



Installing the Software

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Installing the Software

Installing software on the router involves installing a consolidated package (bootable image). This consists of a bundle of subpackages (modular software units), with each subpackage controlling a different set of functions.

These are the two main methods to install the software:

- **Managing and Configuring a Router to Run Using Consolidated Packages** —This a simple method that is similar to a typical Cisco router image installation and management that is supported across Cisco routers.
- **Managing and Configuring a Router to Run Using Individual Packages** —This method allows for individual upgrade of subpackages and generally has reduced boot times compared to the method below. Use this method if you want to individually upgrade a module's software.

It is better to upgrade software in a planned period of maintenance when an interruption in service is acceptable. The router needs to be rebooted for a software upgrade to take effect.

Guestshell Installation

The guestshell is removed from the IOS XE software image from the Cisco IOS XE 17.9 release. If you need to use guestshell, then you can download it from <https://developer.cisco.com/docs/iox/#!/iox-resource-downloads/downloads>.

The Guest Shell is a virtualized Linux-based environment, designed to run custom Linux applications, including Python for automated control and management of Cisco devices. Using the Guest Shell, the user can also install, update, and operate third-party Linux applications and access the IOS CLI.

The Guest Shell environment is intended for tools, Linux utilities, and manageability rather than networking.

Guest Shell shares the kernel with the host (router) system. Users can access the Linux shell of Guest Shell and update scripts and software packages in the container rootfs. However, users within the Guest Shell cannot modify the host file system and processes.

The Guest Shell container is managed using IOx. IOx is Cisco's Application Hosting Infrastructure for Cisco IOS XE devices. IOx enables hosting of applications and services developed by Cisco, partners, and third-party developers in network edge devices, seamlessly across diverse and disparate hardware platforms.

With these users in mind, guestshell will be made available as a single tar file which can then be downloaded and installed on the system like any other IOX application. As a result, there won't be any increase in the size of the universal release image.



Note Day 0 guestshell provisioning will not work with this approach.

Sample guestshell configuration can be found on this page: https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/prog/configuration/178/b_178_programmability_cg/m_178_prog_guestshell.html

To install guestshell on the device, copy the tar file to the router and run the following command:

```
app-hosting install appid guestshell package <path to tar file>
```

Use the following command to check the status:

```
show app-hosting list
```

Once guestshell has been deployed successfully, standard guestshell commands such as **guestshell enable**, **guestshell run bash**, and **guestshell run python3** should work.

The following resource talks about running python scripts using guestshell:

https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/prog/configuration/178/b_178_programmability_cg/m_178_prog_eem_python.html



Note Only python3 is supported in 17.5.1.

Important - Before You Install

Before attempting to install Guest shell on your device, please verify that the device has IOx container keys programmed on it by running the following command:

```
Router#show software authenticity keys | i Name
Product Name : ISR900_BL
Product Name : ISR900_BL
Product Name : ISR900
Product Name : ISR900
Product Name : ISR900_Containers
Product Name : ISR900_Containers
Product Name : CISCO
```

The output should contain one or more lines with the Product Name “ISR900_Containers”. If the device does not have container keys programmed on it, then you will not be able to install guest shell.

You will see an error like the following:

```
*Aug 26 15:47:21.484: %IOSXE-3-PLATFORM: R0/0: IOx: App signature verification failed with
non-zero exit code
*Aug 26 15:47:21.588: %IM-6-INSTALL_MSG: R0/0: ioxman: app-hosting: Install failed: App
package signature (package.sign)
verification failed for package manifest file package.mf. Re-sign the application and then
deploy again.
```

The guest shell tar file is published along with the IOS-XE image for a given release. More information can be found here: <https://developer.cisco.com/docs/iox/#!/iox-resource-downloads/downloads>

Licensing

Cisco Software Licensing

Cisco software licensing consists of processes and components to activate Cisco IOS software feature sets by obtaining and validating Cisco software licenses.

You can enable licensed features and store license files in the bootflash of your router. Licenses pertain to consolidated packages, technology packages, or individual features.

An evaluation license is automatically converted to a Right to Use model after 60 days and this license is valid permanently. The conversion to a permanent license applies only to evaluation licenses. For other features supported on your router, you must purchase a permanent license.

See the "Configuring the Cisco IOS Software Activation Feature" chapter of the [Software Activation Configuration Guide, Cisco IOS XE Release 3S](#).

Consolidated Packages

One of the following two consolidated packages (images) is preinstalled on the router:

- **universalk9**—Contains the **ipbasek9** base package and the **securityk9**, **uck9**, and **appxk9** technology packages.
- **universalk9_npe**—Contains the **ipbasek9** base package and the **securityk9_npe**, **uck9**, and **appxk9** technology packages. This image has limited crypto functionality.



Note The term npe stands for No Payload Encryption.



Note The terms super package and image also refer to a consolidated package.

To obtain software images for the router, go to <http://software.cisco.com/download/navigator.html>.

An image-based license is used to help bring up all the subsystems that correspond to a license. This license is enforced only at boot time.

Apart from the **universalk9** and **universalk9_npe** images, a Boot ROMMON image is available. For more information, see *ROMMON Images* section.

For more information about identifying digitally signed Cisco software and how to show the digital signature information of an image file, see the "Digitally Signed Cisco Software" section in the [Loading and Managing System Images Configuration Guide, Cisco IOS XE Release 3S](#).

The following examples show how to obtain software authenticity information and internal details of a package:

- *Displaying Digitally Signed Cisco Software Signature Information* section
- *Obtaining the Description of a Module or Consolidated Package* section

Many features within the consolidated package are contained in the **ipbasek9** base package. The license key for the **ipbasek9** package is activated by default.

Technology Packages

Technology packages contain software features within a consolidated package. To use different sets of features, enable the licenses of selected technology packages. You can enable the licenses for any combination of technology packages.

Each technology package has an evaluation license that converts to a Right to Use (RTU) license after 60 days and is then valid permanently.

The following is a list of technology packages:



Note In Cisco 1000 Series Integrated Series Routers, although L2TPv2 sessions comes up without appxk9, you need the appxk9 license for the traffic to go through the sessions. You also need the appxk9 license to apply the QoS policies to the L2TPv2 sessions.

securityk9

The **securityk9** technology package includes all crypto features, including IPsec, SSL/SSH, Firewall, and Secure VPN.

The **securityk9_npe** package (npe = No Payload Encryption) includes all the features in the **securityk9** technology package without the payload-encryption functionality. This is to fulfill export restriction requirements. The **securityk9_npe** package is available only in the **universalk9_npe** image. The difference in features between the **securityk9** package and the **securityk9_npe** package is therefore the set of payload-encryption-enabling features such as IPsec and Secure VPN.

uck9

The Unified Communications technology package is required to enable Cisco Unified Border Element (Cisco UBE) functionality. To use Cisco UBE features, you will require session licenses and a Security technology package to secure the media.

appxk9

The **appxk9** technology package contains Application Experience features, which are similar to the features in the DATA package of the Cisco Integrated Services Routers Generation 2 routers. For more information, see: http://www.cisco.com/c/en/us/products/collateral/cloud-systems-management/software-activation-on-integrated-services-routers-isr/white_paper_c11_556985.html#wp9000791.

There are many features in the **appxk9** package, including MPLS, PfR, L2/L3 VPN, Broadband, and AVC.

Unlicensed Feature: Example

If you try to use a feature that is part of a package that is not enabled, an error message is displayed.

In the following example, the **crypto map** command is called during configuration and an error message is displayed. This is because, the feature associated with **crypto map** is part of the **securityk9** package and the **securityk9** package is not enabled.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#crypto map
^
% Invalid input detected at '^' marker.
```

Use the **show license feature** command to view the license features that are enabled. In the following example, the **securityk9** and the **uck9** packages are not enabled.



Note **ipbasek9** is provided by default.

```
Router# show license feature
Feature name      Enforcement  Evaluation  Subscription  Enabled  RightToUse
appxk9           yes         yes         no            yes     yes
uck9             yes         yes         no            no      yes
securityk9       yes         yes         no            no      yes
ipbasek9         no          no          no            yes     yes
```

LED Indicators

For information on LEDs on the router, see "LED Indicators" in the "Overview" section of the [Hardware Installation Guide for the Cisco 4000 Series Integrated Services Routers](#).

For information on LEDs on the SSD Carrier Card NIM, see "Overview of the SSD Carrier Card NIM (NIM-SSD)" in the "Installing and Upgrading Internal Modules and FRUs" section of the [Hardware Installation Guide for the Cisco 4000 Series Integrated Services Routers](#).

Related Documentation

For further information on software licenses, see [Software Activation on Cisco Integrated Services Routers and Cisco Integrated Service Routers G2](#).

For further information on obtaining and installing feature licenses, see [Configuring the Cisco IOS Software Activation Feature](#).

How to Install and Upgrade the Software

To install or upgrade the software, use one of the following methods to use the software from a consolidated package or an individual package. Also see the overview section.

- [Managing and Configuring a Router to Run Using a Consolidated Package, on page 6](#)
- [Managing and Configuring a Router to Run Using Individual Packages, on page 10](#)

Managing and Configuring a Router to Run Using a Consolidated Package



Note Do not use these procedures if you also need to install any optional subpackages or plan to upgrade individual subpackages. See [Managing and Configuring a Router to Run Using Individual Packages, on page 10](#).

- [Managing and Configuring a Consolidated Package Using copy and boot Commands, on page 6](#)
- [Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example, on page 7](#)

Managing and Configuring a Consolidated Package Using copy and boot Commands

To upgrade a consolidated package, copy the consolidated package to the **bootflash:** directory on the router using the **copy** command. After making this copy of the consolidated package, configure the router to boot using the consolidated package file.

The following example shows the consolidated package file being copied to the **bootflash:** file system via TFTP. The config register is then set to boot using **boot system** commands, and the **boot system** commands instruct the router to boot using the consolidated package stored in the **bootflash:** file system. The new configuration is then saved using the **copy running-config startup-config** command, and the system is then reloaded to complete the process.

```
Router# dir bootflash:
Directory of bootflash:/
11 drwx 16384 Dec 4 2007 04:32:46 -08:00 lost+found
86401 drwx 4096 Dec 4 2007 06:06:24 -08:00 .ssh
14401 drwx 4096 Dec 4 2007 06:06:36 -08:00 .rollback_timer
28801 drwx 4096 Mar 18 2008 17:31:17 -07:00 .prst_sync
43201 drwx 4096 Dec 4 2007 04:34:45 -08:00 .installer

928862208 bytes total (712273920 bytes free)

Router# copy tftp: bootflash:
Address or name of remote host []? 172.17.16.81
Source filename []? /auto/tftp-users/user/isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
Destination filename [isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin]?
Accessing
tftp://172.17.16.81//auto/tftp-users/user/isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
...
Loading /auto/tftp-users/user/isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin from
172.17.16.81 (via GigabitEthernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```

!!!!!!!
[OK - 208904396 bytes]
208904396 bytes copied in 330.453 secs (632176 bytes/sec)
Router# dir bootflash:
Directory of bootflash:/
11 drwx 16384 Dec 4 2007 04:32:46 -08:00 lost+found
86401 drwx 4096 Dec 4 2007 06:06:24 -08:00 .ssh
14401 drwx 4096 Dec 4 2007 06:06:36 -08:00 .rollback_timer
28801 drwx 4096 Mar 18 2008 17:31:17 -07:00 .prst_sync
43201 drwx 4096 Dec 4 2007 04:34:45 -08:00 .installer
12 -rw- 208904396 May 28 2008 16:17:34 -07:00
isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
928862208 bytes total (503156736 bytes free)
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# boot system flash bootflash:isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
Router(config)# config-reg 0x2102
Router(config)# exit
Router# show run | include boot
boot-start-marker
boot system flash bootflash:isr4400-universalk9.03.10.00.S.153-3.S-ext.SPA.bin
boot-end-marker
Router# copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Router# reload

```

Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example

```

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#boot system tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin
Router(config)#config-register 0x2102
Router(config)#exit
Router# show run | include boot
boot-start-marker
boot system tftp://10.81.116.4/rtp-isr4400-54/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 17:42:54.445 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) 1994-2014 by cisco Systems, Inc.
Compiled Mon 05/27/2014 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

IP_ADDRESS: 172.18.42.119
IP_SUBNET_MASK: 255.255.255.0
DEFAULT_GATEWAY: 172.18.42.1
TFTP_SERVER: 10.81.116.4
TFTP_FILE: rtp-isr4400-54/isr4400.bin
TFTP_MACADDR: a4:4c:11:9d:ad:97
TFTP_VERBOSE: Progress
TFTP_RETRY_COUNT: 18
TFTP_TIMEOUT: 7200
TFTP_CHECKSUM: Yes
ETHER_PORT: 0

ETHER_SPEED_MODE: Auto Detect
link up...
Receiving rtp-isr4400-54/isr4400.bin from 10.81.116.4
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
File reception completed.
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 : 5116 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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Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
```


San Jose, California 95134-1706

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]
Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Tue 27-May-14 21:28 by mcpre

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<http://www.cisco.com/wvl/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 1133585K/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>
Router>enable
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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```

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ROM: IOS-XE ROMMON

```
Router uptime is 0 minutes
Uptime for this control processor is 3 minutes
System returned to ROM by reload
System image file is "tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin"
Last reload reason: Reload Command
```

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If you require further assistance please contact us by sending email to export@cisco.com.

