Upgrade Software and FPD

This chapter describes the procedures to upgrade software and FPDs.

Upgrade Software

Upgrading the software is the process of installing a new version of the Cisco IOS XR operating system on NCS 1010. NCS 1010 is preinstalled with the Cisco IOS XR image. However, you can install a new version to keep features up to date. You can perform the software upgrade operation using an ISO image from the XR mode.

Before you begin

- Configure Management Interface
- Copy the ISO image to be installed either on the NCS 1010 hard disk or on a network server to which NCS 1010 has access.

Step 1 Execute one of these commands:

- **install replace /harddisk:**/*iso-image-name*
- **install package replace** *<ftp or http or https protocol>/package_path/ filename1 filename2 ...*

Note The **install package replace** command upgrades the ISO image but doesn't reload the RP automatically. But the **install replace** command upgrades the ISO image and reloads the RP.

Example:

```
RP/0/RP0/CPU0:ios#install replace /harddisk:/ncs1010-x64.iso
Mon Jul  4 10:15:07.697 UTC
Once the packaging dependencies have been determined, the install operation may have to reload the
system.
If you want to control the timing of system reload, you must not continue, but use the 'install
package replace' command instead, followed by 'install apply'.
Continue? [yes/no]:[yes] yes
```

```
Install replace operation 1.1 has started
Install operation will continue in the background
.....................
.....................
ios con0/RP0/CPU0 is now available
```

Installs the new ISO image from the harddisk or from the network server. The install operation takes between 20–40 minutes to complete.

Note Boot time FPD upgrade happens before XR boot. All the FPDs belonging to the RP location are upgraded during the boot time FPD upgrade.

Note Automatic FPD upgrade is enabled by default.. When the automatic FPD upgrade is enabled, the install operation also upgrades the FPDs (except the Golden FPDs) that need to be upgraded.

Step 2 **show install request**

Example:

```
RP/0/RP0/CPU0:ios#show install request
Mon May  9 15:16:27.486 UTC
User request: install replace /harddisk:/ncs1010-x64.iso
Operation ID: 1.1
State:        In progress since 2022-05-09 15:13:08 UTC
Current activity:    Package add or other package operation
Next activity:       Apply
Time started:        2022-05-09 15:14:34 UTC
Timeout in:          38m 6s
Locations responded: 0/1
Location          Packaging operation stage Notification Phase Clients responded
----------------- ------------------------- ------------------ -----------------
0/RP0/CPU0        Package operations        None in progress                N/A
```

Displays the current status of the install operation.

When the install operation completes successfully, the device automatically reloads.

Note In case of the **install package replace** command, you'll be prompted to enter the next command (**install apply reload** command).

Step 3 **install commit**

Example:

```
RP/0/RP0/CPU0:ios#install commit
Mon May  9 15:24:28.581 UTC
Install commit operation 1 has started
Install operation will continue in the background
```

Commits the new ISO image.

Step 4 **show install committed**

Example:

```
RP/0/RP0/CPU0:ios#show install committed
Mon May  9 15:24:55.672 UTC
Software Hash: 9dfe3b29058bd85eccc3910fb6ea66bf7bf9ccaa9e7ef38c8e3499ab1d0e91f8
Package                           Version
--------------------------------------------------- ---------------------------
xr-aaa                            7.9.1
xr-acl                            7.9.1
xr-apphosting                     7.9.1
xr-appmgr                         7.9.1
```

```
xr-bcdl                          7.9.1
xr-bfd                           7.9.1
```

Displays the list of committed packages.

Software Upgrade and Downgrade Matrix

The following table lists the upgrade and downgrade paths supported for Cisco NCS 1010.

Upgrade Path		Downgrade Path	
Source Release	**Destination Release**	**Source Release**	**Destination Release**
R7.7.1, R7.9.1	R7.10.1	R7.10.1	R7.9.1, R7.7.1

Install Packages and RPMs

Complete this task to install additional packages or rpm files. The rpm files that need to be installed must be placed in a folder.

Note This task can be used to install SMUs as well.

Before you begin

- Configure and connect to the management interface. You can access the installable file through the management interface. For details about configuring the management interface, see Configure Management Interface.
- Copy the package or rpm to be installed either on the NCS 1010 hard disk or on a network server to which NCS 1010 has access.

