



Cisco IOx Local Manager Workflows

This chapter provides step-by-step procedures for many of the workflows and operations that you can perform with Cisco IOx Local Manager.

This chapter includes these sections:

- [App Lifecycle Workflows, on page 1](#)
- [App Management Workflows, on page 9](#)
- [Cartridge Management Workflows, on page 13](#)
- [Layer Management Workflow, on page 15](#)
- [Middleware Management Workflows, on page 16](#)
- [Internal Network Management Workflows, on page 17](#)
- [Security and App Validation Workflows, on page 20](#)
- [Events and Errors Viewing Workflows, on page 22](#)
- [Log File Workflows, on page 25](#)
- [Diagnostic Information Workflow, on page 27](#)
- [Tech Support Information Workflows, on page 28](#)
- [Core Dump File Workflows, on page 29](#)

App Lifecycle Workflows

App lifecycle workflows include the operations that you use to add, activate, deactivate, start, stop, upgrade, and delete an app.

There is no limit, other than system resource restrictions, on the number of apps that can simultaneously have the status of DEPLOYED. For PAAS apps, there also is no limit on how many can simultaneously have the status of ACTIVATED, or STARTED. For VM apps, only one can have the status of ACTIVATED or STARTED at a time.

The following sections describe these workflows:

Adding/Deploying an App

Adding an app uploads the app tarball (a file in tar format) to the host system. After you add the app, it appears on the Cisco IOx Local Manager Applications page and has status DEPLOYED. System CPU and RAM resources are not yet reserved for the app. An app with this status can be activated, upgraded, or deleted.

To add an app, perform the following steps.

Before You Begin

Make sure that the app tarball is stored in a local or network location that the system from which you logged in to Cisco IOx Local Manager can access.

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Click the **Add/Deploy** button on the Applications page.
The Deploy application dialog box displays.
- Step 3** In the Deploy application dialog box, take these actions:
- In the **Application ID** field enter, a unique identifier to be assigned to the app.
The identifier can contain up to 64 letters, numbers, and underscores (_), in any combination.
 - Click the **Choose File** button and follow the on-screen prompts to locate and select the app tarball.
 - Click the **OK** button.
The file uploads to the host system. This process can take some time. When the upload completes, the Successfully Deployed dialog box displays.
To ensure that the upload completes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the upload is in process.
- Step 4** In the Successfully Deployed dialog box, click **OK**.
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Activating an App

Activating an app reserves host system CPU and memory (RAM) resources that the app requires to run, designates the network from which the app obtains its IP address, and assigns host system serial ports for use by the app, if requested. After you activate an app, its status on the Cisco IOx Applications page appears as ACTIVATED.

You can activate an app that has a status of DEPLOYED.

As part of the activation process, you designate a *resource profile* for the app. A resource profile designates the amount of CPU and memory resources that the app needs to run. You can choose from several preset resource profiles or enter custom values for a profile. See the [App-ID > Resources Page](#) section for more information.

When an app is activated, the host system reserves the resources that the app needs to run, but the resources are not used until the app starts. You cannot activate an app if the host system does not have sufficient resources available for the app to run.

In addition, for a PAAS app, the appropriate cartridges must be installed before the app can be activated.

To activate an app, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
- The Applications page displays.
- Step 2** Make sure that **DEPLOYED** appears in the **Status** field for the app that you want to activate.
- Step 3** Click **activate** in the **Actions** field for the app that you want to activate.
- The *App-ID* page for the app appears.
- Step 4** Make sure that the **Resources** tab is selected on the *App-ID* page.
- Step 5** In the Resource Profile area, take either of these actions to choose a resource profile, which designates the host system CPU and memory resources that the app requires when it runs:
- To use a preset or default resource profile, choose the option that you want from the **Profile** drop-down list.
- The system enters information in the **CPU** and **Memory** fields based on the option that you choose. In this case, these fields become read only.
- To enter your own values for a resource profile, choose **Custom** from the **Profile** drop-down list. Then, in the **CPU** field, enter the number of CPU units that the app requires when it runs, in the **Memory** field, enter the amount of RAM, in MB, that the app requires when it runs, and in the **Disk** field, enter the amount of disk space, in MB, that the app requires when it runs.
- A value that you enter in the **Disk** field must be greater than the existing value. You cannot decrease the disk space value.
- Make sure that you do not enter a CPU or memory value that exceeds the available CPU or memory resources that are displayed at the bottom of the Resource Profile area. If you enter a value that exceeds resource availability, the app cannot be activated.
- If needed, refer to the app documentation or developer for information regarding resources that an app requires when it runs.
- Step 6** In the Advanced Settings area, take the following actions as needed.
- This area appears only if the app type is Docker and the host system supports native Docker.
- In the **Docker Options** field, enter one or more Docker run options to be used when you activate the app.
- This field includes the `--rm` option by default (see the following bullet point).
- Check the **Auto delete container instance** check box to add the `--rm` run option to the Docker Options field and to use this option when you activate the app.
- When you stop an app that you activated and started with the `--rm` option, the app container instance is deleted automatically and the app goes to DEPLOYED state (rather than STOPPED state).
- This check box is checked by default.
- Step 7** From the drop-down list in the Network Configuration area, choose an option to designate the logical network from which the app obtains its IP address.

The internal interfaces of the app in this area appear as `ethX`, where `X` is a number. The number of internal interfaces depend on the number of network interfaces that the app defines in its metadata. For example, if the app metadata defines one network interface, `eth0` appears in the this area. If the app metadata defines two network interfaces, `eth0` and `eth1` appear in this area.

In each drop-down list option, `#` is a number that matches the number at the end of the corresponding interface name of the internal Cisco IOx bridge that provides connectivity for an internal network. For example, the logical network `iox-bridge0` corresponds to the interface name `svcbr_0`. Similarly, the logical network `iox-nat1` corresponds to the interface name `svcbr_1`. *Description* is a description of the network as defined on the System Setting page. See the [System Setting Page](#) section for related information.