```
License Level: advenenterprise
License Type: EvalRightToUse
--More-- Next reload license Level: advenenterprise
```

```
cisco ISR4451/K9 (2RU) processor with 1133585K/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
```

Managing and Configuring a Router to Run Using Individual Packages

To choose between running individual packages or a consolidated package, see *Installing the Software - Overview* section.

The following topics are included in this section:

- [Installing Subpackages from a Consolidated Package, on page 11](#)
- [Installing a Firmware Subpackage, on page 22](#)
- [Installing Subpackages from a Consolidated Package on a Flash Drive, on page 16](#)

Installing Subpackages from a Consolidated Package

Perform the following procedure to obtain the consolidated package from a TFTP server.

Another variation of this procedure obtains the consolidated package from a USB flash drive. This is described in [Installing Subpackages from a Consolidated Package on a Flash Drive](#).

Before you begin

Copy the consolidated package to the TFTP server.

Procedure

	Command or Action	Purpose
Step 1	show version Example: <pre>Router# show version Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version 15.3(20120627:221639) [build_151722_111] Copyright (c) 1986-2012 by Cisco Systems, Inc. Compiled Thu 28-Jun-12 15:17 by mcpre . . .</pre>	Shows the version of software running on the router. This can later be compared with the version of software to be installed.
Step 2	dir bootflash: Example: <pre>Router# dir bootflash:</pre>	Displays the previous version of software and that a package is present.
Step 3	show platform Example: <pre>Router# show platform Chassis type: ISR4451/K9</pre>	Displays the inventory.
Step 4	mkdir bootflash: <i>URL-to-directory-name</i> Example: <pre>Router# mkdir bootflash:mydir</pre>	<p>Creates a directory to save the expanded software image.</p> <p>You can use the same name as the image to name the directory.</p>
Step 5	request platform software package expand file <i>URL-to-consolidated-package</i> to <i>URL-to-directory-name</i> Example: <pre>Router# request platform software package expand file bootflash:isr4400-universalk9-NIM.bin to bootflash:mydir</pre>	Expands the software image from the TFTP server (<i>URL-to-consolidated-package</i>) into the directory used to save the image (<i>URL-to-directory-name</i>), which was created in Step 4.

	Command or Action	Purpose
Step 6	reload Example: Router# reload rommon >	Enables ROMMON mode, which allows the software in the consolidated file to be activated.
Step 7	boot URL-to-directory-name/packages.conf Example: rommon 1 > boot bootflash:mydir/packages.conf	Boots the consolidated package, by specifying the path and name of the provisioning file: packages.conf.
Step 8	show version installed Example: Router# show version installed Package: Provisioning File, version: n/a, status: active	Displays the version of the newly installed software.

Examples

The initial part of the example shows the consolidated package, `isr4400-universalk9.164422SSA.bin`, being copied to the TFTP server. This is a prerequisite step. The remaining part of the example shows the consolidated file, `packages.conf`, being booted.

```
Router# copy tftp:isr4400/isr4400-universalk9.164422SSA.bin bootflash:
Address or name of remote host []? 192.0.2.1
Destination filename [isr4400-universalk9.164422SSA.bin]?
Accessing tftp://192.0.2.1/isr4400/isr4400-universalk9.164422SSA.bin...
Loading isr4400/isr4400-universalk9.164422SSA.bin from 192.0.2.1 (via GigabitEthernet0):
!!!!!!!!!!
[OK - 410506248 bytes]

410506248 bytes copied in 338.556 secs (1212521 bytes/sec)

Router# show version
Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version
15.3(20120627:221639) [build_151722 111]
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thu 28-Jun-12 15:17 by mcpre

IOS XE Version: 2012-06-28_15.31_mcpre

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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 0 minutes
Uptime for this control processor is 3 minutes
System returned to ROM by reload
System image file is "tftp:isr4400/isr4400.bin"
Last reload reason: Reload Command
```

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```
License Level: adventerprise
License Type: EvalRightToUse
Next reload license Level: adventerprise
cisco ISR4451/K9 (2RU) processor with 1136676K/6147K bytes of memory.
Processor board ID FGL161611AB
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of Compact flash at bootflash:.
```

Configuration register is 0x8000

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

```
11 drwx 16384 May 3 2012 19:58:37 +00:00 lost+found
178465 drwx 4096 Jun 6 2012 15:20:20 +00:00 core
584065 drwx 4096 Jul 13 2012 19:19:00 +00:00 .prst_sync
405601 drwx 4096 May 3 2012 19:59:30 +00:00 .rollback_timer
113569 drwx 40960 Jul 13 2012 19:19:32 +00:00 tracelogs
64897 drwx 4096 May 3 2012 19:59:42 +00:00 .installer
13 -rw- 1305 May 7 2012 17:43:42 +00:00 startup-config
14 -rw- 1305 May 7 2012 17:43:55 +00:00 running-config
15 -r-- 1541 Jun 4 2012 18:32:41 +00:00 debug.conf
16 -rw- 1252 May 22 2012 19:58:39 +00:00 running-config-20120522
519169 drwx 4096 Jun 4 2012 15:29:01 +00:00 vman_fdb
```

7451738112 bytes total (7067635712 bytes free)

```
Router# show platform
Chassis type: ISR4451/K9
```

Slot	Type	State	Insert time (ago)
0	ISR4451/K9	ok	15:57:33
0/0	ISR4451-6X1GE	ok	15:55:24
1	ISR4451/K9	ok	15:57:33
1/0	SM-1T3/E3	ok	15:55:24
2	ISR4451/K9	ok	15:57:33
2/0	SM-1T3/E3	ok	15:55:24

```

R0          ISR4451/K9          ok, active          15:57:33
F0          ISR4451-FP          ok, active          15:57:33
P0          Unknown            ps, fail            never
P1          XXX-XXXX-XX         ok                  15:56:58
P2          ACS-4450-FANASSY     ok                  15:56:58

```

```

Slot        CPLD Version        Firmware Version
-----
0           12090323          15.3(01r)S [ciscouser-ISRRO...
1           12090323          15.3(01r)S [ciscouser-ISRRO...
2           12090323          15.3(01r)S [ciscouser-ISRRO...
R0          12090323          15.3(01r)S [ciscouser-ISRRO...
F0          12090323          15.3(01r)S [ciscouser-ISRRO...

```

```

Router# mkdir bootflash:isr4400-universalk9.dir1
Create directory filename [isr4400-universalk9.dir1]?
Created dir bootflash:/isr4400-universalk9.dir1
Router# request platform software package expand file bootflash:isr4400-universalk9.NIM.bin

```

```

to bootflash:isr4400-universalk9.dir1
Verifying parameters
Validating package type
Copying package files
SUCCESS: Finished expanding all-in-one software package.

```

```

Router# reload
Proceed with reload? [confirm]

```

```

*Jul 13 19:39:06.354: %SYS-5-RELOAD: Reload requested by console.Reload Reason: Reload
Command.

```

```

rommon 1 > boot bootflash:isr4400-universalk9.dir1/packages.conf

```

```

File size is 0x00002836
Located isr4400-universalk9.dir1/packages.conf
Image size 10294 inode num 324484, bks cnt 3 blk size 8*512
#
File is comprised of 1 fragments (33%)

```

```

is_valid_shalhash: SHA-1 hash:
calculated 62f6235a:fc98eb3a:85ce183e:834f1cb3:8a1f71d1
expected 62f6235a:fc98eb3a:85ce183e:834f1cb3:8a1f71d1
File size is 0x04b3dc00
Located isr4400-universalk9.dir1/isr4400-mono-universalk9-build_164422SSA.pkg
Image size 78896128 inode num 324491, bks cnt 19262 blk size 8*512
#####
File is comprised of 21 fragments (0%)
.....

```

```

Router# show version installed
Package: Provisioning File, version: n/a, status: active
File: bootflash:isr4400-universalk9.dir1/packages.conf, on: RP0
Built: n/a, by: n/a
File SHA1 checksum: ad09affd3f8820f4844f27accladd502e0b8f459

Package: rpbases, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9-build_164422SSA.pkg, on:
RP0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 5e95c9cbc4eaf5a4a5a1ac846ee2d0f41d1a026b

Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: active

```

File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99

Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e
Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_fpge_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: eb72900ab32c1c50652888ff486cf370ac901dd7

Package: firmware_sm_lt3e3, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_sm_lt3e3_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 803005f15d8ea71ab088647e2766727ac2269871

Package: rpcontrol, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 980fd58fe581e9346c44417b451d1c09ebb640c2

Package: rpios-universalk9, version: dir1, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.23, by: mcpre
File SHA1 checksum: 27084f7e30a1d69d45a33e05d1b00345040799fb
Package: rpassess, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 0119802deda2da91c38473c47a998fb3ed423448

Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99

Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e

Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_fpge-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: eb72900ab32c1c50652888ff486cf370ac901dd7

Package: firmware_sm_lt3e3, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_sm_lt3e3-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 803005f15d8ea71ab088647e2766727ac2269871

Package: rpcontrol, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpcontrol-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 980fd58fe581e9346c44417b451d1c09ebb640c2

Package: rpios-universalk9, version: 2012-07-10_16.23_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpios-universalk9-BLD-BLD_MCP_DEV_LATEST_

```

20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.23, by: mcpre
File SHA1 checksum: 27084f7e30ald69d45a33e05d1b00345040799fb

Package: rpaccess, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpaccess-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 0119802deda2da91c38473c47a998fb3ed423448

Package: rpbase, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpbase-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 5e95c9cbc4eaf5a4a5a1ac846ee2d0f41d1a026b

Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP1/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99

Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_sp2700-BLD-BLD_MCP_DEV_LATEST_20120710_164422SSA.pkg, on: RP1/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e

Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: n/a

```

Installing Subpackages from a Consolidated Package on a Flash Drive

The steps for installing subpackages from a consolidated package on a USB flash drive are similar to those described in Installing Subpackages from a Consolidated Package section .

Procedure

-
- | | |
|---------------|--|
| Step 1 | show version |
| Step 2 | dir usb: |
| Step 3 | show platform |
| Step 4 | mkdir bootflash:URL-to-directory-name |
| Step 5 | request platform software package expand fileusb: package-name to URL-to-directory-name |
| Step 6 | reload |
| Step 7 | boot URL-to-directory-name/packages.conf |
| Step 8 | show version installed |
-

How to Install and Upgrade the Software for Cisco IOS XE Denali Release 16.3

To install or upgrade the software, use one of the following methods to use the software from a consolidated package or an individual package. Also see *Overview* section.

- *Managing and Configuring a Router to Run Using a Consolidated Package* section

- *Managing and Configuring a Router to Run Using Individual Packages* section
- *Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example* section
- *Upgrading to Cisco IOS XE Denali Release 16.3* section

Upgrading to Cisco IOS XE Denali Release 16.3

Upgrading the device to Cisco IOS XE Denali Release 16.3 for the first time uses the same procedures as specified in the earlier section. In addition, Cisco IOS XE Denali Release 16.3 requires a minimum ROMMON version. When the device boots up with Cisco IOS XE Denali image for the first time, the device checks the installed version of the ROMMON, and upgrades if the system is running an older version. During the upgrade, do not power cycle the device. The system automatically power cycles the device after the new ROMMON is installed. After the installation, the system will boot up with the Cisco IOS XE image as normal.



Note When the device boots up for first time and if the device requires an upgrade, the entire boot process may take several minutes. This process will be longer than a normal boot due to the ROMMON upgrade.

The following example illustrates the boot process of a consolidated package:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#boot system tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin
Router(config)#config-register 0x2102
Router(config)#exit
Router# show run | include boot
boot-start-marker
boot system tftp://10.81.116.4/rtp-isr4400-54/isr4400.bin
boot-end-marker
license boot level advanterprise
Router# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router# reload
Proceed with reload? [confirm]
Sep 13 17:42:54.445 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: process exit with
reload chassis code

Initializing Hardware ...

System integrity status: c0000600

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) 1994-2014 by cisco Systems, Inc.
Compiled Mon 05/27/2014 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

IP_ADDRESS: 172.18.42.119
IP_SUBNET_MASK: 255.255.255.0
DEFAULT_GATEWAY: 172.18.42.1
TFTP_SERVER: 10.81.116.4
TFTP_FILE: rtp-isr4400-54/isr4400.bin
TFTP_MACADDR: a4:4c:11:9d:ad:97
TFTP_VERBOSE: Progress
TFTP_RETRY_COUNT: 18
TFTP_TIMEOUT: 7200
TFTP_CHECKSUM: Yes
ETHER_PORT: 0

ETHER_SPEED_MODE: Auto Detect
link up...
Receiving rtp-isr4400-54/isr4400.bin from 10.81.116.4
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
File reception completed.
Boot image size = 504063931 (0x1e0b67bb) 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 : 5116 msec
Image validated

Detected old ROMMON version 12.2(20150910:184432), upgrade required
Upgrading to newer ROMMON version required by this version of IOS-XE, do not power cycle
the system. A reboot will automatically occur for the new ROMMON to take effect.
selected : 1
Booted : 1
Reset Reason: 1

Info: Upgrading entire flash from the rommon package
Switching to ROM 0
Upgrade image MD5 signature is b702a0a59a46a20a4924f9b17b8f0887
Upgrade image MD5 signature verification is b702a0a59a46a20a4924f9b17b8f0887
Switching back to ROM 1
ROMMON upgrade complete.

To make the new ROMMON permanent, you must restart the RP.
ROMMON upgrade successful. Rebooting for upgrade to take effect.

