



Managing Devices

A *device* is a Cisco IOS device that supports Cisco IOx. You can install Cisco IOx apps on these devices only.

The Cisco Fog Director Device pages provide information about devices, and provide access to features for monitoring and troubleshooting devices, and for administering apps on devices.

To access the Devices pages, log in to Cisco Fog Director as described in the “[Accessing Cisco Fog Director](#)” section on page 3-1, and then click the **DEVICES** tab. The Devices View page displays.

This chapter includes these sections:

- [Viewing General Information about Devices, page 5-1](#)
- [Viewing Detailed Information about a Device, page 5-6](#)
- [Adding Devices, page 5-13](#)
- [Importing Devices, page 5-14](#)
- [Editing Attributes for a Device, page 5-16](#)
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- [Editing Devices, page 5-26](#)
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- [Starting or Stopping an App on a Device, page 5-32](#)
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- [Deleting Unused Cartridges, page 5-35](#)
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Viewing General Information about Devices

The Devices View page, which displays when you choose the **DEVICES** tab in Cisco Fog Manager, provides general information about devices that have been added or uploaded to Cisco Fog Manager.

This page includes the items that [Table 5-1](#) describes.

Table 5-1 **Devices View Page Items**

Item	Description
Last Heard chart	Number of devices with which Cisco Fog Director successfully interacted over the past month. The chart can include sections for day, week, month, and never. Hover your mouse pointer over a section of the cart to see the percentage of devices that correspond to that section.
Reachability chart	Number of devices with which Cisco Fog Director can communicate. Hover your mouse pointer over a section of the cart to see the percentage of devices that correspond to that section.
Top 5 Consumers	<p>Includes the following charts, which provide information about resources that IOx apps consumed on devices during the past 24 hours. Hover your mouse pointer over any circle in a chart to see the hostname of the device for which that circle provides information. Double-click any circle in a chart to display detailed information about the device for which that circle provides information, as described in the “Viewing Detailed Information about a Device” section on page 5-6.</p> <ul style="list-style-type: none"> • CPU—Shows the percentage of CPU resources consumed by apps for the five devices on which the apps consumed the most resources • Memory—Shows the memory, in KB, consumed by apps for the five devices on which the apps consumed the most memory • Disk—Shows the disk space, in MB, consumed by apps for the five devices on which the apps consumed the most disk space • Network—Shows the network bandwidth, in KB, consumed by the five devices that consumed the most bandwidth when running apps
ADD button	Displays the Adds New Device window, which you use to add a device to Cisco Fog Director. See the “Adding Devices” section on page 5-13.
IMPORT button	Lets you add devices to Cisco Fog Director by importing a CSV file in which information for the devices is defined. See the “Importing Devices” section on page 5-14.

Table 5-1 Devices View Page Items (continued)


Item	Description
Additional Actions button 	Displays the following options: <ul style="list-style-type: none"> • RE-DISCOVER— Choose this option to cause Cisco Fog Director discover device information, capabilities, and app states for a selected set of devices. See the “Rediscovering Devices” section on page 5-26. • EDIT—Choose this option to update user name, password, port, and contact information for a selected set of devices. See the “Editing Devices” section on page 5-26. • TAG— Choose this options to add a tag to or remove a tag from multiple devices. See the “Managing Tags for Devices” section on page 5-31. • DELETE—Choose this option to delete multiple devices from Cisco Fog Director inventory. See the “Deleting Devices” section on page 5-29. • PROFILES—Choose this option to manage device profiles for devices. See the “Managing Device Profiles” section on page 5-17.

Table 5-1 Devices View Page Items (continued)


Item	Description
Device Filters field	<p>Click this field and then choose from the following options to display in the Device table only devices that meet designated criteria. When you choose an option, it displays in the Device Filters field and the Device table updates automatically. You can add as many device filter options as needed. To remove a device filter option from this field, click the X icon  next to the option.</p> <ul style="list-style-type: none"> • REACHABLE option: <ul style="list-style-type: none"> – Online—Choose this option to display only devices that are on line – Offline—Choose this option to display only devices that are not on line • LAST HEARD options: <ul style="list-style-type: none"> – Day—Choose this option to display only devices with which Cisco Fog Director successfully interacted over the past 24 hours – Week—Choose this option to display only devices with which Cisco Fog Director successfully interacted beginning from the current time 7 days ago – Month—Choose this option to display only devices with which Cisco Fog Director successfully interacted beginning with the current time 28 days ago – Never—Choose this option to display only devices with which Cisco Fog Director has not successfully interacted • DISCOVERY STATUS option: <ul style="list-style-type: none"> – Not Discovered—Choose this option to display only devices that Cisco Fog Director has not yet discovered – Discovering—Choose this option to display only devices that Cisco Fog Director is in the process of discovering – Discovered—Choose this option to display only devices that Cisco Fog Director has discovered – Discovery Failed—Choose this option to display only devices that Cisco Fog Director tried to discover was unable to discover (for example, because the device is unreachable)

Table 5-1 *Devices View Page Items (continued)*






Item	Description
Device table	<p>Provides information about each device that has been added to Cisco Fog Director. This table includes the following:</p> <ul style="list-style-type: none"> • Search Hostname, IP Address field—Type all or part of a hostname or IP address of a device to display information for devices with matching information. The table display updates as you type. • Show field—Enter the name of a tag and then press the Enter key to display information for devices with a matching tag. You can display a drop-down of tags that you can choose typing the first few letters of the tag. • Host Name—Hostname of the device. Click a hostname to display detailed information about the device. See the “Viewing Detailed Information about a Device” section on page 5-6. • IP Address—IP address of the device. Click a hostname to display device detailed information about the device. See the “Viewing Detailed Information about a Device” section on page 5-6. • Tags—Tags for the device. See the “Managing Tags for Devices” section on page 5-31. • Health—Icons that represent information about CPU use or memory use on the device. Hover your mouse pointer over an icon to see more detailed information. • Last Heard—How long ago Cisco Fog Director last communicated with the device, or a brief explanation of why the last attempt to communicate with the device was unsuccessful. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table. • Items per page drop-down list—Choose the maximum number of devices that appear in each page of the table. <p>To see additional information about a device or access various functions for a device, click the Expand icon  to the left of the device hostname in the Device table. The following row in this table describes the items that appear.</p>

Table 5-1 Devices View Page Items (continued)

Item	Description
Expanded device information and functions	<p>The following items appear when you click the Expand icon  to the left of the device hostname in the Device table:</p> <ul style="list-style-type: none"> • Edit Device—Click to edit various attributes for the device. See the “Editing Attributes for a Device” section on page 5-16. • Delete Device—Click to remove the device from Cisco Fog Director. See the “Deleting Devices” section on page 5-29. • Refresh Device—Click to cause Cisco Fog Director to rediscover the device and update information that displays. • App information and controls—Provides the following for each app that is installed on the device <ul style="list-style-type: none"> – App—Name of the app. – Downtime - today—Amount of time during the past 24 hours that the app was in Stopped state. – CPU - mean %age today—Average (mean) percentage of CPU resources that the app used on the device during the past 24 hours. – Memory - mean Kb today—Average (mean) memory (RAM) in KB, that the app consumed on the device during the past 24 hours. – Status—State of the app. – Action—Stop App button , Start App button , Remove App button , depending on the state of the app. See the “Starting or Stopping an App on a Device” section on page 5-32 or the “Removing an App from a Device” section on page 5-34.

