



# Upgrade Software and FPD

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- [Plan the Software Upgrade](#) , on page 1
- [Upgrade the Software](#), on page 3
- [Verify the Software Upgrade](#), on page 11
- [NCS 1020 FPD](#), on page 12

## Plan the Software Upgrade

Before you upgrade the software version, prepare the NCS 1020 to ensure that the upgrade process is seamless.

This section describes the following processes to prepare your NCS 1020 for an upgrade:

### Backup Current Configuration

The ability to recover from a disaster is an essential part of any system maintenance plan. We recommend you backup the configurations in a secure remote location and verify that the transfer is a success, both before and after upgrade.

#### Procedure

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**Step 1** Create a backup of the running configuration to one of the following locations based on your requirement:

- Copy the configuration to the `harddisk:` location on the NCS 1020.

```
RP/0/RP0/CPU0:ios#copy running-config harddisk:/running_config-<mmddyyyy>
Destination filename [running_config-<mmddyyyy>]?
Building configuration...
[OK]
Verifying checksum... OK (0xDCf1)
```

- Copy the configuration to a remote server. Ensure the NCS 1020 has root access to the server.

```
RP/0/RP0/CPU0:ios#scp harddisk:/ running_config-<mmddyyyy>
user:password@<ip-address>:<location>
```

**Step 2** Verify that the configuration is backed up.

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## Check System Stability

System stability checks are essential to measure the efficiency and ability of an upgrade to function over an extended period.

At the EXEC prompt, execute the following commands to assess basic system stability checks before and after the software upgrade.

Command	Reason	Workaround
<code>show platform</code>	Verify that all nodes are in IOS XR RUN/OPERATIONAL state	NA
<code>show install active summary</code>	Verify that the proper set of packages are active	NA
<code>show install committed summary</code>	Verify that the proper set of committed packages are same as active	Execute 'install commit' command
<code>clear configuration inconsistency</code>	Verify/fix configuration file system	NA
<code>show hw-module fpd</code>	Ensure all the FPD versions status are CURRENT	Execute <code>upgrade hw-module fpd</code> command
<code>show media</code>	Display the current state of the disk storage media	To free up space, remove older .iso image files and bug fix .tar files.
<code>show inventory</code>	Show chassis inventory information	NA

## Obtain Install Files

You can obtain the install files based on one of the following options that is best suited to your network:

- **Base ISO and Optional RPMs:** You can upgrade the software through the standard method where you install the ISO followed by the required RPMs.
- **Golden ISO:** You can build a customized golden ISO (GISO) image with the base ISO and the required RPMs to automatically upgrade the software.

## Standard ISO and RPMs




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**Note** Contact your Cisco Systems technical support representative for NCS1020 ISO image with required IOS-XR version and optional RPM's.

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## Golden ISO



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**Note** Contact your Cisco Systems technical support representative for NCS1020 Golden GIOS image creation with required IOS-XR version and optional RPM's information.

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### *Create Repository to Access Install Files*

A **Repository** is a directory where the ISO, RPMs, and their metadata are downloaded. The package manager uses this repository to query the packages.

The repository can either be created locally on the NCS 1020, or on a remote location that can be accessed through FTP, HTTP, or HTTPS. In a repository, you can create directories based on different Cisco IOS XR platforms, releases or both. You can create and use multiple repositories. The files to be installed can saved in the local repository, remote repository or a combination of both.



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**Note** The Golden ISO (GISO) method does not require you to create a repository. However, you can still install the GISO from a remote repository.

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**Important** Each package is named based on its name, version, software release, and architecture. Hence, any packages that have these attributes in common and differ only by platform are indistinguishable. We recommend that you create different repositories for different platforms and releases.

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## Upgrade the Software

This section provides information about the processes involved in upgrading the IOS XR software on your Cisco NCS 1020.

The Cisco IOS XR software can be upgraded using one of these methods:

### Upgrade NCS 1020 Using CLI Commands

There are two options to upgrade your Cisco IOS XR software using the Command Line Interface (CLI):

- Base ISO and optional RPMs
- Golden ISO (GISO)

**Before you begin**

**Note** Ensure that you have adequate disk space. Run the **fsck** command to check the status of the file system, for a successful IOS XR upgrade. You must run the **fsck** command in the System Admin EXEC mode to install a System Admin package, and in the XR EXEC mode to install the XR package. All install commands are applicable in both the System Admin EXEC mode and in XR EXEC mode. System Admin install operations are done from XR EXEC mode.



