

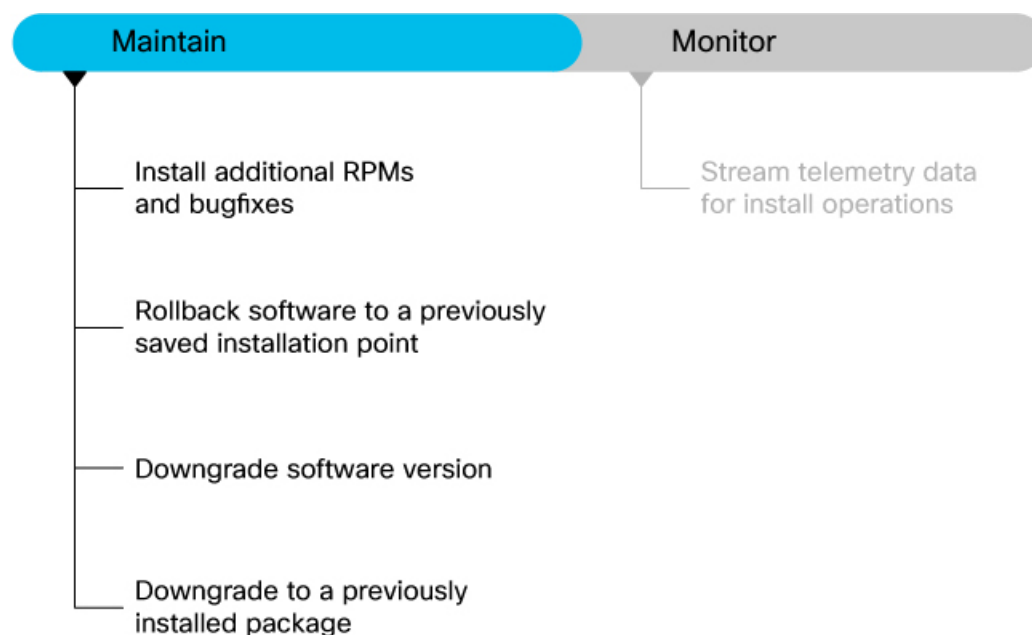


## Manage the Router

Use the procedures in this section to maintain the router at optimum conditions and monitor the install operation by streaming telemetry data.

The following workflow shows the tasks involved in managing the software:

**Figure 1: Workflow to Manintain and Monitor the Software Installation**



This section contains the following topics:

- [Install Additional RPMs and Bug Fixes, on page 2](#)
- [Downgrade Software Version, on page 4](#)
- [Downgrade to a Previously Installed Package, on page 6](#)
- [Rollback from SONiC to Cisco IOS XR OS, on page 8](#)
- [Stream Telemetry Data for Install Operations, on page 10](#)

# Install Additional RPMs and Bug Fixes

You can install individual optional packages when new features are added or software problems are fixed.

## Before you begin

When you upgrade the Cisco IOS XR software, you can also install or remove optional feature packages (RPMs or bug fixes) *before* applying the changes in the router. You can perform this operation while an atomic change is already in progress. However, all packaging operations before this command are discarded.

You can install the packages from a remote repository or copy the files to the router. If you are using a remote repository, ensure you have created and configured an external repository to store the packages. See the [Create Repository to Access Install Files](#) topic.

Download the specific additional RPMs and latest bug fix RPMs as tarballs to the repository. If the bug fix has dependencies, we recommend that you create a bug fix tarball that contains all dependencies. The *README* file in the tarball provides relevant information about the bug fix and identifies any dependencies – for example, whether other bug fix RPMs may be required for a complete fix.

## Option 1: Install RPMs Using Command Line Interface

Optional RPMs and bug fixes are available as TAR files on the [Software Download](#) page. Starting with Cisco IOS XR Release 7.3.1, you are no longer required to manually extract the RPMs from the TAR file; you can install the bug fix RPM directly from the TAR file.

