



Managing Apps

The Cisco Fog Director Apps pages provide information about Cisco IOx apps, and provide access to features for managing these apps and performing related operations.

When you log in to Cisco Fog Director, the Apps View page appears. If no apps have yet been added to Cisco Fog Director, this page displays “Welcome to Cisco Fog Director” and displays the **ADD NEW APP** button and the **IMPORT APPS** button.

If at least one app has been added, this page includes these areas:

- **Installed Apps area**—Lists apps that have been installed, or are in the process of being installed, through Cisco Fog Director on at least one device. Also provide information about these apps and devices, and access to other features and information for managing these apps. (An app that has been installed and then removed from a device appear in this area until you manually remove it from this area.)
- **Available Apps area**—Lists apps that have been published are so are available to be installed on one or more devices. Also provide information about these apps and devices, and access to other features and information for managing these apps.
- **Unpublished Apps area**—Lists apps that have been uploaded to Cisco Fog Director but that have not been published.

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

This chapter includes these sections:

- [Managing Installed Apps, page 4-2](#)
- [Managing Available Apps, page 4-3](#)
- [Managing Unpublished Apps, page 4-5](#)
- [Viewing Detailed Information about an Installed or Available App, page 4-6](#)
- [Adding an App, page 4-8](#)
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Managing Installed Apps

The Installed Apps area on the Apps View page lists each app that is installed through Cisco Fog Director on at least one device, provides information about these apps, and provides access to related features.

For each installed app, area includes the items that [Table 4-1](#) describes.

Table 4-1 *Installed Apps Area Items*

Item	Description
App name and icon	Displays the name and version of the app and an app for the app. Click an app icon to display more detailed information about the app and to access features for managing the app, as described in the “Viewing Detailed Information about an Installed or Available App” section on page 4-6.
App Status	<p>Displays text and a chart that provide information about the states of an app. App states can include the following:</p> <ul style="list-style-type: none"> • Running—App is running on a device • In Progress—App is in the process of installing on a device • Stopped—An app that was running has been stopped on a device • Failed—A start, stop, install, uninstall, upgrade, or configuration action that was performed on an app did not execute properly <p>The text that describes each state shows the number of devices on which the app in that state and the total number of devices on which the app is installed. For example, “8/12 Running” means that the app is installed on 12 devices and is running on 8 of them.</p> <p>The donut chart provides a visual representation of each state of an app as a percentage of the number of devices on which the app is installed. Hover your mouse pointer over any section of a chart to see what state that section represents and the percentage of devices on which the app is in that state. Click a chart to display monitoring information for the app, as described in the “Monitoring an App” section on page 4-31.</p>

Table 4-1 *Installed Apps Area Items (continued)*

Item	Description
Top 5 CPU Consumer	<p>Host name of up to five devices on which the app has consumed the most CPU resources during the past 24 hours.</p> <p>The percentage value next to a host name indicates the average amount of CPU resources the app consumed on the device during the past 24 hours.</p> <p>Click a host name to display device detailed information about the device. See the “Viewing Detailed Information about a Device” section on page 5-4 for more information.</p>
Top 5 Memory Consumer	<p>Host name of up to five devices on which the app has consumed the most RAM resources during the past 24 hours, and the amount of memory, in MG, consumed on each device.</p> <p>The percentage value next to a host name indicates the average amount of RAM resources the app consumed on the device during the past 24 hours.</p> <p>Click a host name to display device details information about the device. See the “Viewing Detailed Information about a Device” section on page 5-4 for more information.</p>
REMOVE button	Appears if an app is not currently installed on any device. Click to remove the app from the Installed Apps area.

Managing Available Apps

The Available Apps area on the Apps View page lists each app that has been published, provides information about these apps, and provides access to related features. An available app is ready to be installed on one or more devices.

You can display this area in either of these views:

- App Install view—Lists available apps and provide access to detailed information and related features for each app
- APP EDIT view—Lists available apps, provides options for unpublishing an app or removing it from a device, and provides access to related information and features for each app

The following sections provide more detailed information:

- [Available Apps Area: App Install View, page 4-3](#)
- [Available Apps Area: App Edit View, page 4-4](#)

Available Apps Area: App Install View

The Available Apps area appears in App Install view by default when you access the Apps View page. When this area is in the App Edit view, you can change to the App Install view by clicking the **SWITCH TO APP INSTALL VIEW** button or by clicking the **APPS** tab.

In App Install view, the Available Apps area includes the items that [Table 4-2](#) describes.

Table 4-2 Available Apps Area, App Install View Items



Item	Description
App name and icon	Displays the name, version, and icon of each available app. Click an app icon to display more detailed information about the app and to access features for managing the app, as described in the “Viewing Detailed Information about an Installed or Available App” section on page 4-6.
SWITCH TO APP EDIT VIEW button	Click to change the Available Apps area to App Edit view.

Available Apps Area: App Edit View

The Available Apps area appears in App Edit view when this area is in App Install view and you click the **SWITCH TO APP EDIT VIEW** button.

In App Edit view, the Available Apps area includes the items that [Table 4-3](#) describes.

Table 4-3 Available Apps Area, App Edit View Items


Item	Description
App name and icon	Displays the name, version, and icon of each available app. Click an app icon to display more detailed information about the app and to access features for administering the app.
IMPORT APPS button	See the “Backing Up and Restoring Apps” section on page 4-30.
EXPORT APPS button	See the “Backing Up and Restoring Apps” section on page 4-30.
SWITCH TO APP INSTALL VIEW button	Click to change the Available Apps area to App Install view. See the “Available Apps Area: App Install View” section on page 4-3.
Unpublish button  for each app	See the “Unpublishing an App” section on page 4-10.
Remove button  for each app	See the “Removing an App” section on page 4-20.

When the Available Apps area is in App Edit view and you click an app icon, a configuration page displays. The items that this page displays vary depending on the type of the app, and can include the items that [Table 4-4](#) describes.

Table 4-4 Available Apps Area > Configuration Page Items

Item	Description
App icon	The icon that appears in Cisco Fog Director for the app. This icon comes from an image file that you specify. You can click Edit Icon to select an image file as described in the “Editing an App Icon, Description, and Release Notes” section on page 4-21.
Author	Entity that authored the app, as specified in the app metadata.