Initializing Hardware ...
```

```
System integrity status: 00300610
Key Sectors: (Primary,GOOD), (Backup,GOOD), (Revocation,GOOD)
Size of Primary = 2288 Backup = 2288 Revocation = 300
```

```
ROM:RSA Self Test Passed
```

```
Expected hash:
ddaf35a193617abacc417349ae204131
12e6fa4e89a97ea20a9eeee64b55d39a
2192992a274fc1a836ba3c23a3feebbd
454d4423643ce80e2a9ac94fa54ca49f
```

```
Obtained hash:
ddaf35a193617abacc417349ae204131
12e6fa4e89a97ea20a9eeee64b55d39a
2192992a274fc1a836ba3c23a3feebbd
454d4423643ce80e2a9ac94fa54ca49f
ROM:Sha512 Self Test Passed
Self Tests Latency: 418 msec
Rom image verified correctly
```

```
System Bootstrap, Version 12.2(20120618:163328) [username-ESGROM_20120618_GAMMA 101],
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2014 by cisco Systems, Inc.
Compiled Mon 05/27/2014 12:39:32.05 by username
```

```
CPLD Version: 33 (MM/DD/YY): 06/23/14 Cisco ISR4351/K9 Slot:0
```

```
Current image running: Boot ROM1
```

```
Last reset cause: ResetRequest
Reading confreg 0x2102
```

```
Reading monitor variables from NVRAM
Enabling interrupts...done
```

```
Checking for PCIe device presence...done
Cisco ISR4351/K9 platform with 16777216 Kbytes of main memory
```

```
autoboot entry: NVRAM VALUES: bootconf: 0x0, autobootstate: 0
autobootcount: 0, autobootsptr: 0x0
Rommon upgrade requested
Flash upgrade reset 0 in progress
.....
Initializing Hardware ...
```

```
Checking for PCIe device presence...done
Reading confreg 2102
System integrity status: 0x300610
Key Sectors: (Primary, GOOD), (Backup,GOOD), (Revocation,GOOD)
Size of Primary = 2288 Backup = 2288 Revocation = 288
RSA Self Test Passed
```

```
Expected hash:
DDAF35A193617ABACC417349AE204131
12E6FA4E89A97EA20A9EEEE64B55D39A
2192992A274FC1A836BA3C23A3FEEBBD
454D4423643CE80E2A9AC94FA54CA49F
```

```
Obtained hash:
DDAF35A193617ABACC417349AE204131
12E6FA4E89A97EA20A9EEEE64B55D39A
```

```

2192992A274FC1A836BA3C23A3FEEBBD
454D4423643CE80E2A9AC94FA54CA49F
Sha512 Self Test Passed
Rom image verified correctly

```

```

System Bootstrap, Version 16.2(1r), RELEASE SOFTWARE
Copyright (c) 1994-2016 by cisco Systems, Inc.

```

```

Current image running: *Upgrade in progress* Boot ROM0

```

```

Last reset cause: BootRomUpgrade
ISR4351/K9 platform with 16777216 Kbytes of main memory

```

```

Cisco ISR 4400 platform with 4194304 Kbytes of main memory

```

```

IP_ADDRESS: 172.18.42.119
IP_SUBNET_MASK: 255.255.255.0
DEFAULT_GATEWAY: 172.18.42.1
TFTP_SERVER: 10.81.116.4
TFTP_FILE: rtp-isr4400-54/isr4400.bin
TFTP_MACADDR: a4:4c:11:9d:ad:97
TFTP_VERBOSE: Progress
TFTP_RETRY_COUNT: 18
TFTP_TIMEOUT: 7200
TFTP_CHECKSUM: Yes
ETHER_PORT: 0

```

```

ETHER_SPEED_MODE: Auto Detect
link up...
Receiving rtp-isr4400-54/isr4400.bin from 10.81.116.4
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
File reception completed.
Boot image size = 504063931 (0x1e0b67bb) bytes

```

```

Image Base is: 0x56834018
Image Size is: 0x1E089706
Package header rev 1 structure detected
Package type:30000, flags:0x0
IsoSize = 503874534
Parsing package TLV info:
000: 0000000900000001D4B45595F544C565F - KEY_TLV_
010: 5041434B4147455F434F4D5041544942 - PACKAGE_COMPATIB
020: 494C4954590000000000000090000000B - ILITY
030: 4652555F52505F54595045000000009 - FRU_RP_TYPE
040: 000000184B45595F544C565F5041434B - KEY_TLV_PACK
050: 4147455F424F4F54415243480000009 - AGE_BOOTARCH
060: 0000000E415243485F693638365F5459 - ARCH_i686_TY
070: 5045000000000009000000144B45595F - PE KEY_
080: 544C565F424F4152445F434F4D504154 - TLV_BOARD_COMPAT
090: 0000009000000012424F4152445F6973 - BOARD_is
0A0: 72343330305F5459504500000000009 - r4300_TYPE
0B0: 000000184B45595F544C565F43525950 - KEY_TLV_Cryp
0C0: 544F5F4B4559535452494E4700000009 - TO_KEYSTRING

```

```

TLV: T=9, L=29, V=KEY_TLV_PACKAGE_COMPATIBILITY
TLV: T=9, L=11, V=FRU_RP_TYPE
TLV: T=9, L=24, V=KEY_TLV_PACKAGE_BOOTARCH
TLV: T=9, L=14, V=ARCH_i686_TYPE
TLV: T=9, L=20, V=KEY_TLV_BOARD_COMPAT
TLV: T=9, L=18, V=BOARD_isr4300_TYPE

```

```
TLV: T=9, L=24, V=KEY_TLV_CRYPTO_KEYSTRING
TLV: T=9, L=10, V=EnCrYpTiOn
TLV: T=9, L=11, V=CW_BEGIN=$$
TLV: T=9, L=19, V=CW_FAMILY=$isr4300$
TLV: T=9, L=59, V=CW_IMAGE=$isr4300-universalk9.2016-06-29_23.31_paj.SSA.bin$
TLV: T=9, L=19, V=CW_VERSION=$16.3.1$
TLV: T=9, L=52, V=CW_DESCRIPTION=$Cisco IOS Software, IOS-XE Software$
TLV: T=9, L=9, V=CW_END=$$
Found DIGISIGN TLV type 12 length = 392
RSA Self Test Passed
```

Expected hash:

```
DDAF35A193617ABACC417349AE204131
12E6FA4E89A97EA20A9EEEE64B55D39A
2192992A274FC1A836BA3C23A3FEEBBD
454D4423643CE80E2A9AC94FA54CA49F
```

Obtained hash:

```
DDAF35A193617ABACC417349AE204131
12E6FA4E89A97EA20A9EEEE64B55D39A
2192992A274FC1A836BA3C23A3FEEBBD
454D4423643CE80E2A9AC94FA54CA49F
```

Sha512 Self Test Passed

Found package arch type ARCH_i686_TYPE

Found package FRU type FRU_RP_TYPE

Calculating SHA-1 hash...Validate package: SHA-1 hash:

```
calculated 8B082C48:35C23C9E:8A091441:D6FACEE6:B5111533
expected 8B082C48:35C23C9E:8A091441:D6FACEE6:B5111533
```

Image validated

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

Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version 16.3(20160527:095327)

[v163_throttle]

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Compiled Tue 27-May-16 21:28 by mcpre

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```
Warning: the compile-time code checksum does not appear to be present.
cisco ISR4451/K9 (2RU) processor with 1133585K/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!

Installing a Firmware Subpackage

Before you begin

Obtain a consolidated package that contains your required firmware package and expand the package. (See [Managing and Configuring a Router to Run Using Individual Packages, on page 10.](#)) Make a note of the location and name of the firmware package and use this information in the steps below for *URL-to-package-name*.

You can install a firmware subpackage if the router has been configured using, for example, [Managing and Configuring a Router to Run Using Individual Packages, on page 10.](#)

Firmware subpackages are not released individually. You can select a firmware package from within a consolidated package after expanding the consolidated package. The firmware package can then be installed as shown in the procedure below.



Note Read the Release Notes document pertaining to the consolidated package to verify that the firmware within the consolidated package is compatible with the version of Cisco IOS XE software that is currently installed on a router.

Procedure

	Command or Action	Purpose
Step 1	show version Example: <pre>Router# show version Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version 15.3(20120627:221639) [build_151722_111] Copyright (c) 1986-2012 by Cisco Systems, Inc. Compiled Thu 28-Jun-12 15:17 by mcpre . .</pre>	Shows the version of software running on the router. This can later be compared with the version of software to be installed.
Step 2	dir bootflash: Example: <pre>Router# dir bootflash:</pre>	Displays the previous version of software and that a package is present.
Step 3	show platform Example: <pre>Router# show platform Chassis type: ISR4451/K9</pre>	Checks the inventory. Also see the example in Installing Subpackages from a Consolidated Package section.
Step 4	mkdir bootflash: <i>URL-to-directory-name</i> Example: <pre>Router# mkdir bootflash:mydir</pre>	Creates a directory to save the expanded software image. You can use the same name as the image to name the directory.
Step 5	request platform software package expand file <i>URL-to-consolidated-package</i> to <i>URL-to-directory-name</i> Example: <pre>Router# request platform software package expand file bootflash:isr4400-universalk9-NIM.bin to bootflash:mydir</pre>	Expands the software image from the TFTP server (<i>URL-to-consolidated-package</i>) into the directory used to save the image (<i>URL-to-directory-name</i>), which was created in the Step 4.
Step 6	reload Example: <pre>Router# reload rommon ></pre>	Enables ROMMON mode, which allows the software in the consolidated file to be activated.
Step 7	boot <i>URL-to-directory-name</i> /packages.conf Example: <pre>rommon 1 > boot bootflash:mydir/packages.conf</pre>	Boots the consolidated package by specifying the path and name of the provisioning file: packages.conf.

	Command or Action	Purpose
Step 8	show version installed Example: Router# show version installed Package: Provisioning File, version: n/a, status: active	Displays the version of the newly installed software.

Examples

The initial part of the following example shows the consolidated package, `isr4400-universalk9.164422SSA.bin`, being copied to the TFTP server. This is a prerequisite step. The remaining part of the example shows the consolidated file, `packages.conf`, being booted.

```
Router# tftp:isr4400/isr4400-universalk9.164422SSA.bin bootflash:
Address or name of remote host []? 192.0.2.1
Destination filename [isr4400-universalk9.164422SSA.bin]?
Accessing tftp://192.0.2.1/isr4400/isr4400-universalk9.164422SSA.bin...
Loading isr4400/isr4400-universalk9.164422SSA.bin from 192.0.2.1 (via GigabitEthernet0):
!!!!!!!!!!
[OK - 410506248 bytes]

410506248 bytes copied in 338.556 secs (1212521 bytes/sec)

Router# show version
Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental Version

15.3(20120627:221639) [build_151722 111]
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thu 28-Jun-12 15:17 by mcpre

IOS XE Version: 2012-06-28_15.31_mcpre

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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 0 minutes
Uptime for this control processor is 3 minutes
System returned to ROM by reload
System image file is "tftp:isr4400/isr4400.bin"
Last reload reason: Reload Command

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```


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```
License Level: advenenterprise
License Type: EvalRightToUse
Next reload license Level: advenenterprise
cisco ISR4451/K9 (2RU) processor with 1136676K/6147K bytes of memory.
Processor board ID FGL161611AB
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of Compact flash at bootflash:.
```

Configuration register is 0x8000

Router# **dir bootflash:**

Directory of bootflash:/

```
11 drwx 16384 May 3 2012 19:58:37 +00:00 lost+found
178465 drwx 4096 Jun 6 2012 15:20:20 +00:00 core
584065 drwx 4096 Jul 13 2012 19:19:00 +00:00 .prst_sync
405601 drwx 4096 May 3 2012 19:59:30 +00:00 .rollback_timer
113569 drwx 40960 Jul 13 2012 19:19:32 +00:00 tracelogs
64897 drwx 4096 May 3 2012 19:59:42 +00:00 .installer
13 -rw- 1305 May 7 2012 17:43:42 +00:00 startup-config
14 -rw- 1305 May 7 2012 17:43:55 +00:00 running-config
15 -r-- 1541 Jun 4 2012 18:32:41 +00:00 debug.conf
16 -rw- 1252 May 22 2012 19:58:39 +00:00 running-config-20120522
519169 drwx 4096 Jun 4 2012 15:29:01 +00:00 vman_fdb

7451738112 bytes total (7067635712 bytes free)
```

Router# **show platform**

Chassis type: ISR4451/K9

Slot Type State Insert time (ago)

```
-----
0 ISR4451/K9 ok 15:57:33
0/0 ISR4451-6X1GE ok 15:55:24
1 ISR4451/K9 ok 15:57:33
1/0 SM-1T3/E3 ok 15:55:24
2 ISR4451/K9 ok 15:57:33
2/0 SM-1T3/E3 ok 15:55:24
R0 ISR4451/K9 ok, active 15:57:33
F0 ISR4451-FP ok, active 15:57:33
P0 Unknown ps, fail never
P1 XXX-XXXX-XX ok 15:56:58
P2 ACS-4450-FANASSY ok 15:56:58
```

Slot CPLD Version Firmware Version

```
-----
0 12090323 15.3(01r)S [ciscouser-ISRRO...
1 12090323 15.3(01r)S [ciscouser-ISRRO...
2 12090323 15.3(01r)S [ciscouser-ISRRO...
R0 12090323 15.3(01r)S [ciscouser-ISRRO...
F0 12090323 15.3(01r)S [ciscouser-ISRRO...
```

```

Router# mkdir bootflash:isr4400-universalk9.dir1
Create directory filename [isr4400-universalk9.dir1]?
Created dir bootflash:/isr4400-universalk9.dir1
Router# request platform software package expand file bootflash:isr4400-universalk9.NIM.bin
to
bootflash:isr4400-universalk9.dir1
Verifying parameters
Validating package type
Copying package files
SUCCESS: Finished expanding all-in-one software package.

