



Cisco NCS540L IOS-XR Release 7.7.2

IOS-XR System Upgrade Procedure

For N540-28Z4C-SYS-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D,
N540X-16Z4G8Q2C-A/D, N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D,
N540X-4Z14G2Q-A, N540-24Q8L2DD-SYS, N540-FH-CSR-SYS,
N540-FH-AGG-SYS, N540-6Z14S-SYS-D Variants



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1. Purpose, Scope and Audience

This document provides information on the methods available for system upgrade for NCS540I Series platforms with XR7 OS from software version 7.3.x/7.4.x/7.5.x/7.6.x/7.7.1 to 7.7.2

🔗 **This document covers XR7 to XR7 upgrade procedure only.**

Platform	Supported From	To
N540-28Z4C-SYS-A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540X-16Z4G8Q2C-A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540-12Z20G-SYS-A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540X-12Z16G-SYS-A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540X-6Z18G-SYS -A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540X-8Z16G-SYS -A/D	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540X-4Z14G2Q-A	7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540-FH-CSR-SYS	7.3.x/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540-FH-AGG-SYS	7.3.2/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540-24Q8L2DD-SYS	7.4.x/7.5.x/7.6.x/7.7.1	7.7.2
N540-6Z14S-SYS-D	7.5.2/7.7.1	7.7.2

🔗 **For PIDs N540X-6Z18G-SYS - A/D, N540X-8Z16G-SYS - A/D, N540X-4Z14G2Q-A, N540-6Z14S-SYS-D use “ncs540l-aarch64” images**

🔗 **NOTE (MUST READ)**

7.3.1 is considered a break release for direct upgrade, due to a known issue with kernel cache corruption that was fixed in releases 7.2.1 and 7.3.1. Please refer to CSCvr79738 for more information. This issue applies to new NCS540L PIDs shipped with 7.0.1, but it is possible that certain affected units that were subsequently upgraded to other production releases might fail the upgrade to release 7.3.1 from any previous releases. With this bug, operations on very large files, for example, an iso image, may fail because of cache corruption. In case of failure, clear the cache and retry the install operation.

Hence software upgrade/downgrade using "install replace" or "install package replace" CLI from 7.0.x/7.1.x/7.2.x to 7.7.2 is NOT supported and will need to be done via re-image using iPXE/USB boot.

Note: A production SMU is available for release 7.0.1 that allows a remote install using the disaster recovery partition. The SMU enables a custom script that re-images the disk prior to launching the image upgrade. Please contact Cisco TAC for assistance if you are upgrading from release 7.0.1.

2. Obtain Required Package Files

The software deliverables include:

ISO image containing the base install image - ncs540l-x64-7.7.2.iso

Tar file containing optional RPMs - NCS540l-iosxr-7.7.2.tar

This tar file contains below optional RPMs:

- o ncs540l-netflow
- o ncs540l-mcast
- o BGP
- o CDP
- o IPSLA
- o IS-IS
- o LLDP
- o MCAST
- o MPLS-OAM
- o Netflow
- o OSPF
- o Perfmgmt
- o Telnet
- o Track
- o Eigrp
- o RIP
- o lictrl

✎ Except CDP, Telnet , EIGRP , RIP and lictrl other RPMs are part of base install image.

✎ For PIDs N540X-6Z18G-SYS - A/D, N540X-8Z16G-SYS - A/D, N540X-4Z14G2Q-A, N540-6Z14S-SYS-D use “ncs540l-aarch64” images

3. Configuration Backup

Copy the running-configuration to harddisk on the router.

```
RP/0/RP0/CPU0:ROUTER# copy running-config harddisk:<filename>
```

Copy the running-configuration to a remote tftp server

```
RP/0/RP0/CPU0:ROUTER# copy running-config tftp://<tftp server IP Address >/<TFTP  
Server Location>
```

For Example:

```
copy running-config tftp://223.255.254.25/auto/tftp-gyre/user1/running_cfg
```

4. Install Bridge SMUs

This section lists the *Bridge SMUs needed to perform a System Upgrade from 7.3.x/7.4.x/7.5.x/7.6.x to 7.7.2 image.