Step 1 **install package add source /harddisk:/** *iso-image-name or rpm-folder-name*

Example:

```
RP/0/RP0/CPU0:ios#install package add source /harddisk:/rpm/
Mon Jul  4 11:37:31.526 UTC
Install add operation 2.1.1 has started
Install operation will continue in the background
```

Ensure to add the respective packages or rpm files as appropriate. This operation may take time depending on the size of the files that are added. The operation takes place in an asynchronous mode. The **install package add source** command runs in the background, and the EXEC prompt is returned.

Step 2 **show install request**

Example:

```
RP/0/RP0/CPU0:ios#show install request

Mon Jul  4 11:44:48.411 UTC

User request: install package add source file:///harddisk:/rpm/
Operation ID: 2.1.1
State:        Success since 2022-07-04 11:38:57 UTC

Current activity:    Await user input
Time started:        2022-07-04 11:38:57 UTC

The following actions are available:
    install package add
    install package remove
    install package upgrade
    install package downgrade
    install package abort latest
    install package abort all-since-apply
    install apply restart
    install apply reload

Least impactful apply method: install apply restart
```

Displays the current status of the install operation.

Step 3 **install apply reload**

Example:

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

Mon Jul  4 11:45:18.434 UTC
Install apply operation 2.1 has started
Install operation will continue in the background
```

Enables NCS 1010 to reload.

Step 4 **show install request**

Example:

```
RP/0/RP0/CPU0:ios#show install request

Mon Jul  4 11:47:32.221 UTC

User request: install apply reload
Operation ID: 2.1
State:        Success since 2022-07-04 11:46:03 UTC

Current activity:    Await user input
Time started:        2022-07-04 11:46:03 UTC

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
    install commit
```

Displays the current status of the install operation.

Step 5 **install commit**

Example:

```
RP/0/RP0/CPU0:ios#install commit
Mon Jul  4 11:48:47.745 UTC
Install commit operation 2 has started
Install operation will continue in the background
```

Commits the package or rpm files.

Step 6 **show install request**

Example:

```
RP/0/RP0/CPU0:ios#show install request

User request: install commit
Operation ID: 2
State:        In progress since 2022-07-04 11:48:48 UTC

Current activity:    Commit transaction
Next activity:       Transaction complete
Time started:        2022-07-04 11:48:48 UTC

No per-location information.
```

Displays the current status of the install operation. The above output indicates that the install operation is in progress.

Step 7 **show install request**

Example:

```
RP/0/RP0/CPU0:ios#show install request

User request: install commit
Operation ID: 2
State:        Success since 2022-07-04 11:50:32 UTC

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
```

Displays the current status of the install operation. The above output indicates that the install operation is complete.

Step 8 **show install active summary**

Example:

```
RP/0/RP0/CPU0:ios#show install active summary

Mon Jul  4 11:52:24.823 UTC
Active Packages:    XR: 145    All: 1265
Label:              7.9.1
Software Hash:      3ce63ce432d50358d7a0d654ec61e4377abccf265013132e310b4d34a7259b90

Optional Packages                                              Version
```

```
------------------------------------------------- ----------------------------
xr-bgp                                                                 7.9.1
xr-ipsla                                                               7.9.1
xr-is-is                                                               7.9.1
xr-lldp                                                                7.9.1
xr-mpls-oam                                                            7.9.1
xr-netsim                                                              7.9.1
xr-olc                                                                 7.9.1
xr-ospf                                                                7.9.1
xr-perfmgmt                                                            7.9.1
xr-telnet                                                              7.9.1
xr-track                                                               7.9.1
```

Displays the list of active packages and rpm files.

Step 9 **show install committed summary**

Example:

```
RP/0/RP0/CPU0:ios#show install committed summary

Mon Jul  4 11:54:04.178 UTC
Committed Packages: XR: 145    All: 1265
Label:              7.9.1
Software Hash:      3ce63ce432d50358d7a0d654ec61e4377abccf265013132e310b4d34a7259b90