**Note** If an interface on a NCS 1020 does not have a configuration and is brought up by performing no-shut operation, then upon NCS 1020 reload, the interface state changes to **admin-shutdown** automatically.

Perform a system upgrade by installing a base package—Cisco IOS XR Unicast Routing Core Bundle.

**Upgrade NCS 1020 Using YANG Data Models**

Data models are a programmatic way of configuring and collecting operational data of a network device. They replace the process of manual configuration and can be used to automate configuration tasks across heterogeneous devices in a network.

**Access Install-related Data Models**

You can use YANG data models to install and upgrade the NCS 1020. The data models are packaged with the release image in the `/pkg/yang` directory.

**Procedure**

**Step 1** Navigate to the directory in the release image where the YANG data models are available.

**Example:**

```
RP/0/RP0/CPU0:ios#run
[node_RP0_CPU0:~]$cd /pkg/yang
```

**Step 2** View the list of install-related data models on your NCS 1020.

**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
```

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

Date Model	Description
Cisco-IOS-XR-um-install-cfg	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 NCS 1020.
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 NCS 1020 from a source location.

You can also access the supported data models to install Cisco IOS XR software from the [Github](#) repository.

## Use Manageability Agent to Connect to NCS 1020

Use a manageability agent like NETCONF or gRPC to connect and communicate with the NCS 1020. You can send Remote Procedure Calls (RPC) requests to configure or retrieve operational data from the NCS 1020. The NCS 1020 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 parameters of a container and leaf in the data model. For more information about understanding the data model structure and using data models, see the .

## Generate RPC Messages to Install IOS XR Image

### Before you begin

Not all software versions are supported as the target upgrade software version. You must review the supported upgrade and downgrade paths, hardware or software limitations, and bridging SMUs required for the version.

## Procedure

- Step 1** Use the `install-replace` RPC on the `Cisco-IOS-XR-install-act.yang` data model to upgrade the NCS 1020(s).
- Step 2** Configure the values of the `source-type`, `source`, and `file` parameters.
- Step 3** Send `edit-config` NETCONF RPC request using the data model to configure the repository. Edit the values in the `repositories` parameters and send this request to the NCS 1020 from the client.

### Example:

In this example, the request is to install the `ncs1010-x64-24.2.1.iso` image from the local repository.

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <edit-config>
    <target>
      <candidate/>
    </target>
    <config>
      <install xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-install-cfg">
        <repositories>
          <repository>
            <id>repo_local</id>
            <url>file:///harddisk:/repo/</url>
            <description>local repository</description>
          </repository>
        </repositories>
      </install>
    </config>
  </edit-config>
</rpc>
```

View the RPC response received from the NCS 1020.

```
<?xml version="1.0"?>
<rpc-reply message-id="101" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <ok/>
</rpc-reply>
```

In the response, the NCS 1020 acknowledges the configuration and sends a reply to the client with an `ok` message.

- Step 4** Apply the changes to activate the ISO on the NCS 1020 using RPCs by using the `install-apply` RPC on the `Cisco-IOS-XR-install-augmented-act.yang` data model and send the RPC from the client to the NCS 1020.

### Example:

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <install-apply xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-install-augmented-act">
    <apply-method>least-impactful</apply-method>
  </install-apply>
</rpc>
```

View the RPC response received from the NCS 1020.

```
<?xml version="1.0"?>
<rpc-reply message-id="101" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <op-id xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-install-augmented-act">2.1</op-id>
</rpc-reply>
```

In the response, the NCS 1020 sends an ID indicating that the changes are applied successfully.

- Step 5** Verify that the software upgrade is successful. Use the `get` RPC on `Cisco-IOS-XR-install-oper.yang` data model. Edit the `install` parameter and send an RPC request from the client to the NCS 1020.

**Example:**

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <get>
    <filter>
      <install xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-install-oper">
        <request/>
      </install>
    </filter>
  </get>
</rpc>
```

View the RPC response received from the NCS 1020.

```
<?xml version="1.0"?>
<rpc-reply message-id="101" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <data>
    <install xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-install-oper">
      <request>
        <request>install commit</request>
        <state>success</state>
        <timestamp>2022-06-27 T02:52:07Z</timestamp>
        <operation-id>26</operation-id>
      </request>
    </install>
```

The state of the install operation in the RPC response indicates that the software and the RPMs are upgraded successfully.