- Bridge SMU: Here bridge SMU means all the mandatory SMUs required to upgrade to Target release from Base Release

Base (From) Release	Target (To) Release	Bridge SMU
7.3.1	7.7.2	CSCvy66646
7.3.2/7.4.x/7.5.x/7.6.x/7.7.1	7.7.2	No Bridge SMU Required

5. Pre-Upgrade Tasks

System Stability Check: The following commands should be executed to verify basic system stability before the upgrade.

#show platform	(Verify that all nodes are in "OPERATIONAL" state)
#show <ipv4 ipv6> interface brief	(Verify that all necessary interfaces are "UP")
#show install active	(Verify that the proper set of packages are active)
#show install commit	(Verify that the proper set of committed packages are same as active. If not, execute 'install commit')
#cfs check <or> clear configuration inconsistency	(Verify/fix configuration file system)
#show hw-module fpd	(Ensure all the FPD versions status are CURRENT) Please refer to " Field Programmable Versions " section for FPD version information.
#show alarms	(Verify Alarms)
#show environment all	(Verify environment)
#show media location all	(Verify media in XR and sysadmin plane)
#show inventory	(Verify inventory)
#show log	(Verify syslogs on router)

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

For OSPF use “max-metric” command.

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

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

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

Disable auto FPD auto upgrade if already configured. FPD auto-upgrade is not supported.

```
RP/0/RP0/CPU0:ROUTER(config)#no fpd auto-upgrade  
RP/0/RP0/CPU0:ROUTER(config)#commit
```

Check available space in install repository. At least 2GB of free space is required to perform Systemupgrade. If copying the packages and SMU’s to the harddisk ensure 50% free space on the harddisk.

```
RP/0/RP0/CPU0:ROUTER#show media
```

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

```
RP/0/RP0/CPU0:ROUTER#run  
[node0_RP0_CPU0:~]$cd /harddisk\:  
[node0_RP0_CPU0:/harddisk:]$rm *core*
```

6. Software Upgrade

6.1 “install-replace” Method

Download 7.7.2 ISO and packages tar and SMUs from CCO.

Copy tar file to tftp / scp / ftp server. Verify the contents of the tar file.

Copy the 7.7.2 ISO/tar file to the router harddisk and verify that file is copied successfully

```
RP/0/RP0/CPU0:ROUTER#scp root@1.56.24.1:/auto/tftp-gud/sit/7.7.2/ncs540/ncs540l-x64-7.7.2.iso  
/misc/disk1/
```

Verify the md5 checksum or sha512 checksum of the iso/tar with the original MD5/sha512 values on CCO

```
[node0_RP0_CPU0:/misc/disk1]$md5sum ncs540l-x64-7.7.2.iso  
OR  
[node0_RP0_CPU0:/harddisk:]$sha512sum ncs540l-x64-7.7.2.iso
```

Perform ‘install package replace’ of 772 iso file:

```
RP/0/RP0/CPU0:ROUTER# install package replace /harddisk:/ncs540l-x64-7.7.2.iso
```

Activate the new .iso image on the router by applying the changes.

```
RP/0/RP0/CPU0:ROUTER#install apply reload [noprompt]
```

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

Verify that all the packages are installed correctly in XR

RP/0/RP0/CPU0:ROUTER#show install active

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:ROUTER#install commit

Note: In case user wants to perform one shot install operation please use the cli "install replace harddisk:/ncs540l-x64-7.7.2.iso noprompt ", here Install operation will proceed with no prompting and router will be rebooted without user interaction with new image.

Along with "noprompt" user can optionally use "commit" keyword. When Commit option is used, this will auto commit the software after the install activation completes successfully. However, if any login failures are seen after the reload, rollback would be possible with USB/PXE boot or appropriate workaround

Verify system stability through commands described under Check [System Stability](#) section after router comes up with new software

Verify show version to check router is upgraded.

