Upgrading Flash Memory for Cisco 4000 Series ISRs

First Published: September 3, 2015

When the Cisco 4000 Series Integrated Services Routers (ISR) flash memory is provided to the customer, the flash memory card is not pre-configured. This document describes the procedures to transfer the Cisco IOS image, configuration files, and licenses from an original flash memory card (default flash memory) to a new flash memory card.

Note You do not have to reformat the new flash memory card, if you are using a Cisco 4000 series router to transfer or upgrade the Cisco IOS image. If the flash memory card is corrupted or files cannot be read, reformat the flash memory card on the Cisco 4000 series router using the **format** command.

Contents

This document includes the following sections:

Cisco Systems, Inc.
www.cisco.com

Feature Information

For the latest information about features and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Additional References" section on page 10.

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

Upgrading the Flash Memory Card

To upgrade the flash memory card, perform these steps:

Step 1 Save the start-up and running configuration to an external universal serial bus (USB) flash memory (see Saving the Startup and Running Configuration, page 2).

Step 2 Save the permanent licenses installed to a file (see Saving Licenses, page 2).

Step 3 Install the new flash memory card, and copy the desired image from an external USB flash memory card to the bootflash (Installing the New Flash Memory Card, page 3).

Saving the Startup and Running Configuration

Use the **copy** command to save the start up or running configuration files to a device. For example, you can save the configuration files to an external USB flash memory.

Examples

This example shows how to save the start up or running configuration files to a device.

```
Router# copy startup-config usb0:startup-config.cfg
Destination filename [startup-config.cfg]?
1469 bytes copied in 0.310 secs (4739 bytes/sec)
Router# copy running-config usb0:running-config.cfg
Destination filename [running-config.cfg]?
1462 bytes copied in 0.363 secs (4028 bytes/sec)
```

Saving Licenses

You can save the permanent licenses installed on a router to a file. This file can be reinstalled to retrieve all licenses back to the same router.

Example

```
Router# license save usb0:license-saved.lic
license lines saved ..... to usb0:license-saved.lic
```

Installing the New Flash Memory Card

Before You Begin

If you want to transfer old configurations and licenses from an old flash memory card to the new flash memory card, copy the configuration files and the saved license file to an USB flash memory card. Also, copy the designated image to an USB flash memory card and insert it into an external USB flash slot of the router. For more information, see Retrieving the License and Configuration Files section.

To install a new flash memory card on Cisco 4000 series ISR, perform these steps:

Step 1 Read the "Safety Warnings" section and disconnect the power supply before you perform any module replacement.

Step 2 Remove the chassis cover. For instructions on removing the chassis cover, see "Replacing the Chassis Cover" section.

Step 3 Place the flash memory card on top of the flash memory card connector.

Step 4 Tighten the supplied screw to secure the flash memory card in place.

Step 5 Replace the chassis cover. See ""Replacing the Chassis Cover" section.

Step 6 Power on the router.

Step 7 Boot up the router from the Cisco image that is available in an external USB flash memory card.

> ✎
>
> **Note** After the new flash memory is installed, it will take priority over the default flash. The content of new flash memory card is empty, therefore, the router will have to be first booted from an external USB flash memory.

Step 8 Copy the desired Cisco image from an external USB flash memory card to the bootflash using the **copy usb0:imagename bootflash** command.

Step 9 After copying files, execute the **dir bootflash:** command to ensure that the Cisco image is copied. This command can also be used to verify the size of the installed flash memory.

Step 10 Reload the router and boot up the router from the new flash memory:

```
rommon 1 > b bootflash:
or
rommon 1 > b bootflash:imagename.bin
```

Step 11 After the system boots up, execute the **show version** command to ensure that the Cisco image is booted from the bootflash.

Step 12 To transfer configuration files and reinstall saved licenses from the previous flash memory to the new flash memory, follow the steps provided in the Retrieving the License and Configuration Files section.

