

Cisco NCS5500

IOS-XR Release 24.4.1

IOS-XR System Upgrade Procedure

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1 Introduction

1.1 Purpose, Scope and Audience

The purpose of this document is to describe the upgrade and downgrade procedure for the Cisco NCS 5500 Series Network Convergence System Router, Release IOS-XR 24.4.1

Audience: This guide is for Cisco Systems Field Engineers and Network Operators. It is split into four sections.

- Simple one command install upgrade process & detailed IOS XR install upgrade process.
- Other Boot Options
- FPD upgrade
- Caveats and CLI changes

1.2 Upgrade/downgrade Matrix

Single Step Upgrade/Downgrade is supported for following releases:

Platform	Supported From	To
NCS5500 Fixed + Modular Chassis	IOS-XR 7.3.2/7.3.3/7.3.4/7.3.5/7.3.6/7.4.2/7.5.2/7.5.3/7.5.4/7.6.2/7.7.2/7.7.21/7.8.x/7.9.x/7.10.x/7.11.1/7.11.2/7.11.21/24.1.x/24.2.1/24.2.2/24.3.1/24.3.2	IOS-XR 24.4.1

1.3 NOTE:

1. Because of Linux kernel Migration from Wind River Linux to Open Embedded Linux, upgrade from releases older than 7.3.1 to release 7.6.1 or later cannot be performed directly. It must be upgraded first to any – 7.3.2 or 7.4.x or 7.5.x release.

Once router is upgraded to an interim release, please proceed with upgrade to 7.6.1 or later.

Similarly, to downgrade from 7.6.1 or later to a release prior to 7.3.1, it must be downgraded to any - 7.3.2 or 7.4.x or 7.5.x release first and then proceed with lower version downgrade.

However, the 2-step upgrade requirement is not applicable when we upgrade the image using iPX or USB methods.

2. If the router is running with 6.6.3 release, Cisco's recommendation is to upgrade it to 7.3.2 and then proceed with 24.4.1 upgrade as 2-step upgrade process.

For NCS5501, NCS5502 platforms running with 6.6.3 release, Cisco's recommendation is to upgrade it to 7.0.2 + CSCv35484 and then upgrade it to 7.3.2 and then proceed with 24.4.1 upgrade.

1.4 Summary of Upgrade Steps

1. Perform upgrade using "install source" cli mentioned in this document.
2. Release IOS-XR 24.4.1 introduces the below mentioned PIDs:
 - NA
3. Following cards will not be supported from release IOS-XR 24.4.1:
 - NA

1.5 Bridge SMUs

The following table outlines the SMUs that must be installed for upgrade and downgrade procedure. No Bridge SMUs are required.

Table 1: Needed Bridge SMUs

NCS5500							
Device	From Release	To Release	Bridge SMU	Device	From Release	To Release	Bridge SMU
NCS5500	2421	2441		NCS5500	2441	2421	
NCS5500	2422	2441		NCS5500	2441	2422	
NCS5500	2432	2441		NCS5500	2441	2432	
NCS5500	2431	2441		NCS5500	2441	2431	
NCS5500	2412	2441		NCS5500	2441	2412	
NCS5500	2411	2441		NCS5500	2441	2411	
NCS5500	71121	2441		NCS5500	2441	71121	
NCS5500	7112	2441		NCS5500	2441	7112	
NCS5500	7111	2441		NCS5500	2441	7111	
NCS5500	7102	2441		NCS5500	2441	7102	
NCS5500	7101	2441		NCS5500	2441	7101	
NCS5500	7721	2441		NCS5500	2441	7721	

NCS5500	791	2441		NCS5500	2441	791	
NCS5500	792	2441		NCS5500	2441	792	
NCS5500	782	2441		NCS5500	2441	782	
NCS5500	781	2441		NCS5500	2441	781	
NCS5500	772	2441		NCS5500	2441	772	
NCS5500	762	2441		NCS5500	2441	762	
NCS5500	754	2441		NCS5500	2441	754	
NCS5500	753	2441		NCS5500	2441	753	
NCS5500	752	2441		NCS5500	2441	752	
NCS5500	742	2441		NCS5500	2441	742	
NCS5500	735	2441		NCS5500	2441	735	
NCS5500	736	2441		NCS5500	2441	736	
NCS5500	734	2441		NCS5500	2441	734	
NCS5500	733	2441		NCS5500	2441	733	
NCS5500	732	2441		NCS5500	2441	732	

1.6 Packages for Upgrade

Following files are available to download for various boot options:

