

# **Cisco NCS5500**

## **IOS-XR Release 7.2.1**

### **IOS-XR System Upgrade Procedure**

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# 1 Introduction

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## 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 7.2.1

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

- 1) Simple one command install upgrade process & detailed IOS XR install upgrade process
- 2) Other Boot Options
- 3) FPD upgrade
- 4) 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	6.5.x/6.6.x/7.x.x	7.2.1

For older releases, it is recommended to first upgrade to one of the supported releases and then move to the target release. Following link can be used to download the upgrade document for 6.5.3 release(File name: NCS5500-docs-6.5.3.tar):

<https://software.cisco.com/download/home/286291132/type/280805694/release/6.5.3>

## 1.3 Summary of Upgrade Steps

1. Add the image to the router using tftp, http, sftp, scp. Via install add source
2. Activate the image via install activate
3. Release 7.2.1 introduces Turin-CR. PIDs:
  - NCS-55A1-24Q6H-SS
4. Following cards will not be supported from release 7.2.1:
  - N/A

## 1.4 Cisco Software Manager

Cisco Software Manager (CSM) can be used to manage SMUs, to create your own SMU tar ball, or find out which SMUs are applicable to your network. More information on CSM: [Download CSM/CSM Documentation](#)

## 1.5 Mandatory SMUs

The following table outlines the SMUs that must be installed for upgrade and downgrade procedure.

**Table 1: Needed Mandatory SMUs**

Release Mandatory/Optional SMUs		
	Upgrade SMUs	Downgrade SMUs
R6.5.x	N/A	N/A
R6.6.x	N/A	N/A
R7.0.x	N/A	N/A
R7.1.x	N/A	N/A

\*Applicable to eXR only.

## 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	NCS5000-iosxr-7.2.1.tar	NCS 5500 IOS XR Software	Contains all rpms except k9sec
2	NCS5500-iosxr-k9-7.2.1.tar	NCS 5500 IOS XR Software 3DES	Contains all rpms including k9sec
3	ncs5500-usb_boot-7.2.1.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-7.2.1.iso [Boot image]
mpls	ncs5500-mpls-2.1.0.0-r721.x86_64.rpm
mpls-rsvp-te	ncs5500-mpls-te-rsvp-3.1.0.0-r721.x86_64.rpm
multicast	ncs5500-mcast-3.0.0.0-r721.x86_64.rpm
ospf	ncs5500-ospf-2.0.0.0-r721.x86_64.rpm
isis	ncs5500-isis-2.1.0.0-r721.x86_64.rpm
li	ncs5500-li-1.0.0.0-r721.x86_64.rpm
k9sec	ncs5500-k9sec-3.1.0.0-r721.x86_64.rpm
mgbl	ncs5500-mgbl-3.0.0.0-r721.x86_64.rpm

## 2 Pre-Upgrade Task

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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>  
root@10.1.1.1:/auto/config/.
```

## 2.2 System Stability check

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

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

```
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 2GB of free space is required to perform System upgrade. If copying the packages and SMU's to the harddisk ensure 50% free space 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.

- Download 7.2.1 image from CCO.

Copy tar file to scp server. Verify the contents of the tar file"

- Copy the 7.2.1 tar file to the router harddisk and verify that file is copied successfully

```
RP/0/RP0/CPU0:55XX#scp root@10.1.1.1://auto/<image file> /misc/disk1/.
```

```
RP/0/RP0/CPU0:PE7#scp prpothul@172.16.1.1:/auto/tftp-  
gud/sit/721/ncs5500/721/NCS5500-iosxr-k9-7.2.1.tar harddisk:/  
Mon Aug 10 12:57:05.037 PDT  
Connecting to 172.16.1.1...  
Password:  
Transferred 1786286080 Bytes  
1786286080 bytes copied in 154 sec (11557832)bytes/sec
```

- Verify the md5 checksum of the tar/individual rpms with the original MD5 values on CCO

```
[xr-vm_node0_RP0_CPU0:/misc/disk1]$md5sum NCS5500-iosxr-k9-7.2.1.tar
```

```
[xr-vm_node0_RP0_CPU0:/harddisk:]$md5sum NCS5500-iosxr-k9-7.2.1.tar  
6a9c3eb47839d12e5f7eb0b8e2b83c39 NCS5500-iosxr-k9-7.2.1.tar
```

- Perform 'install add' of NCS5500-iosxr-k9-7.2.1.tar file:

```
RP/0/RP0/CPU0:55XX#install add source harddisk:/ NCS5500-iosxr-k9-7.2.1.tar
```

```
RP/0/RP0/CPU0:PE7#install add source harddisk:/ NCS5500-iosxr-k9-  
7.2.1.tar
```

```
Mon Aug 10 13:02:46.711 PDT
```

```
Aug 10 13:02:48 Install operation 447 started by root:
```

```
install add source harddisk:/ NCS5500-iosxr-k9-7.2.1.tar
```

```
Aug 10 13:03:06 Install operation will continue in the background
```