**Step 1** Check the available packages in the repository.

### Example:

```
Router#show install available
```

```
Trying to access repositories...
```

Package	Architecture	Version	Repository
xr-8000-core	x86_64	7.8.1	remote-repo
xr-core	x86_64	7.8.1	remote-repo

**Step 2** Install the packages (additional RPMs or bug fixes).

- **Option 1:** Install RPMs without control over reload operation.

**Important** This option is not applicable when you downgrade or remove RPMs.

You can either specify a tarfile (with bug fixes or optional packages), or a repository containing the RPMs. Use this command:

```
Router#install source full-path-to-rpm [all]
```

Specify the **all** keyword if you want to install optional packages. Exclude the **all** keyword if you want to upgrade the packages that are currently installed on the system.

The *full-path-to-rpm* can be one of the following locations based on where you have saved the files.

- Local path—files located in or under `/var/xr/disk1/`, `/harddisk:/` or `/misc/disk1/`

- Remote repository or tar file—`ftp://<server>[;<named-vrf>]/<remote_path>`,  
`https://<server>[;<named-vrf>]/<remote_path>` or  
`http://<server>[;<named-vrf>]/<remote_path>`

If you want to add new packages from this source, you must use the **all** keyword:

```
Router#install source full-path-to-rpm all sync
```

**Note** If the remote repository is reachable through a named VRF, you must mention the named VRF in the above commands. For example,

```
Router#install source http://10.105.57.27;vrf1/repoinfra/install_rpms.tar
```

where **vrf1** is the named VRF through which the remote repository is accessible.

The operation adds the RPMs and applies the change via `reload` or `restart` operation, whichever is least impactful based on the update.

- **Option 2:** Install RPMs with control over reload operation.

**Important** This option is applicable when you downgrade, remove or rollback RPMs.

- Install RPMs by providing the RPM name, Cisco bug fix ID (example, CSCab12345) or add packages from a specified source. Use the **install package add** command if you want to add new optional packages, else use the **install package upgrade** command.

```
Router#install package add <pkg1> <pkg2> <pkgn>
```

Or

```
Router#install package upgrade <pkg1> <pkg2> <pkgn>
```

- Apply the changes.

```
Router#install apply [reload | restart]
```

You can use the `reload` or `restart` options based on the change that is installed. To determine whether a `reload` or `restart` is required, check the output of **show install request** or **show install history last transaction verbose** command. The output indicates the required actions.

```
Router#show install history last transaction verbose
2023-01-25 05:45:37 UTC    Transaction 87 started
2023-01-25 05:45:37 UTC    Atomic change 87.1 started
2023-01-25 05:45:37 UTC    Packaging operation 87.1.1 started
2023-01-25 05:45:37 UTC    Transaction 87 complete
```

**Least impactful apply method: process restart**

### Step 3 Check the status of the install operation.

#### Example:

```
Router#show install request
User request: No user requests found
State:        Success
Current activity: No install operation in progress
```

The following actions are available:

```
install package add
install package remove
install package upgrade
```

```
install package downgrade
install package replace
install package rollback
install replace
install rollback
install source
```

**Note** Include the keyword `noprompt` in the commands to enable the system to bypass your permission to reload the router.

**Step 4** Verify the image and packages are activated successfully.

**Example:**

```
Router# show install request
User request: install package add xr-mcast
Operation ID: 87.1.1
State: Success
```

**Step 5** Commit the transaction.

**Example:**

```
Router#install commit
```

## Option 2: Install RPMs Using YANG Data Model

Use `Cisco-IOS-XR-install-augmented-act.yang` data model to install the RPMs or bug fixes.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p>Use the <code>install-package-replace</code> RPC on the data model.</p> <p><b>Example:</b></p> <pre>&lt;install-package-replace&gt;   &lt;source-type&gt;remote&lt;/source-type&gt;   &lt;source&gt;remote-repo&lt;/source&gt;   &lt;file&gt;rpm-file-name&lt;/file&gt; &lt;/install-package-replace&gt;</pre>	<p>If the install operation lists the repository reachable through a VRF, you must add the VRF name for the operation to be successful.</p> <pre>&lt;install-package-upgrade xmlns=http://cisco.com/ns/yang/Cisco-IOS-XR-install-augmented-act&gt;    &lt;source-type&gt;ftp&lt;/source-type&gt;    &lt;source&gt;10.105.57.27;vrf1/repoinfra/install_rpms.tar&lt;/source&gt; &lt;/install-package-upgrade&gt;</pre>