The options that are available in this list depend on the type of host system. Here are examples of some options that can appear:

- **iox-bridge# Description** —App obtains its IP address from a DHCP pool that is configured in Cisco IOS.
- **iox-nat# Description** —App obtains its IP address from an internal network address translator
- **iox-nat_docker# Description**—App obtains its IP address from an internal native Docker network address translator. (Applicable only to host systems that support native Docker.)

Step 8

If you choose a bridge type network from the drop-down list in the Network Configuration area and you want to assign IP addresses to the network interface dynamically, take these actions.

- a) Click the **Interface Setting** link that corresponds to the network interface for which you want to configure how an IP address is assigned.
- b) Make sure that the **Dynamic** radio button in the IPv4 Setting area or in the IPv6 setting area is selected, depending on the type of IP addresses that your network uses.

The **Dynamic** radio buttons are selected by default.

- c) (Optional) In the **DHCP Client ID** field, enter a DHCP client ID that is sent to the DHCP server when the app is activated.

If you enter a value, and if the DHCP server has been configured with a static binding that maps a client ID string to a specific IP address, the DHCP server assigns the mapped IP address to the app when the app boots up.

- d) Click the **OK** button.

Step 9

If you choose a bridge type network from the drop-down list in the Network Configuration area and you want to assign a static IP address to the network interface, take these actions.

- a) Click the **Interface Setting** link that corresponds to the network interface for which you want to configure how an IP address is assigned.
- b) Click the **Static** radio button the IPv4 Setting area or the IPv6 setting area, depending on the type of IP addresses that your network uses.

If you want to assign IP addresses dynamically, click the **Dynamic** radio button in the appropriate area instead.

- c) Configure the following options that appear:

Enter the static address and subnet mask to use. You can enter an IPv4 or an IPv6 address. If the `IPv6required` field is set to “true” in the app descriptor file (`package.yaml`) for an app, you must enter an IPv6 address.

- **IP/Mask** field (for IPv4 Setting only)—Enter the static address and subnet mask to use

- **IP/Prefix** field (for IPv6 Setting only)—Enter the static address and prefix to use
- **DNS** field —(Optional) Enter the IP address of the DNS server that the app uses for external communication
- **Gateway IP** field—(Optional if you do not check the **Default Gateway** check box, required otherwise) Enter the IP address of the gateway that the app uses for external communication.
- **Default Gateway** check box— Check this check box to make the gateway that you designate in the **Gateway IP** field the default gateway.

d) Click the **OK** button.

Step 10 If you choose a bridge type network from the drop-down list in the Network Configuration area and you do not want to use an IP address for the network interface, click the Disable radio button in the IPv4 Setting area or the IPv6 setting area.

Step 11 If you choose a nat type network from the drop-down list in the Network Configuration area for an app whose metadata requests TCP or UDP ports to be open on a network interface and if the interface is connected to a NAT network, take these actions to configure how TCP and UDP ports on the host system are mapped to internal ports of the app:

- a) Click the **Port Mapping** link that corresponds to the network interface for which you want to configure port mapping. (This link appear only if the app metadata requests TCP or UDP ports to be open on a network interface and if the interface is connected to a NAT network.)
- b) Take either of these actions in the Port Mapping dialog box that appears:
 - To cause the system to map ports automatically, click the **Auto** radio button. The system takes this action by default.
 - To enter port mapping information manually, click the **Custom** radio button. The Port Mapping table provides a description of each internal port and the corresponding internal ports that the app requests, as defined in the metadata for the app. In each the External Port(s) field, enter the ports on the host system to which you want to map the corresponding internal ports.

c) Click the **OK** button.

Step 12 In the Serial Access Configuration area, click the radio button or buttons that correspond to the host system serial port or ports that you want to assign for use by the app.

This area appears only if the app metadata requests that a serial port on the host system be assigned for use by the app.

Step 13 (Optional) In the USB Configuration area, click the radio button for each port that you want to assign for use by the app.

This area appears only if the host system can provide this information and if the app metadata requests that a USB port on the host system be assigned for use by the app.

This area identifies one or more USB ports on the host system that the app metadata requests for use by the app. Port_description is a description of the port usage that comes from the app metadata.

Step 14 (Optional) In the VNC Options area, take the following actions.

The area appears only if the host system supports accessing an app via a VNC session.

- In the Password field, enter a password for accessing an app via a VNC session.

Use this password in the VNC client that you use to access the app.

- In the Port field, enter a port number to be used for accessing the app via a VNC session.

If you do not enter a port number, the system assigns a value. Valid port numbers are 5900 through 65535.

Step 15 If you are activating a Docker or PAAS type app and you want to run the app in debug mode, check the **debug mode** check box.

If an app that is running in debug mode shuts down unexpectedly, the app does not go to STOPPED state. Instead, the app remains in RUNNING state so that you can use an SSH client to access the app and troubleshoot.

Step 16 Click the **Activate** button at the bottom of the Resources tab.

If sufficient CPU and memory resources are available on the host system, the activation process executes. This process can take some time.

To ensure that the activation completes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the activation is in process.

Deactivating an App

Deactivating an app releases the host system CPU and memory (RAM) resources that were reserved for the app and makes these resources available for other uses. After you deactivate an app, its status on the Cisco IOx Applications page appears as DEPLOYED.

You can deactivate an app that has a status of ACTIVATED or STOPPED.

To deactivate an app, perform the following steps. This procedure has the same effect as clicking the **Deactivate** button on the *App-ID* > Resources page.

Procedure

Step 1 Choose **Applications** from the Cisco IOx Local Manager menu bar.

The Applications page displays.

Step 2 Make sure that **ACTIVATED** or **STOPPED** appears in the **Status** field for the app that you want to deactivate.

Step 3 Click **deactivate** in the **Actions** field for the app that you want to deactivate.

The deactivation process executes. This process can take some time. A progress bar indicates the status of the deactivation process.

