Manage Device Software Images

Set Up Software Image Management

Manually upgrading your devices to the latest software version can be error prone and time consuming. Cisco Prime Infrastructure simplifies the version management and routine deployment of software updates to your devices by helping you plan, schedule, download, and monitor software image updates. You can also view software image details, view recommended software images, and delete software images. The software image management page provides a consolidated view of the various aspects of image management such as software image management lifecycle widget, software image summary, and job details.

Prime Infrastructure stores all of the software images for the devices in your network. The images are stored according to the image type and version.

Before you can upgrade software images, you must configure your devices with Telnet or SSH credentials. Also SNMP read-write community strings that match the community strings entered when the device was added to Prime Infrastructure must be configured.

SSH or Telnet must be configured for importing the images from a device.

Make Sure Devices Are Configured Correctly

Prime Infrastructure can transfer files to and from devices only if the SNMP read-write community strings configured on your devices match the strings that were specified when the devices were added to Prime Infrastructure.

Note To improve security, Prime Infrastructure no longer uses some of the SSH CBC (Cipher Block Chaining) ciphers that older Cisco IOS-XE and IOS-XR versions use, as they have been deemed weak. For devices running Cisco IOS-XE, ensure that you upgrade to version 16.5.x or later. And for devices running Cisco IOS-XR, upgrade to version 6.1.2 or later. Otherwise, several Software Image Management operations will fail.

Note SWIM operations are not supported in the NAT environment and Child Virtual Device Contexts (VDCs) of Cisco Nexus 7000 Series Switches.

Verify the FTP/TFTP/SFTP/SCP Settings on the Prime Infrastructure Server

If you will be using FTP, TFTP, SFTP, or SCP make sure that it is enabled and properly configured.

How to Control Images that are Saved to the Image Repository During Inventory Collection

Because collecting software images can slow the data collection process, by default, Prime Infrastructure does not collect and store device software images in the image repository when it performs inventory collection. Users with Administration privileges can change that setting using the following procedure.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Software Image Management**.

Step 2 To retrieve and store device images in the image repository when Prime Infrastructure performs inventory collection, check the **Collect images along with inventory collection** check box.

Step 3 Click **Save**.

Step 4 To view retrieved images, Choose **Inventory** > **Device Management** > **Software Images** and click **Link** adjacent to **Software Image Repository** under **Useful Links** section.

Note Click **Image Dashboard** icon in the top-right corner of Software Image page to view the top 10 running software images from Network Devices page

Software Image Management Processes and Supported Devices

The following table describes the different processes involved in managing software images and whether the processes are supported in the Unified Wireless LAN Controllers and devices.

Note Refer the Supported Device List for additional information on Platforms such as Protocols supported during Image Import, Image Distribution via Local File Server, Software Image Management Server and Support for TFTP FallBack, or ISSU and Activation without Distribution.

Table 1: Software Image Management Processes and Supported Devices

Software Image Management Processes	Description	Unified WLCs	3850 Cisco IOS XE 3.2.2	5760 Cisco IOS XE 3.2.2	Mobility Express Controller
Image import from device	Ability to import software image from devices that are already managed by Prime Infrastructure. The software image can then be distributed to other devices.	Not supported because the software image cannot be reassembled into a package.	Supported **Note** When the device is running in install mode, the running image will be “packages.conf”. Prime Infrastructure does not support importing of image in this format in the install mode.	Supported **Note** When the device is running in install mode, the running image will be “packages.conf”. Prime Infrastructure does not support importing of image in this format in the install mode.	Not Supported
Image import from file	Ability to import software image from known location on a file server to Prime Infrastructure. The software image can then be distributed to other devices.	Supported	Supported	Supported	Supported

Software Image Management Processes	Description	Unified WLCs	3850 Cisco IOS XE 3.2.2	5760 Cisco IOS XE 3.2.2	Mobility Express Controller
Image import from URL	Ability to import software image from network accessible locations (URI/URL) to Prime Infrastructure . The software image can then be distributed to other devices.	Supported	Supported	Supported	Supported
Import Image using Protocol	Ability to import software image from an FTP location to Prime Infrastructure. The software image can then be distributed to other devices.	Supported	Supported	Supported	Supported

Software Image Management Processes	Description	Unified WLCs	3850 Cisco IOS XE 3.2.2	5760 Cisco IOS XE 3.2.2	Mobility Express Controller
Image upgrade/distribution	Ability to upgrade software image on the managed devices from. This allows you to upgrade the soPrime Infrastructureftware image for multiple devices based on demand or at a later point in time as scheduled. The feedback and status are displayed during the upgrade and devices can be restarted, if required. In large deployments, you can stagger reboots so that the service at a site is not completely down during the upgrade window.	Supported	Supported	Supported	

Software Image Management Processes	Description	Unified WLCs	3850 Cisco IOS XE 3.2.2	5760 Cisco IOS XE 3.2.2	Mobility Express Controller
					Supports Distribution and Activation **Note** • Distribution and Activation is failed on device running with 8.2 image version. • Distribution is supported using SFTP protocol when ME devices runs on 8.7.x image version. • Distribution is supported for external server only using SFTP protocol when ME devices run on 8.7.x image version.

Software Image Management Processes	Description	Unified WLCs	3850 Cisco IOS XE 3.2.2	5760 Cisco IOS XE 3.2.2	Mobility Express Controller
					• Distribution is not supported for external server using TFTP protocol.
Image recommendation	Ability to recommend a compatible image for the devices that are managed from Prime Infrastructure and downloaded from Cisco.com.	Not supported because the flash requirement is not available.	Supported	Supported	Supported
Image upgrade analysis	Ability to analyze the software images to determine the hardware upgrades required before you can perform the software upgrade.	Not supported because there is no minimum requirement for RAM or ROM. The newly upgraded image replaces the existing image after an upgrade.	Supported	Supported	Not Supported

Note Prime Infrastructure does not support software image distribution on Cisco Catalyst 4500 devices configured with a redundant supervisor engine.

