Migrating using Manual Method

This document provides the procedure to manually migrate from Cisco IOS XR to Cisco IOS XR 64-bit operating system on the ASR 9000 series routers.

- Supported Hardware, on page 1
- Software Requirement, on page 4
- Prepare System for Migration, on page 4
- Migrate to IOS XR 64-Bit OS, on page 6
- Verify Migration, on page 9

Supported Hardware

The supported IOS XR 64-bit Product ID (PID) is listed in the table.

<table>
<thead>
<tr>
<th>Type</th>
<th>Supported</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans PID</td>
<td>ASR-9904-FAN</td>
<td></td>
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<tr>
<td></td>
<td>ASR-9006-FAN-V2</td>
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<td>ASR-9912-FAN</td>
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</tr>
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<td>ASR-9922-FAN-V2</td>
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<td>PEMS PID</td>
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<td>PWR-4.4KW-DC-V3</td>
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<td>Fabric PID</td>
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<td></td>
<td>A99-SFC-S</td>
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<td></td>
<td>A99-SFC-T</td>
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</table>
## Supported Hardware

<table>
<thead>
<tr>
<th>Type</th>
<th>Supported</th>
<th>Release</th>
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<tbody>
<tr>
<td>RP, RSP</td>
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<tr>
<td></td>
<td>A9K-RSP880-TR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A99-RSP-TR</td>
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</tr>
<tr>
<td></td>
<td>A99-RSP-SE</td>
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<tr>
<td></td>
<td>A9K-RSP880-LT-TR</td>
<td>6.4.1</td>
</tr>
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<td></td>
<td>A9K-RSP880-LT-SE</td>
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<td>Type</td>
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<td>Release</td>
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<td>Line card</td>
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<td>A90-8X100GE-CM</td>
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<td>A9K-8X100GE-TR</td>
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<td>A9K-MOD400-TR</td>
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<td></td>
<td>A9K-24X10GE-1G-TR</td>
<td>6.3.2</td>
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<tr>
<td></td>
<td>A9K-24X10GE-1G-SE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A9K-48X10GE-1G-TR</td>
<td></td>
</tr>
<tr>
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<td>A9K-48X10GE-1G-SE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A9K-4X100GE</td>
<td>6.4.1</td>
</tr>
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<td>A9K-24X10GE-1G-CM</td>
<td>6.4.2</td>
</tr>
<tr>
<td></td>
<td>A9K-48X10GE-1G-CM</td>
<td></td>
</tr>
</tbody>
</table>
Software Requirement

A version of IOS XR release based on your requirement as outlined in the table in Supported Hardware, on page 1 topic must run on the system before migrating to IOS XR 64 bit.

1. Upgrade the system to the minimum IOS XR release identified or higher.
2. Migrate from IOS XR release to any IOS XR 64 bit release.

Prepare System for Migration

Prepare the system before migrating to IOS XR 64-bit to enable easy operation.

Before you begin

Before you proceed, ensure that you have completed these pre-requisites:

- **Connect port:** connect console port to the terminal server. After migration, the console port will be connected the IOS XR 64-bit plane. If necessary, the AUX port can be used to connect to the management plane.
- **Backup data:** back up data on the router, System Admin plane, and XR plane configurations to an external server. All data drives except for hardiskb:/drive are formatted during migration. The hardiskb:/drive, also known as eusb:/drive is resized. All available data drives can be viewed using the `show media` command.
- **Configure processor:** Configure RSP4/RP2 to reach the external server to download IOS XR 64-bit ISO image.

Procedure

**Step 1**

Upgrade the ASR 9000 router to a minimum version as listed in table Supported Hardware, on page 1:

a) For every available line card in the system, identify the list of 64-bit releases from the Supported Hardware, on page 1 table, and select the latest release.

**Example:**

In the following specification, the minimum required release is 6.3.2.

<table>
<thead>
<tr>
<th>RP/LC</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>A99-RP2-SE</td>
<td>6.1.3</td>
</tr>
<tr>
<td>A9K-8X100GE-TR</td>
<td>6.1.3</td>
</tr>
<tr>
<td>A99-SFC2</td>
<td>6.1.3</td>
</tr>
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<td>A9K-400GE-DWDM-TR</td>
<td>6.2.1</td>
</tr>
<tr>
<td>A9K-24X10GE-1G-TR</td>
<td>6.3.2</td>
</tr>
</tbody>
</table>
b) Upgrade to IOS XR image as listed in table Supported Hardware, on page 1.