## Downgrade Software Version

### Before you begin

Check the FPD status and ensure that all the FPDs are in `CURRENT` state.

```
Router#show hw-module location all fpd
```

If the FPDs are not in `CURRENT` state, upgrade the FPDs.

```
Router#upgrade hw-module location all fpd all
```

After all the FPDs are upgraded, reload the router.

```
Router#reload location all
Proceed with reload? [confirm]
```

After the router reloads, check that all the FPDs are in `CURRENT` state.



**Note** We do not recommend downgrading the FPDs when you downgrade the system.

For more information on upgrading FPDs, see the [Upgrading Field-Programmable Device](#) chapter.

Downgrade the current software version to a previous software release in case of an upgrade failure or based on requirement.

**Step 1** Determine the supported target versions to downgrade from the current version.

**Example:**

```
Router#show install upgrade-matrix
```

View the hardware or software limitations, and bridging SMUs required for the version downgrade. For more information about checking compatibility between the current and target versions, see [View Supported Upgrade and Downgrade Releases](#).

**Downgrading Packages:**

Customers can also downgrade user-specified packages (for example, xr-telnet). This is separate from downgrading the entire XR version, but an ISO for an earlier version of XR is used instead of a newer ISO.

**Note** The downgrade of IOS XR from version 7.3.4 to 7.0.14 for systems with Open PID RP can cause route processor BIOS corruption. We recommend that you do not downgrade below version 7.3.16.

**Step 2** Back up the file system of the current version for recovery purposes.

**Example:**

Copy the running configuration to the harddisk: directory on the router:

```
Router#copy running-config harddisk:/running_config-<mmddyyyy>
```

Copy the running configuration to a remote server:

```
Router#scp harddisk:/ running_config user@<ip-address>:<location>
```

**Step 3** Download the target version from the [Software Download Center](#).

**Step 4** You can either install from the remote repository or copy the ISO image file to the /harddisk: of the router.

**Example:**

```
Router#scp root@<ip-address>:/<dir>/8000-x64-release.iso harddisk:
```

**Step 5** Verify that the MD5 checksum of the copied target file matches with the MD5 value of the source on the [Software Download Center](#).

**Example:**

```
Router#show md5 file /harddisk:/8000-x64-<target-version>.iso
```

**Step 6** Install the base image to downgrade the system.

- **Option 1:** Install ISO without control over reload timing.

```
Router#install replace /harddisk:/8000-x64-release.iso
```

The image is installed, the changes are applied through a reload or a restart of the system, and commits the changes. However, you do not have control over the timing of the reload or restart —these occur as soon as the package operation completes and the system is ready.

If you want to control when your system reloads (management of a network outage), we recommend that you schedule a downgrade window and perform an **install replace** operation, letting the system reload without intervention.

- **Option 2:** Install ISO with control over reload timing.

- a. Install the image.

```
Router#install package replace /harddisk:/8000-x64-release.iso
```

- b. Apply the changes.

```
Router#install apply [reload | restart]
```

You can use either the `reload` or `restart` options based on the file that is installed. To determine whether a `reload` or `restart` is required, check the output of **show install request** command. The output indicates the required actions.

**Step 7** After the base image is downgraded, install the additional packages. For more information, see [Install Additional RPMs and Bug Fixes, on page 2](#).

During an install operation, if the system reboots unexpectedly or an apply by reload results in the system failing to boot, it automatically recovers to its software state before the current transaction.