Optional Packages                                              Version
------------------------------------------------- ----------------------------
xr-bgp                                                                 7.9.1
xr-ipsla                                                               7.9.1
xr-is-is                                                               7.9.1
xr-lldp                                                                7.9.1
xr-mpls-oam                                                            7.9.1
xr-netsim                                                              7.9.1
xr-olc                                                                 7.9.1
xr-ospf                                                                7.9.1
xr-perfmgmt                                                            7.9.1
xr-telnet                                                              7.9.1
xr-track                                                               7.9.1
```

Displays the list of committed packages and rpm files.

Related Commands

The following commands can be used to track the status of the install operation.

Related Commands	Purpose
show install active	Displays the list of active packages.
show install committed	Displays the list of committed packages.
show install log	Displays the log information for the install operation. This information is used for troubleshooting in case of installation failure.
show install package	Displays the details of the packages that are added to the repository. Use this command to identify individual components of a package.
show install request	Displays the current status of the install operation.

Related Commands	Purpose
show install which	Displays the package information on an installed file.

NCS 1010 FPD

A Field Programmable Device (FPD) refers to any programmable hardware device on a chassis, which includes a Field Programmable Gate Array (FPGA). NCS 1010 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 displayed as *NOT READY*. The status will change once FPD support for these SSDs is enabled in future releases.

The following table lists the NCS 1010 FPDs that are distributed across route processor (RP), power modules (PM), line cards (LC), and Rack.

Table 1: NCS 1010 FPDs

Location	FPDs
RP	• ADMConfig • CpuFpga • CpuFpgaGolden • BIOS • BIOS-Golden • SsdIntelS4510 • SsdMicron5300 • SsdSmartModular • TamFw • TamFwGolden
PM0 and PM1	• AP-PrimMCU • AP-SecMCU
LC	• ILA • OLT • Raman-1 • Raman-2

Location	FPDs
Rack	• IoFpga • IoFpgaGolden • EITU-ADMConfig • SsdIntelS4510 • SsdMicron5300 • SsdSmartModular

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 1010 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#show hw-module fpd
```

The following output shows the types of FPDs for each module.

```
Thu Mar  2 12:35:06.602 IST

Auto-upgrade:Enabled
Attribute codes: B golden, P protect, S secure, A Anti Theft aware
                                                                                FPD Versions
                                                                                ============
Location   Card type             HWver FPD device       ATR Status   Running Programd
Reload Loc
-----------------------------------------------------------------------------------------------
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  ADMConfig            CURRENT    3.40    3.40
NOT REQ
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  BIOS             S   CURRENT    4.20    4.20
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  BIOS-Golden      BS  CURRENT            4.10
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  CpuFpga          S   CURRENT    1.11    1.11
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  CpuFpgaGolden    BS  CURRENT            1.01
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  SsdIntelS4510    S   CURRENT   11.32   11.32
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  TamFw            S   CURRENT    6.13    6.13
  0/RP0
0/RP0/CPU0 NCS1010-CNTLR-K9      1.11  TamFwGolden      BS  CURRENT            6.11
  0/RP0
0/PM0      NCS1010-AC-PSU        0.0   AP-PriMCU            CURRENT    1.03    1.03
NOT REQ
0/PM0      NCS1010-AC-PSU        0.0   AP-SecMCU            CURRENT    2.01    2.01
NOT REQ
0/PM1      NCS1010-AC-PSU        0.0   AP-PriMCU            CURRENT    1.03    1.03
NOT REQ
0/PM1      NCS1010-AC-PSU        0.0   AP-SecMCU            CURRENT    2.01    2.01
NOT REQ
0/0/NXR0   NCS1K-OLT-L           1.0   OLT              S   CURRENT    1.02    1.02
```

```
NOT REQ
0/Rack     NCS1010-SA            2.1   EITU-ADMConfig       CURRENT    2.10    2.10
NOT REQ
0/Rack     NCS1010-SA            2.1   IoFpga           S   CURRENT    1.12    1.12
NOT REQ
0/Rack     NCS1010-SA            2.1   IoFpgaGolden     BS  CURRENT            1.01
NOT REQ
0/Rack     NCS1010-SA            2.1   SsdIntelS4510    S   CURRENT   11.32   11.32
 0/Rack
```

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: • B - Golden Image • S - Secure Image • P - Protect Image The attribute code of the primary FPDs is S and the Golden FPDs is BS.
Status	Status of the FPD. See Table 3: Description of FPD Status Values in show hw-module fpd Command, on page 9.
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.