   RP/0/RSP0/CPU0:ios# admin install add source <path-to-image>/asr9k-mini-px.pie-6.1.3
   asr9k-fpd-px-6.1.3 activate prompt-level none synchronous

   For more information about upgrading the version, see Upgrading and Managing Software on Cisco ASR 9000 Series Router in the Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide.

c) Verify that the packages are active.

   RP/0/RSP0/CPU0:ios# show install active summary
   Sun Oct 30 09:05:05.333 UTC
   Default Profile:
      SDRs:
      Owner
   Active Packages:
      disk0:asr9k-mini-px-6.1.3
      disk0:asr9k-fpd-px-6.1.3

d) Commit the upgrade.

   RP/0/RSP0/CPU0:ios# admin install commit

Step 2  Upgrade FPD on RSP4, RP2, LC, and FC2 with unified FPDs:

   Important  FPD upgrade of new and supported hardware that will be used in IOS XR 64-bit after migration must be done in IOS XR.

   RP/0/RSP0/CPU0:ios#admin upgrade hw-module fpd all location all

   During the upgrade of FPDs:
   • Do not reload the router or power cycle the router.
   • Do not do an online insertion and removal (OIR) of RP2, RSP4, LC, and FC2 cards.
   • Check the console logs or syslogs to monitor the progress of the FPD upgrade. If you observe a failure in the logs, stop the upgrade process and contact the Cisco Technical Assistance Center.

Step 3  Setup a user with root-lr privileges only in the XR plane.

   XR Plane:

   username root
   group root-lr
   password <password>
!

   Note  In IOS XR 64-bit, the root-system group exists only in the System Admin plane, and not in the XR plane. Instead, root-lr group with equal privileges must be setup in the XR plane.

Step 4  Run script resize_eusb to clean up harddisk:/, harddiskb:/, and back up System Admin and XR plane config to harddiskb:/.

   When searching for file in XR shell using ls –litr in /pkg/bin for migrate_to_eXR or resize_eusb, use the complete file name. For example, ls –litr pkg/bin/resize_eusb or ls –litr pkg/bin/migrate_to_eXR. Wild card search is not supported in shell.
Step 5  Copy the converted IOS XR 64-bit configuration to harddiskb:/ drive.  

For IOS XR 64-bit to load XR plane configuration automatically during boot up, copy IOS XR to IOS XR 64-bit converted configuration to harddiskb:/cXR_xr_plane_converted_eXR.cfg.

For IOS XR 64-bit to load System Admin plane configuration automatically during boot up, copy IOS XR to IOS XR 64-bit converted configuration to harddiskb:/cXR_admin_plane_converted_eXR.cfg.

Step 6  To create crypto keys automatically when k9sec rpm is installed, create harddiskb:/crypto_auto_key_gen.txt. In this text file, provide the crypto key CLI to be executed post migration. For example, crypto key generate rsa 2048.

What to do next

Ensure all supported RSPs, RPs, FCs, and LCs are present so that the new OS takes effect on all of the cards post migration.

For the list of supported IOS XR 64-bit Product ID (PID), see Supported Hardware, on page 1.

After the router is prepared for migration, run the migration script to migrate to IOS XR 64-bit OS.

Migrate to IOS XR 64-Bit OS

Migration to IOS XR 64 bit is performed using a script migrate_to_eXR available in /pkg/bin/. The migration script performs these tasks:

- Copies GRUB files to /harddiskb:/efi/boot/
- Sets the boot mode on active RSP/RP to boot from harddiskb:
- Sets the boot mode on standby RSP /RP to boot from active RSP/RP

Before you begin

- Ensure that you have completed Prepare System for Migration, on page 4.
- Install the mandatory FPD PIE.
From IOS XR release 6.1.3, the golden ISO (GISO) migration tar file must be built to migrate from IOS XR to IOS XR 64 bit. For more information about building the GISO migration tar file, see Customize Installation using GISO chapter in Cisco ASR 9000 Series Aggregation Services Router Flexible Packaging Configuration Guide.

