

Workflow for Installing Cisco IOS XR7 Software

The router is shipped with a pre-installed version of the Cisco IOS XR (XR7) software. When the router is powered ON for the first time, the pre-installed software starts functioning automatically. You configure the router for network capabilities. When a new version of the software is available, you can upgrade the system using these tasks:

Note For instructions to upgrade image-specific software, navigate to the CCO Software Download portal, select the product and refer to the `ncs5700-x64-<version>.docs.tar` file for the release.

- Obtain Data Models for Install Operation, on page 1
- Create a repository to install IOS XR SMUs or optional packages, on page 3
- Upgrade the System, on page 6
- Install optional packages for additional functionality, on page 15

Obtain Data Models for Install Operation

You can use YANG data models to install and upgrade XR7 software. The data models are packaged with the release image in the `/pkg/yang` directory.

The models are in the `.yang` format. Each data model can be identified as one of the following functionalities:

- `-oper` in the model name indicates an operational model. For example, `Cisco-IOS-XR-install-oper.yang` and `Cisco-IOS-XR-install-augmented-oper.yang` are operational models for the install operation.
- `-cfg` indicates a configuration model. For example, `Cisco-IOS-XR-install-cfg.yang` is a configuration model for the install operation.
- `-act` indicates an action model. For example, `Cisco-IOS-XR-install-augmented-act.yang` and `Cisco-IOS-XR-install-act.yang` are action models for the install operation.

Procedure

Step 1 View the install-related data models on the router. You can also access the supported data models to install Cisco IOS XR software from the Github repository.

Example:

```
node0_RP0_CPU0:/pkg/yang]$ls -ltr *install*
-rw-r--r--. 1 root root  8646 Jul  2 01:59 Cisco-IOS-XR-install-act.yang
-rw-r--r--. 1 root root  7267 Jul  2 01:59 Cisco-IOS-XR-install-search-act.yang
-rw-r--r--. 1 root root 10664 Jul  2 01:59 Cisco-IOS-XR-install-augmented-act.yang
-rw-r--r--. 1 root root  2511 Jul  2 02:00 Cisco-IOS-XR-um-install-cfg.yang
-rw-r--r--. 1 root root  2270 Jul  2 02:04 Cisco-IOS-XR-install-cfg.yang
-rw-r--r--. 1 root root  6222 Jul  2 02:04 Cisco-IOS-XR-install-oper.yang
-rw-r--r--. 1 root root 14009 Jul  2 02:04 Cisco-IOS-XR-install-augmented-oper.yang
-rw-r--r--. 1 root root 13726 Jul  2 02:04 Cisco-IOS-XR-install-oper-sub1.yang
-rw-r--r--. 1 root root  2440 Jul  2 02:04 Cisco-IOS-XR-install-augmented-oper-sub2.yang
-rw-r--r--. 1 root root 59866 Jul  2 02:04 Cisco-IOS-XR-install-augmented-oper-sub1.yang
```

The following table describes the function of the install-related data models:

Data Model	Description
Cisco-IOS-XR-um-install-cfg model	Unified data model that contains a collection of YANG definitions for Cisco IOS XR install package configuration, and augments the modules with configuration data
Cisco-IOS-XR-install-oper	Operational data model to view details that are related to basic package information, active and committed packages, and fixes
Cisco-IOS-XR-install-cfg	Configuration data model to specify the location of the install source
Cisco-IOS-XR-install-act	Action model to perform basic install operations and software upgrade
Cisco-IOS-XR-install-search-act	Action model that contains a collection of YANG definitions for install actions related to searching for package information
Cisco-IOS-XR-install-augmented-oper	Augmented operational model that displays information about packaging, atomic changes, and history of the install operation on the router
Cisco-IOS-XR-install-augmented-act	Action model to perform flexible install operations, including controlling the exact timing of system reloads and rolling back to a previous commit
Cisco-IOS-XR-shellutil-copy-act	Action model to copy files on the router from a source location

Step 2 Use a manageability agent like NETCONF or gRPC to connect and communicate with the router. You can send Remote Procedure Calls (RPC) requests to configure or retrieve operational data from the router. The router processes the request and responds to the request through an RPC response. You use the RPCs to send requests to install the software by populating the relevant container and leaf in the data model.