## Downgrade to a Previously Installed Package

You can downgrade a package to a previously installed version. By default, the subsequent previous version (version previous to the current version) is installed. Also, you can downgrade the software to a specific version of interest. To remove a bug fix RPM from the installed packages, downgrade the package to a version where the fix was not applied.



**Note** While downgrading, you can choose any previous version, including the base version of the RPM. However, when downgrading a bug fix RPMs, ensure that you also consider all dependencies of the current version.

Bug fix RPM is an upgrade to the existing package. The action of removing a bug fix RPM either removes the entire feature, or fails if the package is mandatory.

You can use the **show install fixes deactivate** command to view information related to removing a bug fix. This command provides information such as the package changes, other bug fixes that get deactivate, instructions for adding packages missing for the bug fix removal to be successful, command for removing the bug fix, and any recommendations, if applicable. See the following example:



**Note** You can specify any number of DDTs separated by a space in the **show install fixes deactivate** command. For example, to know the recommendations for removing bug fix for ABC123, DEF456, and GHI789, you can use **show install fixes deactivate ABC123 DEF456 GHI789** command.

```
Router#show install fixes deactivate CSCwc26944
```

```
User-requested DDTs deactivated by this command: CSCwc26944
```

```
All DDTs deactivated by this command: CSCvs01738,CSCwc26944
```

Package changes:

```
xr-8000-core-7.5.2v1.0.5 -> xr-8000-core-7.5.2v1.0.4
xr-8000-fib-ea-7.5.2v1.0.1 -> xr-8000-fib-ea-7.5.2v1.0.0          (missing)
xr-8000-leabaofa-7.5.2v1.0.3 -> xr-8000-leabaofa-7.5.2v1.0.2
xr-8000-mcast-7.5.2v1.0.1 -> xr-8000-mcast-7.5.2v1.0.0          (missing)
xr-8000-utapp-blaze-7.5.2v1.0.2 -> xr-8000-utapp-blaze-7.5.2v1.0.1
xr-fib-7.5.2v1.0.3 -> xr-fib-7.5.2v1.0.2
xr-mcast-7.5.2v1.0.1 -> xr-mcast-7.5.2v1.0.0                    (missing)
xr-ncs5401-core-7.5.2v1.0.14 -> xr-ncs5401-core-7.5.2v1.0.10
xr-ncs5700-core-7.5.2v1.0.14 -> xr-ncs5700-core-7.5.2v1.0.10
xr-ofa-7.5.2v1.0.3 -> xr-ofa-7.5.2v1.0.1
xr-snmp-7.5.2v1.0.1 -> xr-snmp-7.5.2v1.0.0                      (missing)
```

Example install commands:

```
install source any-configured xr-8000-core-7.5.2v1.0.4 xr-8000-fib-ea-7.5.2v1.0.0
xr-8000-leabaofa-7.5.2v1.0.2 xr-8000-mcast-7.5.2v1.0.0 xr-8000-utapp-blaze-7.5.2v1.0.1
xr-fib-7.5.2v1.0.2 xr-mcast-7.5.2v1.0.0 xr-ncs5401-core-7.5.2v1.0.10
xr-ncs5700-core-7.5.2v1.0.10 xr-ofa-7.5.2v1.0.1 xr-snmp-7.5.2v1.0.0
install package downgrade xr-8000-core-7.5.2v1.0.4 xr-8000-fib-ea-7.5.2v1.0.0
xr-8000-leabaofa-7.5.2v1.0.2 xr-8000-mcast-7.5.2v1.0.0 xr-8000-utapp-blaze-7.5.2v1.0.1
xr-fib-7.5.2v1.0.2 xr-mcast-7.5.2v1.0.0 xr-ncs5401-core-7.5.2v1.0.10
xr-ncs5700-core-7.5.2v1.0.10 xr-ofa-7.5.2v1.0.1 xr-snmp-7.5.2v1.0.0
```