Migrate Using eUSB Boot

To migrate using the 64-bit image stored in eUSB:

**Procedure**

**Step 1**
Copy the IOS XR 64-bit tar image to harddisk:/ drive. The tar image must be copied only to harddisk:/ drive. This tar image can be mini or GISO tar file. The following example shows a mini tar file copied to harddisk:/ drive. The mini tar file is posted on CCO, and GISO tar file must be created based on required RPMS/SMU.

```
RP/0/RSP0/CPU0# copy <image-location>/asr9k-mini-x64-migrate_to_eXR.tar6.1.3 harddisk:/asr9k-mini-x64-migrate_to_eXR.tar-6.1.3
```

**Step 2**
Run the migration script.

```
RP/0/RSP0/CPU0#run /pkg/bin/migrate_to_eXR -m eusb -r
```

Running the script with –r parameter will reload the router. Remove this parameter to reload manually.

```
Running the migration script on the standby node 0/RSP1/CPU0...
Assigning booting mode...
Updated booting mode successfully
Finished executing on the standby node.
Found tar file asr9k-mini-x64-migrate_to_eXR.tar-6.1.3 in /harddisk:/.
This tar file should contain the ASR9K IOS XR 64 Bit ISO and boot files.
Extracting boot/ EFI/ from tar file...
Tar: blocks=20
  x boot/certs/Root_Certificate_Store.bin, 1047 bytes, 3 tape blocks
  x boot/certs/CertFile, 795 bytes, 2 tape blocks
  x boot/certs/crl.der, 438 bytes, 1 tape blocks
  x boot/bzImage, 4475087 bytes, 8741 tape blocks
  x boot/initrd.img, 144796121 bytes, 282805 tape blocks
  x boot/signature.initrd.img, 256 bytes, 1 tape blocks
  x EFI/boot/grub.efi, 914463 bytes, 1787 tape blocks
  x EFI/boot/grub.cfg, 530 bytes, 2 tape blocks
Finished extracting tar file.
Updated the image filename in /harddiskb:/EFI/boot/grub.cfg to asr9k-mini-x64-migrate_to_eXR.tar-6.1.3
Assigning booting mode...
Updated booting mode successfully
Now reloading the system to migrate to ASR9K IOS XR 64 bit.
Proceed with reload? [confirm]
Reloading in 5 secs
```

Reboot on ASR9912 RP2 (0x100326) in slot 0
By reload via REBOOT_CAUSE_RELOAD (4000001)
Current time: 2016-10-30 11:20:05.651, Up time: 4h 16m 3s
Release mastership on RP2
Normal reboot
Migrate Using TFTPBOOT

To migrate using TFTPBOOT with management port connectivity:

**Procedure**

Run the migration script `migrate_to_eXR` available in `/pkg/bin/`.

```
RP/0/RSP0/CPU0:ios#run /pkg/bin/migrate_to_eXR -s -p tftp -a 1.24.55.61 -n 255.255.255.0 -g 1.24.0.1 –u <image-location>/asr9k-mini-x64.iso
```

For help about the migration script, execute the command `run /pkg/bin/migrate_to_eXR -h`.

Migration script parameters:

<table>
<thead>
<tr>
<th>Script parameter</th>
<th>Parameter description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>IP_ADDRESS</td>
</tr>
<tr>
<td>-n</td>
<td>IP_SUBNET_MASK</td>
</tr>
<tr>
<td>-g</td>
<td>DEFAULT_GATEWAY</td>
</tr>
<tr>
<td>-u</td>
<td>SERVER_URL</td>
</tr>
<tr>
<td>-p</td>
<td>Protocol</td>
</tr>
<tr>
<td>-s</td>
<td>Static Settings</td>
</tr>
</tbody>
</table>
System will boot with IOS XR 64-bit followed by automatic reload, and will boot from disk. The standby RSP and RP, if present, will boot from active RSP and RP.

What to do next
Set username and password when the system prompts on the XR console. The user is also created on System Admin plane.

Verify Migration

After running the migration script, verify that the system migrated to IOS XR 64 bit successfully.

Before you begin
Ensure that you have completed Prepare System for Migration, on page 4 and Migrate to IOS XR 64-Bit OS, on page 6.

Procedure

Step 1
Run the `show platform` command to verify that RSP4, RP2, LC, and FC2 are in IOS XR RUN or OPERATIONAL state.

An IOS XR RUN or OPERATIONAL state indicates that the System Admin and XR planes are booted up. The system is ready for IOS XR 64-bit FPD upgrades and configuration. If an RSP4, RP2, FC2, or LC is not displayed, contact Cisco Technical assistance Center.