Router# reload
Proceed with reload? [confirm]

*Jul 13 19:39:06.354: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command.

rommon 1 > boot bootflash:isr4400-universalk9.dir1/packages.conf

File size is 0x00002836
Located isr4400-universalk9.dir1/packages.conf
Image size 10294 inode num 324484, bks cnt 3 blk size 8*512
#
File is comprised of 1 fragments (33%)

is_valid_shalhash: SHA-1 hash:
calculated 62f6235a:fc98eb3a:85ce183e:834f1cb3:8a1f71d1
expected 62f6235a:fc98eb3a:85ce183e:834f1cb3:8a1f71d1
File size is 0x04b3dc00
Located isr4400-universalk9.dir1/isr4400-mono-universalk9-build_164422SSA.pkg
Image size 78896128 inode num 324491, bks cnt 19262 blk size 8*512
#####
File is comprised of 21 fragments (0%)
.....

Router# show version installed
Package: Provisioning File, version: n/a, status: active
File: bootflash:isr4400-universalk9.dir1/packages.conf, on: RP0
Built: n/a, by: n/a
File SHA1 checksum: ad09affd3f8820f4844f27accladd502e0b8f459

Package: rpbase, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9-build_164422SSA.pkg, on:
RP0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 5e95c9cbc4eaf5a4a5a1ac846ee2d0f41d1a026b

Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes_164422SSA.pkg, on:
RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99

Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e
Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_fpge_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: eb72900ab32c1c50652888ff486cf370ac901dd7

```

```
Package: firmware_sm_lt3e3, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_sm_lt3e3_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 803005f15d8ea71ab088647e2766727ac2269871

Package: rpcontrol, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 980fd58fe581e9346c44417b451d1c09ebb640c2

Package: rpios-universalk9, version: dir1, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.23, by: mcpre
File SHA1 checksum: 27084f7e30ald69d45a33e05d1b00345040799fb
Package: rpaccess, version: 2012-07-10_16.22_mcpre, status: active
File: bootflash:isr4400-universalk9.dir1/isr4400-mono-universalk9_164422SSA.pkg, on: RP0/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 0119802deda2da91c38473c47a998fb3ed423448

Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes_164422SSA.pkg, on:
RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99

Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e

Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_fpge-BLD-BLD_MCP_DEV_LATEST_
20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: eb72900ab32c1c50652888ff486cf370ac901dd7

Package: firmware_sm_lt3e3, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_sm_lt3e3-BLD-BLD_MCP_DEV_LATEST_
20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 803005f15d8ea71ab088647e2766727ac2269871

Package: rpcontrol, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpcontrol-BLD-BLD_MCP_DEV_LATEST_20120710_
164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 980fd58fe581e9346c44417b451d1c09ebb640c2

Package: rpios-universalk9, version: 2012-07-10_16.23_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpios-universalk9-BLD-BLD_MCP_DEV_LATEST_
20120710_164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.23, by: mcpre
File SHA1 checksum: 27084f7e30ald69d45a33e05d1b00345040799fb

Package: rpaccess, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpaccess-BLD-BLD_MCP_DEV_LATEST_20120710_
164422SSA.pkg, on: RP0/1
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 0119802deda2da91c38473c47a998fb3ed423448

Package: rpbase, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-rpbase-BLD-BLD_MCP_DEV_LATEST_20120710_
164422SSA.pkg, on: RP1
Built: 2012-07-10_16.22, by: mcpre
```

```
File SHA1 checksum: 5e95c9cbc4eaf5a4a5a1ac846ee2d0f41d1a026b
```

```
Package: firmware_attributes, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_attributes-BLD-BLD_MCP_DEV_LATEST_
20120710_164422SSA.pkg, on: RP1/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 71614f2d9cbe7f96d3c6e99b67d514bd108c6c99
```

```
Package: firmware_dsp_sp2700, version: 2012-07-10_16.22_mcpre, status: n/a
File: bootflash:isr4400-universalk9.dir1/isr4400-firmware_dsp_sp2700-BLD-BLD_MCP_DEV_LATEST_
20120710_164422SSA.pkg, on: RP1/0
Built: 2012-07-10_16.22, by: mcpre
File SHA1 checksum: 8334565edf7843fe246783b1d5c6ed933d96d79e
```

```
Package: firmware_fpge, version: 2012-07-10_16.22_mcpre, status: n/a
```

Upgrading the Firmware on xDSL NIMs

To upgrade the firmware on a xDSL Network Interface Module (NIM), perform these steps:

Before you begin

When you boot the router in packages.conf mode with the Cisco IOS XE image (super package) during the installation period, you can upgrade or downgrade the firmware without reloading the router. You need to follow the steps described in Installing a Firmware Subpackage section before proceeding with the firmware upgrade.

If you do not boot the router in packages.conf mode with the Cisco IOS XE image, you need to follow the below prerequisites before proceeding with the firmware upgrade:

- Copy the firmware subpackage (NIM firmware) into bootflash:/mydir.
- Send a request to the platform software package expand file *bootflash:/mydir/<IOS-XE image>* to expand the super package.
- Reload the hardware module subslot to boot the module with the new firmware.
- Verify that the module is booted up with the new firmware using the **show platform software subslot x/y module firmware** command.

Procedure

	Command or Action	Purpose
Step 1	copy Cisco IOS XE image into bootflash: mydir . Example: Router# mkdir bootflash:mydir	Creates a directory to save the expanded software image. You can use the same name as the image to name the directory.
Step 2	request platform software package expand file <i>bootflash:/mydir/<IOS-XE image></i> to expand super package. Example:	Expands the platform software package to super package.

	Command or Action	Purpose
	<pre>Router# request platform software package expand file bootflash:mydir/isr4400-universal-9.03.14.00.S.155-1.S-std.SSA.bin</pre>	
Step 3	<p>reload.</p> <p>Example:</p> <pre>Router# reload rommon ></pre>	Enables ROMMON mode, which allows the software in the super package file to be activated.
Step 4	<p>boot bootflash:mydir/ /packages.conf.</p> <p>Example:</p> <pre>rommon 1 > boot bootflash:mydir/packages.conf</pre>	Boots the super package by specifying the path and name of the provisioning file: packages.conf.
Step 5	<p>copy NIM firmware subpackage to the folder bootflash:mydir/.</p> <p>Example:</p> <pre>Router#copy bootflash:isr4400-firmware_nim_xdsl.2014-11-17_11.05_3n.SSA.pkg bootflash:mydir/</pre>	Copies the NIM firmware subpackage into bootflash:mydir.
Step 6	<p>request platform software package install <i>rp 0 file bootflash:/mydir/<firmware subpackage></i>.</p> <p>Example:</p> <pre>Router#request platform software package install rp 0 file bootflash:mydir/isr4400-firmware_nim_xdsl.2014-11-17_11.05_3n.SSA.pkg</pre>	Installs the software package.
Step 7	<p>hw-module subslot x/y reload to boot the module with the new firmware.</p> <p>Example:</p> <pre>Router#hw-module subslot 0/2 reload</pre>	Reloads the hardware module subslot and boots the module with the new firmware.
Step 8	<p>show platform software subslot 0/2 module firmware to verify that the module is booted up with the new firmware.</p> <p>Example:</p> <pre>Router# show platform software subslot 0/2 module firmware Pe</pre>	Displays the version of the newly installed firmware.

Examples

The following example shows how to perform firmware upgrade in a router module:

```
Router#mkdir bootflash:mydir
Create directory filename [mydir]?
```

```

Created dir bootflash:/mydir
Router#
Router#copy bootflash:isr4400-universalk9.03.14.00.S.155-1.S-std.SPA.bin bootflash:/mydir/
Destination filename [mydir/isr4400-universalk9.03.14.00.S.155-1.S-std.SPA.bin]?
Copy in progress...CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCC
425288648 bytes copied in 44.826 secs (9487544 bytes/sec)
Router#
Router#
Router#dir bootflash:/mydir
Directory of bootflash:/mydir/

632738 -rw-          425288648 Dec 12 2014 09:16:42 +00:00
isr4400-universalk9.03.14.00.S.155-1.S-std.SPA.bin

7451738112 bytes total (474025984 bytes free)
Router#

Router#request platform software package
expand file bootflash:/mydir/isr4400-universalk9.03.14.00.S.155-1.S-std.SPA.bin
Verifying parameters
Validating package type
Copying package files
SUCCESS: Finished expanding all-in-one software package.

Router#reload
Proceed with reload? [confirm]

*Dec 12 09:26:09.874: %SYS-5-RELOAD: Reload requested by console. Reload Reason:
Reload Command.Dec 12 09:26:25.156 R0/0: %PMAN-5-EXITACTION: Process manager is exiting:
process exit with reload chassis code

Initializing Hardware ...

System integrity status: 00000610
Rom image verified correctly
System Bootstrap, Version 15.3(3r)S1, RELEASE SOFTWARE
Copyright (c) 1994-2013 by cisco Systems, Inc.

Current image running: Boot ROM0

Last reset cause: LocalSoft
Cisco ISR4451-X/K9 platform with 4194304 Kbytes of main memory

rommon 1 boot bootflash:/mydir/packages.conf

File size is 0x000028f1
Located mydir/packages.conf
Image size
10481 inode num 632741, bks cnt 3 blk size 8*512

#
File size is 0x150ae3cc
Located mydir/isr4400-mono-universalk9.03.14.00.S.155-1.S-std.SPA.pkg
Image size 353035212 inode num 356929, bks cnt 86191 blk size 8*512
#####
#####
Boot image size = 353035212 (0x150ae3cc) bytes

```

```
Package header rev 1 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
  calculated 8e966678:8afb08f4:8a88bb8f:fe591121:8bddf4b3
  expected   8e966678:8afb08f4:8a88bb8f:fe591121:8bddf4b3

RSA Signed RELEASE Image Signature Verification Successful.
Package Load Test Latency : 3799 msec
Image validated
Dec 12 09:28:50.338 R0/0: %FLASH_CHECK-3-DISK_QUOTA: Flash disk quota exceeded
[free space is 61864 kB] - Please clean up files on bootflash.
```

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cisco ISR4451-X/K9 (2RU) processor with 1681388K/6147K bytes of memory.
Processor board ID FTX1736AJUT

```

2 Ethernet interfaces
4 Gigabit Ethernet interfaces
2 ATM interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
7393215K bytes of flash memory at bootflash:.

Press RETURN to get started!

*Dec 12 09:28:58.922:
%IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL:
Module name = esg Next reboot level = appxk9 and License = appxk9
*Dec 12 09:28:58.943:
%IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL:
Module name = esg Next reboot level = ipbasek9 and License = ipbasek9
*Dec 12 09:28:58.981:
  %ISR_THROUGHPUT-6-LEVEL: Throughput level has been set to 1000000 kbps
*Dec 12 09:29:13.302: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan
*Dec 12 09:29:14.142: %LINK-3-UPDOWN: Interface Lsmpi0, changed state to up
*Dec 12 09:29:14.142: %LINK-3-UPDOWN: Interface EOBC0, changed state to up
*Dec 12 09:29:14.142: %LINK-3-UPDOWN: Interface GigabitEthernet0, changed state to down
*Dec 12 09:29:14.142: %LINK-3-UPDOWN: Interface LIIN0, changed state to up
*Dec 12 09:28:51.438: %CMRP-3-PFU_MISSING:cmd: The platform does not detect a power
supply in slot 1
*Dec 12 09:29:01.256: %CMLIB-6-THROUGHPUT_VALUE:cmd: Throughput license found, throughput
set to 1000000 kbps
*Dec 12 09:29:03.223: %CPPHA-7-START:cpp_ha: CPP 0 preparing ucode
*Dec 12 09:29:03.238: %CPPHA-7-START:cpp_ha: CPP 0 startup init
*Dec 12 09:29:11.335: %CPPHA-7-START:cpp_ha: CPP 0 running init
*Dec 12 09:29:11.645: %CPPHA-7-READY:cpp_ha: CPP 0 loading and initialization complete
*Dec 12 09:29:11.711: %IOSXE-6-PLATFORM:cpp_cp:
Process CPP_PFILTER_EA_EVENT_API_CALL_REGISTER
*Dec 12 09:29:16.280:
%IOSXE_MGMTVRF-6-CREATE_SUCCESS_INFO:
Management vrf Mgmt-intf created with ID 1, ipv4 table-id 0x1, ipv6 table-id 0x1E000001
*Dec 12 09:29:16.330:
%LINEPROTO-5-UPDOWN: Line protocol on Interface Lsmpi0, changed state to up
*Dec 12 09:29:16.330:
%LINEPROTO-5-UPDOWN: Line protocol on Interface EOBC0, changed state to up
*Dec 12 09:29:16.330:
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0, changed state to down
*Dec 12 09:29:16.330:
%LINEPROTO-5-UPDOWN: Line protocol on Interface LIIN0, changed state to up
*Dec 12 09:29:17.521: %SYS-5-LOG_CONFIG_CHANGE: Buffer logging disabled
*Dec 12 09:29:18.867: %SYS-5-CONFIG_I: Configured from memory by console
*Dec 12 09:29:18.870:
%IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/0, interfaces disabled
*Dec 12 09:29:18.870:
%IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/1, interfaces disabled
*Dec 12 09:29:18.871:
%IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/2, interfaces disabled
*Dec 12 09:29:18.873:
%SPA_OIR-6-OFFLINECARD: SPA (ISR4451-X-4x1GE) offline in subslot 0/0
*Dec 12 09:29:18.874: %SPA_OIR-6-OFFLINECARD: SPA (NIM-VA-B) offline in subslot 0/1
*Dec 12 09:29:18.874: %SPA_OIR-6-OFFLINECARD: SPA (NIM-VAB-A) offline in subslot 0/2
*Dec 12 09:29:18.876: %IOSXE_OIR-6-INSCARD: Card (fp) inserted in slot F0
*Dec 12 09:29:18.876: %IOSXE_OIR-6-ONLINECARD: Card (fp) online in slot F0
*Dec 12 09:29:18.882: %IOSXE_OIR-6-INSSPA: SPA inserted in subslot 0/0
*Dec 12 09:29:18.884: %IOSXE_OIR-6-INSSPA: SPA inserted in subslot 0/1
*Dec 12 09:29:18.884: %IOSXE_OIR-6-INSSPA: SPA inserted in subslot 0/2
*Dec 12 09:29:18.935: %SYS-5-RESTART: System restarted --
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version 15.5(1)S,
RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport

```