Prime Infrastructure supports software image distribution on Cisco Catalyst 6000 devices with dual supervisors; Prime Infrastructure distributes the software image on both the active and the standby supervisor engine.

Adjust Criteria for Cisco.com Image Recommendations

You can use Cisco.com to get information about recommended images based on criteria you provide. The following procedure shows how you can adjust those recommendations. The following table also lists the default settings.

Note To use these features, the device must support image recommendations.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory > Software Image management**.

Step 2 Adjust the recommendation settings as follows.

Setting	Description	Default
Recommend latest maintenance version of each major release	Only considers images if it is the latest maintenance version of each major release	Disabled
Recommend same image feature	Only considers images with same feature set as running device image	Disabled
Recommend versions higher than the current version	Only considers images that are higher than the running device image	Disabled
Include CCO for recommendation	Retrieves images from Cisco.com and the image repository	Enabled

Step 3 Click **Save**.

Adjust Image Transfer and Distribution Preferences

Use this procedure to specify the default protocols Prime Infrastructure should use when transferring images from the software image management server to devices. You can also configure Prime Infrastructure to perform, by default, a variety of tasks associated with image transfers and distributions—for example, whether to back up the current image before an upgrade, reboot the device after the upgrade, continue to the next device if a serial upgrade fails, and so forth. Users with Administration privileges can change that setting using the following procedure.

This procedure only sets the defaults. You can override these defaults when you perform the actual distribute operation.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Sofware Image Management > Protocol**.

Step 2 Specify the default protocol Prime Infrastructure should use when transferring images in the Image Transfer Protocol Order. Arrange the protocols in order of preference. If the first protocol listed fails, Prime Infrastructure will use the next protocol in the list.

Note When distributing an image to a device, use the most secure protocols supported by the device (for example, SCP instead of TFTP). TFTP tends to time out when transferring very large files or when the server and client are geographically distant from each other. If you choose SCP for the image distribution, ensure that the device is managed in Prime Infrastructure with full user privilege (Privileged EXEC mode); otherwise the distribution will fail due to copy privilege error (SCP: protocol error: Privilege denied).

Step 3 Specify the default protocol Prime Infrastructure should use when configuring images on devices in the Image Config Protocol Order area. Arrange the protocols in order of preference.

Step 4 Specify the tasks that Prime Infrastructure should perform when distributing images:

Setting	Description	Default
Continue distribution on failure	If distributing images to multiple devices and distribution to a device fails, continues the distribution to other devices	Enabled
TFTP fallback	Stores the running image into TFTP server, stored image is used to reboot when distribution/ activation fails.	Disabled
Backup running image	Before image distribution, backs up the running image to the software image repository	Disabled
Insert boot command	Inserts the boot command into the running image, after image distribution	Disabled
Smart Flash Delete Before Distribution	Delete the unneccassary files from flash to free up the memory space before distribution	Disabled

Step 5 Click **Save**.

Add a Software Image Management Server to Manage Groups of Devices

To distribute images to a group of devices, add a software image management server and specify the protocol it should use for image distribution. You can add a maximum of three servers. Prime Infrastructure supports only Linux server as an external server.

Before you begin, you must create location groups in **Inventory** > **Group Management** > **Network Device Groups** > **Create location group**. You can select this created location group in **Sites Served** field in **Administration** > **Servers** > **Software Image Management Servers**.

Step 1 Add the server.

a) Choose **Administration** > **Servers** > **Software Image Management Servers**.
b) Click the Add Row icon and enter the server name, IP address, and device group the server will support.
c) Click **Save**.

Step 2 Configure the server protocol settings.

a) Check the check box next to the server name, then click **Manage Protocols**.
b) Click the Add Row icon and enter the software image management protocol details (username, password, and so forth).
c) Click **Save**.

Note When distributing image using the image management server, the image will be copied to the server and it will be deleted after the job gets completed. This image file will not be deleted for TFTP protocol.

The software image distribution and image import may fail due to authentication issues, if you use special characters in the protocol password.

Change Cisco.com Credentials for Software Image Operations

When Prime Infrastructure connects to Cisco.com to perform software image management operations (for example, to check image recommendations), it uses the credentials stored in the Account Settings page. You can change those settings using the following procedure.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **General** > **Account Settings**.

Step 2 Click the **Cisco.com Credentials** tab.

Step 3 Change the settings, then click **Save**.

Copy Software Images from Devices to the Image Repository (Create a Baseline)

Depending on your system settings, Prime Infrastructure may copy device software images to the image repository during inventory collection (see How to Control Images that are Saved to the Image Repository During Inventory Collection, on page 2). If you need to perform this operation manually, use the following procedure, which imports software images directly from devices into the image repository.

Before you begin, ensure that images are physically present on the devices (rather than remotely loaded).

Note If you are importing many images, perform this operation at a time that is least likely to impact production.

The software image import may fail with authentication error, if you use special characters in the protocol

Step 1 Choose **Inventory** > **Device Management** > **Software Images**.

Step 2 Click the **Add/Import** tab.

Step 3 In the Import Images dialog box, complete the following:

a) In the **Source** area, select the devices (you may want to select one device group at a time).

b) In the **Collection Options** area, specify whether to import the files immediately or schedule the import for later.

Step 4 Click **Submit**.

How Do I Find Out Which Images Are Used by Network Devices?