Table 4-4 Available Apps Area > Configuration Page Items (continued)



Item	Description
Resource Profile	Resource profile of the app, which specifies the amount of host system CPU and memory (RAM) resources that the app requires on a device. For information about assigning resource profiles to an app, see <i>Cisco IOx Local Manager Reference Guide</i> .
CPU	Number of CPU units that the app requires on a device.
Memory	Amount of RAM, in KB, that the app requires on a device.
Disk	Amount of disk space, in MB, that the app requires on a device.
App Type	Type of the app (for example, PaaS or VM)
Runtime	Runtime environment that the app requires on a device.
CPU Architecture	Type of device on which the app is supported.
App Links	Appears if you configured links for an app. Click a link to go to the configured resource. See the “ Configuring App Links ” section on page 4-28.
UPGRADE PKG button	Lets you upload a newer version of an app to Cisco Fog Director. See the “ Upgrading an App ” section on page 4-19.
PUBLISH button	Click to publish the app, which makes the app available for installation on devices. See the “ Publishing an App ” section on page 4-10.
SAVE button	Click to save updates that you make to the description or release notes for the app. See the “ Editing an App Icon, Description, and Release Notes ” section on page 4-21.
Description	Brief description of the app that appears when you view detailed information for the app. You can click Edit next to “Description” to enter description text as described in the “ Editing an App Icon, Description, and Release Notes ” section on page 4-21.
Release Notes	Notes for the app that appears when you view detailed information for the app. For example, notes might include a list and descriptions of features added in an updated app. You can click Edit next to “Release Notes” to enter release note text as described in the “ Editing an App Icon, Description, and Release Notes ” section on page 4-21.
App Links button 	Let you configure external links for an app. See the “ Configuring App Links ” section on page 4-28.

Managing Unpublished Apps

The Unpublished Apps area on the Apps View page on the Apps View page lists each app that has been uploaded to Cisco Fog Director and is not yet published. An unpublished app must be published before it can be installed on one or more devices.

The Unpublished Apps area includes the items that [Table 4-5](#) describes.

Table 4-5 *Unpublished Apps Area Items*

Item	Description
ADD NEW APP button	Lets you upload an app to Cisco Fog Director. See the “Adding an App” section on page 4-8 .
App name and icon	Displays the name, version, and icon of each unpublished app. Click an icon to display additional information for the app. The page that appears is the same page that the “Available Apps Area: App Edit View” section on page 4-4 describes.
Publish button  for each app	Lets you publish an app, which makes it available for installation on a device. See the “Publishing an App” section on page 4-10 .
Remove button  for each app	Removes this version of the app from Cisco Fog Director.

Viewing Detailed Information about an Installed or Available App

To view detailed information about an installed app or available, click its icon in the Installed Apps area or in the Available Apps area on the Apps View page. The App Configuration page displays.

This page includes information and features that apply to the app. The items that this page displays vary depending on the state of the app, and can include the items that [Table 4-6](#) describes.

Table 4-6 *Detailed Information about an Installed or Available App Items*

Item	Description
General information	The name of the app, its version, and the date and time it was last updated.
Author	Entity that authored the app, as specified in the app metadata.
CPU	Number of CPU units that the app requires on a device.
Memory	Amount of RAM, in KB, that the app requires on a device.
Disk	Amount of disk space, in MB, that the app requires on a device.
App Type	Type of the app (PaaS or VM)
Runtime	Runtime environment that the app requires on a device.
CPU Architecture	Type of device on which the app is supported.
App Links	Appears if you configured links for an app. Click a link to go to the configured resource. See the “Configuring App Links” section on page 4-28 .
INSTALL button	Lets you install an app on one or more devices. See the “Installing an App” section on page 4-10 .
MONITOR APP button	Displays information about the operation of the app and its resource consumption on devices. See the “Monitoring an App” section on page 4-31 .
UNINSTALL button	Lets you uninstall an app from one or more devices. See the “Uninstalling an App” section on page 4-16 .

Table 4-6 Detailed Information about an Installed or Available App Items (continued)


Item	Description
Installation Successful display	<p>Shows the number of devices on which the app has been successfully installed.</p> <p>The EDIT CONFIGURATION button under this display lets you update configuration parameters that apply to an app. These items may include configuration information, resource profile, networking, and port information. See the “Reconfiguring App Parameters” section on page 4-22 for more information.</p>
Actions Failed on display	<p>Shows the number of devices on which an installation, update, uninstall, or reconfiguration action failed for the app.</p> <p>Hover your mouse pointer over this area to see more detailed information about specific action failure types. You can click the RETRY NOW button retry an action.</p> <p>See the “Retrying a Failed Action for an App” section on page 4-29 for more information.</p>
Upgrade Required On	<p>After you add and publish a newer version of an already-published app, this field displays the number of devices on which the app should be upgraded. You can click the UPGRADE button to perform the upgrade. See the “Upgrading an App” section on page 4-19 for more information.</p>
Installing Display	<p>Displays information about the devices on which the app is installing. This information includes:</p> <ul style="list-style-type: none"> • One or more <i>device squares</i>. Each one represents a device on which you are installing the app and shows the status of the install operation on that device. You can hover your mouse pointer over a device square to display the Edit Resource Profile dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the resource profile that has been assigned for the app on the device. You can click the hostname and IP address in the dialog box to exit the installation and display the Device Details page for the device. • The host name of the device on which the app is installing and the status and progress of the installation operation on that device. Click the host name to display detailed information about the device, as described in the “Viewing Detailed Information about a Device” section on page 5-4. • A search device field, which you can display by clicking the expand icon  next to Search Device. Enter the IP address or host name of a device to see the status of the app installation process on that device.

Table 4-6 Detailed Information about an Installed or Available App Items (continued)

Item	Description
App State on installed devices display	<p>Includes a chart that provides a visual representation of the number of devices on which the app in a particular state.</p> <p>Hover your mouse pointer over any section of a chart to see what state that section represents and the number of devices on which the app is in that state.</p> <p>Click any section of the chart to display a table with detailed information about each device on which the app is in the state. This table includes the following:</p> <ul style="list-style-type: none"> • App state and percentage—Name of the state, and the percentage of devices on which the app is installed that the app is in that state. • Search Hostname, IP Address field—Type all or part of a host name or IP address of a device to display information for devices with matching information. The table display updates as you type. • Host Name—Host name of the device on which the app is in the state. Click a host name to display detailed information about the device. See the “Viewing Detailed Information about a Device” section on page 5-4 for more information. • IP address—IP address of the device on which the app is in the state. Click an IP address to display detailed information for the device. See the “Viewing Detailed Information about a Device” section on page 5-4 for more information. • 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. • Error Summary—For an app that is in the Failed state, provides information about the cause of the action that failed. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table.
Description	Brief description of the app. See the “Editing an App Icon, Description, and Release Notes” section on page 4-21 for related information.
Release Notes	Release notes for the app. See the “Editing an App Icon, Description, and Release Notes” section on page 4-21 for related information.