Table 2: IOS-XR Software files available for download

#	File	Contents	Comment
1	NCS5500-iosxr-24.4.1.tar	NCS 5500 IOS XR Software	Contains all rpms except k9sec
2	NCS5500-iosxr-k9-24.4.1.tar	NCS 5500 IOS XR Software 3DES	Contains all rpms including k9sec
3	ncs5500-usb_boot-24.4.1.zip	NCS 5500 IOS XR Software	Contains USB Boot Package

1.7 Required Package files

Mini ISO Package is mandatory to perform the System Upgrade and upgrade needs to be done from XR VM. Additional XR packages listed below are needed depending on the router configuration and required features:

Description	Package Name
Boot Image	ncs5500-mini-x-24.4.1.iso
mpls	ncs5500-mpls-1.0.0.0-r2441.x86_64.rpm
mpls-rsvp-te	ncs5500-mpls-te-rsvp-1.0.0.0-r2441.x86_64.rpm
multicast	ncs5500-mcast-1.0.0.0-r2441.x86_64.rpm
ospf	ncs5500-ospf-1.0.0.0-r2441.x86_64.rpm
isis	ncs5500-isis-1.0.0.0-r2441.x86_64.rpm
li	ncs5500-li-1.0.0.0-r2441.x86_64.rpm
eigrp	ncs5500-eigrp-1.0.0.0-r2441.x86_64.rpm
k9sec	ncs5500-k9sec-1.0.0.0-r2441.x86_64.rpm
mgbl	ncs5500-mgbl-1.0.0.0-r2441.x86_64.rpm
lictrl	ncs5500-lictrl-1.0.0.0-r2441.x86_64.rpm
healthcheck	ncs5500-healthcheck-1.0.0.0-r2441.x86_64.rpm
ponctrl	ncs5500-pon-ctrl-1.0.0.0-r2441.x86_64.rpm

2 Pre-Upgrade Task

Note: Config backup, precheck, Image download, tar file copy to router and install add are hitless operation and can be done outside of MW.

2.1 Configuration Backup

- Copy the running-configuration to a harddisk: on the router.

```
RP/0/RP0/CPU0:55XX# copy running-config harddisk:/running_config
```

- Copy the running-configuration to a remote scp server

```
RP/0/RP0/CPU0:55XX#scp harddisk:/<file name> <user_name>@<server  
ip>:/<path>
```

2.2 System Stability check

- The following commands should be executed to verify basic system stability before the upgrade. At the XR prompt:

show platform	verify that all nodes are in "IOS XR RUN/OPERATIONAL" state
show platform vm	verify that all nodes are in "FINAL Band" state
show redundancy	verify that a Standby RP is available and the system is in "NSR-ready" state
show ipv4 interface brief <or> show ipv6 interface brief <or> show interface summary	verify that all necessary interfaces are "UP"
show install active	verify that the proper set of packages are active
admin show install active	verify on sysadmin plane
show install committed	verify that the proper set of committed packages are same as active. If not, execute 'install commit'
cfs check clear configuration inconsistency	verify configuration file system to fix configuration file system
show hw-module fpd	Ensure all the FPD versions status are CURRENT Please refer to "Field Programmable Versions Document" for FPD version information.
show alarms	Shows any outstanding alarms in system
admin show environment all	Shows temperature, Fan, Voltage, Power status
Admin show led	Shows LED status
show media (both XR and Admin mode)	Shows the disk usage in XR and admin state
show inventory	Shows chassis inventory information
show logging	Capture show logging to check for any errors

2.3 Cost out IGP:

Cost-out IGP: To minimize traffic loss during the upgrade please follow below steps:

For OSPF use “max-metric” command.

```
RP/0/RP0/CPU0:55XX(config-ospf)# max-metric router-lsa
```

For ISIS use “set-overload-bit” command.

```
RP/0/RP0/CPU0:55XX(config-isis)# set-overload-bit
```

2.4 Enable auto-fpd upgrade:

Enable auto FPD auto upgrade from XR and Sysadmin if it is not enabled already.

```
RP/0/RP0/CPU0:55XX(config)#fpd auto-upgrade enable
RP/0/RP0/CPU0:55XX(config)#commit
```

2.5 Disk Cleanup:

Check available space in install repository. At least 2G of free space is required to perform system upgrade. If user is going to copy the packages and SMU's to the harddisk, please ensure enough free space is available on the harddisk. Check in Both XR and admin plane

XR:

```
RP/0/RP0/CPU0:55XX# show media location 0/RP0/CPU0
RP/0/RP0/CPU0:55XX# show media location 0/RP1/CPU0
```

Admin:

```
sysadmin-vm:0_RP0# show media location 0/RP0
sysadmin-vm:0_RP0# show media location 0/RP1
```

Check inactive packages and remove them before upgrading in XR and Admin plane.