To view a list of the images used by network devices, choose **Reports** > **Reports Launch Pad** > **Device** > **Detailed Software**.

To list the top ten images use by network devices (and how many devices are using those images), choose **Inventory** > **Device Management** > **Software Images**. Click **Software Image Repository** under **Useful Links**, then then click the **Image Dashboard** icon in the top-right corner of the page.

How Do I Know a Device Has the Latest Image?

If your device type supports image recommendations, you can use the following procedure to check if a device has the latest image from Cisco.com. Otherwise, use the Cisco.com product support pages to get this information.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**, then click the device name hyperlink to open the Device Details page.

Step 2 Click the **Image** tab and scroll down to the Recommended Images area. Prime Infrastructure lists all of the images from Cisco.com that are recommended for the device.

How Do I Know Whether I have Permission to Download Software from Cisco.com

Prime Infrastructure displays only the recommended latest initial version of the software images for the device type you specify, and it allows you to download the software images directly from Cisco.com. In order to download a EULA or K9 software image from Cisco.com, you must accept/renew the EULA agreement or K9 Agreement periodically.

Prime Infrastructure does not display deferred software images. For detailed information, see Cisco Prime Infrastructure 3.2 Supported Devices list.

If you encounter any error message while importing software image from Cisco.com, see ASD Exceptions and Error Conditions, on page 24.

Note You cannot fetch the suggested and other image versions from Cisco.com based on the ASD implementation.

View the Images That Are Saved in the Image Repository

Use this procedure to list all of the software images saved in the image repository. The images are organized by image type and stored in the corresponding software image group folder.

Step 1 Choose **Inventory** > **Device Management** > **Software Images**. Prime Infrastructure lists the images that are saved in the image repository within the **Software Image Summary** panel.

From **Software Image Management Lifecyle** widget, you can:

- Import new images into the image repository from network devices; file systems on client machines, IPv4 or IPv6 servers (URLs), FTP servers, and Cisco.com. See Add (Import) Software Images to the Repository, on page 14.
- Adjust the requirements that a device must meet in order to upgrade to this image. See Change the Device Requirements for Upgrading a Software Image, on page 17.
- Perform an upgrade analysis. See Verify That Devices Meet Image Requirements (Upgrade Analysis), on page 18.
- Copy new software images to devices. .See Distribute a New Software Image to Devices, on page 19.
- Activate images, which makes a new image the device's running image. See Activate a New Software Image on Devices, on page 21.
- Commit Cisco IOS XR images, which persists the image across device reloads and creates a rollback point. See Commit Cisco IOS XR Images Across Device Reloads, on page 23.

Step 2 Go to Software Image repository and click a software image hyperlink to open the Image Information page that lists the file and image name, family, version, file size, and so forth.

From here you can:

- See which devices are using this image by checking the Device Details area at the bottom of the page.
- Adjust the requirements that a device must meet in order to upgrade to this image. (See Change the Device Requirements for Upgrading a Software Image, on page 17.)

Find Out Which Devices Are Using an Image

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 In the **Software Image Summary** panel, locate the image that you are interested in by expanding the image categories in the navigation area or entering partial text in one of the Quick Filter fields. For example, entering **3.1** in the Version field would list Versions 3.12.02S, 3.13.01S, and so forth.

Step 3 Click on **Count** hyperlink, to navigate to **Software Image Repository**.

Step 4 Click the image hyperlink to open the **Software Image Detail** page. Prime Infrastructure lists all devices in the **Device List** area only if the selected image is running in any of the managed devices.

View Recommended Images on Cisco.com

If your devices support Cisco.com image recommendations, you can use this procedure to check which images your devices should be using.

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click **Software Image Repository** under **Useful Links**.

Step 3 Click on a image hyperlink to navigate to **Software Image Detail** page if you want to distribute or change the image requirements. (Devices will be listed in **Device List** area only if the selected image is running on any of the managed devices.)

Step 4 Choose the devices which you want to distribute the image from the **Device List** drop-down list and click **Distribute New Version**.

Step 5 Choose one of the following image sources:

- **Recommend Image from Cisco.com** to select an image available on Cisco.com. You need to login with your Cisco credentials. Provide your CEC username, password, select EULA and K9 and click **Login**. Specify options, click **Start Recommendation**.
- **Select Image from Local Repository** to select an image stored locally. Then, under Local Repository:

Step 6 Select the image to distribute, then click **Apply**.

Step 7 Choose the image name in the Distribute Image Name field to change your selection and pick a new image, then click **Save**.

Step 8 Specify Distribution Options. You can change the default options in **Administration > System Settings >Inventory> SoftwareImage Management**.

Step 9 Specify schedule distribution options, select Now or Date and then click **Submit**.

Download Images from Cisco.com

Depending on your device type, Prime Infrastructure can narrow the list of available images by maintenance versions, feature sets, versions, and so forth (see Adjust Criteria for Cisco.com Image Recommendations, on page 8).

Prime Infrastructure will use the Cisco.com credentials that are set by the administrator. If default credentials are not set, you must enter valid credentials. (See Change Cisco.com Credentials for Software Image Operations, on page 10).

Step 1 Choose **Inventory** > **Device Management** > **Software Images**.

Step 2 Click the **Add/Import** tab.

Step 3 In the Import Images dialog:

a) Click **Cisco.com**.

b) If the credentials are not auto-populated, enter a valid Cisco.com user name and password.

c) Accept **End User License Agreement** and **Strong Encryption Eligibility Agreement**.

Step 4 Click **Device Selection** tab.

Step 5 Select the devices. You can select maximum 20 devices.

Step 6 Click **Image Selection** tab.