```

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*Dec 12 09:29:18.895: %SPA-3-ENVMON_NOT_MONITORED:iomd: Environmental monitoring
is not enabled for ISR4451-X-4x1GE[0/0]
*Dec 12 09:29:19.878: %LINK-5-CHANGED: Interface GigabitEthernet0,
changed state to administratively down
*Dec 12 09:29:22.419: %SPA_OIR-6-ONLINECARD: SPA (ISR4451-X-4x1GE) online in subslot 0/0
*Dec 12 09:29:22.610: %SYS-6-BOOTTIME: Time taken to reboot after reload = 194 seconds
*Dec 12 09:29:24.354: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/0,
changed state to down
*Dec 12 09:29:24.415: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/2,
changed state to down
*Dec 12 09:29:24.417: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/3,
changed state to down
*Dec 12 09:29:30.919: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/0,
changed state to up
*Dec 12 09:29:30.925: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/2,
changed state to up
*Dec 12 09:29:30.936: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/3,
changed state to up
*Dec 12 09:29:31.919: %LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet0/0/0, changed state to up
*Dec 12 09:29:31.930: %LINEPROTO-5-UPDOWN: Line protocol on
Interface GigabitEthernet0/0/2, changed state to up
*Dec 12 09:29:31.936: %LINEPROTO-5-UPDOWN: Line protocol on
Interface GigabitEthernet0/0/3, changed state to up
*Dec 12 09:29:34.147: %SSH-5-ENABLED: SSH 1.99 has been enabled
*Dec 12 09:30:29.152: %SPA_OIR-6-ONLINECARD: SPA (NIM-VA-B) online in subslot 0/1
*Dec 12 09:30:29.470: %SPA_OIR-6-ONLINECARD: SPA (NIM-VAB-A) online in subslot 0/2
*Dec 12 09:30:31.152: %LINK-3-UPDOWN: Interface Ethernet0/1/0, changed state to down
*Dec 12 09:30:31.152: %LINK-3-UPDOWN: Interface ATM0/1/0, changed state to down
*Dec 12 09:30:31.470: %LINK-3-UPDOWN: Interface Ethernet0/2/0, changed state to down
*Dec 12 09:30:31.470: %LINK-3-UPDOWN: Interface ATM0/2/0, changed state to down
*Dec 12 09:31:03.074: %CONTROLLER-5-UPDOWN: Controller VDSL 0/2/0, changed state to up
*Dec 12 09:31:05.075: %LINK-3-UPDOWN: Interface Ethernet0/2/0, changed state to up
*Dec 12 09:31:06.076: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2/0,
changed state to up
*Dec 12 09:31:12.559: %CONTROLLER-5-UPDOWN: Controller VDSL 0/1/0, changed state to up
*Dec 12 09:31:20.188: %LINK-3-UPDOWN: Interface ATM0/1/0, changed state to up
*Dec 12 09:31:21.188: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/1/0,
changed state to up
Router>
Router>en
Password:
Router#
Router#show controller vdsl 0/2/0
Controller VDSL 0/2/0 is UP

Daemon Status:  UP

      XTU-R (DS)  XTU-C (US)
Chip Vendor ID:  'BDCM'      'BDCM'
Chip Vendor Specific:  0x0000      0xA41B
Chip Vendor Country:  0xB500      0xB500
Modem Vendor ID:  'CSCO'      ' '
Modem Vendor Specific:  0x4602      0x0000
Modem Vendor Country:  0xB500      0x0000
Serial Number Near:  FOC18426DQ8 4451-X/K15.5(1)S
Serial Number Far:
Modem Version Near:  15.5(1)S
Modem Version Far:  0xa41b

Modem Status(L1): TC Sync (Showtime!)

```

```
DSL Config Mode: VDSL2
Trained Mode(L1): G.993.2 (VDSL2) Profile 30a
```

```
TC Mode: PTM
Selftest Result: 0x00
DELT configuration: disabled
DELT state: not running
```

```
Failed full inits: 0
Short inits: 0
Failed short inits: 0
```

```
Modem FW Version: 4.14L.04
Modem PHY Version: A2pv6F039h.d24o_rc1
```

```
Line 1:
```

```

    XTU-R (DS)  XTU-C (US)
Trellis:      ON    ON
SRA:         disabled disabled
SRA count:    0    0
Bit swap:    enabled  enabled
Bit swap count: 9    0
Profile 30a:  enabled
Line Attenuation: 3.5 dB    0.0 dB
Signal Attenuation: 0.0 dB    0.0 dB
Noise Margin:   30.9 dB  12.4 dB
Attainable Rate: 200000 kbits/s  121186 kbits/s
Actual Power:  13.3 dBm   7.2 dBm
Per Band Status:      D1  D2  D3  U0  U1  U2  U3
Line Attenuation(dB): 0.9 1.5 5.5 N/A 0.1 0.9 3.8
Signal Attenuation(dB): 0.8 1.5 5.5 N/A 0.0 0.2 3.2
Noise Margin(dB):    31.1 31.0 30.9 N/A 12.3 12.4 12.5
Total FECC: 0    0
Total ES: 0    0
Total SES: 0    0
Total LOSS: 0    0
Total UAS: 51   51
Total LPRS: 0    0
Total LOFS: 0    0
Total LOLS: 0    0
```

```

    DS Channel11  DS Channel10  US Channel11  US Channel10
Speed (kbps):   NA           100014  NA           100014
SRA Previous Speed: NA           0  NA           0
Previous Speed:  NA           0  NA           0
Reed-Solomon EC: NA           0  NA           0
CRC Errors:     NA           0  NA           0
Header Errors:  NA           0  NA           0
Interleave (ms): NA           9.00  NA           0.00
Actual INP:     NA           4.00  NA           0.00
```

```
Training Log : Stopped
Training Log Filename : flash:vdsllog.bin
```

```
Router#
Router#
```

```
Router#copy bootflash:isr4400-firmware_nim_xdsl.2014-11-17_11.05_39n.SSA.pkg
bootflash:mydir/
Destination filename [mydir/isr4400-firmware_nim_xdsl.2014-11-17_11.05_39n.SSA.pkg]?
Copy in progress...CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

```
6640604 bytes copied in 1.365 secs (4864911 bytes/sec)
Router#

Router#request platform software package install rp 0 file
bootflash:mydir/isr4400-firmware_nim_xdsl.2014-11-17_11.05_39n.SSA.pkg
--- Starting local lock acquisition on R0 ---
Finished local lock acquisition on R0

--- Starting file path checking ---
Finished file path checking

--- Starting image file verification ---
Checking image file names
Locating image files and validating name syntax
  Found isr4400-firmware_nim_xdsl.2014-11-17_11.05_39n.SSA.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 ISSU compatibility verification ---
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 ISSU compatibility verification

--- Starting impact testing ---
Checking operational impact of change
Finished impact testing

--- Starting list of software package changes ---
Old files list:
  Removed isr4400-firmware_nim_xdsl.03.14.00.S.155-1.S-std.SPA.pkg
New files list:
  Added isr4400-firmware_nim_xdsl.2014-11-17_11.05_39n.SSA.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
Skipping soft links for firmware upgrade
Skipping soft links for firmware upgrade
Assembling Dynamic configuration files
Applying interim IPC and database definitions
rsync: getaddrinfo: cc2-0 873: Name or service not known rsync error:
error in socket IO (code 10) at /auto/mcpbuilds19/
release/03.14.00.S/BLD-V03_14_00_S_FC5/contrib/rsync/clientserver.c(104) [sender=2.6.9]
rsync: getaddrinfo: cc2-0 873: Name or service not known rsync error:
error in socket IO (code 10) at /auto/mcpbuilds19/
release/03.14.00.S/BLD-V03_14_00_S_FC5/contrib/rsync/clientserver.c(104) [sender=2.6.9]
rsync: getaddrinfo: cc2-0 873: Name or service not known rsync error:
error in socket IO (code 10) at /auto/mcpbuilds19
/release/03.14.00.S/BLD-V03_14_00_S_FC5/contrib/rsync/clientserver.c(104) [sender=2.6.9]
Replacing running software
Replacing CLI software
Restarting software
Applying final IPC and database definitions
rsync: getaddrinfo: cc2-0 873: Name or service not known rsync error:
error in socket IO (code 10) at /auto/mcpbuilds19/
release/03.14.00.S/BLD-V03_14_00_S_FC5/contrib/rsync/clientserver.c(104) [sender=2.6.9]
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.
Router#
Router#show platform software subslot 0/2 module firmware
Avg Load info
-----
1.83 1.78 1.44 3/45 607

Kernel distribution info
-----
Linux version 3.4.11-rt19 (sapanwar@blr-atg-001) (gcc version 4.6.2
(Buildroot 2011.11) ) #3 SMP PREEMPT Fri Nov 7 09:26:19 IST 2014

Module firmware versions
-----
Modem Fw Version: 4.14L.04
Modem Phy Version: A2pv6F039h.d24o_rc1

Boot Loader: Secondary
-----
Version: 1.1

Modem Up time
-----
0D 0H 25M 38S

Router#

Router#hw-module subslot 0/2 reload
Proceed with reload of module? [confirm]
Router#
*Dec 12 09:55:59.645: %IOSXE_OIR-6-SOFT_RELOADSPA: SPA(NIM-VAB-A)
reloaded on subslot 0/2
*Dec 12 09:55:59.646: %SPA_OIR-6-OFFLINECARD: SPA (NIM-VAB-A) offline in subslot 0/2
*Dec 12 09:55:59.647: %CONTROLLER-5-UPDOWN: Controller VDSL 0/2/0, changed state to down

```

```

*Dec 12 09:57:22.514: new extended attributes received from iomd(slot 0 bay 2 board 0)
*Dec 12 09:57:22.514: %IOSXE_OIR-6-SOFT_RELOADSPA: SPA(NIM-VAB-A)
  reloaded on subslot 0/2
*Dec 12 09:57:22.515: %SPA_OIR-6-OFFLINECARD: SPA (NIM-VAB-A) offline in subslot 0/2
Router#
Router#
*Dec 12 09:58:35.471: %SPA_OIR-6-ONLINECARD: SPA (NIM-VAB-A) online in subslot 0/2
*Dec 12 09:58:37.470: %LINK-3-UPDOWN: Interface Ethernet0/2/0, changed state to down
*Dec 12 09:58:37.470: %LINK-3-UPDOWN: Interface ATM0/2/0, changed state to down
Router#

Router#show platform software subslot 0/2 module firmware
Avg Load info
-----
0.84 0.23 0.08 1/45 598

Kernel distribution info
-----
Linux version 3.4.11-rt19 (sapanwar@blr-atg-001) (gcc version 4.6.2 (Buildroot 2011.11) )
#6 SMP PREEMPT Mon Nov 17 10:51:41 IST 2014

Module firmware versions
-----
Modem Fw Version: 4.14L.04
Modem Phy Version: A2pv6F039n.d24o_rc1

Boot Loader: Secondary
-----
Version: 1.1

Modem Up time
-----
0D 0H 0M 42S

Router#

```

Provisioning Files

This section provides background information about the files and processes used in [Managing and Configuring a Router to Run Using Individual Packages, on page 50](#).

The consolidated package on a router consists of a collection of subpackages and a provisioning file titled `packages.conf`. To run the software, the usual method used is to boot the consolidated package, which is copied into memory, expanded, mounted, and run within memory. The provisioning file's name can be renamed but subpackage file's names cannot be renamed. The provisioning file and subpackage files must be kept in the same directory. The provisioning file does not work properly if any individual subpackage file is contained within a different directory.



Note An exception to this is that if a new or upgraded module firmware package is subsequently installed, it need not be in the same directory as the provisioning file.

Configuring a router to boot, using the provisioning file `packages.conf`, is beneficial because no changes have to be made to the boot statement after the Cisco IOS XE software is upgraded.

File Systems

The following table provides a list of file systems that can be seen on the Cisco 1100 series routers.

Table 1: Router File Systems

File System	Description
bootflash:	Boot flash memory file system.
flash:	Alias to the boot flash memory file system above.
cns:	Cisco Networking Services file directory.
nvrnram:	Router NVRAM. You can copy the startup configuration to NVRAM or from NVRAM.
obfl:	File system for Onboard Failure Logging (OBFL) files.
system:	System memory file system, which includes the running configuration.
tar:	Archive file system.
tmpsys:	Temporary system files file system.
usb0:	The Universal Serial Bus (USB) flash drive file systems. Note The USB flash drive file system is visible only if a USB drive is installed in usb0: port.

Use the ? help option, or use the **copy** command in command reference guides, if you find a file system that is not listed in the table above.

Autogenerated File Directories and Files

This section discusses the autogenerated files and directories that can be created, and how the files in these directories can be managed.

Table 2: Autogenerated Files

File or Directory	Description
crashinfo files	Crashinfo files may appear in the bootflash: file system. These files provide descriptive information of a crash and may be useful for tuning or troubleshooting purposes. However, the files are not part of router operations, and can be erased without impacting the functioning of the router.

File or Directory	Description
core directory	The storage area for .core files. If this directory is erased, it will automatically regenerate itself at bootup. The .core files in this directory can be erased without impacting any router functionality, but the directory itself should not be erased.
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.
tracelogs directory	The storage area for trace files. Trace files are useful for troubleshooting. If the Cisco IOS process fails, for instance, users or troubleshooting personnel can access trace files using diagnostic mode to gather information related to the Cisco IOS failure. Trace files, however, are not a part of router operations, and can be erased without impacting the router's performance.