XR:

```
RP/0/RP0/CPU0:55XX#install remove inactive all
```

Admin:

```
sysadmin-vm:0_RP0# install remove inactive
```

Check and delete core files and any other files which are not required in harddisk in XR and admin plane

XR:

```
RP/0/RP0/CPU0:55XX#run
[xr-vm_node0_RP0_CPU0:~]$cd /misc/disk1
[xr-vm_node0_RP0_CPU0:/misc/disk1]$rm *core*
```

Admin:

```
RP/0/RP0/CPU0:55XX#admin
sysadmin-vm:0_RP0# run
[sysadmin-vm:0_RSP0:~]$ cd /misc/disk1
[sysadmin-vm:0_RSP0:~]$ rm *core*
```

3 Software Upgrade

All System Upgrade related install operations should be done in the XR VM plane. The optional packages (mpls, mcast, mgbl etc.) that are being installed/upgraded must match the active packages, else the install will fail.

3.1 Single-Command Upgrade using install-source:



Note

Cisco recommends using this single cli method to perform software upgrade.

- Download IOS-XR 24.4.1 image from CCO.
 - Copy the tar file to scp/sftp server. Verify that the md5 checksum of tar file matches with CCO server
 - Untar and verify the contents of the tar file.
- Execute the below mentioned CLI from XR to perform one step upgrade.
 - ‘install source’ will identify and install dependent rpm’s automatically even though when we enter mini.iso only as input in CLI. User should ensure mini.iso and rpm’s are placed in same folder while doing untar of the tar file.



Note

Please verify the reachability to scp/sftp server and access to image path/files before proceeding with install operation. Please ensure only mini.iso and required rpm packages for ncs5500 are available in this folder, no other files should be present in the same folder.

Example for scp:

```
RP/0/RP0/CPU0:55XX# install source scp://<user>@<server-ip>/<image-path>  
ncs5500-mini-x-24.4.1.iso noprompt
```

<OR>

If user wants to copy the tar file to router harddisk to perform install operation, please refer below steps

Copy the tar file to router harddisk:

```
RP/0/RP0/CPU0:55XX#scp <user_name>@<server ip>:/<path>/<image-tar-file>  
/misc/disk1/image/
```

Untar the file to same folder in harddisk:

```
[xr-vm_node0_RP0_CPU0:/misc/disk1/image]$ tar -xvf NCS5500-iosxr-k9-  
24.4.1.tar
```

Now perform the install operation using below cli:

```
RP/0/RP0/CPU0:55XX#install source harddisk:/image/ ncs5500-mini-x-  
24.4.1.iso noprompt
```

- Verify that all the packages are installed correctly in XR and SysAdmin
 RP/0/RP0/CPU0:55XX#show install active
 sysadmin-vm:0_RP0# show install active
- Verify system stability through commands described under Check System Stability section (2.2) after router comes up with new software.
- Verify show version to check router is upgraded.

```
RP/0/RP1/CPU0:Router##show version
Cisco IOS XR Software, Version 24.4.1
Copyright (c) 2013-2024 by Cisco Systems, Inc.
```

Build Information:

```
Built By      : swtools
Built On      : Tue Dec 17 08:00:55 PST 2024
Built Host    : iox-lnx-118
Workspace     : /auto/srcarchive10/prod/24.4.1/ncs5500/ws
Version       : 24.4.1
Location      : /opt/cisco/XR/packages/
Label         : 24.4.1
```

```
cisco NCS-5500 () processorSystem uptime is 28 minutes
```

Check to see if there were any failed startup configurations.

```
RP/0/RP0/CPU0:55XX#show configuration failed startup
```

- Perform install commit after router reload
 RP/0/RP0/CPU0:55XX#install commit

3.2 Classic Upgrade (install add & activate image/SMUs):

Classic upgrade method requires user to perform install add and install activate operation to complete the upgrade.