An example of `show platform` output from RSP0:

```
RP/0/RSP0/CPU0:ios#show platform
Sun Oct 30 11:25:04.315 UTC
Node Type State Config state
-------------------------------------------------------------------------------
0/RSP0/CPU0 A9K-RSP880-SE(Active) IOS XR RUN NSHUT
0/RSP1/CPU0 A9K-RSP880-SE(Standby) IOS XR RUN NSHUT
0/FT0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/0/CPU0 A9K-AC-PEM-V3 OPERATIONAL NSHUT
0/1/CPU0 A9K-AC-PEM-V3 OPERATIONAL NSHUT
```

An example of `show platform` output from RP0:

```
RP/0/RP0/CPU0:ios#show platform
Sun Oct 30 11:30:01.907 UTC
Node Type State Config state
-------------------------------------------------------------------------------
0/RP0/CPU0 A9K-RP2-TR(Active) IOS XR RUN NSHUT
0/RP1/CPU0 A9K-RP2-TR(Standby) IOS XR RUN NSHUT
0/FT0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/FT1 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/0/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/1/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/2/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/3/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/4/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
0/5/CPU0 A9K-8X100GE-L-SE IOS XR RUN NSHUT
```
An example of `show platform` output from System Admin:

```
sysadmin-vm:0_RP0# show platform
Sun Oct 30 11:37:04.862 UTC
Location Card Type HW State SW State Config State
----------------------------------------------------------------------------
0/0 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/1 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/2 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/3 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/4 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/5 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/6 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/7 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/8 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/9 A9K-8X100GE-L-SE OPERATIONAL OPERATIONAL NSHUT
0/RP0 A9K-RSP880-SE OPERATIONAL OPERATIONAL NSHUT
0/RP1 A9K-RSP880-SE OPERATIONAL OPERATIONAL NSHUT
0/FC0 A9K-SFC2 OPERATIONAL N/A NSHUT
0/FC1 A9K-SFC2 OPERATIONAL N/A NSHUT
0/FC2 A9K-SFC2 OPERATIONAL N/A NSHUT
0/FC3 A9K-SFC2 OPERATIONAL N/A NSHUT
0/FC4 A9K-SFC2 OPERATIONAL N/A NSHUT
0/FC6 A9K-SFC2 OPERATIONAL N/A NSHUT
0/PT0 A9K-AC-PEM-V2 OPERATIONAL N/A NSHUT
0/PT1 A9K-AC-PEM-V2 OPERATIONAL N/A NSHUT
0/PT2 A9K-AC-PEM-V2 OPERATIONAL N/A NSHUT
```

**Step 2**

Run the `show hw-module fpd` command from XR or System Admin mode to check if an FPD upgrade is required. If an upgrade is required, perform step 3, else go to step 4.

The FPD pie is bundled with the ISO image installed on the router.

```
RP/0/RSP0/CP00:ios# show hw-module fpd
Sun Oct 30 12:05:00.674 UTC
FPD Versions
-------------------
Location Card type HWVer FPD device ATR Status Running Programd
------------------------------------------------------------------------------
0/RSP0 A9K-RSP880-SE 1.0 Alpha-FPGA NEED UPGD 0.10 0.10
0/RSP0 A9K-RSP880-SE 1.0 CBC CURRENT 34.38 34.38
0/RSP0 A9K-RSP880-SE 1.0 Cha-FPGA CURRENT 0.04 0.04
0/RSP0 A9K-RSP880-SE 1.0 IPU-FPGA NEED UPGD 0.40 0.40
0/RSP0 A9K-RSP880-SE 1.0 IPU-Linux CURRENT 1.80 1.80
0/RSP0 A9K-RSP880-SE 1.0 Omega-FPGA CURRENT 10.48 10.48
0/RSP0 A9K-RSP880-SE 1.0 Optimus-FPGA NEED UPGD 0.08 0.08
0/RSP0 A9K-RSP880-SE 1.0 Rommon CURRENT 0.11 0.11
```
A **NEED UPGD** status indicates that an FPD upgrade of the card is required.

**Step 3** Run the `upgrade hw-module location all fpd all` command to upgrade the FPD from XR or System Admin plane.

```
RP/0/RSP0/CPU0:ios#upgrade hw-module location all fpd all
```

**Note** During the upgrade of FPDs:
- Do not reload the router or power cycle the router.
- Do not do an online insertion and removal (OIR) of RP2, RSP4, LC, and FC2 cards.
- Check the console logs or syslogs to monitor the progress of the FPD upgrade. If you observe a failure in the logs, stop the upgrade process and contact the Cisco Technical Assistance Center.