**IMPORTANT:** The above commands cannot currently be run because there are missing packages. Put the following packages in an accessible repository.

```
xr-8000-fib-ea-7.5.2v1.0.0
xr-8000-mcast-7.5.2v1.0.0      (optional package)
xr-mcast-7.5.2v1.0.0          (optional package)
xr-snmp-7.5.2v1.0.0
```

**IMPORTANT:** If the optional packages are not available, then they can be completely removed before removing the DDTs using `install package remove xr-8000-mcast-7.5.2v1.0.0`  
`xr-mcast-7.5.2v1.0.0`

The following example shows the package `xr-telnet-7.0.11v1.0.1` is downgraded to `xr-telnet-7.0.11v1.0.0`. The path to source can be a local location or a configured repository.

### Before you begin

Ensure you have access to the previously installed package and its source.

## Step 1 Downgrade the package using one of the following options:

- Downgrade the package where the fix was applied. When multiple older versions of the package are present in the configured repositories, the immediate previous version of the package is installed. Use caution when using this command as the current version of the package is removed completely.

```
Router#install package downgrade xr-telnet
```

Apply the changes.

```
Router#install apply [reload | restart]
```

**Attention** To identify whether to reload the router or restart the affected processes as part of the apply operation, use either **show install history last transaction verbose** command or **show install request** command.

- Install a specific earlier version of the optional package. The changes are applied automatically.

**Attention** An automatic change may trigger a reload of the router depending on the package being downgraded.

```
Router#install source <path-to-source> xr-telnet-7.0.1v1.0.0
```

- Use `install RPC` on the `Cisco-IOS-XR-install-act.yang` data model. Here is an example usage with a local repository:

```
<install>
  <packages>
    <packagename>
      xr-telnet-7.0.11v1.0.0
    </packagename>
  </packages>
  <source>file://<path-to-source></source>
</install>
```

The package version `xr-telnet-7.0.11v1.0.1` is downgraded to `xr-telnet-7.0.11v1.0.0`.

**Step 2** Commit the operation.

**Example:**

```
Router#install commit
```

## Rollback from SONiC to Cisco IOS XR OS

This section describes how to rollback from SONiC OS to Cisco IOS XR software on the router.

### Before you begin

Complete these prerequisites before you install Cisco IOS XR software on a router running SONiC:

- Ensure all SONiC instance are running with FPD version 0.1.

```
root@sonic#cardevent.py --send CV_FPDPUBLISH --slot all
root@sonic#fpd-util.py --getfpd
1.0.0.13_programed 0.1
1.0.0.3_programed 0.1
1.0.0.5_programed 0.1
1.0.0.33_programed 0.1
```

- Ensure that chassis can access the DHCP or PXE server hosting the IOS XR image.
- Check the BIOS version on RP and LC to ensure that the BIOS version required for IOS XR boot operation is available.

**RP:**



```
cisco@sonic#fwutil show status
```

Chassis	Module	Component	Version	Description
8800-RP		BIOS	1-25	BIOS - Basic Input Output System
		Aldrin	1.2	Marvell - Aldrin Ethernet switch
		Aikido	1.35	Aikido - x86 FPGA
		TAM	2.5	TAM FW - x86

**LC:**

```
cisco@sonic#fwutil show status
```

Chassis	Module	Component	Version	Description
8800-LC-48H		BIOS	1-25	BIOS - Basic Input Output System
		Aldrin	-1.65535	Marvell - Aldrin Ethernet switch

- Copy the IOS XR image to router as onie-recovery-x86\_64-cisco\_8000-r0.efi64.pxe image.

