Installing and Upgrading Software

This chapter describes how to update software on the Cisco ASR 903 Series Router.

Software Packaging on the Cisco ASR 900 Series Router

Software Package Modes

The Cisco ASR 900 Series Router can be booted using any of the following:

- Consolidated—A single software image containing a full collection of software packages. This mode provides a simplified installation and can be stored in the bootflash, a TFTP server, or a network server.

- Sub-package—One or more sub-images extracted from the consolidated image. This mode provides optimized memory usage and requires that you store files in the bootflash directory.

Note The Cisco ASR 900 Series Routers supports both consolidated and sub-package mode boot.

Note In-Service Software Upgrade (ISSU) is supported only on sub-package on the router. See Understanding In-Service Software Upgrades, on page 9.

Understanding Cisco ASR 900 Series Router Software Packages

Table 1: Individual Sub-Packages

Sub-Package	Purpose
RPBase	Route Switch Processor (RSP) operating system
RPControl	Control plane processes between IOS process and the rest of the platform.
RPAccess	Handles security features including Secure Socket Layer (SSL) and Secure Shell (SSH)
RPIOS	Cisco IOS kernel, which is where IOS features are stored and run. **Note** Each consolidated image has a unique RPIOS package.
FP Pkg	Controls FP daemons.
IO Pkg	Controls input/output driver daemons.
LC Base	Controls basic kernel functions including runtime, initialization scripts, and chassis control daemons.

Provisioning Files

Provisioning files manage the boot process when the Cisco ASR 903 Series Router is configured to boot in sub-packages. The provisioning file manages the bootup of each individual sub-package. Provisioning files are extracted automatically when individual sub-package files are extracted from a consolidated package. Provisioning files are not necessary for running the router using the complete consolidated package.

File Systems on the Cisco ASR 900 Series Router

Table 2: File Systems

File System	Description
bootflash:	The boot flash memory file system on the active RSP.
cns:	The Cisco Networking Services file directory.
nvram:	Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM.
stby-bootflash:	The boot flash memory file system on the standby RSP.
stby-harddisk:	The hard disk file system on the standby RSP.
stby-usb[0-1]:	The Universal Serial Bus (USB) flash drive file systems on the standby RSP.
system:	The system memory file system, which includes the running configuration.
tar:	The archive file system.
tmpsys:	The temporary system files file system.
usb[0-1]:	The Universal Serial Bus (USB) flash drive file systems on the active RSP.

If you see a file system not listed in the above table, enter the **?** help option or see the **copy** command reference for additional information on that file system.

System Requirements

RP Memory Recommendations

Table 3: Memory Recommendations for the Cisco ASR 903 Series Router Consolidated Package Image

Platform	Image Name	Software Image	Individual Sub-package Contents	DRAM Memory
Cisco ASR 903 Router	Cisco ASR 903 Series RSP1 UNIVERSAL W/O CRYPTO	asr903rsp1-universal.*version* .bin	asr903rsp1-rpbase.*version* .pkg	2 GB (RSP1) 4 GB (RSP1+)
			asr903rsp1-rpcontrol.*version* .pkg	
			asr903rsp1-rpaccess.*version* .pkg	
			asr903rsp1-rpios-universal.*version*. pkg	
			asr903rsp1-espbase.*version.pkg*	
			asr903rsp1-sipbase.*version* .pkg	
			asr903rsp1-sipspa.*version* .pkg	
			asr903rsp1-packages-universal. version.conf	
			packages.conf	

Platform	Image Name	Software Image	Individual Sub-package Contents	DRAM Memory
Cisco ASR 903 Router	Cisco ASR 903 Series RSP1 UNIVERSAL NPE	asr903rsp1-universalk9_npe.*version* .bin	asr903-hw-programmables.*version* . pkg	2 GB (RSP1) 4 GB (RSP1+)
			asr903rsp1-espbase.*version* .pkg	
			asr903rsp1-packages-universalk9.*version* .pkg	
			asr903rsp1-rpacess.*version* .pkg	
			asr903rsp1-rpbase.*version* .pkg	
			asr903rsp1-rpcontrol.*version* .pkg	
			asr903rsp1-rpios-universalk9_npe.*version* .pkg	
			asr903rsp1-sipbase.*version*.pkg	
			asr903rsp1-sipspa.*version*.pkg	
			packages.conf	

ROMMON Version Requirements

ROMMON Release 15.3(1r)S1 is the recommended release for all ROMMON upgradeable components. For more information about ROMMON images, see Release Notes for the Cisco ASR 903 Router.