**What to do next**

Perform preliminary checks to verify that the NCS 1020 is upgraded successfully.

## Install IOS XR Image

### Install ISO and RPMs

Use this procedure to install the base ISO and optional RPMs.

**Before you begin**

Ensure you have created a repository locally on the NCS 1020 or on a remote server which is reachable over HTTP, HTTPS or FTP. This repository will be used to copy the required RPMs. Ensure the NCS 1020 can reach the repository server over the Management Ethernet interface. For information about creating the repository to host the RPMs, see [Create Repository to Access Install Files, on page 3](#).

**Procedure**

**Step 1** You can either install from the remote repository or copy the ISO image file to the /harddisk: of the NCS 1020.

**Example:**

```
RP/0/RP0/CPU0:ios#scp root@<ip-address>:<dir>/ncs1010-x64-24.2.1.iso harddisk:
```

**Step 2** To verify data integrity, verify the md5 checksum of the copied file with the original MD5 values on CCO.

**Example:**

```
RP/0/RP0/CPU0:ios#show md5 file /harddisk:/ncs1010-x64-24.2.1.iso
```

**Step 3** Install the base image to upgrade the system.

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

```
RP/0/RP0/CPU0:ios#install replace /harddisk:/ncs1010-x64-24.2.1.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 an upgrade window and perform an **install replace**, letting the system reload without intervention.

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

- a. Install the image.

```
RP/0/RP0/CPU0:ios#install package replace /harddisk:/ncs1010-x64-24.2.1.iso
```

- b. Apply the changes.

```
RP/0/RP0/CPU0:ios#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 4** After the base image is upgraded, install the additional packages.

If a system fails to boot successfully, or reboots unexpectedly when the package is undergoing a version change, the system is automatically recovered to its old software state.

**Note**

If you perform a manual or automatic system reload without completing the transaction with the **install commit** command, the action will revert the system to the point before the install transaction commenced, including any configuration changes. Only the log is preserved for debugging.

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## Install Golden ISO

Use this procedure to install the Golden ISO (GISO) that contains the base ISO and a customized list of optional RPMs that you built using the *gisobuild.py* tool. For details, see Build Customized Golden ISO Image.

Golden ISO (GISO) upgrades the NCS 1020 to a version that has a predefined list of bug fixes (sometimes also called software maintenance updates) with a single operation.

To update the system to the same release version with a different set of bug fixes:

- Create a GISO with the base version and all the bug fixes you require
- Use the **install replace** or **install package replace** commands to install the GISO.

The GISO can include bridging bug fixes for multiple source releases, and installs only the specific bridging bug fixes 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.
- To meet the prerequisite requirements of a new release version that were not met by the earlier version.




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**Note** The **install replace** command is supported only with GISO, but not with .rpm packages directly.

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## Procedure

**Step 1** Copy the GISO image file to either the /harddisk: of the NCS 1020 or a repository based on your requirement.

### Example:

In this example, the image is copied to the /harddisk: of the NCS 1020.

```
RP/0/RP0/CPU0:ios#scp root@<ip-address>:/auto/tftp-test/ncs1010-x64-24.2.1.iso harddisk:
```

**Step 2** Install the GISO.

- **Option 1:** Install GISO without control over reload timing.
  - a. Install GISO to upgrade to a new release, add or remove bugfixes or optional packages.

```
RP/0/RP0/CPU0:ios#install replace source-location/giso-name.iso
```

The *source-location* can be one of the following locations based on step 1.

- Local path to the GISO—files located in or under /var/xr/disk1/, /harddisk:/ or /misc/disk1/
- Remote repository—ftp://<server>[;<vrf>]/<remote\_path> or http://<server>[;<vrf>]/<remote\_path>

This command runs the replace operation and applies the new version via NCS 1020 restart or reload, whichever is least impactful, given the change. For example, if you have a GISO that is the same as your base image except one bugfix, and that bugfix can be applied by process restart, the command will install the bugfix and apply by restart, no NCS 1020 reload occurs. However, you do not have control over the timing of the reload or restart—these operations occur as soon as the packaging is complete and the system is ready. If you want to control the timing of system reloads, we recommend that you schedule an upgrade window and run the **install replace** command, allowing the system to reload without manual intervention or network impact.