Examples

The following examples show how to install the new flash memory card and configuration files.

```
rommon 1 > b usb0:isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin
Located isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin, start cluster is 362

################################################################################
Image loaded
Boot image size = 420064132 (0x1909ab84) bytes

Package header rev 1 structure detected
```

```
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
    calculated 5a14a524:a6156a42:431693db:3aa55699:06bfa964
    expected   5a14a524:a6156a42:431693db:3aa55699:06bfa964

RSA Signed RELEASE Image Signature Verification Successful.
Package Load Test Latency : 7699 msec
Image validated
%IOSXEBOOT-4-BOOT_SRC: (rp/0): mounting /boot/super.iso to /tmp/sw/isos

                Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth
in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR
sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

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

Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version 15.4(3)S3,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Thu 28-May-15 15:58 by mcpre

Cisco IOS-XE software, Copyright (c) 2005-2015 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.

% failed to initialize nvram

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.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
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 ISR4331/K9 (1RU) processor with 1687301K/6147K bytes of memory.
Processor board ID FDO1915A011
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
14888959K bytes of flash memory at bootflash:.
1014785K bytes of USB flash at usb0:.

          --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

*Jun  4 23:41:27.869: %SMART_LIC-6-AGENT_READY: Smart Agent for Licensing is initialized
```

```
*Jun  4 23:41:28.909: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = esg
Next reboot level = ipbasek9 and License = No valid license found
*Jun  4 23:41:28.972: %ESG_THROUGHPUT-6-LEVEL: Throughput level has been set to 100000
kbps
*Jun  4 23:41:29.948: %IOSXE_RP_NV-3-NV_ACCESS_FAIL: Initial read of NVRAM contents failed
*Jun  4 23:41:35.851: pak_debug_init: Successfully initialized pak debug trace buffer
*Jun  4 23:41:37.799: adsl_ifmib_init
*Jun  4 23:41:37.844: %LINK-3-UPDOWN: Interface Lsmpi0, changed state to up
*Jun  4 23:41:37.844: %LINK-3-UPDOWN: Interface EOBC0, changed state to up
*Jun  4 23:41:37.845: %LINK-3-UPDOWN: Interface GigabitEthernet0, changed state to down
*Jun  4 23:41:37.853: %LINK-3-UPDOWN: Interface LIIN0, changed state to up
*Jun  4 23:41:39.091: %IOSXE_MGMTVRF-6-CREATE_SUCCESS_INFO: Management vrf Mgmt-intf
created with ID 1, ipv4 table-id 0x1, ipv6 table-id 0x1E000001
*Jun  4 23:41:39.143: %LINEPROTO-5-UPDOWN: Line protocol on Interface Lsmpi0, changed
state to up
*Jun  4 23:41:39.143: %LINEPROTO-5-UPDOWN: Line protocol on Interface EOBC0, changed state
to up
*Jun  4 23:41:39.143: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0,
changed state to down
*Jun  4 23:41:39.144: %LINEPROTO-5-UPDOWN: Line protocol on Interface LIIN0, changed state
to up
*Jun  4 23:41:25.027: %EVUTIL-6-PREREQUISITE: SIP0: cmcc:  Preferred library is absent
*Jun  4 23:41:25.028: %EVUTIL-6-PREREQUISITE: SIP0: cmcc:  Preferred library is absent
*Jun  4 23:41:31.098: %CMLIB-6-THROUGHPUT_VALUE: SIP1: cmand:  Throughput license found,
throughput set to 100000 kbps
*Jun  4 23:41:32.339: %CPPHA-7-START: SIP1: cpp_ha:  CPP 0 preparing ucode
*Jun  4 23:41:32.585: %CPPHA-7-START: SIP1: cpp_ha:  CPP 0 startup init
*Jun  4 23:41:32.798: %CPPHA-7-START: SIP1: cpp_ha:  CPP 0 running init
*Jun  4 23:41:34.439: %CPPHA-7-READY: SIP1: cpp_ha:  CPP 0 loading and initialization
complete
*Jun  4 23:41:34.817: %IOSXE-6-PLATFORM: SIP1: cpp_cp: Process
CPP_PFILTER_EA_EVENT__API_CALL__REGISTER
*Jun  4 23:42:15.103: %LINK-5-CHANGED: Interface GigabitEthernet0, changed state to
administratively down
*Jun  4 23:42:19.474: %IOSXE_OIR-6-REMSPA: SPA removed from subslot 0/0, interfaces
disabled
*Jun  4 23:42:19.475: %SPA_OIR-6-OFFLINECARD: SPA (ISR4331-3x1GE) offline in subslot 0/0
*Jun  4 23:42:19.479: %IOSXE_OIR-6-INSCARD: Card (fp) inserted in slot F0
*Jun  4 23:42:19.479: %IOSXE_OIR-6-ONLINECARD: Card (fp) online in slot F0
*Jun  4 23:42:19.480: %IOSXE_OIR-6-INSCARD: Card (cc) inserted in slot 0
*Jun  4 23:42:19.480: %IOSXE_OIR-6-ONLINECARD: Card (cc) online in slot 0
*Jun  4 23:42:19.482: %IOSXE_OIR-6-INSCARD: Card (cc) inserted in slot 1
*Jun  4 23:42:19.482: %IOSXE_OIR-6-ONLINECARD: Card (cc) online in slot 1
*Jun  4 23:42:19.536: %IOSXE_OIR-6-INSSPA: SPA inserted in subslot 0/0
*Jun  4 23:42:19.580: %SYS-5-RESTART: System restarted --
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version 15.4(3)S3,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Thu 28-May-15 15:58 by mcpre
*Jun  4 23:42:19.577: %SPA-3-ENVMON_NOT_MONITORED: SIP1: iomd:  Environmental monitoring
is not enabled for ISR4331-3x1GE[0/0]
*Jun  4 23:42:21.593: new extended attributes received from iomd(slot 0 bay 0 board 0)
*Jun  4 23:42:21.694: %SPA_OIR-6-ONLINECARD: SPA (ISR4331-3x1GE) online in subslot 0/0
*Jun  4 23:42:21.695: %IOSXE_OIR-6-SOFT_RELOADSPA: SPA(ISR4331-3x1GE) reloaded on subslot
0/0
*Jun  4 23:42:21.696: %SPA_OIR-6-OFFLINECARD: SPA (ISR4331-3x1GE) offline in subslot 0/0
*Jun  4 23:42:22.041: %SYS-6-BOOTTIME: Time taken to reboot after reload = 21551 seconds
*Jun  4 23:42:27.587: %SPA-3-ENVMON_NOT_MONITORED: SIP1: iomd:  Environmental monitoring
is not enabled for ISR4331-3x1GE[0/0]
*Jun  4 23:42:30.693: %SPA_OIR-6-ONLINECARD: SPA (ISR4331-3x1GE) online in subslot 0/0
```

