RUCKUS FastIron Software Upgrade Guide, 08.0.90

Supporting FastIron Software Release 08.0.90

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Contacting RUCKUS Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their RUCKUS products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the RUCKUS Support Portal using https://support.ruckuswireless.com, or go to https://www.commscope.com/ruckus and select **Support**.

What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources, use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Requests for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, Central and South America, and Asia Pacific, toll-free numbers are available at https://support.ruckuswireless.com/contact-us and Live Chat is also available.
- Worldwide toll number for our support organization. Phone charges will apply: +1-650-265-0903

We suggest that you keep a physical note of the appropriate support number in case you have an entire network outage.

Self-Service Resources

The RUCKUS Support Portal at https://support.ruckuswireless.com offers a number of tools to help you to research and resolve problems with your RUCKUS products, including:

- Technical Documentation—https://support.ruckuswireless.com/documents
- Community Forums—https://community.ruckuswireless.com
- Knowledge Base Articles—https://support.ruckuswireless.com/answers
- Software Downloads and Release Notes—https://support.ruckuswireless.com/#products_grid
- Security Bulletins—https://support.ruckuswireless.com/security

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management.

Document Feedback

RUCKUS is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to RUCKUS at #Ruckus-Docs@commscope.com.

When contacting us, include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- RUCKUS SmartZone Upgrade Guide, Release 5.0
- Part number: 800-71850-001 Rev A
- Page 7

RUCKUS Product Documentation Resources

Visit the RUCKUS website to locate related documentation for your product and additional RUCKUS resources.

Release Notes and other user documentation are available at https://support.ruckuswireless.com/documents. You can locate the documentation by product or perform a text search. Access to Release Notes requires an active support contract and a RUCKUS Support Portal user account. Other technical documentation content is available without logging in to the RUCKUS Support Portal.

White papers, data sheets, and other product documentation are available at https://www.commscope.com/ruckus .

Online Training Resources

To access a variety of online RUCKUS training modules, including free introductory courses to wireless networking essentials, site surveys, and products, visit the RUCKUS Training Portal at https://commscopeuniversity.myabsorb.com/. The registration is a two-step process described in this video. You create a CommScope account and then register for, and request access for, CommScope University.

Document Conventions

The following table lists the text conventions that are used throughout this guide.

TABLE 1 Text Conventions

Convention	Description	Example
`monospace`	Identifies command syntax examples	`device(config)# interface ethernet 1/1/6`
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the **Start** menu, click **All Programs**.
italics	Publication titles	Refer to the *RUCKUS Small Cell Release Notes* for more information.

Notes, Cautions, and Safety Warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE
A NOTE provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

ATTENTION
An ATTENTION statement indicates some information that you must read before continuing with the current action or task.



CAUTION
A CAUTION statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



DANGER
A DANGER statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Command Syntax Conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
bold text	Identifies command names, keywords, and command options.
italic text	Identifies a variable.
[ ]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{**x**| **y**| **z**}	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x|**y**	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, *member*[*member*...].
\	Indicates a “soft” line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

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What's new in this document

TABLE 2 Summary of enhancements in FastIron release 08.0.90, February 1, 2023

Feature	Description	Location
Updates to address defects	Minor updates on content throughout to address defects.	All chapters.

TABLE 3 Summary of enhancements in FastIron release 08.0.90

Feature	Description	Location
Unified FastIron Image (UFI) support	A Unified FastIron Image (UFI), consisting of the application image, the boot code image and the signature file, can be downloaded in a single file. Beginning with FastIron 08.0.90, there will be primary and secondary partitions for the boot image. ICX switches running software versions pre-08.0.90 non-UFI would first need to upgrade to 08.0.80f non-UFI before upgrading to 08.0.90 UFI. Any new hardware platform starting from ICX 7850 will use only UFIs.	Refer to Software Mandatory Upgrade Steps from a Pre-08.0.90 Non-UFI Version to a 08.0.90 UFI Version on page 14 and Software Downgrade from a UFI to a Non-UFI Version on page 26.
Updates to address defects	Minor updates on content throughout to address defects.	All chapters.

Supported hardware

This guide supports the following RUCKUS products:

- RUCKUS ICX 7850 Series
- RUCKUS ICX 7750 Series
- RUCKUS ICX 7650 Series
- RUCKUS ICX 7450 Series
- RUCKUS ICX 7250 Series
- RUCKUS ICX 7150 Series

For information about what models and modules these devices support, see the hardware installation guide for the specific product family.

Software Upgrade and Downgrade

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Software Upgrade Procedure Overview

You can upgrade FastIron software in several ways: through a manual step-by-step process, through a manifest file, or through a Unified FastIron Image (UFI).

NOTE
Support is available for upgrades beginning with FastIron 08.0.0.

1. Preliminary checks. For any upgrade, follow the instructions in Initial Steps on page 11 to determine the current software versions, license requirements, and instructions on where to download the software.

   If configured, syslogs do not persist across reloads.

2. Upgrade the software. For a step-by-step upgrade, refer to Upgrade Process on page 13.

   NOTE
   For the FastIron 08.0.90 release, UFI image copy is the recommended software upgrade method for both standalone devices and traditional stacks.

   NOTE
   In the FastIron 08.0.90 release and later releases, all new hardware platforms, starting with ICX 7850 devices, support only UFI images for software upgrade.

   NOTE
   For a stack or a Campus Fabric (SPX) system, you can perform a full manual upgrade for each unit, or you can download the software as described in Upgrade Process on page 13 followed by an In-service software upgrade for the stack or SPX system as described in In-service Software Upgrade on page 41. Be sure to check ISSU Limitations and Considerations on page 41 before performing an In-service software upgrade.

Initial Steps

NOTE
You must upgrade to the boot code that supports the current release. Refer to "Image File Names" in the release notes for detailed information.

RUCKUS recommends that you always use the manifest file for any image upgrade or downgrade.

If you are upgrading from FastIron release 08.0.80 to release 08.0.90, RUCKUS recommends using SCP to transfer files.

Determining the Current Flash Image Version

To determine the current flash image version of the device, enter the **show flash** command at any level of the CLI.

The following **show flash** output is for releases prior to FastIron 08.0.90.

```
device# show flash
Stack unit 1:
  Compressed Pri Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Sec Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.06T215
  Code Flash Free Space = 1602994176
Stack unit 3:
  Compressed Pri Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Sec Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.06T215
  Code Flash Free Space = 1604464640
Stack unit 4:
  Compressed Pri Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Sec Code size = 31768772, Version:08.0.30T213 (SPR08030.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.06T215
  Code Flash Free Space = 1588183040
```

Determining the Current Flash and Boot Image Versions

To determine the current boot and flash image versions installed on a device, enter the **show version** command at any level of the CLI.

```
device# show version
  Copyright (c) 1996-2016 Brocade Communications Systems, Inc. All rights reserved.
    UNIT 3: compiled on Jan 21 2019 at 23:28:08 labeled as SPR08030
      (31768772 bytes) from Primary SPR08030.bin
        SW: Version 08.0.30T213
    UNIT 1: compiled on Jan 21 2019 at 23:28:08 labeled as SPR08030
      (31768772 bytes) from Primary SPR08030.bin
        SW: Version 08.0.30T213
    UNIT 4: compiled on Jan 21 2019 at 23:28:08 labeled as SPR08030
      (31768772 bytes) from Primary SPR08030.bin
        SW: Version 08.0.30T213
      Compressed Boot-Monitor Image size = 786944, Version:10.1.06T215 (spz10106)
  HW: Stackable ICX7450-48
  Internal USB: Serial #: 9900314061200173
      Vendor: ATP Electronics, Total size = 1919 MB
==========================================================================
UNIT 1: SL 1: ICX7450-48F 48-port Management Module
      Serial  #:CYS3333K006
      License: ICX7450_L3_SOFT_PACKAGE   (LID: eauIIIImFFL)
      License Compliance: ICX7450-PREM-LIC-SW is Compliant
.
.
The system : started=warm start   reloaded=by "reload"
My stack unit ID = 3, bootup role = active
```

Determining the Current Licenses Installed

Use the **show version** command to display the licenses installed on the device.

```
device# show version
!
!
UNIT 1: SL 1: ICX7450-48F 48-port Management Module
```

```
Serial #: CYS3333K006
License: ICX7450_L3_SOFT_PACKAGE (LID: eauIIIImFFL)
License Compliance: ICX7450-PREM-LIC-SW is Compliant
```

Obtaining Software Licenses

NOTE
For complete instructions on how to generate a license, refer to the *RUCKUS FastIron Software Licensing Guide*.

1. If required, generate a new license from the License Management page on the RUCKUS Support website. If you are upgrading to a different type of image that uses a different license from the one already installed on the device, generate a separate license file.
2. Download the required software images for the target release from the Software Downloads page on the RUCKUS Support website. For the list of software image files available for FastIron 08.0.xx, refer to the release notes for the specific release.

Upgrade Process

NOTE
Before upgrading the software on a RUCKUS ICX device, refer to Upgrade and Downgrade Limitations on page 34. For a stacking system, also refer to Changes to Upgrade and Downgrade for Stacking from FastIron Release 08.0.90 on page 36.

Software images for all RUCKUS ICX devices can be uploaded and downloaded between flash modules on the device and a TFTP, SCP, HTTPS, or USB module on the network.

RUCKUS ICX devices have two flash memory modules:

- Primary flash: The default local storage device for image files and configuration files.
- Secondary flash: A second flash storage device. You can use secondary flash to store redundant images for additional booting reliability or to preserve one software image while testing another one.

Only one flash device is active at a time. By default, the primary image becomes active when you reboot the device.

The following methods are available to upgrade your RUCKUS ICX device.

- Trivial File Transfer Protocol (TFTP): Use TFTP to copy an image from a TFTP server onto a flash module.
- Secure Copy Protocol (SCP): Use SCP to copy images to and from a host (recommended).
- Hypertext Transfer Protocol Secure (HTTPS): From FastIron release 08.0.80, you can use HTTPS, which requires a server that supports HTTP over TLS.
- Universal Serial Bus (USB): From FastIron release 08.0.30, you can use a USB device that contains the appropriate files and is connected to a standalone unit or the active controller in a stack.

  NOTE
  The USB storage format must be FAT32. The USB drive can be formatted from a host computer or from an ICX device. Copying the firmware or configuration files from a host computer to USB is straightforward, like copying any other file from a computer to USB.

Software Mandatory Upgrade Steps from a Pre-08.0.90 Non-UFI Version to a 08.0.90 UFI Version

Upgrading from a pre-08.0.90 non-UFI version to a FastIron 08.0.90 UFI version is a two-step upgrade process. For example, if you want to upgrade a device from FastIron 08.0.30 to FastIron 08.0.90, complete the following steps.

1. Download the 08.0.80f non-UFI using one of the transfer methods listed in Table 4, and reboot the device with the 08.0.80f image using the **boot system flash primary** command. The system uses the 08.0.80f image. Save the running configuration to startup configuration using the **write memory** command.

   NOTE
   The above step is mandatory as it migrates the configured Access Control list (ACL) configurations without sequence numbers to the new ACL format. The system will otherwise lose the previously configured ACL configuration without sequence numbers while upgrading from a pre-08.0.90 non-UFI version to a UFI version.

2. Copy the 08.0.90 UFI to the primary flash partition using the second step of the same method, and reboot the device again to obtain the 08.0.90 UFI.

   NOTE
   The **show version** command might display boot code mismatch message after performing the above upgrade step.

   Re-copy the 08.0.90 UFI to the primary and the secondary flash partition to avoid boot image mismatch.

TABLE 4 File Transfer Method and Commands Required

Transfer Method	Commands
TFTP	1a) device# copy tftp flash 10.176.220.51 SPR08080f.bin primary 1b) device# copy tftp flash 10.176.220.51 spz10114.bin bootrom and 2a) device# copy tftp flash 10.176.220.51 SPR08090ufi.bin primary 2b) device# copy tftp flash 10.176.220.51 SPR08090ufi.bin secondary or 1) device# copy tftp system-manifest 10.176.220.51 FI08080f_Manifest.txt all-images-primary 2a) device# copy tftp system-manifest 10.176.220.51 FI08090_Manifest.txt primary 2b) device# copy tftp system-manifest 10.176.220.51 FI08090_Manifest.txt secondary
SCP	1a) device# copy scp flash 10.176.132.13 SPR08080f.bin primary 1b) device# copy scp flash 10.176.132.13 spz10114.bin bootrom 2a) device# copy scp flash 10.176.132.13 SPR08090ufi.bin primary 2b) device# copy scp flash 10.176.132.13 SPR08090ufi.bin secondary
HTTPS [FastIron 08.0.80 and later]	1a) device# copy https flash 10.176.132.132 SPR08080f.bin primary 1b) device# copy https flash 10.176.132.132 spz10114.bin bootrom 2a) device# copy https flash 10.176.132.132 SPR08090ufi.bin primary 2b) device# copy https flash 10.176.132.132 SPR08090ufi.bin secondary
USB	1a) device# copy disk0 flash SPR08080f.bin primary 1b) device# copy disk0 flash spz10114.bin bootrom 2a) device# copy disk0 flash SPR08090ufi.bin primary 2b) device# copy disk0 flash SPR08090ufi.bin secondary

Loading the Flash Code using TFTP

1. a. Copy the 08.0.80f non-UFI from the TFTP server into flash memory using the **copy tftp flash** command.

```
ICX7250-48 Router# copy tftp flash 10.176.220.51 SPR08080f.bin primary
Load to buffer (8192 bytes per dot)
.....................................................................
.....................................................................
TFTP to Flash Done.
```

b. Copy the bootrom images using the following command.

```
ICX7250-48 Router# copy tftp flash 10.176.220.51 spz10114.bin bootrom
Load to buffer (8192 bytes per dot)
.....................
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(65536 bytes per dot)...
............
TFTP to Flash Done.
```

c. Enter the **show flash** command to verify the image and uboot files have been installed in the primary partition flash.

```
ICX7250-48 Router# show flash
Stack unit 1:
  Compressed Pri Code size = 29826604, Version:08.0.80fT213 (SPR08080f.bin)
  Compressed Sec Code size = 31760580, Version:08.0.30rT213 (SPR08030r.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.14T215
  Code Flash Free Space = 1710112768
```

d. Reboot the device with the 08.0.80f image using the **boot system** command.