- b. [Optional] Specify **reload** keyword to force reload for all operations. This may be useful if you want a reliable flow.
  - c. [Optional] Specify **commit** keyword for the install, apply and commit operations to be performed without user intervention.
- **Option 2:** Install GISO with control over reload timing.
    - a. Install GISO to upgrade to a new release, add or remove bugfixes or optional packages. The functionality is similar to **install replace** command, except that the staging of packaging changes is performed using this command.

```
RP/0/RP0/CPU0:ios#install package replace source-location/giso-name.iso
```

The **install package replace** command does not apply the changes.

**b. Apply the changes.**

```
RP/0/RP0/CPU0:ios#install apply [reload | restart]
```

You can use either the `reload` or `restart` options based on the change that is installed. You can only apply the changes by restarting the software if the difference between the GISO being installed and the running image is minimal such as bugfixes or package updates.

To determine whether a `reload` or `restart` is required, check the output of **show install request** command. The output indicates the required actions.

**Note**

A GISO label is a string that identifies a GISO. Any install operation, such as adding or removing a package or modifying the software image (replace or package replace) will change the custom label to a system-generated default label. For example:

```
RP/0/RP0/CPU0:ios#show install active summary
Thu May 30 19:28:28.720 IST
Active Packages:   XR: 153   All: 1321
Label:             24.2.1.40I
XR Software Hash:  2cda979eb34cdbbfb204a5d4e080c4939d2e6311c044fcf4f634f8fe26fa3f38
```

Optional Packages	Version
-----	-----
xr-bgp	24.2.1.40Iv1.0.0-1
xr-healthcheck	24.2.1.40Iv1.0.0-1
xr-ipsla	24.2.1.40Iv1.0.0-1
xr-is-is	24.2.1.40Iv1.0.0-1
xr-lldp	24.2.1.40Iv1.0.0-1
xr-mpls-oam	24.2.1.40Iv1.0.0-1
xr-netsim	24.2.1.40Iv1.0.0-1
xr-olc	24.2.1.40Iv1.0.0-1
xr-ospf	24.2.1.40Iv1.0.0-1
xr-perfmgmt	24.2.1.40Iv1.0.0-1
xr-track	24.2.1.40Iv1.0.0-1

In this example, the software image is modified to remove the CDP package.

```
RP/0/RP0/CPU0:ios#install package remove xr-cdp
```

```
Install remove operation 39.1.1 has started
Install operation will continue in the background
...
Packaging operation 39.1.1: 'install package remove xr-cdp' completed without error
```

**Apply the changes.**

```
RP/0/RP0/CPU0:ios#install apply
```

```
Thu Feb 02 11:13:09.015
```

Once the packaging dependencies have been determined, the install operation may have to reload the system.

If you want more control of the operation, then explicitly use 'install apply restart' or 'install apply reload' as reported by 'show install request'.

```
Continue? [yes/no]:[yes] yes
```

```
RP/0/RP0/CPU0:Feb 02 11:13:12.771 : instorch[404]: %INSTALL-6-ACTION_BEGIN : Apply by restart 39.1 started
```

```
Install apply operation 39.1 has started
```

```
Install operation will continue in the background
```

View the software version.

```
RP/0/RP0/CPU0:ios#show version
Wed Jun 12 14:43:12.934 IST
Cisco IOS XR Software, Version 24.2.1 LNT
Copyright (c) 2013-2024 by Cisco Systems, Inc.

Build Information:
  Built By       : cisco
  Built On      : Tue Jun 11 13:58:26 UTC 2024
  Build Host    : iox-ucs-033
  Workspace     : /auto/srcarchive11/prod/24.2.1/ncs1010/ws/
  Version       : 24.2.1
  Label        : 24.2.1
cisco NCS1010 (C3758R @ 2.40GHz)
cisco NCS1020-SA (C3758R @ 2.40GHz) processor with 32GB of memory
NCS 1020 Chassis
```

The `GIS01` custom label is replaced with the label `24.2.1` generated by the system.

## Verify the Software Upgrade

This section provides information about the processes involved in verifying the upgraded software on your Cisco NCS 1020.