Adding an App

Adding a Cisco IOx app uploads the app to Cisco Fog Director. When you add an app, it appears in the Unpublished area on the Apps View page and becomes available to be published.

To add an app, follow these steps:

Procedure

- Step 1** On the Apps View page, click the **ADD NEW APP** button.
If other apps have already been added, this button appears in the Unpublished Apps area.
- Step 2** In the dialog box that appears, Click the **Select App Package** button.
- Step 3** Follow the on-screen prompts to locate and select the app that you want to add.
The app is added to Cisco Fog Director and a page with the items that [Table 4-7](#) displays. The items in this page depend on the type of app that you added.

Table 4-7 Added App Page Items


Item	Description
Edit Icon	Click to add an icon for the app. See the “Editing an App Icon, Description, and Release Notes” section on page 4-21.
App Information	Includes the following information <ul style="list-style-type: none"> Name of the app Latest version—Version of the app that you added Last updated—Date and time that the app was last updated
Author	Entity that authored the app, as specified in the app metadata.
Resource Profile	Resource profile of the app, which specifies the amount of host system CPU and memory (RAM) resources that the app requires on a device. For information about assigning resource profiles to an app, see <i>Cisco IOx Local Manager Reference Guide</i> .
App Type	Type of the app (PaaS or VM)
Runtime	Runtime environment that the app requires on a device.
App Links button 	Let you configure external links for an app. See the “Configuring App Links” section on page 4-28.
UPGRADE PKG button	Lets you upload a newer version of an app to Cisco Fog Director. See the “Upgrading an App” section on page 4-19.
PUBLISH button	Click to publish the app, which makes the app available for installation on devices. See the “Publishing an App” section on page 4-10.
SAVE button	Click to save updates that you make to the description or release notes for the app. See the “Editing an App Icon, Description, and Release Notes” section on page 4-21.
Description	Brief description of the app that appears when you view detailed information for the app. You can click Edit next to “Description” to enter description text as described in the “Editing an App Icon, Description, and Release Notes” section on page 4-21.


Table 4-7 Added App Page Items (continued)

Item	Description
Release Notes	Notes for the app that appears when you view detailed information for the app. For example, notes might include a list and descriptions of features added in an updated app. You can click Edit next to “Release Notes” to enter release note text as described in the “Editing an App Icon, Description, and Release Notes” section on page 4-21.

Publishing an App

You can publish an app after it has been added to Cisco Fog Director. A published app becomes available to install on devices.

To publish an app, take any of these actions:

- In the Unpublished Apps area on the Apps View page, click the **Publish** button  that appears under the app that you want to publish
- In the page that displays when you add an app, click the **PUBLISH** button.
- In the Available Apps area, go to App Edit view, click the icon for the app that you want to publish, and then click the **PUBLISH** button in the page that displays


After you perform the Publish action, the app moves from the Unpublished Apps area to the Available Apps area on the Apps View page.

Unpublishing an App

Unpublishing an app moves the app to the unpublished area and makes it unavailable for installation on any device. Unpublishing an app does not remove it from devices on which it is installed already.

To unpublish an app, follow these steps:

Procedure

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- Step 1** In the Available Apps area on the Apps View page, click **SWITCH TO APP EDIT VIEW**.
- Step 2** Click the **Unpublish** button  under the icon for the app.
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Installing an App

You can install a published app on a device that has been added or imported to Cisco Fog Director.

The following sections provide additional information:

- [Install App Options, page 4-11](#)
- [Install App Procedure, page 4-12](#)

Install App Options


To view options for installing an app, click the **INSTALL** button on the Apps Configuration page for the app.

The Filter Devices page displays. This page includes the items that [Table 4-8](#) describes.

Table 4-8 Filter 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 host name 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 end 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—Host name 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.
ADD SELECTED DEVICES button	Click to add devices with checked check boxes to the Selected Devices table.

Table 4-8 Filter Devices Page Items (continued)

Item	Description
Selected Devices table	<p>Provides information about each device on which you want to install the app. 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 host name or IP address of a device to display information for devices with matching information. The table display updates as you type. • Host Name—Host name 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. • Action—Click the x icon  to remove a device from the selected device 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.
Next button	Available if there is at least one device in the Selected Devices table. Click to continue an app install procedure.

Install App Procedure

To install an app on one or more devices, perform the following steps.

If you are installing an app on multiple devices and want to stop the installation procedure at any time, unpublish the app as described in the [“Unpublishing an App” section on page 4-10](#).

Before You Begin

- Add or import each device on which you are installing the app to Cisco Fog Director. See the [“Adding Devices” section on page 5-8](#) or the [“Importing Devices” section on page 5-9](#).
- Add the app to Cisco Fog Director. See the [“Adding an App” section on page 4-8](#).
- Publish the app. See the [“Publishing an App” section on page 4-10](#).

Procedure

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- Step 1** Take either of these actions:
- If the device is installed on at least one device, in the Installed Apps area on the Apps View page, click the icon for the app that you want to install, and then click the **INSTALL** button.
 - If the device is not installed on any device, in the Available Apps area on the Apps View page, make sure that you are in App Install view, click the icon for the app that you want to install, and then click the **INSTALL** button.
- Step 2** In the Installed Devices table, check the check box for each device on which you want to install the app. For detailed information about this table and locating devices, see the [“Install App Options” section on page 4-11](#).
- Step 3** Click the **ADD SELECTED DEVICES** button.
- The devices that you selected and on which the app can be installed are added to the Selected Devices table. The app will be installed on the devices that this table lists. For detailed information about this table and about removing devices from this table, see the [“Install App Options” section on page 4-11](#).
- Step 4** Click the **Next** button near the bottom of the page.
- The Installation Summary page appears. This page lets you review and configure operations that are performed by Cisco Fog Director on the devices on which you are installing the app.
- Step 5** (Optional) In the Installation Summary page, expand **Selected Devices** (if it is not expanded already) to review the following information for each device that you selected:
- Host Name—Host name of the device.
 - IP Address—IP address of the device.
 - Tags—Tags that are assigned to the device.
 - 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.
 - Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table.
- Step 6** In the Installation Summary page, take the following actions as needed:
- (Optional) To change the list of devices that you selected, click the **Back** button, update information in the Selected Devices table as described earlier in this procedure, and then click the **Next** button again.
 - (Optional) To change the default tag that will be added to each device, type another tag name in the **Tag Selected Devices as** field.