To ensure that process executes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the app is deactivating.

Starting an App

Starting an app initiates starts the app container for the app on the host system. CPU and memory (RAM) resources that were reserved for the app become in use. After you start an app, its status on the Cisco IOx Applications page appears as **RUNNING**.

You can start an app that has a status of **ACTIVATED** or **STOPPED**.

To start an app, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **ACTIVATED** or **STOPPED** appears in the **Status** field for the app that you want to start.
- Step 3** Click **start** in the **Actions** field for the app that you want to start.
The starting process executes. This process can take some time.
To ensure that the app starts successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the app is starting.
-

Stopping an App

Stopping an app immediately shuts down its app container on the host system. CPU and memory (RAM) resources that were used by the app remain reserved for it but are not in use. After you stop an app, its status on the Cisco IOx Applications page appears as **STOPPED**.

You can stop an app that has a status of **RUNNING**.

To stop an app, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **RUNNING** appears in the **Status** field for the app that you want to stop.
- Step 3** On the Applications page, click **stop** in the **Actions** field for the app that you want to stop.
The stopping process executes. This process can takes some time.
To ensure that the app stops successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the app is stopping.
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Upgrading an App

Upgrading an app replaces it with another version. The replacement app must be in a tarball (a file in tar format).

You typically use this operation to replace an app with a newer version or with a version that addresses issues in the existing version. After you upgrade an app, its status on the Cisco IOx Applications page appears as **DEPLOYED**.

You can upgrade an app that has a status of **DEPLOYED**.

To upgrade an app, perform the following steps.

Before You Begin

Make sure that upgrade tarball is stored in a local or network location that the system from which you logged in to Cisco IOx Local Manager can access.

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **DEPLOYED** appears in the **Status** field for the app that you want to upgrade.
- Step 3** On the Applications page, click **upgrade** in the **Actions** field for the app that you want to upgrade.
The Upgrade application dialog box appears.
- Step 4** In the Upgrade application dialog box, take these actions:
- Make sure that the **Application Id** field shows the identifier of the app that you want to upgrade.
 - Click the **Browse** button and follow the on-screen prompts to locate and select the upgrade tarball.
 - (Optional) Check the **Preserve Application Data** check box if you want the upgrade process to preserve existing app data.
This data includes information written to the app directory, app log files, and app configuration files. If you do not check this check box, the upgrade process deletes this data.
 - Click the **OK** button.
The upgrade process executes. This process can take some time.
To ensure that the upgrade completes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the upgrade is in process.
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Deleting an App

Deleting an app removes it from the host system and releases CPU and memory (RAM) resources that were reserved for the app. After you delete an app, it no longer appears on the Cisco IOx Applications page.

You can delete an app that has a status of **DEPLOYED**.

To delete an app, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **DEPLOYED** appears in the **Status** field for the app that you want to delete.
- Step 3** Click **delete** in the **Actions** field for the app that you want to delete.
In the dialog box that prompts you to confirm the deletion, click **Yes**.
The delete process executes.
To ensure that the app deletes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the app deletes.
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App Management Workflows

App management workflows include the operations that you use for various app management activities, including updating an app configuration file, accessing an app via a console, and downloading an app log file.

These workflows also include operations that you use to upload files to the /data directory or subdirectory in an app container, download files to your local system, and delete files or subdirectories from the /data directory in an app container. The files can be configuration files or other files that an app needs when it runs.

The following sections describe the app management workflows:

Updating an App Configuration file

When an app starts, it can read its specific configuration information from a configuration file. This file is named `package_config.ini`. It is a text file that is stored in the /data directory in the app container for the app.

The `package_config.ini` file is included in the app .tar package. Its contents and format are flexible and are defined by the app developer. It must be a text file, and its name and location cannot be changed.

This section explains how to update the contents of an `package_config.ini` file from Cisco IOx Local Manager. You also can update this file by accessing the /data directory in the app container through a console and editing `package_config.ini`.

To update an app configuration file from Cisco IOx Local Manager, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Click **manage** in the **Actions** field for the app for which you want to update a configuration file.
The *App-ID* page for the app appears.

- Step 3** On the *App-ID* page, choose the **App-Config** tab.
- Step 4** In the *App-ID* > App-Config page, take these actions:
- In the text field, enter configuration information for the app.
 - Click the **Save** button.

Accessing an App via a Console

If an app is running, you can access its container (for a PAAS app) or VM (for a KVM app) via a console. After you access the container or VM, you can use Linux console commands to obtain information about the app.

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 on the Cisco IOx host system. For instructions, see your Cisco IOS documentation.

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
- The Applications page displays.
- Step 2** Make sure that **RUNNING** appears in the **Status** field for the app that you want to access.
- Step 3** Click **manage** in the **Actions** field for the app that you want to access.
- The *App-ID* page for the app appears.
- Step 4** On the *App-ID* page, choose the **App-Info** tab.
- Step 5** On the *App-ID* > App-Info page, take these actions to obtain the private key that you need for console access:
- In the Console Access area, click the *app_id*.pem link that appears in the sample command, where *app_id* is the identifier of the app.
 - In the dialog box that displays, highlight and copy all text that displays.
- Make sure to include the “-----BEGIN RSA PRIVATE KEY-----” and “-----END RSA PRIVATE KEY-----” text.
- Click the **OK** button to close the dialog box.
- Step 6** On the system from which you logged in to Cisco IOx Local Manager, take these actions:
- 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.
 - Paste the private key that you copied into this file, and save it locally.
 - Make sure that this file has the Linux permission 700.
- Step 7** Take these actions to connect to the host system from a console:
- From the console system, start an SSH client, and enter the command that appears in the Console Access area on the *App-ID* > App-Info page.
- When you enter the command:

- Replace `<SSH_PORT>` with the port number for console access to the host system.
- Replace `app_id.pem` with the path to the file that you created in Step 6, if the file is not in the current directory.

b) Use the commands in your SSH client to complete the connection process.