**RP:**

```
cisco@sonic#ifconfig eth0 192.0.2.254 netmask 255.255.0.0
```

**Linux:**

```
node$ :scp 8000-x64-7.10.1.iso cisco@192.0.2.254:/ws/
```

**RP:**

```
cp /ws/8000-x64-7.10.1.iso
/opt/cisco/var/tftp/onie-recovery-x86_64-cisco_8000-r0.efi64.pxe
```

**Step 1** Run the migration script.

**Example:**

```
root@sonic#xrmigration.sh
INFO: Staging LC found : 1.0.0.3
INFO: ipxe container start
INFO: ipxe container service already running
INFO: override ONIE image with XR image on staging LC
INFO: Create dummy sonic image as onie-installer.bin on staging LC for SONiC ipxe server
INFO: XR ethswitch upgrade on all LC
INFO: Set migration context at staging LC0
INFO: Set migration context at RP
Reload all cards in 30 sec
Handling chassis reload scenario...
```

After two reloads, the RP reaches the iPXE server to automatically install the IOS XR image.

**Step 2** Reload all line cards.

**Example:**

```
Router#reload boot media network location LC
```

**Step 3** Verify the status of the cards.

**Example:**

```
Router#show platform
```

```
Thu Jun 1 21:38:26.276 UTC
```

Node	Type	State	Config state
0/RP0/CPU0	8800-RP (Active)	IOS XR RUN	NSHUT
0/0/CPU0	88-LC0-36FH	IOS XR RUN	NSHUT

0/1/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/5/CPU0	88-LC0-36FH-M	IOS XR RUN	NSHUT
0/FC0	8808-FC0	OPERATIONAL	NSHUT
0/FT0	8808-FAN	OPERATIONAL	NSHUT
0/FT1	8808-FAN	OPERATIONAL	NSHUT
0/FT2	8808-FAN	OPERATIONAL	NSHUT
0/FT3	8808-FAN	OPERATIONAL	NSHUT
0/PT0	8800-HV-TRAY	OPERATIONAL	NSHUT
0/PT1	8800-HV-TRAY	OPERATIONAL	NSHUT
0/PT2	8800-HV-TRAY	OPERATIONAL	NSHUT

**Step 4** After IOS XR software is installed on both RP and LC, reload all the nodes on the router.

**Example:**

```
Router#reload location all
```

The OS is migrated from SONiC to Cisco IOS XR software.

## Stream Telemetry Data for Install Operations

*Table 1: Feature History Table*

Feature Name	Release Information	Description
Stream Telemetry Data about Install Operations	Release 7.5.2	You can stream telemetry data for install-related details such as active and committed packages, view the progress of install operations, retrieve the image version, and view the error messages with recovery information when an operation fails.

To stream telemetry data that is related to software installation, you must create subscriptions to the sensor paths in the YANG data models. See *Obtain Data Models for Install Operation* for the list of supported data models. For information about establishing a telemetry session and creating subscriptions, see the *Telemetry Configuration Guide for Cisco 8000 Series Routers*.

Stream Telemetry Data About	Description	YANG Path
Summary of active packages	Data is streamed after a successful <b>apply</b> operation. An active package is the software currently running on the system.	Cisco-IOS-XR-install-oper: install/packages/active/summary
Summary of committed packages	Data is streamed after a successful <b>commit</b> operation. A package that is committed remains active following a system reload.	Cisco-IOS-XR-install-oper: install/packages/committed/summary

Stream Telemetry Data About	Description	YANG Path
Status of the last request operation	Data is streamed when starting a new request and also when entering an <code>idle</code> state. If the operation has failed, this includes error messages along with recovery state.	Cisco-IOS-XR-install-oper: install/request
Image version and GISO label	Data is streamed after a successful <b>apply</b> operation.	Cisco-IOS-XR-install-oper: install/version
Packaging information	Data is streamed at the start and end of a packaging operation.	Cisco-IOS-XR-install-augmented-oper: install/history/latest-packaging-operation
Atomic information	Data is streamed at the start and end of <b>apply</b> operation.	Cisco-IOS-XR-install-augmented-oper: install/history/latest-atomic-change
Transaction information	<p>Data is streamed at the start, in progress, and end of a <b>commit</b> operation.</p> <p><b>Note</b> After a transactional rollback, some of the data such as summary of active packages, image version can change. However, telemetry events are not sent after the reload operation.</p>	Cisco-IOS-XR-install-augmented-oper: install/history/latest-transaction