Determining the Software Version

You can use the **show version installed** command to list the installed sub-packages on the router.

Cisco IOS XE 3S to Cisco IOS Version Number Mapping

Each version of Cisco IOS XE 3S has an associated Cisco IOS version.

Table 4: Cisco IOS XE 3S to Cisco IOS Version Number Mapping

Cisco IOS XE 3S Version	Cisco IOS Version
3.5.0S	15.2(1)S
3.5.1S	15.2(1)S1

Cisco IOS XE 3S Version	Cisco IOS Version
3.6.0S	15.2(2)S
3.6.1S	15.2(2)S1
3.7.0S	15.2(4)S
3.8.0S	15.3(1)S
3.9.0S	15.3(2)S
3.10.0S	15.3(3)S
3.11.0S	15.4(1)S
3.12.0S	15.4(2)S
3.13.0S	15.4(3)S

Note The Cisco ASR 903 Series Router does *not* support IOS XE versions prior to 3.50S.

Autogenerated Files and Directories

Caution Do not alter any autogenerated file in the bootflash: directory should not be deleted, renamed, moved, or altered in any way unless directed by customer support; altering these files can have unpredictable consequences for system performance.

Table 5: Autogenerated Files

File or Directory	Description
crashinfo files	A crashinfo file may appear in the bootflash: file system. Crashinfo files are useful for tuning and troubleshooting, but are not related to router operations: you can erase them without impacting the router's performance.
core files	The bootflash/core directory is the storage area for .core files. Do not erase or move the core directory.
lost+found directory	This directory is created on bootup if a system check is performed. Its appearance is completely normal and does not indicate any issues with the router.

File or Directory	Description
tracelogs files	The storage area for trace files is bootflash/tracelogs. Trace files are useful for troubleshooting; you can access trace files using diagnostic mode to gather information related to the IOS failure. Do not erase or move the tracelog directory.

Setting the Router to Boot in Sub-Package Mode

Note For instructions on how to download an image file, see Downloading an Image, on page 10. In the following example, the image is located in the bootflash: Image/image-name.

SUMMARY STEPS

1. **configure terminal**
2. **config-register**
3. **exit**
4. **request platform software package expand file** *source-URL* [**to** *destination-URL*] [**force**] [**verbose**] [**wipe**]
5. **request platform software package expand file** *source-URL* [**to***destination-URL*] [**force**] [**verbose**] [**wipe**]
6. **configure terminal**
7. **boot system flash** [**flash-fs:**] [*partition-number:*] [*filename*]
8. **exit**
9. **copy running-config startup-config**
10. **reload**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters configuration mode.
Step 2	**config-register** **Example:** `Router(config)# config-register 0x2`	Sets the configuration register so that the router boots using a specified image in NVRAM.

	Command or Action	Purpose
Step 3	**exit** **Example:** `Router(config)#exit`	Exits configuration mode and returns to the EXEC command interpreter prompt.
Step 4	**request platform software package expand file** *source-URL* [**to** *destination-URL*] [**force**] [**verbose**] [**wipe**] **Example:** `Router# request platform software package expand file bootflash:Image/asr903rsp1-adventerprisek9.base.bin` **Example:**	Expands the consolidated image file on the active RSP.
Step 5	**request platform software package expand file** *source-URL* [**to***destination-URL*] [**force**] [**verbose**] [**wipe**] **Example:** `Router# request platform software package expand file stby-bootflash:Image/asr903rsp1-adventerprisek9.base.bin`	Expands the consolidated image file on the standby RSP. **Note** This step applies only if your router has a redundant RSP.
Step 6	**configure terminal** **Example:** `Router# configure terminal`	Enters configuration mode.
Step 7	**boot system flash** [**flash-fs:**] [*partition-number:*] [*filename*] **Example:** `Router(config)# boot system bootflash:Image/packages.conf`	Sets the router to boot using the packages.conf file.
Step 8	**exit** **Example:** `Router(config)#exit`	Exits configuration mode and returns to the EXEC command interpreter prompt.
Step 9	**copy running-config startup-config** **Example:** `Router# copy running-config startup-config`	Saves the configuration.
Step 10	**reload** **Example:** `Router#reload`	Reloads the router.