This section contains the following topics:

### Check System Stability

System stability checks are essential to measure the efficiency and ability of an upgrade to function over an extended period.

At the EXEC prompt, execute the following commands to assess basic system stability checks before and after the software upgrade.

Command	Reason	Workaround
<code>show platform</code>	Verify that all nodes are in <code>IOS XR RUN/OPERATIONAL</code> state	NA
<code>show install active summary</code>	Verify that the proper set of packages are active	NA
<code>show install committed summary</code>	Verify that the proper set of committed packages are same as active	Execute 'install commit' command
<code>clear configuration inconsistency</code>	Verify/fix configuration file system	NA
<code>show hw-module fpd</code>	Ensure all the FPD versions status are <code>CURRENT</code>	Execute <code>upgrade hw-module fpd</code> command
<code>show media</code>	Display the current state of the disk storage media	To free up space, remove older .iso image files and bug fix .tar files.

Command	Reason	Workaround
<a href="#">show inventory</a>	Show chassis inventory information	NA

## NCS 1020 FPD

A Field Programmable Device (FPD) refers to any programmable hardware device on a chassis, which includes a Field Programmable Gate Array (FPGA). NCS 1020 uses several FPDs that are necessary for chassis, route processor, line cards, and power modules to function properly.



**Note** If the FPD in a given SSD is not supported by the current IOS XR software release, the status is not displayed.

The following table lists the NCS 1020 FPDs that are distributed across route processor (RP), power modules (PM), line cards (LC), and Rack.

**Table 1: NCS 1020 FPDs**

Location	FPDs
RP	<ul style="list-style-type: none"> <li>• ADMConfig</li> <li>• CpuFpga</li> <li>• CpuFpgaGolden</li> <li>• BIOS</li> <li>• BIOS-Golden</li> <li>• SsdIntelS4510</li> <li>• SsdMicron5300</li> <li>• SsdMicron5400</li> <li>• TamFw</li> <li>• TamFwGolden</li> </ul>
PM0 and PM1	<ul style="list-style-type: none"> <li>• PO-PrimMCU</li> <li>• PO-SecMCU</li> </ul>

Location	FPDs
LC	<ul style="list-style-type: none"> <li>• ILA</li> <li>• OLT</li> <li>• Raman-1</li> <li>• Raman-2</li> <li>• CpuModFw</li> <li>• OptModFw</li> </ul>
Rack	<ul style="list-style-type: none"> <li>• IoFpgaLow</li> <li>• IoFpgaUp</li> <li>• IoFpgaLowGolden</li> <li>• IoFpgaUpGolden</li> <li>• ADMCONFIG</li> <li>• SsdIntelSC2KB</li> <li>• SsdMicron5400</li> </ul>

Golden FPDs serve as backup FPDs for the primary FPDs. For example, **BIOS-Golden** is the backup Golden FPD for the **BIOS** primary FPD. If a primary FPD is corrupted, NCS 1020 boots with the corresponding Golden FPD. The Golden FPDs cannot be upgraded.

**Retrieve FPD Information**

There are multiple types of FPDs for each type of module. The **show hw-module fpd** command provides information about each FPD.

```
RP/0/RP0/CPU0:ios#sh hw-module fpd
Wed Apr 24 15:54:04.551 IST
```

```
Auto-upgrade:Enabled
Attribute codes: B golden, P protect, S secure, A Anti Theft aware
```

Location Reload Loc	Card type	HWver	FPD device	ATR Status	FPD Versions	
					Running	Programd
0/RP0/CPU0 NOT REQ	NCS1010-CTR2-B-K9	0.1	ADMCONFIG	CURRENT	1.00	1.00
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	BIOS	S CURRENT	5.20	5.20
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	BIOS-Golden	BS CURRENT		1.90
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	CpuFpga	S CURRENT	1.06	1.06
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	CpuFpgaGolden	BS CURRENT		1.02
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	SsdMicron5300	S CURRENT	0.01	0.01
0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	TamFw	S CURRENT	9.07	9.07