NOTE

Use the **boot system flash primary** command to boot the image from the primary flash memory.

```
ICX7250-48 Router# boot system flash primary
```

e. Enter the **show version** command to display the flash image running on the device.

```
ICX7250-48 Router# show version
Copyright (c) 2017 Ruckus Wireless, Inc. All rights reserved.
    UNIT 1: compiled on Apr  6 2020 at 22:40:21 labeled as SPR08080f
      (29829112 bytes) from Primary SPR08080f.bin
        SW: Version 08.0.80fT213
      Compressed Boot-Monitor Image size = 786944, Version:10.1.14T215 (spz10114)
       Compiled on Thu Nov 15 12:59:16 2018

  HW: Stackable ICX7250-48
==========================================================================
UNIT 1: SL 1: ICX7250-48 48-port Management Module
      Serial  #:DUJ3851L0CL
      Software Package: ICX7250_L3_SOFT_PACKAGE   (LID: fwlINKGnFen)
      Current License: l3-prem-8X10G
      P-ASIC  0: type B344, rev 01  Chip BCM56344_A0
==========================================================================
UNIT 1: SL 2: ICX7250-SFP-Plus 8-port 80G Module
==========================================================================
1000 MHz ARM processor ARMv7 88 MHz bus
8192 KB boot flash memory
2048 MB code flash memory
2048 MB DRAM
STACKID 1  system uptime is 2 minute(s) 41 second(s)
The system started at 04:27:55 GMT+00 Wed Jul 29 2020

The system : started=warm start   reloaded=by "reload"
```

2. a. Copy the 08.0.90 UFI from the TFTP server into flash memory using the **copy tftp flash** command.

```
ICX7250-48 Router# copy tftp flash 10.176.220.51 SPR08090ufi.bin primary

Load to buffer (8192 bytes per dot)
.....................................................
.....................................................
Processing the bundle image...
Flashing application image to Primary partition...

SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(65536 bytes per dot)...
.....................................................
Flashing bootrom image...

SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(65536 bytes per dot)...
............
Post processing bundle image...
Bundle image processed successfully
```

b. Save the running configuration to startup configuration using the **write memory** command.

```
ICX7250-48 Router# write memory
```

c. Reboot the device with the 08.0.90 UFI image using the **boot system flash primary** command.

```
ICX7250-48 Router# boot system flash primary
```

NOTE
The system does not support full functionality such as third-party packages (DHCPv6, HTTP, Python, and so on.) without a UFI update. If you stop the upgrade process after the reboot without downloading the UFI, the following warning message is displayed on the console.

```
WARNING: FI image is not booted from UFI. Please download UFI image and reboot the system for
 full functionality.
```

NOTE
The **show version** command might display boot code mismatch message after performing the above upgrade.

d. Re-copy the 08.0.90 UFI to the secondary flash partition to avoid boot image mismatch.

```
ICX7250-48 Router# copy tftp flash 10.176.220.51 SPR08090ufi.bin secondary

Load to buffer (8192 bytes per dot)
.....................................................
.....................................................
Processing the bundle image...
Flashing application image to Secondary partition...
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(65536 bytes per dot)...
.....................................................................................
Flashing bootrom image...

SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(65536 bytes per dot)...
............
Post processing bundle image...
Bundle image processed successfully
```

e. Enter the **show version** command to display the flash image running on the device.

```
ICX7250-48 Router# show version

Copyright (c) Ruckus Networks, Inc. All rights reserved.
    UNIT 1: compiled on Jul 20 2020 at 22:56:24 labeled as SPR08090_B16
      (32947884 bytes) from Primary SPR08090_B16.bin (UFI)
        SW: Version 08.0.90_B16T213
      Compressed Primary Boot Code size = 786944, Version:10.1.18T215 (spz10118)
       Compiled on Mon Jul 13 08:53:15 2020
```

```
  HW: Stackable ICX7250-48
==========================================================================
UNIT 1: SL 1: ICX7250-48 48-port Management Module
      Serial  #:DUJ3851L0CL
      Software Package: ICX7250_L3_SOFT_PACKAGE   (LID: fwlINKGnFen)
      Current License: l3-prem-8X10G
      P-ASIC  0: type B344, rev 01  Chip BCM56344_A0
==========================================================================
UNIT 1: SL 2: ICX7250-SFP-Plus 8-port 80G Module
==========================================================================
1000 MHz ARM processor ARMv7 88 MHz bus
    8 MB boot flash memory
    2 GB code flash memory
    2 GB DRAM
STACKID 1  system uptime is 1 minute(s) 49 second(s)
The system started at 04:41:32 GMT+00 Wed Jul 29 2020

The system : started=warm start   reloaded=by "reload"
```

f. Enter the **show flash** command to verify the image and uboot files.

```
ICX7250-48 Router# show flash
Stack unit 1:
  Compressed Pri Code size = 32947884, Version:08.0.90T213 (SPR08090_B16.bin)
  Compressed Sec Code size = 32947884, Version:08.0.90T213 (SPR08090_B16.bin)
  Compressed Pri Boot Code size = 786944, Version:10.1.18T215 (spz10118)
  Compressed Sec Boot Code size = 786944, Version:10.1.14T215 (spz10114)
  Code Flash Free Space = 1613893632
```

When upgrading the flash image version, the image is automatically updated across all stack units. When upgrading from one major release to another (for example, from FastIron 08.0.30 to FastIron 08.0.40), make sure that every unit in the traditional stack has the same major code version. If you reboot the stack while units are running different code versions, the units cannot communicate.

Loading the Flash Code Using Manifest Method

1. a. Copy the 08.0.80f non-UFI from the TFTP server into flash memory using the **copy tftp system** command.

```
ICX7450-48P Router# copy tftp system 10.176.220.51 FI08080f_Manifest.txt all-images-primary

You are about to download boot image and boot signature image as well,
ARE YOU SURE?(enter 'y' or 'n'): Error: Enter y/n  or Y/N for confirmation
Y
ICX7450-48P Router#Flash Memory Write (8192 bytes per dot)
ICX7450-48P Router#
DOWNLOADING MANIFEST FILE   Done.
ICX7450-48P Router#Flash Memory Write (8192 bytes per dot)
Automatic copy to member units:  3
COPY ICX7450 SIGNATURE TFTP to Flash Done
ICX7450-48P Router#Load to buffer (8192 bytes per dot)
Automatic copy to member units:  3
................................................................................
................................................................................
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot).............
................................................................................
Copy ICX7450 from TFTP to Flash Done.
ICX7450-48P Router#Flash Memory Write (8192 bytes per dot)
Automatic copy to member units:  3
Local flash access is going on, please try later
Download request from active unit 3 mac = 609c.9fc7.28d0
DOWNLOAD OF ICX7450 BOOT SIGNATURE  Done.
ICX7450-48P Router#Load to buffer (8192 bytes per dot)
Automatic copy to member units:  3
.....................................................................
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
................................................................................
ICX7450 Boot IMAGE COPY IS DONE
Manifest image download is complete, please reload the system.
```

b. Enter the **show flash** command to verify the image and uboot files have been installed in the primary partition flash.

```
ICX7450-48P Router# show flash

Stack unit 2:
  Compressed Pri Code size = 29826604, Version:08.0.80fT213 (SPR08080f.bin)
  Compressed Sec Code size = 31760580, Version:08.0.30rT213 (SPR08030r.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.14T215
  Code Flash Free Space = 1710112768
Stack unit 3:
  Compressed Pri Code size = 29826604, Version:08.0.80fT213 (SPR08080f.bin)
  Compressed Sec Code size = 31760580, Version:08.0.30rT213 (SPR08030r.bin)
  Compressed Boot-Monitor Image size = 786944, Version:10.1.14T215
  Code Flash Free Space = 1732276224
```

c. Reboot the device with the 08.0.80f image using the **boot system** command.

> **NOTE**
> Use the **boot system flash primary** command to boot the image from the primary flash memory.

```
ICX7450-48P Router# boot system flash primary
```

d. Enter the **show version** command to display the flash image running on the device.

```
ICX7450-48P Router# show version

Copyright (c) 2017 Ruckus Wireless, Inc. All rights reserved.
UNIT 2: compiled on Apr  9 2019 at 03:20:17 labeled as SPR08080f
      (29826604 bytes) from Primary SPR08080f.bin
        SW: Version 08.0.80fT213
      Compressed Boot-Monitor Image size = 786944, Version:10.1.14T215 (spz10114)
       Compiled on Thu Nov 15 12:59:16 2018

  HW: Stackable ICX7450-48-HPOE
```

```
  Internal USB: Serial #: 9900314071600059
      Vendor: ATP Electronics, Total size = 1919 MB
==========================================================================
UNIT 2: SL 1: ICX7450-48P POE 48-port Management Module
      Serial  #:CYR3333K01E
      Software Package: ICX7450_BASE_L3_SOFT_PACKAGE   (LID: eatIIIImFGg)
      Current License: l3-base-macsec
      P-ASIC  2: type B548, rev 01  Chip BCM56548_A0
==========================================================================
UNIT 2: SL 2: ICX7400-4X1GF 4-port 4G Module
      Serial  #:CYY3323K004
1000 MHz ARM processor ARMv7 88 MHz bus
8192 KB boot flash memory
2048 MB code flash memory
2048 MB DRAM
STACKID 2  system uptime is 1 minute(s) 17 second(s)
The system started at 13:25:22 GMT+00 Tue Sep 10 2019
The system : started=warm start   reloaded=by "reload"
My stack unit ID = 2, bootup role = active
```

2. a. Copy the 08.0.90 UFI from the TFTP server into flash memory using the **copy tftp system** command.

```
ICX7450-48P Router# copy tftp system 10.176.220.51 FI08090_Manifest.txt primary

You are about to download boot image and boot signature image as well, ARE YOU SURE?
(enter 'y' or 'n'): y

ICX7450-48P Router# Flash Memory Write (8192 bytes per dot)
DOWNLOADING MANIFEST FILE   Done.
SYSLOG: <14> Sep 10 13:32:07 MANIFEST_FILE_DOWNLOAD_DONE
Manifest upgrade in progress...

SYSLOG: <14> Sep 10 13:32:07 Different Flash-image filenames detected between flash-image
spr08080f.bin
and requested flash-image spr08090ufi.bin
SYSLOG: <14> Sep 10 13:32:07 Different boot-image filenames detected between boot-image spz10114.bin
and requested boot-image spz10115.bin

ICX7450-48P Router#Flash Memory Write (8192 bytes per dot)
Automatic copy to member units:  3
COPY ICX7450 SIGNATURE TFTP to Flash Done
SYSLOG: <14> Sep 10 13:32:07 ICX7450_SIG_COPY_DONE
ICX7450-48P Router#Load to buffer (8192 bytes per
dot).............................................
Automatic copy to member units:  3
SYSLOG: <14> Sep 10 13:32:07 COPY IMAGE TO FLASH START…….
Processing the bundle image.....................................................................
.....................................................................................................
Flashing application image to Primary partition..................................................
SYSLOG: <14> Sep 10 13:33:09 COPY APPLICATION IMAGE FROM BUNDLE START
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot).............
.....................................................................................................
Flashing bootrom image...
SYSLOG: <14> Sep 10 13:35:12 COPY BOOTROM IMAGE FROM BUNDLE START
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot).............
.....................................................................................................
Post processing bundle image....................................................................
Bundle image processed successfully

ICX7450-48P Router#
SYSLOG: <14> Sep 10 13:35:22 COPY  BUNDLE IMAGE COMPLETED
Copy ICX7450 from TFTP to Flash Done
Manifest file upgrade done, please reload the system
Copying the downloaded/created manifest file from ramfs to flash...
SYSLOG: <14> Sep 10 13:35:22 ICX7450_IMAGE_COPY_DONE
SYSLOG: <14> Sep 10 13:35:22 MANIFEST_COPY_DONE
ICX7450-48P Router#.
Copy Done.
```

b. Save the running configuration to startup configuration using the **write memory** command.

```
ICX7450-48P Router# write memory
```

c. Reboot the device with the 08.0.90 UFI image using the **boot system flash primary** command.

```
ICX7450-48P Router# boot system flash primary

ICX7450-48P Router# show flash

Stack unit 2:
  Compressed Pri Code size = 32536860, Version:08.0.90T213 (SPR08090.bin)
  Compressed Sec Code size = 31760580, Version:08.0.30rT213 (SPR08030r.bin)
  Compressed Pri Boot Code size = 786944, Version:10.1.15T215 (spz10115)
 Compressed Sec Boot Code size = 786944, Version:10.1.14T215 (spz10114)
  Code Flash Free Space = 1668575232

Stack unit 3:
  Compressed Pri Code size = 32536860, Version:08.0.90T213 (SPR08090.bin)
  Compressed Sec Code size = 31760580, Version:08.0.30rT213 (SPR08030r.bin)
  Compressed Pri Boot Code size = 786944, Version:10.1.15T215
  Compressed Sec Boot Code size = 786944, Version:10.1.14T215
```

```
  Code Flash Free Space = 1679028224
```

