

# Cisco ASR 9000 Series Aggregation Services Router Release 6.6.2

## Upgrade and Downgrade Procedure

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# 1 Introduction

## 1.1 Purpose, Audience and Scope

The purpose of this document is to describe the upgrade and downgrade procedure for the Cisco ASR 9000 Series Aggregation Services Router, Release 6.6.2

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

- 1) Simple one command installs upgrade process & detailed IOS XR install upgrade process
- 2) Turboboot (Highly NOT recommended)
- 3) FPD upgrades
- 4) Caveats and CLI changes

## 1.2 Summary of Upgrade Steps

1. IOS-XR upgrade from pre-4.2.1 is not supported and has not been covered in testing, the upgrade from pre 4.2.1 can be attempted through a standard Turbo boot method or install upgrade, and caveats may apply. Please review the install cheat sheet for short cuts. <https://supportforums.cisco.com/document/12440491/ios-xr-install-upgrade-cheat-sheet>
2. It's highly recommended that CSM be used to come up with a list of optimized set of SMUs or Service Packs that should be installed on the release that is going to be deployed. SMUs/SP + Major release can be installed together in one install operation to save time and avoid multiple reloads. For more information on Service packs, see the following link, when possible it's always preferred to deploy Service Packs <http://www.cisco.com/c/en/us/support/docs/ios-nx-os-software/ios-xr-software/117550-technote-product-00.pdf>
3. (Optional) before an upgrade, Bridge SMU's may need to be installed on the current release to ensure that installation of new software succeeds. Check section "Mandatory SMUs" and download the ASR9k-iosxr-px-6.6.2-bridge\_smus.tar file if required. Extract only **the** packages that are applicable to your currently running release. Install activates these prior to upgrading the router to the new release. No Bridge SMUs are required to upgrade from any release after 4.3.x.
4. For upgrading from Pre - 5.3.1 images to 6.6.2 you must first upgrade the system to IOS XR release 6.1.x then upgrade the system to 6.6.2. There is no direct upgrade path to 6.6.2.
  - a. Other option is to do a TURBOBOOT directly to 6.6.2
5. For upgrading from Pre - 5.3.1 images to 6.6.2 you must install a post-expiry SMU along with the new root certificate. You can install additional SMUs or pie files after adding the post-expiry SMU.
6. Refer below link for details: <http://www.cisco.com/c/en/us/td/docs/routers/technotes/MOP-CSS-to-Abra>
7. Release 6.6.2 introduces the following hardware's: No new hardware
8. Please refer the ddt's for the unsupported cards from release 6xx: **CSCuz35344**

## 1.3 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 Download page](#)

User Documentation: <http://www.cisco.com/en/US/docs/routers/asr9000/software/smu/csmuser.html>

## 1.4 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
R4.2.3	CSCud98419** CSCud37351 CSCud54093	
R5.1.0	No	CSCui99165
R6.0.0	No	No
R6.0.1	No	No
R6.1.2	No	No
R6.1.3	*CSCvf01652	No
R6.1.4	*CSCvf01652	No
R6.2.2	*CSCvf01652	No
R6.2.25	*CSCvf01652	No

\*Applicable to eXR only.

\*\* The SMU for CSCud98419 should be used if fpd auto-upgrade option is being used during the upgrade. Please refer to Section [4](#) for more information CSCud37351 and CSCud54093 are the pre-requisite SMU s for CSCud98419.

## 1.5 Selection of Packages for Upgrade

As software features grow, so do file sizes. So in order to ease the downloading experience and TFTP size issues, Cisco is changing its package delivery system by providing multiple files of smaller sizes as shown below:

**Table 1- New IOS-XR Packaging Format**

#	File	Contents	Comment
1	ASR9k-iosxr-px-6.6.2-bridge_smus.tar	Contains all bridge SMUs + other miscellaneous SMUs	Important – If applicable, Bridge SMUs are loaded onto your existing XR version before Upgrading to R6.6.2. Refer to Section 4 for a list of mandatory.
2	ASR9K-iosxr-px-6.6.2-turboboot.tar	Contains mini-vm file	Once installed, you will need to load the optional packages in Row 3 or Row 4 to complete the installation
3	ASR9K-iosxr-px-6.6.2-pies.tar	The mini.pie + optional packages (e.g., mcast, mpls, etc.). No mini-vm file.	The mini.pie constitute the base package. Optional packages add features as needed. No Mini.vm and no k9-sec pie.
4	ASR9k-iosxr-px-6.6.2-k9-pies.tar	Same as Row 3 + k9-sec pie	Contains Line item-3 + K9sec pie.
5	Asr9k-ncs500x-nV-px-6.6.2.tar	Only ncs500x pie	
6	asr9k-mini-x64-6.6.2.iso	64-bit mini.iso image only	Contains 64-bit mini.iso upgrade image only
7	ASR9K-x64-iosxr-px-6.6.2.tar	All 64-bit rpms. No mini.iso and k9sec rpm.	Contains all rpms except the mini.iso
8	ASR9K-x64-iosxr-px-k9-6.6.2.tar	All 64-bit rpms. No mini.iso.	Contains all rpms including k9sec except the mini.iso
9	asr9k-9000v-nV-x64-1.0.0.0-r662.x86_64.rpm	64-bit 9000v satellite rpm	Contains all rpms including k9sec except the mini.iso
10	asr9k-mini-x64-migrate_to_eXR.tar-6.6.2	64-bit migration consists of mini.iso	64-bit migration tar file. Refer “ASR9K-Migration-to-ios-xr-64-bit” documentation on CCO.

## 2 Upgrade to IOS XR Release 6.6.2

### 2.1 Upgrading IOS XR – CXR Images

NOTE:

1. Cisco recommends that you do a backup of the ASCII configuration to the harddisk: or off box location... Reload is required for the manual FPD upgrade in order for the new FPD to take effect.
2. It's recommended that **"auto fpd"** firmware upgrade is disabled prior to the upgrade. Refer to the FPD section for more details.
3. When the upgrade is completed and **"install commit"** is performed an **"install remove inactive"** can be used to clear old images from the disk. This is a hitless operation.
4. If the install operation fails collect the relevant show tech install output
5. use **ignore-pkg-presence-check** keyword if an upgrade is attempted without installing all the optional pies. This can be useful when offloading some unused pies. **"admin#install activate ignore-pkg-presence-check <operation id or package list> "**

Following install operations must be performed in **"admin"** mode. The optional packages (mpls, mcast, mgbl etc.) that are being installed/upgraded must match the active packages, else the install will fail.

Two install options are covered; the first is a single command install upgrade. The second is two-command install upgrade.

1. Single command upgrade: **"admin install add <pkgs+smus or SP> activate"**

IOS XR install upgrades can be performed in a single install add <pkgs+smus or SP or TAR> activate".

Examples of popular single command install:

Command, in the format "admin install

Example 1) Standard install

```
A9K-PE1(admin)#install add source tftp://10.10.10.1/ asr9k-px-6.6.2.CSCcd54321.pie  
asr9k-px-6.6.2.CSCab12345.pie asr9k-px-6.6.2.CSCef12345.pie activate
```

Example 2) This is an example of a create your own TAR install:

```
A9K-PE1(admin)#install add tar tftp://10.10.10.1/ Rel6.6.2.tar activate
```

Example 3) If the file server is reachable through a vrf, in the example here the vrf name is **"management"**:

```
A9K-PE1(admin)#install add source ftp://root:root@1.1.1.1;management/ asr9k-px-  
6.6.2.CSCcd54321.pie asr9k-px-6.6.2.CSCab12345.pie asr9k-px-6.6.2.CSCef12345.pie activate
```

Example 4) If the file server has sftp capabilities, then use (test is username: test123 is password)

```
A9K-PE1(admin)#install add tar sftp://test:test123@1.1.1.1:/tftpboot/662.tar activate
```

Install COMMIT Operation:

```
A9K-PE1(admin)# install commit
```

## 2. Two command upgrade:

The above can be broken down into two operations if needed.

- I. Perform **“admin install add <pkgs+smu’s or SP>”** to copy the software from TFTP/SFTP/SCP/FTP server to the router. *This is a hitless operation and can be formed outside a maintenance window.*
- II. After the add is successful perform **“admin install activate <pkgs+smus or SP>”** on packages, SMU's or  
SP to activated, at this point the router will reboot. After the router has reloaded and sufficient checks have been done, then perform the following steps. **“admin install commit”** this will make the software (packages and smu's) persistent across reloads

Example:

Install ADD Operation:

```
A9K-PE1(admin)#install add source tftp://10.10.10.1/ asr9k-mini-px.pie-6.6.2 asr9k-mpls-px.pie-6.6.2 asr9k-mcast-px.pie-6.6.2 asr9k-px-6.6.2.CSCab12345-0.0.0.pie synchronous
```