By default, the system adds a tag with the app name to each device. You can change this name, or, if you do not want a tag to be added, delete all text in this field. See the [“Managing Tags for a Device” section on page 5-12](#) for related information.
 - (Optional) To cause the app to start automatically after it installs, check the **Start app after installation** check box. 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.

- (Optional) Click the **VIEW INCOMPATIBLE DEVICES** button (if this button is not dimmed) to see a table that provides information about devices that you selected but on which the app cannot be installed. This table includes the following items:
 - Host Name—Host name of the device.
 - IP Address—IP address of the device.
 - Tags—Tags that are assigned to the device.
 - 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.
 - Incompatibility Cause—A brief description of why the app cannot be installed on the device.
 - Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table, and to designate the maximum number of devices that can appear on each page.

Step 7 (Optional) In the Installation Summary page, expand **Customize Configuration** to view and update configuration information for this app.

The configuration items that display are defined in the `package_config.ini` file for the app. The value that each field displays is the default value for that item as defined by the app. You can make updates in these fields as needed.

Step 8 (Optional) In the Installation Summary page, expand **Configure Resource Profile** to view and update the resource profiles that have been assigned for the app on each device.

You can update the resource profile for a specific device, some devices, or all devices.

The *device squares* in the box in the middle of the Configure Resource Profile area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Resource Profile dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the resource profile that has been assigned for the app on the device. You can click the hostname and IP address in the dialog box to exit the installation and display the Device Details page for the device.

To update a resource profile on one or more devices, take these actions:

- a. If you want to limit the device squares displays to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
- b. Take the desired action:
 - To change the resource profile for a specific device, hover your mouse pointer over the device square for that device, and in the Edit Resource Profile dialog box, choose a resource profile from the **Select Profile** drop-down list.
 - To change the resource profile for all devices for which a device square displayed, click the desired profile radio button and then click the **REASSIGN PROFILE** button:
 - **Exact matching profile**—Assigns the resource profile that is defined for the app in its metadata, if the resources are available on a device
 - **Largest available profile**—Assigns the largest resource profile that is currently available on each device on which you are installing

Step 9 (Optional) In the Installation Summary page, expand **Configure Networking** to view and update the network from which the app obtains its IP address or addresses on each device.

The Configure Networking area is available only if its options apply to this installation.

You can update the network for a specific device, some of devices, or all devices.

The *device squares* in the box in the middle of the Configure Networking area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Network Details dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the network that has been assigned for the app on the device.

To update the network for an app on one or more devices, take these actions:

- a. If you want to limit the device squares to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
- b. Take the desired action:
 - To change the network for a specific device, hover your mouse pointer over the device square for that device, and in the Edit Network Details dialog box. choose a network from the **Select Network** drop-down list. Network options are:
 - **iox-bridge0**—App obtains its IP address from a DHCP pool that is configured in Cisco IOS
 - **iox-nat0**—App obtains its IP address from an internal network address translator
 - To change the network for all devices for which a device square displayed, click either of the following radio buttons and then click the **REASSIGN NETWORKS** button:
 - **Bridged**—App obtains its IP address from a DHCP pool that is configured in Cisco IOS
 - **NATed**—App obtains its IP address from an internal network address translator

Step 10 (Optional) In the Installation Summary page, expand **Configure Device Resource Ports** to view and update the serial port that an app uses on a device.

The Configure Device Resource Ports area is available only if the app requests a serial port.

The *device squares* in the box in the middle of the Configure Device Resource Ports area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Serial Details dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the serial port that has been assigned for the app on the device.

To update a serial port for an app on one or more devices, take these actions:

- a. If you want to limit the device squares to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
- b. Hover your mouse pointer over the device square for the device that you want to update, and in the Edit Serial Details dialog box, choose a port from the **Select Serial Port** drop-down list.

Step 11 (Optional) In the Installation Summary page, expand **Network Status** to view network, resource, and related information for apps and devices.

The Network Status area displays the following information:

- How many of the devices that you selected for installation of the app are reachable. (“Reachable” means that Cisco Fog Director can communicate with the device.) Hover your mouse pointer over a graph to see more detailed information.
- The *device squares* in the box in the middle of the area. Each box represents a device on which you are installing the app. You can hover your mouse pointer over a device square to display the following information:
 - **Cartridges**—Cisco cartridges that a PAAS app requires to run. These cartridges must already be uploaded to Cisco Fog Director (see [Chapter 7, “Managing Cartridges”](#)) and are installed automatically on the device as part of the app installation process.
 - **CPU Availability**—Number of free CPU units on the device.
 - **Memory Availability**—Amount of free RAM, in MB, on the device.
- How many of the devices that you selected for installation of the app are reachable. (“Reachable” means that Cisco Fog Director can communicate with the device.) Hover your mouse pointer over a graph to see more detailed information.
- How often the Cisco Fog Director updates the information in this area. You can choose a value from the **Collect resource usage at least every** drop-down list. Options are **Every 15 mins**, **Every 1 hour**, **Every 4 hour**, **Every 8 hour**, **Every 16 hour**, and **Never ever**.

Step 12 When you are satisfied with the information on the Installation Summary page, click the **DONE, LET’S GO** button.

The App Configuration page appears, as described in the [“Viewing Detailed Information about an Installed or Available App”](#) section on page 4-6.

While the app is installing on a device, the status of the installation displays for that device. Click the device to see the progress of the installation.

If the Actions Failed display on this page indicates that the installation failed on any device, you can click the **RETRY NOW** button to try the installation on these devices again. See the [“Retrying a Failed Action for an App”](#) section on page 4-29.

Uninstalling an App

You can uninstall an app from any device on which it is running. Uninstalling an app removes it from the device and releases device CPU and memory (RAM) resources that were reserved for it.

You can uninstall an app that is in any state.

The following sections provide additional information:

- [Uninstall App Options, page 4-17](#)
- [Uninstall App Procedure, page 4-18](#)

Uninstall App Options


To view options for uninstalling an app, click the **UNINSTALL APP** button on the Apps Configuration page for the app.

A page displays that includes the items that [Table 4-9](#) describes.