Understanding In-Service Software Upgrades

The ISSU process allows you to update the router software with minimal service interruption.

Starting with Cisco IOS XE Release 3.11, step-by-step ISSU upgrade is supported on the router. Two types of ISSU upgrade is supported on the router.

- Single-Command ISSU Upgrade, on page 9
- Step-By-Step ISSU Upgrade, on page 10

General Prerequisites for ISSU Upgrade

- The router must be booted in sub-package mode (with package.conf).
- The package.conf (base image packages) and the upgrade image should exist in the same location in the bootflash.

Bootflash Space Requirements

The ISSU process requires a minimum of 600 MB available space in bootflash memory.

General Restrictions for ISSU Upgrade

- ISSU is *not* supported for single RSP configurations.
- Cisco IOS XE software compatibility is supported only between identical image types. Cross-image-type upgrades or installations (such as from an Universal image to an *Universalk9_npeimage) are not* supported in the ISSU process.
- Running two different image types simultaneously is *not* supported.
- ISSU upgrades from one package mode to another are *not* supported.

Single-Command ISSU Upgrade

A single command upgrade allows you to install a complete set of sub-packages using a single command.

The command installs the complete set of packages on the standby RSP, and then perform a rolling reload of the interface modules on the active RSP. After the interface modules are reloaded, an HA switchover is performed and the complete set of sub-packages will be installed on the new (i.e. previously active) RSP. For information about completing a single-command upgrade, see Completing the Single Command Upgrade, on page 12.

Step-By-Step ISSU Upgrade

Starting with Cisco IOS XE Release 3.11S and later releases, step-by-step ISSU upgrade is available on the router. For information on performing a step-by-step ISSU, see Performing Step-by-Step ISSU Upgrade, on page 13.

Downloading an Image

Download the image to the same partition of the bootflash where the base image exists. For information on downloading images see, Loading and Managing System Images Configuration Guide, Cisco IOS XE Release 3S.

Note Ensure that you have chosen an upgrade image that is supported by your current software version.

Performing a Single Command Software Upgrade

A single command upgrade updates the active and standby RSPs with a single IOS command. Follow these steps to complete the one-shot upgrade.

Preparing for Installation

SUMMARY STEPS

1. Verify the chassis is booted using sub-package mode and in hot standby state, else set the router to sub-package mode.
2. Download the new image file from Cisco.com on the chassis.
3. Open a console session to the active RSP.
4. Copy the new consolidated image file to the active image bootflash directory such that the new image file is in the same location as the existing image file.
5. **configure terminal**
6. **redundancy**
7. **mode sso**
8. **end**
9. Confirm that the router has reached SSO state
10. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Verify the chassis is booted using sub-package mode and in hot standby state, else set the router to sub-package mode.	For more information, see Setting the Router to Boot in Sub-Package Mode, on page 7.
Step 2	Download the new image file from Cisco.com on the chassis.	For more information about downloading Cisco software image, see *Using Cisco IOS XE Software* in Cisco ASR 903 Router Chassis Software Configuration Guide.
Step 3	Open a console session to the active RSP.	For instructions on how to open a console session, see Console Port, Telnet, and SSH Handling in Cisco ASR 903 Router Chassis Software Configuration Guide. .
Step 4	Copy the new consolidated image file to the active image bootflash directory such that the new image file is in the same location as the existing image file.	**Note** Do not copy the packages.conf file to a new directory after expanding the package. It is required that the packages.conf file and sub package files exist in the same directory. **Note** It is not necessary to copy the new consolidated image file to the standby RSP; the one-shot upgrade process completes this step.
Step 5	**configure terminal** **Example:** `Router# configure terminal`	Enters configuration mode.