Important Notes About Autogenerated Directories

Important information about autogenerated directories include:

- Autogenerated files on the bootflash: directory should not be deleted, renamed, moved, or altered in any way unless directed by Cisco customer support.



Note Altering autogenerating files on the bootflash: may have unpredictable consequences for system performance.

- Crashinfo, core, and trace files can be deleted.

Flash Storage

Subpackages are installed to local media storage, such as flash memory. For flash storage, use the **dir bootflash:** command to list the file names.



Note Flash storage is required for successful operation of a router.

Configuring the Configuration Register for Autoboot

The configuration register can be used to change router behavior. This includes controlling how the router boots. Set the configuration register to 0x0 to boot into ROM, by using one of the following commands:

- In Cisco IOS configuration mode, use the **config-reg 0x0** command.

- From the ROMMON prompt, use the **confreg 0x0** command.

For more information about the configuration register, see [Use of the Configuration Register on All Cisco Routers](#) and [Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example, on page 44](#).



Note Setting the configuration register to 0x2102 will set the router to autoboot the Cisco IOS XE software.



Note The console baud rate is set to 9600 after changing the **confreg** to 0x2102 or 0x0. If you cannot establish a console session after setting **confreg**, or garbage output appears, change the setting on your terminal emulation software to 9600.

Crypto Throughput Licensing

The Cisco 1100 series routers currently support two levels of crypto throughput licensing. The default crypto throughput level is 50 Mbps.

- The licensed level for Cisco 1111-8P SKU is 250 Mbps.
- The licensed level for Cisco 1111-4P SKU is 150 Mbps.

The following example is for the Cisco 1111-4P SKU:

Verify the current crypto throughput level

```
Router#sh platform hardware throughput crypto
The current crypto level is 50000 kb/s <---- This indicates the current crypto throughput.
```

Make changes to the existing crypto throughput level

```
Router(config)#platform hardware throughput crypto ?
  150000  throughput in kbps
  50000   throughput in kbps

Router(config)#platform hardware throughput crypto 150000
Feature Name:throughput
```

```
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE KEY PROVIDED FOR ANY CISCO PRODUCT FEATURE OR USING SUCH
PRODUCT FEATURE CONSTITUTES YOUR FULL ACCEPTANCE OF THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.
```

```
Use of this product feature requires an additional license from Cisco,
together with an additional payment. You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the product, including during the 60 day evaluation period, is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day evaluation period, your use of the product feature will be
governed solely by the Cisco end user license agreement (link above),
```


together with any supplements relating to such product feature. The above applies even if the evaluation license is not automatically terminated and you do not receive any notice of the expiration of the evaluation period. It is your responsibility to determine when the evaluation period is complete and you are required to make payment to Cisco for your use of the product feature beyond the evaluation period.

Your acceptance of this agreement for the software features on one product shall be deemed your acceptance with respect to all such software on all Cisco products you purchase which includes the same software. (The foregoing notwithstanding, you must purchase a license for each software feature you use past the 60 days evaluation period, so that if you enable a software feature on 1000 devices, you must purchase 1000 licenses for use past the 60 day evaluation period.)

Activation of the software command line interface will be evidence of your acceptance of this agreement.

ACCEPT? (yes/[no]): yes

```
*Jul 14 08:12:41.898: %LICENSE-6-EULA_ACCEPTED: EULA for feature throughput 1.0 has been
accepted. UDI=C1111-8P:FGL212694M3; StoreIndex=3:Built-In License Storage% The config will
take effect on next reboot
```

Check the show license feature, throughput license at this point would not be enabled.

```
Router#sh license feature
Feature name      Enforcement  Evaluation  Subscription  Enabled  RightToUse
appxk9           no          yes         yes           no       no
  yes            yes
securityk9      no          yes         yes           no       yes
  yes
ipbasek9        no          no          no            no       no
  no
FoundationSuiteK9 yes         yes         no            no
  yes
throughput      yes         yes         no            No<--   yes
internal_service yes         no          no            no
  no
```

Save the configuration

```
Router#wr mem
Building configuration...
```

[OK]

Reload the router

```
Router#reload
Proceed with reload? [confirm]
```

Verify the new crypto throughput level

```
Router#sh platform hardware throughput crypto
The current crypto level is 150000 kb/s.
```

Verify if the throughput license is enabled

```
Router#sh license feature
Feature name      Enforcement  Evaluation  Subscription  Enabled  RightToUse
appxk9           no          yes         yes           no       no
  yes            yes
securityk9      no          yes         yes           no       yes
  yes
```

```

yes
ipbasek9                no                no                no                no
no
FoundationSuiteK9      yes                yes                no                no
yes
throughput              yes                yes                no                yes<--
yes
internal_service        yes                no                no                no
no
=====

```

Unlicensed Feature: Example

If you try to use a feature that is part of a package that is not enabled, an error message is displayed.

In the following example, the **crypto map** command is called during configuration and an error message is displayed. This is because, the feature associated with **crypto map** is part of the **securityk9** package and the **securityk9** package is not enabled.

```

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#crypto map
^
% Invalid input detected at '^' marker.

```

Use the **show license feature** command to view the license features that are enabled. In the following example, the **securityk9** and the **uck9** packages are not enabled.



Note **ipbasek9** is provided by default.

```

Router# show license feature
Feature name      Enforcement  Evaluation  Subscription  Enabled  RightToUse
appxk9            yes          yes         no             yes      yes
uck9              yes          yes         no             no       yes
securityk9        yes          yes         no             no       yes
ipbasek9          no           no          no             yes      yes

```

LED Indicators

For information on LEDs on the router, see the "LED Indicators" section of the Hardware Installation Guide for the Cisco 1100 Series Integrated Services Routers.

Related Documentation

For further information on software licenses, see [Software Activation on Cisco Integrated Services Routers and Cisco Integrated Service Routers G2](#).

For further information on obtaining and installing feature licenses, see [Configuring the Cisco IOS Software Activation Feature](#).

How to Install and Upgrade the Software

To install or upgrade the software, use one of the following methods to use the software from a consolidated package or an individual package.



Note When a device is in the installation mode, formatting of the boot drive, bootflash/flash is not recommended. Formatting is blocked to ensure stability of the running image and to avoid any impact to upgrade of the software.

Managing and Configuring a Router to Run Using a Consolidated Package



Note Do not use these procedures if you also need to install any optional subpackages or plan to upgrade individual subpackages. See [Managing and Configuring a Router to Run Using Individual Packages, on page 50](#).

Managing and Configuring a Consolidated Package Using copy and boot Commands

To upgrade a consolidated package, copy the consolidated package to the **bootflash:** directory on the router using the **copy** command. After making this copy of the consolidated package, configure the router to boot using the consolidated package file.

The following example shows the consolidated package file being copied to the **bootflash:** file system via TFTP. The config register is then set to boot using **boot system** commands, and the **boot system** commands instruct the router to boot using the consolidated package stored in the **bootflash:** file system. The new configuration is then saved using the **copy running-config startup-config** command, and the system is then reloaded to complete the process.

```
Router# dir bootflash:
Directory of bootflash:/
  11  drwx          16384  Jun 13 2017 14:13:26 +00:00  lost+found
105249 drwx           4096  Jul 12 2017 15:48:19 +00:00  .installer
48577  drwx           4096  Jun 13 2017 14:16:31 +00:00  core
56673  drwx           4096  Jul 12 2017 18:42:01 +00:00  .prst_sync
145729 drwx           4096  Jun 13 2017 14:14:47 +00:00  .rollback_timer
  12  -rw-             0  Jun 13 2017 14:14:58 +00:00  tracelogs.a4i
348129 drwx          8192  Jul 12 2017 19:47:16 +00:00  tracelogs
  13  -rw-             30  Jul 12 2017 18:42:01 +00:00  throughput_monitor_params
  14  -rw-             35  Jun 13 2017 15:32:49 +00:00  pnp-tech-time
  15  -rw-        134096  Jun 13 2017 15:32:50 +00:00  pnp-tech-discovery-summary
  16  -rw-        2425808  Jul 12 2017 17:18:59 +00:00
C1100-ROMMON-20170621-SecureBoot-Aikido-SSA.pkg
6650826752 bytes total (5914554368 bytes free)
```

```
Router# copy tftp: bootflash:Address or name of remote host []? 172.18.40.4
Destination filename [c1100.bin]?
Accessing tftp://172.18.40.4/user5/c1100.bin...
Loading user5/c1100.bin from 172.18.40.4 (via GigabitEthernet0/0/0):
```

```
[OK - 379357675 bytes]

Router# dir bootflash:
Directory of bootflash:/

   11  drwx                16384  Jun 13 2017 14:13:26 +00:00  lost+found
105249 drwx                4096   Jul 12 2017 15:48:19 +00:00  .installer
48577  drwx                4096   Jun 13 2017 14:16:31 +00:00  core
56673  drwx                4096   Jul 12 2017 18:42:01 +00:00  .prst_sync
145729 drwx                4096   Jun 13 2017 14:14:47 +00:00  .rollback_timer
   12  -rw-                  0     Jun 13 2017 14:14:58 +00:00  tracelogs.a4i
348129 drwx                8192   Jul 12 2017 19:47:16 +00:00  tracelogs
   13  -rw-                  30     Jul 12 2017 18:42:01 +00:00  throughput_monitor_params
   14  -rw-                   35     Jun 13 2017 15:32:49 +00:00  pnp-tech-time
   15  -rw-               134096   Jun 13 2017 15:32:50 +00:00  pnp-tech-discovery-summary
   16  -rw-             2425808   Jul 12 2017 17:18:59 +00:00
C1100-ROMMON-20170621-SecureBoot-Aikido-SSA.pkg
   17  -rw-             379357675   Jul 12 2017 19:00:30 +00:00  c1100.bin

6650826752 bytes total (5914554368 bytes free)
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# boot system flash bootflash:c1100.bin
Router(config)# config-reg 0x2102
Router(config)# exit
Router# show run | include boot
boot-start-marker
boot system flash bootflash:c1100.bin boot-end-marker
Router# copy run start
Destination filename [startup-config]? Building configuration...
[OK]
Router# reload
```

Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example

```
Router# configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#boot system tftp://172.18.40.4/<path>/c1100.bin
Router(config)#config-register 0x2102
Router(config)#exit

Router# show run | include boot
boot-start-marker
boot system tftp /<path>/c1100-universalk9_ias.16.06.02.SPA.bin 223.255.254.254
boot-end-marker
diagnostic bootup level minimal
Router#

Router# copy running-config startup-config
Destination filename [startup-config]? Building configuration...
[OK]
Router# reload
The following license(s) are transitioning, expiring or have expired.
Features with expired licenses may not work after Reload.
Feature: internal_service ,Status: expiring, Period Left: 270 wks 2 days
Proceed with reload? [confirm]
```

```
*Jul 12 19:56:22.981: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload Command.UEFI firmware (version MARVELL devel-17.1.0 built at 01:11:40 on Jun 22 2017)
```

```
Armada Platform Init
```

```
Board is TSN-P2H
Comphy-0: SGMII2      3.125 Gbps
Comphy-1: SGMII3      1.25 Gbps
Comphy-2: USB3_HOST0  5 Gbps
Comphy-3: USB3_HOST1  5 Gbps
Comphy-4: SGMII0      1.25 Gbps
Comphy-5: PCIE2       5 Gbps
```

```
UtmiPhy: stage: Check PLL.. Passed
UTMI PHY 0 initialized to USB Host0
UtmiPhy: stage: Check PLL.. Passed
UTMI PHY 1 initialized to USB Host1
Successfully installed controller 0 at 0xF2701000
Successfully installed controller 1 at 0xF2701100
Successfully installed controller 2 at 0xF2211000
PciEmulation: Skip SD/MMC device with index 0
Successfully installed protocol interfaces
Y[=3hfs_w_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
fsw_ext4_volume_mount: success, blocksize 4096
```

```
Starting ROMMON...
Rom image verified correctly
```

```
System Bootstrap, Version 12.2[16.6(1r)RC3], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2017 by cisco Systems, Inc.
Compiled at Wed Jun 21 21:09:42 2017 by user2
```

```
!!! DEBUG CPLD Version Installed. For INTERNAL USE ONLY !!!
```

```
Current image running: Boot ROM1
```

```
Last reset cause: LocalSoft
C1111-8PLTEEAW platform with 4194304 Kbytes of main memory
```

```
.....
```

```
IP_ADDRESS: 172.18.42.231
IP_SUBNET_MASK: 255.255.255.0
DEFAULT_GATEWAY: 172.18.42.1
TFTP_SERVER: 172.18.40.4
TFTP_FILE: user5/c1100.bin
```

```
TFTP_MACADDR: D4:8C:B5:83:A3:6C
ETHER_PORT: 0
Unable to get TFTP file size - Using maximum size of 1073741824 bytes.
```

```
Package header rev 3 structure detected
IsoSize = 344424448
Calculating SHA-1 hash...Validate package: SHA-1 hash:
    calculated 5361A704:82F2A7F9:200C5D02:1209D89B:14A7FAFB
    expected   5361A704:82F2A7F9:200C5D02:1209D89B:14A7FAFB
```

```
RSA Signed DEVELOPMENT Image Signature Verification Successful
Image validated
    DXE      809 ms
    BDS     1153 ms
    BDS       21 ms
Total Time = 1984 ms
```

Starting OS kernel...