Viewing Detailed Information about a Device

To view detailed information about a device, take any of these actions:

- On the Devices View page, double-click a circle in a Top 5 Consumers chart. Detailed information displays for the device for which that circle provides information.
- On the Apps View page or the Devices View page, click the hostname of the IP address of a device anywhere that either of these items displays as a link.

The Device Details page displays. This page includes information and features that apply to the app, as the following sections describe:

- [Device Details Area, page 5-7](#)
- [Apps Area, page 5-10](#)

Device Details Area

The Device Details area on the Device Details page provides detailed information about a device, and includes the items that [Table 5-1](#) describes.

Table 5-2 *Host Information Area Items*

Item	Description
Up Time	Amount of time that the device has been operating since it last started.
Last Heard	How long ago Cisco Fog Director last communicated with the device, or a brief explanation of why the last attempt to communicate with the device was unsuccessful.
Version	Version of the app that is installed on the device.
Contact Person	Name of the person who is responsible for the device or the app.
Installed Cartridges	Cartridges that have been installed on the device for apps.
Profile	<p>Shows the name of the device profile that is associated with the device.</p> <p>Hover your mouse pointer over the name to see the following summary information about the device profile:</p> <ul style="list-style-type: none"> • Name—Name of the device profile. • Events collection frequency—How often Cisco Fog Director collects events information from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director. • Metrics collection frequency—How often Cisco Fog Director collects metrics information such as CPU, memory, and network resource use from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director. • Default timeout—Amount of time, in seconds, after which Cisco Fog Director generates an error if it does not receive a response to a request that it sends to a device. • No of devices used—Number of devices with which this profile is associated <p>For related information, see the “Managing Device Profiles” section on page 5-17.</p>

Table 5-2 Host Information Area Items (continued)

Item	Description
DEVICE DETAILS tab	<p>Displays the following information:</p> <ul style="list-style-type: none"> • Serial number—Serial number of the device. • IP Address—IP address of the device. • Port—Port on which Cisco IOx runs on the device. • Description—Description of the device that was entered when the device was added to Cisco Fog Director. • Resources charts—Shows the amount of CPU (in units), memory (in KB), and disk (in MB) resources that are in use and available for apps on the device. Hover your mouse pointer over a chart to see more detailed information.
LAYERS tab	<p>Displays the following fields and buttons, which allow you to manage layers that are on a device.</p> <p>For related information, see the “Managing Layers” section on page 5-35.</p> <ul style="list-style-type: none"> • Check boxes—Check the check box for each layer that you want the DELETE SELECTED LAYERS action to affect. You can click the check box at the top of the list of layers to quickly check boxes for all layers. • LAYER ID—Content-addressable identifier of the layer. • SIZE—Amount of disk space that the layer consumes on the device, in KB. • USAGE—Status of the layer: <ul style="list-style-type: none"> – IN USE—At least one app in Running state is using the layer – NOT IN USE—No installed app is using the layer • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the list. • Items per page drop-down list—Choose the maximum number of devices that appear in each page of the list. • DELETE SELECTED LAYERS—Click to delete each layer with a status of NOT IN USE for which the corresponding check box is checked. • DELETE ALL UNUSED LAYERS—Click to delete all layers that are not used by any app that is installed on the device.

Table 5-2 Host Information Area Items (continued)

Item	Description
CARTRIDGES tab	<p>Includes the following (see Chapter 7, “Managing Cartridges,” for more information about cartridges):</p> <ul style="list-style-type: none"> • Unused Cartridges—Number of cartridges that are installed on the device but that are not used by any app. • NAME—Name of each unused cartridge. Hover your mouse pointer over a cartridge name to see detailed information about the cartridge. • SIZE—Size, in MB, of each unused cartridge. • DELETE UNUSED CARTRIDGES button—Removes all unused cartridges from the device. See the “Deleting Unused Cartridges” section on page 5-35.
OUTSTANDING ACTIONS tab	<p>Displays the following information. For related information, see the “Managing Outstanding and Expired Actions for Apps” section on page 4-52.</p> <ul style="list-style-type: none"> • Outstanding Actions—Number of actions that are in Outstanding state on this device. • Outstanding Actions table—Includes these items: <ul style="list-style-type: none"> – Check box—Check the check box for each app for which you want to cancel additional retries of the corresponding action on the device. You can click the check box in the title row of the table to quickly check all boxes in the table. – App—Name of the app to which the outstanding action relates. – Action—Type of the outstanding action (Install, Edit, Upgrade, or Uninstall). – Next Attempt at—Date and time that Cisco Fog Director will next attempt to perform the action on the device, according to the action plan that is in effect for this action. – Pending Attempts—Maximum number of additional times that Cisco Fog Director will attempt to perform the action on the device, according to the action plan that is in effect for this action. • CANCEL OUTSTANDING button—Click to stop Cisco Fog Director from retrying the action on the devices that are listed in the Selected Devices table. Choosing this option cancels the action plan that is in effect for the action on this device and moves the action on this device to Expired state.
Launch Local Manager link	<p>Opens the Cisco IOx Local Manager application in a new browser tab or window. This application is installed on a device as part of the installation of the Cisco IOx framework on that device. It provides a web-based user interface that you can use to manage, administer, monitor, and troubleshoot apps on the host system, and to perform a variety of related activities. For detailed information about this application, see <i>Cisco IOx Local Manager Reference Guide</i>.</p>

Table 5-2 Host Information Area Items (continued)

Item	Description
Collect Debug Logs	Turns Cisco IOx debug log collection on or off for the device. See the “Obtaining Device Logs” section on page 5-36 .
VIEW DEVICE LOGS button	Click to display log information that is generated by the device. If the Collect Debug Logs option is set to Yes on this Device Details page, the device log also includes debug information. See the “Obtaining Device Logs” section on page 5-36 .
DOWNLOAD TECH SUPPORT LOGS button	Click to obtain a log file that contains log information that was generated by the device. If the Collect Debug Logs option is set to Yes on this Device Details page, the log file also includes debug information. See the “Obtaining Device Logs” section on page 5-36 .

Apps Area

The Apps area on the Device Details page includes the items that [Table 5-3](#) describes for each Cisco IOx app that is installed on the device. Some items might not appear depending on your deployment.

Table 5-3 Apps Area Items




Item	Description
App Info	<p>Includes the following information:</p> <ul style="list-style-type: none"> • App Status—Status of the app (for example, RUNNING). • App Type—Type of the app. • Installed on—Date and time that the app was installed on the device. • Last Upgrade—Date and time that the app was upgraded on the device. • Version—Version number of the app. • App Links—Available if you configured links for an app. Click a link to go to the configured resource. See the “Configuring App Links” section on page 4-40. • Services Bundle Used—Appears if the app requires services that are provided by another app. Hover your mouse pointer over this text to see the name and version number of the app that provides the services. • Used By—Appears for a app that provides services. Hover your mouse pointer over this text to see the name and version number of each app that requires the services that this app provides. • Start App button  —Start the app, which initiates its operation on the device and puts the app in Running state. • Stop App button  —Stops the app, which shuts down its operation on the device and puts the app in Stopped state. <p>You cannot stop an app that provides services if the services that it provides are being used by one or more other apps that are in Running state. To stop an app that provides services, first stop each app that uses the services that it provides.</p> <ul style="list-style-type: none"> • Remove App button  —Removes the app from the device. See the “Removing an App from a Device” section on page 5-34.