For more information about understanding the data model structure and using data models, see the *Programmability Configuration Guide for Cisco NCS 5500 Series Routers*.

Create a repository to install IOS XR SMUs or optional packages

Note If only Golden ISO (GISO) is used, you do not need to create a repository.

To install packages (RPM), code upgrades, and updates in XR7, you need a repository of RPMs for the router to download the RPMs for installation. The repository can be local to the router, or accessed remotely through FTP, HTTP, or HTTPS.

Important The repository must be created specific to each platform and release. Do not create repositories with a mix of platforms and releases.

When the repository is accessed remotely, you must provide a repository URL from where the install files are fetched. The URL contains:

- IP address of the server
- Port number of the server
- (Optional) Virtual Routing and Forwarding (VRF) name

The repository can be configured to be reachable using a non-default VRF table. If the repository is reachable through an address in a VRF, specify the name of the VRF.

The format of the repository URL is one of the following:

- FTP: `ftp://<server>[;<vrf>]/<path-to-repository>`
- HTTP: `http://<server>[;<vrf>]/<path-to-repository>`
- HTTPS: `https://<server>[;<vrf>]/<path-to-repository>`
- Local: `file:///<path-to-repository>`. The path to the repository must be under /harddisk:/ location.

For example, the URL for HTTP server is http://172.16.0.0:3333/.

Note Username and password are not supported for HTTP and FTP repositories.

Create and Configure a Local Repository

The router can serve as repository to host the RPMs. You must be a `root-lr` user with access to the router shell. Remote repository is the recommended method to access the RPMs. However, if remote repository is not your preferred option, then you can use the router as a repository to host the RPMs.

Using a local repository removes the need to setup an external server for software installation. In this method, the image files are copied directly to the router, and used to create a repository locally. However, on the downside, the files for future updates must be copied to each router individually.

This section provides the procedure for setting up a local RPM repository on the router.

Procedure

Step 1 Create a directory locally on the router's `/harddisk:`. Copy the required RPMs and ISO files (using copy or scp command) from the server to the local directory on the router.

Step 2 Access the shell of the router using `run` command and untar the RPMs.

Example:

```
Router#run
[node:~]$cd <directory-with-rpms>
[node:~]$tar -xvzf <rpm-name>.tgz
```

Step 3 Exit from the shell.

Step 4 Configure the local repository.

Example:

```
Router#config
Router(config)#install repository local-repo url file:///harddisk:/<directory-with-rpms>
Router(config)#commit
<data and time stamp> UTC: config[67543]: Configuration committed by user.
Router(config)#end
```

where, `local-repo` is the repository name, `file:///harddisk:/<directory-with-rpms>` is the local repository URL.

Step 5 Check the contents of the repository.

Example:

NCS 5700 Series:

```
Router#show install available
Trying to access repositories...
Package                Architecture          Version          Repository
--------------------  ---------------  ------------------ ---------------
xr-ncs5700-core       x86_67        7.3.1v1.0.1-1      local-repo
xr-core               x86_64        7.3.1v1.0.1-1      local-repo
```

Note
Only the top-level packages are displayed. The contents of the repository is displayed only when the configured repository is valid and the RPMs are present in the repository. It displays only the packages that are available in the repository and not part of active system.

Create and Configure an External Repository

To create an external repository, use a server that can be reached over HTTP, HTTPS or FTP. The following instructions are applicable to Linux distribution systems.

Using an external repository provides a central common repository to be used across devices. This eliminates the need to copy files for future updates to each router individually. It also serves as a single source when new RPMs (bug fixes, packages, updates) are made available. This is the recommended method to setup a repository.

Before you begin

Ensure that you have completed the following tasks:

- Set up your HTTP, HTTPS or FTP server. Ensure that the server is reachable as specified in the note above.
- Install `createrepo` utility on the Linux distribution system (if not installed already).