Table 4-9 *Uninstall App Items*

Item	Description
Installed Devices table	<p>Provides information about each device on which the app is installed, and includes the following items:</p> <ul style="list-style-type: none"> • Search Hostname, IP Address field—Type all or part of a host name 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 end 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 from which you want to uninstall 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—Host name of the device on which the app is installed. • IP Address—IP address of the device on which the app is installed. • Tags—Tags that are assigned to the 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.
ADD SELECTED DEVICES button	Click to add devices with checked check boxes to the Selected Devices table.

Table 4-9 Uninstall App Items (continued)

Item	Description
Selected Devices table	<p>Provides information about each device from which you want to uninstall the app. 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 from which you want to remove the app. • Search Hostname, IP Address field—Type all or part of a host name or IP address of a device to display information for devices with matching information. The table display updates as you type. • Host Name—Host name of the device from which you want to uninstall the app. • IP Address—IP address of the device from which you want to uninstall the app. • Tags—Tags that are assigned to the device from which you want to uninstall 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. • Action—Click the x icon  to remove a device from the selected device table. Clicking this icon does not affect the device and does not remove the app from the device. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table.
DONE, LET'S GO button	Executes an uninstall operation.

Uninstall App Procedure

To remove an installed app from one or more devices, follow these steps:

Procedure

Step 1

Take either of these actions:

- In the Installed Apps area on the Apps View page, click the icon for the app that you want to uninstall, and then click the **UNINSTALL** button.
- In the Available Apps area on the Apps View page, make sure that you are in App Install view, click the icon for the app that you want to uninstall, and then click the **UNINSTALL** button.

- Step 2** In the Installed Devices table, check the check box for each device from which you want to uninstall the app.
- For detailed information about this table and locating devices, see the [“Uninstall App Options” section on page 4-17](#).
- Step 3** Click the **ADD SELECTED DEVICES** button.
- The devices with checked check boxes are added to the Selected Devices table. The app will be uninstalled from devices that this table lists. For detailed information about this table and about removing devices from this table, see the [“Uninstall App Options” section on page 4-17](#).
- Step 4** Click the **DONE, LET’S GO** button.
-

Upgrading an App

When a new version of an installed app becomes available, you can upgrade the app. This process includes uploading the app for Cisco Fog Director and then upgrading devices with the new app version.

To upgrade an app, follow these steps:

Procedure

- Step 1** If you are not viewing the page that displays when you add an app, take these actions:
- In the Available Apps area on the Apps View page, make sure that you are in App Edit view.
 - In this area, click the icon for the app for the app to upgrade.
- Step 2** Take these actions to upload the new version of the app to Cisco Fog Director:
- Click the **UPGRADE PKG** button.
 - In the dialog box that displays, click the **Select New App Package** button, and then follow the on-screen prompts to locate and select the app file that you want.
- The app file that you select uploads to Cisco Fog Director.
- Step 3** Click the **Publish** button on the Configuration page.
- The app is published, which makes it available for upgrading, and the Apps View page displays.
- Step 4** Take these actions to upgrade devices with the app that you uploaded:
- In the Installed Apps area on the Apps View page, click the icon for the app to upgrade.
 - Click the **UPGRADE** button, which appears under the “Upgrade Required on” displays.
- The Filter Devices page appears. This page includes the items that [Table 4-8 on page 4-11](#) describes.
- In the table, check the check box for each device on which you want to upgrade the app, and then click the **ADD SELECTED DEVICES** button.
 - Click the **DONE, LET’S GO** button.
- The App Configuration page appears, as described in the [“Viewing Detailed Information about an Installed or Available App” section on page 4-6](#).
- While the app is upgrading on a device, the status of the upgrade displays for that device. Click the device to see the progress of the upgrade.

If the Actions Failed display on this page indicates that the upgrade failed on any device, you can click the **RETRY NOW** button to try the upgrade on these devices again. See the [“Retrying a Failed Action for an App” section on page 4-29](#).

Reverting to the Previous Version of an App

After you upgrade an app, you can revert to the most recent previously installed version of that app, if needed.

The following sections provide additional information:

- [Reverting to the Previous Version of a Published App, page 4-20](#)
- [Reverting to the Previous Version of an Unpublished App, page 4-20](#)

Reverting to the Previous Version of a Published App

If you have upgraded an app and then published the upgraded version, you can revert to the previous version of the app.

To revert to the previous version of a published app, follow these steps:

Procedure

-
- Step 1** Uninstall the app from each device on which it is installed, as described in the [“Uninstalling an App” section on page 4-16](#).
- Step 2** Unpublish the app, as described in the [“Unpublishing an App” section on page 4-10](#).
- The previous version of the app appears in the Published area on the Apps View page.
-

Reverting to the Previous Version of an Unpublished App

If you have upgraded an app but not published the upgraded version, you can revert to the previous version of the app.



To revert to the previous version of an unpublished app, remove the app as described in the [“Removing an App” section on page 4-20](#). The previous version of the app appears in the Unpublished area on the Apps View page.

Removing an App

Removing an app removes it from Cisco Fog Director.

To remove an app, follow these steps:

Procedure

-
- Step 1** Uninstall the app as described in the “[Uninstalling an App](#)” section on page 4-16.
The app moves to the Available Apps area on the Apps View page.
- Step 2** In the Available Apps area, click **SWITCH TO APP EDIT VIEW**.
- Step 3** Click the **Remove** button  under the icon for the app.
The app moves to the Unpublished Apps area on the Apps View page.
- Step 4** In the Unpublished Apps area, click the **Remove** button  under the icon for the app.
-

Editing an App Icon, Description, and Release Notes

You can add or update the following items for an app:

- **Icon**—The icon that appears in Cisco Fog Director for the app.
This icon comes from an image file that you specify. The image size should be 250 x 250 pixels. The system accepts images that are other sizes, but those images are scaled and may not appear as desired. The image file can in any of these formats: ai, bmp, drw, gif, ico, jpe, jpeg, jpg, pct, png, psd, psp, raw, scf, svg, svgz, tif, or tiff.
- **Description**—Brief description of the app that appears when you view detailed information for the app.
- **Release Notes (optional)**—Notes for the app that appears when you view detailed information for the app. For example, notes might include a list and descriptions of features added in an updated app.