Or a TAR

```
A9K-PE1(admin)#install add tar tftp://10.10.10.1/662.tar synchronous
```

Install ACTIVATE Operation:

```
A9K-PE1(admin)# install activate disk0:asr9k-mini-px-6.6.2 disk0:asr9k-mpls-px-6.6.2 disk0:asr9k-mcast-px-6.6.2 asr9k-px-6.6.2.CSCab12345-0.0.0 synchronous
```

Another shortcut is to activate the install add operation id A9K-PE1(admin)# install activate id <install add operation id>

Another shortcut is to activate with a wildcard:  
A9K-PE1(admin)# install activate disk0:\*6.6.2\*

Install COMMIT Operation:

```
A9K-PE1(admin)# install commit
```

## 2.2 Upgrading IOS XR – EXR Images

NOTE:

1. **Cisco recommends that you do a backup of the ASCII configuration to the harddisk: or off box location.**
2. **FPD AUTO-UPGRADE can be used while upgrading images from 6xx releases. Manual FPD upgrade requires additional reload of router for newer FPD images to take effect.**

**Configure FPD AUTO-UPGRADE in from ADMIN-VM in config mode.**

```
RP/0/RP1/CPU0:PE2#admin
sysadmin-vm:0_RP0# config t
Entering configuration mode terminal
sysadmin-vm:0_RP0(config)# fpd auto-upgrade enable
sysadmin-vm:0_RP0(config)# commit
```

Following install operations must be performed in “**xm**” vm. The optional packages (mpls, mcast, mgbl etc.) that are being installed/upgraded must match the active packages, else the install will fail

1. Perform “**install add <pkgs+smu’s or SP>**” to copy the software from TFTP/SFTP/SCP/FTP server to the router.  
*This is a hitless operation and can be formed outside a maintenance window.*
2. After **install add** operation is successful perform “**install prepare <install id generated during add operation>**”
3. After successful completion of install prepare operation, perform **install activate** command to activate prepared packages, at this point the router will **reboot**.
4. After the router has reloaded and sufficient checks have been done, then perform “**install commit**” operation. This will make the software (packages and smu’s) persistent across reloads

Example:

Install ADD Operation: (Can be done with individual packages or tar)

```
RP/0/RP1/CPU0:PE2#sh install log 11
Apr 27 01:40:02 Install operation 11 started by lab:
  install add source tftp://202.153.144.26/auto/tftp-blr-users1/reevfern asr9k-eigrp-x64-1.0.0.0-r662.x86_64.rpm
asr9k-isis-x64-1.1.0.0-r662.x86_64.rpm asr9k-k9sec-x64-2.1.0.0-r662.x86_64.rpm asr9k-li-x64-1.1.0.0-
r662.x86_64.rpm asr9k-m2m-x64-2.0.0.0-r662.x86_64.rpm asr9k-mcast-x64-2.0.0.0-r662.x86_64.rpm asr9k-mgbl-x64-
2.0.0.0-r662.x86_64.rpm asr9k-mini-x64-6.6.2.iso asr9k-mpls-te-rsvp-x64-2.1.0.0-r662.x86_64.rpm asr9k-mpls-x64-
2.0.0.0-r662.x86_64.rpm asr9k-optic-x64-1.0.0.0-r662.x86_64.rpm asr9k-ospf-x64-1
.0.0.0-r662.x86_64.rpm asr9k-9000v-nV-x64-1.0.0.0-r662.x86_64.rpm asr9k-bng-x64-1.0.0.0-r662.x86_64.rpm
Apr 27 01:40:03 Action 1: install add action started
Apr 27 01:40:04 Install operation will continue in the background
Apr 27 02:19:15 Packages added:
Apr 27 02:19:15   asr9k-eigrp-x64-1.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-isis-x64-1.1.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-k9sec-x64-2.1.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-li-x64-1.1.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-m2m-x64-2.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-mcast-x64-2.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-mgbl-x64-2.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-mini-x64-6.6.2
Apr 27 02:19:15   asr9k-mpls-te-rsvp-x64-2.1.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-mpls-x64-2.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-optic-x64-1.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-ospf-x64-1.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-9000v-nV-x64-1.0.0.0-r662.x86_64
Apr 27 02:19:15   asr9k-bng-x64-1.0.0.0-r662.x86_64
Apr 27 02:19:15 Action 1: install add action completed successfully
Apr 27 02:19:16 Install operation 11 finished successfully
Apr 27 02:19:16 Ending operation 11
```