0/RP0/CPU0 0/RP0	NCS1010-CTR2-B-K9	0.1	TamFwGolden	BS	CURRENT		9.06
0/PM0 NOT REQ	NCS1K4-AC-PSU-2	1.0	PO-PrimMCU		CURRENT	1.03	1.03
0/PM0 NOT REQ	NCS1K4-AC-PSU-2	1.0	PO-SecMCU		CURRENT	1.05	1.05
0/PM1 NOT REQ	NCS1K4-AC-PSU-2	1.0	PO-PrimMCU		CURRENT	1.03	1.03
0/PM1 NOT REQ	NCS1K4-AC-PSU-2	1.0	PO-SecMCU		CURRENT	1.05	1.05
0/0/NXR0 NOT REQ	NCS1K-E-OLT-C	1.0	OLT	S	CURRENT	3.14	3.14
0/2/NXR0 NOT REQ	NCS1K14-CCMD-16-C	1.0	CpuModFw	S	CURRENT	42.14	42.14
0/2/NXR0 NOT REQ	NCS1K14-CCMD-16-C	1.0	OptModFw	S	CURRENT	20.02	20.02
0/3/NXR0 NOT REQ	NCS1K14-CCMD-16-C	1.0	CpuModFw	S	CURRENT	42.14	42.14
0/3/NXR0 NOT REQ	NCS1K14-CCMD-16-C	1.0	OptModFw	S	CURRENT	20.02	20.02
0/Rack NOT REQ	NCS1020-SA	0.1	ADMCONFIG		CURRENT	1.00	1.00
0/Rack NOT REQ	NCS1020-SA	0.1	IoFpgaLow	S	CURRENT	1.08	1.08
0/Rack NOT REQ	NCS1020-SA	0.1	IoFpgaLowGolden	BS	CURRENT		0.07
0/Rack NOT REQ	NCS1020-SA	0.1	IoFpgaUp	S	CURRENT	1.08	1.08
0/Rack NOT REQ	NCS1020-SA	0.1	IoFpgaUpGolden	BS	CURRENT		0.06
0/Rack 0/Rack	NCS1020-SA	0.1	SsdMicron5400	S	CURRENT	0.02	0.02

The following table describes the significant fields in the output of the **show hw-module fpd** command.

**Table 2: Description of Fields in show hw-module fpd Command**

Field	Description
Location	Location of the FPD.
Card type	PID of the modules such as chassis, card, CPU, and PSU.
HWver	Hardware version where the FPD resides.
FPD device	Name of the FPD.
ATR	Attribute codes. The possible values are: <ul style="list-style-type: none"> <li>• B - Golden Image</li> <li>• S - Secure Image</li> <li>• P - Protect Image</li> </ul> The attribute code of the primary FPDs is S and the Golden FPDs is BS.

Field	Description
Status	Status of the FPD. See <a href="#">Table 3: Description of FPD Status Values in show hw-module fpd Command</a> , on page 15.
Running	FPD image version that has been activated and currently running in the FPD device.
Programd	FPD image version that has been programmed into the FPD device, but might not be activated.
Reload Loc	Indicates whether reload of the location is required or not.

The following table describes the possible values of the Status field in the output of the **show hw-module fpd** command.

**Table 3: Description of FPD Status Values in show hw-module fpd Command**

FPD Status	Description
NOT READY	The driver that owns the FPD device has not initialized the FPD client to handle this device.
CURRENT	FPD version is up to date and upgrade is not required.
NEED UPGD	Upgrade is required for this FPD. Check the output of the <b>show fpd package</b> command to determine the recommended FPD version.
UPGD PREP	FPD is preparing for upgrade.
IN QUEUE	Upgrade of this FPD is in queue.
UPGD SKIP	FPD upgrade is not required. For example, <ul style="list-style-type: none"> <li>• FPD version is up to date and compatible.</li> <li>• FPD image is protected.</li> </ul>
UPGRADING	FPD upgrade started and the driver did not report the upgrade progress information yet.
%UPGD	Percentage of FPD upgrade completion.
RLOAD REQ	FPD upgrade is successfully completed and the FPD must be reloaded for the new version to take effect.
UPGD FAIL	FPD upgrade has failed. Check the syslog for failure reason. It could be a timeout or a failure that is reported by the driver.
UPGD DONE	FPD upgrade is successfully completed.

## Verify if an FPD Upgrade is Required

### Procedure

**Step 1** Use the `show hw-module fpd` command to check whether all the FPDs are in the Current state.

If the status of any FPD is **NEED UPGD**, then the upgrade is required for that FPD.

