Upgrade Software on Switches with Redundant Supervisor Engines

Contents

Introduction

This document describes the steps to upgrade the software images on Catalyst 6000/6500 Series Switches with redundant Supervisor Engines.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Understand EtherChannel Load Balancing and Redundancy on Catalyst Switches

- Understand Internal MSFC Redundancy on Hybrid Mode Catalyst 6000 Switches

Components Used

The outputs shown in this document are based on these Catalyst 6500 Series hardware and software versions:

- Supervisor Engine 32 with Cisco IOS® Software Releases 12.2(18)SXF and 12.2(18)SXF6 in Native mode.

- Supervisor Engine 32 with Catalyst OS versions 8.5(6) and 8.5(7) in Hybrid mode.

- Multilayer Switch Feature Card (MSFC2a) with Cisco IOS Software Releases 12.2(18)SXF and 12.2(18)SXF6 in Hybrid mode.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Related Products

This document is also applicable to the Catalyst 6500 Series Switch with redundant Supervisor Engine 720.

Conventions

Refer to **Cisco Technical Tips Conventions** for more information on document conventions.

Background Information

Introduction

This document explains the step-by-step procedures to upgrade the software images on Catalyst 6000/6500 Series Switches with redundant Supervisor Engines that run in Hybrid mode (Cisco Catalyst Operating System (CatOS) on Supervisor Engine, and Cisco IOS on Multilayer Switch Feature Card (MSFC)) or Native mode (Cisco IOS System Software on Supervisor Engine and MSFC). Refer to **Convert CatOS to Cisco IOS for Catalyst 6500/6000 Switches** for more information on the differences between CatOS and Cisco IOS System Software.

Note: This document also applies when you upgrade the Cisco IOS native image in a VSS environment.

The software image upgrade is necessary when:

- You want to implement new features in your network that are available in the new software release.

- You want to install a new line card that is not supported by the current software version that you run on the switch.

- A known bug affects your switch, and that bug is resolved in the next software release.

Supervisor Redundancy

Catalyst 6500 Series Switches allow a redundant Supervisor Engine to take over if the primary Supervisor Engine fails in order to support fault resistance. Redundant Supervisor Engines must be of the same type with the same model feature card to support redundancy. When you install two Supervisor Engines, the first one to come online becomes the active module. The second Supervisor Engine goes into standby mode. All

administrative and network management functions, such as Simple Network Management Protocol (SNMP), command-line interface (CLI) console, Telnet, Spanning Tree Protocol (STP), Cisco Discovery Protocol (CDP), and VLAN Trunk Protocol (VTP) are processed on the active Supervisor Engine. On the standby Supervisor Engine, the console port is inactive. Redundant Supervisor Engines are hot swappable. The system continues to operate with the same configuration after it switches over to the redundant Supervisor Engine.

Both the Cisco IOS software and Catalyst OS support the deployment of redundant Supervisor Engines for component level redundancy within a Catalyst 6500 chassis. However, the operational model for Supervisor Engine redundancy differs between Cisco IOS software and CatOS.

Note: Redundancy is always enabled and cannot be disabled. Redundancy is enabled anytime the switch has two Supervisor Engines installed on it and the switch decides which specific redundancy mode to use in accordance to the type of images it has. The Cisco IOS and feature set that runs on both Supervisors must be the same for SSO redundancy.

Hybrid Mode

In CatOS, the foundation for supervisor redundancy is the high availability feature. This feature allows systems with dual supervisors to synchronize the protocol states between the active and standby Supervisor Engines. If an active supervisor failure were to take place, the standby supervisor then takes over system operation with accurate and up-to-date state information of the protocols that run on the switch. This allows a supervisor failover to take place in one to three seconds and requires no network reconvergence for Layer 2, 3, and 4 protocols. From a router perspective, the MSFC engines can be configured for redundancy as well with hybrid software.

The Catalyst OS High Availability feature was disabled by default until Cisco Catalyst OS Release 8.5. The alternative is referred to as fast switchover. The fast switchover feature is the predecessor to the high availability feature. Therefore, it is the Supervisor Engine switchover mechanism in place when high availability is disabled or not supported in the software version. In order to reduce the switchover time, this feature skips some events that typically take place when a Supervisor Engine fails. Specifically, the fast switchover mechanism allows each line card to skip the respective software downloads and a portion of the diagnostics, which are normally a part of system re-initialization. The switchover still includes the restart of all protocols (Layer 2 and above), as well as the reset of all ports.