### Install PREPARE Operation:

```
RP/0/RP1/CPU0:PE2#install prepare id 11
Apr 27 02:20:21 Install operation 12 started by lab:
  install prepare id 11
Apr 27 02:20:21 Package list:
Apr 27 02:20:21      asr9k-eigrp-x64-1.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-isis-x64-1.1.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-k9sec-x64-2.1.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-li-x64-1.1.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-m2m-x64-2.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-mcast-x64-2.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-mgbl-x64-2.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-mini-x64-6.6.2
Apr 27 02:20:21      asr9k-mpls-te-rsvp-x64-2.1.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-mpls-x64-2.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-optic-x64-1.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-ospf-x64-1.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-9000v-nV-x64-1.0.0.0-r662.x86_64
Apr 27 02:20:21      asr9k-bng-x64-1.0.0.0-r662.x86_64
Apr 27 02:21:45 Install operation will continue in the background
```

### Install ACTIVATE Operation:

```
RP/0/RP1/CPU0:PE2#install activate
Apr 27 03:01:17 Install operation 13 started by lab:
  install activate
Apr 27 03:01:19 This install operation will reload the system, continue?
  [yes/no]:[yes] default yes
Apr 27 03:05:19 Install operation will continue in the background
```

### Install Commit Operation:

```
RP/0/RP1/CPU0:PE2#install commit
Apr 27 03:20:11 Install operation 14 started by lab:
  install commit
Apr 27 03:20:12 Install operation will continue in the background
Apr 27 03:21:16 Install operation 14 finished successfully
Apr 27 03:21:16 Ending operation 14
```

3. When the upgrade is completed and **“install commit”** is performed an **“install remove inactive”** can be used to clear old images from the disk. This is a hitless operation.
4. If the install operation fails collect the relevant show tech install output

---

### 3 Turboboot Option for Upgrades

Turboboot should not be necessary for an upgrade to XR6.6.2 if the instructions are followed that are documented. Any upgrade that is not part of the matrix may require a turboboot or has other possible requisitions. Turboboot Instructions are well documented in this location:

<https://supportforums.cisco.com/document/123576/asr9000xr-understanding-turboboot-and-initial-system-bring>

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## 4 FPD Upgrade

Fpd auto-upgrade feature if configured on router should take care of fpd upgrade. Manual fpd upgrade can be performed after R6.6.2 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/RSP0/CPU0:router(admin)#upgrade hw-module fpd all location 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:

1. CSCUj69940: Auto-FPD upgrade will not work if the source release does not have FPD Package installed and the user has configured auto-fpd prior to upgrade.
2. CSCul00317: Auto-FPD upgrade will not work if FPD being upgraded is 2 releases old or if no new FPD changes are available. Workaround is to perform a manual FPD upgrade.
3. CSCut97560 : FPD upgrade (both auto and manual) fails if there is not enough space on harddisk: Workaround is to clear some unwanted files in the harddisk before doing the fpd upgrade

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## 5 Downgrade from IOS XR Release 6.6.2

To Downgrade from 6.6.2 to 5.3.x / 5.2.x/4.3.x (4.3.0, 4.3.1, 4.3.2, 4.3.4), if user has **not** performed “install commit” on Release 6.6.2, the router can be reverted back to its prior committed state by performing “reload location all” from admin mode. If the user has performed “install commit”, then “install rollback to <>” procedure needs to be initiated. However due to a new linecard VSM introduction in 5.1.1, this “install rollback” would fail if the system has x86 based RP and a software fix is available in 5.1.2 and 5.2.0. Please do not use “install rollback..” command but as a workaround, use “install activate ..” to go back to the previous image needed.

To Downgrade from 6.6.2 to pre-430 images, Turboboot is the only option. Due to CSCud37497, downgrade from R6.6.2 requires the **turboboot with the format option** (e.g., ROMMON Variable set as “TURBOBOOT=on, disk0, format”). This is because R6.6.2 image is a combo image unlike pre-430 images, which has -p and -px versions.

Image Signing SMU is not mandatory for downgrade from XR631 - XR5xx releases.

While downgrading from IOS XR 6.6.2, CSCuy53266 can be installed as part of the target version tar or in the same “install” command line. It’s an optional SMU if you have NTP configured.