Procedure

Step 1 Create a directory on the server and copy all the RPMs to a directory. This directory hosts the repository and must be accessible to the HTTP, HTTPS or FTP server that the router will use to access the repository. For example, `/var/www/html`, is the directory where the repository will be created.

If the RPM files are archived (.tar format) or compressed (.tgz or .gz format), extract the files. The files hierarchically arrange in sub directories under the main directory that is used as a repository.

Step 2 Convert the directory to a repository using `createrepo` utility on the Linux server. This creates a directory named `repodata` with the metadata of all the RPMs.

Example:

```
[node]$createrepo --database /var/www/html/
Saving Primary metadata
Saving file lists metadata
Saving other metadata
Generating sqlite DBs
Sqlite DBs complete

[node]$cd /var/www/html/
[node]$ls
repodata
```

If you add new packages to the repository, change or remove packages from the repository, you must run `createrepo` command again to update the metadata. This ensures that the package manager chooses the correct packages.

Step 3 Configure the external repository.

Example:

```
Router#config
Router(config)#install repository remote-repo url http://10.194.88.104/<directory-with-rpms>
Router(config)#commit
<data and time stamp> UTC: config[67542]: Configuration committed by user 'cisco'.
Router(config)#end
```

For FTP, the repository is configured as follows:

```
Router#config
Router(config)#install repository remote-repo url ftp://10.194.88.104/<directory-with-rpms>
Router(config)#commit
<data and time stamp> UTC: config[67543]: Configuration committed by user 'cisco'.
Router(config)#end
```

where, `remote-repo` is the repository name, `http://10.194.88.104/<directory-with-rpms>` is the HTTP repository URL, and `ftp://10.194.88.104/<directory-with-rpms>` is the FTP repository URL.

Step 4 Verify connectivity to the server, and check the contents of the repository.

Example:

NCS 5700 Series:

```
Router#show install available
Trying to access repositories...
Package                 Architecture          Version          Repository
--------------------  ---------------  ------------------ ---------------
xr-ncs5700-core       x86_64        7.3.1v1.0.1-1      local-repo
xr-core               x86_64        7.3.11v1.0.1-1     remote-repo
```

Note
Only the top-level packages are displayed. The contents of the repository are displayed only when the configured repository is valid and the RPMs with the updated metadata are present in the repository. It displays only the packages that are available in the repository and not part of active system.

Upgrade the System

You can upgrade the system when a newer version is available. A system upgrade replaces the existing version of the software with a newer version. By keeping the software up to date, you can ensure that the device works with the latest features and bug fixes.

You can replace the currently active software on your system with the software from a specified ISO image or GISO image. Only a minimal set of changes is performed to upgrade to the new software. Packages are not removed and reinstalled if they have the same name and version. For example, an upgrade that differs by only one package, removes and install only that one modified package.

Note The instructions in this section also apply to system downgrade.

This section shows replacing the current software version with `.iso` image. To understand the phases of install operation, see Software Deliverables and Terminologies. For information about repositories, see Create a repository to install IOS XR SMUs or optional packages, on page 3.

Supported software upgrade or downgrade versions

Cisco routers come preinstalled with Cisco IOS XR software. You can upgrade the software to access new features and fixes, or downgrade it if needed. To take advantage of the latest features and software improvements, we recommend that you keep your router updated with the current version.

Table 1: Feature History Table

Feature Name	Release Information	Description
Optimized IOS XR upgrade or downgrade process	Release 25.3.1	Introduced in this release on: NCS 5700 fixed port routers; NCS 5700 line cards [Mode: Compatibility; Native] You can now upgrade Cisco IOS XR software from an earlier version to version 25.3.1 or later, and downgrade from version 25.3.1 or later to an earlier version, with certain limitations. These limitations are designed to help prevent failures during the upgrade or downgrade process.
View supported software upgrade or downgrade IOS XR versions	Release 7.5.1	You can determine whether a software version can be upgraded or downgraded to another version using this functionality. Before an actual upgrade or downgrade process, you can also view the hardware or software limitations that could cause the upgrade or downgrade to fail. This feature helps you plan successful software upgrades or downgrades. This feature introduces the **show install upgrade-matrix** command.