The switchover performance with default settings that results takes approximately 28 seconds, plus the time it takes for the protocols to restart. High availability removes this limitation. High availability allows the active Supervisor Engine to communicate with the standby Supervisor Engine. This keeps feature protocol states synchronized. Synchronization between the Supervisor Engines allows the standby Supervisor Engine to take over in the event of a failure.

By default on the Cisco Catalyst 6500 Series Switch, the Catalyst OS software images on the active and the standby Supervisor Engines must be the same. If the two supervisor images are not the same version during system bootup, the active Supervisor Engine downloads its current boot image to the standby Supervisor Engine. The NVRAM configuration of the active Supervisor Engine is also synchronized between the Supervisor Engines.

The second portion of the Catalyst OS High Availability feature is called versioning. It depends on the high availability feature enabled in a dual Supervisor Engine configuration. This allows different but compatible images to run on the active and standby Supervisor Engines, thus disables the default supervisor image synchronization process. This feature is primarily used to simplify the software upgrade process when two Supervisor Engines are involved.

Hybrid systems with redundant supervisor/MSFC combinations can optionally have two active MSFCs in the same chassis (referred to as Dual Router Mode). In this configuration, Hot Standby Router Protocol (HSRP) is configured internally between both active MSFCs. With Cisco IOS software, the standby MSFC is not fully operational. Therefore, it is not possible to run internal HSRP between the two MSFCs. External HSRP from the Cisco Catalyst 6500 to other routers in the network is supported in either Route Processor Redundancy (RPR), Route Processor Redundancy Plus (RPR+), or non-stop forwarding with stateful switchover (NSF/SSO) mode with the Cisco IOS software.

Refer to Configuring Redundant Connections for more information.

Native Mode

Cisco IOS software on the Catalyst 6500 supports RPR, also known as Enhanced High System Availability (EHSA), RPR+, NSF/SSO and single router mode with stateful switchover (SRM/SSO). In this operational model, one supervisor/MSFC pair is fully operational and the other pair is in standby mode.

The **show module** command lists the active and standby supervisors. There are heartbeat messages between two pairs to ensure rapid failure detection. There is no stateful protocol redundancy between Supervisor Engines with RPR or RPR+. The SSO redundancy mode provides the stateful protocol redundancy between Supervisor Engines in Cisco IOS and is equivalent in terms of functionality to the Cisco Catalyst OS High Availability redundancy mode.

In Cisco IOS software, the supervisor and MSFC are each responsible for different functions and protocols (Layer 2 vs. Layer 3). However, the system is dependent on the availability of both engines for proper operation. Failure of either the supervisor or the MSFC in RPR/RPR+/SSO mode causes a switchover from the active supervisor to the standby supervisor/MSFC.

Note: In Hybrid mode, the Supervisor Engine can remain fully operational if one MSFC fails. A MSFC failure does not necessarily cause a supervisor switchover, but can cause an MSFC failover only. This allows a cross model where the active Policy Feature Card (PFC) and the Switch Processor (SP) that runs Catalyst OS is fully functional in one slot, whereas the Route Processor (RP)/MSFC is fully functional in another slot.

This section provides an overview of supervisor redundancy characteristics with RPR, RPR+, NSF/SSO and SRM/SSO:

- **RPR**—The first redundancy mode of operation introduced in Cisco IOS software. In RPR mode, the startup configuration and boot registers are synchronized between the active and standby supervisors, the standby is not fully initialized, and images between the active and standby supervisors do not need to be the same. Upon switchover, the standby supervisor becomes active automatically, but it must complete the boot process. In addition, all line cards are reloaded and the hardware is reprogrammed. The RPR switchover time is 2 or more minutes.