For example:

```
ASR9K (admin)# install add tar tftp://10.10.10.1/Rel5_3_2.tar asr9k-px-5.3.2.CSCuy53266-1.0.0.pie activate
```

---

## 6 ISSU SMU Upgrade in IOS XR Release 6.6.2

ISSU SMU Upgrade is deprecated since XR 5.2.2

## 7 Caveats

The caveats listed below are summaries only. Please view each release note enclosure (RNE) for complete details (Including known workarounds and/or actions to take).

1. CSCvg03032 – On performing upgrade from 4.x release to 6.6.2, if a router is configured with SSH Server's session limit higher than 110 in the releases that allowed such configuration, the configuration has to be changed to a value lesser than equal to 110 before the software is upgraded to 6.6.2. If this has not been done, the software upgrade will fail and ssh session limit config will be rejected/lost.
2. CSCun82453: Firmware upgrade for Delta V2 power module may fails.
3. CSCud63564: On downgrading to 4.2.3 and below with newer cards like VSM and A9K-40GE-SE/TR and to 4.3.0 with SIP-700(8G), shelfmgr process crashes followed by periodic router reloads are encountered.
4. CSCum75609: Image downgrades using "install rollback" will not work due to software changes introduced to accommodate a new line card type in R5.1.x/R5.2.x. Users are advised to use the "admin install activate" command instead.
4. CSCug38404: ROMMON downgrading isn't allowed on certain line cards with a 2.00 ROMMON Version. The downgrade operation will fail.
5. CSCtx28180: Due to the CLI change from "label-allocation-mode" to "label mode" introduced, when performing a software downgrade from R6.6.2 to R4.3.0 (or earlier), "label mode" configuration will be lost if any. It is recommended to remove "label m o d e " config and re-apply the Configuration as "label- allocation-mode" after the downgrade.
6. CSCur59629: Unable to install SMU/SP if downgraded from 5.1.x and above to 4.3.4. This issue is confined to RP with ppc architecture on downgrading to 4.3.x from 5.1.x and above and then trying to install a SMU/SP on top of 4.3.x. A rollback or "reload" without committing the software to 4.3.x should still work fine.
7. After upgrading to R6.6.2, OSPF area format error would be seen if the user has "area 0.0.0.0" configured in pre-4.3.1 releases. Change the OSPF area format from "area 0.0.0.0" to "area 0" before upgrading to R6.6.2
8. In release 4.3.1 (& later), PIM mofrr command format has changed from "mofrr ACL" to "mofrr flow ACL". After upgrading to R4.3.1 (6.6.2), user has to update the PIM mofrr configuration from "mofrr ACL" to "mofrr flow ACL"
9. In release 4.3.1 (& later), PIM "mofrr non-revertive" format has changed to "mofrr non-revertive <word>". After upgrading to R4.3.1 (& later), user has to update the "mofrr non-revertive" configuration in the PIM address-family configuration mode to "mofrr non-revertive <non-revertive MoFRR word>".
10. CSCul35062: During downgrade from version 5.1.0 or later to versions prior to 5.1.0, some dynamic subscriber template configuration fails to be re-applied after the reboot. Remove a n y < b>monitor- session</b> configuration in dynamic subscriber templates before attempting the downgrade.
11. Release 5.1.1 introduces a new Services Line Card named 'VSM'[A9K-VSM-500], which requires 'services-infra' package. Refer to VSM install instructions for more details. Please refer to CGv6 Configuration Guide.
12. CSCun84883: ipmitool crash during VSM-500 bootup while downgrading to 513/52x. This SMU has to be installed in order to avoid the crash.
13. CSCuz35344: Discontinue the support for 40GLC, RSP-4G/8G and ISM from 6xx releases
14. CSCvn62963 - Cache memory usage high after router boot up

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## 8 References on EOS/EOL:

**1. RSP-4G/8G**

<http://www.cisco.com/c/en/us/products/collateral/routers/asr-9000-series-aggregation-services-routers/eos-eol-notice-c51-734029.html>

**2. 40G Linecard**

<http://www.cisco.com/c/en/us/products/collateral/routers/asr-9000-series-aggregation-services-routers/eos-eol-notice-c51-733321.html>

**3. 80G & 160G Linecards**

<http://www.cisco.com/c/en/us/products/routers/asr-9000-series-aggregation-services-routers/eos-eol-notice-c51-731288.html>

**4. ISM Linecard**

<http://www.cisco.com/c/en/us/products/collateral/routers/asr-9000-series-aggregation-services-routers/eos-eol-notice-c51-734174.html>