Step 6	**redundancy**
	Example:
	`Router(config)# redundancy`
	`Router(config-red)#`
		Enters redundancy configuration mode.

Step 7	**mode sso** **Example:** `Router(config-red)# mode sso`	Sets the router in SSO redundancy mode.
Step 8	**end** **Example:** `Router(config)# end`	Exits configuration mode and returns to the EXEC command prompt.
Step 9	Confirm that the router has reached SSO state **Example:** `*Jan 12 17:52:26.516: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SSO)`	Wait for the output before proceeding.

	Command or Action	Purpose
Step 10	**copy running-config startup-config** **Example:** `Router# copy running-config startup-config`	Saves the configuration.

Completing the Single Command Upgrade

SUMMARY STEPS

1. **request platform software package install node file** *file-URL* [**interface-module-delay** *delay*]
2. Wait for the router messages
3. Wait for original active RSP to reboot.
4. Switch to the new active console.
5. Wait for new active console to return to SSO state

DETAILED STEPS

	Command or Action	Purpose
Step 1	**request platform software package install node file** *file-URL* [**interface-module-delay** *delay*] **Example:** `Router# request platform software package install node file bootflash:Image/asr903rsp1-adventerprisek9.upgrade.bin interface-module-delay 160`	Initiates the one-shot installation procedure using the consolidated image file. **Note** You can adjust the delay between the OIR of each IM using the **interface-module-delay** keyword. We recommend you set the **interface-module-delay** value to 150 seconds or greater in order to ensure sufficient time for IM software upgrades. Keywords other than **interface-module-delay** are not supported.
Step 2	Wait for the router messages	The router displays a series of STAGE/SUCCESS messages. For sample output of a single command upgrade, see Example: Single Command Software Upgrade, on page 15.
Step 3	Wait for original active RSP to reboot.	The active RSP reboots and returns to the console prompt
Step 4	Switch to the new active console.	

	Command or Action	Purpose
Step 5	Wait for new active console to return to SSO state **Example:** `*Jan 12 17:52:26.516: %RF-5-RF_TERMINAL_STATE: Terminal state reached for (SSO)`	Confirms that the router has reached SSO state; wait for this output before proceeding

Performing Step-by-Step ISSU Upgrade

Step 1 Verify the chassis is booted using sub-package mode and in hot standby state, else set the router to sub-package mode, see Setting the Router to Boot in Sub-Package Mode, on page 7.

Step 2 Download the image on the chassis.

Step 3 Extract the sub-package images from the asr903rsp1-adventerprisek9.upgrade.bin image on the active RSP using the **request platform software package expand file bootflash:Image/ asr903rsp1-adventerprisek9.upgrade.bin** command.

Step 4 Extract the sub-package image from the asr903rsp1-adventerprisek9.upgrade.bin image on the standby RSP using the **request platform software package expand file stby-bootflash:Image/asr903rsp1-adventerprisek9.upgrade.bin** command.

Step 5 Upgrade all the sub-packages on the standby RSP using the **request platform software package install rp** *stdby_slot_num* **file stby-bootflash:asr903rsp1-*.upgrade.pkg** command.

Step 6 Reload the standby module from active RP using the **hw-module slot** *stdby_slot_num* **reload** command and wait for the standby to reach Hot standby state.

Step 7 Execute the **request platform software package install file rp** *active_slot_num* **file bootflash:asr903rsp1-sipspa.upgrade.pkg slot** *0* **bay** *im_slot_num* **force** command for each IM present in the router.

Note The IMs present are reset during the installation. Verify the IM state is OK before proceding to the next IM.

Step 8 Upgrade all the sub-packages on the active RSP using the **request platform software package install rp** *active_slot_num* **file bootflash:asr903rsp1-*.upgrade.pkg** command.