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

Cisco IOS Software [Fuji], ISR Software (ARMV8EB_LINUX_IOSD-UNIVERSALK9_IAS-M), Experimental
Version 16.7.20170621:131015 [polaris_dev-/scratch/user5/tsn_0620 104]
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 21-Jun-17 09:12 by user5

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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 C1111-8PLTTEAWE (1RU) processor with 1463766K/6147K bytes of memory.
Processor board ID FGL21071SK5
1 Virtual Ethernet interface
11 Gigabit Ethernet interfaces
2 Cellular interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
6598655K bytes of flash memory at bootflash:.
0K bytes of WebUI ODM Files at webui:.
```

```
%INIT: waited 0 seconds for NVRAM to be available
```

Press RETURN to get started!

```
*Jul 12 20:02:38.716: %SMART_LIC-6-AGENT_READY: Smart Agent for Licensing is initialized
*Jul 12 20:02:39.070: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = esg
Next reboot level = ipbasek9 and License = No valid license found
*Jul 12 20:02:40.781: %ISR_THROUGHPUT-6-CRYPTO: Crypto level has been set to 50000 kbps
*Jul 12 20:02:46.668: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan
*Jul 12 20:02:46.855: in NSH init
*Jul 12 20:02:47.097: %LINK-3-UPDOWN: Interface Lsmpi0, changed state to up
*Jul 12 20:02:47.098: %LINK-3-UPDOWN: Interface EOBC0, changed state to up
*Jul 12 20:02:47.098: %LINK-3-UPDOWN: Interface LIIN0, changed state to up
*Jul 12 20:02:47.142: aaa proxy process: dmiauthd mqipc init failed
*Jul 12 20:02:47.171: %PNP-6-PNP_DISCOVERY_STOPPED: PnP Discovery stopped (Startup Config
Present)
*Jul 12 20:01:43.752: %IOSXE-3-PLATFORM: R0/0: kernel: [ 105.413908] cpld_ioctl (line
1307): ioctl not implemented: type=122 number=180
*Jul 12 20:01:59.696: %IOSXE-1-PLATFORM: R0/0: kernel: [ 121.345752] moka_fpga_open
*Jul 12 20:02:42.243: %CMLIB-6-THROUGHPUT_VALUE: R0/0: cmand: Throughput license found,
throughput set to 50000 kbps
*Jul 12 20:02:48.098: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state
to down
*Jul 12 20:02:48.098: %LINEPROTO-5-UPDOWN: Line protocol on Interface Lsmpi0, changed state
to up
*Jul 12 20:02:48.099: %LINEPROTO-5-UPDOWN: Line protocol on Interface EOBC0, changed state
to up
*Jul 12 20:02:48.099: %LINEPROTO-5-UPDOWN: Line protocol on Interface LIIN0, changed state
to up
*Jul 12 20:02:52.867: %CRYPTO_ENGINE-5-KEY_ADDITION: A key named TP-self-signed-3241146330
has been generated or imported
*Jul 12 20:02:56.210: %SYS-2-PRIVCFG_DECRYPT: Successfully apply the private config file
*Jul 12 20:02:56.298: %SYS-5-CONFIG_I: Configured from memory by console
*Jul 12 20:02:56.311: %IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/0, interfaces disabled
*Jul 12 20:02:56.311: %IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/1, interfaces disabled
*Jul 12 20:02:56.311: %IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/2, interfaces disabled
*Jul 12 20:02:56.311: %IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/3, interfaces disabled
*Jul 12 20:02:56.325: %SPA_OIR-6-OFFLINECARD: SPA (C1111-2x1GE) offline in subslot 0/0
*Jul 12 20:02:56.338: %SPA_OIR-6-OFFLINECARD: SPA (C1111-ES-8) offline in subslot 0/1
*Jul 12 20:02:56.339: %CELLWAN-2-MODEM_DOWN: Modem in NIM slot 0/2 is DOWN
*Jul 12 20:02:56.339: %CELLWAN-2-MODEM_DOWN: Modem in NIM slot 0/2 is DOWN
*Jul 12 20:02:56.340: %SPA_OIR-6-OFFLINECARD: SPA (C1111-LTE) offline in subslot 0/2
*Jul 12 20:02:56.340: %SPA_OIR-6-OFFLINECARD: SPA (ISR-AP1100AC-E) offline in subslot 0/3
*Jul 12 20:02:56.343: %IOSXE_OIR-6-INSCARD: Card (fp) inserted in slot F0
```

Configuring a Router to Boot the Consolidated Package via TFTP Using the boot Command: Example

```

*Jul 12 20:02:58.205: %SYS-5-RESTART: System restarted --
Cisco IOS Software [Fuji], ISR Software (ARMV8EB_LINUX_IOSD-UNIVERSALK9_IAS-M), Experimental
Version 16.7.20170621:131015 [polaris_dev-/scratch/user5/tsn_0620 104]
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 21-Jun-17 09:12 by user5
*Jul 12 20:02:58.252: %SSH-5-ENABLED: SSH 1.99 has been enabled
*Jul 12 20:02:58.464: %CRYPTO_ENGINE-5-KEY_ADDITION: A key named
TP-self-signed-3241146330.server has been generated or imported
*Jul 12 20:03:01.059: %SYS-6-BOOTTIME: Time taken to reboot after reload = 400 seconds
*Jul 12 20:03:07.272: %CRYPTO_ENGINE-5-KEY_ADDITION: A key named CISCO_IDEVID_SUDI has been
generated or imported
*Jul 12 20:03:12.073: %SPA_OIR-6-ONLINECARD: SPA (C1111-ES-8) online in subslot 0/1
*Jul 12 20:03:12.140: %LINK-3-UPDOWN: Interface Cellular0/2/0, changed state to down
*Jul 12 20:03:12.141: %LINK-3-UPDOWN: Interface Cellular0/2/1, changed state to down
*Jul 12 20:03:12.286: %SPA_OIR-6-ONLINECARD: SPA (C1111-LTE) online in subslot 0/2
*Jul 12 20:03:12.342: new extended attributes received from iomd(slot 0 bay 3 board 0)
*Jul 12 20:03:12.349: %SPA_OIR-6-ONLINECARD: SPA (C1111-2x1GE) online in subslot 0/0
*Jul 12 20:03:12.774: %SPA_OIR-6-ONLINECARD: SPA (ISR-AP1100AC-E) online in subslot 0/3
*Jul 12 20:03:13.927: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/0, changed state to down
*Jul 12 20:03:13.961: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/1, changed state to down
*Jul 12 20:03:13.981: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/2, changed state to down
*Jul 12 20:03:14.005: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/3, changed state to down
*Jul 12 20:03:14.021: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/4, changed state to down
*Jul 12 20:03:14.033: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/5, changed state to down
*Jul 12 20:03:14.041: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/6, changed state to down
*Jul 12 20:03:14.045: %LINK-3-UPDOWN: Interface GigabitEthernet0/1/7, changed state to down
*Jul 12 20:03:14.055: %LINK-3-UPDOWN: Interface Wlan-GigabitEthernet0/1/8, changed state
to down
*Jul 12 20:03:14.297: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/0, changed state to down
*Jul 12 20:03:14.323: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/1, changed state to down
*Jul 12 20:03:17.613: %LINK-3-UPDOWN: Interface Wlan-GigabitEthernet0/1/8, changed state
to up
*Jul 12 20:03:18.613: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Wlan-GigabitEthernet0/1/8, changed state to up
*Jul 12 20:03:18.621: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state
to up
*Jul 12 20:03:18.961: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/0, changed state to up
*Jul 12 20:03:19.962: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0,
changed state to up
*Jul 12 20:03:40.876: %IOSXE-3-PLATFORM: R0/0: ngiolite: Modem VID/PID: 1199 9071
*Jul 12 20:03:40.880: %IOSXE-3-PLATFORM: R0/0: ngiolite: Modem is in connected state
*Jul 12 20:04:06.349: %CELLWAN-5-SIM_DETECT_START: [Cellular0/2/0]: SIM presence detection
starts !!
*Jul 12 20:04:08.976: %CELLWAN-5-SIM_DETECT_COMPLETE: [Cellular0/2/0]: SIM presence detection
has completed !!
*Jul 12 20:04:09.228: %CELLWAN-2-SIM_NOT_PRESENT: [Cellular0/2/0]: SIM is not present in
NIM SIM Slot.
*Jul 12 20:05:14.464: %CELLWAN-2-MODEM_UP: Modem in NIM slot 0/2 is now UP
*Jul 12 20:05:14.665: %CELLWAN-2-MODEM_RADIO: Cellular0/2/0 Modem radio has been turned on

Router>
Router>enable
Router#show version
Cisco IOS XE Software, Version 16.06.02
Cisco IOS Software [Everest], ISR Software (ARMV8EB_LINUX_IOSD-UNIVERSALK9_IAS-M), Version
16.6.2, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 01-Nov-17 03:00 by mcpre

```

```

Cisco IOS-XE software, Copyright (c) 2005-2017 by cisco Systems, Inc.
All rights reserved. Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0. The

```


software code licensed under GPL Version 2.0 is free software that comes with ABSOLUTELY NO WARRANTY. You can redistribute and/or modify such GPL code under the terms of GPL Version 2.0. For more details, see the 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 3 minutes
 Uptime for this control processor is 5 minutes
 System returned to ROM by Reload Command
 System image file is "usb0:c1100-universalk9_ias.16.06.02.SPA.bin"
 Last reload reason: Reload Command

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. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

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If you require further assistance please contact us by sending email to export@cisco.com.

Suite License Information for Module:'esg'

Suite	Suite Current	Type	Suite Next reboot
FoundationSuiteK9 securityk9 appxk9	None	None	None

Technology Package License Information:

Technology	Technology-package Current	Technology-package Type	Technology-package Next reboot
appxk9	None	None	None
securityk9	None	None	None
ipbase	ipbasek9	None	ipbasek9

cisco C1111-8PLTELAWN (1RU) processor with 1464345K/6147K bytes of memory.
 Processor board ID FGL212392WT
 8 Virtual Ethernet interfaces
 11 Gigabit Ethernet interfaces
 2 Cellular interfaces
 32768K bytes of non-volatile configuration memory.
 4194304K bytes of physical memory.
 6762495K bytes of flash memory at bootflash:.
 7855044K bytes of USB flash at usb0:.

```

0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x2100

Router#

```

Managing and Configuring a Router to Run Using Individual Packages

To choose between running individual packages or a consolidated package, see the *Installing the Software - Overview* section.

Installing Subpackages from a Consolidated Package

Perform the following procedure to obtain the consolidated package from a TFTP server.

Another variation of this procedure obtains the consolidated package from a USB flash drive. This is described in the *Installing Subpackages from a Consolidated Package on a Flash Drive*.

Before you begin

Copy the consolidated package to the TFTP server.

Procedure

	Command or Action	Purpose
Step 1	<p>show version</p> <p>Example:</p> <pre> Router# show version Cisco IOS XE Software, Version 16.06.02 Cisco IOS Software [Everest], ISR Software (ARMV8EB_LINUX_IOSD-UNIVERSALK9_IAS-M), Version 16.6.2, RELEASE SOFTWARE (fc2) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2017 by Cisco Systems, Inc. Compiled Wed 01-Nov-17 03:00 by mcpre Cisco IOS-XE software, Copyright (c) 2005-2017 by cisco Systems, Inc. All rights reserved. Certain components of Cisco IOS-XE software are licensed under the GNU General Public License ("GPL") Version 2.0. The software code licensed under GPL Version 2.0 is free software that comes with ABSOLUTELY NO WARRANTY. You can redistribute and/or modify such GPL code under the terms of GPL Version 2.0. For more details, see the </pre>	Shows the version of software running on the router. This can later be compared with the version of software to be installed.

	Command or Action	Purpose				
	<p>documentation or "License Notice" file accompanying the IOS-XE software, or the applicable URL provided on the flyer accompanying the IOS-XE software.</p> <p>ROM: IOS-XE ROMMON</p> <p>Router uptime is 3 minutes Uptime for this control processor is 5 minutes System returned to ROM by Reload Command System image file is "usb0:c1100-universalk9_ias.16.06.02.SPA.bin" Last reload reason: Reload Command</p> <p>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. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.</p> <p>A summary of U.S. laws governing Cisco cryptographic products may be found at: http://www.cisco.com/wvl/export/crypto/tool/storg.html</p> <p>If you require further assistance please contact us by sending email to export@cisco.com.</p> <p>Suite License Information for Module:'esg'</p>					
	<table border="1"> <thead> <tr> <th data-bbox="513 1545 766 1598">Suite Type</th> <th data-bbox="766 1545 1013 1598">Suite Current Suite Next reboot</th> </tr> </thead> <tbody> <tr> <td data-bbox="513 1650 766 1703">FoundationSuiteK9 None</td> <td data-bbox="766 1650 1013 1703">None None</td> </tr> </tbody> </table>	Suite Type	Suite Current Suite Next reboot	FoundationSuiteK9 None	None None	
Suite Type	Suite Current Suite Next reboot					
FoundationSuiteK9 None	None None					
	<p>securityk9 appxk9</p> <p>Technology Package License Information:</p>					

	Command or Action	Purpose
	<pre> Technology Technology-package Technology-package Current Type Next reboot appxk9 None None None securityk9 None None None ipbase ipbasek9 None ipbasek9 cisco C1111-8PLTELAWN (1RU) processor with 1464345K/6147K bytes of memory. Processor board ID FGL212392WT 8 Virtual Ethernet interfaces 11 Gigabit Ethernet interfaces 2 Cellular interfaces 32768K bytes of non-volatile configuration memory. 4194304K bytes of physical memory. 6762495K bytes of flash memory at bootflash:. 7855044K bytes of USB flash at usb0:. 0K bytes of WebUI ODM Files at webui:. Configuration register is 0x2100 Router# . </pre>	
Step 2	<p>dir bootflash:</p> <p>Example:</p> <pre>Router# dir bootflash:</pre>	Displays the previous version of software and that a package is present.
Step 3	<p>show platform</p> <p>Example:</p> <pre>Router# show platform Chassis type: C1100</pre>	Displays the inventory.
Step 4	<p>mkdir bootflash: <i>URL-to-directory-name</i></p> <p>Example:</p> <pre>Router# mkdir bootflash:mydir</pre>	<p>Creates a directory to save the expanded software image.</p> <p>You can use the same name as the image to name the directory.</p>
Step 5	<p>request platform software package expand file <i>URL-to-consolidated-package</i> to <i>URL-to-directory-name</i></p> <p>Example:</p> <pre>Router# request platform software package expand file</pre>	<p>Expands the software image from the TFTP server (<i>URL-to-consolidated-package</i>) into the directory used to save the image (<i>URL-to-directory-name</i>), which was created in Step 4.</p>

	Command or Action	Purpose
	<code>bootflash:c1100-universalk9-ias.bin to bootflash:mydir</code>	
Step 6	reload Example: Router# <code>reload</code> rommon >	Enables ROMMON mode, which allows the software in the consolidated file to be activated.
Step 7	boot <i>URL-to-directory-name/packages.conf</i> Example: rommon 1 > <code>boot</code> <code>bootflash:mydir/packages.conf</code>	Boots the consolidated package, by specifying the path and name of the provisioning file: packages.conf.
Step 8	show version installed Example: Router# <code>show version installed</code> Package: Provisioning File, version: n/a, status: active	Displays the version of the newly installed software.

Examples

The initial part of the example shows the consolidated package, c1100.bin, being copied to the TFTP server. This is a prerequisite step. The remaining part of the example shows the consolidated file, packages.conf, being booted.