- **RPR+**—An enhancement to RPR in which the standby supervisor is completely booted and line cards do not reload upon switchover. The configuration that runs is synchronized between the active and the standby supervisors. All synchronization activities inherited from RPR are also performed. The synchronization is done before the switchover, and the information synchronized to the standby is used when the standby becomes active to minimize the downtime. No link layer or control-plane information is synchronized between the active and the standby supervisors. Interfaces can bounce after switchover, and the hardware contents need to be reprogrammed. The RPR+ switchover time is 30 or more seconds. The actual failover time is dependent on the size and complexity of the configuration.

- **NSF/SSO**—Both the Cisco IOS software and the CatOS support NSF with SSO. The key differentiators apply in where and how these features are applied with the more advanced forms of these features deployed first in Cisco IOS. SSO expands the RPR+ capabilities to provide transparent failover of Layer 2 protocols when a supervisor failure occurs. SSO is stateful for Layer 2 protocols. The PFC and Distributed Forwarding Card (DFC) hardware tables are maintained across a switchover. This allows for transparent failover at Layer 2 and Layer 4. NSF works in conjunction with SSO to ensure Layer 3 integrity after a switchover. It allows a router that experiences the failure of an active supervisor to continue forwarding data packets along known routes, while the routing protocol information is recovered and validated. This forwarding can continue to take place by the leverage of restart mechanisms that allow peering arrangements to recover upon failover. This avoids unnecessary route flaps and network instability. The failover time is 0 to 3 seconds with NSF/SSO.

- **SRM/SSO**—When the switch is powered on, SRM with SSO runs between the two Supervisor Engines. The Supervisor Engine that boots first becomes the active Supervisor Engine. The MSFC and PFC become fully operational. The configuration of the redundant Supervisor Engine and MSFC is exactly the same as the active Supervisor Engine and MSFC. Processes, such as routing protocols, are created on both the active MSFC and the redundant MSFC. The redundant Supervisor Engine is fully initialized and configured, which shortens the switchover time. The active Supervisor Engine checks the image version of the redundant Supervisor Engine when the redundant Supervisor Engine comes online. If the image on the redundant Supervisor Engine does not match the image on the active Supervisor Engine, RPR mode is used. If the active Supervisor Engine or MSFC fails, the redundant Supervisor Engine and MSFC become active. SRM with SSO supports a switchover time of 0 to 3 seconds for Layer 2 unicast traffic.

  Note: SRM with SSO is supported only on Supervisor Engine 720 and Supervisor Engine 32.

Refer to these documents for more information:

- [RPR and RPR+ Supervisor Engine Redundancy](#)

- [NSF with SSO Supervisor Engine Redundancy](#)

Software Upgrade

In this section, you are presented with the information to upgrade the software images on a Catalyst 6500 Series Switch with redundant Supervisor Engines.

Note: This procedure can impact the data traffic. Cisco recommends that you perform this procedure during a scheduled maintenance window.

Note: Use the [Cisco CLI Analyzer](#) to obtain more information on the commands used in this section. Only registered Cisco users have access to internal Cisco tools and information.

Native Mode

In this section, you are presented with the information to upgrade the software images on a Catalyst 6500 Series Switch with redundant Supervisor Engines that run in Native mode.

It is recommended that a console connection be available for both Supervisor Engines for this procedure. The console port on the active Supervisor Engine is active and that on the standby Supervisor Engine is

inactive.

> **Note**: The software images that this document uses are for example purposes only. Replace the images with the images that you use in your switch environment.

Complete these steps in order to upgrade the Cisco IOS software images on the active and standby Supervisor Engines:

1. Establish a console connection to the active Supervisor Engine and verify that the image version runs on the Supervisor Engines.

   ```
   <#root>

   Cat-6509#

   show version

   Cisco Internetwork Operating System Software
   Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M),
   Version 12.2(18)SXF, RELEASE SOFTWARE (fc1)
   Technical Support: http://www.cisco.com/techsupport
   Copyright (c) 1986-2005 by cisco Systems, Inc.
   Compiled Fri 09-Sep-05 21:36 by ccai
   Image text-base: 0x40101040, data-base: 0x42CC0000

   ROM: System Bootstrap, Version 12.2(17r)SX3, RELEASE SOFTWARE (fc1)

   BOOTLDR: s3223_rp Software (s3223_rp-IPBASEK9-M),
   Version 12.2(18)SXF, RELEASE SOFTWARE (fc1)
   ```