- Download IOS-XR 24.4.1 image from CCO.
 Copy tar file to scp server. Verify that the md5 checksum of tar file matches with CCO
 Untar and verify the contents of the tar file.
- Copy the IOS-XR 24.4.1 tar file to the router harddisk and verify that file is copied successfully
 RP/0/RP0/CPU0:55XX#scp <user_name>@<server ip>:/<path>/<image> /misc/disk1/.
- Verify the md5 checksum of the tar file with the original MD5 values on CCO
 [xr-vm_node0_RP0_CPU0:/misc/disk1]\$md5sum NCS5500-iosxr-k9-24.4.1.tar

- Perform 'install add' of NCS5500-iosxr-k9-24.4.1.tar file:

```
RP/0/RP0/CPU0:55XX#install add source harddisk:/ NCS5500-iosxr-k9-24.4.1.tar
```

- Take a note of the install operation id generated by the add operation in previous step.

```
Install operation #id finished successfully
```

- Activate all the packages from install add operation by using the same operation #id noted from above step.

```
RP/0/RP0/CPU0:55XX#install activate id <#id> noprompt
```

- Router will reload at the end of activation to start using the new packages.



Note

This operation may take up to 30 minutes to complete.

- Verify that all the packages are installed correctly in XR and SysAdmin

```
RP/0/RP0/CPU0:55XX#show install active
sysadmin-vm:0_RP0# show install active
```

- Verify system stability through commands described under Check System Stability section (2.2) after router comes up with new software.

- Verify show version to check router is upgraded.

```
RP/0/RP1/CPU0:Router##show version
Cisco IOS XR Software, Version 24.4.1
Copyright (c) 2013-2024 by Cisco Systems, Inc.
```

Build Information:

```
Built By      : swtools
Built On      : Tue Dec 17 08:00:55 PST 2024
Built Host    : iox-lnx-118
Workspace     : /auto/srcarchive10/prod/24.4.1/ncs5500/ws
Version       : 24.4.1
Location      : /opt/cisco/XR/packages/
Label         : 24.4.1
```

```
cisco NCS-5500 () processor
System uptime is 28 minutes
```

- Check to see if there were any failed startup configurations.

```
RP/0/RP0/CPU0:55XX#show configuration failed startup
```

- Execute 'install commit' to commit the newly active software (install commit is required after any install activate operation else after router reload, nodes will go back to previously committed software)

```
RP/0/RP0/CPU0:55XX#install commit
```

4 Post Upgrade Tasks

- Disk cleanup: Once software upgrade has been completed, disk space can be recovered by removing any inactive packages that are no longer needed (if the packages are required later, they can be re-added):

```
RP/0/RP0/CPU0:55XX#install remove inactive all
```

- Verify/fix configuration file system (mandatory):

```
RP/0/RP0/CPU0:55XX#cfs check
```

- Verify fpd versions running are current:

```
RP/0/RP0/CPU0:55XX#show hw-module fpd
```

- Restore IGP metric if changed before the upgrade (this is done from xr vm)

OSPF

```
RP/0/RP0/CPU0:55XX# (config-ospf)# no max-metric router-lsa
```

ISIS

```
RP/0/RP0/CPU0:55XX# (config-isis)# no set-overload-bit
```

5 Other Boot Options (GISO/IPXE/USB)

Please refer below for various boot options:

Router Bring up:

<https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/77x/b-system-setup-cg-ncs5500-77x/m-bring-up-the-router.html>

GISO:

<https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/77x/b-system-setup-cg-ncs5500-77x/m-golden-iso.html>

IPXE and USB Boot option:

<https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/77x/b-system-setup-cg-ncs5500-77x/m-perform-disaster-recovery.html>

Please find below the link for more information about installation of optional rpms.

<https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/77x/b-system-setup-cg-ncs5500-77x/m-performing-system-upgrade-and-installing-packages.html> _

6 FPD Upgrade

Fpd auto-upgrade feature if it is configured on router should take care of the fpd upgrade. Otherwise, manual fpd upgrade can be performed after IOS-XR 24.4.1 upgrade is install committed. Run the “show hw-module fpd” command to check which firmware files need to be upgraded, by inspecting the ‘Status’ column. If there is any ‘NEED UPGD’ marked, manual upgrade is required. After Manual upgrade, a reload is required for the fpd to take effect. Issue the following command to upgrade FPD:

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

TimingIC-A, TimingIC-B-0, TimingIC-B-1 fpds will not be upgraded even with “fpd auto-upgrade enable” configured.

A manual fpd upgrade needs to be triggered for the TimingIC fpds.

RP/0/RP0/CPU0:router#upgrade hw-module location 0/RP0 fpd TimingIC-B-0

7 Downgrade from 24.4.1 IOS XR Release

Downgrade can be performed by following options.