Table 5-3 Apps Area Items (continued)


Item	Description
App Details	<p>Includes the following information:</p> <ul style="list-style-type: none"> • Refresh button —Click to cause Cisco Fog Director to rediscover the device and update information that displays in the Apps area. • Resource Profile—Resource profile that is configured for the app. Hover your mouse pointer over the resource profile name to see system CPU and memory (RAM) resources that the app requires on the device. • App IP—IP address that is assigned to the app on the device. • Ports—Hover your mouse pointer over Ports to see port asked and port mapping information for TCP ports and UDP ports. Port Asked is the port that the app requests in its package_config.ini file. Mapped Port is the port that is used for external communication with the app. Port mapping is handled by Cisco IOx. • App mac—MAC address that is assigned to the app on the device • Network Mode—Network mode in that is assigned to the app • Serial Port—Serial port that is assigned to the app • Cartridges Used—Cisco cartridges that the app requires to run, if any
App Downtime	<p>Shows the states that the app was in on the device over the past month. Hover your mouse pointer over any section of a chart to see the name of the state, the date and time that the app entered the state, and the amount of time the app was in the state.</p>
App Consumption	<p>Displays the following charts, which provide information about device resources that the app consumes:</p> <ul style="list-style-type: none"> • CPU Consumption—Percentage of CPU resources that the app used on the device during the designated time period. • Memory Consumption—RAM resources, in KB, that the app used on the device during the designated time period. • Disk Consumption—Hard disk space, in MB, that the app used on the device during the designated time period. • Network Consumption—Network bandwidth, in bytes, that the device used for the app during the designated time period. <p>You can click Day, Week, or Month above these charts to designate the time period for the information that the charts display.</p> <p>Hover your mouse pointer over any part of a chart to see detailed information about a data point.</p>
App Log tab	<p>Displays log information that was generated by the app on the device. Click Refresh to update the display with current information.</p>

Table 5-3 Apps Area Items (continued)

Item	Description
Edit Configuration tab	Lets you update configuration for the app. The items that display are defined in the package_config.ini file for the app.
Edit App Settings tab	<p>Lets you change the following settings for an app:</p> <ul style="list-style-type: none"> • Resource Profiles—Resource profile for the app • Network Configuration—Network information that relates to how the app obtains its IP address or addresses on each device • Serial Configuration—Device serial port that the app uses • VNC Password—VNC password that is required to access an app on the device via a VNC session • VCPU Configuration—Number of virtual CPUs that the app requires on a device <p>If you make changes in this tab, click the RECONFIGURE SETTINGS button to send the updated information to the device.</p> <p>For detailed information about these settings, see the “Install App Procedure” section on page 4-15.</p>
View all App Logs	Displays all logs that the app generates on the device. Click Refresh to update the display with current information.
App Console Support area	Displays the command that you can use to access the app via a console. See the “Accessing an App via a Console” section on page 5-36.

Adding Devices

Adding a device makes it manageable by Cisco Fog Director and available for the installation and running of IOx apps.

All devices that you add to Cisco Fog Director should be configured to synchronize their time from same NTP server. In this way, Cisco Fog Director can accurately aggregate data from the servers.

To add a device, follow these steps:

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **ADD** button.
- The Add New Device window displays.

Step 3 In the Add New Device window, enter information for the device to add, as described in the following table:

Field	Description
IP Address	Required. IP address of the device to be added.
Port	Required. HPPTS port on which Cisco IOx runs on the device. Valid values are 0 through 65535. The default port is 844.
Username	Required. Cisco IOS user name that is configured on the device.
Password	Required. Cisco IOS password that is configured on the device.
Tags	Optional. One or more tags for the device. (See the “Managing Tags for Devices” section on page 5-31 for an explanation of tags.) To enter more than one tag, separate each tag by pressing the Tab key.
Contact Details	Optional. Contact information of the person who is responsible for the device.
Network Element ID	Identifier of the network element for the device. This ID typically uses a hierarchical naming convention, for example, us-west.cal.ne1. Space, hyphen (-), and underscore (_) characters are not allowed.
Description	Optional. Brief description of the device.
Profile	Device profile to associate to the device. If you do not specify a device profile, the default device profile is used. To enter a device profile, start typing the name of the profile to display profiles that begin with the characters you type, then click the one that you want. For related information, see the “Managing Device Profiles” section on page 5-17.

Step 4 In the Add New Device window, take one of these actions:

- To save the information you entered, add the device, and exit the window, click the **SAVE & CLOSE** button.
- To save the information you entered, add the device, and clear the fields in the window, click the **SAVE & AND ADD MORE** button. Now you can enter information for another device to add.
- To clear the fields in the window and exit the window without adding the device, click the **CANCEL** button.

Importing Devices

Importing devices provides you with a convenient way to add several devices to Cisco Fog Director at once. The import process involves creating a comma-separated value (CSV) file that includes information about each device to be added, and then importing that file to Cisco Fog Director.

The following sections provide detailed information:

- [Creating an Import File, page 5-15](#)
- [Importing an Import File, page 5-16](#)

Creating an Import File

To import devices to Cisco Fog Director, you begin by creating a CSV import file. This file includes one record for each device that is to be added Cisco Fog Director.

Cisco Fog Director provides a sample CSV file that you can use to create your own file.

Cisco recommends that you use Microsoft Excel to edit the sample CSV file, then use the Save As command in Excel to save the file as a **CSV (Comma delimited)** type.

An import file must adhere to these guidelines:

- The file must be comma delimited.
- Lines preceded with a pound sign (#) are comment lines and are ignored by the import process.
- Each record must include each field that the following procedure describes. The fields must be in the order shown. A field that is indicated as “Optional” can be blank.

To use the sample CSV file to create an import file, perform the following steps.



Note

For security reasons, you may not want to include valid user name, password, port, or contact information when you create an import file. In this case, use dummy values in these fields and do not check the **Discover devices after import** check box when you import the import file. Then, after you import the import file, you can use the Device Edit feature to update these values for the devices. For more information, see the [“Editing Devices” section on page 5-26](#).

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **IMPORT** button.
The Import window displays.
- Step 3** Click **Download Sample CSV** and follow the on-screen prompts to open a sample CSV file or save it in to the location of your choice.
- Step 4** If you saved the sample CSV file, open it with Microsoft Excel or another editor that can open a CSV file.
- Step 5** For each device to be added, create a record for it that includes the following information:

Field	Description
ipv4_address	Required. IP address of the device.
https_port	Required. HTTPS port on which Cisco IOx runs on the device. Valid values are 0 through 65535. The default port is 844.
https_username	Required. Cisco IOS user name that is configured on the device.
https_password	Required. Cisco IOS password that is configured on the device.

