Configuration Examples

This chapter provides examples of configuring common networking tasks on the router. The examples in this chapter are provided for illustrative purposes only; little or no context is given with these examples. For more information, see Installing the Software.

When reading this section, also be aware that networking configurations are complex and can be configured in many ways. The examples in this section show one method of accomplishing a configuration.

This chapter contains the following examples:

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- Obtaining the Description of a Module or Consolidated Package, on page 18

Copying the Consolidated Package from the TFTP Server to the Router

The following example shows how to copy the consolidated package from the TFTP server to the router:

```
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 17:48:41 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 17:49:14 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb

7451738112 bytes total (7015186432 bytes free)
Router# copy tftp bootflash:
Address or name of remote host []? 10.81.116.4
Source filename []? rtp-isr4400-54/isr4400.bin
```

```
Destination filename [isr4400.bin]?
Accessing tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin...
Loading rtp-isr4400-54/isr4400.bin from 10.81.116.4 (via GigabitEthernet0): !!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 424317088 bytes]

424317088 bytes copied in 371.118 secs (1143348 bytes/sec)
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 17:48:41 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:05:07 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 18:01:41 +00:00  isr4400.bin

7451738112 bytes total (6590910464 bytes free)
```

Configuring the Router to Boot Using the Consolidated Package Stored on the Router

The following example shows how to configure the router to boot using the consolidated package stored on the router:

```
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 17:48:41 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:05:07 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 18:01:41 +00:00  isr4400.bin

7451738112 bytes total (6590910464 bytes free)


Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# boot system bootflash:isr4400.bin
Router(config)# config-register 0x2102
Router(config)# exit
Router# show run | include boot
boot-start-marker
boot system bootflash:isr4400.bin
boot-end-marker
license boot level adventerprise
Router# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

```
Router# reload
Proceed with reload? [confirm]
Sep 13 18:08:36.311 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: process exit
with reload chassis code


Initializing Hardware ...

System integrity status: c0000600
Failures detected:
 Boot FPGA corrupt

Key Sectors:(Primary,GOOD),(Backup,GOOD),(Revocation,GOOD)
Size of Primary = 2288 Backup = 2288 Revocation = 300

ROM:RSA Self Test Passed
ROM:Sha512 Self Test Passed
Self Tests Latency: 58 msec


System Bootstrap, Version 12.2(20120618:163328) [username-ESGROM_20120618_GAMMA 101],
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2012  by cisco Systems, Inc.
Compiled Mon 06/18/2012 12:39:32.05 by username

Current image running: Boot ROM0

Last reset cause: LocalSoft

Cisco ISR 4400 platform with 4194304 Kbytes of main memory

File size is 0x194a90a0
Located isr4400.bin
Image size 424317088 inode num 13, bks cnt 103594 blk size 8*512
################################################################################################
Boot image size = 424317088 (0x194a90a0) bytes

ROM:RSA Self Test Passed
ROM:Sha512 Self Test Passed
Self Tests Latency: 58 msec

Package header rev 1 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
 calculated 7294dffc:892a6c35:a7a133df:18c032fc:0670b303
 expected   7294dffc:892a6c35:a7a133df:18c032fc:0670b303
Signed Header Version Based Image Detected

Using FLASH based Keys of type = PRIMARY KEY STORAGE
Using FLASH based Keys of type = ROLLOVER KEY STORAGE
RSA Signed DEVELOPMENT Image Signature Verification Successful.
Package Load Test Latency : 5133 msec
Image validated
%IOSXEBOOT-4-BOOT_ACTIVITY_LONG_TIME: (local/local): load_modules took: 2 seconds, expected

max time 2 seconds

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Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
```

```
Software clause at DFARS sec. 252.227-7013.

           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706


Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version

15.3(20120910:013018) [mcp_dev-BLD-BLD_MCP_DEV_LATEST_20120910_000023-ios 153]
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Sun 09-Sep-12 21:28 by mcpre

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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.