Step 7 Select images and click the **Schedule tab**.

Step 8 Click **Submit**.

Step 9 Verify that the images are listed on the **Software Images** page. (Click the **Software Image Repository** Link in the **Useful Links** section.)

Add (Import) Software Images to the Repository

Prime Infrastructure displays the recommended latest software images for the device type you specify, and it allows you to download the software images directly from cisco.com. Prime Infrastructure does not display deferred software images. For detailed information, see Cisco Prime Infrastructure 3.2 Supported Devices list.

Note In order to download a K9 software image from cisco.com, you must accept/renew the https://software.cisco.com/download/eula.html K9 agreement periodically.

The following topics explain the different ways you can add software images to the image repository. For an example of how to troubleshoot a failed import, see Manage Jobs Using the Jobs Dashboard.

- Add a Software Image That Is Running on a Managed Device, on page 14
- Add a Software Image from an IPv4 or IPv6 Server (URL), on page 15
- Add a Software Image for an FTP Protocol Server (Protocol), on page 16
- Add a Software Image from a Client Machine File System, on page 16

Add a Software Image That Is Running on a Managed Device

This method retrieves a software image from a managed device and saves it in the image repository.

Note When distributing an image to a device, use the most secure protocols supported by the device (for example, SCP instead of TFTP). TFTP tends to time out when transferring very large files or when the server and client are geographically distant from each other. If you choose SCP for the image distribution, ensure that the device is managed in Prime Infrastructure with full user privilege (Privileged EXEC mode); otherwise the distribution will fail due to copy privilege error (SCP: protocol error: Privilege denied).

The software image distribution and image import may fail with authentication error, if you use special characters in the protocol password.

Note that TFTP is supported only when copying images from the device to the server and not the other way around.

Limitations:

- For Cisco IOS-XR devices, direct import of images from the device is not supported by Prime Infrastructure; SMU and PIE imports are also not supported on these devices.

- For Cisco IOS-XE devices, if the device is loaded with the 'packages.conf' file, then images cannot be imported directly from that device.

Step 1 Choose **Inventory** > **Device Management** > **Software Images**.

Step 2 Click the **Add/Import** tab.

Step 3 In the Import Images dialog:

a) Click **Device** and under Collection Options, choose one or more devices.

For Cisco Catalyst 3850 Ethernet Stackable Switch and Cisco 5760 Series Wireless Controller there are two modes for importing the software images:

- Install mode —When the device is running in install mode, the running image will be “packages.conf”. Prime Infrastructure does not support importing of any image in install mode.
- Bundle mode —When the device is running in Bundle mode, the running image will be in “.bin” format. Prime Infrastructure supports importing of any image in bundle mode.

You can check the running image in one of the following ways:

- Choose **Inventory > Network Devices**, click the device name and click Image tab in the device page.
- Use Show version command in device CLI.

b) In the Schedule area, schedule the job to run immediately, at a later time, or on a regular basis.

c) Click **Submit**.

Step 4 To view the status of the job, click the job link in the pop-up message or choose **Administration > Job Dashboard**.

Step 5 Verify that the image is listed on the Software Images page (**Inventory** > **Device Management** > **Software Images**).

Add a Software Image from an IPv4 or IPv6 Server (URL)

You can import software image from network-accessible IPv4 or IPv6 servers or FTP/HTTP servers. Prime Infrastructure supports to import Non-Cisco standard images (Engineering images which are not posted on Cisco.com). Hence, Prime Infrastructure allows you to import any type of file format.

Prime Infrastructure supports to import Non-Cisco standard image.

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click the **Add/Import** tab.

Step 3 In the Import Images dialog:

a) Click **URL**.

b) In the URL To Collect Image field, enter a URL in the following format (you can also use an HTTP URL where user credentials are not required):

http://*username*:*password*@*server-ip/filename*

c) In the Schedule area, schedule the job to run immediately, at a later time, or on a regular basis.

d) Click **Submit**.

Step 4 To view the status of the job, click the job link in the pop-up message or choose **Administration > Job Dashboard**.

Step 5 Verify that the image is listed on the Software Images page (**Inventory** > **Device Management** > **Software Images**).

Add a Software Image for an FTP Protocol Server (Protocol)

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click the **Add/Import** tab.

Note The software image import may fail with authentication error, if you use special characters in the protocol password.

Step 3 In the Import Images dialog:

a) Click **Protocol**.

b) Enter FTP in the Protocol field, then enter the FTP user name, password, server name or IP address, and file name. The following is a file name example:

/*ftpfolder*/asr901-universalk9-mz.154-3.S4.bin

c) In the Schedule area, schedule the job to run immediately, at a later time, or on a regular basis.

d) Click **Submit**.

Step 4 To view the status of the job, click the job link in the pop-up message or choose **Administration > Job Dashboard**.

Step 5 Verify that the image is listed on the Software Images page (**Inventory > Device Management > Software Images**).

Add a Software Image from a Client Machine File System

Before you begin

When you import the software image file, the browser session is blocked temporarily. If the upload operation exceeds the idle timeout limit of the browser session, then you will be logged out of Prime Infrastructure and the file import operation will be aborted. So it is recommended that you increase the idle timeout limit before you begin with this import operation. To increase the idle timeout, see Configure the Global Timeout for Idle Users.

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click the **Add/Import** tab.

Step 3 In the Import Images dialog:

a) Click **File**.

b) Click the **Browse** button and navigate to the software image file.

c) In the Schedule area, schedule the job to run immediately, at a later time, or on a regular basis.

d) Click **Submit**.

Step 4 To view the status of the job, click the job link in the pop-up message or choose **Administration > Job Dashboard**.