NOTE

The system does not support full functionality such as third-party packages (DHCPv6, HTTP, Python, and so on.) without a UFI update. If you stop the upgrade process after the reboot without downloading the UFI, the following warning message is displayed on the console.

```
WARNING: FI image is not booted from UFI. Please download UFI image and reboot the system for
 full functionality.
```

NOTE

The **show version** command might display boot code mismatch message after performing the above upgrade.

d. Re-copy the 08.0.90 UFI to the secondary flash partition to avoid boot image mismatch.

```
ICX7450-48P Router# copy tftp system-manifest 10.176.220.51 FI08090_Manifest.txt secondary
```

e. Enter the **show version** command to display the flash image running on the device.

```
ICX7450-48P Router# show version

Copyright (c) Ruckus Networks, Inc. All rights reserved.
    UNIT 2: compiled on Aug 28 2019 at 13:38:53 labeled as SPR08090
      (32536860 bytes) from Primary SPR08090.bin (UFI) <--- UFI label
        SW: Version 08.0.90T213
      Compressed Secondary Boot Code size = 786944, Version:10.1.15T215 (spz10115)
       Compiled on Thu Jan 31 07:08:44 2019
    UNIT 3: compiled on Aug 28 2019 at 13:38:53 labeled as SPR08090
      (32536860 bytes) from Primary SPR08090.bin (UFI)
        SW: Version 08.0.90T213
      Compressed Primary Boot Code size = 786944, Version:10.1.15T215 (spz10115)

  HW: Stackable ICX7450-48-HPOE
  Internal USB: Serial #: 9900314071600059
      Vendor: ATP Electronics, Total size = 1919 MB
==========================================================================
UNIT 2: SL 1: ICX7450-48P POE 48-port Management Module
      Serial  #:CYR3333K01E
      Software Package: ICX7450_BASE_L3_SOFT_PACKAGE   (LID: eatIIIImFGg)
      Current License: l3-base-macsec
      P-ASIC  2: type B548, rev 01  Chip BCM56548_A0
==========================================================================
UNIT 2: SL 2: ICX7400-4X1GF 4-port 4G Module
      Serial  #:CYY3323K004
==========================================================================
UNIT 2: SL 3: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3332K07A
==========================================================================
UNIT 2: SL 4: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3332K07D
==========================================================================
UNIT 3: SL 1: ICX7450-48F 48-port Management Module
      Serial  #:CYS3315N03F
      Software Package: ICX7450_BASE_L3_SOFT_PACKAGE   (LID: eauIIGKpFIh)
      Current License: l3-base
==========================================================================
UNIT 3: SL 2: ICX7400-4X10GF 4-port 40G Module
      Serial  #:CYV3352M0CR
==========================================================================
UNIT 3: SL 3: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3313N0G5
==========================================================================
UNIT 3: SL 4: ICX7400-1X40GQ 1-port 40G Module
      Serial  #:CYX3315N09J
==========================================================================
1000 MHz ARM processor ARMv7 88 MHz bus
```

```
8192 KB boot flash memory
2048 MB code flash memory
 2048 MB DRAM
STACKID 2  system uptime is 7 minute(s) 35 second(s)
STACKID 3  system uptime is 7 minute(s) 32 second(s)
The system started at 22:59:32 GMT+00 Mon Sep 16 2019

The system : started=warm start   reloaded=by "reload"
My stack unit ID = 2, bootup role = active
```

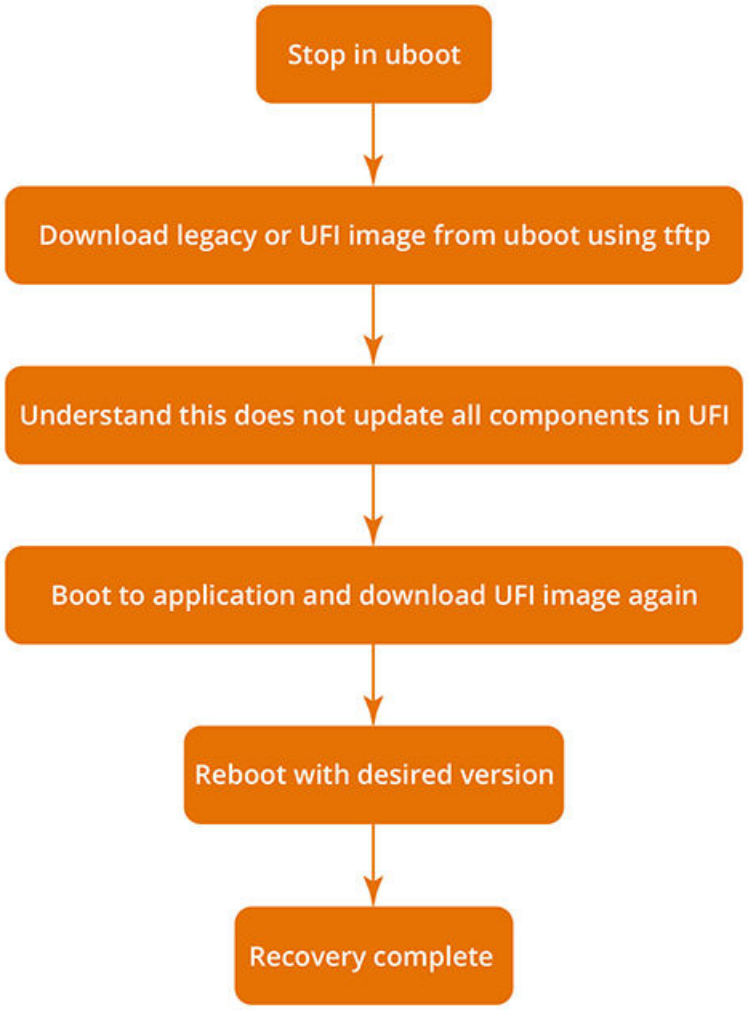
When upgrading the flash image version, the image is automatically updated across all stack units. When upgrading from one major release to another (for example, from FastIron 08.0.30 to FastIron 08.0.40), make sure that every unit in the traditional stack has the same major code version. If you reboot the stack while units are running different code versions, the units cannot communicate.

Recovery procedure

Follow the below steps, when the application fails to boot from both the primary/secondary partitions.

1. Stop at uboot prompt using the console.
2. From uboot prompt, update the UFI for ICX 7850, or legacy image for all other ICX 7K platforms.
   - This step updates the uboot and application only.
   - Other UFI components cannot be updated from the uboot.
3. Boot to FastIron application image and download UFI again.
4. Reboot with the desired version.

FIGURE 1 Recovery procedure



NOTE
For ICX 7150 devices, new CPLD was released in Fastiron 08.0.61 release. If the ICX 7150 device is not running the new CPLD, additional reload is required during the upgrade procedure.

NOTE
For 4K VLAN support in system max configuration, an additional automatic reload occurs for non-active stack units.

Loading the Flash Code Using SCP

The new flash code must be placed on an SCP-enabled host to which the RUCKUS ICX device has access.

NOTE
Copying the manifest file using SCP is not supported.

1. a. Copy the flash code from the SCP-enabled host into the flash memory.

```
ICX7450-48P Router# copy scp flash 10.176.132.13 SPR08080f.bin primary

User name:root
Password:
Connecting to remote host......

Receiving data (8192 bytes per dot)
................................
Automatic copy to member units:  1  4
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
Image copy completed
Primary Image file downloaded successfully.
SCP transfer to device completed
Outbound Connection Closed
```

b. Copy the flash code to bootrom.

```
ICX7450-48P Router# copy scp flash 10.176.132.13 spz10114.bin bootrom

User name:root
Password:
Connecting to remote host......

Receiving data (8192 bytes per dot)
.....................................................
Automatic copy to member units:  1  4
.....................................................................................................

SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...

Image copy completed
.....................................................................................
Done.
SCP transfer to device completed
Connection Closed
```

c. Save the running configuration to startup configuration using the **write memory** command.

```
ICX7450-48P Router# write memory
```

2. a. Reload the device and then immediately upgrade to the UFI.

```
ICX7450-48P Router# boot system flash primary
```

b. Re-copy the 08.0.90 UFI to the primary and the secondary flash partition to avoid boot image mismatch.

```
ICX7450-48P Router# copy scp flash 10.176.132.13 SPR08090ufi.bin primary
User name:root
Password:
Connecting to remote host......

Receiving data (8192 bytes per dot)
Image copy completed

ICX7450-48P Router# copy scp flash 10.176.132.13 SPR08090ufi.bin secondary
```

Copying SCP from external device to ICX for UFI images

The following example copies a UFI image signature file from the SCP server to the primary flash memory.

```
root@ubuntu:~# scp SPR08090ufi.sig sshtestuser@10.176.16.18:file:primary_ufi.sig
```

The following example copies a UFI image file from the SCP server to the primary flash memory.

```
root@ubuntu:~# scp SPR08090ufi.bin sshtestuser@10.176.16.18:flash:pri:SPR08090ufi.bin
```

The following example copies a UFI image signature file from the SCP server to the secondary flash memory.

```
root@ubuntu:~# scp SPR08090ufi.sig sshtestuser@10.176.16.18:file:secondary_ufi.sig
```

The following example copies a UFI image file from the SCP server to the secondary flash memory.

```
root@ubuntu:~# scp SPR08090ufi.bin sshtestuser@10.176.16.18:flash:sec:SPR08090ufi.bin
```

Loading the Flash Code Using HTTPS

The HTTPS method for loading flash code is available for FastIron 08.0.80 and later releases.

1. a. Copy the flash code from the HTTPS to flash memory.

   ```
   ICX7450-48P Router# copy https flash 10.176.132.132 SPR08080f.bin primary
   ```

   b. Copy the flash code to bootrom.

   ```
   ICX7450-48P Router# copy https flash 10.176.132.132 spz10114.bin bootrom
   ```

   c. Save the running configuration to startup configuration using the **write memory** command.

   ```
   ICX7450-48P Router# write memory
   ```

2. a. Reload the ICX device and then perform the UFI upgrade.

   ```
   ICX7450-48P Router# boot system flash primary
   ```

   c. Re-copy the 08.0.90 UFI to the primary partition and the secondary flash partition to avoid boot image mismatch.

   ```
   ICX7450-48P Router# copy https flash 10.176.132.132 SPR08090ufi.bin primary

   ICX7450-48P Router# copy https flash 10.176.132.132 SPR08090ufi.bin secondary
   ```

Loading the Flash Code Using USB

1. a. Copy the application image and the boot image to the flash from the USB.

   ```
   ICX7450-48P Router# copy disk0 flash SPR08080f.bin primary
   ICX7450-48P Router# copy disk0 flash spz10114.bin bootrom
   ```

   b. Save the running configuration to startup configuration using the **write memory** command.

   ```
   ICX7450-48P Router# write memory
   ```

2. a. Reload the device and immediately perform a UFI upgrade.

   ```
   ICX7450-48P Router# boot system flash primary
   ```

   b. Re-copy the 08.0.90 UFI to the primary and the secondary flash partition to avoid boot image mismatch.

   ```
   ICX7450-48P Router# copy disk0 flash SPR08090ufi.bin primary

   ICX7450-48P Router# copy disk0 flash SPR08090ufi.bin secondary
   ```

   c. Enter the **show version** command to verify that the UFI image has loaded successfully.

Software Downgrade from a UFI to a Non-UFI Version

It is recommended that you copy the running configuration to a file before downgrading. You can do this using the copy running-config command to copy the configuration to different locations such as a USB disk file or a tftp server, or you can simply enter the show running-config command and then copy the output and paste it into a computer file.

If you don't have a pre-08090-startup-backup file (which can be checked with the show pre-8090-startup-backup command), or you have many configuration changes to the 08.0.90 release or a later release and you need to downgrade to a pre-08.0.90 release, you must manually edit the 08.0.90 configuration to create a pre-08.0.90 format.

Every unit, including a stack member, has a startup-config file, and every unit renames the startup-config as the backup file when the write memory command is used. If you no longer need the pre-8090-startup-backup file, you can delete it using the erase pre-8090-startup-backup command. This command erases the pre-8090-startup-backup file in every unit in the stacking system. You may no longer need the older backup file if you are certain you will not have to downgrade the system or if you have made many configuration changes with the FastIron 08.0.90 or later release installed, making the backup file obsolete.

RUCKUS recommends downgrading to earlier releases using a manifest download.