Field	Description
tags	Optional. One or more tags for the device. (See the “Managing Tags for Devices” section on page 5-31 for an explanation of tags.) If you include more than one tag, separate each tag with a comma. Enclose the tag or tag string of tags with double quotation marks (“”).
contact_details	Optional. Contact information of the person who is responsible for the device.
description	Optional. Brief description of the device.

- Step 6** Save the import file as a **CSV (Comma delimited)** type in the location of your choice. You can give this file any valid Windows file name.

Importing an Import File

After you create an import file as described in the [“Creating an Import File”](#) section on page 5-15, you can import the file to Cisco Fog Director. Doing so adds the devices that the file defines to Cisco Fog Director.

If the import file includes a record for a device that already exists in Cisco Fog Director, the information for that device is updated with the information in the record.

To import an import file, follow these steps:

Procedure


- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **IMPORT** button.
The Import window displays.
- Step 3** Check the **Discover devices after import** check box if you want Cisco Fog Director to discover the devices after they are imported.
If you do not choose to discover the devices now, you can discover them later as described in the [“Rediscovering Devices”](#) section on page 5-26.
- Step 4** Click the **Select devices csv** button and follow the on-screen prompts to locate and select the CSV file that you want to import.

Editing Attributes for a Device

Editing attributes for a device lets you update various information for the device.

To edit device information, follow these steps:

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** In the Device table, click the **Expand** icon  to the left of the device hostname of the device for which you want to edit attributes.
- Step 3** Click **Edit Device**.
- The Edit Device dialog box displays. This dialog box shows the IP address of the device and provides fields in which you can enter or update information.
- Step 4** In the Edit Device dialog box, enter information in the following fields as needed:
- **Port**—HTTPS port on which Cisco IOx runs on the device.
Valid values are 0 through 65535. The default port is 844.
 - **Username**—Cisco IOS user name that is configured on the device.
 - **Password**—Cisco IOS password that is configured on the device.
 - **Contact Details**—Contact information of the person who is responsible for the device.
 - **Description**—Brief description of the device.
- Step 5** In the Edit Device dialog box, take either of these actions:
- Click the **SAVE & CLOSE** button to save your changes and exit the dialog box
 - Click the **CLOSE** button to exit the dialog box without saving your changes
-


Managing Device Profiles

A device profile is a set of events monitoring, metrics monitoring, communication, and security configuration settings that can be associated with one or more devices.

There is always a device profile called “System Default Profile” that associated with a device if the device does not have another device profile associated with it.


- [Device Profile Configuration Options, page 5-17](#)
- [Adding a Device Profile, page 5-19](#)
- [Viewing a Device Profile, page 5-20](#)
- [Editing a Device Profile, page 5-22](#)
- [Deleting a Device Profile, page 5-25](#)

Device Profile Configuration Options

To view options for managing device profiles, on the Devices View page, click the **Additional Actions** button  and then click **PROFILES**.

The Profiles page displays. This page includes the items that [Table 5-4](#) describes.

Table 5-4 Profiles Page Items


Item	Description
Available Profiles	Displays the number of device profiles that are available.
ADD button	Displays the Adds New Profile window, which you use to add a device profile to Cisco Fog Director. See the “Adding a Device Profile” section on page 5-19 .
VIEW button	Displays detailed information about a device profile for which the corresponding check box is checked. See the “Viewing a Device Profile” section on page 5-20 . This button is dimmed if you do not check a check box for a device profile.
Additional Actions button 	Displays the following options. This button is dimmed if you do not check a check box for a device profile. <ul style="list-style-type: none"> • EDIT—Displays the Edit Profile window, from which you can view or edit information for a device profile. See the “Viewing a Device Profile” section on page 5-20. • MARK AS DEFAULT—Sets as the default the device profile for which the corresponding check box is checked. See the “Setting a Device Profile as the Default” section on page 5-25. • DELETE—Deletes from Cisco Fog Director the device profile for which the corresponding check box is checked. See the “Deleting a Device Profile” section on page 5-25.
Search Profile Name field	Type all or part of a device profile name to display information for devices profiles with matching names. The Device Profile list display updates as you type.
Device Profile list	Displays the device profiles that have been created in Cisco Fog Director and that can be associated with devices. This list includes the following items for each device profile <ul style="list-style-type: none"> • Check box—Check to choose a device profile to view details about, set as the default, or delete • NAME—Name of the device profile • DEFAULT—Displays “DEFAULT” for the device profile that is set to the default and “NON DEFATULT” for other device profiles • ASSOCIATED DEVICES COUNT—Number of devices with which the device profile is associated
Pagination controls	Click a control to go to the first, next, last, previous, or specific page in the table. From the Items per page drop-down list, choose the maximum number of device profile that appear in each page of the table.

Adding a Device Profile

Adding a device profile specifies the configuration settings that the profile includes and makes the profile available to associate with devices.

To add a device profile, follow these steps:


Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **PROFILES**. The Profiles page displays.
- Step 3** On the Profiles page, click the **ADD** button. The Add New Profile window displays.
- Step 4** In the Add New Profile window, take these actions:
- In the Profile Name field, enter a name for the device profile.
 - If you want to set this device profile the default device profile, check the **Mark this Profile as Default** check box.
 - In the **MONITORING** tab, take these actions:
 - From the **Events Collection Frequency** drop-down list, choose an option to specify how often Cisco Fog Director collects events information from the device. This information is shown in various summary and detail displays throughout Cisco Fog Director. The default value is **Every 2 hrs**.
 - From the **Metrics Collection Frequency** drop-down list, choose an option to specify how often Cisco Fog Director collects metrics information such as CPU, memory, and network resource use from the device. This information is shown in various summary and detail displays throughout Cisco Fog Director. The default value is **Every 2 hrs**.
 - In the **COMMUNICATION** tab, take these actions:
 - In the **Default timeout for control actions** field, enter the amount of time, in seconds, after which Cisco Fog Director generates an error if it does not receive a response to a control request that it sends to a device. The default value is 600 seconds (10 minutes).
 - In the **Timeout for file transfers** field, enter the amount of time, in seconds, after which Cisco Fog Director generates an error if a transfer of an app, service, or cartridge file from Cisco Fog Director to a device times out. The default value is 3600 seconds (1 hour).
 - In the **Proxy address** field, enter the IP address of an HTTP proxy server that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment.
 - In the **Proxy port** field, enter the HTTP proxy server port that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment. You can type a number or use the arrow buttons to enter a value.
 - In the **SECURITY** tab, take these actions:



Note The **Verify SSL Certificates** check box is reserved for future use.