Note If you have missed the package installation on any of the IM in Step 7 and proceeded to Step 8, the packages are automatically installed for the missed IMs.

Step 9 Perform a switchover. Wait for the new standby RSP module to reach hot standby state.
The latest image is upgraded on the router.

Upgrading the ROMMON on the RSP Module

The Cisco ASR 903 Router has two ROMMON regions (ROM0 and ROM1). We recommend that the upgrade is performed on both the regions.

Caution To avoid actions that might make your system unable to boot, read this entire section before starting the upgrade.

Step 1 Check the RSP bootup ROMMON region (ROM0 or ROM1). The example, shows the RSP boots up from ROM0 region.

Example:

```
System Bootstrap, Version 15.2(1r)S1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2011 by cisco Systems, Inc.
Compiled Wed 07-Dec-11 07:33 by tinhuang
Current image running: Boot ROM0
```

Step 2 Copy the ROMMON image to the bootflash on the active and standby RSP.

Example:

```
copy bootflash:asr903-rommon.153-1r.S1.pkg
```

Step 3 Use the **upgrade rom-monitor filename bootflash:asr903-rommon.153-1r.S1.pkg R0** command to upgrade the version.

Note R0 represents RSP in slot0 of the chassis. Step 3 upgrades the ROMMON region of the RSP that is not used (ROM1 region) as ROM 0 region is used (in this procedure) in Step 1 to boot up the RSP.

Step 4 Upgrade the ROMMON on the Standby RSP (for High Availability) using **upgrade rom-monitor filename bootflash:asr903-rommon.153-1r.S1.pkg R1** command.

Note R1 represents the RSP in slot1 of the chassis. Step 4 upgrades the ROMMON region of the RSP that is not used (ROM 0 region).

Step 5 Reload the router.

Example:

```
System Bootstrap, Version 15.2(1r)S1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2011 by cisco Systems, Inc.
Compiled Wed 07-Dec-11 07:33 by tinhuang
Current image running: Boot ROM0
Last reset cause: RSP-Board
UEA platform with 2097152 Kbytes of main memory
Rommon upgrade requested
Flash upgrade reset 1 in progress
.......
System Bootstrap, Version 12.2(20120514:121217) [npenumar-pegasus_rommon_02 183], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2008 by cisco Systems, Inc.
Compiled Fri 15-Jun-12 11:45 by ccai
Current image running: *Upgrade in progress* Boot ROM1
Last reset cause: BootRomUpgrade
UEA platform with 2097152 Kbytes of main memory
```

Step 6 Reload the router again to confirm bootup from upgraded ROMMON region ROM1.

Example:

```
System Bootstrap, Version 15.2(1r)S1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2011 by cisco Systems, Inc.
```

```
Compiled Fri 15-Jun-12 11:45 by ccai
Current image running: Boot ROM1
```

Step 7 Repeat Step 3 to Step 6 to update the other region on the RSP (ROM0) region in this procedure).

Note We recommend that both region ROM0 andROM1 are upgraded.

Example: Verifying ROMMON Upgrade

Use the show platform command to verify the ROMMON upgrade.

```
Router# show platform

Chassis type: ASR-903
Slot      Type                State                 Insert time (ago)
--------- ------------------- --------------------- -----------------
 0/0      A900-IMA1X          ok                    04:48:07
 0/1      A900-IMA1X          ok                    04:43:42
 0/4      A900-IMA8T          ok                    05:18:21
 0/5      A900-IMA8T          ok                    05:18:21
R0        A903-RSP1A-55       ok, active            05:23:11
R1        A903-RSP1A-55       ok, standby         05:23:11
F0                                          ok, active           05:23:11
F1                                          ok, standby         05:23:11
P0        A900-PWR550-D       ok                    05:20:02
P1        A900-PWR550-D       ok                    05:19:55
P2        A903-FAN            ok                    05:19:45
Slot      CPLD Version        Firmware Version
--------- ------------------- ---------------------------------------
R0        11102133            15.3(1r)S1
R1        11102133            15.3(1r)S1
F0        11102133            15.3(1r)S1
F1        11102133            15.3(1r)S1
```