NOTE
Reboot the device using the **boot system** command only. When a system running FastIron 08.0.90 detects that it is about to reload to a pre-08.0.90 release, the system tries to recover the backup file. A message is displayed asking for confirmation before recovering the file with a warning that all changes made with the current release will be lost.

```
Warning! the startup-config is 8.0.90 or later, but you are reloading to a pre-8090 image. There is
no pre-8090-startup-backup file. Reloading to pre-8090 image may lose some stack-port/trunk
configurations due to 8090 format changes.
```

When a system is upgraded to FastIron 08.0.90 or later and then downgraded to a pre-08.0.90 release, the results of the downgrade differ, depending on the situation. The following cases describe specific situations and the expected results. The scenarios in the following tables apply to a standalone unit or a stack.

TABLE 5 Downgrade Scenarios

Situation	Result
The user never uses a **write memory** command when running FastIron 08.0.90.	The downgrade is seamless.
The user does not change any configuration but uses the **write memory** command when running FastIron 08.0.90.	The downgrade is fine. The system recovers the backup file before reloading to a pre-08.0.90 release.
The user makes configuration changes while running FastIron 08.0.90 and uses the **write memory** command.	The downgrade loses all configuration changes made under FastIron 08.0.90. The system recovers the backup file that does not contain the changes.

TABLE 6 Scenarios where Downgrades Cannot Be Performed

Situation	Result
The user reloads the system by powering down.	The system cannot recover the backup file before reloading.
The standalone or active controller does not have a startup-config flash file generated by any pre-08.0.90 release.	Downgrade is not possible.

The following sections provide examples of manifest downloads using TFTP and SCP.

NOTE
RUCKUS does not recommend using the application image download.

Downgrade from a UFI to a Non-UFI Version Using TFTP

The following example uses TFTP to downgrade from FastIron release 08.0.90 to FastIron release 08.0.70e.

1. Enter the **show version** command to confirm the active image version.

```
ICX7650-48P Router# show  version
  Copyright (c) Ruckus Networks, Inc. All rights reserved.
    UNIT 1: compiled on Feb  7 2019 at 17:14:15 labeled as TNR08090
      (61202340 bytes) from Primary TNR08090.bin (UFI)
        SW: Version 08.0.90T233
      Compressed Primary Boot Code size = 1573376, Version:10.1.15T235 (tnu10115)
       Compiled on Thu Jan 31 07:09:04 2019

  HW: Stackable ICX7650-48-HPOE
==============================================================================
UNIT 1: SL 1: ICX7650-48P-L3-PREM POE 48-port Management Module
      Serial  #:EZD3324N03R
      Software Package: ICX7650_BASE_L3_SOFT_PACKAGE   (LID: gbfIIHJpFIt)
      Current License: l3-base
      P-ASIC  0: type B567, rev 11  Chip BCM56567_B0
==============================================================================
UNIT 1: SL 2: ICX7600-2X40GQ 2-port 80G Module
      Serial  #:EZG3320N0AX
==============================================================================
UNIT 1: SL 3: ICX7650-2X100G 2-port 200G Module
==============================================================================
 2000 MHz ARM processor ARMv8 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
 3910 MB DRAM
STACKID 1  system uptime is 4 day(s) 3 hour(s) 57 minute(s) 39 second(s)
The system started at 18:24:43 GMT+00 Mon Jan 17 2000

The system : started=warm start   reloaded=by "reload"
```

2. Copy the FastIron 08.0.70 images to flash using the manifest file.

```
ICX7650-48P Router# copy tftp  system-manifest FI08070_Manifest.txt primary
ICX7650-48P Router#Flash Memory Write (8192 bytes per dot)
DOWNLOADING MANIFEST FILE   Done.

Manifest upgrade in progress...
ICX7650-48P Router#Flash Memory Write (8192 bytes per dot)

COPY ICX7650 SIGNATURE TFTP to Flash Done
 ICX7650-48P Router#Load to buffer (8192 bytes per dot)
.....................................................................................................
.....................................................
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
.....................................................................................................
..................................................................................... Copy
ICX7650 from TFTP to Flash Done.
ICX7650-48P Router#Flash Memory Write (8192 bytes per dot)
....
DOWNLOAD OF ICX7650 BOOT SIGNATURE  Done.
ICX7650-48P Router#
 !!! Downloading this  boot image can result in application-boot image mismatch. Please use UFI
image.
Load to buffer (8192 bytes per dot)
............
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
.....................................................................................................
.....................................................................................
ICX7650 Boot IMAGE COPY IS DONE

  Manifest image download is complete, please reload the system
 Copying the downloaded/created manifest file from ramfs to flash...
Copy Done.
```

3. Enter the **show flash** command to confirm the loaded version.

```
ICX7650-48P Router# show flash
Stack unit 1:
  Compressed Pri Code size = 56630696, Version:08.0.70eT233 (TNR08070e.bin)
  Compressed Sec Code size = 61191868, Version:08.0.90T233 (TNR08090.bin)
  Compressed Pri Boot Code size = 1573376, Version:10.1.14T235 (tnu10114)
  Compressed Sec Boot Code size = 1573376, Version:10.1.15T235 (tnu10115b5)
  Code Flash Free Space = 2725548032
```

4. Reload the device.

```
ICX7650-48P Router# boot system flash primary
```

5. Enter the **show version** command to confirm the loaded version.

```
ICX7650-48P Router# show version
  Copyright (c) 2017 Ruckus Wireless, Inc. All rights reserved.
    UNIT 1: compiled on Jan 22 2019 at 04:42:38 labeled as TNR08070e
      (56630696 bytes) from Primary TNR08070e.bin
        SW: Version 08.0.70eT233
      Compressed Boot-Monitor Image size = 1573376, Version:10.1.14T235 (tnu10114)
       Compiled on Thu Nov 15 07:40:46 2018

  HW: Stackable ICX7650-48-HPOE
==========================================================================
UNIT 1: SL 1: ICX7650-48P-L3-BASE POE 48-port Management Module
      Serial  #:EZD3324N03R
      License: ICX7650_BASE_L3_SOFT_PACKAGE   (LID: gbfIIHJpFIt)
      P-ASIC  0: type B567, rev 11  Chip BCM56567_B0
==========================================================================
UNIT 1: SL 2: ICX7600-2X40GQ 2-port 80G Module
      Serial  #:EZG3320N0AX
==========================================================================
UNIT 1: SL 3: ICX7650-2X100G 2-port 200G Module
==========================================================================
 2000 MHz ARM processor ARMv8 88 MHz bus
 8192 KB boot flash memory
 2048 MB code flash memory
 3911 MB DRAM
STACKID 1  system uptime is 1 minute(s) 59 second(s)
The system started at 22:09:22 GMT+00 Fri Jan 21 2000

The system : started=warm start   reloaded=by "reload"
```

Downgrade from a UFI to a Non-UFI Version Using SCP

When TFTP is not available or a secure download is required, you can download FastIron images using SCP.

NOTE

If you downgrade from FastIron release 08.0.90 to a previous release using SCP, boot image download using SCP is not possible. Once the ICX device has booted from the previous image, you must download the boot image again separately.

The following example downgrades from FastIron 08.0.90 images to 08.0.70e images using SCP.

1. Copy the application image to flash using SCP.

```
ICX7650-48F Router# copy scp flash 10.176.132.13 TNR08070e.bin primary
User name:root
Password:
Connecting to remote host......

Receiving data (8192 bytes per dot)
.....................................................................................................
.....................................................................................................
.....................................................................
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
.....................................................................................................
.....................................................................................................
.................
Primary Image file downloaded successfully.

SCP transfer to device completed

Outbound Connection Closed
```

2. Enter the **show flash** command to check for the installed image.

```
ICX7650-48F Router# show flash
Stack unit 1:
  Compressed Pri Code size = 56630696, Version:08.0.70eT233 (TNR08070e.bin)
  Compressed Sec Code size = 56623412, Version:08.0.70eT233 (TNR08070e.bin)
  Compressed Pri Boot Code size = 1573376, Version:10.1.15T235 (tnu10115)
  Compressed Sec Boot Code size = 1573376, Version:10.1.15T235 (tnu10115b5)
  Code Flash Free Space = 2728226816
```

3. Reload the ICX device.

```
ICX7650-48 Router# boot system flash primary
```

4. Copy the boot image to flash using SCP.

```
ICX7650-48F Router# copy scp flash 10.176.132.13 tnu10114.bin bootrom
User name:root
Password:
Connecting to remote host......

Receiving data (8192 bytes per dot)
.....................................................................................................
.....................................................................................................
...........
SYNCING IMAGE TO FLASH. DO NOT SWITCH OVER OR POWER DOWN THE UNIT(8192 bytes per dot)...
.....................................................................................................
.....................................................................................
Done.


SCP transfer to device completed

Outbound Connection Closed
```

5. Reload the ICX device.

```
ICX7650-48 Router# boot system flash primary
```

Reverting to the Old Image

Once the upgrade is completed, the primary partition has the new image, and the secondary partition has the older image. You can use the following steps to move the stack back to the older image.

1. Move the older image from the secondary partition to the primary partition.
   - For a traditional stack, use the following command.

     ```
     device# copy flash flash primary
     ```

   - For an SPX system, use the following command for CB units.

     ```
     device# copy flash flash primary
     ```

   - For an SPX system, use the following command for PE units.

     ```
     device# copy tftp flash server-ip file-name primary
     ```

2. Confirm that the proper image has been reloaded on all units.
3. Reboot the system from the primary flash image.

   ```
   device# boot system flash primary
   ```

Image download using USB

Beginning with FastIron 08.0.90, the system can be upgraded by downloading the manifest file in the USB drive.

NOTE
The USB storage format must be FAT32. The USB drive can be formatted from a host computer or from an ICX device. Copying the firmware or configuration files from a host computer to USB is straightforward, like copying any other file from a computer to USB.

When TFTP server access is not available, you can use the manifest file in the USB to download the images of a system. Manifest image download using USB is not supported for 08.0.80 and earlier releases. In earlier releases, USB image download was supported for standalone systems only. Beginning with FastIron 08.0.90, the USB image download feature is extended to both Stacking and Campus Fabric (SPX) system. USB image download is supported on all ICX 7K hardware platforms.

The following actions must be performed to initiate the upgrade using the USB drive.

1. Plug in a valid USB drive (USB2 drives and backward-compatible USB3 drives) with the appropriate pre-loaded manifest files to the system.
2. Reload the unit with the USB drive plugged in.

NOTE
USB image download is not supported in FIPS mode.

Software upgrade using USB is not triggered in the following scenarios:

- If the USB drive is not detected during the bootup.
- When the USB drive is corrupted, not accessible, unmountable, or if there is no valid file system in the USB drive.
- If there is an existing configuration file in the system.

NOTE
The configuration file must be deleted from the system using the **erase startup-configuration** command. Image download using USB is not triggered if there is a configuration file in the system.

When the image is successfully copied and upgraded, the system automatically reloads. On boot up, the system copies the configuration file from the USB drive. Then the system reloads with the updated image and the new configuration. If there are multiple configuration files in the USB drive, the configuration files are copied in the following order (in descending priority):

- *model*.cfg for example "ICX7650.cfg,"ICX7150.cfg"
- “default.cfg”

Upgrade using manifest file in the USB

Beginning with FastIron 08.0.90, the **copy disk0 system-manifest** command can be used to copy the manifest file from USB. The images stored in the USB disk are copied to the primary or secondary partition based on the choice of partition. This image can be an application image or a Unified FastIron Image (UFI).

NOTE
The USB storage format must be FAT32. The USB drive can be formatted from a host computer or from an ICX device. Copying the firmware or configuration files from a host computer to USB is straightforward, like copying any other file from a computer to USB.

If you are upgrading the system to 08.0.80 or later releases, the system will upgrade the images using UFI.

If you are downgrading the system to 08.0.70 or an earlier release, only application image is supported.

From 08.0.90 release onward, if a valid manifest file and the corresponding images are stored in a USB, then the stack or campus fabric (SPX) system upgrade can be performed using the following command.

copy disk0 system-manifest *file-name primary/secondaryrouter/switch*

The parameter ***file-name*** is the name of the manifest file.

The ***primary/secondary*** parameter specifies the upgrade location. This option will download the boot image and application image for any manifest download.

The ***router/switch*** option downloads the specified images. If neither option is specified, images corresponding to the running version are downloaded. For example, if a switch build is running, switch images are downloaded from the manifest folder.

NOTE
After the USB image download, use the unmount command **unmount***disk0* before removing the disk.

After the manifest file is successfully downloaded, the manifest.txt file in the flash is retained for any future reverse manifest.

If the image is not successfully downloaded from the manifest file, the following warning message is displayed on the console.

WARNING: Possible failure on one of the member units while downloading the image. Images may not be in sync after reloading.

The user can upgrade the failed member unit at this point. If the user reloads the system, an image mismatch occurs, and the auto-copy feature upgrades the unit.

NOTE
The **all-images-primary** and **all-images-secondary** options for manifest download is deprecated beginning in release 08.0.90.

Auto-download using USB

When the system boots up, it checks for a valid manifest file, and if the manifest file is available, the system begins copying the files from the USB drive to the system flash memory. The system copies the images only through manifest file download and picks only the image listed in the manifest file. The system also copies the signature file and boot image files listed by the manifest file. It is recommended that the USB drive contain only one manifest file set. If there are multiple manifest files in the USB drive, the system selects the first available manifest file (the order of the manifest files is not defined). The image and boot image in the USB drive must be a different version than in the system flash memory.