For limitations specific to the Cisco IOS XR software version 25.3.1 upgrade and downgrade processes, see Restrictions.

For release-specific caveats, refer to the Caveats section.

Compatibility checks for Cisco IOS XR software upgrades and downgrades

The compatibility check feature for Cisco IOS XR software facilitates choosing a release that follows Cisco-certified upgrade and downgrade paths, asking critical questions such as:

- Which upgrade or downgrade releases are supported for my current release
- If I want to upgrade from Release X to Release Y, does my router support this upgrade
- Are there any bridging SMUs that must be installed before upgrading?

This feature checks whether your current release can upgrade or downgrade to a specified target release. This automatic validation occurs during the start of a software upgrade or downgrade using the **install replace** command. If the validation fails, the upgrade is blocked, and the system notifies you of the reason for the failure. This validation allows you to proactively determine upgrade or downgrade compatibility thus saving plannig effort.

The feature provides prerequisites and limitations for a specific upgrade or downgrade such as:

- Required bridging SMU RPMs
- Blocking SMU RPMs
- Unsupported hardware
- Caveats or restrictions

If needed, bypass automatic validation by including the **force** keyword with the **install replace** command. When you use this option, the system displays warning messages if the upgrade fails, but it does not stop the software upgrade. Explore **force ?** for any impacts beyond this.

Restrictions for Cisco IOS XR software upgrades on NCS 5700 platforms

Starting from Cisco IOS XR Release 25.3.1, these restrictions apply to the Cisco IOS XR software upgrades on NCS 5700 platforms.

- If the router reloads during the upgrade before executing the **install commit** command, it will boot the target image instead of the original image.
- The software does not support the **install package replace** command for installing ISO with control over reload timing. Do not attempt to use it as it results in an error.
- The software does not support rollbacks for release upgrades. Use the **install replace** command with the previous golden ISO instead.

Show commands for software upgrade and downgrade

You can view the software upgrade and downgrade information using the **show** commands in this table or through the operational data.

Command	Description
show install upgrade-matrix running	Displays all supported software upgrades from the current version according to the support data installed on the running system
show install upgrade-matrix iso *path-to-ISO*	Displays details about the software upgrade from the current version to the version of the target ISO according to the support data in both the running system and the ISO image
show install upgrade-matrix iso *path-to-ISO* **all**	Displays all supported software upgrades from any version according to the support data in the target ISO image
show install upgrade-matrix iso *path-to-ISO* **from-running**	Displays details about the software upgrade from the current version to the version of ISO according to the support matrices in both the running system and the target ISO image **Note**

Command	Description
	From Cisco IOS XR Release 25.2.1, the **running** keyword is deprecated from the **show install upgrade-matrix iso** command. This is applicable for routers with Cisco IOS XR7 network operating systems.

Note If your running version is below Cisco IOS XR Release 7.5.1, upgrade the system to Cisco IOS XR Release 7.5.1. Then, use the **show install upgrade-matrix** command to check the required SMUs for your target version.