   > **Note**: If you try to establish a console connection to the standby Supervisor Engine, this message displays:

   ```
   <#root>

   Cat-6509-sdby>
   Standby console disabled
   ```

2. Check the status of the Supervisor Engine modules.

   ```
   <#root>

   Cat-6509#

   show module

   Mod Ports Card Type                                  Model              Serial No.
   --- ----- ------------------------------------ ------------------ -----------
   ```

5

```
        9

Supervisor Engine 32 8GE (Active)

        WS-SUP32-GE-3B      SAD084401JD


6

    9

Supervisor Engine 32 8GE (Hot)

          WS-SUP32-GE-3B       SAD084401GG

!--- The active Supervisor Engine is in slot 5 and standby is in slot 6.

  7   48  48 port 10/100 mb RJ45                    WS-X6348-RJ-45      SAL0618006V

Mod MAC addresses                            Hw     Fw           Sw           Status
--- -------------------------------- ------ ------------ ------------ -------
  5   0030.f273.a008 to 0030.f273.a013   0.406 12.2(18r)SX2 12.2(18)SXF  Ok
  6   0030.f273.9f90 to 0030.f273.9f9b   0.406 12.2(18r)SX2 12.2(18)SXF  Ok
  7   0009.1264.b648 to 0009.1264.b677   6.1   5.4(2)       8.5(0.46)RFW Ok

!--- Output suppressed.
```

The module status of the standby Supervisor Engine in the **show module** command output is different for the different redundancy modes for Native Cisco IOS:

- RPR—Status shows **Cold** .

  Cold redundancy refers to the degree of resiliency that a redundant system traditionally provides. A redundant system is cold when no state information is maintained between the backup or standby system and the system it protects.

- RPR+—Status shows **Warm** .

  Warm redundancy refers to a degree of resiliency beyond the cold standby system. In this case, the redundant system is partially prepared. However, the system does not have all the state information that the primary system knows for an immediate take-over. Some additional information must be determined or gleaned from the traffic flow or the peer network devices to handle packet forwarding.

- SSO—Status shows **Hot** .

  Hot redundancy refers to a degree of resiliency where the redundant system is fully prepared to handle the traffic of the primary system. Substantial state information is saved, so the network service is continuous, and the effect on traffic flow is minimal or nil in the case of a failover.

3. Verify the redundancy mode status from the active Supervisor Engine.

   ```
   <#root>

   Cat-6509#

   show redundancy
   ```

```
Redundant System Information :
------------------------------
        Available system uptime = 8 hours, 32 minutes
Switchovers system experienced = 0
              Standby failures = 0
         Last switchover reason = none

                 Hardware Mode = Duplex


Configured Redundancy Mode = sso
    Operating Redundancy Mode = sso

               Maintenance Mode = Disabled
                 Communications = Up


Current Processor Information

:
------------------------------


Active Location = slot 5


Current Software state

 =

ACTIVE

       Uptime in current state = 2 hours, 14 minutes
                  Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M),
Version 12.2(18)SXF, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Fri 09-Sep-05 21:36 by ccai
                           BOOT = disk0:s3223-ipbasek9-mz.122-18.SXF.bin,12;
                        BOOTLDR =
         Configuration register = 0x2102


Peer Processor Information

 :
---------------------------


Standby Location = slot 6


Current Software state

 =

STANDBY HOT

       Uptime in current state = 31 minutes
                  Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M),
Version 12.2(18)SXF, RELEASE SOFTWARE (fc1)
```

```
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Fri 09-Sep-05 21:36 by ccai
                        BOOT = disk0:s3223-ipbasek9-mz.122-18.SXF.bin,12;
                   BOOTLDR =
        Configuration register = 0x2102
Cat-6509#
```

✎ **Note**: The default redundancy mode of operation with Supervisor Engine 32 is SSO with same image versions and RPR if different image versions are installed.