Downloading an App Log File

An app writes information about its operation and related activities to app log files that it creates in the `/data/logs` directory in the app container for the app. You can download an app log file from the host system to the location of your choice.

To download an app log file, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
 - Step 2** Click **manage** in the **Actions** field for the app for which you want to download a log file.
The *App-ID* page for the app appears.
 - Step 3** On the *App-ID* page, choose the **Logs** tab.
 - Step 4** On the *App-ID* > Log page, click **Download** in the **Download** field for the app log file that you want.
 - Step 5** Follow the on-screen prompts to save the file in the location of your choice.
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Uploading a File to an App Data Directory

Uploading a file puts a file into the designated location under the `/data` directory of the container for an app. The app must be in the **ACTIVATED**, **RUNNING**, or **STOPPED** state. This operation is not available for use when an app is in the **DEPLOYED** state.

To upload a file to an app `/data` directory, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **ACTIVATED**, **RUNNING**, or **STOPPED** appears in the **Status** field for the app for which you want to upload a file.
- Step 3** Click **manage** in the **Actions** field for the app for which you want to upload a file.

The *App-ID* page for the app appears.

Step 4 On the *App-ID* page, choose the **App-DataDir** tab.

Step 5 In the *App-ID > App-DataDir* page, click the **Upload** button.

The Upload Configuration dialog box displays.

Step 6 In the Upload Configuration dialog box, take these actions:

- a) If you want to upload the file to a subdirectory of the /data directory, enter that subdirectory path in the Path field. Do not precede the path with any text, including a slash (/) or /data.

If you enter a path that does not exist, the system creates that path under the /data directory.

If you want to upload the file to the top level of the /data directory, do not enter a path in this field.

- b) Click the **Browse** button and follow the on-screen prompts to navigate to and select the file to upload.
- c) Click the **OK** button.

The upload process executes. This process can take some time. A progress bar indicates the status of the upload process.

To ensure that the file uploads successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the file is uploading.

Downloading a File from an App Data Directory

Downloading a file from an app /data directory file saves a copy of the file to your local PC. The app for which you are downloading a file must be in the ACTIVATED, RUNNING, or STOPPED state. This operation is not available for use when an app is in the DEPLOYED state.

To download a file from an app /data directory, follow these steps:

Procedure

Step 1 Choose **Applications** from the Cisco IOx Local Manager menu bar.

The Applications page displays.

Step 2 Make sure that **ACTIVATED**, **RUNNING**, or **STOPPED** appears in the **Status** field for the app for which you want to download a file.

Step 3 Click **manage** in the **Actions** field for the app for which you want to download a file.

The *App-ID* page for the app appears.

Step 4 On the *App-ID* page, choose the **App-DataDir** tab.

Step 5 In the *App-ID > App-DataDir* page, take these actions:

- a) In the Name field, navigate to and click the name of the file that you want to download.
- b) Follow the on-screen prompts to save the file.

Deleting a File or Directory from an App Data Directory

Deleting a file or directory from an app /data directory permanently removes the item from the directory. The app for which you want to delete a file or directory must be in the ACTIVATED, RUNNING, or STOPPED state. This operation is not available for use when an app is in the DEPLOYED state.

To delete a file or directory from an app /data directory, follow these steps:

Procedure

- Step 1** Choose **Applications** from the Cisco IOx Local Manager menu bar.
The Applications page displays.
- Step 2** Make sure that **ACTIVATED**, **RUNNING**, or **STOPPED** appears in the **Status** field for the app for which you want to delete a /data directory file or directory.
- Step 3** Click **manage** in the **Actions** field for the app for which you want to delete a /data directory file or directory.
The *App-ID* page for the app appears.
- Step 4** On the *App-ID* page, choose the **App-DataDir** tab.
- Step 5** In the *App-ID > App-DataDir* page, click **delete** in the **Actions** field for the file or directory that you want to delete.
- Step 6** In the dialog box that prompts you to confirm the deletion, click **Yes**.
The delete process executes. This process can take some time.
To ensure that the file deletes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the file is deleting.
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Cartridge Management Workflows

A Cisco IOx app can be a PAAS type, a KVM type, LXC app, or a Docker type. Unlike a KVM, Docker, or LXC, a PAAS app, which typically is created with a higher level language such as Java or Python, is in a package that contains only files for the app logic. The package does not include Linux operating system files or the root file system that the app requires.

To activate, a PAAS app requires cartridges, which are Cisco-provided files that you install on the host system.

If an app requires cartridges but the cartridges are not yet installed, you can still add the app in Cisco IOx Local Manager. However, you must install the required cartridges before you can activate the app. To determine whether an app requires cartridges, you can look at the **Cartridge Required** field on the *App-ID > App-Info* page. See the [App-ID > App-info Page](#) section for more information.

Cartridge management workflows include the operations that you use to install, delete, and view information about cartridges. The following sections describe these workflows:

Installing a Cartridge

Installing a cartridge uploads it to the host system and makes it available to the apps that require it.

To install cartridge, perform the following steps.

Before You Begin

Make sure that the cartridge file is stored in a local or network location that the system from which you logged in to Cisco IOx Local Manager can access.

Procedure

Step 1 Choose **Cartridges/Layers** from the Cisco IOx Local Manager menu bar.

The Cartridges/Layers page displays.

Step 2 Click the **Install** button in the Cartridges area on the Cartridges page.

The Deploy Cartridge dialog box displays.

Step 3 In the Deploy Cartridge dialog box, take these actions:

- a) Click the **Browse** button and follow the on-screen prompts to locate and select the cartridge file.
- b) Click the **OK** button.

The cartridge file installs on the host system. This process can take some time. When the upload completes, the Successfully Deployed dialog box displays.

To ensure that the cartridge deploys successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the deployment is in process.

Step 4 In the Successfully Deployed dialog box, click **OK**.