Supported software upgrade from running version

This example shows all supported releases for upgrade from the current version on the NCS 5700 router:

```
Router#show install upgrade-matrix running
Tue Jun  7 06:36:06.865 UTC
This may take a while ...

The current software [7.5.2] can be upgraded from and downgraded to the following releases:

================================================================================
From      To        Bridge SMUs Required        Caveats
================================================================================
7.5.2     7.6.1     None                        - Caveat string
--------------------------------------------------------------------------------

Router#show install upgrade-matrix running
Matrix: XR version: 25.3.1, File version: 1.0, Version: N/A
The upgrade matrix indicates that the following system upgrades are supported from the
current XR version:
From       To         Restrictions
---------- ---------- ------------------------------------------------------
25.3.1     24.1.2     Target fixes; Caveats; Replace performed via reimage
25.3.1     24.2.11    Target fixes; Caveats; Replace performed via reimage
25.3.1     24.2.2     Target fixes; Caveats; Replace performed via reimage
25.3.1     24.2.21    Caveats; Replace performed via reimage
25.3.1     24.3.1     Target fixes; Caveats; Replace performed via reimage
25.3.1     24.3.2     Target fixes; Caveats; Replace performed via reimage
25.3.1     24.3.20    Caveats; Replace performed via reimage
25.3.1     24.4.1     Caveats; Replace performed via reimage
25.3.1     24.4.2     Caveats; Replace performed via reimage
25.3.1     25.1.1     Caveats; Replace performed via reimage
25.3.1     25.1.2     Caveats; Replace performed via reimage
25.3.1     25.2.1     Caveats; Replace performed via reimage
25.3.1     25.2.2     Caveats; Replace performed via reimage
25.3.1     7.10.2     Target fixes; Caveats; Replace performed via reimage
25.3.1     7.11.2     Target fixes; Caveats; Replace performed via reimage
25.3.1     7.11.21    Target fixes; Caveats; Replace performed via reimage
Add the from and to versions to the end of the CLI command, for data on versions with
additional restrictions
For example, to display restrictions for the 25.3.1->24.1.2 upgrade, use
        'show install upgrade-matrix running 25.3.1 24.1.2'
```

Supported software upgrade between two releases

This example shows the support information for an upgrade from one release to another—7.5.2 and 7.3.1:

```
Router#show install upgrade-matrix running 7.5.2 7.3.1
Tue May 10 19:33:59.135 UTC
------------------------------------------------------------
Upgrade matrix information for system upgrade: 7.5.2->7.3.1
------------------------------------------------------------

XR system upgrade is supported, with the following restrictions:

The following fixes must be installed if any version of the package is installed.
-------------------------------
Ddts          Name         Version
-----------   -----------  ------------------
CSCab54345    xr-bgp        7.5.2
```

Supported software upgrades from current version

This example shows all releases that support upgrades or downgrades for the current release:

```
Router#show install upgrade-matrix running all
Tue May 10 19:33:59.135 UTC
------------------------------------------------------------
Matrix: XR Version: 7.5.2, File version: 1.0

The upgrade matrix indicates that the following system upgrades are supported:
--------------------------------------------------------------------------------
From          To           Restrictions
-----------   -----------  ------------------
7.3.0         7.5.2        -
7.3.1         7.5.2        -
7.3.2         7.5.2        -
7.3.3         7.5.2        -
7.3.4         7.5.2        -
7.5.1         7.5.2        -
7.5.2         7.3.0        -
7.5.2         7.3.1        Bridging fixes
7.5.2         7.3.2        -
7.5.2         7.3.3        -
7.5.2         7.3.4        -
7.5.2         7.5.1        -
7.5.2         7.6.1        -
7.6.1         7.5.2        -
```

Supported software upgrade from current version to target version

This example shows the supported release to upgrade software from the current version to a target version.

```
Router#show install upgrade-matrix iso /harddisk\:ncs5500-7.5.2.iso
------------------------------------------------------------
Upgrade matrix information for system upgrade: 7.5.2->7.6.1
------------------------------------------------------------

XR system upgrade is supported with no additional restrictions
```

The current image has the upgrade matrix that specifies only its supported upgrade or downgrade versions up to a certain version. If you want to determine the upgrade path of a newer version of ISO that is higher than the version in the current matrix, the upgrade matrix from the new ISO will provide the supported upgrade or downgrade paths.