**Step 2** Use the `show fpd package` command to determine the FPDs that are supported with the current software release and the minimum hardware requirements for each FPD.

```
RP/0/RP0/CPU0:ios#show fpd package
Wed Apr 24 15:59:13.897 IST
```

```
=====
                                Field Programmable Device Package
                                =====
Card Type          FPD Description          Req   SW   Min Req  Min Req
=====          =====          =====
                                Reload Ver   SW Ver   Board Ver
=====          =====          =====
NCS1010-CTR2-B-K9  ADMCONFIG                NO     1.00   1.00     0.1
                   BIOS                    YES     5.20   5.20     0.0
                   BIOS-Golden              YES     5.10   0.01     0.0
                   CpuFpga                  YES     1.06   1.06     0.0
                   CpuFpgaGolden           YES     1.02   0.01     0.0
                   SsdIntelS4510            YES    11.32  11.32     0.0
                   SsdMicron5300            YES     0.01   0.01     0.0
                   SsdMicron5400            YES     0.02   0.02     0.0
                   TamFw                    YES     9.07   9.07     0.0
                   TamFwGolden           YES     9.06   0.01     0.0
-----
NCS1010-CTR2-K9    ADMCONFIG                NO     1.00   1.00     0.1
                   BIOS                    YES     5.20   5.20     0.0
                   BIOS-Golden              YES     5.10   0.01     0.0
                   CpuFpga                  YES     1.06   1.06     0.0
                   CpuFpgaGolden           YES     1.02   0.01     0.0
                   SsdIntelS4510            YES    11.32  11.32     0.0
                   SsdMicron5300            YES     0.01   0.01     0.0
                   SsdMicron5400            YES     0.02   0.02     0.0
                   TamFw                    YES     9.07   9.07     0.0
                   TamFwGolden           YES     9.06   0.01     0.0
-----
NCS1020-SA         ADMCONFIG                NO     1.00   1.00     0.0
                   IoFpgaLow                NO     1.08   1.08     0.0
                   IoFpgaLowGolden         NO     0.07   0.01     0.0
                   IoFpgaUp                  NO     1.08   1.08     0.0
                   IoFpgaUpGolden         NO     0.06   0.01     0.0
                   SsdIntelSC2KB            YES     1.20   1.20     0.0
                   SsdMicron5400            YES     0.02   0.02     0.0
-----
NCS1K-E-ILA-2R-C  ILA                      NO     3.14   3.14     0.1
                   ILA                      NO     0.28   0.28    99.1
                   Raman-1                  NO     3.14   3.14     0.1
                   Raman-1                  NO     0.28   0.28    99.1
                   Raman-2                  NO     3.14   3.14     0.1
                   Raman-2                  NO     0.28   0.28    99.1
-----
NCS1K-E-ILA-R-C   ILA                      NO     3.14   3.14     0.1
                   ILA                      NO     0.28   0.28    99.1
=====
```



	Raman-1	NO	3.14	3.14	0.1
	Raman-1	NO	0.28	0.28	99.1
NCS1K-E-ILA-R-C-2	ILA	NO	3.14	3.14	0.1
	ILA	NO	0.28	0.28	99.1
	Raman-2	NO	3.14	3.14	0.1
	Raman-2	NO	0.28	0.28	99.1
NCS1K-E-OLT-C	OLT	NO	3.14	3.14	0.1
	OLT	NO	0.28	0.28	99.1
NCS1K-E-OLT-L	OLT	NO	3.12	3.12	0.1
NCS1K-E-OLT-R-C	OLT	NO	3.14	3.14	0.1
	OLT	NO	0.28	0.28	99.1
	Raman-1	NO	3.14	3.14	0.1
	Raman-1	NO	0.28	0.28	99.1
NCS1K-ILA-2R-C	ILA	NO	3.14	3.14	0.1
	ILA	NO	0.28	0.28	99.1
	Raman-1	NO	3.14	3.14	0.1
	Raman-1	NO	0.28	0.28	99.1
	Raman-2	NO	3.14	3.14	0.1
	Raman-2	NO	0.28	0.28	99.1
NCS1K-ILA-C	ILA	NO	3.14	3.14	0.1
	ILA	NO	0.28	0.28	99.1
NCS1K-ILA-L	ILA	NO	3.12	3.12	0.1
NCS1K-ILA-R-C	ILA	NO	3.14	3.14	0.1
	ILA	NO	0.28	0.28	99.1
	Raman-1	NO	3.14	3.14	0.1
	Raman-1	NO	0.28	0.28	99.1
NCS1K-OLT-C	OLT	NO	3.14	3.14	0.1
	OLT	NO	0.28	0.28	99.1
NCS1K-OLT-L	OLT	NO	3.12	3.12	0.1
NCS1K-OLT-R-C	OLT	NO	3.14	3.14	0.1
	OLT	NO	0.28	0.28	99.1
	Raman-1	NO	3.14	3.14	0.1
	Raman-1	NO	0.28	0.28	99.1
NCS1K14-CCMD-16-C	CpuModFw	NO	42.14	42.14	0.0
	OptModFw	NO	20.02	20.02	0.0
NCS1K14-CCMD-16-L	CpuModFw	NO	42.14	42.14	0.0
	OptModFw	NO	20.02	20.02	0.0
NCS1K4-AC-PSU-2	PO-PriMCU	NO	1.03	1.03	0.1
	PO-SecMCU	NO	1.05	1.05	0.1