Image auto-copy feature

In case of an image mismatch between control bridge and port extender images, the mismatched port extender images can be upgraded using a configured TFTP server.

Beginning with 08.0.90, the correct image stored in the USB is used to upgrade and reload the mismatched port extender images.

First, we will look for the correct image in the TFTP server. If the TFTP server does not have the correct image, the image in the USB is used. The correct image stored in the USB is used for port extender. If the USB does not have the correct image, the port extender will remain in a mismatched state.

The USB status mode LED indicates the status of boot from USB and is present only for ICX 7650 and ICX 7850. Refer to the *RUCKUS Hardware Installation Guide* for more information.

Software Recovery

If the software upgrade or downgrade fails, the device may reboot continuously as shown in the following CLI output.

```
bootdelay: ===
Booting image from Primary
Bad Magic Number
could not boot from primary, no valid image; trying to boot from secondary
Booting image from Secondary
Bad Magic Number
## Booting image at 01ffffc0 ...
Bad Magic Number
## Booting image at 01ffffc0 ...
Bad Magic Number
could not boot from secondary, no valid image; trying to boot from primary
Booting image from Primary
Bad Magic Number
## Booting image at 01ffffc0 ...
Bad Magic Number
```

Recovering Software

This section explains how to recover devices from image installation failure or deleted or corrupted flash images.

NOTE
Software recovery should be performed under the supervision of a RUCKUS support engineer.

1. Connect a console cable from the console port to the terminal server.
2. Connect an Ethernet cable from the management port (the port located under the console port on the device) to the TFTP server.

   The device will be in boot mode for recovery.

3. Set the existing variables from the boot prompt.

```
device> printenv
baudrate=9600
uboot=ruckus/ICX7450/bootcode/spz10115
Version:10.1.06T215 (May 15 2015 - 11:28:23)
```

   The path is to the boot image on the TFTP server.

4. Set the TFTP server that hosts a valid ICX software image using the **setenv serverip** command.

```
ICX 7450-48> setenv serverip 10.10.10.21
```

5. Set the IP address, gateway IP address, and netmask for the device management port, and save the configuration using the **setenv ipaddr**, **setenv gatewayip**, **setenv netmask**, and **saveenv** commands.

```
ICX 7450-48> setenv ipaddr 10.10.10.22
ICX 7450-48> setenv gatewayip 10.10.10.1
ICX 7450-48> setenv netmask 255.255.255.0
ICX 7450-48> saveenv
```

   NOTE
   The IP address and the gateway IP address set for the device management port should be for the same subnet as the TFTP server NIC.

6. Enter the **printenv** command to verify the IP addresses that you configured for the device and the TFTP server.

```
ICX 7450-48> printenv
baudrate=9600
ipaddr=10.10.10.22
gatewayip=10.10.10.1
netmask=255.255.255.0
serverip=10.10.10.1
uboot=brocade/ICX7450/bootcode/spz10115
Version:10.1.06T215 (May 15 2015 - 11:28:23)
```

7. Test the connectivity to the TFTP server from the device using the **ping** command to ensure a working connection.

```
ICX 7450-48> ping 10.10.10.21
ethPortNo = 0
Using egiga0 device
host 10.10.10.21 is alive
```

8. Provide the file name of the image that you want to copy from the TFTP server using the **setenv image_name** command.

```
ICX 7450-48> setenv image_name images/ICX/SPR08090.bin
```

9. Update the flash using the **update_primary** or **update_secondary** command as appropriate.

```
ICX 7450-48> update_primary
```

10. Provide the file name of the boot image to be copied from the tftp server.

```
> setenv uboot
```

11. Update the uboot file.

```
ICX 7450-48> update_uboot
```

12. Load the image from the primary or secondary flash using the **boot_primary** or **boot_secondary** command as appropriate.

```
ICX 7450-48> boot_primary
```

Deprecated or Removed Features and Commands

The following upgrade and downgrade commands and features have been deprecated.

- SNTP is no longer supported. NTPv4 replaces SNTP.
- The **stack persistent-mac-timer** command is deprecated in FastIron 08.0.20.
- The **show cpu-utilization** command replaces the **show process cpu** command.
- The **stack secure-setup** command is deprecated beginning in release 08.0.90.
- The **default-port** command is deprecated beginning in release 08.0.90.
- The **copy tftp | scp flash** *tftp server-ip file-name* **bootrom** command is deprecated beginning in release 08.0.90.
- The **copy tftp | scp flash** *tftp server-ip file-name* **fips-bootrom-sig** command is deprecated beginning in release 08.0.90.
- The **copy tftp | scp flash** *tftp server-ip file-name* **fips-primary-sig** command is deprecated in ICX 7850 devices.
- The **copy tftp | scp flash** *tftp server-ip file-name* **fips-secondary-sig** command is deprecated in ICX 7850 devices.
- The **copy disk0 flash** *file-name* **bootrom** command is deprecated beginning in release 08.0.90.
- The **copy disk0 flash** *file-name* **fips-bootrom-sig** command is deprecated beginning in release 08.0.90.
- The **copy disk0 flash** *file-name* **fips-primary-sig** command is deprecated in ICX 7850 devices.
- The **copy disk0 flash** *file-name* **fips-secondary-sig** command is deprecated in ICX 7850 devices.
- The **copy tftp system-manifest** *server-ip-address manifest-file-name* **all-images-primary | all-images-secondary** command is deprecated beginning in release 08.0.90.

Upgrade and Downgrade Limitations

The following table lists known issues related to FastIron 08.0.90 image upgrade and downgrade.

TABLE 7 Known Issues Related to FastIron 08.0.90 Upgrade or Downgrade

Issue	Protocol Affected	Platforms Affected	FastIron Releases Affected	Issue Fixed	Issue Details
1. Image upgrade of UFI image using TFTP from FastIron release 08.0.80 onward does not work on ICX 7650 devices.	TFTP	ICX7650	08.0.80, 08.0.80a, 08.0.80b, 08.0.80c, 08.0.80d	08.0.80f (TFTP will be supported when it is released.)	Due to an increase in UFI image size, image upgrade from the FastIron 08.0.80 release to the FastIron 08.0.90 release does not work for ICX 7650 devices. There are two possible workarounds: (a) Use SCP to download the UFI image. (b) Download application and boot images separately using TFTP.

TABLE 7 Known Issues Related to FastIron 08.0.90 Upgrade or Downgrade (continued)

Issue	Protocol Affected	Platforms Affected	FastIron Releases Affected	Issue Fixed	Issue Details
2. The **show version** command does not show correct image name on standby or stack members after image upgrade.	USB image download	All ICX platforms	08.0.30, 08.0.40, 08.0.50, 08.0.60, 08.0.61, 08.0.70	--	The **show version** command shows "eusb1" as the image name for standby units when the FastIron image is downloaded from USB. The image is downloaded correctly, and there is no functional impact. The workaround is to download the images using the TFTP or SCP protocol.
3. Image download using USB of boot image does not work on standby or member units.	USB image download	All ICX platforms	08.0.30, 08.0.40, 08.0.50, 08.0.60, 08.0.61, 08.0.70	--	The boot image is not flashed to the standby controller unit when USB is used to upgrade or downgrade a stack. The workaround is to download the images using the TFTP or SCP protocol.
4. Warning messages are displayed on standalone units during copy of UFI images using SCP.	SCP	All ICX platforms	08.0.80, 08.0.80a, 08.0.80b, 08.0.80c, 08.0.80d, 08.0.80f	--	The following warning message is displayed on standalone units while copying UFI images using SCP. The image is downloaded correctly, and there is no functional impact. WARNING: Possible failure on one of the member units while downloading the image. Images may not be in sync after reloading. The workaround is to download the images using TFTP.
5. USB image upgrade is not supported for stacking in FastIron release 08.0.80.	USB image download	All ICX platforms	All ICX platforms	--	Image upgrade using USB is not supported for stacking in FastIron release 08.0.80 and 08.0.80 patches. The workaround is to upgrade using the TFTP or SCP protocol.
6. Lower version of uboot is not guaranteed to work with higher version of the application image.	--	All ICX platforms	All ICX platforms	--	Earlier versions of the ICX software does not support UFI and can cause mismatch between uboot and application image versions. Using UFI takes care of keeping the versions intact and avoid mismatch.
7. When a system is upgraded to FastIron 08.0.90 or later and then downgraded to a pre-08.0.90 release, may cause mismatch between uboot and application versions.	--	All ICX platforms	All ICX platforms	--	Depending upon the mismatch, it may cause application to not boot the UFI image in primary/ secondary.

Campus Fabric Limitations for Image Downgrade from FastIron Release 08.0.90 to Previous Releases

Consider the following information when downgrading from FastIron release 08.0.90 in a Campus Fabric (SPX) network.

ICX Device Support in SPX Systems

The following table lists RUCKUS ICX devices and the release when they were introduced for use in a Control Bridge (CB) or as a Port Extender (PE) unit.

TABLE 8 SPX Support for ICX Devices

ICX device	First FastIron release to support SPX on device	SPX role
ICX 7750	08.0.40	CB
ICX 7450	08.0.40	PE
ICX 7250	08.0.50	PE
ICX 7150	08.0.70	PE
ICX 7650	08.0.80	CB

SPX System with ICX 7650 CB Units

- Downgrade from FastIron release 08.0.90 to 08.0.70 or prior releases is not supported. If this downgrade is attempted in an SPX system with ICX 7650 CB units, the PE units are not recognized, and the SPX system is dismantled.
- Downgrade from FastIron release 08.0.90 to 08.0.80 should be fine.

SPX System with ICX 7750 CB Units

- Downgrade from FastIron release 08.0.90 to 08.0.30 or earlier releases is not supported. If a downgrade is attempted, PE units are not recognized, and the SPX system is dismantled.
- Downgrade from FastIron release 08.0.90 to 08.0.40 does not recognize ICX 7150 or ICX 7250 devices configured as PEs.
- Downgrade from FastIron release 08.0.90 to 08.0.50 does not recognize ICX 7250 devices as PEs.
- Downgrade from FastIron release 08.0.90 to 08.0.70 or later releases should be fine.

General Upgrade and Downgrade Considerations for Stacks

Read the following section before upgrading a stack from a pre-08.0.90 release to FastIron 08.0.90 or later and before downgrading from FastIron 08.0.90 or a later release to a pre-08.0.90 release. Certain stack configuration behaviors have changed in FastIron release 08.0.90, and new commands have been introduced to assist with upgrades and downgrades. For additional information on stacking changes, refer to the *RUCKUS FastIron Stacking Configuration Guide*.

Changes to Upgrade and Downgrade for Stacking from FastIron Release 08.0.90

The stacking port format is different beginning with FastIron 08.0.90. The change in format creates upgrade and downgrade issues.

Upgrading to FastIron Release 08.0.90 from Earlier Releases

Upgrades from earlier releases to FastIron 08.0.90 are seamless. FastIron 08.0.90 recognizes the old format and parses startup-config flash to convert the configuration to the new format. After upgrade, if you enter the **write memory** command to save the configuration, the new format is stored to startup-config flash.

In the following example, an ICX 7450 stack is upgraded to FastIron 08.0.90 from FastIron 08.0.80 startup-config flash. The user has not yet used the **write memory** command. Output for the **show configuration** command shows that the FastIron 08.0.80 startup-config flash remains in the old format. The command output for the **show running-config** command displays the runtime configuration in the new format.

```
ICX7450-48P Router# show configuration
!
Startup-config data location is flash memory
!
Startup configuration:
!
ver 08.0.80T213 <-- old 08.0.80 release startup-config flash
!
stack unit 1
module 1 icx7450-48p-poe-management-module
module 2 icx7400-xgf-4port-40g-module
module 3 icx7400-qsfp-1port-40g-module
module 4 icx7400-qsfp-1port-40g-module
priority 128
default-ports 1/2/1 1/2/3
stack-trunk 1/2/1 to 1/2/2
stack-trunk 1/2/3 to 1/2/4
stack-port 1/2/1 1/2/3
stack unit 2
module 1 icx7450-48p-poe-management-module
module 2 icx7400-xgf-4port-40g-module
module 3 icx7400-qsfp-1port-40g-module
module 4 icx7400-qsfp-1port-40g-module
priority 128
default-ports 2/2/1 2/2/3
stack-trunk 2/2/1 to 2/2/2
stack-port 2/2/1 2/2/3
stack enable
stack mac 609c.9f2a.97e0


ICX7450-48P Router# show running-config
Current configuration:
!
ver 08.0.90
!
stack unit 1
module 1 icx7450-48p-poe-management-module
module 2 icx7400-xgf-4port-40g-module
module 3 icx7400-qsfp-1port-40g-module
module 4 icx7400-qsfp-1port-40g-module
priority 128
stack-trunk 1/2/1 to 1/2/2
stack-trunk 1/2/3 to 1/2/4
stack unit 2
module 1 icx7450-48p-poe-management-module
module 2 icx7400-xgf-4port-40g-module
module 3 icx7400-qsfp-1port-40g-module
module 4 icx7400-qsfp-1port-40g-module
priority 128
stack-trunk 2/2/1 to 2/2/2
stack-port 2/2/3
stack enable
stack mac 609c.9f2a.97e0
```

Downgrading from FastIron 08.0.90 to Earlier Releases

A standalone or active controller parses the startup-config flash to read the stacking ports for the entire stack. A release prior to FastIron 08.0.90 does not understand startup-config flash content generated by FastIron 08.0.90 or later releases. As a result, if you try to downgrade from FastIron 08.0.90 or later to a pre-08.0.90 release, the stack may break. FastIron 08.0.90 attempts to overcome the need to downgrade by saving and recovering the original startup-config flash.