RP/0/RP0/CPU0:ROUTER#show version

Cisco IOS XR Software, Version 7.7.2 LNT
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Build Information:

Built By : ingunawa
Built On : Wed Oct 26 17:22:02 UTC 2022
Build Host : iox-ucs-002
Workspace : /auto/srcarchive14/prod/7.7.2/ncs540l/ws
Version : 7.7.2
Label : 7.7.2

cisco NCS540L (C3708 @ 1.70GHz)
cisco N540X-16Z4G8Q2C-A (C3708 @ 1.70GHz) processor with 8GB of memory
NCS540L uptime is 1 hour, 55 minutes
Cisco NCS 540 System with 16x10G+4x1GCu+8x25G+2x100G AC Chassis

Check to see if there were any failed startup configurations

RP/0/RP0/CPU0:ROUTER#show configuration failed startup

Install Optional RPM's or recommended SMUs for 7.7.2 (optional)

Create an install repository.

- a) Create a directory under the document root directory.

```
[node0_RP0_CPU0:~]$cd /misc/disk1/  
[node0_RP0_CPU0:~]$mkdir files  
[node0_RP0_CPU0:~]$cd files
```

- b) Copy all the RPMs to a directory. For example, /misc/disk1/files
- c) Untar all the RPMs.

```
tar -xvzf <rpm-name>.tgz
```

- d) Convert the directory to a repository using createrepo command. This command creates a directory named repodata with the metadata of all the RPMs.

```
[node0_RP0_CPU0:/misc/disk1]$createrepo_c files
Directory walk started
Directory walk done - 14 packages
Temporary output repo path: files/.repodata/ Preparingsqlite
DBs
Pool started (with 5 workers)
Pool finished
```

If you add new packages to the repository, change or remove packages from the repository, you must run createrepo command again to update the metadata. This ensures that the package manager picks up the correct packages.

Configure the install repository.

```
RP/0/RP0/CPU0:Router#config
RP/0/RP0/CPU0:Router(config)#install repository file:///harddisk:/files
RP/0/RP0/CPU0:Router(config)#commit
<data and time stamp> UTC: config[67542]: Configuration committed by user 'cisco'.
RP/0/RP0/CPU0:Router(config)#end
```

Verify connectivity to the server, and check the contents of the repository.

```
RP/0/RP0/CPU0:ROUTER#show install available
Trying to access repositories...
```

Package	Architecture	Version	Repository
xr-cdp	x86_64	7.7.2v1.0.0-1	files
xr-telnet	x86_64	7.7.2v1.0.0-1	files
xr-syslog	x86_64	7.7.2v1.0.1-1	files

Use 'install package add' command for installing optional RPM's (CDP or Telnet)

```
RP/0/RP0/CPU0:Router#install package add xr-cdp xr-telnet
```

Use 'install package upgrade' command for installing SMU's.

```
RP/0/RP0/CPU0:Router#install package upgrade xr-syslog
```

Activate the RPMs/SMUs

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

After system comes up from reload, execute 'install commit'

7. Post-Upgrade Tasks

Verify/fix configuration file system (mandatory):

RP/0/RP0/CPU0:ROUTER#cfs check

Verify fpd versions running are current:

RP/0/RP0/CPU0:ROUTER#show hw-module fpd

Upgrade the FPD's using below command if FPD upgrade is needed.

RP/0/RP0/CPU0:ROUTER#upgrade hw-module location <location> fpd <FPD Name>

Reload the router for the new FPD's to take effect

Restore IGP metric if changed before the upgrade

OSPF

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

ISIS

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

8. Caveats

- Software Upgrade is supported from 7.3.x/7.4.x/7.5.x/7.6.x/7.7.1 to 7.7.2
- Due to CSCvr79738 bug, software upgrade is not supported from (701 / 702 / 711 / 712 / 721/ 722) to 7.7.2.
- If router needs to be upgraded from (701 / 702 / 711 / 712 / 721/ 722) to 7.7.2 , then this should be done via iPXE/USB Boot to 7.7.2 image.

9. Pre-Downgrade Tasks

Follow all the procedures mentioned in [Pre-Upgrade Tasks](#).

10. Software Downgrade

10.1 “install-replace” CLI Method

Follow same procedures mentioned in [“Software-Upgrade using install-replace”](#)

10.2 “install-rollback” CLI Method

View the list of available transaction IDs.

```
RP/0/RP0/CPU0:ROUTER#show install rollback list-ids
```

Explore the main packages that is to be installed if you roll the software back to the specific transaction ID.

```
RP/0/RP0/CPU0:ROUTER#show install rollback id <id>
```

View the relative changes that is made to the currently installed software if it is rolled back to a transaction ID.

```
RP/0/RP0/CPU0:ROUTER#show install rollback id <id> changes
```

Rollback to the software associated with the specific transaction ID.

```
RP/0/RP0/CPU0:ROUTER#install rollback <id> [commit] [noprompt]
```



If you want to apply the change and rollback to the associated transaction ID, commit the change. You can also include the keyword noprompt in the command to enable the system to bypass your permission to reload the router.