To add or update an icon, description, or release notes for an app, follow these steps:

Procedure

-
- Step 1** If you are not viewing the page that displays when you add an app, take these actions:
- a. In the Available Apps area on the Apps View page, make sure that you are in App Edit view.
 - b. In this area, click the icon for the app for which you want to add or update the icon, description, or release notes.
- Step 2** To add or update an icon, take these actions:
- a. Click **Edit Icon**.
 - b. Follow the on-screen prompts to locate and select the image file for the icon that you want.
- Step 3** To add or update a description, take these actions:
- a. Click **Edit** next to “Description.”
 - b. In the edit area that appears, type the description. You can use the formatting tools at the top of the Edit area to format the text and perform related operations.
 - c. Click **Apply**.
 - d. Click the **SAVE** button.

- Step 4** To add or update release notes, take these actions:
- a. Click **Edit next to** “Release Notes.”
 - b. In the edit area that appears, type the notes. You can use the formatting tools at the top of the Edit area to format the text and perform related operations.
 - c. Click **Apply**.
 - d. Click the **SAVE** button.
-

Reconfiguring App Parameters

You can reconfigure a variety of items that apply to an app. Depending on the app, items that you can reconfigure include:

- Configuration information—Configuration items that are defined in the `package_config.ini` file for the app
- Resource profile—Amount of host system CPU and memory (RAM) resources that the app requires on a device.
- Networking—Network from which the app obtains its IP address or addresses
- Resource Port—Serial port that the app uses on a device

The following sections provide additional information:

- [Reconfigure App Options, page 4-22](#)
- [Reconfigure App Procedure, page 4-24](#)

Reconfigure App Options

To view options for reconfiguring an app, take either of these actions:


- Click the **EDIT CONFIGURATION** button on the Apps Configuration page for the app
- From the Devices tab, choose a device, and then click **EDIT CONFIGURATION** near the bottom of the page that displays for the device

If you clicked **Edit Configuration** from the Apps Configuration page, the Reconfigure App page appears, which displays that includes the items that [Table 4-10](#) describes.

Table 4-10 Reconfigure App Page Items

Item	Description
Installed Devices table	<p>Provides information about each device on which the app is installed, and includes the following items:</p> <ul style="list-style-type: none"> • Search Hostname, IP Address field—Type all or part of a host name 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 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 reconfigure 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—Host name of the device on which the app is installed. • IP Address—IP address of the device on which the app is installed. • Tags—Tags that are assigned to the device on which the app is installed. • 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.
ADD SELECTED DEVICES button	Click to add devices with checked check boxes to the Selected Devices table.

Table 4-10 Reconfigure App Page Items (continued)

Item	Description
Selected Devices table	<p>Provides information about each device on which you want to reconfigure the app. 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 reconfigure the app. • Search Hostname, IP Address field—Type all or part of a host name or IP address of a device to display information for devices with matching information. The table display updates as you type. • Host Name—Host name of the device on which you want to reconfigure the app. • IP Address—IP address of the device on which you want to reconfigure the app. • Tags—Tags that are assigned to the device on which you want to reconfigure 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. • Action—Click the x icon  to remove a device from the selected device table. Clicking this icon does not affect the device and does not remove the app from the device. • Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table.
Customize Resources	Expand this area to access the items that you can reconfigure.

Reconfigure App Procedure

You can reconfigure an app from the Apps View page or the Devices View page, as described in the following sections:

- [Reconfiguring an App from the Apps View Page, page 4-24](#)
- [Reconfiguring an App from the Devices View Page, page 4-27](#)

Reconfiguring an App from the Apps View Page




Reconfiguring an app from the Apps View page is useful if you want to apply the reconfiguration to multiple devices.

To reconfigure an app from the Apps View page, perform the following steps. The items that you can reconfigure depend on the app, so some configuration options that the following procedure includes may not be available for some apps.

Before You Begin



Make sure that the app is installed as described in the [“Installing an App” section on page 4-10](#).

Procedure

-
- Step 1** Take one of these actions:
- In the Installed Apps area on the Apps View page, click the icon for the app that you want to reconfigure, and then click the **EDIT CONFIGURATION** button on the App Configuration page.
 - In the Available Apps area on the Apps View page, make sure that you are in App Install view, click the icon for the app that you want to reconfigure, and then click the **EDIT CONFIGURATION** button on the App Configuration page.
- Step 2** In the Installed Devices table, check the check box for each device on which you want to reconfigure the app.
- For detailed information about this table and locating devices, see the [“Reconfigure App Options” section on page 4-22](#).
- Step 3** Click the **ADD SELECTED DEVICES** button.
- The devices with checked check boxes are added to the Selected Devices table. The app can be reconfigured on devices that this table list. For detailed information about this table and about removing devices from this table, see the [“Reconfigure App Options” section on page 4-22](#).
- Step 4** To to change configuration information for this app, take these actions:
- a. Click the Expand icon  next to **Customize Configuration**.
The configuration items that display are defined in the package_config.ini file for the app.
 - b. Make updates as needed in the fields that appear.
The value that each field displays is the default value for that item as defined by the app. To see the current value of an item on a particular device, from the Devices tab, choose a device, and then click **EDIT CONFIGURATION** near the bottom of the page that displays for the device.
 - c. (Optional) **Check the Restart app** after configuration check box if you want the app to restart after you save the configuration updates. Some apps require a restart after a configuration change.
 - d. Click the **DONE, LET’S GO** button to complete the changes to configuration information.
- Step 5** To reconfigure resource profiles that have been assigned for the app, take these actions:
- a. Click the Expand icon  next to **Customize Resources**, if this area is not expanded already.
 - b. Click the Expand icon  next to **Configure Resource Profiles**.
You can update the resource profile for a specific device, some devices, or all devices.
The *device squares* in the box in the middle of the Configure Resource Profile area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Resource Profile dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the resource profile that has been assigned for the app on the device. You can click the hostname and IP address in the dialog box to exit the reconfigure procedure and display the Device Details page for the device.

- c. If you want to limit the device squares displays to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
- d. Take the desired action:
 - To change the resource profile for a specific device, hover your mouse pointer over the device square for that device, and in the Edit Resource Profile dialog box. choose a resource profile from the **Select Profile** drop-down list.
 - To change the resource profile for all devices for which a device square displayed, click the desired profile radio button and then click the **Reassign Profile** button:
 - **Exact matching profile**—Assigns the resource profile that is defined for the app in its metadata, if the resources are available on a device
 - **Largest available profile**—Assigns the largest resource profile that is currently available on a device
- e. If you are finished reconfiguring the app, click the **EDIT RESOURCES** button. Otherwise, continue to the following step.