In FastIron 08.0.90, when the **write memory** command is used, the system renames the startup-config flash "pre-8090-startup-backup" if it has been generated from a pre-08.0.90 release. You can view the contents of the saved file using the **show pre-8090-startup-backup** command.

> **NOTE**
> When a stack downgrades to a pre-08.0.90 release from recovered pre-08.0.90 startup-config flash, it loses all configuration changes made under FastIron 08.0.90.

Every unit, including a stack member, has a startup-config file, and every unit renames the startup-config as the backup file when the **write memory** command is used.

If you no longer need the pre-8090-startup-backup file, you can delete it using the **erase pre-8090-startup-backup** command. This command erases the pre-8090-startup-backup file in every unit in the stacking system. You may no longer need the older backup file if you are certain you will not have to downgrade the system or if you have made many configuration changes with the FastIron 08.0.90 or later release installed, making the backup file obsolete.

When a system running FastIron 08.0.90 detects that it is about to reload to a pre-08.0.90 release, the system tries to recover the backup file. A message is displayed asking for confirmation before recovering the file with a warning that all changes made with the current release will be lost.

```
ICX7450-48P Router# boot system flash secondary
Are you sure? (enter 'y' or 'n'): y
Warning! the startup-config is 8.0.90 or later, but you are reloading to a pre-8090 image.
The system will use the pre-8090-startup-backup file to reload and lose all 8.0.90 changes.
(You can type "show pre-8090-startup-backup" to see its content.)
Do you want to reload ? (enter 'y' or 'n'): y
Reload using pre-8090-startup-backup file.
```

> **NOTE**
> In contrast, the **reload yes** and **boot system flash secondary yes** commands do not require confirmation. The following example shows the system response when the **boot system flash secondary yes** command is entered.

```
ICX7450-48P Router# boot system flash secondary yes
Reload using pre-8090-startup-backup file.
T=8m11.3: Halt and reboot
```

When a system is upgraded to FastIron 08.0.90 or later and then downgraded to a pre-08.0.90 release, the results of the downgrade differ, depending on the situation. The following cases describe specific situations and the expected results. The scenarios in the following tables apply to a standalone unit or a stack.

TABLE 9 Downgrade Scenarios

Situation	Result
The user never uses a **write memory** command when running FastIron 08.0.90.	The downgrade is seamless.
The user does not change any configuration but uses the **write memory** command when running FastIron 08.0.90.	The downgrade is fine. The system recovers the backup file before reloading to a pre-08.0.90 release.
The user makes configuration changes while running FastIron 08.0.90 and uses the **write memory** command.	The downgrade loses all configuration changes made under FastIron 08.0.90. The system recovers the backup file that does not contain the changes.

Switchover or failover does not affect these downgrade scenarios. For example, you may perform a switch-over to change the active controller and then reload. The recovery result is the same as a reload without changing the active controller.

There are a few cases where recovery does not work.

TABLE 10 Scenarios where Downgrades Cannot Be Performed

Situation	Result
The user reloads the system by powering down.	The system cannot recover the backup file before reloading.
The standalone or active controller does not have a startup-config flash file generated by any pre-08.0.90 release.	Downgrade is not possible.

NOTE
It is recommended that you copy the running configuration to a file before downgrading. You can do this using the **copy running-config** command to copy the configuration to different locations such as a USB disk file or a tftp server, or you can simply enter the **show running-config** command and then copy the output and paste it into a computer file.

NOTE
If you don't have a pre-08090-startup-backup file (which can be checked with the **show pre-8090-startup-backup** command), or you have many configuration changes to the 08.0.90 release or a later release and you need to downgrade to a pre-08.0.90 release, you must manually edit the 08.0.90 configuration to create a pre-08.0.90 format.

In-service Software Upgrade

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What Is an In-service Software Upgrade?

An in-service software upgrade (ISSU) allows stack units or units in a Campus Fabric (SPX) system to be upgraded with minimal interruptions to multi-unit topologies.

ISSU provides an incremental method to upgrade traditional stacks and Campus Fabric (SPX) systems. A successful ISSU does not affect uplink or downlink connectivity in a topology with multi-unit LAGs. Only the node that is undergoing the upgrade requires a hardware reset that includes the reset of the packet processor. As a result, traffic transiting only that node is disrupted.

NOTE
Traffic through PE nodes is affected by ISSU because PE ports cannot be part of a traditional LAG.

ISSU Limitations and Considerations

When using ISSU, consider the following capabilities and restrictions:

- ISSU is supported on FastIron ICX 7150, ICX 7250, ICX 7450, ICX 7650, ICX 7750, and ICX 7850 stackable hardware.
- ISSU is supported in a traditional ring stack topology and an SPX topology where control bridges are connected in a ring. PE units can be connected in either linear or ring topologies.
- ISSU works for stacks of two units to the maximum supported twelve units.
- ISSU is supported in SPX configurations with the maximum number of PE units.
- ISSU is supported for upgrades between minor releases only. Within the minor release, ISSU upgrade can be performed only upto the next two incremental versions. For example, you can use ISSU to upgrade between FastIron 08.0.90 and FastIron 08.0.90a or between FastIron 08.0.90a and FastIron 08.0.90c but not between FastIron 08.0.90a and FastIron 08.0.90d.
- For ISSU to occur with minimal disruption, the customer network connected to the stack and CB units in an SPX system must have redundant uplink and downlink configurations across multiple units.
- If the secondary partition is upgraded, this partition is set as the default boot partition for the stack.
- Most CLI commands, SNMP, and web operations are blocked while ISSU is in progress.
- To make the upgrade seamless, the following administrative operations are blocked while ISSU is in progress:
  - Configuration
  - Image download to flash memory
  - Stack commands or SPX commands that may result in topology change or discovery

- Initiation of another ISSU
- New PE join activity

The following additional items are blocked during ISSU in a Campus Fabric system:

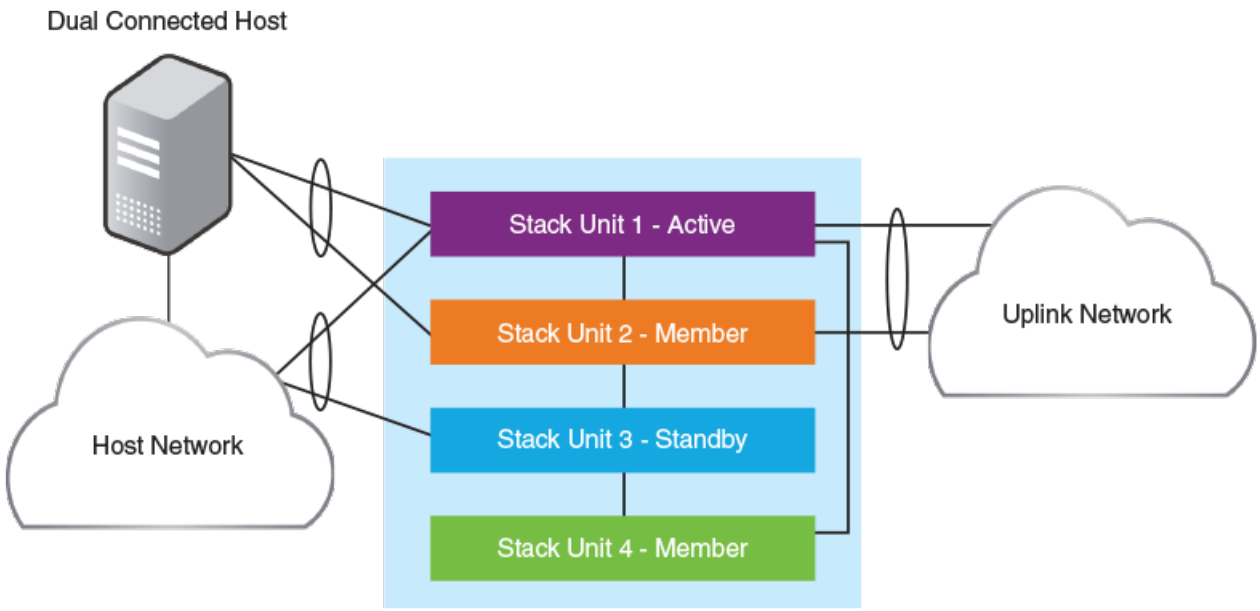
- The web interface
- SPX DDM commands
- SPX interactive-setup
- SPX zero-touch provisioning
- Clear commands

Recommended Stack Topology for ISSU

ISSU provides an ability to upgrade traditional stacks without affecting the network.

ISSU reduces its network impact only if redundant uplink and downlink connections are available from multiple stack units. A typical topology where ISSU can be used effectively is shown in the following figure.

FIGURE 2 Recommended Stack Topology for ISSU



In the figure, redundant links are going to both the uplink network and the downlink network from different units of the stack. At any point during the upgrade, the uplink and downlink connectivity is maintained. The following software features are used to provide link redundancy:

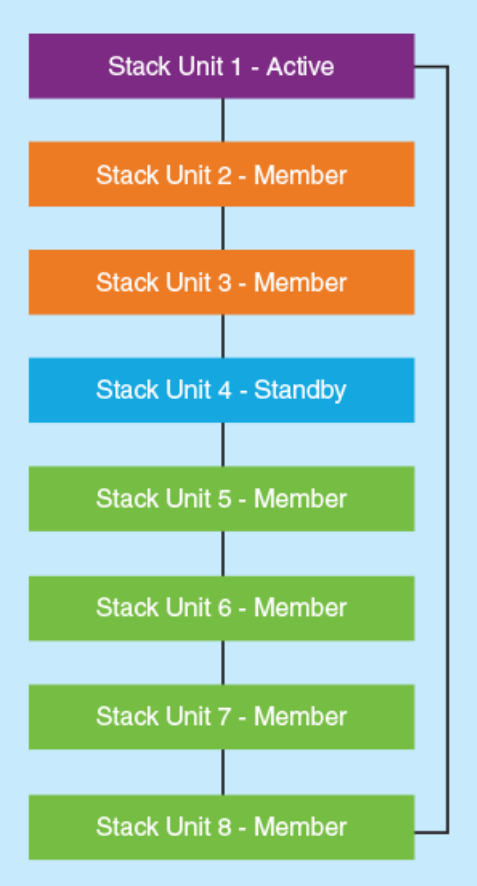
- Link aggregation (or dual connectivity to two different PEs in a chain or ring to provide PE redundancy)
- VRRP and VRRP-E
- Graceful restart for IP routing features

The node that is being upgraded goes through a hardware reset. This resets the packet processor, and traffic flowing through that specific node is disrupted.

How ISSU Works When Upgrading Stack Units

The following section describes the checks and the upgrade sequence for the typical 8-unit stack shown in the Figure 3. For a step-by-step procedure on performing an ISSU, refer to Upgrading a Stack with ISSU on page 45.

FIGURE 3 Stack Units To Be Upgraded



After you have downloaded release software as described in Initial Steps on page 11 and Upgrade Process on page 13, you can check the sequence in which stack units will be upgraded using the **show issu sequence** command. The following example displays the ISSU upgrade sequence for the stack shown in Figure 3.

```
device# show issu sequence
Stack units will be upgraded in the following order
ID Type Role
4 ICX7450-32ZP standby
3 ICX7450-32ZP member
2 ICX7450-32ZP member
5 ICX7450-32ZP member
6 ICX7450-32ZP member
7 ICX7450-32ZP member
8 ICX7450-32ZP member
1 ICX7450-32ZP active
```

All stack ISSU processes follow the same pattern. As reflected in the sample output, the stack in our example responds to the **issu** command in the following ways:

- Unit 4, the standby controller, is reloaded with the new image.

- Once the standby controller joins the stack, all member units from the standby controller to the active controller units (3 and 2 in the following example) reload the new image.
- All members from the standby controller to the active controller in the other direction (5,6,7, and 8 in the following example) reload the new image.
- Once all member units and the standby controller are reloaded with the new image, the active controller unit triggers a switchover, in which the old standby controller (4) becomes the new active controller unit, and the old active controller (unit 1) becomes the new standby controller.
- The new active controller (unit 4) reloads the old active controller (unit 1) with the new image.
- Once the old active controller (unit 1) comes up as a member unit and rejoins the stack, standby controller election occurs, and the stack becomes fully functional with the upgraded image.

  NOTE
  If the stack unit configurations have priority settings, a final switchover is done to ensure that the unit with the highest priority becomes the active controller unit.

Pre-ISSU Compatibility Checks for a Traditional Stack

After ISSU is triggered, but before ISSU processing begins, a pre-ISSU compatibility check is executed.

The compatibility check determines whether the stack is ready for an upgrade. A successful compatibility check for a stack displays the passing results shown in the following table.

