
Configuration save/restore	1	N/A
Firmware upgrade	1	N/A
Restore defaults	1 (device UI and rear-panel button)	N/A
Dual image support	1	Enabled
Factory reset	1	N/A

Port characteristics

The following table describes the port characteristics.

Table 93. Port characteristics

Feature	Sets Supported	Default
Auto negotiating speed and full/half duplex	All ports	Auto negotiation
Auto MDI/MDIX	For crossover cables on all ports	Enabled
802.3x flow control/back pressure	All ports	Disabled
Port mirroring: TX, RX, Both	1	Disabled
Port trunking (aggregation)	8	Preconfigured
802.1D spanning tree	1	Disabled
802.1w RSTP	1	Enabled
802.1s spanning tree	8 instances	Disabled

Table 93. Port characteristics (continued)

Feature	Sets Supported	Default
Static 802.1Q tagging	256	VID = 1 Max member ports are equal to the number of ports on the switch
Learning process	Supports static and dynamic MAC entries	Dynamic learning is enabled by default

Traffic control settings

The following table describes the traffic control settings.

Table 94. Traffic control settings

Feature	Sets Supported	Default
Storm control	All ports	Disabled
Jumbo frame	All ports	1522 Max = 10,000 bytes

Quality of Service settings

The following table describes the Quality of Service settings.

Table 95. Quality of Service settings

Feature	Sets Supported	Default
Number of queues	8	N/A
802.1p	1	Enabled
DSCP	1	Disabled
Egress rate limiting	All ports	Disabled

Security settings

The following table describes the security settings.

Table 96. Security settings

Feature	Sets Supported	Default
802.1X	All ports	Disabled
MAC ACLs	100 (shared with IPv4 and IPv6 ACLs)	All MAC addresses allowed
IPv4 ACLs	100 (shared with MAC and IPv6 ACLs)	All IPv4 addresses allowed
IPv6 ACLs	100 (shared with IPv4 ACL and MAC ACL)	All IPv6 addresses allowed
Password control access	1	Idle time-out = 5 mins.
Device admin password	1	Password = password
Management security	1 profile with 20 rules for HTTP/HTTPS/SNMP access to allow/deny an IP address/subnet	All IP addresses allowed
Port MAC lockdown	All ports	Disabled

System management settings

The following table describes the system management settings.

Table 97. System management settings

Feature	Sets Supported	Default
Multi-session web connections	4	Enabled
SNMPv1/v2 SNMPv3	Max 5 community entries	Enabled (read, read/write communities)
Time control	1 (Local or SNTP)	Local time enabled
LLDP/LLDP-MED	All ports	Enabled
Logging	3 (Memory/Flash/Server)	Memory log enabled
MIB support	1	Disabled
Smart Control Center	N/A	Disabled

Settings for other features

The following table describes the settings for other features.

Table 98. Settings for other features

Feature	Sets Supported	Default
IGMP snooping v1/v2/v3	All ports	Disabled
EAPoL flooding	All ports	Disabled
BPDU flooding	All ports	Disabled
Multicast groups	256	Disabled
Filter multicast control	All ports	Disabled
Number of DHCP snooping bindings	256	N/A
Number of DHCP static entries	256	N/A
MAC address database size	16k	N/A
Number of IPv4/IPv6 static routes	32	N/A
Number of supported VLANs	64	N/A
Number of supported routed VLANs	15	N/A
Number of supported ARP entries	512	N/A

Hardware technical specifications

The tables in the following sections describes the main hardware technical specifications for each model. For more hardware information, see the data sheet, which you can download by visiting netgear.com/support/download/.

Model MS510TXM hardware technical specifications

Table 99. Hardware technical specifications for model MS510TXM

Feature	Description
Network interfaces	• Four multispeed Ethernet ports (1–4), each of which supports 2.5G, 1G, and 100M. • Four multispeed Ethernet ports (5–8), each of which supports 10G, 5G, 2.5G, 1G, and 100M. • Two dedicated SFP+ fiber uplink ports (9F and 10F), each of which is capable of 10G and 1G.
AC power input	100–240V ~ 50–60Hz, 1.2A max.
Maximum power consumption	47.0W
Minimum power consumption	23.9W
Dimensions (W x D x H)	13.0 x 8.12 x 1.7 in. (330 x 206 x 43 mm)
Weight	4.25 lb (2.08 kg)
Operating temperature	32º to 122ºF (0° to 50°C)
Operating humidity	95% maximum relative humidity, noncondensing
Storage temperature	–4° to 158°F (–20º to 70ºC)
Storage humidity	95% maximum relative humidity, noncondensing
Electromagnetic certifications and compliance	CE: EN 55032:2012+AC:2013; EN 55032:2015+AC:2016; EN 55035:2017; EN 55024:2010; EN 61000-3-2:2014; EN 61000-3-3:2013, Class A
	VCCI: VCCI 32-1:2016, Class A
	RCM: AS/NZS CISPR 32:2013 Class A
	FCC: 47 CFR FCC Part 15, Class A, ANSI C63.4:2014
	ISED: ICES-003:2016 Issue 6, Class A, ANSI C63.4:2014
	BSMI: CNS 13438 Class A
Safety certifications	CB report / certificate IEC 60950-1:2005 (ed.2)+A1:2009+A2:2013
	CSA mark, CAN/CSA C22.2 No. 62368-1-14, UL 62368-1, 2nd Ed.
	CE LVD: EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013; EN 62368-1:2014/AC:2015
	RCM AS/NZS 62368.1:2018
	BSMI: CNS 14336-1

Model MS510TXUP hardware technical specifications

Table 100. Hardware technical specifications for model MS510TXUP

Feature	Description
Network interfaces	• Four multispeed Ethernet Ultra60 PoE++ (802.3bt) ports (1–4), each of which supports 2.5G, 1G, and 100M. • Four multispeed Ethernet Ultra60 PoE++ (802.3bt) ports (5–8), each of which supports 10G, 5G, 2.5G, 1G, and 100M. • Two dedicated SFP+ fiber uplink ports (9F and 10F), each of which is capable of 10G and 1G.
AC power input	100–240V ~ 50–60Hz, 4.9A max.
Maximum power consumption	380.9W (with PoE)
Minimum power consumption	31.5W
Switch PoE power budget	295W
Dimensions (W x D x H)	13.0 x 8.12 x 1.7 in. (330 x 206 x 43 mm)
Weight	5.53 lb (2.51 kg)
Operating temperature	32º to 122ºF (0° to 50°C)
Operating humidity	95% maximum relative humidity, noncondensing
Storage temperature	–4° to 158°F (–20º to 70ºC)
Storage humidity	95% maximum relative humidity, noncondensing
Electromagnetic certifications and compliance	CE: EN 55032:2012+AC:2013; EN 55032:2015+AC:2016; EN 55035:2017; EN 55024:2010; EN 61000-3-2:2014; EN 61000-3-3:2013, Class A
	VCCI: VCCI 32-1:2016, Class A
	RCM: AS/NZS CISPR 32:2013 Class A
	FCC: 47 CFR FCC Part 15, Class A, ANSI C63.4:2014
	ISED: ICES-003:2016 Issue 6, Class A, ANSI C63.4:2014
	BSMI: CNS 13438 Class A
Safety certifications	CB report / certificate IEC 60950-1:2005 (ed.2)+A1:2009+A2:2013
	CSA mark, CAN/CSA C22.2 No. 62368-1-14, UL 62368-1, 2nd Ed.
	CE LVD: EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013; EN 62368-1:2014/AC:2015
	RCM AS/NZS 62368.1:2018
	BSMI: CNS 14336-1