Supported software upgrade from current version to an ISO version

This example shows the software upgrade paths, downgrade paths, and restrictions to an upgrade from the current version to the target ISO version:

```
Router#show install upgrade-matrix iso /harddisk\:/ncs5500-x64-7.5.2.iso all
Tue Jun  7 06:40:43.973 UTC
This may take a while ...

7.5.2 can be upgraded from and downgraded to the following releases:


================================================================================
From      To        Bridge SMUs Required        Caveats
================================================================================
7.6.1     7.5.2     None                        None
--------------------------------------------------------------------------------
7.4.2     7.5.2     None                        None
--------------------------------------------------------------------------------
7.4.1     7.5.2     None                        None
--------------------------------------------------------------------------------
7.3.2     7.5.2     None                        None
--------------------------------------------------------------------------------
7.3.1     7.5.2     None                        None
--------------------------------------------------------------------------------
7.2.2     7.5.2     None                        None
--------------------------------------------------------------------------------
7.2.1     7.5.2     None                        None
--------------------------------------------------------------------------------
7.5.2     7.6.1     None                        None
--------------------------------------------------------------------------------
7.5.2     7.4.2     None                        None
--------------------------------------------------------------------------------
7.5.2     7.4.1     None                        None
--------------------------------------------------------------------------------
7.5.2     7.3.2     None                        None
--------------------------------------------------------------------------------
7.5.2     7.3.1     None                        None
--------------------------------------------------------------------------------
7.5.2     7.2.2     None                        None
--------------------------------------------------------------------------------
7.5.2     7.2.1     None                        None
--------------------------------------------------------------------------------
```

Software upgrade with an unsupported release

This example shows how an attempt to replace version 7.4.2 with an unsupported version 7.5.1 results in an upgrade failure with a message specifying the reason for the failure.

```
Router#install package replace /harddisk\:/ncs5500-x64-7.4.2.iso synchronous
Tue May 10 19:33:59.135 UTC
Starting:
  install package replace /harddisk:/ncs5500-x64-7.4.2.iso
Packaging operation 1.1.1
Press Ctrl-C to return to the exec prompt. This will not cancel the install operation

Current activity: Initializing ...
Current activity: Verify input and download ISO ..........

Packaging operation 1.1.1: 'install package replace /harddisk:/ncs5500-x64-7.4.2.iso' failed
 -
Software upgrade 7.5.1->7.4.2 not listed as permitted.
Automatically recovered after failure, ready for next user request.
```

Supported software upgrades using a rollback operation

This example shows all releases that support upgrades or downgrades for the current release:

```
Router#show install upgrade-matrix rollback 130 all
Mon Jun  6 10:42:23.013 UTC
Matrix: XR version: 7.5.2, File version: 1.0

The upgrade matrix indicates that the following system upgrades are supported:

From       To         Restrictions
---------- ---------- --------------
7.3.1      7.5.2      Bridging fixes
7.3.2      7.5.2      -
7.4.1      7.5.2      -
7.4.2      7.5.2      -
7.5.1      7.5.2      -
7.6.1      7.5.2      -
7.5.2      7.3.1      -
7.5.2      7.3.2      -
7.5.2      7.4.1      -
7.5.2      7.5.1      -
```

Supported software upgrade between releases with a specific rollback ID

This example shows the support information for an upgrade from one release to another, say, 7.5.2 to 7.3.1, with a specific rollback ID 130:

```
Router#show install upgrade-matrix rollback 130 7.3.1 7.5.2
Mon Jun  6 10:42:55.052 UTC
------------------------------------------------------------
Upgrade matrix information for system upgrade: 7.3.1->7.5.2
------------------------------------------------------------

XR system upgrade is supported, with the following restrictions:

The following fixes must be installed if any version of the package is installed.
---------------
Ddts       Name            Version
---------- --------------- -----------
CSCvy66646 xr-install      7.3.1v1.0.1
```

Upgrade the current active version of Cisco IOS XR Software

This section shows replacing the current running software with an `.iso` image. This method must be used to change the IOS XR release version (upgrade or downgrade). It can also be used with golden ISO to keep the XR release version the same but change the installed SMUs and/or optional packages.

Upgrade the current active version

In this scenario, you replace the current software with `.iso` image, apply the changes, and commit the install operation. Committing the changes indicates the end of the current transaction. The updated software is used after the changes are applied, before the install transaction is committed.

A reboot is not always necessary. Bug fixes can be applied using a GISO that contains the current running software and the additional bugfix. These fixes may not require a reboot. Reboots are required for a system version change, if too many processes need restarting, there is configuration in the GISO to apply or if the bugfix is marked as requiring a reload.

From Cisco IOS XR Release 7.5.1, you can use the Automatic Install of Bridging Bug Fix RPMs feature to install any bridging bug fix RPMs that are prerequisite for a system upgrade or a downgrade.