The following table describes the fields in the output of the **show fpd package** command.

**Table 4: Description of Fields in show fpd package Command**

Field	Description
Card Type	PID of the modules such as chassis, card, CPU, and PSU.
FPD Description	Description of the FPD.

Field	Description
Req Reload	Determines whether reload is required to activate the FPD image.
SW Ver	Recommended FPD software version for the associated module running the current Cisco IOS XR Software.
Min Req SW Ver	Minimum required FPD software version to operate the module.
Min Req Board Ver	Minimum required hardware version for the associated FPD. A minimum hardware requirement of version 0.0 indicates that all the hardware can support this FPD version.

FPD can be upgraded using two methods:

- [Upgrade FPDs Manually](#)
- [Upgrade FPDs Automatically](#)

## Upgrade FPDs Manually

Use the following procedure to upgrade the FPDs manually.



**Note** The Golden FPDs cannot be upgraded using the CLI.

### Procedure

- Step 1** Use the **show hw-module fpd** command to display information about the current FPD version.  
You can use this command to determine if you must upgrade the FPD.
- Step 2** Use the **show alarms brief system active** command to display the active alarms.  
You must upgrade the FPD when the **One Or More FPDs Need Upgrade Or Not In Current State** alarm is present.
- Step 3** Use the **upgrade hw-module location [location-id] fpd [fpd name]** command to upgrade a specific FPD.  
After upgrading the FPD, the user must wait for upgrade completion. The progress of the FPD upgrade can be monitored using the **show hw-module fpd** command.

#### Example:

```
RP/0/RP0/CPU0:ios#upgrade hw-module location 0/Rack fpd IoFpgaLow
```

#### Note

The FPDs of power modules belong to 0/PM0 and 0/PM1 locations. The FPDs belonging to both the PM locations cannot be simultaneously upgraded.

- Step 4** Use the **reload location** *location-id* to reload the FPDs belonging to a specific location with the new version. The **Reload Loc** field in the output of **show hw-module fpd** command indicates whether the reload is required or not.
- Example:**
- ```
RP/0/RP0/CPU0:ios#reload location 0/RP0/CPU0
```
- Step 5** (Optional) Use the **upgrade hw-module location all fpd all** command to upgrade all the FPDs at once.
- Step 6** (Optional) Use the **upgrade hw-module [location [location-id | all]] fpd [fpd name] | all** command to upgrade a specific FPD, all the FPDs, or the FPDs belonging to a specific location.

**Example:**

```
RP/0/RP0/CPU0:ios#upgrade hw-module location all fpd all
```

**Note**

The FPDs of power modules and SSDs cannot be forcefully upgraded.

---

## Upgrade FPDs Automatically

The automatic FPD upgrade upgrades the FPD version of all the modules to the latest version. When automatic FPD upgrade is enabled, all the FPDs (except the Golden FPDs) that are in NEED UPGD status are upgraded to CURRENT status during the software upgrade.

In NCS 1020, automatic FPD upgrade is enabled by default.

### Procedure

---

Use the following commands to disable automatic FPD upgrade.

**Example:**

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#fpd auto-upgrade disable
RP/0/RP0/CPU0:ios(config)#commit
RP/0/RP0/CPU0:ios(config)#end
```

---