- Check the **Verify App Signature** check box if you want to enable App Package Signature Verification on the device. When this option is enabled, the Cisco application-hosting framework verifies the app when the app is installed or upgraded on a device with which this device profile is associated. If the app signature is not verified, the installation fails. The system performs this verification in two steps. First, it uses local trust anchors on the device to ensure that the embedded package certificate in the application is trusted. Next, it ensures that the embedded package signature is valid.
- (Optional) If you checked the **Verify App Signature**, check click **Browse** and navigate to and select the trust anchor (a .tar.gz or .tgz certificate file) that is required for the app signature to be verified. The trust anchor is uploaded to Cisco Fog Director when you click the **SAVE** button. When you install an app, Cisco Fog Director pushes this trust anchor file to the device. If the trust anchor file exists on the device, Cisco Fog Director overwrites the existing file.

After you import a trust anchor file, the file name displays on this tab. Click the remove icon  next to the file name to remove from the list, if it is needed.

You do not need to upload a trust anchor file if a trust anchor for app signature verification already exists on the device.

- Step 5** (Optional) Click the **Show Advanced** button on any tab to display the JSON code for this device profile. The button changes to **Hide Advanced**. Click the **Hide Advanced** button to collapse the JSON code display.
- Step 6** Click the **SAVE** button to save the device profile.
To exit the Add New Profile window without saving the device profile, click the **Cancel** button.
-

Viewing a Device Profile

You can view detailed information about any device profile.

To view a device profile, follow these steps:

Procedure


-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **PROFILES**.
The Profiles page displays.
- Step 3** On the Profiles page, check the check box for the profile that you want to view, and then click the **VIEW** button.
The Profile Details window displays. It includes the items that [Table 5-5](#) describes.
-

Table 5-5 Profile Details Window Items

Item	Description
MONITORING Tab	
Event Collection Frequency	How often Cisco Fog Director collects events information from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director.
Metrics Collection Frequency	How often Cisco Fog Director collects metrics information such as CPU, memory, and network resource use from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director.
COMMUNICATION Tab	
Default timeout for control actions	Amount of time, in seconds, after which Cisco Fog Director generates an error if it does not receive a response to a control request that it sends to a device.
Timeout for file transfers	Amount of time, in seconds, after which Cisco Fog Director generates an error if a transfer of an app, service, or cartridge file from Cisco Fog Director to a device times out.
Proxy address	IP address of an HTTP proxy server that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment.
Proxy port	HTTP proxy server port that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment. You can type a number or use the arrow buttons to enter a value.
SECURITY Tab	
Verify SSL Certificates	Reserved for future use.
Verify App Signature	If checked, App Package Signature Verification is enabled on the device. When this option is enabled, the Cisco application-hosting framework verifies the signature of an app when the app is installed or upgraded on a device with which this device profile is associated. If the app signature is not verified, the installation fails.
Trust Anchor for App Signature Verification	Name of the trust anchor (certificate file) on the device that is compared with a certificate in the app during the app signature verification process.
Advanced Options	
Advanced Options button	Click to display the Overview tab and the Devices tab. The button changes to Hide Advanced . Click the Hide Advanced button to collapse the advanced display.
Overview tab	Displays JSON code for the device profile.

Table 5-5 Profile Details Window Items (continued)

Item	Description
Devices tab	<p>Includes the following items</p> <ul style="list-style-type: none"> • Total associated devices—Number of devices with which this device profile is associated. • Search Hostname, IP Address field—Type all or part of a hostname or IP address of a device to display information for devices with matching information. The Devices table display updates as you type. • Devices table—Provides information about each device with which this device profile is associated. The table includes the following items: <ul style="list-style-type: none"> – Host Name—Hostname of the device – IP Address—IP address of the device – Tags—Tags that are assigned to a device. – Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table – Items per page drop-down list—Choose the maximum number of devices that appear in each page of the table

Editing a Device Profile

You can edit device profile security options.

To a device profile, follow these steps:

Procedure



-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **PROFILES**.
The Profiles page displays.
- Step 3** On the Profiles page, take one of these actions, check the check box for the profile that you want to edit, click the **Additional Actions** button , and then choose **EDIT**.
The Edit Profile window displays. It includes the items that [Table 5-6](#) describes. You can view options in the **MONITORING** and **CONMMUNICATION** tab and update options in the **SECURITY** tab.
- Step 4** If you make configuration updates in the Edit Profile window, click the **UPDATE** button to save your changes.
-

Table 5-6 Edit Profile Window Items

Item	Description
MONITORING Tab (read only)	
Event Collection Frequency	How often Cisco Fog Director collects events information from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director.
Metrics Collection Frequency	How often Cisco Fog Director collects metrics information such as CPU, memory, and network resource use from a device. This information is shown in various summary and detail displays throughout Cisco Fog Director.
COMMUNICATION Tab (read only)	
Default timeout for control actions	Amount of time, in seconds, after which Cisco Fog Director generates an error if it does not receive a response to a control request that it sends to a device.
Timeout for file transfers	Amount of time, in seconds, after which Cisco Fog Director generates an error if a transfer of an app, service, or cartridge file from Cisco Fog Director to a device times out.
Proxy address	IP address of an HTTP proxy server that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment.
Proxy port	HTTP proxy server port that Cisco Fog Director uses to communicate with a device, if such proxy communication is configured in your deployment. You can type a number or use the arrow buttons to enter a value.
SECURITY Tab	
Verify SSL Certificates	Reserved for future use.
Verify App Signature	Check this check box if you want to enable App Package Signature Verification on the device. When this option is enabled, the Cisco application-hosting framework verifies the app when the app is installed or upgraded on a device with which this device profile is associated. If the app signature is not verified, the installation fails. The system performs this verification by comparing a certificate on the device with a certificate in the app.

Table 5-6 Edit Profile Window Items (continued)

Item	Description
Trust anchor radio buttons	<p>The following radio buttons appear if the Verify App Signature check box is checked:</p> <ul style="list-style-type: none"> • Existing Trust Anchor—Appears if there is an existing trust anchor on the device. Click to use the trust anchor that is shown. You can hover your mouse pointer over the trust anchor name to see the checksum value certificate. • New Trust Anchor—Click to import a new trust anchor for the device. After you click this radio button, click Browse and navigate to and select the trust anchor (a .tar.gz or .tgz certificate file) that is required for the app signature to be verified. The trust anchor is uploaded to Cisco Fog Director when you click the UPDATE button. After you import a trust anchor file, the file name displays under the BROWSE button. Click the X next to the file name to remove from the list, if it needed. • No Trust Anchor—Click to if you want to delete the existing trust anchor from the device profile. The trust anchor is deleted when you click the UPDATE button.
Advanced Options	
Advanced Options button	Click to display the Overview tab and the Devices tab. The button changes to Hide Advanced . Click the Hide Advanced button to collapse the advanced display.
Overview tab	Displays JSON code for the device profile.
Devices tab	<p>Includes the following items</p> <ul style="list-style-type: none"> • Total associated devices—Number of devices with which this device profile is associated. • Search Hostname, IP Address field—Type all or part of a hostname or IP address of a device to display information for devices with matching information. The Devices table display updates as you type. • Devices table—Provides information about each device with which this device profile is associated. The table includes the following items: <ul style="list-style-type: none"> – Host Name—Hostname of the device – IP Address—IP address of the device – Tags—Tags that are assigned to a device – Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table – Items per page drop-down list—Choose the maximum number of devices that appear in each page of the table
UPDATE button	Click to update the device profile with changes that you made and exit the Edit Profile window.