Deleting a Cartridge

Deleting a cartridge removes it from the host system. Apps that require this cartridge cannot be activated until the cartridge is installed again.

To delete cartridge, perform the following steps.

Before You Begin

Deactivate all apps that use the cartridge, as described in the [Deactivating an App, on page 6](#) section.

Procedure

Step 1 Choose **Cartridges/Layers** from the Cisco IOx Local Manager menu bar.

The Cartridges/Layers page displays.

Step 2 On the Cartridges page, click **Delete** in the **Actions** field for the cartridge that you want to delete.

Step 3 In the dialog box that prompts you to confirm the deletion, click **Yes**.

The delete process executes. This process can take some time.

To ensure that the cartridge deletes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the cartridge is deleting.

Viewing Detailed Information about a Cartridge

You can view detailed information about any cartridge that is installed on the host system. To do so, follow these steps:

Procedure

- Step 1** Choose **Cartridges/Layers** from the Cisco IOx Local Manager menu bar.
The Cartridges/Layers page displays.
- Step 2** On the Cartridges page, click **Info** in the **Actions** field for the cartridge for which you want to view detailed information.
The Cartridge Information window displays.
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Layer Management Workflow

A layer is a component of a Docker image from which an app package has been created.

When Local Manager installs an app, the Cisco application-hosting framework identifies the layers that the app requires and installs the required layers.

When you delete an app, the system does not automatically remove from the host system 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 host system 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. This process is useful if you need to free up disk space on this host system.

You can delete any layer that is not in use by an installed app. To do so, follow these steps:

Procedure

- Step 1** Choose **Cartridges/Layers** from the Cisco IOx Local Manager menu bar.
The Cartridges/Layers page displays.
- Step 2** On the Cartridges page, click **Delete Unused Layers** in the at the bottom of the Layers area.
-

Middleware Management Workflows

Cisco Data in Motion runs on a Cisco IOx host system and provides a middleware service to Cisco IOx apps. Cisco Data in Motion also can be used as a standalone service. The Cisco Data in Motion middleware service must be started before an app can use it. This service requires you to upload a license before starting it.

The following sections describe the workflows that relate to middleware management:

Uploading a Cisco Data in Motion License

Uploading a Cisco Data in Motion license puts the license on the host system so that the Cisco Data in Motion service can run.

To upload a Cisco Data in Motion license, perform the following steps.

Before You Begin

Make sure that the Cisco Data in Motion license file is stored in a local or network location that the system from which you logged in to Cisco IOx Local Manager can access.

Procedure

- Step 1** Choose **Middleware Service** from the Cisco IOx Local Manager menu bar.
The Middleware Service page displays.
- Step 2** If the Status field for the service for which you want to upload the license shows **Stopped**, click **start** in the **Actions** field for the service.
- Step 3** Click **license** in the **Actions** field for the service for which you want to upload the license.
The Upload License File dialog box displays.
- Step 4** In the Upload License File dialog box, take these actions:
- In the **Login name** field, enter the user name that you use to log in to Cisco IOS.
This name must be configured in Cisco IOS as a “user” with privilege 15.
 - In the **Login password** field, enter the user name that you use to log in to Cisco IOS.
 - Click the **Browse** button and follow the on-screen prompts to locate and select the file that you want.
 - Click the **OK** button.

The upload process begins. This process can take some time.

To ensure that the upload completes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the upload is in process.

Starting a Cisco Data in Motion Service

Starting the Cisco Data in Motion service makes the service available to apps that require it.

Before You Begin

You must upload the license before the service becomes fully functional. See the [Uploading a Cisco Data in Motion License, on page 16](#) section.

To start the Cisco Data in Motion service, follow these steps:

Procedure

- Step 1** Choose **Middleware Service** from the Cisco IOx Local Manager menu bar.
The Middleware Service page displays.
- Step 2** On the Middleware Service page, click **start** in the **Actions** field for the service that you want to start.
The starting process executes. This process can take some time. A progress bar indicates the status of the starting process.
To ensure that the middleware starts successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the service is starting.
-

Stopping a Cisco Data in Motion Service

Stopping the Cisco Data in Motion service makes the service unavailable on the host system.

To stop the Cisco Data in Motion service, follow these steps:

Procedure

- Step 1** Choose **Middleware Service** from the Cisco IOx Local Manager menu bar.
The Middleware Service page displays.
- Step 2** On the Middleware Service page, click **stop** in the **Actions** field for the service that you want to stop.
The stopping process executes. This process can take some time. A progress bar indicates the status of the stopping process.
To ensure that the middleware stops successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the service is stopping.
-

Internal Network Management Workflows

Internal network management workflows include the operations that you use to add, view information about, edit information for, or delete a Cisco IOx internal network. These networks allow apps on host systems to communicate with other systems.

The workflows for adding and deleting an internal network can be performed only for host systems that allow internal networks to be added.

The following sections describe the internal network management workflows:

Adding an Internal Network

Adding an internal network lets you add a Cisco IOx internal network for an app that requires the network for external connectivity. This operation is available only on host systems that allow internal networks to be added.

If needed, refer to the app documentation or developer for information network configuration that an app requires when it runs.

To add an internal network, perform the following steps.

Procedure

Step 1 Choose **System Setting** from the Cisco IOx Local Manager menu bar.

The System Setting page displays.

Step 2 Click the **Add Network** button in the System Logs area on the System Setting page.

The Add Network dialog box displays.

If you do not see the **Add** button, click **Additional Networks** to expand this area.

Step 3 In the Add Network dialog box, take these actions:

- a) In the **Network Description** field, enter a brief description of the internal network.
- b) From the **Physical Interface** drop-down list, choose the physical interface that the internal network should use for connectivity.

The options that are available depend on your host system platform. See your host system documentation for information about these options.

- c) In the **Vlan ID** field, enter the identifier of the VLAN on which this internal network operates, if applicable.
- d) Check the **Nat Enabled** check box if you want to enable NAT networking mode on this network, otherwise skip to Step 3.