Warning:  the compile-time code checksum does not appear to be present.
cisco ISR4451/K9 (2RU) processor with 1133589K/6147K bytes of memory.
Processor board ID FGL1619100P
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of Compact flash at bootflash:.
7816688K bytes of USB flash at usb0:.

Press RETURN to get started!
```

Extracting the Subpackages from a Consolidated Package into the Same File System

The following example shows how to extract the subpackages from a consolidated package into the same file system.

After entering the **request platform software package expand file bootflash:isr4400.bin** command (note that the **to** option is not used) the subpackages are extracted from the consolidated package into **bootflash:**

```
Router> enable
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:12:58 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:13:31 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 18:01:41 +00:00  isr4400.bin

7451738112 bytes total (6590029824 bytes free)
Router# request platform software package expand file bootflash:isr4400.bin
Verifying parameters
Validating package type
Copying package files
SUCCESS: Finished expanding all-in-one software package.
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:12:58 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:16:49 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 18:01:41 +00:00  isr4400.bin
778756  -rw-   112911096  Sep 13 2012 18:15:49 +00:00
isr4400-espbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778757  -rw-     2220784  Sep 13 2012 18:15:49 +00:00
isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778758  -rw-      371440  Sep 13 2012 18:15:49 +00:00
isr4400-firmware_fpge.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778759  -rw-     8080112  Sep 13 2012 18:15:49 +00:00
isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778760  -rw-     9331440  Sep 13 2012 18:15:49 +00:00
isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778761  -rw-      379632  Sep 13 2012 18:15:49 +00:00
isr4400-firmware_ucse.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
 --More--         778754  -rw-       10540  Sep 13 2012 18:15:48 +00:00
isr4400-packages-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.conf
778762  -rw-    27218680  Sep 13 2012 18:15:50 +00:00
isr4400-rpaccess.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778763  -rw-    78938264  Sep 13 2012 18:15:50 +00:00
isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778764  -rw-    45177592  Sep 13 2012 18:15:50 +00:00
isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778765  -rw-   114662144  Sep 13 2012 18:16:01 +00:00
isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778766  -rw-    26360568  Sep 13 2012 18:16:03 +00:00
isr4400-sipbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778767  -rw-    13091576  Sep 13 2012 18:16:06 +00:00
isr4400-sipspa.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
778755  -rw-       11349  Sep 13 2012 18:16:06 +00:00  packages.conf

7451738112 bytes total (6150725632 bytes free)
```

Extracting the Subpackages from a Consolidated Package into a Different File System

The following example shows how to extract the subpackages from a consolidated package into a different file system.

The initial **dir usb0:** command shows that there are no subpackages in the **bootflash:** directory.

After the **request platform software package expand file usb0:isr4400.bin to bootflash:** command is entered, the subpackages are displayed in the **bootflash:** directory. The isr4400.bin consolidated package file is in the **usb0:** directory.

```
Router# dir usb0:
Directory of usb0:/

  121  -rwx   424317088  Sep 13 2012 18:27:50 +00:00  isr4400.bin

7988666368 bytes total (7564341248 bytes free)

Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:12:58 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:41:51 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb

7451738112 bytes total (6590418944 bytes free)
Router# request platform software package expand file usb0:isr4400.bin to bootflash:
Verifying parameters
Validating package type
Copying package files
SUCCESS: Finished expanding all-in-one software package.
Router# dir bootflash:
Directory of bootflash:/
11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:12:58 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:46:52 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
454276  -rw-   112911096  Sep 13 2012 18:46:05 +00:00
isr4400-espbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454277  -rw-     2220784  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454278  -rw-      371440  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_fpge.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454279  -rw-     8080112  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454280  -rw-     9331440  Sep 13 2012 18:46:06 +00:00
isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454281  -rw-      379632  Sep 13 2012 18:46:06 +00:00
```