This rollback operation installs the previous software and also applies the change automatically.

This may reload the router depending on the package that is rolled back. Alternatively, use the install package rollback command to only rollback the package but not apply the changes. You can check whether the router will reload or restart if you apply the change using the show install history last transaction verbose command or show install request command. Based on the command output, you can take the appropriate action using install apply reload | restart command to either reload or restart the system. Use the install commit command to commit the transaction.

Commit the operation.

```
RP/0/RP0/CPU0:ROUTER#install commit
```

Verify system stability through commands described under Check [System Stability](#) section after router comes up with new software

Check to see if there were any failed startup config.

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

11. Post-Downgrade Tasks

Verify/fix configuration file system (mandatory):

```
RP/0/RP0/CPU0:ROUTER#cfs check
```

Verify fpd versions running are current:

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

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

OSPF

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

ISIS

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

12. Caveats

- Software Downgrade is supported from 7.7.2 to 73x/74x/75x/76x/7.7.1
- Due to CSCvr79738 bug, software Downgrade is not supported from (701 / 702 / 711 / 712 / 721/ 722) to/from 7.7.2
- Downgrade from 7.7.2 to (701 / 702 / 711 / 712 / 721/ 722) needs to be done via iPXE/USBBoot.
- On the Cisco N540-FH-CSR-SYS and Cisco N540-FH-AGG-SYS routers, when downgrading from 7.7.2 to 7.4.x, or 7.5.x , the port-mode configuration failed to apply.

Example of failed config:

```
controller Optics0/0/0/10
```

```
port-mode Ethernet framing packet rate 10GE
```

```
!!% The process 'portmode' took too long to respond to an apply request and was timed out
```

```
!
```

We need to perform a force downgrade of fpd. Please execute the command "upgrade hw-module location 0/RP0/CPU0 fpd DpFpga force"

Once completed please reload the setup. Post that this issue will not be hit.

- Following caveats are applicable on downgrade from 7.7.2 to 7.3.x

Caveat ID Number	Description
CSCvy86308	Darwin:ERROR: in reading line 3 in /dev/xr_bootstrap
CSCvv60687	Continuous mibd_infra crash on downgrade 7.7.x to 731