You need to add the required Bridging Bug Fix RPMs into the customized ISO built using Cisco Golden ISO (GISO) build script **gisobuild.py**, by going through the steps in Golden ISO images. Ensure that you add the required bridging bug fix RPMs into your Golden ISO. The GISO can include bridging Bug Fix RPMs for multiple releases, and installs only the specific bridging Bug Fix RPMs required for the target release. The bridging bug fix RPMs can be used in the following scenarios:

- To resolve a bug that might stop upgrade.
- The latest version has new prerequisite requirements that are not met by the earlier version.

The **install replace** command adds and applies the highest version of any bridging bugfix RPMs for the currently active XR version.

Procedure

Step 1 Copy the ISO (or GISO) image to the `/harddisk:` location on the router.

Step 2 Upgrade the system to replace the current software with the .iso image.

Example:

```
Router#install replace /harddisk:/ncs5700-x64.iso
```

Step 3 Activate the new .iso image on the router by applying the changes.

Example:

```
Router#install apply {reload | restart} [noprompt]
```

Note
For operations that do not change the XR release version (SMU or optional package install), you can control the timing of reload or process restart by using **install package replace** *iso* followed by **install apply {reload | restart } [noprompt]**.

To identify whether a reload is required or only process restart is needed, use either **show install history last transaction verbose** command or **show install request** command.

Include the keyword `noprompt` in the command to enable the system to bypass your permission to reload the router.

Applying the change gives you the flexibility to test the operation of the new software before committing the changes. If you reload the router, the router reverts the software to its previous software state.

All operations that automatically apply the new software are prohibited when an atomic change is already in progress. You must address the current atomic-change before performing this operation. To address the change, apply the current atomic-change, or cancel it with the **install package abort all-since-apply** command.

Step 4 View the install log.

Example:

```
Router#show install log detail
Fri Nov 12 09:43:49.702 UTC
2021-11-12 09:33:47 UTC    Transaction 1 started
2021-11-12 09:33:47 UTC    Atomic change 1.1 started
2021-11-12 09:33:47 UTC    Packaging operation 1.1.1 started
2021-11-12 09:33:47 UTC    Replace
```

```
2021-11-12 09:35:58 UTC    Packaging operation 1.1.1 success
2021-11-12 09:36:04 UTC    Apply by reload started
2021-11-12 09:38:48 UTC    Atomic change 1.1 successfully applied by reload
```

Step 5 Verify that the image is activated successfully.

Example:

```
Router#show install request
```

Step 6 Commit the transaction.

Example:

```
Router#install commit
```

Note
Any action requests may be run synchronously from the CLI. During this request, you are updated with the status of the request whenever it changes. The following example shows the output from a synchronous action request:

```
Router#install commit synchronous
Starting:
  install commit
Transaction 1
The install operation will continue in the background
Press Ctrl-C to return to the exec prompt. This will not cancel the install operation

Current activity: Initializing ....
Current activity: Commit transaction ......

Transaction 4: 'install commit' completed without error
```

Upgrade QDD Optical Modules Through CLI

The QDD optics firmware file needs to be copied to the router manually. Contact Cisco Support to check the QDD firmware version, IOS XR release compatibility, and to obtain the QDD optics firmware file.

Limitation: When ports share a common management interface, IOS XR serializes the firmware upgrade. Serializing and deserializing may delay the upgrade process.

Procedure

Step 1 From the router, copy the QDD firmware file to the hard disk using the following command:

Example: `scp user@10.1.1.1:/home/user/filename harddisk:/`

- When you are using VRF, use the following sample command:

```
scp user@10.1.1.1:/home/user/cl1.bin vrf MGMT harddisk:/

Tue Jan 25 02:57:22.762 UTC
Connecting to 10.1.1.1...
Password:
  Transferred 1484800 Bytes
  1484800 bytes copied in 0 sec (22161194)bytes/sec

RP/0/RP0/CPU0:8808#dir harddisk:/cl1.bin
Tue Jan 25 03:00:47.835 UTC
```

```
Directory of harddisk:/cl1.bin
35 -rw-r--r--. 1 1484800 Jan 25 02:57 dp04qsdd_dp04sfp8_161_10_01.ackit

53461500 kbytes total (42983204 kbytes free)
```