```
isr4400-firmware_ucse.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
 --More--         454274  -rw-       10540  Sep 13 2012 18:46:05 +00:00
isr4400-packages-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.conf
454282  -rw-    27218680  Sep 13 2012 18:46:06 +00:00
isr4400-rpaccess.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454283  -rw-    78938264  Sep 13 2012 18:46:06 +00:00
isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454284  -rw-    45177592  Sep 13 2012 18:46:06 +00:00
isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454285  -rw-   114662144  Sep 13 2012 18:46:16 +00:00
isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454286  -rw-    26360568  Sep 13 2012 18:46:19 +00:00
isr4400-sipbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454287  -rw-    13091576  Sep 13 2012 18:46:21 +00:00
isr4400-sipspa.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454275  -rw-       11349  Sep 13 2012 18:46:21 +00:00  packages.conf

7451738112 bytes total (6575869952 bytes free)
```

Configuring the Router to Boot Using Subpackages

After placing the provisioning file and subpackage files in a directory and booting the router, we recommend that you do not rename, delete, or alter any of these files. Renaming, deleting, or altering the files can lead to unpredictable router problems and behaviors. Each version of a consolidated package contains subpackages that are similar to those shown in the following table. However, each version of a consolidated package may contain different versions of each subpackage.

Table 1: Subpackages

Subpackage	Description
RPBase	Provides the operating system software for the Route Processor. This is the only bootable package.
RPControl	Controls the control plane processes that act as the interface between the Cisco IOS process and the rest of the platform.
RPAccess	Exports processing of restricted components, such as Secure Socket Layer (SSL), Secure Shell (SSH), and other security features.
RPIOS	Provides the Cisco IOS kernel, where Cisco IOS XE features are stored and run. Each consolidated package has a different version of RPIOS.
ESPBase	Provides the Embedded Services Processor (ESP) operating system and control processes, and ESP software.
SIPBase	Provides control processes.
SIPSPA	Provides Input/Output (I/O) drivers.
Firmware	Firmware subpackage. The name of the subpackage includes the module type, which either refers to a Network Information Module (NIM) or Cisco Enhanced Service Module.

The following example shows how to configure the router to boot using subpackages:

The **dir bootflash:** command confirms that all subpackages and the provisioning file are in the same file system, as shown in the following example:

```
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:12:58 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:46:52 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
454276  -rw-   112911096  Sep 13 2012 18:46:05 +00:00
isr4400-espbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454277  -rw-     2220784  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454278  -rw-      371440  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_fpge.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454279  -rw-     8080112  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454280  -rw-     9331440  Sep 13 2012 18:46:06 +00:00
isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454281  -rw-      379632  Sep 13 2012 18:46:06 +00:00
isr4400-firmware_ucse.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
 --More--         454274  -rw-       10540  Sep 13 2012 18:46:05 +00:00
isr4400-packages-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.conf
454282  -rw-    27218680  Sep 13 2012 18:46:06 +00:00
isr4400-rpaccess.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454283  -rw-    78938264  Sep 13 2012 18:46:06 +00:00
isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454284  -rw-    45177592  Sep 13 2012 18:46:06 +00:00
isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454285  -rw-   114662144  Sep 13 2012 18:46:16 +00:00
isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454286  -rw-    26360568  Sep 13 2012 18:46:19 +00:00
isr4400-sipbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454287  -rw-    13091576  Sep 13 2012 18:46:21 +00:00
isr4400-sipspa.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454275  -rw-       11349  Sep 13 2012 18:46:21 +00:00  packages.conf

7451738112 bytes total (6575869952 bytes free)

Router# show running | include boot
boot-start-marker
boot-end-marker
license boot level adventerprise
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# boot system bootflash:packages.conf
Router(config)# config-register 0x2102
Router(config)# exit
Router# show running | include boot
boot-start-marker
boot system bootflash:packages.conf
boot-end-marker
license boot level adventerprise
Router# copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Router# reload
```

```
Proceed with reload? [confirm]
Sep 13 18:49:39.720 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: process exit with
 reload chassis code


Initializing Hardware ...