After the system boots up, execute the **show version** command to ensure that the Cisco image boots up from the bootflash:

```
Router# show version
Cisco IOS XE Software, Version 03.13.03.S - Extended Support Release
Cisco IOS Software, ISR Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Version 15.4(3)S3,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Thu 28-May-15 15:58 by mcpre


ROM: IOS-XE ROMMON

Router uptime is 1 minute
Uptime for this control processor is 2 minutes
System returned to ROM by reload
System image file is "usb0:isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin"
Last reload reason: Reload Command

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

Technology Package License Information:


-----------------------------------------------------------------
Technology     Technology-package          Technology-package
               Current      Type           Next reboot
-----------------------------------------------------------------
appx           None         None           None
uc             None         None           None
security       None         None           None
ipbase         ipbasek9     None           ipbasek9
cisco ISR4331/K9 (1RU) processor with 1687301K/6147K bytes of memory.
Processor board ID FDO1915A011
3 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
4194304K bytes of physical memory.
14888959K bytes of flash memory at bootflash:.
1014785K bytes of USB flash at usb0:.

Configuration register is 0x0
```

Execute the **dir bootflash:** command to check the image in the bootflash:

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


11        drwx          16384    Jun 4 2015 23:42:53 +00:00  lost+found
1144641   drwx           4096    Jun 4 2015 23:43:32 +00:00  .prst_sync

15006666752 bytes total (14244331520 bytes free)
```

If the files are not in the bootflash, copy the desired image from the external USB flash to the bootflash using the **copy usb0:imagename bootflash** command.

```
Router# copy usb0: bootflash:
Source filename []? isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin
Destination filename [isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin]?
Copy in
progress...CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

```
420064132 bytes copied in 51.000 secs (8236552 bytes/sec)
```

Execute the **dir bootflash:** command to ensure that the Cisco image is copied to the bootflash:

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

11        drwx            16384    Jun 4 2015 23:42:53 +00:00  lost+found
1144641   drwx             4096    Jun 4 2015 23:43:32 +00:00  .prst_sync
12        -rw-        420064132    Jun 4 2015 23:45:05 +00:00
isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin

15006666752 bytes total (13823848448 bytes free)

Reload the router.

Router# reload
Proceed with reload? [confirm]

*Jun  4 23:45:43.848: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload
Command.Jun  4 23:45:57.691 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 15.4(3r)S3, RELEASE SOFTWARE
Copyright (c) 1994-2014  by cisco Systems, Inc.