If you check **Nat Enabled**, the Nat Subnet fields and Bridge IP radio buttons appear. The Nat Subnet fields include a system-provided address range for the NAT subnet.

- e) If you want to change the system-provided address range for the NAT subnet, in the Nat Subnet fields, enter the range that you want.

The system does not allow you to define an address range that includes addresses that are in use by another internal NAT network that is configured on the host system.

- f) Click one of these Bridge IP radio buttons:

- **Static**—Click to configure a static IP address for the Cisco IOx bridge. The **IP Address / Mask**, **Gateway IP**, **DNS**, and **Domain** fields appear.

- **DHCP**—Click to cause the Cisco IOx bridge to obtain its IP address from an available DHCP server. Skip to Step 3.
- g) If you clicked the **Static** radio button for Bridge IP, take these actions:
- In the **IP Address / Mask** field, enter the IP address and subnet mask for the Cisco IOx bridge
 - In the **Gateway IP** field, enter the IP address of the gateway server for the Cisco IOx bridge
 - In the **DNS** field, enter the IP address of the DNS server for the Cisco IOx bridge
 - In the **Domain** field, enter the domain for the static bridge IP address.
- h) Check the **Bridge Enabled** check box if you want to enable bridge networking mode on this network.
- i) Check the **Mirror Mode** check box if you want to enable an app to monitor network traffic that flows through the physical interface of the host system.
- j) Click the **OK** button.
- The network is added.
-

Viewing Information about an Internal Network

You can view information about any internal network that is configured in Cisco IOx Local Manager.

To view information about an internal network, follow these steps:

Procedure

- Step 1** Choose **System Setting** from the Cisco IOx Local Manager menu bar.
- The System Setting page displays.
- Step 2** In the Additional Networks area on the System Setting page, click **view** in the **Actions** field for the network about which you want to view information.
- The Additional Information window displays, which provide detailed information about the internal network.
-

Editing Information for an Internal Network

You can edit the description of any internal network that is configured in Cisco IOx Local Manager. You also can edit the address range for the NAT subnet, if NAT is enabled for the internal network.

To edit information for an internal network, follow these steps:

Procedure

- Step 1** Choose **System Setting** from the Cisco IOx Local Manager menu bar.

The System Setting page displays.

- Step 2** In the Additional Networks area on the System Setting page, click **edit** in the **Actions** field for the network for which you want to edit information.

The Edit Network dialog box displays.

- Step 3** In the Edit Network dialog box, take these actions as needed:

- a) In the **Network Description** field, update the description of the internal network.
- b) In the **NAT Subnet** field, update the address range for the NAT subnet.

The system does not allow you to define an address range that includes addresses that are in use by another internal network that is configured on the host system.

- Step 4** In the Edit Network dialog box, click the **OK** button.

Information for the network is updated.

Deleting an Internal Network

Deleting an internal network removes its configuration from the host system.

The internal network named `svcbr_0` is provided by default. This network cannot be deleted because it provides minimum outside connectivity for Cisco IOx hosting.

In addition, an internal network cannot be deleted if an app that uses it is in the **ACTIVATED**, **RUNNING**, or **STOPPED** state.

To delete an internal network, perform the following steps.

Procedure

- Step 1** Choose **System Setting** from the Cisco IOx Local Manager menu bar.

The System Setting page displays.

- Step 2** In the Additional Networks area on the System Setting page, click **delete** in the **Actions** field for the network that you want to delete.

- Step 3** In the dialog box that prompts you to confirm the deletion, click **Yes**.

The delete process executes. This process can take some time.

To ensure that the network deletes successfully, do not refresh your browser or attempt another Cisco IOx Local Manager operation while the network is deleting.

Security and App Validation Workflows

You can configure Cisco IOx Local manager for the following security features:

- SSL connection between Cisco IOx Local Manager and the Cisco application-hosting framework (CAF)—See the [Configuring an SSL Connection, on page 21](#) section
- Signature validation of apps that you install on the host system—See the [Configuring App Signature Validation, on page 21](#) section

Configuring an SSL Connection

By default, Cisco IOx Local Manager uses a self-signed certificate for communication with the CAF. You can configure Cisco IOx Local Manager to use an SSL certificate, signed by a private or commercial CA, that you provided. When you configure an SSL connection, a green lock icon and “Secure” indication appear next to the Cisco IOx Local Manager IP address in the address field in your browser, as shown here:

 Secure ://192.11

To configure SSL connections for Cisco IOx Local Manager, follow these steps:

Procedure

- Step 1** Choose **System Setting** from the Cisco IOx Local Manager menu bar.
The System Setting page displays.
- Step 2** Click **Import Certificates** in the **SSL/TLS** area on the System Setting page.
- Step 3** In the pop-up window that informs you that CAF will restart after the certificate is uploaded, click **Yes**.
The Import SSL dialog box displays.
- Step 4** In the Import SSL dialog box, take these actions:
- a) Click **Choose File** next to Certificate and then navigate to and select the signed SSL certificate that you want to use.
 - b) Click **Choose File** next to Key and then navigate to and select the encryption key for the signed SSL certificate.
 - c) Click **OK**.
- Step 5** When you see the pop-up window with the message “Successfully Deployed,” click **OK**.
- Step 6** When you see the pop-up window with the message “Please reopen LM in new tab once CAF is up” click **OK**.
The CAF server, which is the server that hosts Cisco IOx Local Manager, restarts so that the CAF updates with the certificate that you uploaded.
- Step 7** Open Cisco IOx Local Manager in a new browser tab
-

Configuring App Signature Validation

The app signature validation feature causes Cisco IOx Local Manager to validate each app that you add by comparing a certificate on the host system with a certificate in the app. This feature ensures that an app that you add meets the following criteria:

- The app image is consistent. It has not been corrupted or improperly sent to the host system.
- The app image has not been tampered with and contains no malware or code injection.
- The app image comes from a trusted source

When you enable the app signature validation feature, you can only add apps that are signed. If you try to add an app that is not signed, the message “Application Deployment Failed” displays.