System integrity status: c0000600
Failures detected:
 Boot FPGA corrupt


Key Sectors:(Primary,GOOD),(Backup,GOOD),(Revocation,GOOD)
Size of Primary = 2288 Backup = 2288 Revocation = 300

ROM:RSA Self Test Passed
ROM:Sha512 Self Test Passed
Self Tests Latency: 58 msec


System Bootstrap, Version 12.2(20120618:163328) [username-ESGROM_20120618_GAMMA 101],
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2012  by cisco Systems, Inc.
Compiled Mon 06/18/2012 12:39:32.05 by username

Current image running: Boot ROM0

Last reset cause: LocalSoft

Cisco ISR 4400 platform with 4194304 Kbytes of main memory

File size is 0x00002c55
Located packages.conf
Image size 11349 inode num 454275, bks cnt 3 blk size 8*512
#
File size is 0x04b48098
Located isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
Image size 78938264 inode num 454283, bks cnt 19273 blk size 8*512
################################################################################################################################################
Boot image size = 78938264 (0x4b48098) bytes

ROM:RSA Self Test Passed
ROM:Sha512 Self Test Passed
Self Tests Latency: 58 msec

Package header rev 1 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
 calculated dbe960a6:d239245c:76d93622:d6c31a41:40e9e420
 expected   dbe960a6:d239245c:76d93622:d6c31a41:40e9e420
Signed Header Version Based Image Detected

Using FLASH based Keys of type = PRIMARY KEY STORAGE
Using FLASH based Keys of type = ROLLOVER KEY STORAGE
RSA Signed DEVELOPMENT Image Signature Verification Successful.
Package Load Test Latency : 1159 msec
Image validated

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```

```
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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version
 15.3(20120910:013018) [mcp_dev-BLD-BLD_MCP_DEV_LATEST_20120910_000023-ios 153]
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Sun 09-Sep-12 21:28 by mcpre



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export@cisco.com.

Warning:  the compile-time code checksum does not appear to be present.
cisco ISR4451/K9 (2RU) processor with 1133589K/6147K bytes of memory.
Processor board ID FGL1619100P
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of Compact flash at bootflash:.
7816688K bytes of USB flash at usb0:.

Press RETURN to get started!

Router>
Router> en
Router# show version
Cisco IOS XE Software, Version BLD_V154_3_S_XE313_THROTTLE_LATEST_20140527_070027-ext
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version
15.4(20140527:095327)
[v154_3_s_xe313_throttle-BLD-BLD_V154_3_S_XE313_THROTTLE_LATEST_20140527_070027-ios 156]


IOS XE Version: BLD_V154_3_S_XE313_THROTTLE_LATEST
```

```
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documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON

Router uptime is 1 minute
Uptime for this control processor is 4 minutes
 --More--         System returned to ROM by reload
System image file is "bootflash:packages.conf"
Last reload reason: Reload Command

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export@cisco.com.

License Level: adventerprise
License Type: EvalRightToUse
 --More--         Next reload license Level: adventerprise

cisco ISR4451/K9 (2RU) processor with 1133589K/6147K bytes of memory.
Processor board ID FGL1619100P
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of Compact flash at bootflash:.
7816688K bytes of USB flash at usb0:.

Configuration register is 0x2102

Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:53:29 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:54:03 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
454276  -rw-   112911096  Sep 13 2012 18:46:05 +00:00
isr4400-espbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454277  -rw-     2220784  Sep 13 2012 18:46:05 +00:00
```

```
isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454278  -rw-      371440  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_fpge.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454279  -rw-     8080112  Sep 13 2012 18:46:05 +00:00
isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454280  -rw-     9331440  Sep 13 2012 18:46:06 +00:00
isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454281  -rw-      379632  Sep 13 2012 18:46:06 +00:00
isr4400-firmware_ucse.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
 --More--         454274  -rw-       10540  Sep 13 2012 18:46:05 +00:00
isr4400-packages-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.conf
454282  -rw-    27218680  Sep 13 2012 18:46:06 +00:00
isr4400-rpaccess.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454283  -rw-    78938264  Sep 13 2012 18:46:06 +00:00
isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454284  -rw-    45177592  Sep 13 2012 18:46:06 +00:00
isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454285  -rw-   114662144  Sep 13 2012 18:46:16 +00:00
isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454286  -rw-    26360568  Sep 13 2012 18:46:19 +00:00
isr4400-sipbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454287  -rw-    13091576  Sep 13 2012 18:46:21 +00:00
isr4400-sipspa.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg
454275  -rw-       11349  Sep 13 2012 18:46:21 +00:00  packages.conf

7451738112 bytes total (6574940160 bytes free)

Router# del isr4400*
Delete filename [isr4400*]?
Delete bootflash:/isr4400-espbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg?
[confirm]
Delete bootflash:/isr4400-firmware_fpge.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg?
[confirm]
Delete bootflash:/isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg?
[confirm]
Delete bootflash:/isr4400-firmware_ucse.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-packages-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.conf?
[confirm]
Delete bootflash:/isr4400-rpaccess.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-rpbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg?
[confirm]
Delete bootflash:/isr4400-sipbase.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Delete bootflash:/isr4400-sipspa.BLD_MCP_DEV_LATEST_20120910_000023.SSA.pkg? [confirm]
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:53:29 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 18:54:03 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
454275  -rw-       11349  Sep 13 2012 18:46:21 +00:00  packages.conf

7451738112 bytes total (6574952448 bytes free)
Router# del packages.conf
Delete filename [packages.conf]?
```

```
Delete bootflash:/packages.conf? [confirm]
Router# copy tftp bootflash:
Address or name of remote host []? 10.81.116.4
Source filename []? rtp-isr4400-54/isr4400.bin
Destination filename [isr4400.bin]?
Accessing tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin...
Loading rtp-isr4400-54/isr4400.bin from 10.81.116.4 (via GigabitEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 424317088 bytes]

424317088 bytes copied in 351.758 secs (1206276 bytes/sec)
```