Table 5-6 Edit Profile Window Items (continued)



Item	Description
CANCEL button	Click to exit the Edit Profile window without saving any changes.

Setting a Device Profile as the Default

You can set any device profile as the default. The system automatically associates the default device profile with devices that do not have another device profile associated with them.

To set a device profile as the default, follow these steps:

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **PROFILES**. The Profiles page displays.
- Step 3** On the Profiles page, take these actions:
- Check the check box for the profile that you want to set as the default.
 - Click the **Additional Actions** button  and then choose **MARK AS DEFATUL**.



The DEFAULT field in the Device Profile list in the Profiles page updates to show “DEFAULT” for this device profile and to show “NON DEFAULT” for other device profiles.

Deleting a Device Profile

Deleting a device profile removes it from Cisco Fog Director. You cannot delete a device profile that is set as the default or a device profile that is associated with one or more devices.

To delete device profile as the default, follow these steps:

Procedure




-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **PROFILES**. The Profiles page displays.
- Step 3** On the Profiles page, take these actions:
- Check the check box for the profile that you want to delete.
 - Click the **Additional Actions** button  and then choose **DELETE**.
-

Rediscovering Devices

Rediscovering devices causes Cisco Fog Director to discover device information (including host name and serial ID), capabilities (including CPU, memory, disk and network resources), and states of apps for the devices that you select.

To rediscover devices, follow these steps:

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **RE-DISCOVER**. The Re-Discover Devices page displays. The top part of this page displays the Devices table, which lists the devices that can be rediscovered.
- Step 3** If you want to limit the devices that display in the Devices table to one or more specific devices, take the appropriate action:
- To limit the device display to a specific device based on its hostname or IP address, enter all or part of the hostname or IP address in the **Search Hostname, IP Address** field.
 - To limit the device display to specific devices based on a tag, choose a tag from the **Show** drop-down list
 - To limit the device display to specific devices based on reachability, last heard, or discovery status, click the Device Filters and then choose the desired filter option. When you choose an option, it displays in the Device Filters field and the Device table updates automatically. You can add as many device filter options as needed. To remove a device filter option from this field, click the X icon  next to the option. For descriptions of the device filter options, see the [Device Filters field](#) row in [Table 5-1 on page 5-2](#).
- Step 4** In the Installed Devices table, check the check box for each device that you want to be rediscovered.
- Step 5** Click the **ADD SELECTED DEVICES** button.
- The devices with checked check boxes are added to the Selected Devices table. The devices that this table lists will be rediscovered.
- To remove a device from this table, click the x icon  in the Action column that corresponds to the device to remove.
- Step 6** Click the **DONE, LET'S GO** button.
- Cisco Fog Director rediscovered the devices that you selected.
-

Editing Devices


For security reasons, you may not want to include valid user name, password, port, or contact information when you create an import file. In this case, you can use dummy values for this information and uncheck the **Discover devices after import** check box when you import the import file. Then, after you import the import file, you can use the Device Edit feature to update these values for the devices. (For related information, see the [“Importing Devices”](#) section on page 5-14.)

The Edit Devices feature lets you update user name, password, port, and contact information for multiple devices simultaneously.

The following sections provide additional information:

- [Edit Device Options, page 5-27](#)
- [Editing Information for Multiple Devices, page 5-29](#)

Edit Device Options

To view options for editing devices on the Devices View page, click the **Additional Actions** button  and then click **EDIT**.

The Edit Devices page displays. This page includes the items that [Table 5-7](#) describes.

Table 5-7 *Edit Devices Page Items*


Item	Description
Installed Devices table	<p>Provides information about each device that has been added to Cisco Fog Director, and includes the following items:</p> <ul style="list-style-type: none"> • Search Hostname, IP address field—Type all or part of a hostname or IP address of a device to display information for devices with matching information. The table display updates as you type. • Device filters field—To limit the device display to specific devices based on reachability, last heard, or discovery status, click the Device Filters and then choose the desired filter option. When you choose an option, it displays in the Device Filters field and the Device table updates automatically. You can add as many device filter options as needed. To remove a device filter option from this field, click the X icon  next to the option. For descriptions of the device filter options, see the Device Filters field row in Table 5-1 on page 5-2. • Show field—Enter the name of a tag and then press the Enter key to display information for devices with a matching tag. You can choose a tag from a drop-down list of available tags by typing the first few letters of the tag and then clicking the tag that you want. • Check box—Check the check box for each device on which you want to install the app. You can click the check box in the title row of the table to quickly check all boxes in the table. • Host Name—Hostname of the device on which the app is to be installed. • IP Address—IP address of the device on which the app is to be installed. • Tags—Tags that are assigned to a device. • Installed Apps—Apps that are installed on the device. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table. • Items per page drop-down list—Choose the maximum number of devices that appear in each page of the table.

Table 5-7 Edit Devices Page Items (continued)



Item	Description
ADD SELECTED DEVICES button	Click to add devices with checked check boxes to the Selected Devices table.
Selected Devices table	<p>Provides information about each device for which you want to edit information. Devices appear in this table after you check their check boxes in the Installed Devices table and then click ADD SELECTED DEVICES. This table includes the following items:</p> <ul style="list-style-type: none"> • Selected Devices—Number of devices on which you want to install the app. • Search Hostname, IP Address field—Type all or part of a hostname or IP address of a device to display information for devices with matching information. The table display updates as you type. • Host Name—Hostname of the device on which you want to install the app. • IP Address—IP address of the device on which you want to install the app. • Tags—Tags that are assigned to the device on which you want to install the app. • Health—Icons that represent information about CPU use or memory use on the device. Hover your mouse pointer over an icon to see more detailed information. • Last Heard—How long ago Cisco Fog Director last communicated with the device, or a brief explanation of why the last attempt to communicate with the device was unsuccessful. • Action—Click the x icon  to remove a device from the Selected Devices table. Clicking this icon does not affect the device. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table. • Items per page drop-down list—Choose the maximum number of devices that appear in each page of the table.
Edit Devices Information	<p>Appears when one or more devices appear in the Selected Devices table, and includes the following fields:</p> <ul style="list-style-type: none"> • Username—Cisco IOS user name for the devices • Port—HTTPS port on which Cisco IOx runs on the devices • Password—Cisco IOS password for the devices • Contact Details—Contact information of the person who is responsible for the devices

Table 5-7 Edit Devices Page Items (continued)

Item	Description
DONE, LET'S GO button	Appears when one or more devices appear in the Selected Devices table. Click to update the devices in the Selected Devices table with the information in the Edit Devices Information fields.