Step 5 Verify that the image is listed on the Software Images page (**Inventory > Device Management > Software Images**).

Note Submit button will be enabled only after you select Now or Date for each Activation jobs.

Import Software Images to the Virtual Image Repository

You can use the Prime Infrastructure Virtual Image Repository (VIR) to automatically retrieve and store device images from specified URLs or files. You can schedule these downloads to occur regularly.

Currently, the VIR supports FTP or HTTP downloads only.

To import software images to the VIR:

Step 1 Choose **Inventory** > **Device Management** > **Virtual Image Repository**. The page lists the number of images currently retained in the repository.

Step 2 Click **Import**.

Step 3 Specify the **Source** from which to import the software image. You can specify one of the following sources:

- URL—Specify the FTP or HTTP URL from which to import the software image. You can use an HTTP URL where user credentials are not required.
- File—A local file on the client machine.

Step 4 Click **Collection Options** and then enter the required information.

Step 5 Click **Schedule** and specify the schedule on which to import image file. You can run the collection job immediately or schedule it to run at a later time. You can also schedule the job to recur automatically

Step 6 Click **Submit**.

Step 7 Choose **Administration** > **Dashboards** > **Job Dashboard** > **User Jobs** > **Software Image Import** to view the status about the image collection job. The Duration field is updated after the job completes.

Related Topics

Add (Import) Software Images to the Repository, on page 14
Distribute a New Software Image to Devices, on page 19

Change the Device Requirements for Upgrading a Software Image

Use this procedure to change the RAM, flash, and boot ROM requirements that a device must meet for a software image to be distributed to the device. These values are checked when you perform an upgrade analysis (see Verify That Devices Meet Image Requirements (Upgrade Analysis), on page 18).

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 In the **Software Image Summary** panel, locate and select the software image by clicking its associated hyperlink.

Step 3 Click the software image name hyperlink to open its image information.

Step 4 Adjust the device requirements:

- Minimum RAM (from 1 – 999999999999999)
- Minimum FLASH (from 1 – 999999999999999)
- Minimum Boot ROM Version

Step 5 Click **Save**.

Step 6 Click **Restore Defaults**, if you want to retain the previous requirements.

Verify That Devices Meet Image Requirements (Upgrade Analysis)

An upgrade analysis verifies that the device hardware is capable of storing the new image pertaining to RAM and FLASH, the image is compatible with the device family, and the software version is compatible with the image version running on the device. After the analysis, Prime Infrastructure displays a report that provides the results by device. The report data is gathered from:

- The software image repository, which contains information about minimum RAM, minimum Flash, and so on, in the image header.
- The Prime Infrastructure inventory, which contains information about the active images on the device, as well as Flash memory, modules, and processor details.

Note Upgrade analysis is supported on all Cisco IOS-XR devices (such as Cisco NCS 1000, Cisco NCS 4000, Cisco NCS 5000, Cisco NCS 5500, and Cisco NCS 6000), except on Cisco ASR 9000 devices.

If you want to adjust the device requirements for an image, see Change the Device Requirements for Upgrading a Software Image, on page 17.

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click **Software Image Upgrade Analysis** under **Useful Links**. (Do not select an image from the Software Images page.)

Step 3 In the Upgrade Analysis dialog:

a) Choose the source for the software images (the image repository or Cisco.com).
b) Select the devices you want to analyze.
c) Select the software images you want to analyze the devices against.
d) Click **Run Report**.

The report groups devices by their IP address.

Distribute a New Software Image to Devices

You can distribute a software image to a device or set of similar devices in a single deployment. Prime Infrastructure verifies that the device and software image are compatible.

Based on a device's capabilities, Prime Infrastructure can use different transport protocols (SCP, TFTP, FTP, SFTP) to distribute images to devices. For better reliability and security, we recommend you to use secure protocols only (SFTP, SCP) for distributing software images. If you choose SCP protocol for the image distribution, ensure that the device is managed in Prime Infrastructure with full user privilege (Privileged EXEC mode), otherwise the distribution will fail due to copy privilege error (SCP: protocol error: Privilege denied).

We do not recommend using TFTP or FTP. If you choose TFTP protocol for the image distribution and if the device and the server are in different subnet, the image should be copied within the specified session time limit (one hour) which is maintained by the application otherwise the distribution will fail due to timeout error.

For Software Image Distribution to work efficiently, the device and server from which the distribution is performed must be in the same geographical location or site. If you want to distribute software images into different geographical location of Prime Infrastructure and device, create location group and map this location into Software Image Management server. This external server will transfer images from Prime Infrastructure to Software Image Management server and then start distributing to mapped device location. The Software Distribution job would return error if the distribution takes more time due to network slowness or low speed.

Note To ensure that there are no SNMP views blocking access to the CISCO-FLASH-MIB, remove the following command from the configuration for all routers and switches (if present) on which you want to download a software image:

The software image distribution and image import may fail with authentication error, if you use special characters in the protocol password.

```
snmp-server view ViewName ciscoFlashMIB excluded
```

Step 1 Choose **Inventory** > **Device Management** > **Software Images**

Step 2 Click **Distribute** in the Software Image Management Lifecyle widget.

Step 3 In the **Image Selection** window, choose the software images that you want to distribute.

Step 4 Click the **Device Selection** tab, and choose the devices that you want to distribute the image.

By default, the devices for which the selected image is applicable are shown.

Step 5 Click the **Image Details Verification** tab and click the image row to do the following:

- Choose the image name in the **Distribute Image Name** field to change your selection and pick a new image, then click **Save**.
- Choose the value displayed in the **Distribute Location** field, select a new location in which to store the software image, then click **Save**.