**Step 4** Reload the router to upgrade with IOS XR 64-bit FPD.

```
sysadmin-vm:0_RSP0# hw-module location all reload
Sun Oct 30 13:05:56.202 UTC
Reload hardware module ? [no,yes] yes
```

**Step 5** Verify that the status of all FPDs is **CURRENT**.

```
RP/0/RSP0/CPU0:ios#show hw-module fpd
RP/0/RSP0/CPU0:ios#show hw-module fpd
Sun Oct 30 13:48:42.178 UTC
```

```
<table>
<thead>
<tr>
<th>Location</th>
<th>Card type</th>
<th>HWver</th>
<th>FPD device</th>
<th>ATR</th>
<th>Status</th>
<th>Running Programd</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/RSP0</td>
<td>A9K-RSP880-SE</td>
<td>1.0</td>
<td>Alpha-FPGA</td>
<td>0.14</td>
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<tr>
<td>0/RSP0</td>
<td>A9K-RSP880-SE</td>
<td>1.0</td>
<td>CBC</td>
<td>34.38</td>
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<td></td>
</tr>
<tr>
<td>0/RSP0</td>
<td>A9K-RSP880-SE</td>
<td>1.0</td>
<td>Cha-FPGA</td>
<td>0.04</td>
<td>0.04</td>
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</tr>
<tr>
<td>0/RSP0</td>
<td>A9K-RSP880-SE</td>
<td>1.0</td>
<td>IPU-FPGA</td>
<td>0.42</td>
<td>0.42</td>
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</tr>
<tr>
<td>0/RSP0</td>
<td>A9K-RSP880-SE</td>
<td>1.0</td>
<td>IPU-FSBL</td>
<td>1.80</td>
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<tr>
<td>0/RSP0</td>
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</table>
Step 6  Install required RPMs if mini.iso is installed on the router. If full.iso is installed, only k9 sec package is required to be installed on the router.

Configure RSP4/RP2 to reach the external server to install the required RPMs.

In the following sample output, with mini.iso installed on the router, all the RPMs are installed.

```
RP/0/RSP0/CPU0:ios# install add source <image-location>/asr9k-mcast-x64-2.0.0.0r613.x86_64.rpm
asr9k-eigrp-x64-1.0.0.0-r613.x86_64.rpm asr9k-mgb1-x642.0.0.0-r613.x86_64.rpm
asr9k-isis-x64-1.0.0.0-r613.x86_64.rpm
asr9k-mpls-te-rsvp-x64-1.0.0.0-r613.x86_64.rpm
asr9k-mpls-x64-2.0.0.0-r613.x86_64.rpm
asr9k-isis-x64-1.0.0.0-r613.x86_64.rpm
asr9k-mpls-te-rsvp-x64-1.0.0.0-r613.x86_64.rpm
asr9k-k9sec-x64-1.1.0.0-r613.x86_64.rpm
asr9k-mpls-x64-2.0.0.0-r613.x86_64.rpm
asr9k-isis-x64-1.0.0.0-r613.x86_64.rpm
asr9k-k9sec-x64-1.1.0.0-r613.x86_64.rpm
asr9k-li-x64-1.1.0.0-r613.x86_64.rpm
asr9k-optic-x64-1.0.0.0-r613.x86_64.rpm
RP/0/RSP0/CPU0:ios# install activate id 1 << (Pick ID from install add step)
Or
RP/0/RSP0/CPU0:ios# install activate <rpm 1> <rpm 2> <rpm 3> <rpm n>
```

Step 7  Verify that the RPMs are successfully installed.

```
RP/0/RSP0/CPU0:ios# show install committed
Sun Oct 30 15:06:15.991 UTC
Node 0/RSP0/CPU0 [RP]
Boot Partition: xr_lv0
Committed Packages: 12
  asr9k-xr-6.1.1 version=6.1.3 [Boot image]
  asr9k-eigrp-x64-1.0.0.0-r613
  asr9k-isis-x64-1.0.0.0-r613
  asr9k-mcast-x64-2.0.0.0-r613
  asr9k-mgb1-x642.0.0.0-r613
  asr9k-mpls-te-rsvp-x64-1.0.0.0-r613
  asr9k-k9sec-x64-1.1.0.0-r613
  asr9k-li-x64-1.1.0.0-r613
  asr9k-m2m-x64-2.0.0.0-r613
  asr9k-mpls-x64-2.0.0.0-r613
  asr9k-optic-x64-1.0.0.0-r613
  asr9k-ospf-x64-1.0.0.0-r613
The router is migrated to IOS XR 64 bit successfully.
```