Backing Up Configuration Files

This section provides the following examples:

- Copying a Startup Configuration File to BootFlash, on page 13
- Copying a Startup Configuration File to a USB Flash Drive, on page 14
- Copying a Startup Configuration File to a TFTP Server, on page 14

Copying a Startup Configuration File to BootFlash

```
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:53:29 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 19:03:19 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 19:02:50 +00:00  isr4400.bin

7451738112 bytes total (6150721536 bytes free)
Router# copy nvram:startup-config bootflash:
Destination filename [startup-config]?
1367 bytes copied in 0.116 secs (11784 bytes/sec)
Router# dir bootflash:
Directory of bootflash:/

   11  drwx       16384   Jul 2 2012 15:25:23 +00:00  lost+found
16225  drwx        4096  Jul 31 2012 19:30:48 +00:00  core
178465  drwx        4096  Sep 13 2012 18:53:29 +00:00  .prst_sync
324481  drwx        4096   Jul 2 2012 15:26:54 +00:00  .rollback_timer
   12  -rw-           0   Jul 2 2012 15:27:06 +00:00  tracelogs.696
373153  drwx      114688  Sep 13 2012 19:03:19 +00:00  tracelogs
32449  drwx        4096   Jul 2 2012 15:27:08 +00:00  .installer
681409  drwx        4096  Jul 31 2012 19:15:39 +00:00  .ssh
697633  drwx        4096   Jul 2 2012 15:27:08 +00:00  vman_fdb
   13  -rw-   424317088  Sep 13 2012 19:02:50 +00:00  isr4400.bin
   14  -rw-        1367  Sep 13 2012 19:03:57 +00:00  startup-config
```

```
7451738112 bytes total (6150717440 bytes free)
Router# copy bootflash:startup-config tftp:
Address or name of remote host []? 172.18.40.33
Destination filename [router-confg]? startup-config
!!
1367 bytes copied in 0.040 secs (34175 bytes/sec)
Router# exit

Router con0 is now available


Press RETURN to get started.
```