- When you are not using VRF, remove the `vrf MGMT` command:

```
scp user@10.1.1.1:/home/user/cl1.bin harddisk:/
```

Step 2 Run the following commands to upgrade the FPD for QDD optical modules:

Multiport upgrade:`upgrade optics port 0,1,2,3,4 filename /harddisk:/cl1.bin location 0/1/CPU0`

Single port upgrade: `upgrade optics port 0 filename /harddisk:/cl1.bin location 0/1/CPU0`

You can check the firmware upgrade progress using the following command: `show optics firmware upgrade port 0,1,1,2,3,4 location 0/1/CPU0`

Install optional packages for additional functionality

You can install one or more packages (RPM) that are not already present on the system. The packages are not mandatory for the software to function, but provide additional functionality. Based on your requirement, you can install or remove these optional packages. The source file can be a repository name, repository url, local filepath, or path to a tar file.

You must specify only the top-level package name that you want to install. The associated dependencies of this package, in the form of card and partition-specific packages, are included automatically. By default, the latest available version of each package is installed. You can also explicitly install a specific version of a package.

This example shows the options to install the optional package `xr-telnet-7.3.17.5.2v1.0.1-1.x86_64.rpm`.

Procedure

Step 1 Install one or more optional packages using one of the following options:

- **Option 1:** Install the package from the local directory:

  NCS 5700 Series:

  ```
  Router#install source /harddisk:/files xr-telnet-7.3.1v1.0.1-1.x86_64.rpm
  ```

  Note
  The `install source` command automatically applies the changes. Use this command to install optional packages. To upgrade existing packages, see Upgrade the System to Obtain Bug Fixes.

- **Option 2:** Install the package from a configured remote repository:

  ```
  Router#install source install-repo xr-telnet
  ```

  Here, `install-repo` is the name of the repository. For repository configuration, see Create a repository to install IOS XR SMUs or optional packages, on page 3.

- **Option 3:** Install the package from a repository URL:

```
Router#install source http://72.16.0.0:3333/remote-repo xr-telnet
```

- **Option 4:** Add the package and apply the change. The package must be available in the repository.

  NCS 5700 Series:

```
Router#install package add xr-telnet-7.3.1v1.0.1-1.x86_64.rpm
Router#install apply {restart | reload}
```

More than one package can be installed using a single packaging operation. Use the following command:

```
Router#install source <path-to-source> <package 1> <package 2> … <package n>
```

For example,

NCS 5700 Series:

```
Router#install source /harddisk:/files xr-telnet-7.3.1v1.0.0-1.x86_64.rpm
xr-mcast-7.3.1v1.0.0-1.x86_64.rpm
```

To perform this task using data models, use the `install` RPC on the Cisco-IOS-XR-install-act data model. Here is an example with an HTTP repository:

```
<install>
   <packages>
     <packagename>pkg1</packagename>
     <packagename>pkg2</packagename>
     …
     <packagename>pkgn</packagename>
   </packages>
   <source-type>http</source-type>
   <source><path-to-source></source>
</install>
```

Step 2 Commit the operation.

Example:

```
Router#install commit
```

Step 3 Check the status of install operation.

Example:

NCS 5700 Series:

```
Router# show install history last package
Tue Jul 14 11:09:19.748 UTC
2021-07-14 11:08:12 UTC        Packaging operation 1.1.1 started
2021-07-14 11:08:12 UTC        Add
2021-07-14 11:08:12 UTC        xr-telnet
2021-07-14 11:09:10 UTC        Packaging operation 1.1.1 success

Location 0/RP0/CPU0
   Add xr-telnet-7.3.1v1.0.0-1.x86_64
   Add xr-telnet-36cad6c174d48ffe-7.3.1v1.0.0-1.x86_64
   Add xr-telnet-ncs5700-7.3.1v1.0.0-1.x86_64
   Add xr-telnet-a1f05ad3091205a8-7.3.1v1.0.0-1.x86_64
```