TABLE 11 Pre-ISSU Checks for a Traditional Stack

Check	Passing Result
Stacking Topology is Ring	Yes
Standby Present	Yes
Standby ready for upgrade	Yes
Flash use in progress	No
Stack interactive-setup in progress	No
Stack ZTP is configured	No
ISSU in progress or aborted	No
Election pending	No
Election in progress	No
Reload pending	No
CPU utilization high	No
All units in ready state	Yes
Primary Image is upgrade compatible	Yes
Secondary Image is upgrade compatible	Yes
Startup config and Running Config Same	Yes
Boot option present in running config	No
User in Config mode	No
POE-Firmware Download is in Progress	No
System ready for issu	If this flag is present, you can proceed with ISSU. Otherwise, check the conditions flagged by three asterisks (***) and make prescribed corrections to the device before performing an ISSU.
ISSU not in progress	

Upgrading a Stack with ISSU

The following examples for copying images represent typical use. Other options such as manifest-based image copy can also be used. Refer to Initial Steps on page 11 and Upgrade Process on page 13 for more information before performing the upgrade.

Complete the following steps to upgrade a stack using ISSU.

NOTE
By default, switches are booted from the primary partition.

1. Copy the images.
   a) Back up the running image to the secondary partition.

```
device# copy flash flash secondary
```

   b) Copy the new image from its server location to the primary partition.

```
device# copy tftp flash 10.10.10.10 SWR08090aufi.bin primary
```

   The IP address in the example is for the TFTP server. The address can be an IPv4 or IPv6 address. The .bin file is the name of the image file.
2. Check the sequence of the upgrade.

```
device# show issu sequence
Stack units will be upgraded in the following order
ID Type Role
1 ICX7450-32ZP standby
3 ICX7450-32ZP member
4 ICX7450-32ZP active
```

   The example shows the sequence for a three-unit stack.

3. Initiate the upgrade.

   Use the **issu primary** command, preferably with an error recovery option, if you downloaded the image to the primary partition of the flash.

   Or use the **issu secondary** command, preferably with an error recovery option, if you downloaded the image to the secondary partition.

   NOTE
   RUCKUS recommends using an error recovery option when upgrading.

   NOTE
   The issu command option **on-error reload-primary** shown in the following example specifies an automatic reload from the primary partition if there is an upgrade error. You can also specify the option **on-error reload-secondary** to reload from the secondary partition to bring the stack back up with the original image.

- Initiating the upgrade with error recovery.

```
device# issu primary on-error reload-primary
Stacking Topology is Ring               Yes
Standby Present                         Yes
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
Proceed with upgrade? (enter 'y' or 'n'):
```

- Initiating the upgrade without error recovery (not recommended)

```
device# issu secondary
Stacking Topology is Ring               Yes
Standby Present                         Yes
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
Proceed with upgrade? (enter 'y' or 'n'):
```

If an error occurs when the upgrade was initiated without error recovery, the error condition is marked by three asterisks.

```
device# issu primary
Stacking Topology is Ring               Yes
Standby Present                         No   ***
Standby ready for upgrade               No   ***
```

```
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
System not ready for issu. Check error condition highlighted by "***" and rectify.
ISSU not in progress
```

4. Enter **y** when prompted to start the upgrade, or **n** to stop the process.

5. Wait for the upgrade to complete, and check the status. (You may check the status at any time.)

   The following **show issu status** command output indicates the successful completion of an ISSU upgrade.

```
device# show issu status
Last upgrade time 00:02:19.367 GMT+00 Tue Mar 20 2019
The older image before-ISSU SPR08090.bin
Stacking Topology is Ring               Yes
Standby Present                         Yes
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
System ready for issu
ISSU not in progress
```

   The following example shows a status display for an upgrade that is in progress.

```
device# show issu status
ISSU Status: In Progress
Upgrade State: UNIT JOIN
Upgrade Option: issu primary
ID   Type          Role      State
1    ICX7450-32ZP  member    UPGRADING
3    ICX7450-32ZP  member    UPGRADE PENDING
4    ICX7450-32ZP  active    UPGRADE PENDING
```

   If the upgrade has not been initiated, the **show issu status** command displays information about whether the system is ready for the upgrade.

   The following example shows a status display for an aborted upgrade.

```
device# show issu status
ISSU Status: Aborted
Upgrade State: UPGRADE ABORT
Upgrade Option: issu primary
Reason for Abort: UNABLE TO UPGRADE
ID   Type          Role      State
1    ICX7450-32ZP  member    UPGRADE ABORT
3    ICX7450-32ZP  standby   UPGRADE PENDING
4    ICX7450-32ZP  active    UPGRADE PENDING
```

   The following example shows an unsuccessful ISSU that was aborted due to a hot swap error.

```
device# show issu status
 Abort info before recovery upgrade:
         Reason for abort                HOTSWAP ERROR
         Hotswap error with Unit 1
 Topology is Ring                        Yes
 Standby Present                         Yes
 Standby ready for upgrade               Yes
 Flash use in progress                   No
 Stack interactive-setup in progress     No
 ISSU in progress or aborted             No
 Election pending                        No
 Election in progress                    No
 Reload pending                          No
 CPU utilization high                    No
```

```
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
System ready for issu
ISSU not in progress
```

If the upgrade is aborted manually or if ISSU detects an abort condition (when the **issu** command is used without the **on-error** option), the stack is left as it is, and a manual recovery is required.

Summary ISSU Command Sequence for Upgrading a Stack

```
device# copy flash flash secondary
device# copy tftp flash 10.10.10.10 SWR0809a0ufi.bin primary
device# show issu sequence
device# issu primary on-error reload-primary
device# show issu status
```

Recommended Topology for Campus Fabric (SPX) ISSU

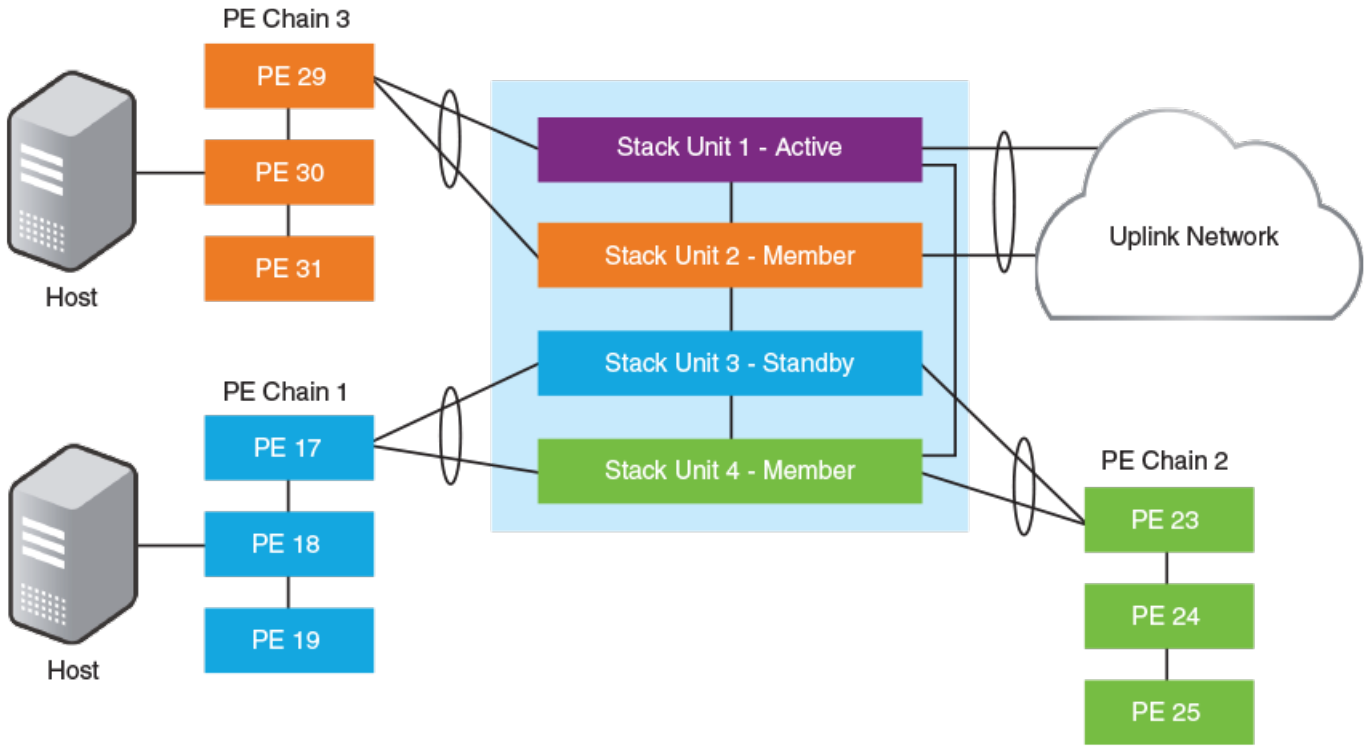
ISSU provides the ability to upgrade Campus Fabric (SPX) systems with minimal traffic loss.

Multi-PE unit LAGs are not supported in an SPX system, which means that traffic through a PE being upgraded is affected by the upgrade. ISSU reduces the network impact of an upgrade only if redundant uplink and downlink connections are available from multiple CB stack units.

NOTE
Because traditional LAGs are not supported on Port Extender (PE) units in an SPX system, dual connectivity (through two different PE units) is recommended for every PE chain or ring.

The following figure illustrates a typical topology where ISSU can be used effectively to upgrade an SPX system.

FIGURE 4 Recommended Topology for SPX ISSU

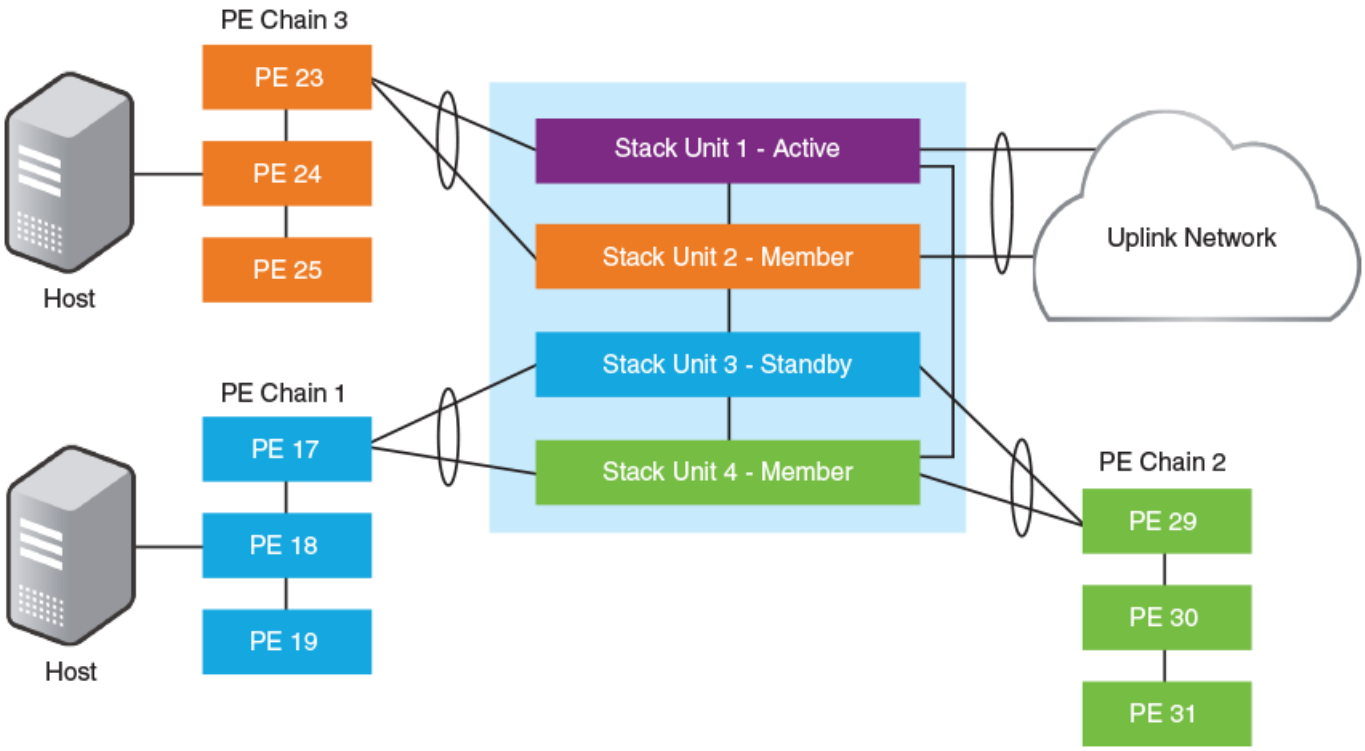


In the figure, redundant links connect different CB units in the SPX system to the uplink network. As each node is upgraded, it undergoes a hardware reset, which resets the packet processor and disrupts traffic flowing through the node. The redundant links allow traffic to flow through other units, minimizing the impact of each unit upgrade.

How ISSU Works When Upgrading a Campus Fabric (SPX) System

The following section describes the checks and the upgrade sequence for an SPX system in the typical topology shown in Figure 5. For a step-by-step procedure on performing an ISSU, refer to Upgrading a Campus Fabric (SPX) System with ISSU on page 53.

FIGURE 5 Typical SPX Topology



After you have downloaded release software as described in Initial Steps on page 11 and Upgrade Process on page 13, you can check the sequence in which stack units will be upgraded using the **show issu sequence** command.