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

```
Install operation id# 447 finished successfully
```

```
RP/0/RP0/CPU0:PE7#Aug 10 13:06:26 Install operation 447 finished successfully
```

- Add recommended SMUs for 7.2.1 if not already in initial tarball (optional)

```
RP/0/RP0/CPU0:55XX#install add source harddisk: <mandatory SMU tar file>
```

N/A

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

Install operation **id# 2** finished successfully

- Prepare the packages added before

```
RP/0/RP0/CPU0:55XX#install prepare id 447
```

```
RP/0/RP0/CPU0:PE7#install prepare id 447
```

```
Mon Aug 10 13:08:59.541 PDT
```

```
Aug 10 13:09:01 Install operation 448 started by root:
```

```
install prepare id 447
```

```
Aug 10 13:09:01 Package list:
```

```
Aug 10 13:09:01 ncs5500-k9sec-3.1.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-mgbl-3.0.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-mpls-te-rsvp-3.1.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-ospf-2.0.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-isis-2.1.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-mcast-3.0.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-mpls-2.1.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-li-1.0.0.0-r721.x86_64
```

```
Aug 10 13:09:01 ncs5500-mini-x-7.2.1
```

```
Aug 10 13:09:01 Install operation will continue in the background
```

```
RP/0/RP0/CPU0:PE7#
```

Or (if SMU was added)

```
RP/0/RP0/CPU0:55XX#install prepare id 447 2
```

- Activate all the packages

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

```
RP/0/RP0/CPU0:PE7#install activate
```

```
Mon Aug 10 13:45:10.667 PDT
```

```
Aug 10 13:45:12 Install operation 449 started by root:
```

```
install activate
```

```
This install operation will reload the system, continue?
```

```
[yes/no]:[yes] yes
```

```
Aug 10 13:45:17 Install operation will continue in the background
```

```
RP/0/RP0/CPU0:PE7#Aug 10 13:47:27 Install operation 449 finished successfully
```

- 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/RP0/CPU0:PE7#sh version
Mon Aug 10 14:01:42.396 PDT
Cisco IOS XR Software, Version 7.2.1
Copyright (c) 2013-2020 by Cisco Systems, Inc.
```

```
Build Information:
Built By      : deenayak
Built On      : Sat Aug  8 09:42:26 PDT 2020
Built Host    : iox-ucs-013
Workspace     : /auto/srcarchive13/prod/7.2.1/ncs5500/ws
Version       : 7.2.1
Location      : /opt/cisco/XR/packages/
Label        : 7.2.1
```

```
cisco NCS-5500 () processor
System uptime is 9 minutes
```

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

```
RP/0/RP0/CPU0:PE7#show configuration failed startup
```

```
RP/0/RP0/CPU0:PE7#show configuration failed startup
Mon Aug 10 14:03:54.914 PDT
!!20:53:27 UTC Mon Aug 10 2020
```

- 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

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- 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 at a later time, 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 to <https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x.html> for various boot options:

Router Bring up:

[https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x\\_chapter\\_011.html](https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x_chapter_011.html)

GISO:

[https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x\\_chapter\\_01000.html](https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x_chapter_01000.html)

IPXE and USB Boot option:

[https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x\\_chapter\\_01001.html](https://www.cisco.com/c/en/us/td/docs/iosxr/ncs5500/system-setup/71x/b-system-setup-cg-ncs5500-71x/b-system-setup-cg-ncs5500-71x_chapter_01001.html)

## 6 FPD Upgrade

---

Fpd auto-upgrade feature if configured on router should take care of fpd upgrade. Manual fpd upgrade can be performed after 7.2.1 upgrade is install committed. Run the “show hw-module fpd location all” command to check which firmware files need to be upgraded, by inspecting the Upg/Dng column. If there is any ‘Yes’ 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**

Note: Except CBC update, router reload is required after running the “upgrade hw-module fpd all location all” command, to make the changes in effect. No reload is required after running the upgrade hw-module fpd cbc location all command. The new CBC firmware will be active. The software automatically resets the local CAN Bus. FPD pie is mandatory for the above steps.

### **Auto-FPD requirements:**

N/A

## 7 Downgrade from 7.2.1 IOS XR Release

---

Downgrade can be performed by following options.

1) Disable fpd auto-upgrade

**Option 1:** If install commit was not done post upgrade, a 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-6.6.3, ncs5500-xr-6.6.3

install remove ncs5500-mini-x-6.6.3 ( This will remove the mini as well as individual ISOs ) and then install add \*mini.iso” .

Install prepare, activate the packages along with iso.

**Option 3:** install add downgrade image iso +rpm, prepare and activate

**Example:**

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

```
install prepare id 10
```

```
install activate id 11 noprompt
```

**Note:** Please do refer the caveats for known anomalies.

### 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 at a later time, 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

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There are no caveats for System Upgrade to 7.2.1