13. Field Programmable Versions

PID	FPD	731	732	741	742	751	752	761	762	771	772
N540-28Z4C-SYS-A/D	ADMConfig	1.04	1.04	1.04	1.05	1.04	1.05	1.05	1.05	1.05	1.05
	IoFpga	2.03	2.07	2.03	2.07	2.03	2.07	2.07	2.07	2.07	2.07
	Primary-BIOS	1.19	1.2	1.32	1.33	1.32	1.33	1.33	1.33	1.41	1.41
	StdbyFpga	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TamFw	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
N540X-16Z4G8Q2C-A/D	ADMConfig	1.04	1.04	1.04	1.05	1.04	1.05	1.05	1.05	1.05	1.05
	IoFpga	2.03	2.07	2.03	2.07	2.03	1.05	1.05	1.05	2.07	2.07
	Primary-BIOS	1.19	1.2	1.32	1.33	1.32	2.07	2.07	2.07	1.41	1.41
	StdbyFpga	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TamFw	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
N540-12Z20G-SYS-A/D	ADMConfig	1.04	1.04	1.04	1.05	1.04	1.05	1.05	1.05	1.05	1.05
	IoFpga	2.03	2.07	2.03	2.07	2.03	2.07	2.07	2.07	2.07	2.07
	Primary-BIOS	1.19	1.2	1.32	1.33	1.32	1.33	1.33	1.33	1.41	1.41
	StdbyFpga	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TamFw	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
N540X-12Z16G-SYS-A/D	ADMConfig	1.04	1.04	1.04	1.05	1.04	1.05	1.05	1.05	1.05	1.05
	IoFpga	2.03	2.07	2.03	2.07	2.03	1.05	2.07	2.07	2.07	2.07
	Primary-BIOS	1.19	1.2	1.32	1.33	1.32	2.07	1.33	1.33	1.41	1.41
	StdbyFpga	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TamFw	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
N540-24Q8L2DD-SYS	ADM-DBConfig	NA	NA	NA	2.03	2.03	2.03	2.03	2.03	2.03	2.03
	ADM-MBConfig	NA	NA	NA	2.01	2.01	2.01	2.01	2.01	2.01	2.01
	IoFpga	NA	NA	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
	Primary-BIOS	NA	NA	1.07	1.33	1.08	1.08	1.08	1.08	4.05	4.05
	StdbyFpga	NA	NA	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
	TamFw	NA	NA	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
N540X-6Z18G-SYS-A/D	ADMConfig	NA	NA	NA	NA	NA	5	5	5	5	5
	IoFpga	0.15	0.15	0.15	0.17	0.15	0.17	0.17	0.17	0.17	0.17
	Prim-BootLoader	10.2	20	20	20	20.04	20.04	20.04	20.04	20.05	20.05
	StdbyFpga	0.33	0.33	0.33	0.34	0.33	1.09	1.09	1.09	1.09	1.09
	TamFw	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
N540X-8Z16G-SYS-A/D	ADMConfig	NA	NA	NA	NA	NA	5	5	5	5	5
	IoFpga	0.15	0.15	0.15	0.17	0.15	0.17	0.17	0.17	0.17	0.17
	Prim-BootLoader	10.2	20	20	20	20	20	20	20	20	20
	StdbyFpga	0.33	0.33	0.33	0.34	0.33	1.09	1.09	1.09	1.09	1.09
	TamFw	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
N540X-4Z14G2Q-A	ADMConfig	NA	NA	NA	NA	NA	5	5	5	5	5
	IoFpga	NA	NA	0.15	0.17	0.15	0.17	0.17	0.17	0.17	0.17
	Prim-BootLoader	NA	NA	20	20	20.04	20.04	20.04	20.04	20.05	20.05
	StdbyFpga	NA	NA	0.33	0.34	0.33	1.09	1.09	1.09	1.09	1.09

	TamFw	NA	NA	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
N540-FH-CSR-SYS	ADM1_Config	NA	NA	NA	0.09	1.01	1.01	1.01	1.01	1.01	1.01
	ADM2_Config	NA	NA	NA	0.09	1.01	1.01	1.01	1.01	1.01	1.01
	DpFpga	1.17	0.19	0.19	0.19	0.19	0.19	0.21	0.21	0.21	0.21
	IoFpga	1.23	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Primary-BIOS	1.17	1.17	1.17	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	StdbyFpga	0.43	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
	TamFw	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05
N540-FH-AGG-SYS	ADM1_Config	NA	NA	NA	1.02	1.01	1.02	1.02	1.02	1.02	1.02
	ADM2_Config	NA	NA	NA	1.02	1.01	1.02	1.02	1.02	1.02	1.02
	DpFpgaCpri	NA	NA	0.20	0.20	0.20	0.20	0.22	0.22	0.22	0.22
	DpFpgaEth	NA	NA	1.18	1.18	1.18	1.18	1.20	1.20	1.20	1.20
	IoFpga	NA	NA	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Primary-BIOS	NA	NA	1.17	1.33	1.33	1.33	1.33	1.33	1.33	1.33
	StdbyFpga	NA	NA	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
TamFw	NA	NA	6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.05	
N540-6Z14S-SYS-D	ADMConfig	NA	NA	NA	NA	NA	5.03	NA	NA	5.03	5.03
	IoFpga	NA	NA	NA	NA	NA	0.17	NA	NA	0.17	0.17
	Prim-BootLoader	NA	NA	NA	NA	NA	20.04	NA	NA	20.05	20.05
	StdbyFpga	NA	NA	NA	NA	NA	1.09	NA	NA	1.09	1.09
	TamFw	NA	NA	NA	NA	NA	6.05	NA	NA	6.05	6.05

** FPD versions on the boards shipped by manufacturing may have higher versions than the fpd package integrated in XR