- Choose the value displayed in the **Software Image Management Server** field, then click **Save**. You can choose either a Local file server or one of the servers created under **Administration** > **Servers** > **Software Image Management Servers**.

The Status and Status Message fields display the validity of the selections you made. For example, if the status is green, there is adequate space available to store the image on the specified location on the device.

Step 6 Click the **Image Deployment** tab and set the image deployment options as required:

- Backup Current Image—Before distributing new images, import the running images from the device to software images repository page.
- Insert boot command—To set the boot variable in the device boot path list.
- Activate—To enable the Activate option, you must check the Insert Boot Command check box.
  - Activate OFF—New image will be distributed and boot variable is set in device boot path list. Device will not be rebooted in this mode and will continue to run with the running image.
  - Activate Sequential—Once the image distribution is completed for all the selected devices, the devices will reboot sequentially.
  - Activate Parallel— Once the image distribution is completed for all the selected devices, the devices will reboot simultaneously.
- Smart Flash Delete Before Distribution—Clears the flash memory before image distribution if there is no sufficient space in the device.
- Continue on Failure—If the image distribution fails for one image, the next device in queue will be picked up for activation.
- TFTP Fallback—It prompts the device to reload the current running image from the TFTP server location during image distribution failure.
- Device Upgrade Mode—See the section Deploy Software Images to Wireless/DC Devices, on page 22 for more information.
- ISSU Options: If you choose the **ISSU** option, the software image in the device will get upgraded without need for rebooting the device. For Nexus device, In Service Software Downgrade (ISSD) is not supported for certain images, hence you have to perform traditional reload (chassis reload) or activate the image without ISSU option in the Prime Infrastructure. For more information the section *Supported Upgrade and Downgrade Paths* in the Cisco Nexus 7000 Series NX-OS Release Notes, Release 6.2.

Step 7 Prime infrastructure allows you to use a maximum of one Local file server and three Software Image Management Servers for software image distribution. Each server can distribute the image to five devices at one instance. When the image distribution is completed for one device, the next subsequent device will be taken up for the image distribution.Click the **Schedule Distribution** tab and specify the schedule options, then click **Submit**.

The details about the image distribution job is displayed in the Software Image Management dashboard. You can also view the image distribution job details from **Administration > Dashboards > Job Dashboard > User Jobs > Software Image Distribution**. The **Duration** field is updated after the job completes.

Note Submit button will be enabled only after you select Now or Date for each Activation jobs

Activate a New Software Image on Devices

When a new image is activated on a device, it becomes the running image on the disk. Deactivated images are not removed when a new image is activated; you must manually delete the image from the device.

If you want to distribute and activate an image in the same job, see Distribute a New Software Image to Devices, on page 19.

To activate an image without distributing a new image to a device — for example, when the device has the image you want to activate—use the following procedure. The activation uses the distribution operation but does not distribute a new image.

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click the **Activate** icon in the Software Image Management Lifecyle widget.

Step 3 In the **Activation Source** tab, choose **Activate from Library** or **Activate from Completed Distribution Jobs**.

Step 4 If you choose Activate from Completed Distribution Jobs, go to Job selection tab and select the distributed success or partial success jobs. Then, go to Activate preview tab and select the Device list displayed with image name and flash details. Click the **Activate Job Options** tab.

Step 5 In the **Activate Job Options** window, choose the required settings and go to Step 10:

- Activate Options: Off, Sequential or Parallel
- Continue on failure: Continue the activation even if it fails on a device.
- Commit: Commit the image on the device post distribution.
- ISSU Options: If you choose the **ISSU** option, the software image in the device will get upgraded without need for rebooting the device. For Nexus device, In Service Software Downgrade (ISSD) is not supported for certain images, hence you have to perform traditional reload (chassis reload) or activate the image without ISSU option in the Prime Infrastructure. For more information the section *Supported Upgrade and Downgrade Paths* in the Cisco Nexus 7000 Series NX-OS Release Notes, Release 6.2.
- Device Upgrade Mode: Your options are:
  - Convert to Bundle Mode: The activated image will be upgraded or downgraded in the bundle mode and the image format will be .bin.
  - Convert to Install Mode: The activated image will be upgraded or downgraded in the Install mode and the image format will be packages.conf.
  - Retain Current Running Mode: The activated image will be upgraded or downgraded in the existing device running mode, irrespective of whether the mode is either bundle or install mode.

Step 6 If you choose Activate from Library in the Activation Source tab, then click the **Image Selection** tab.

Step 7 In the **Image Selection** tab, choose the software images that you want to distribute.

Step 8 Go to Image Details Verification tab, change the Activate Location field and validate the verification status message.

Step 9 Click the **Activate Image** tab, and verify whether the selected devices and software images are mapped correctly for activation. While using standby images for activation, click the **Verify Image Selection** tab.

Note When you are activating a standby/alternate image, if the version of the standby/alternate image is lower than that of the image running on the device, the Verification Status Message column displays in red that you are downgrading to a lower version.

Step 10 Click the **Activate Job Options** tab, and choose the required Activate Job options.

Step 11 Go to Schedule Activation tab, select Now or Date and Click **Submit** to activate the software image in the selected devices.

Note **Submit** button will be enabled only after you select Now or Date for each Activation jobs.

Deploy Software Images to Wireless/DC Devices

You can view the **Device Upgrade Mode** option only during image upgrade for Cisco 5760 Series Wireless Controller and Cisco Catalyst 3850 Ethernet Stackable Switch. The following table describes the possible device upgrade options and the corresponding image format for Cisco 5760 Series Wireless Controller and Cisco Catalyst 3850 Ethernet Stackable Switch.