Current image running: Boot ROM0

Last reset cause: LocalSoft
Cisco ISR4331/K9 platform with 4194304 Kbytes of main memory

rommon 1 > dir bootflash:
File System: EXT2/EXT3

11        16384     drwx------      lost+found
1144641   4096      drwxrwxrwx      .prst_sync
12        420064132 -rw-r--r--      isr4300-universalk9.03.13.03.S.154-3.S3-ext.SPA.bin
```

Retrieving the License and Configuration Files

Before You Begin

Insert the USB flash memory card with the configuration files and the saved license file to the router, For more information, see Additional References and Additional References sections.

To retrieve the license and configuration files from an original flash memory, perform these steps:

Step 1   Execute the **license install filename.lic** command to reinstall all licenses from the previous flash to the new flash memory. For more information, see Installing and Upgrading Licenses by Using Software Activation Commands section.

Examples

The following example shows how to reinstall all licenses from the previous flash to the new flash memory.

```
Router# license install bootflash:license-saved.lic
Installing licenses from "bootflash:license-saved.lic"
Installing...Feature:appxk9...Successful:Supported
Installing...Feature:ipbasek9...Successful:Supported
Installing...Feature:securityk9...Successful:Supported
Installing...Feature:uck9...Successful:Supported
4/4 licenses were successfully installed
0/4 licenses were existing licenses
0/4 licenses were failed to install

Router#
*Jun 8 21:13:57.827: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = esg
Next reboot level = appxk9 and License = appxk9
*Jun 8 21:13:57.924: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = esg
Next reboot level = securityk9 and License = securityk9
*Jun 8 21:13:57.926: %LICENSE-6-INSTALL: Feature appxk9 1.0 was installed in this device.
UDI=ISR4331/K9:FDO1913151A; StoreIndex=1:Primary License Storage
*Jun 8 21:13:57.934: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = esg
Next reboot level = uck9 and License = uck9
*Jun 8 21:13:58.123: %LICENSE-6-INSTALL: Feature ipbasek9 1.0 was installed in this
device. UDI=ISR4331/K9:FDO1913151A; StoreIndex=2:Primary License Storage
*Jun 8 21:13:58.349: %LICENSE-6-INSTALL: Feature securityk9 1.0 was installed in this
device. UDI=ISR4331/K9:FDO1913151A; StoreIndex=3:Primary License Storage
*Jun 8 21:13:58.667: %LICENSE-6-INSTALL: Feature uck9 1.0 was installed in this device.
UDI=ISR4331/K9:FDO1913151A; StoreIndex=4:Primary License Storage
```

Step 2 Copy the start-up configuration file from the USB flash memory to the start-up configuration of the router.

Step 3 Copy the running configuration file from the USB flash memory to the running configuration of the router.

Step 4 Reload the router to enable all permanent licenses.

Examples

This example shows how to retrieve the configuration from the original flash memory.

```
Router# copy usb0:startup-config.cfg startup-config
Destination filename [startup-config]?
1469 bytes copied in 1.769 secs (830 bytes/sec)
Router#
Router# copy usb0:runing-config.cfg running-config
Destination filename [running-config]?
A system RELOAD is required before templating state change
1469 bytes copied in 0.153 secs (9601 bytes/sec)
```

Verifying the System

After upgrading the new flash memory, ensure that the system is restored by checking the start up and running configuration. In addition, check the retrieved licenses.

Examples

This example shows how to check the retrieved licenses.

```
Router# show license
Index 1 Feature: appxk9
Period left: Life time
License Type: Permanent
License State: Active, Not in Use
License Count: Non-Counted
License Priority: Medium
Index 2 Feature: uck9
Period left: Life time
License Type: Permanent
License State: Active, Not in Use
License Count: Non-Counted
License Priority: Medium
Index 3 Feature: securityk9
Period left: Life time
License Type: Permanent
License State: Active, Not in Use
License Count: Non-Counted
License Priority: Medium
Index 4 Feature: ipbasek9
Period left: Life time
License Type: Permanent
License State: Active, In Use
License Count: Non-Counted
License Priority: Medium
Index 5 Feature: cme-srst
Period left: Not Activated
Period Used: 0 minute 0 second
License Type: EvalRightToUse
License State: Active, Not in Use, EULA not accepted
License Count: 0/0 (In-use/Violation)
License Priority: None
Index 6 Feature: hseck9
Index 7 Feature: throughput
Period left: Not Activated
Period Used: 0 minute 0 second
License Type: EvalRightToUse
License State: Active, Not in Use, EULA not accepted
License Count: Non-Counted
License Priority: None
Index 8 Feature: internal_service
```

Additional References

The following sections provide references related to this function.

Related Documents

Related Topic	Document Title
Upgrading Field-Programmable Hardware Devices for Cisco 4000 Series ISRs	*http://www.cisco.com/c/en/us/td/docs/routers/access/4400/cpld/isr4400_hwfp.html*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html