You can enable the app signature validation feature only on host systems that supports app signing. The Application Signature Validation configuration options do not appear on host systems that do not support app signing.

Configuring the app signature validation feature involves enabling the feature and uploading to the host system the trust anchor (certificate) that matches the certificate in the apps that you will add.

To configure app signature validation, follow these steps:

Procedure

- Step 1** Choose **System Setting** from the Cisco IOx Local Manager menu bar.
The System Setting page displays.
- Step 2** In the Configuration area under the Application Signature Validation area, click the **Enable Application Signature** button, and then click **OK** in the Successfully Saved dialog box that appears.
The button changes to **Disable Application Signature**. If you later want to disable this feature, click the **Disable Application Signature** button.
- Step 3** In the Trust Anchor area under the Application Signature Validation area, take these actions to upload the certificate to the host system:
- Click the **Import Trust Anchor** button. The Import Trust Anchor dialog box appears.
 - In the Import Trust Anchor dialog box, click **Choose File**, and then navigate to and select the certificate file (a .tar or .tar.gz file) that you want to use.
 - In the Import Trust Anchor dialog box, click **Choose File**.
- The certificate uploads to the host system and the Trust Anchor area displays the checksum value and metadata of the certificate. If this certificate is not the one that you want, you can upload another one, which replaces the one that is displayed.
-

Events and Errors Viewing Workflows

The host system captures information about events and errors that have been written to the Cisco application-hosting framework log files since the Cisco application-hosting framework last started on the host system. You can view this information as needed.

The following sections describe the workflows that relate to log files:

Viewing Events

An event is an activity that occurred on the host system. An event typically relates to a successful Cisco application-hosting framework operation. The system captures information about events and you can view this information to help monitor your system or for troubleshooting.

To view events, follow these steps:

Procedure

-
- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** Click the **Events** button in the Events area on the System Troubleshoot page.
If you do not see the **Events** button, click **Events** to expand this area.
The Events list near the bottom of this area displays a list of events that have occurred on the host system and the following information for each event:
- **Timestamp**—Date and time that the event occurred
 - **#Record**—Unique system-assigned record identifier of the event
 - **App_id**—Identifier of the app to which the event relates
 - **Event_type**—Descriptive term that indicates the type of event
 - **Message**—Text that briefly describes the event
- Step 3** (Optional) To display in the Events list only events with text in the corresponding **App_id**, **Event_type**, or **Message** fields that starts with a specific case-sensitive character string, enter the string in the Search field and then click the **Search** button .
- To redisplay all events after performing a search, delete all characters in the Search field and then click the **Search** button .
- Step 4** (Optional) Use the following controls to navigate the Events list:
- **Page size drop-down list**—Choose the number of events that appear on each page of list. Options are **5**, **10**, **15**, **20**, and **25**.
 - **First page button**  —Click to display the first page of a list.
 - **Previous page button**  —Click to display the previous page of a list.
 - **Next page button**  —Click to display the next page of a list.
 - **Last page button**  —Click to display the first last of a list.

- Record field and Go to #Record button—To display at the top of the list an event with a specific record identifier, enter that record identifier in the Record field and then click the **Go to #Record** button. You can type a record identifier in the field or click the Up-Arrow or Down-Arrow buttons in the field to enter a value.

Viewing Errors

An error is an issue that occurred on the host system. The system captures information about errors and you can view this information to help monitor your system or for troubleshooting.

To view errors, follow these steps:

Procedure

-
- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** Click the **Errors** button in the Events area on the System Troubleshoot page.
If you do not see the **Errors** button, click **Events** to expand this area.
The Errors list near the bottom of this area displays error lines from the CAF log file and the following information for each error:
- Timestamp—Date and time that the error occurred.
 - #Record—Unique system-assigned record identifier of the error.
 - Type—Type of error: **INFO**, **ERROR**, **CRITICAL**, or **WARNING**.
 - Message—Text that briefly describes the error.
- Step 3** (Optional) To display in the Errors list only errors with text in the Type or Message fields that starts with a specific character string, enter the case-sensitive string in the Search field and then click the **Search** button .
- To redisplay all errors after performing a search, delete all characters in the Search field and then click the **Search** button .
- Step 4** (Optional) Use the following controls to navigate the Errors list:
- Page size drop-down list—Choose the number of errors that appear on each page of list. Options are **5**, **10**, **15**, **20**, and **25**.
 - First page button —Click to display the first page of a list.
 - Previous page button —Click to display the previous page of a list.

- Next page button  —Click to display the next page of a list.
- Last page button  —Click to display the first last of a list.
- Record field and Go to #Record button—To display at the top of the list error with a specific record identifier, enter that record identifier in the Record field and then click the **Go to #Record** button. You can type a record identifier in the field or click the Up-Arrow or Down-Arrow buttons in the field to enter a value.

Step 5 (Optional) To see additional information that relates to an error, click **details** in the Details field for the error. A window displays that shows the error in red type, and the few lines in the CAF log file that come before and after the error.

If needed, you can download the CAF log file that contains the error. You can then locate the error in the log file by searching the file for the timestamp that matches the timestamp corresponds to the error in the Errors list. To download a CAF log file, see [Downloading Log Files, on page 26](#).

Log File Workflows

The host system can capture information about a variety of operations and store this information in log files. You can configure the type and level of information that the system logs, and you can download and provide host log files to Cisco for troubleshooting, if needed.

The following sections describe the workflows that relate to log files:

Configuring Log Files

Configuring log files lets you set the categories for which the host system logs information and the level at which it logs information.

To configure log files, perform the following steps. This procedure sets the same log level for each category that you choose. If you want to set different log levels for different categories, repeat this procedure as needed.