The following example displays **show issu sequence** command output for the Campus Fabric (SPX) topology shown in Figure 5 and indicates the sequence in which CB units and their associated PE units will be upgraded. PE units are upgraded along with their associated CB units. This association of PE units to CB units is computed automatically.

```
device# show issu sequence
Stack units will be upgraded in the following order
ID      Type              Role
3       ICX7750-48XGC     standby
   17   ICX7450-32ZP      spx-pe
   18   ICX7150-48ZP      spx-pe
   19   ICX7150-48        spx-pe
2       ICX7750-20QXG     member
   23   ICX7450-32ZP      spx-pe
   24   ICX7150-48ZP      spx-pe
   25   ICX7150-48        spx-pe
4       ICX7750-48XGF     member
   29   ICX7450-32ZP      spx-pe
   30   ICX7150-48ZP      spx-pe
   31   ICX7150-48        spx-pe
1       ICX7750-48XGF     active

PEs 17, 18, 19 are associated with CB unit 3 for upgrade.
PEs 23, 24, 25 are associated with CB unit 2 for upgrade.
PEs 29, 30, 31 are associated with CB unit 4 for upgrade.
```

As reflected in **show issu sequence** output, the system responds to the **issu** command in the following ways:

- Unit 3, the standby controller, is reloaded with the new image, along with associated PEs 17, 18, and 19.

- Once the standby controller and associated PEs join the SPX system, member units from the standby controller to the active controller (unit 2 in the previous figure) reload from the new image. Along with CB unit 2, associated PEs 23, 24, and 25 are also upgraded.
- All members from the standby controller to the active controller in the other direction (unit 4) reload from the new image. Along with unit 4, associated PEs 29, 30, and 31 are also upgraded.
- Once all member units and the standby controller are reloaded with the new image, the active controller triggers a switchover, in which the old standby controller (unit 3) becomes the new active controller, and the old active controller (unit 1) becomes the new standby controller.
- The new active controller (unit 3) reloads the old active controller (unit 1) with the new image. If there are any PEs attached to unit 3 that are not yet upgraded (none in this example), they are upgraded next.
- Once the old active controller (unit 1) comes up as a member unit and rejoins the SPX system, standby controller election occurs, and the SPX system becomes fully functional with the upgraded image.

NOTE
If the stack unit configurations include priority settings, a final switchover occurs to ensure that the unit with the highest priority becomes the active controller.

Pre-ISSU Compatibility Checks for an SPX System

After you enter the **issu** command but before an ISSU is performed in an SPX system, a set of checks similar to the set of compatibility checks performed for a stack is executed to determine whether the SPX system is ready for an upgrade.

.

NOTE
In contrast to the standard stacking checklist, zero-touch provisioning (ZTP) cannot be in progress when an SPX ISSU is initiated.

A successful compatibility check for an SPX system displays the passing results shown in the following table. Any differences between an SPX system and a stacking system are noted.

TABLE 12 Pre-ISSU Checks for an SPX System

Check	Passing Result
Stacking Topology is Ring	Yes
Standby Present	Yes
Standby ready for upgrade	Yes
Flash use in progress	No
Stack interactive-setup in progress	No
Stack ZTP is configured	No
SPX interactive-setup in progress	No (unique to SPX ISSU)
ZTP is configured	No (unique to SPX ISSU)
ISSU in progress or aborted	No
Election pending	No
Election in progress	No
Reload pending	No
CPU utilization high	No
All units in ready state	Yes
Primary Image is upgrade compatible	Yes

TABLE 12 Pre-ISSU Checks for an SPX System (continued)

Check	Passing Result
Secondary Image is upgrade compatible	Yes
Startup config and Running Config Same	Yes
Boot option present in running config	No
User in Config mode	No
POE-Firmware Download is in Progress	No
System ready for issu	If this flag is present, you can proceed with ISSU. Otherwise, check the conditions flagged by three asterisks (***) and make prescribed corrections to the device before performing an ISSU.
ISSU not in progress	

Upgrading a Campus Fabric (SPX) System with ISSU

Complete the following steps to upgrade an SPX system using ISSU.

The following examples for copying images represent typical use. Other options such as manifest-based image copy can also be used. Refer to Initial Steps on page 11 and Upgrade Process on page 13 for more information before performing the upgrade.

NOTE
By default, switches are booted from the primary partition.

The IP address used in the following code examples (10.10.10.10) is for the TFTP server. The address may be an IPv4 or an IPv6 address. The .bin file names used in the examples are image file names.

1. Copy the images.
   a) Back up the running image on the CB to the secondary partition.

```
device# copy flash flash secondary
```

   b) Back up the running image on the PE to the secondary partition.

```
device# copy tftp flash 10.10.10.10 SPR08090.bin secondary
```

   c) Copy the new image to the primary partition on the CB.

```
device# copy tftp flash 10.10.10.10 SWR08090aufi.bin primary
```

   d) Copy the new image to the primary partition on the PE.

```
device# copy tftp flash 10.10.10.10 SPR08090aufi.bin primary
```

2. Check the sequence of the upgrade.

```
device# show issu sequence

Stack units will be upgraded in the following order
ID     Type              Role
 2      ICX7750-20QXG     standby
 3      ICX7750-48XGF     member
20      ICX7150-48PF      spx-pe
21      ICX7150-48P       spx-pe
22      ICX7150-48P       spx-pe
18      ICX7450-24G       spx-pe
19      ICX7450-24G       spx-pe
 1      ICX7750-20QXG     active
17      ICX7450-24G       spx-pe
```

3. Initiate the upgrade.

   Use the **issu primary** command, preferably with an error recovery option, if you downloaded the image to the primary partition of the flash.

   Or use the **issu secondary** command, preferably with an error recovery option, if you downloaded the image to the secondary partition.

   NOTE
   RUCKUS recommends using an error recovery option when upgrading.

   NOTE
   The issu command option **on-error reload-primary** shown in the following example specifies an automatic reload from the primary partition if there is an upgrade error. You can also specify the option **on-error reload-secondary** to reload from the secondary partition to bring the stack back up with the original image.

- Initiating the upgrade with error recovery

```
device# issu primary on-error reload-primary
Stacking Topology is Ring               Yes
Standby Present                         Yes
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
Spx interactive-setup in progress       No
ZTP is configured                       No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress
Proceed with upgrade? (enter 'y' or 'n'):
```

- Initiating the upgrade without error recovery (not recommended)

```
device# issu secondary
Stacking Topology is Ring               Yes
Standby Present                         Yes
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
Spx interactive-setup in progress       No
ZTP is configured                       No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress
Proceed with upgrade? (enter 'y' or 'n'):
```

NOTE

If you initiate an upgrade without error recovery and an error occurs, the error condition is marked by three asterisks.

```
device# issu primary
Stacking Topology is Ring               Yes    ***
Standby Present                         Yes    ***
Standby ready for upgrade               Yes
Flash use in progress                   No
Stack interactive-setup in progress     No
Stack ZTP is configured                 No
Spx interactive-setup in progress       No
ZTP is configured                       No
ISSU in progress or aborted             No
Election pending                        No
Election in progress                    No
Reload pending                          No
CPU utilization high                    No
All units in ready state                Yes
Primary Image is upgrade compatible     Yes
Secondary Image is upgrade compatible   Yes
Startup config and Running Config Same  Yes
Boot option present in running config   No
User in Config mode                     No
POE-Firmware Download is in Progress    No
System not ready for issu. Check error condition highlighted by "***" and rectify.
```

4. Enter **y** when prompted to start the upgrade, or **n** to stop the process.

5. Wait for the upgrade to complete, and check the status. (You may check the status at any time.)

   The following example displays **show issu status** command output for an ISSU in progress for an SPX system.

```
device# show issu status
ISSU Status: In Progress
Upgrade State: UNIT TO BE UPGRADED
Upgrade Option: issu primary on-error reload-primary

ID   Type          Role      State
2    ICX7750-20QXG standby   UPGRADE PENDING
3    ICX7750-48XGF member    UPGRADE PENDING
20   ICX7150-48PF  spx-pe    UPGRADE PENDING
21   ICX7150-48P   spx-pe    UPGRADE PENDING
22   ICX7150-48P   spx-pe    UPGRADE PENDING
18   ICX7450-24G   spx-pe    UPGRADE PENDING
19   ICX7450-24G   spx-pe    UPGRADE PENDING
1    ICX7750-20QXG active    UPGRADE PENDING
17   ICX7450-24G   spx-pe    UPGRADE PENDING
```

   If the upgrade has not been initiated, the command displays information on whether the system is ready for upgrade.

   The following **show issu status** command example displays output for an aborted ISSU.

```
device# show issu status
ISSU Status: Aborted
Upgrade State: UPGRADE ABORT
Upgrade Option: issu primary
Reason for Abort: UNABLE TO UPGRADE

ID   Type          Role      State
2    ICX7750-20QXG standby   UPGRADE ABORT
3    ICX7750-48XGF member    UPGRADE PENDING
20   ICX7150-48PF  spx-pe    UPGRADE PENDING
21   ICX7150-48P   spx-pe    UPGRADE PENDING
22   ICX7150-48P   spx-pe    UPGRADE PENDING
18   ICX7450-24G   spx-pe    UPGRADE PENDING
19   ICX7450-24G   spx-pe    UPGRADE PENDING
1    ICX7750-20QXG active    UPGRADE PENDING
17   ICX7450-24G   spx-pe    UPGRADE PENDING
```

   NOTE
   If the upgrade is aborted manually, or if the ISSU process detects an abort condition (when the **issu** command is used without the **on-error** option), the stack is left as it is, and a manual recovery is required.

Summary ISSU Command Sequence for Upgrading an SPX System

```
device# copy flash flash secondary
device# copy tftp flash 10.10.10.10 SWR08090aufi.bin primary
device# show issu sequence
device# issu primary on-error reload-primary
device# show issu status
```

ISSU Errors

There are several sources of errors that may be encountered during an ISSU, and there are two means of error recovery.

TABLE 13 Common Errors

Check	Passing Result
Hot-swap timeout	Unit hot-swap does not complete within the expected time.

TABLE 13 Common Errors (continued)

Check	Passing Result
Version synchronization timeout	Version information synchronization does not complete within the expected time.
Standby assignment timeout	After upgrading the current standby unit, the standby assignment does not occur within the expected time.
Standby assignment error	After upgrading the current standby unit, the expected unit was not elected as the new standby unit.
Image/boot source mismatch	After a unit upgrade, the image version and boot source did not match the expected version or boot source.
Unit fails to rejoin	The unit fails to rejoin the stack or SPX system within the specified time after an upgrade.
Unit delete	The unit is detached from the stack or SPX system while the ISSU is in progress.
Ping fail	A unit fails to respond to keepalive messages.

TABLE 14 Crash and Manual Abort Errors

Error Message	Description
Unit crash	If the **issu** command **on-error** option is specified, the unit that crashes is reloaded from the partition specified in the command. The active controller detects this condition as a unit delete and reloads all the existing stack members from the partition specified in the **issu** command **on-error** option.
Active reload/crash	If the active controller reloads unexpectedly, or crashes while the ISSU is in progress, the stack units detect the loss of the active controller and abort the ISSU. If the **issu** command **on-error** option is specified, all units that were part of the stack at the time of the active controller crash are reloaded from the partition specified in the command. Any units that were being upgraded at the time of the active controller failover reload from the target partition given in the **issu** command. Once all units have booted and an active controller has been elected, if some units have a running image different from the active controller image, an **image auto-copy** is executed, and units are reloaded to ensure they are all running the same image.
Manual abort	If ISSU is aborted through the **issu abort** command, ISSU is stopped, and the stack is left in the current state for manual recovery. This behavior occurs whether ISSU is started with or without the **issu** command **on-error** option.

Error Recovery

There are two means for error recovery, one manual and one automatic:

- When ISSU is started with the **issu primary** or **issu secondary** command, the following results apply:
  - If an error occurs, the upgrade is aborted, and the stack is left for manual recovery. In this condition, it is likely that the running images on the stack units are different. After abort, **image auto-copy** is not executed.
  - Units continue with their current running image until the system is reloaded. As a result, a reload of the entire stack is required to bring it back to a functional state.
  - To ensure system stability, the stack is left in the aborted state. You must reload the system manually. If any of the stack units are reloaded individually, they cannot move to the Ready state. To execute a manual recovery, refer to Manual Error Recovery on page 59.

- The following points apply when ISSU is started with an **issu primary** or an **issu secondary** command that includes an **on-error reload primary** or an **on-error reload-secondary** option:
  - If an error occurs, the upgrade is aborted.
  - All the units in the stack are automatically reloaded to the partition specified by the **issu** command **on-error** option.
  - After the system reload, any units that were unreachable at the time of the ISSU abort may have an image that is different from the other units. When these units rejoin the stack, an **image auto-copy** is executed for any units with a mismatched image, and they are reloaded after the auto-copy completes.

Manual Error Recovery

Complete the following steps to manually recover from an ISSU error.

If an error is detected during the upgrade, ISSU is aborted. In this case, the recommended procedure is to reload the stack to the old or new image from the primary or secondary partition, and then use the **boot system flash** command to reload the stack.

1. Reload to the primary partition.

```
device# boot system flash primary
```

2. Reload to the secondary partition.

```
device# boot system flash secondary
```



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350 West Java Dr., Sunnyvale, CA 94089 USA
https://www.commscope.com