Copying a Startup Configuration File to a USB Flash Drive

```
Router# dir usb0:
Directory of usb0:/

No files in directory

4094840832 bytes total (4094836736 bytes free)
Router# copy nvram:startup-config usb0:
Destination filename [startup-config]?
1644 bytes copied in 0.248 secs (6629 bytes/sec)
Router# dir usb0:
Directory of usb0:/

3097__-rwx________1644__ Oct 3 2012 14:53:50 +00:00__startup-config

4094840832 bytes total (4094832640 bytes free)
Router#
```

Copying a Startup Configuration File to a TFTP Server

```
Router# copy nvram:startup-config tftp:
Address or name of remote host []? 172.18.40.4
Destination filename [router-confg]?
!!
3274 bytes copied in 0.039 secs (83949 bytes/sec)
Router#
```

Displaying Digitally Signed Cisco Software Signature Information

In this example, authenticity details for a consolidated package are displayed on the screen:

```
router# show software authenticity running
PACKAGE isr4400-rpbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
-----------------------------------------------------------------
Image type                   : Special
    Signer Information
        Common Name          : CiscoSystems
        Organization Unit    : IOS-XE
        Organization Name    : CiscoSystems
    Certificate Serial Number : 50F48E17
```

```
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-rpcontrol.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48DA3
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-rpios-universalk9.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
---------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48E98
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-rpaccess.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48DB4
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-firmware_dsp_sp2700.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
---------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48DBE
```

```
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-firmware_sm_1t3e3.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
--------------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48DC7
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-firmware_nim_t1e1.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
--------------------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48D74
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-espbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
--------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48D64
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-sipbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
--------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48D94
```

```
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

PACKAGE isr4400-sipspa.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
----------------------------------------------------------------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48D7F
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : rp_base
        Verifier Version      : BLD_MCP_DEV_LATEST_20130114_162711

SYSTEM IMAGE
------------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50F48F33
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : ROMMON
        Verifier Version      : System Bootstrap, Version 12.2(20121015:145923
ROMMON
------
Image type                    : Special
    Signer Information
        Common Name           : CiscoSystems
        Organization Unit     : IOS-XE
        Organization Name     : CiscoSystems
    Certificate Serial Number : 50801108
    Hash Algorithm            : SHA512
    Signature Algorithm       : 2048-bit RSA
    Key Version               : A

    Verifier Information
        Verifier Name         : ROMMON
        Verifier Version      : System Bootstrap, Version 12.2(20121015:145923
Microloader
-----------
Image type                    : Release
    Signer Information
        Common Name           : CiscoSystems
        Organization Name     : CiscoSystems
    Certificate Serial Number : bace997bdd9882f8569e5b599328a448
    Hash Algorithm            : HMAC-SHA256
    Verifier Information
        Verifier Name         : Hardware Anchor
```

```
        Verifier Version      : F01001R06.02c4c06f82012-09-17
```

Obtaining the Description of a Module or Consolidated Package

In this example, internal details of the consolidated package are displayed on the screen:

```
router# request platform software package describe file
bootflash:isr4400-rpbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
Package: isr4400-rpbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg
  Size: 79755832
  Timestamp: 2013-01-15 15:46:59 UTC
  Canonical path: /bootflash/isr4400-rpbase.BLD_MCP_DEV_LATEST_20130114_162711.SSA.pkg

  Raw disk-file SHA1sum:
    5cd5916a216b147e3d9e33c0dc5afb18d86bda94

  Digital Signature Verified
  Computed SHA1sum:
    de80d5920819d224113b81a1d64b17449859952e
  Contained SHA1sum:
    de80d5920819d224113b81a1d64b17449859952e
  Hashes match. Package is valid.

  Header size:     760 bytes
  Package type:    30001
  Package flags:   0
  Header version:  1

  Internal package information:
    Name: rp_base
    BuildTime: 2013-01-14_14.55
    ReleaseDate: Mon-14-Jan-13-16:27
    BootArchitecture: i686
    RouteProcessor: overlord
    Platform: ISR
    User: mcpre
    PackageName: rpbase
    Build: BLD_MCP_DEV_LATEST_20130114_162711
    CardTypes:

  Package is bootable on RP when specified
  by packages provisioning file.
```