Verifying the Upgrade

Example: Single Command Software Upgrade

```
Router# request platform software package install node file bootflash:XE371_k9_0810.bin
interface-module-delay 150


NOTE: Currently node has booted from a provisioning file
NOTE: Going to start a dual rp sub-packages node ISSU install
--- Starting initial file path checking ---
Copying bootflash:XE371_k9_0810.bin to stby-bootflash:XE371_k9_0810.bin
Finished initial file path checking
--- Starting config-register verification ---
Finished config-register verfication
--- Starting image file expansion ---
Expanding image file: bootflash:XE371_k9_0810.bin
Image file expanded and copied
Expanding image file: stby-bootflash:XE371_k9_0810.bin
Image file expanded and copied
Finished image file expansion
STAGE 1: Installing software on standby RP
==========================================
--- Starting local lock acquisition on R0 ---
```

```
Finished local lock acquisition on R0
--- Starting installation state synchronization ---
Finished installation state synchronization
--- Starting local lock acquisition on R1 ---
Finished local lock acquisition on R1
--- Starting file path checking ---
Finished file path checking
--- Starting image file verification ---
Checking image file names
Locating image files and validating name syntax
  Found asr903rsp1-espbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpaccess.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpcontrol.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpios-universalk9_npe.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg

  Found asr903rsp1-sipbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-sipspa.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Verifying image file locations
Inspecting image file types
    WARNING: In-service installation of IOSD package
    WARNING: requires software redundancy on target RP
    WARNING: or on-reboot parameter
    WARNING: Automatically setting the on-reboot flag
    WARNING: In-service installation of RP Base package
    WARNING: requires software reboot of target RP
Processing image file constraints
Creating candidate provisioning file
Finished image file verification
--- Starting candidate package set construction ---
Verifying existing software set
Processing candidate provisioning file
Constructing working set for candidate package set
Constructing working set for running package set
Checking command output
Constructing merge of running and candidate packages
Checking if resulting candidate package set would be complete
Finished candidate package set construction
--- Starting compatibility testing ---
Determining whether candidate package set is compatible
Determining whether installation is valid
Determining whether installation is valid ... skipped
Verifying image type compatibility
Checking IPC compatibility for candidate software
Checking candidate package set infrastructure compatibility
Checking infrastructure compatibility with running software
Checking infrastructure compatibility with running software ... skipped
Checking package specific compatibility
Finished compatibility testing
--- Starting list of software package changes ---
Old files list:
  Removed asr903rsp1-espbase.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpaccess.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpbase.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpcontrol.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpios-universalk9_npe.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-sipbase.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-sipspa.2012-08-12_15.26_amprajap.pkg
New files list:
  Added asr903rsp1-espbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpaccess.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpcontrol.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpios-universalk9_npe.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg

  Added asr903rsp1-sipbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-sipspa.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Finished list of software package changes
--- Starting commit of software changes ---
Updating provisioning rollback files
Creating pending provisioning file
Committing provisioning file
Finished commit of software changes
```

```
SUCCESS: Software provisioned.  New software will load on reboot.
STAGE 2: Restarting standby RP
==============================
--- Starting standby reload ---
Finished standby reload
--- Starting wait for Standby RP to reach terminal redundancy state ---
Finished wait for Standby RP to reach terminal redundancy state
STAGE 3: Installing sipspa package on local RP
==============================================
--- Starting local lock acquisition on R0 ---
Finished local lock acquisition on R0
--- Starting installation state synchronization ---
Finished installation state synchronization
--- Starting file path checking ---
Finished file path checking
--- Starting image file verification ---
Checking image file names
Locating image files and validating name syntax
  Found asr903rsp1-sipspa.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Verifying image file locations
Inspecting image file types