Step 6 To reconfigure the network from which the app obtains its IP address or addresses, take these actions:

- a. Click the Expand icon  next to **Customize Resources**, if this area is not expanded already.
- b. Click the Expand icon  next to **Configure Networking**.

You can update the network for a specific device, some devices, or all devices.

The *device squares* in the box in the middle of the Configure Networking area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Network Details dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the network that has been assigned for the app on the device.

- c. If you want to limit the device squares to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
- d. Take the desired action:
 - To change the network for a specific device, Hover your mouse pointer over the device square for that device, and in the Edit Network Details dialog box, choose a network from the **Select Network** drop-down list. Network options are:
 - **iox-bridge0**—App obtains its IP address from a DHCP pool that is configured in Cisco IOS
 - **iox-nat0**—App obtains its IP address from an internal network address translator
 - To change the network for all devices for which a device square displayed, click either of these radio buttons and then click the **REASSIGN NETWORKS** button:
 - **Bridged**—App obtains its IP address from a DHCP pool that is configured in Cisco IOS
 - **NATed**—App obtains its IP address from an internal network address translator
- e. If you are finished reconfiguring the app, click the **EDIT RESOURCES** button. Otherwise, continue to the following step.

- Step 7** To reconfigure the serial port that the app uses on a device, take these actions:
- a. Click the Expand icon  next to **Customize Resources**, if this area is not expanded already.
 - b. Click the Expand icon  next to **Configure Device Resource Ports**.

The *device squares* in the box in the middle of the Configure Device Resource Ports area represent devices on which you are installing the app. You can hover your mouse pointer over a device square to display the Edit Serial Details dialog box. This dialog box shows the host name and IP address of the device, tags assigned to the device, and the serial port that has been assigned for the app on the device.

 - a. If you want to limit the device squares to one or more specific devices, take either of these actions:
 - 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 a tag, choose a tag from the **Show** drop-down list.
 - b. Hover your mouse pointer over the device square for the device that you want to update, and in the Edit Serial Details dialog box, choose a port from the **Select Serial Port** drop-down list.
 - c. When you are finished reconfiguring resources, click the **EDIT RESOURCES** button.
-

Reconfiguring an App from the Devices View Page

Reconfiguring an app from the Devices View page applies the reconfiguration to a specified device.

To reconfigure an app from the Devices View page, follow these steps:

Before You Begin

Make sure that the app is installed as described in the [“Installing an App” section on page 4-10](#).

Procedure

-
- Step 1** On the Devices page, choose the device on which you want to reconfigure the app.
 - Step 2** Click **Edit Configuration** under the app that you want to reconfigure.

The configuration items that display are defined in the package_config.ini file for the app.
 - Step 3** Make updates as needed in the fields that appear.

The value that each field displays is the value for that item on the device that you chose.
 - Step 4** (Optional) **Check the Restart app** after configuration check box if you want the app to restart after you save the configuration updates. Some apps require a restart after a configuration change.
 - Step 5** Click the **RECONFIGURE APP** button.
-

Configuring App Links

You can use app link to associate links to external resources with an app. For example, you could include a link to a web site or document that provides information about an app, or you could include a link to a reference guide or configuration guide for an app. You can associate as many links as needed with an app.

After you configure a link for an app, the link appears in the under App Links on the App Configuration page, and in the Apps area on the Device Details page. Click a link to go to the configured resource.




The following sections describe how add, update, or delete app links.

- [Adding an App Link, page 4-28](#)
- [Updating or Deleting an App Link, page 4-28](#)

Adding an App Link

To configure and app link, follow these steps:

Procedure





-
- Step 1** If you are not viewing the page that displays when you add an app, take these actions:
- In the Available Apps area on the Apps View page, make sure that you are in App Edit view.
 - In this area, click the icon for the app for which you want to add links.
- Step 2** Click the **App Links** button .
- Three fields appear.
- Step 3** In the first field, enter a name for the link.
- For example, enter the name of the web page or a document that the link references.
- Step 4** In the second field, enter the URL of the link.
- Step 5** In the third field, enter a brief description of the linked resource.
- Step 6** Take either of these actions:
- To save your changes, click the Check icon .
 - To close the fields without saving your changes, click the X icon .
-

Updating or Deleting an App Link

To update or delete an app link, follow these steps:

Procedure

-
- Step 1** If you are not viewing the page that displays when you add an app, take these actions:
- In the Available Apps area on the Apps View page, make sure that you are in App Edit view.
 - In this area, click the icon for the app for which you want to add links.

- Step 2** Take either of these actions
- To delete the link, click the Delete icon .
 - To update the link, click the Delete icon  and continue to [Step 3](#).
- Step 3** In the fields that display, update the name a name of the link, the URL of the link, or the description of the link as needed.
- Step 4** Take either of these actions:
- To save your changes, click the Check icon .
 - To close the fields without saving your changes, click the X icon .
-

Retrying a Failed Action for an App

If any of the following actions fails on one or more devices, you can use the **RETRY NOW** button on the App Configuration page to retry the action:

- Installing an app
- Upgrading an app
- Uninstalling an app
- Reconfiguring app parameters (including configuration, resource profile, networking, and resource port information)

To retry a failed action, follow these steps:

Procedure

- Step 1** From the App Configuration page for the app, click the **RETRY NOW** button. This button is available only if an action failed. The Select Retry Actions page appears. This page includes the following information for each device on which the action failed:
- Host Name—Host name of the device
 - IP Address—IP address of the device
 - Tags—Tags that are assigned to the device
 - Installed Apps—Apps that have been installed on the device
 - Pagination controls—Click a control to go to the first, next, last, previous, or specific page in the table.
- Step 2** In the device table, check the check box for each device to which you want to apply the retry or remove action.
- Step 3** Take either of these actions:
- Click the **REDEPLOY** button to retry the action on the devices that you selected.
 - Click the **REMOVE FOREVER** button to delete information about the error that failed and clear the error from the system
-

Backing Up and Restoring Apps

The Cisco Fog Director export and import features let you back up and restore apps. This feature can be useful for creating an archive of apps or for importing apps to another Cisco Fog Director.

The export feature saves all apps that appear in the Available and the Unpublished areas on the Apps View page to a zip file outside of Cisco Fog Director. The import feature restores apps that have been exported to a zip file.

The following sections describe these features in detail:

- [Exporting Apps, page 4-30](#)
- [Importing Apps, page 4-30](#)

Exporting Apps

Exporting apps lets you save apps in an export file, which is a zip file named exportedApps.zip that is stored outside of Cisco Fog Director. This action affects all apps that appear in the Available and the Unpublished areas on the Apps View.