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** Click the **Logging Management** button in the Logs area on the System Troubleshoot page.
The Logging Management dialog box displays. This dialog box lists each category for which the system collects logging information, and shows the log level that is configured for each category. It also lets you configure options that relate to host system logs.
If you do not see the **Logging Management** button, click **Logs** to expand this area.
- Step 3** In the Logging Management dialog box, take these actions:

- a) Check the check box for each category for which you want the system to collect logging information.
You can click the check box in the title row of the table to quickly check boxes for all categories.
 - b) Take either of these actions:
 - From the **Log Level** drop-down list, choose the level of logging messages that the system collects. Options, in order of least messages to most messages collected, are **critical**, **error**, **warning**, **info**, and **debug**.
 - Click the **Load Defaults** button to set the log level for each category to the default value of **info**.
 - c) Click the **Save** button.
The host system starts collecting logging information according to the options that you configured.
-

Downloading Log Files

You can download a log file from the host system to the location of your choice. You can then review the file or provide it to Cisco for assistance with troubleshooting, if needed.

To download a log file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays. The Logs area on this page includes the Log File list, which displays the following information for each log file, according to the log type that you select:
 - Log name—Name of the log file
 - Timestamp—Host system date and time that the log file was last updated
 - Log Size—Size of the log file, in bytes
 - Error—Number of errors in the log file
- Step 2** (Optional) From the **Select Log Type** drop-down list in the Logs area, choose the type of log files that appear in the Log File list.
Options are:
 - **All Logs**—All log files that the host devices generates
 - **CAF logs**—Log files that the Cisco application-hosting framework generates on the host device
 - **Common platform logs**—Log files that Linux and services such as Syslog generate on the host device
 - **Other logs**—Log files other than CAF logs and common platform logs that are generated on the host device
- Step 3** In the Log File list, click **download** in the **View** field for the log file that you want to download.

- Step 4** Follow the on-screen prompts to save the file in the location of your choice.
-

Diagnostic Information Workflow

Diagnostic information can help you evaluate or troubleshoot the operation of the host system or its components.

When reviewing diagnostic information, we recommend that you generate and review summary diagnostics first. If the summary information does not indicate any issues, there is no need to review other diagnostic information. If the summary information indicates that issues exist, you can generate and review specific information that relates to the issues that are indicated.

To generate and view diagnostic information, follow these steps:

Procedure

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** From the **Diagnostic Type** drop-down list in the Diagnostic area on the System Troubleshoot page, choose the type of diagnostic information to obtain and display.
If you do not see this drop-down list, click **Diagnostics** to expand this area.
Options in the **Diagnostic Type** drop-down list are:
- **summary**—General diagnostic information for the host system
 - **memory**—Diagnostic information that relates to memory on the host system
 - **disk**—Diagnostic information that relates to the hard disk on the host system
 - **process**—Diagnostic information that relates to processes that are running on the host system
 - **networking**—Diagnostic information that relates to networking on the host system
 - **application**—Diagnostic information that relates to apps that are installed on the host system
- The Display field in the Diagnostics area Displays diagnostic information according to the Diagnostic Type option that you chose
- Step 3** (Optional) Check the **Detailed Information** check box to display detailed diagnostic information in the Display field.
By default, this field displays high-level information.
- Step 4** (Optional) If you need assistance with an issue that the display field indicates, copy the text in this field, paste it in a document or message, and provide the document or message to Cisco for assistance.
-

Tech Support Information Workflows

A snapshot file is a tar file that contains hardware and app file information that relates to the IOx framework. It includes information from log files and specific system health and debugging information that can be useful for troubleshooting complex issues. If you experience issues with Cisco IOx Local Manager, you can generate and then download a snapshot file, which you can provide to Cisco for assistance.

The following sections describe the workflows that relate to snapshot files:

Generating a Snapshot File

Generating a snapshot files collects information in a tar file that is stored on the host system. You can generate a snapshot file whenever needed.

To generate a snapshot file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** Click the **Generate snapshot file** button in the TechSupport Information area on the System Troubleshoot page.
If you do not see **Generate snapshot file** button, click **Logs** to expand this area.
The snapshot file is generated and its name appears in the Tech Support snapshot file name field. The filename is `tech_support_timestamp`, where *timestamp* is the host system date and time that the file was generated.
-

Downloading a Snapshot File

Downloading a snapshot file downloads it from the host system to the location of your choice.

To download a snapshot file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** In the TechSupport Information area on the System Info page, click **download** in the **Download** field for the snapshot file that you want to download.
If you do not see the **download** option, click **Logs** to expand this area.

- Step 3** Follow the on-screen prompts to save the file in the location of your choice.
-

Deleting a Snapshot File

Deleting a snapshot file removes it from the host system. You can delete any snapshot file when it is no longer needed.

To delete a snapshot file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** In the TechSupport Information area on the System Troubleshoot page, click the **Delete** icon  in the Delete field for the snapshot file that you want to delete.
If you do not see the **Delete** icon, click **Logs** to expand this area.
-

Core Dump File Workflows

The host system can create a core dump file if a process crashes. A core dump file contains information that can be useful for troubleshooting.

The following sections describe the workflows that relate to core dump files:

Downloading a Core Dump File

Downloading a core dump file downloads it from the host system to the location of your choice.

To download a core dump file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** In the TechSupport Information area on the System Troubleshoot page, click **download** in the **Download** field for the core file that you want to download.
If you do not see the **download** option, click **Logs** to expand this area.

- Step 3** Follow the on-screen prompts to save the file in the location of your choice.
-

Deleting a Core Dump File

Deleting a core dump file removes it from the host system. You can delete any core dump file when it is no longer needed.

To delete a core dump file, follow these steps:

Procedure

- Step 1** Choose **System Troubleshoot** from the Cisco IOx Local Manager menu bar.
The System Troubleshoot page displays.
- Step 2** In the TechSupport Information area on the System Troubleshoot page, click the **Delete** icon  in the Delete field for the core dump file that you want to delete.
If you do not see the **Delete** icon, click **Logs** to expand this area.
-