Editing Information for Multiple Devices

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **EDIT**.
The Edit Devices page displays. The top part of this page displays the Devices table, which lists the devices that have been added to Cisco Fog Director.
- Step 3** In the Installed Devices table, check the check box for each device for which you want to edit information.
For detailed information about this table and locating devices, see the [“Edit Device Options” section on page 5-27](#).
- Step 4** Click the **ADD SELECTED DEVICES** button.
The devices that you selected are added to the Selected Devices table. The information that you provide will be updated on the devices that this table lists. For detailed information about this table and about removing devices from this table, see the [“Edit Device Options” section on page 5-27](#).
- Step 5** In the Edit Devices information area, take the following actions.
You might need to scroll down to see this area.
- In the Username field, enter Cisco IOS user name that is configured on the devices.
 - In the Port field, enter HTTPS port on which Cisco IOx runs on the devices. You can type a number or use the Up or Down arrow buttons to enter a value.
 - In the Password field, enter Cisco IOS password that is configured on the devices.
 - In the Contact Details field, enter the contact information of the person who is responsible for the device.
- Step 6** Click the **DONE, LET'S GO** button.
The devices that you selected are updated with the information that you entered.
-

Deleting Devices

Deleting a device removes it from Cisco Fog Director.

You delete as described in the following sections:


- [Deleting One Device, page 5-30](#)

- [Deleting Multiple Devices, page 5-30](#)

Deleting One Device

To delete single device from Cisco Fog Director, perform the following steps:



Procedure


-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** In the Device table, click the **Expand** icon  to the left of the device hostname of the device that you want to delete.
- Step 3** Click **Delete Device**.
The Delete dialog box displays.
- Step 4** Click **OK** in the delete dialog box.
-

Deleting Multiple Devices

To delete several devices from Cisco Fog Director at the same time, follow these steps:

Procedure

-
- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** On the Devices View page, click the **Additional Actions** button  and then click **DELETE**.
The Delete Devices page displays. The top part of this page displays the Devices table, which lists the devices that you can delete.
- Step 3** If you want to limit the devices that display in the Devices table to one or more specific devices, take the appropriate action:
- To limit the device display to a specific device based on its hostname or IP address, enter all or part of the hostname or IP address in the **Search Hostname, IP Address** field.
 - To limit the device display to specific devices based on a tag, choose a tag from the **Show** drop-down list
 - To limit the device display to specific devices based on reachability, last heard, or discovery status, click the Device Filters and then choose the desired filter option. When you choose an option, it displays in the Device Filters field and the Device table updates automatically. You can add as many device filter options as needed. To remove a device filter option from this field, click the X icon  next to the option. For descriptions of the device filter options, see the [Device Filters field](#) row in [Table 5-1 on page 5-2](#).
- Step 4** In the Installed Devices table, check the check box for each device that you want to delete.
- Step 5** Click the **ADD SELECTED DEVICES** button.
The devices with checked check boxes are added to the Selected Devices table. The devices that this table lists will be deleted.

To remove a device from this table, click the x icon  in the Action column that corresponds to the device to remove.

Step 6 Click the **DONE, LET'S GO** button.

The devices that you selected are removed from Cisco Fog Director.

Managing Tags for Devices

A tag is a brief descriptive label that you assign to a device. For example, a tag could be the name of an administrator, the name of an app, or the purpose of an app. Tags are useful for categorizing devices. In some areas on the Apps pages, you can display devices with matching tags.

The following guidelines apply to tags:

- There is no limit to the number of tags that can be assigned to a device
- A tag can include alphanumeric characters, special characters, and spaces
- Tags are case sensitive

You manage tags for devices in the Device table on the Devices View page as described in the following sections:

- [Managing Tags for One Device, page 5-31](#)
- [Managing Tags for Multiple Devices, page 5-31](#)

Managing Tags for One Device

To assign a tag to a single device, click the **Enter new tag** field in the Tags column that corresponds to the device, enter the tag that you want, and then press the **Enter** key or the **Tab** key. If the tag does not already exist, the system creates a new one with the name that you enter.

To remove a tag from a device, click the **X** next to the tag.

Managing Tags for Multiple Devices

You can assign tags to or remove tags from several devices at the same time. Tags that you assign must already have been created in Cisco Fog Director as described in as described in the “[Managing Tags for One Device](#)” section on page 5-31,



To assign tags to or remove tags from multiple devices, follow these steps

Procedure

Step 1 In Cisco Fog Director, click the **DEVICES** tab.

Step 2 On the Devices View page, click the **Additional Actions** button  and then click **TAG**.

The Tag page displays. The top part of this page displays the Devices table, which lists the devices on which you can assign or remove a tag.

- Step 3** If you want to limit the devices that display in the Devices table to one or more specific devices, take the appropriate action:
- To limit the device display to a specific device based on its hostname or IP address, enter all or part of the hostname or IP address in the **Search Hostname, IP Address** field.
 - To limit the device display to specific devices based on a tag, choose a tag from the **Show** drop-down list
 - To limit the device display to specific devices based on reachability, last heard, or discovery status, click the Device Filters and then choose the desired filter option. When you choose an option, it displays in the Device Filters field and the Device table updates automatically. You can add as many device filter options as needed. To remove a device filter option from this field, click the X icon  next to the option. For descriptions of the device filter options, see the [Device Filters field](#) row in [Table 5-1 on page 5-2](#).
- Step 4** In the Installed Devices table, check the check box for each device on which you want assign or remove a tag.
- Step 5** Click the **ADD SELECTED DEVICES** button.
- The devices with checked check boxes are added to the Selected Devices table. Tags will be assigned to or removed from the devices that this table lists.
- To remove a device from this table, click the x icon  in the Action column that corresponds to the device to remove.
- Step 6** In the Tag Configuration area, take either of these actions:
- To assign a tag to all selected devices:
 - a. Click **Tag** next to Action.
 - b. In the Tag field, enter the tag that you want to assign. The system displays a list of tags with initial characters that match the characters you type. To display a list of all tags, press the Spacebar in this field.
 - To remove a tag from all selected devices:
 - a. Click **Tag** next to Action.
 - b. In the Tag field, enter the tag that you want to remove. The system displays a list of tags with initial characters that match the characters you type. To display a list of all tags, press the Spacebar in this field.

After you choose a tag, a the system displays the number of devices on which the tag is assigned.
- Step 7** Click the **DONE, LET'S GO** button.
- The designated tag is assigned to or removed from all devices that you selected.
-

Starting or Stopping an App on a Device

Starting an app initiates its operation on a host device and puts the app in Running state. CPU and memory (RAM) resources that were reserved for the app become in use.

Stopping an app shuts down its operation on a host device and puts the app in Stopped state. CPU and memory (RAM) resources that were used by the app remain reserved for it but stop being used.

The following sections describe how to start and stop an app from the DEVICES tab. (You also can start and stop an app from the App Monitoring Page by using the as described in the **START** and **STOP** buttons under the Status Charts as described in the “[Viewing General Monitoring Information](#)” section on page 4-58).

- [Starting an App, page 5-33](#)
- [Stopping an App, page 5-33](#)




You also can start or stop an app from the App Monitoring page by clicking the **START** or **STOP** button under a status chart. See the “[Viewing General Monitoring Information](#)” section on page 4-58 for more information.

Starting an App

Starting an app initiates its operation on a host device and puts the app in Running state.