Option 1: If install commit was not done post upgrade, router reload will bring it back to previous install committed image.

Option 2: If downgrade image is part of inactive packages (the mini ISO is broken down into individual ISOs (XR, sysadmin and host) ex – ncs5500-mini-x-7.6.2, ncs5500-xr-7.6.2

install remove ncs5500-mini-x-7.6.2.iso (This will remove the mini as well as individual ISOs)

Install add/activate the packages along with iso.

```
Example: install add source harddisk: <tar file>

install activate id <> noprompt
```

Option 3: Single-command install operation using downgrade version image files as described in section 3.1

```
Example: install source scp://<user>@<server-ip>/<image-
path> <downgrade iso file> noprompt
```

Note: Please do refer the caveats for known anomalies.

If FPD upgrade was done as part of IOS-XR 24.4.1 installation, FPDs do not need to be updated again once the downgrade version is activated.

7.1 Post Downgrade Tasks

- Disk cleanup: Once software upgrade has been completed, disk space can be recovered by removing any inactive packages that are no longer needed (if the packages are required later, they can be re-added):

```
RP/0/RP0/CPU0:55XX#install remove inactive all
```

- Verify/fix configuration file system (mandatory):

```
RP/0/RP0/CPU0:55XX#cfs check
```

- Verify fpd versions running are current:

```
RP/0/RP0/CPU0:55XX#show hw-module fpd
```

- Restore IGP metric if changed before the upgrade (this is done from xr vm)

OSPF

```
RP/0/RP0/CPU0:55XX(config-ospf)# no max-metric router-lsa
```

ISIS

```
RP/0/RP0/CPU0:55XX(config-isis)# no set-overload-bit
```

8 Caveats

1) CSCwm14431

Issue details:

1. Upgrade from 7.10.x/7.11.1 to 24.4.1 saw this issue, where XR was not coming up due to multiple processes getting stuck from the notification not got from fia_cfg.
2. Device is mod fretta, with j2 native hw-mod profile command enabled.
3. After upgrade, running-config had no config loaded.

Issue will be seen during below upgrades:

7.10.x -> 7.11.2

7.10.x -> 24.x.y

7.11.1 -> 7.11.2

7.11.1 -> 24.x.y

Solution:

For Gen-2 (J2 native) devices, if we configure default mdb profile (if no mdb profile already configured already) explicitly before upgrade (7.10.2/7.11.1 --> 7.11.2/24.x.y), we will not run into this issue.

So, The MOP is to have MDB profile configured (on J2 native devices) before upgrade.

- only for j2 native devices (or j2 native configured devices)

- if mdb profile is not configured - configure default mdb profile

Non-J2 devices will not have the problem, as we don't do sleep/wait in case of Gen-1 devices (or say non-j2 native devices)

Detailed MOP steps for **CSCwm14431**:

1. Upgrade paths
 - 7.10.x -> 7.11.2
 - 7.10.x -> 24.x.y
 - 7.11.1 -> 7.11.2
 - 7.11.1 -> 24.x.y
2. Upgrade from 7.11.2 and onwards to 24.x.y will not need these MOP steps.
3. Check hw-mod npu-operating mode RP/0/RP0/CPU0:ios#sh hw-module profile npu-operating-mode
NPU Operation mode: Native Mode
If o/p is "Not Applicable" or "Compatibility Mode", need not do anything. If o/p is "Native mode" then only proceed further
4. Check if any hw-module already configured for mdb-profile RP/0/RP0/CPU0:5508#sh running-config |
i hw hw-module profile npu native-mode-enable β Native mode enabled hw-module profile mdb
l3max-se β MDB profile configured
5. If it was configured earlier and reloaded chassis to take effect, it should be seen in show command as well - RP/0/RP0/CPU0:ios#show hw-module profile mdb-scale MDB scale profile: l3max-se β this can be l3max/l3max-se/l2max/l2max-se In this case, no further steps needed.
6. If no mdb profile was configured, then check the default mdb profile on the device
RP/0/RP0/CPU0:ios#show hw-module profile mdb-scale MDB scale profile: l3max Default mdb
profile can be either l3max or l3max-se only.
7. Configure the same default mdb profile via configuration RP/0/RP0/CPU0:ios(config)#hw-module
profile mdb l3max-se

In order to activate this new mdb profile, you must manually reload the chassis
RP/0/RP0/CPU0:ios(config)#commit

8. Since, we are on upgrade path, no need to manually reload the chassis at this point.