Processing image file constraints
Creating candidate provisioning file
Finished image file verification
--- Starting candidate package set construction ---
Verifying existing software set
Processing candidate provisioning file
Constructing working set for candidate package set
Constructing working set for running package set
Checking command output
Constructing merge of running and candidate packages
Checking if resulting candidate package set would be complete
Finished candidate package set construction
--- Starting compatibility testing ---
Determining whether candidate package set is compatible
WARNING:
WARNING: Candidate software combination not found in compatibility database
WARNING:
Determining whether installation is valid
WARNING:
WARNING: Candidate software combination not found in compatibility database
WARNING:
WARNING:
WARNING: Candidate software combination not found in compatibility database
WARNING:
Software sets are identified as compatible
Verifying image type compatibility
Checking IPC compatibility with running software
Checking candidate package set infrastructure compatibility
Checking infrastructure compatibility with running software
Checking package specific compatibility
Finished compatibility testing
--- Starting impact testing ---
Checking operational impact of change
Finished impact testing
--- Starting list of software package changes ---
Old files list:
  Removed asr903rsp1-sipspa.2012-08-12_15.26_amprajap.pkg
New files list:
  Added asr903rsp1-sipspa.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Finished list of software package changes
--- Starting commit of software changes ---
Updating provisioning rollback files
Creating pending provisioning file
Committing provisioning file
Finished commit of software changes
--- Starting analysis of software changes ---
Finished analysis of software changes
--- Starting update running software ---
Blocking peer synchronization of operating information
Creating the command set placeholder directory
  Finding latest command set
  Finding latest command shortlist lookup file
```

```
  Finding latest command shortlist file
  Assembling CLI output libraries
  Assembling CLI input libraries
  Assembling Dynamic configuration files
  Applying interim IPC and database definitions
  Replacing running software
  Replacing CLI software
  Restarting software
  Restarting IM: 0/0
Skipping IM reload for Ethernet IM
  Restarting IM: 0/1
Skipping IM reload for Ethernet IM
  Restarting IM: 0/2
Skipping IM reload for Ethernet IM
  Restarting IM: 0/3
Skipping IM reload for Ethernet IM
  Restarting IM: 0/4
Skipping IM reload for Ethernet IM
  Applying final IPC and database definitions
  Generating software version information
  Notifying running software of updates
  Unblocking peer synchronization of operating information
Unmounting old packages
Cleaning temporary installation files
  Finished update running software

SUCCESS: Finished installing software.
STAGE 4: Installing software on active RP
=========================================
--- Starting local lock acquisition on R0 ---
Finished local lock acquisition on R0
--- Starting installation state synchronization ---
Finished installation state synchronization
--- Starting file path checking ---
Finished file path checking
--- Starting image file verification ---
Checking image file names
Locating image files and validating name syntax
  Found asr903rsp1-espbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpaccess.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpcontrol.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-rpios-universalk9_npe.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg

  Found asr903rsp1-sipbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Found asr903rsp1-sipspa.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Verifying image file locations
Inspecting image file types
    WARNING: In-service installation of IOSD package
    WARNING: requires software redundancy on target RP
    WARNING: or on-reboot parameter
    WARNING: Automatically setting the on-reboot flag
    WARNING: In-service installation of RP Base package
    WARNING: requires software reboot of target RP
Processing image file constraints
Creating candidate provisioning file
Finished image file verification
--- Starting candidate package set construction ---
Verifying existing software set
Processing candidate provisioning file
Constructing working set for candidate package set
Constructing working set for running package set
Checking command output
Constructing merge of running and candidate packages
Checking if resulting candidate package set would be complete
Finished candidate package set construction
--- Starting compatibility testing ---
Determining whether candidate package set is compatible
Determining whether installation is valid
Determining whether installation is valid ... skipped
Verifying image type compatibility
Checking IPC compatibility for candidate software
Checking candidate package set infrastructure compatibility
```

```
Checking infrastructure compatibility with running software
Checking infrastructure compatibility with running software ... skipped