Table 2: Upgrade/ Downgrade Mode Options

Device Upgrade Mode	Device Image Format Before Distribution	Device Image Format After Distribution
Change Install mode to Bundle mode	packages.conf	.bin
Change Install mode to Retain Current Running Mode	packages.conf	packages.conf
Change Bundle Mode to Retain Current Running Mode	.bin	.bin
Change Bundle mode to Install mode	.bin	packages.conf

If the image distribution status is “Success”, you can check the new image version using any of the following options:

- Choose**Inventory** > **Network Devices**.
  - View the **Software Version** column in the **Network Devices** page.
  - Click the device name and click the **Image** tab.
- Use the **show version**command in the device CLI.

Related Topics

Activate a New Software Image on Devices, on page 21

Supported Image Format for Stack Devices

Prime Infrastructure supports only .tar images for upgrade and downgrade for stacked devices. Stack device do not support.bin format. The list of supported stack devices are:

- Stack of CBS3100 switch modules
- Cisco Catalyst Switch Module 3110X for IBM Blade Center
- Cisco Catalyst Blade Switch 3120X for HP
- Cisco Catalyst Blade Switch 3130X for Dell M1000E
- Cisco Catalyst 2975 Switch
- Cisco 3750 Stackable Switches
- Cisco Catalyst 29xx Stack-able Ethernet Switch
- Cisco ME 3600X-24FS-M Switch
- Cisco ME 3600X-24TS-M Switch
- Cisco ME 3800X-24FS-M Switch Router

Note Cisco Catalyst 3650 and 3850 switches do not have.tar images on Cisco.com. For these switches, Prime Infrastructure supports .bin format.

Commit Cisco IOS XR Images Across Device Reloads

Note For Cisco IOS XR devices, we recommend that you do not commit the package change until the device runs with its configuration for a period of time, until you are sure the change is appropriate.

When you commit a Cisco IOS XR package to a device, it persists the package configuration across device reloads. The commit operation also creates a rollback point on the device which can be used for roll back operations.

If you want to distribute, activate, and commit an image in the same job, use the procedure described in Distribute a New Software Image to Devices.

To commit an activated image, use the following procedure.

Note If you are only working on a single device, perform the commit operation from the Device Details page (click the **Image** tab, choose the image, and click **Commit**).

Step 1 Choose **Inventory > Device Management > Software Images**.

Step 2 Click the **Commit** icon in the Software Image Management Lifecyle widget.

Step 3 Select the devices with the image you want to commit and click **Submit**. (Images can only be committed if they have been activated.)

Step 4 Select the software image you want to activate, then click **Submit**.

Step 5 In the Schedule Distribution area, schedule the commit job to run immediately, at a later time, or on a regular basis.

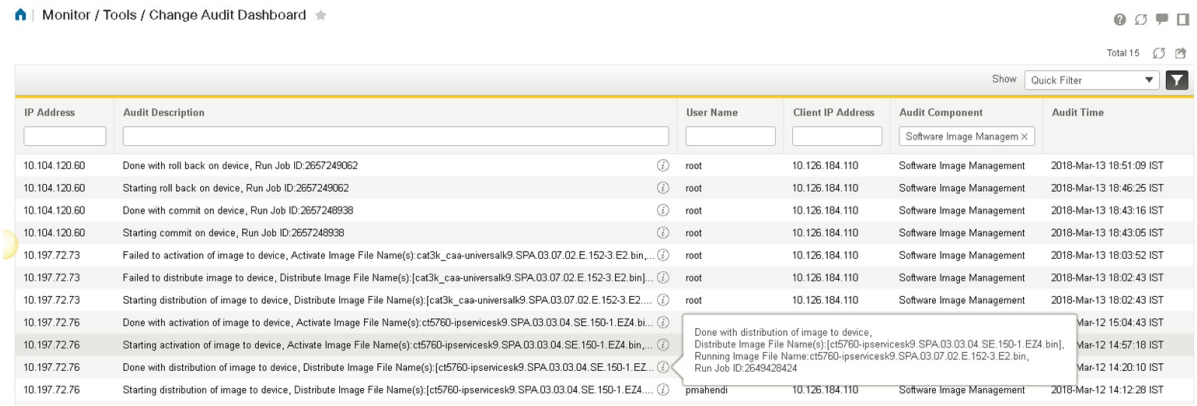
Step 6 Click **Submit**.

Step 7 Choose **Administration > Job Dashboard** to view details about the image activation job.

Check the Change Audit for Software Image Operations

To get historical information about device software image changes, check the Change Audit Dashboard.

Step 1 Choose **Monitor** > **Tools** > **Change Audit Dashboard**. To filter the results to show only image management operations, enter **software image** in the Audit Component field.



Step 2 Click the info icon next to the Audit description to see that status of the Image Distribution and Activation for all device types.

For Example:

Starting distribution of image to device,

Distribute Image File Name(s):[cat3k_caa-universalk9.SPA.03.07.02.E.152-3.E2.bin],

Running Image File Name:cat3k_caa-universalk9.SPA.03.07.04.E.152-3.E4.bin,

Run Job ID:2198989942

Done with distribution of image to device,

Distribute Image File Name(s):[cat3k_caa-universalk9.SPA.03.07.02.E.152-3.E2.bin],

Running Image File Name:cat3k_caa-universalk9.SPA.03.07.04.E.152-3.E4.bin,

Run Job ID:2198989942

ASD Exceptions and Error Conditions

Cisco Prime Infrastructure uses the Cisco Automated Software Distribution (ASD) service to provide software information and download URLs to assist you in upgrading your device/application to the latest version.