To start an app on a device, follow these steps:

Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** Take either of these actions:
- In the Device table on the Devices View page, click the IP address or the hostname of the device on which you want to start the app.
 - In the Device table, click the **Expand** icon  to the left of the device hostname of the device of the device on which you want to start the app.
- Step 3** If the app is running, take either of these actions:
- If you clicked the IP address or the hostname of the device in [Step 2](#), click the **Start App** button  that displays under the icon of the app that you want to start.
 - If you clicked the **Expand** icon in [Step 2](#), click the **Start App** button  that corresponds to the app that you want to start.
-

Stopping an App


Stopping an app shuts down its operation on a host device and puts the app in Stopped state.

You cannot stop an app that provides services if the services that it provides are being used by one or more other apps that are in Running state. Before you stop an app that provides services, stop each app that uses the services that it provides.



To stop an app on a device, follow these steps:

Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** Take either of these actions:

- In the Device table on the Devices View page, click the IP address or the hostname of the device on which you want to stop the app.
- In the Device table, click the **Expand** icon  to the left of the device hostname of the device of the device on which you want to stop the app.

Step 3 If the app is running, take either of these actions:

- If you clicked the IP address or the hostname of the device in [Step 2](#), click the **Stop App** button  that displays under the icon of the app that you want to stop.
 - If you clicked the **Expand** icon in [Step 2](#), click the **Stop App** button  that corresponds to the app that you want to stop
-

Removing an App from a Device


Removing an app from a device removes it from the host device and releases CPU and memory (RAM) resources that were reserved for the app.

To remove an app from a device, follow these steps:



Procedure

Step 1 In Cisco Fog Director, click the **DEVICES** tab.



Step 2 Take either of these actions:

- In the Device table on the Devices View page, click the IP address or the hostname of the device from which you want to remove the app.
- In the Device table, click the **Expand** icon  to the left of the device hostname of the device from which you want to remove the app.

Step 3 If the app is running, take either of these actions:

- If you clicked the IP address or the hostname of the device in [Step 2](#), click the **Stop App** button  that displays under the icon of the app that you want to remove from the device.
- If you clicked the **Expand** icon in [Step 2](#), click the **Stop App** button  that corresponds to the app that you want to remove from the device,

Step 4 Take either of these actions:

- If you clicked the IP address or the hostname of the device in [Step 2](#), click the **Remove App** button  that displays under the icon of the app that you want to remove from the device, then click the **YES** button in the confirmation dialog box that displays.
 - If you clicked the **Expand** icon in [Step 2](#), click the **Remove App** button  that corresponds to the app that you want to remove from the device,
-

Deleting Unused Cartridges

For system maintenance and to free disk space on a device, you can delete cartridges that have been installed on the device but that are not used by any apps. Deleting cartridges removes them and their metadata from a device.

To delete unused cartridges from a device, follow these steps:

Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
 - Step 2** In the Device table on the Devices View page, click the IP address or the hostname of the device for which you want to delete unused cartridges.
 - Step 3** Click the **CARTRIDGES** tab under the Host Information area.
 - Step 4** In the Unused Cartridges area on the page that displays, click the **DELETE UNUSED CARTRIDGES** button.
-

Managing Layers

The Layers tab on the Device Details page provides options for viewing information about and managing layers on a device. A layer is a component of a docker image from which an app package has been created.

When you upload or upgrade an app package from a Docker image, Cisco Fog Director automatically identifies the layers that the image requires and transfers only images that the component layers that do not exist on the device.

When you uninstall an app, the system does not automatically remove from the device the layers that relate to that app. Similarly, when you upgrade an app and the new version no longer needs some layers that were used by the older version, the system does not automatically remove from the device the layers that are no longer used. In both cases, if you want to remove unused layers from the device, you must remove them manually.

You can delete any layer that is not in use by an installed app.

To delete layers that are not used by installed apps from a device, follow these steps:

Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** In the Device table on the Devices View page, click the IP address or the hostname of the device for which you want to delete layers.
- Step 3** Click the **LAYERS** tab under the Host Information area.
- Step 4** In the Layers tab, take either of these actions:
 - To delete specific layers, check the check box for each layer that you want to delete, and then click the **DELETE SELECTED LAYERS** button.

You can click the check box at the top of the list of layers to quickly check boxes for all layers. You cannot delete a layer that is in use by an installed app.

- To delete all layers that are not used by any installed app, click the **DELETE ALL UNUSED LAYERS** button.
-

Obtaining Device Logs

To troubleshoot a device, you can view and download a device log file that you can review or provide to Cisco for assistance. The file contains log information that was generated by the device. If the Collect Debug Logs option on the Device Details page is set to **Yes**, the log file also includes debug information.

To create a log file for a device, follow these steps:

Procedure

- Step 1** In Cisco Fog Director, click the **DEVICES** tab.
- Step 2** In the Device table on the Devices View page, click the IP address or the hostname of the device for which you want to create a log file.
- Step 3** Click the **Yes** button next to Collect Debug Logs near the top right of the screen.
- Step 4** Try to reproduce the issue that you are troubleshooting.
- Step 5** Take either of these actions:
- To review log information, click the **VIEW DEVICE LOGS** button. Then use the tabs in the window that displays to review the information that you want.
 - To save a log file, click the **DOWNLOAD TECH SUPPORT LOGS** button and then follow the on-screen prompts to save the log file in the location of your choice.
- Step 6** (Optional) To stop collecting log information, click the **No** button next to Collect Debug Logs.
-

Accessing an App via a Console

You can access an installed on a device via a console. After you access an app, you can use Linux console commands to obtain information about it.

Cisco Fog Director provides the command and related information that you can use to access an app via a console.

To access an app via a console, perform the following steps.

Before You Begin

Use Cisco IOS configuration options to forward an SSH port on the router that you want to use for console access to port 22.

Procedure

- Step 1** Take any of these actions to display the Device Details page for the device on which you want to access the app via a console:

- On the Devices View page, double-click a circle in a Top 5 Consumers chart.
- On the Apps View page or the Devices View page, click the hostname of the IP address of a device anywhere that either of these items displays as a link.

Step 2 On the Device Details page, take these actions to obtain the private key that you need for console access:

- a. In the App Console Support area at the bottom of the page, click the ***app_id.pem*** link that displays in the sample command, where *app_id* is the identifier of the app.
- b. In the dialog box that displays, follow the prompts to download the *app_id.pem* file.
- c. Use a text editor to open the *app_id.pem* file, highlight and copy all text that displays.
Make sure to include the “-----BEGIN RSA PRIVATE KEY-----” and “-----END RSA PRIVATE KEY-----” text.

Step 3 On the system from which you logged in to Cisco Fog Director, take these actions:

- a. Use a text editor to create a text file called *app_id.pem*, where *app_id* is the identifier of the app whose container or VM you want to access.
- b. Paste the private key that you copied into this file, and save it locally.
- c. Make sure that this file has the Linux permission 600.

Step 4 Take these actions to connect to the host system from a console:

- a. From the console system, start an SSH client.
 - b. Enter the following command to obtain the SSH port required for console access:
prompt% **show running-config | i 22**
 - c. Enter the command that displays in the App Console Support area on the Device Details page.
When you enter the command:
 - Replace **SSH_PORT** with the port number for console access.
 - Replace ***app_id.pem*** with the path to the file that you created in [Step 3](#), if the file is not in the current directory.
 - d. Use the commands in your SSH client to complete the connection process.
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