Checking package specific compatibility
Finished compatibility testing
--- Starting list of software package changes ---
Old files list:
  Removed asr903rsp1-espbase.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpaccess.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpbase.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpcontrol.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-rpios-universalk9_npe.2012-08-12_15.26_amprajap.pkg
  Removed asr903rsp1-sipbase.2012-08-12_15.26_amprajap.pkg
New files list:
  Added asr903rsp1-espbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpaccess.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpcontrol.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
  Added asr903rsp1-rpios-universalk9_npe.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg

  Added asr903rsp1-sipbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Finished list of software package changes
--- Starting commit of software changes ---
Updating provisioning rollback files
Creating pending provisioning file
Committing provisioning file
Finished commit of software changes
SUCCESS: Software provisioned.  New software will load on reboot.
STAGE 5: Restarting active RP (switchover to stdby)
==================================================
--- Starting active reload ---
Finished active reload
SUCCESS: node ISSU finished successfully.
RUDY-1#
RUDY-1#Aug 24 07:54:41.715 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: reload fru
 action requested
System Bootstrap, Version 15.3(1r)S1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012 by cisco Systems, Inc.
Compiled Tue 26-Jun-12 12:42 by ccai
Current image running: Boot ROM0UEA platform with 3670016 Kbytes of main memory
Located packages.conf
Image size 7519 inode num 38, bks cnt 2 blk size 8*512
#
Located asr903rsp1-rpbase.BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021.pkg
Image size 34216240 inode num 90631, bks cnt 8354 blk size 8*512
###########################################################################
#######################################################################################
#######################################################################################
#######################################################################
Boot image size = 34216240 (0x20a1930) bytes
Package header rev 0 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
        calculated e7674970:dbc1eb86:325219c7:b3da0e0f:077e5e4d
        expected   e7674970:dbc1eb86:325219c7:b3da0e0f:077e5e4d
Image validated
%IOSXEBOOT-4-BOOT_ACTIVITY_LONG_TIME: (rp/0): load_crash_kernel took: 2 seconds, expected
max time 2 seconds
%IOSXEBOOT-4-DEBUG_CONF: (rp/0): File /bootflash/debug.conf is absent, ignoring
%IOSXEBOOT-4-BOOT_ACTIVITY_LONG_TIME: (rp/0): Chassis initialization took: 26 seconds,
expected max time 10 seconds
%IOSXEBOOT-4-BOOT_ACTIVITY_LONG_TIME: (rp/0): upgrade hw-programmable took: 2 seconds,
expected max time 2 seconds
              Restricted Rights Legend
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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706
```

```
Cisco IOS Software, IOS-XE Software (PPC_LINUX_IOSD-UNIVERSALK9_NPE-M),
Experimental Version 15.2(20120810:081250)
[v152_4_s_xe37_throttle-BLD-BLD_V152_4_S_XE37_THROTTLE_LATEST_20120810_070021-ios 131]
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This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
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compliance with U.S. and local country laws. By using this product you
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http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to
export@cisco.com.
cisco ASR-903 (RSP1) processor with 540359K/6147K bytes of memory.
Processor board ID FOX1518P0GP
32768K bytes of non-volatile configuration memory.
3670016K bytes of physical memory.
1328927K bytes of SD flash at bootflash:.
Press RETURN to get started!
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS master command list	Cisco IOS Master Command List , All Releases
Cisco IOS High Availability commands	*Cisco IOS High Availability Command Reference*

Standards

Standard	Title
No new or modified standards are supported, and support for existing standards has not been modified.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified. Cisco ASR 900 Series Aggregation Services Routers MIB Specifications Guide	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs Cisco ASR 900 Series Aggregation Services Routers MIB Specifications Guide

RFCs

RFC	Title
No new or modified RFCs are supported, and support for existing RFCs has not been modified.	--

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for In Service Software Upgrade

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 6: Feature Information for In Service Software Upgrade

Feature Name	Releases	Feature Information
In Service Software Upgrade	Cisco IOS XE Release 3.6S	In Cisco IOS XE Release 3.6S, support was added for the Cisco ASR 903 Router.
Step-by-Step ISSU Upgrade	Cisco IOS XE Release 3.11S	In Cisco IOS XE Release 3.11S, step-by-step ISSU upgrade was supported on the Cisco ASR 900 Series Router.