FPD Status	Description
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 **show fpd package** 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, • FPD version is up to date and compatible. • FPD image is protected.
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

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
Thu Mar  2 12:37:58.530 IST

================================ ============================================
                                        Field Programmable Device Package
                                 ============================================
                                           Req     SW      Min Req   Min Req
Card Type            FPD Description       Reload  Ver     SW Ver  Board Ver
================== ========================= ====== ======= ======== =========
--------------------------------------------------------------------------------
NCS1010-AC-PSU       AP-PriMCU                NO      1.03      1.03      0.0
                     AP-SecMCU                NO      2.01      2.01      0.0
--------------------------------------------------------------------------------
NCS1010-CNTLR-K9     ADMConfig                NO      2.30      2.30      0.0
                     ADMConfig                NO      2.30      2.30      0.0
```

```
                    ADMConfig                NO      3.40      3.40      1.0
                    BIOS                     YES     4.20      4.20      0.0
                    BIOS                     YES     4.20      4.20      0.0
                    BIOS-Golden              YES     4.10      4.10      0.0
                    BIOS-Golden              YES     4.10      4.10      0.0
                    CpuFpga                  YES     1.11      1.11      0.0
                    CpuFpga                  YES     1.11      1.11      0.0
                    CpuFpgaGolden            YES     1.01      1.01      0.0
                    CpuFpgaGolden            YES     1.01      1.01      0.0
                    SsdIntelS4510            YES    11.32     11.32      0.0
                    SsdIntelS4510            YES    11.32     11.32      0.0
                    SsdMicron5300            YES     0.01      0.01      0.0
                    SsdMicron5300            YES     0.01      0.01      0.0
                    SsdSmartModular          YES    13.06     13.06      0.0
                    SsdSmartModular          YES    13.06     13.06      0.0
                    TamFw                    YES     6.13      6.13      0.0
                    TamFw                    YES     6.13      6.13      0.0
                    TamFwGolden              YES     6.11      6.11      0.0
                    TamFwGolden              YES     6.11      6.11      0.0
--------------------------------------------------------------------------------
NCS1010-SA          EITU-ADMConfig           NO      1.04      1.04      0.0
                    EITU-ADMConfig           NO      2.10      2.10      1.0
                    EITU-ADMConfig           NO      1.04      1.04      0.0
                    EITU-ADMConfig           NO      2.10      2.10      1.0
                    IoFpga                   NO      1.12      1.12      0.0
                    IoFpga                   NO      1.12      1.12      0.0
                    IoFpgaGolden             NO      1.01      1.01      0.0
                    IoFpgaGolden             NO      1.01      1.01      0.0
                    SsdIntelS4510            YES    11.32     11.32      0.0
                    SsdIntelS4510            YES    11.32     11.32      0.0
                    SsdMicron5300            YES     0.01      0.01      0.0
                    SsdMicron5300            YES     0.01      0.01      0.0
                    SsdSmartModular          YES    13.06     13.06      0.0
                    SsdSmartModular          YES    13.06     13.06      0.0
--------------------------------------------------------------------------------
NCS1K-ILA-2R-C      ILA                      NO      1.12      1.12      0.1
                    ILA                      NO      0.28      0.28     99.1
                    Raman-1                  NO      1.04      1.04      0.1
                    Raman-1                  NO      0.28      0.28     99.1
                    Raman-2                  NO      1.04      1.04      0.1
                    Raman-2                  NO      0.28      0.28     99.1
--------------------------------------------------------------------------------
NCS1K-ILA-C         ILA                      NO      1.12      1.12      0.1
                    ILA                      NO      0.28      0.28     99.1
--------------------------------------------------------------------------------
NCS1K-ILA-L         ILA                      NO      1.00      1.00      0.1
--------------------------------------------------------------------------------
NCS1K-ILA-R-C       ILA                      NO      1.12      1.12      0.1
                    ILA                      NO      0.28      0.28     99.1
                    Raman-1                  NO      1.04      1.04      0.1
                    Raman-1                  NO      0.28      0.28     99.1
--------------------------------------------------------------------------------
NCS1K-OLT-C         OLT                      NO      1.12      1.12      0.1
                    OLT                      NO      0.28      0.28     99.1
--------------------------------------------------------------------------------
NCS1K-OLT-L         OLT                      NO      1.02      1.02      0.1
--------------------------------------------------------------------------------
NCS1K-OLT-R-C       OLT                      NO      1.12      1.12      0.1
                    OLT                      NO      0.28      0.28     99.1
                    Raman-1                  NO      1.04      1.04      0.1
                    Raman-1                  NO      0.28      0.28     99.1
```

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.
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.

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 IoFpga
```

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 1010, automatic FPD upgrade is enabled by default.

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
```