```
Router# copy tftp:c1100.bin bootflash:
Address or name of remote host []? 172.18.40.4
Destination filename [c1100.bin]?
Accessing tftp://172.18.40.4/user5/c1100.bin...
Loading user5/c1100.bin from 172.18.40.4 (via GigabitEthernet0/0/0):
```

```
[OK - 379357675 bytes]
```

```
379357675 bytes copied in 382.880 secs (990800 bytes/sec)
```

```
Router# show version
Cisco IOS XE Software, Version 16.06.02
Cisco IOS Software [Everest], ISR Software (ARMV8EB_LINUX_IOSD-UNIVERSALK9_IAS-M), Version
 16.6.2, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2017 by Cisco Systems, Inc.
Compiled Wed 01-Nov-17 03:00 by mcpre
```

```
Cisco IOS-XE software, Copyright (c) 2005-2017 by cisco Systems, Inc.
All rights reserved. Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0. The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY. You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0. For more details, see the
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 3 minutes
 Uptime for this control processor is 5 minutes
 System returned to ROM by Reload Command
 System image file is "usb0:c1100-universalk9_ias.16.06.02.SPA.bin"
 Last reload reason: Reload Command

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. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

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<http://www.cisco.com/wvl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to export@cisco.com.

Suite License Information for Module:'esg'

Suite	Suite Current	Type	Suite Next reboot
FoundationSuiteK9 securityk9 appxk9	None	None	None

Technology Package License Information:

Technology	Technology-package Current	Technology-package Type	Technology-package Next reboot
appxk9	None	None	None
securityk9	None	None	None
ipbase	ipbasek9	None	ipbasek9

cisco C1111-8PLTELAWN (1RU) processor with 1464345K/6147K bytes of memory.
 Processor board ID FGL212392WT
 8 Virtual Ethernet interfaces
 11 Gigabit Ethernet interfaces
 2 Cellular interfaces
 32768K bytes of non-volatile configuration memory.
 4194304K bytes of physical memory.
 6762495K bytes of flash memory at bootflash:.
 7855044K bytes of USB flash at usb0:.
 0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x2100

Router#

```

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

   11  drwx           16384  Jun 13 2017 14:13:26 +00:00  lost+found
105249 drwx           4096   Jul 12 2017 15:48:19 +00:00  .installer
48577  drwx           4096   Jun 13 2017 14:16:31 +00:00  core
56673  drwx           4096   Jun 13 2017 14:14:40 +00:00  .prst_sync
145729 drwx           4096   Jun 13 2017 14:14:47 +00:00  .rollback_timer
   12  -rw-             0   Jun 13 2017 14:14:58 +00:00  tracelogs.a4i
348129 drwx           4096   Jul 12 2017 15:53:50 +00:00  tracelogs
   13  -rw-             30   Jul 12 2017 15:49:42 +00:00  throughput_monitor_params
   14  -rw-             35   Jun 13 2017 15:32:49 +00:00  pnp-tech-time
   15  -rw-          134096  Jun 13 2017 15:32:50 +00:00  pnp-tech-discovery-summary

6650826752 bytes total (6297722880 bytes free)

```

```

Router# show platform
Chassis type: C1111-8PTELAWN

```

Slot	Type	State	Insert time (ago)
0	C1111-8PTELAWN	ok	00:04:56
0/0	C1111-2x1GE	ok	00:02:41
0/1	C1111-ES-8	ok	00:02:40
0/2	C1111-LTE	ok	00:02:41
0/3	ISR-AP1100AC-N	ok	00:02:41
R0	C1111-8PTELAWN	ok, active	00:04:56
F0	C1111-8PTELAWN	ok, active	00:04:56
P0	PWR-12V	ok	00:04:30

Slot	CPLD Version	Firmware Version
0	17100501	16.6(1r)RC3
R0	17100501	16.6(1r)RC3
F0	17100501	16.6(1r)RC3

```
Router#
```

```
Router# mkdir bootflash:c1100.dir1
```

```
Create directory filename [c1100.dir1]? Created dir bootflash:/c1100.dir1
```

```
Router# request platform software package expand file bootflash:c1100.bin to
bootflash:c1100.dir1
```

```

Jul 12 20:18:28.059 RP0/0: %INSTALL-5-OPERATION_START_INFO: Started expand package
bootflash:c1100.bin
Verifying parameters
Expanding superpackage bootflash:c1100.bin
Validating package type

```

```

*Jul 12 20:18:28.029: %IOSXE-5-PLATFORM: R0/0: Jul 12 20:18:28 packtool:
%INSTALL-5-OPERATION_START_INFO: Started expand package bootflash:c1100.binCopying package
files
SUCCESS: Finished expanding all-in-one software package.
Jul 12 20:19:57.041 RP0/0: %INSTALL-5-OPERATION_COMPLETED_INFO: Completed expand package
bootflash:c1100.bin

```

```
Router# reload
```

```
Proceed with reload? [confirm]
```

```
*Jul 13 19:39:06.354: %SYS-5-RELOAD: Reload requested by console.Reload Reason: Reload Command.
```

```
rommon 1 > boot bootflash:c1100.dir/packages.conf
                Located packages.conf
```

```
=====
Package header rev 3 structure detected
IsoSize = 0
Calculating SHA-1 hash...Validate package: SHA-1 hash:
    calculated 9E5196BD:ED7FB430:538521E5:90175EED:B3AD33B7
    expected   9E5196BD:ED7FB430:538521E5:90175EED:B3AD33B7
```

```
RSA Signed DEVELOPMENT Image Signature Verification Successful
Image validated
    DXE      809 ms
    BDS     1153 ms
    BDS       21 ms
Total Time = 1984 ms
.....
```

```
Router# show version installed
```

```
Package: Provisioning File, version: n/a, status: active
  Role: provisioning file
  File: bootflash:c1100.dir/packages.conf, on: RP0
  Built: n/a, by: n/a
  File SHA1 checksum: a02d730877371ac9c033e90444094bb441adc8e5
```

```
Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: active
  Role: rp_base
  File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on: RP0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992
```

```
Package: rpboot, version: 2017-06-21_09.16_user5, status: active
  Role: rp_boot
  File: bootflash:c1100.dir/c1100-rpboot.2017-06-21_09.16_user5.SSA.pkg, on: RP0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: n/a
```

```
Package: firmware_c1100_gfast, version: 2017-06-21_09.16_user5, status: active
  Role: firmware_c1100_gfast
  File: bootflash:c1100.dir/c1100-firmware_c1100_gfast.2017-06-21_09.16_user5.SSA.pkg, on: RP0/0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 996bc2d56bdb9d4e13f45a613db1bc41d0b6d291
```

```
Package: firmware_c1100_vadsl, version: 2017-06-21_09.16_user5, status: active
  Role: firmware_c1100_vadsl
  File: bootflash:c1100.dir/c1100-firmware_c1100_vadsl.2017-06-21_09.16_user5.SSA.pkg, on: RP0/0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: a2a7daf772c30fc4cec5befac29ff320d8d47152
```

```
Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: active
  Role: rp_daemons
  File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on: RP0/0
  Built: 2017-06-21_09.16, by: user5
```



```
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status:
active
Role: rp_iosd
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/0
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: active
Role: rp_security
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/0
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: active
Role: rp_webui
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/0
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: firmware_c1100_gfast, version: 2017-06-21_09.16_user5, status: n/a
Role: firmware_c1100_gfast
File: bootflash:c1100.dir/c1100-firmware_c1100_gfast.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 996bc2d56bdb9d4e13f45a613db1bc41d0b6d291

Package: firmware_c1100_vadsl, version: 2017-06-21_09.16_user5, status: n/a
Role: firmware_c1100_vadsl
File: bootflash:c1100.dir/c1100-firmware_c1100_vadsl.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: a2a7daf772c30fc4cec5befac29ff320d8d47152

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
Role: rp_daemons
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992
Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status:
n/a
Role: rp_iosd
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
Role: rp_security
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
Role: rp_webui
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP0/1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992
```

```

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
  Role: rp_base
  File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
RP1
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: rpboot, version: 2017-06-21_09.16_user5, status: n/a
  Role: rp_boot
  File: bootflash:c1100.dir/c1100-rpboot.2017-06-21_09.16_user5.SSA.pkg, on: RP1
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: n/a

Package: firmware_c1100_gfast, version: 2017-06-21_09.16_user5, status: n/a
  Role: firmware_c1100_gfast
  File: bootflash:c1100.dir/c1100-firmware_c1100_gfast.2017-06-21_09.16_user5.SSA.pkg, on:
RP1/0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 996bc2d56bdb9d4e13f45a613db1bc41d0b6d291

Package: firmware_c1100_vadsl, version: 2017-06-21_09.16_user5, status: n/a
  Role: firmware_c1100_vadsl
  File: bootflash:c1100.dir/c1100-firmware_c1100_vadsl.2017-06-21_09.16_user5.SSA.pkg, on:
RP1/0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: a2a7daf772c30fc4cec5befac29ff320d8d47152

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
      Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status:
active
  Role: cc
  File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
SIPO/0
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: active
  Role: cc
  File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
SIPO/1
  Built: 2017-06-21_09.16, by: user5
  File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: cc, version: unknown, status: active
  Role: cc
  File: unknown, on: SIPO/2
  Built: unknown, by: unknown
  File SHA1 checksum: unknown

Package: cc, version: unknown, status: active
  Role: cc
  File: unknown, on: SIPO/3
  Built: unknown, by: unknown
  File SHA1 checksum: unknown

Package: cc, version: unknown, status: n/a
  Role: cc
  File: unknown, on: SIPO/4
  Built: unknown, by: unknown
  File SHA1 checksum: unknown

Package: cc, version: unknown, status: n/a
  Role: cc

```

```

File: unknown, on: SIP0/5
Built: unknown, by: unknown
File SHA1 checksum: unknown

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
Role: cc_spa
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
SIP1
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

Package: mono-universalk9_ias, version: 2017-06-21_09.16_user5, status: n/a
Role: cc_spa
File: bootflash:c1100.dir/c1100-mono-universalk9_ias.2017-06-21_09.16_user5.SSA.pkg, on:
SIP2
Built: 2017-06-21_09.16, by: user5
File SHA1 checksum: 1e44c63d734c574b986c9332c1bad8580f55e992

```

Installing Subpackages from a Consolidated Package on a Flash Drive

The steps for installing subpackages from a consolidated package on a USB flash drive are similar to those described in the Installing Subpackages from a Consolidated Package section.

Procedure

-
- | | |
|---------------|---|
| Step 1 | show version |
| Step 2 | dir usbn: |
| Step 3 | show platform |
| Step 4 | mkdir bootflash:<i>URL-to-directory-name</i> |
| Step 5 | request platform software package expand fileusbn: <i>package-name to URL-to-directory-name</i> |
| Step 6 | reload |
| Step 7 | boot <i>URL-to-directory-name/packages.conf</i> |
| Step 8 | show version installed |
-

How to Install and Upgrade the Software for Cisco IOS XE Everest Release 16.6

To install or upgrade the software, use one of the following methods to use the software from a consolidated package or an individual package.

Upgrading to Cisco IOS XE Everest 16.6.2 Release

Upgrading the device to Cisco IOS XE Everest 16.6.2 release for the first time uses the same procedures as specified in the earlier section. In addition, Cisco IOS XE Everest 16.6.2 release requires a minimum ROMMON version. When the device boots up with Cisco IOS XE Everest image for the first time, the device checks the installed version of the ROMMON, and upgrades if the system is running an older version. During the upgrade,

do not power cycle the device. The system automatically power cycles the device after the new ROMMON is installed. After the installation, the system will boot up with the Cisco IOS XE image as normal.



Note When the device boots up for first time and if the device requires an upgrade, the entire boot process may take several minutes. This process will be longer than a normal boot due to the ROMMON upgrade.

The following example illustrates the boot process of a consolidated package:

Not supported for C1100 in this release since C1100 is shipped with the minimum Rommon version.