The table describes the ASD exceptions and error conditions returned by ASD API in Prime Infrastructure while importing the software image from cisco.com.

Table 3: ASD Exceptions and Error Conditions

Error Code	Error Description
PID_INVALID	PID provided in the request is invalid. Please invoke the service with the valid PID.
IMG_NM_INVALID	Image_name provided is invalid. Please provide the valid image_name.
SWTID_INVALID	Software_type_id provided is invalid. Please provide a valid software_type_id.
INVALID_INPUT	Invalid input or No data found for the input provided.
INVALID_MTRANSID	Invalid metadata_trans_id.
INVALID_DWLDSID	Invalid download_session_id.
INVALID_DRETRYID	Invalid download_retry_id.
IMAGE_GUID_INVALID	The image_guid provided in the request is invalid. Please provide a valid image_guid.
PID_MISSING	PID is missing in the request. Please provide a valid PIDin the request.
CUR_REL_MISSING	Current_release is missing in the request. Please provide a valid current_release in the request.
OUT_REL_MISSING	Output_release is missing in the request. Please provide a valid output_release in the request.
IMG_NM_MISSING	Image_names is missing in the request. Please provide at least one valid image_names.
MISSING_DW_RETRY_ID	Download_retry_id is missing in the request. Please provide a valid download_retry_id in the request.
MTRANSID_MISSING	Metadata_trans_id is missing in the request. Please provide a valid metadata_trans_id in the request.
IMAGE_LIMIT_EXCEEDED	The number of image names entered in the request has exceeded the limit.
DRETRYID_EXPIRED	You were previously granted a download_retry_id that has expired
DWLDSID_EXPIRED	You were previously granted a download_session_id that has expired. \nPlease initiate the download service without the download_session_id.
MTRANSID_EXPIRED	Metadata_trans_id had been previously granted that has expired due to time limit on its validity. Please invoke the metadata service and initiate the download.
NO_DATA_FOUND	No Data Found.
IMAGE_GUID_MISSING	Image_guid is missing in the request. Please provide a valid image_guid in the request.
TIMEOUT	10000
CART_EMPTY	There are no items in the cart.
DWLD_WARN	You are receiving this warning message because our records indicates that you may not be authorized to download for the following product(s)

Error Code	Error Description
DWLD_WARN1	If you feel this message is in error, please: Email technical support <mailto:ent-dl@cisco.com> for 24x7 assistance. To expedite your request, please include the following information: User ID (Cisco.com ID used to download software) \Contact Name \Company Name \Contract Number \Product ID \Desired Software Release or File Name Please include the above message in your email. \Contact your Cisco representative, Partner or Reseller to ensure product(s) listed above are covered on a service contract that is associated to your Cisco.com profile. The Partner Locator link may assist in locating your nearest partner. You can add the service contracts for these products to your profile using the Cisco Profile Manager, or have your service administrator do this for you.
DWLD_WARN2	Please follow one of the options below to ensure that you are fully covered for service in the future and that your Cisco.com profile is accurate and up-to-date: Contact your Cisco representative, partner or reseller to ensure the products listed above are covered on a service contract that is associated with your Cisco.com profile. The Partner Locator link may assist in locating the nearest partner. You can add the service contracts for these products to your profile using the Cisco Profile Manager, or have your service access administrator do this for you. Your prompt attention to take action per this notice is appreciated in order to avoid unnecessary interruptions or delays in the process of downloading software.
K9_FORM_AR	K9 form have not been accepted or rejected to continue download.
EULA_FORM_AR	Eula form have not been accepted or rejected to continue download.
K9_FORM_ACC	K9 form have not been accepted to continue download.
EULA_FORM_ACC	EULA form have not been accepted to continue download.
K9_EULA_FORM_AR	Both Eula and k9 form have not been accepted or rejected to continue download.
SER_UNEXPECT_FAIL	Service has encountered an unexpected failure. Please contact the support with the data requested.

Upgrade Controller Software using Rolling AP Upgrade

You can upgrade APs and Controller software versions from Prime Infrastructure using Rolling AP Upgrade feature. You can add APs to an upgrade group and prevent all Access Points from rebooting simultanously. AP Upgrade groups will reboot sequentially in the order of your preference.

To enable Rolling AP Upgrade, follow the below procedure:

Before you begin

1. N+1 controller should be upgraded to new version.
2. Primary controller should be configured to boot from primary image.
3. Prime Infrastructure should be added as a trap receiver and AP register trap control should be enabled on both controllers.
4. N+1 controller should have the following configurations same as the primary controller:
   - WLANs

- AP Groups
- Mobility Groups
- RF Groups
- RF Profiles

Step 1 Click **Configure** and then click **Network Devices** under **Network**.

Step 2 Select the APs that you want to add to a group by clicking the corresponding checkboxes.

Step 3 Click **Groups and Sites** and then click **Add to Group**.

Step 4 Select the group that you want to add you APs to and then click **Add**.

The recommendation is to not have more than 10 groups per controller and 1000 APs per group. Now that you have added APs to a group, you need to intiailize the upgrade process.

Step 5 Click **Configuration** and then click **Rolling AP Upgrade** under **Wireless Technologies**.

Step 6 Select the Primary and the N+1 controllers.

Note The controllers can either be standalone or redundancy paired controllers.

Step 7 If you want to move your APs back to the primary controller, check the corresponding checkbox. Otherwise, the APs, after reboot will get associated with the N+1 controller.

Step 8 To set the order in which the AP groups reboot, select an AP group and move it **Up** or **Down** the list.

Step 9 Select the transfer Protocol and enter the necessary details.

Step 10 To view the status of the job, click **Administration** and then click **Job Dashboard** under **Dashboards**.