To export an app, follow these steps:

Procedure

- Step 1** In the Available Apps area on the Apps View page, make sure that you are in App Edit view, and then click the **EXPORT APPS** button.
- Step 2** Follow the on-screen prompts to save the app in the location of your choice.
The file is named exportedApps.zip.
-

Importing Apps

When you import apps that you exported as described in the “[Exporting Apps](#)” section on page 4-30, the apps are added to Cisco Fog Director. If an app already exists in the Cisco Fog Director to which you are importing, the app is not restored.

To import an app, follow these steps:

Procedure

- Step 1** On the Apps View page, take either of these actions:
- If no apps have yet been added, click the **IMPORT APPS** button
 - If other apps have already been added, in the Available Apps area, make sure that you are in App Edit view, and then click the **IMPORT APPS** button
- Step 2** In the Import Apps dialog box that displays, click the **Select Apps Archive** button.

Step 3 Follow the on-screen prompts to locate and select the exportedApps.zip export file that you want to import.

When the import process completes, the Import Apps Dialog box confirms the completion. It also provides information about any apps that could not be imported (you might need to scroll down in the dialog box to see this information).

Monitoring an App

Monitoring an app provides information about the operation of an app across all devices on which it is installed. This information can be useful for evaluating the operation of the app or for troubleshooting. The following sections describe the app monitoring features:

- [Viewing General Monitoring Information, page 4-31](#)
- [Viewing Detailed Monitoring Information, page 4-33](#)

Viewing General Monitoring Information

To view general monitoring information about an installed app, take any of these actions:

- In the Installed Apps area on the Apps View page, click the App Status donut chart for the app
- In the Available Apps area on the Apps View page, make sure that you are in App Install view, click the icon for the app that you want to monitor, and then click the **MONITOR APP** button
- Click the **MONITOR APP** button when you are viewing detailed information about the app

The App Monitoring page displays. This page includes information and features that apply to the app, and includes some or all of the items that [Table 4-11](#) describes.

Table 4-11 App Monitoring Page Items

Item	Description
Installed-on information	Shows the number of devices on which the app has been successfully installed.
Configuration View link	Click to display detailed information about the app, as described in the “Viewing Detailed Information about an Installed or Available App” section on page 4-6.
APP DOWNTIME	Shows the number of devices on which the app has been in Running state or in Stopped state during the designated time period. Hover your mouse pointer over any part of the chart to see detailed information about a data point. You can click Day , Week , or Month above this graph to designate the time period for the information.

Table 4-11 App Monitoring Page Items (continued)

Item	Description
Status charts	<p>Show information about devices on which an app is running and on which an app is stopped. For each state, a chart shows the name of the state, and the number of devices on which the app is in that state, and the percentage of devices on which the app is installed that the app is in that state.</p> <p>You can click the following buttons under a status chart:</p> <ul style="list-style-type: none"> • STOP—Appears under the Running chart. Click to stop the app, which shuts down its operation on the host devices on which it is running and puts it in Stopped state on these devices. • START—Appears under the Stopped chart. Click to start the app, which initiates its operation on the host devices on which it is stopped and puts it in Running state on these devices. • VIEW DETAIL—Appears under each chart and provides access to information that can be useful for troubleshooting. See the “Viewing Detailed Monitoring Information” section on page 4-33.

Table 4-11 App Monitoring Page Items (continued)

Item	Description
App Consumption	<p>Displays the following charts, which provide information about device resources that the app consumes:</p> <ul style="list-style-type: none"> • Mean CPU Consumption—Average (mean) CPU resources that the app used on devices on which it ran during the designated time period. • Mean Disk Consumption—Average (mean) hard disk space that the app used on devices on which it ran during the designated time period. • Mean Memory Consumption—Average (mean) RAM resources that the app used on devices on which it ran during the designated time period. • Mean Network Consumption—Average (mean) network bandwidth that the devices on which the app ran 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> <p>Click a chart to display a table with detailed information about the corresponding resource consumption for individual devices. The tables include the following items:</p> <ul style="list-style-type: none"> • Host Name—The host name of the device on which the resource is consumed. Click a host name to display device details information for the device. See the “Viewing Detailed Information about a Device” section on page 5-4. • IP Address—The IP Address of the device on which the resource is consumed. Click an IP address to display device details information for the device. See the “Viewing Detailed Information about a Device” section on page 5-4. • Tags—Tags that have been assigned to the device. See the “Managing Tags for a Device” section on page 5-12. • CPU Consumption, Disk Consumption, Memory Consumption, or Network Consumption (depending on the chart that you clicked)—Shows the average (mean) resource consumption of the app on the device during the designated time period.

Viewing Detailed Monitoring Information

To view general monitoring information about an installed app, click either of these buttons on the App Monitoring page:

- **VIEW DETAIL** under the Running Devices chart—Displays a table for the devices on which the app is in Running state. This table includes the **Running Devices** tab and the **Error** tab.

This button is dimmed if the app is not in the Running state on at least one device.

- **VIEW DETAIL** under the Stopped Devices chart—Displays a table for the devices on which the app is in Stopped state. This table includes the **Stopped Devices** tab and the **Error** tab.

This button is dimmed if the app is not in the Stopped state on at least one device.

The **Running Devices** or **Stopped devices** tab in the table provide information for devices on which the app is in the corresponding state. The **Error** tab provides information about devices on which the app is in an error state of some kind.

This table includes the items that [Table 4-5](#) describes.

Table 4-12 Detailed Monitoring Information for an App

Item	Description
Search Hostname, IP Address field	Type all or part of a host name or IP address of a device to display information for devices with matching information. The table display updates as you type.
Host Name	Host name of the device on which the app is in the state. Click a host name to display device details information for the device. See the “Viewing Detailed Information about a Device” section on page 5-4.
IP Address	IP Address of the device on which the app is in the state. Click an IP address to display device details information for the device. See the “Viewing Detailed Information about a Device” section on page 5-4.
Tags (on Running Devices or Stopped Devices tab only)	Tags that have been assigned to the device. See the “Managing Tags for a Device” section on page 5-12.
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.
View App Log button (on Running Devices or Stopped Devices tab only)	Click to display log information that is generated by the app on a device.
Error Summary (on Error tab only)	Brief description of the error that occurred.
Pagination controls	Click a control to go to the first, next, last, previous, or specific page in the table.