---

4. Verify the boot variables for both of the Supervisor Engines.

   <#root>

   Cat-6509#

   show bootvar

   BOOT variable = disk0:s3223-ipbasek9-mz.122-18.SXF.bin

   ```
   ,12;
   CONFIG_FILE variable does not exist
   BOOTLDR variable =
   Configuration register is 0x2102

   Standby is up
   Standby has 983040K/65536K bytes of memory.
   ```

   Standby BOOT variable = disk0:s3223-ipbasek9-mz.122-18.SXF.bin

   ```
   ,12;
   Standby CONFIG_FILE variable does not exist
   Standby BOOTLDR variable =
   Standby Configuration register is 0x2102
   ```

5. Log your console session as a best practice.

   The log enables you to capture a record of the session and compare the log to the steps in this document, if you need to troubleshoot.

   For example, in HyperTerminal, choose **Transfer** > **Capture Text** in order to log a console session.

   Refer to [Connecting a Terminal to the Console Port on Catalyst Switches](#) for more information.

6. Issue the **copy start tftp** command in order to back up the configuration.

   If you back up the configuration, the file can serve as a reference after the upgrade. Refer to [Managing Software Images and Working with Configuration Files on Catalyst Switches](#) for more information on the use of the **copy start tftp** command to back up configuration files.

7. Verify that the Cisco IOS image (s3223*) required for the upgrade is on either Supervisor Engine bootflash (**sup-bootdisk:** and **subordinatesup-bootdisk:**), or on the CompactFlash card (**disk0:** and **subordinatedisk0:**) of both the Supervisor Engines.

```
<#root>

Cat-6509#dir disk0:
Directory of disk0:/

1  -rw-    27267012  Oct 12 2006 21:28:42 +00:00  s3223-ipbasek9-mz.122-18.SXF.bin

2  -rw-    27966916  Oct 12 2006 21:46:16 +00:00  s3223-ipbasek9-mz.122-18.SXF6.bin


!--- This is the CompactFlash card on the active Supervisor Engine.
!--- This is the Cisco IOS software image (s3223*) release for this upgrade.

63971328 bytes total (8736768 bytes free)
Cat-6509#
```

```
<#root>

Cat-6509#

dir subordinatedisk0:

Directory of subordinatedisk0:/

1  -rw-    27267012  Oct 12 2006 21:36:22 +00:00  s3223-ipbasek9-mz.122-18.SXF.bin

2  -rw-    27966916  Oct 12 2006 21:51:20 +00:00  s3223-ipbasek9-mz.122-18.SXF6.bin


!--- This is the CompactFlash card on the standby Supervisor Engine.
!--- This is the Cisco IOS software image (s3223*) release for this upgrade.

63971328 bytes total (8736768 bytes free)
Cat-6509#
```

If you do not have the Cisco IOS image for upgrade on either Supervisor bootflash (**sup-bootdisk:** and **subordinatesup-bootdisk:**) or on CompactFlash card (**disk0:** and **subordinatedisk0:**), go to step 8. If you have the Cisco IOS image installed, go to step 9.

8. Complete this step only if the Cisco IOS Software image (s3223*) is not present from either Supervisor Engine bootflash (**sup-bootdisk:** and **subordinatesup-bootdisk:**) or on CompactFlash card (**disk0:** and **subordinatedisk0:**). **Step 7** determines the need for this step.

Note: You need to format the CompactFlash if it has not been used before, or if it was formatted with use of the CatOS Software algorithm. In order to format CompactFlash card on a Supervisor Engine 32, issue the **format disk0:** command. You can also free up space as necessary on the Flash devices. Issue the **delete sup-bootdisk: filename** or **delete disk0: filename** command in order to delete the file.

Issue the **copy tftp sup-bootdisk:** command first, then the **copy tftp subordinatesup-bootdisk:** or **copy sup-bootdisk: subordinatesup-bootdisk:** command in order to download the image to the Supervisor Engine bootflashes. Or, issue the **copy tftp disk0:** command first, then the **copy tftp subordinatedisk0:** or **copy disk0: subordinatedisk0:** command in order to download the image to the CompactFlash cards.

```
<#root>

Cat-6509#

copy tftp disk0:

Address or name of remote host []? 10.1.1.2
Source filename []? s3223-ipbasek9-mz.122-18.SXF6.bin
Destination filename [s3223-ipbasek9-mz.122-18.SXF6.bin]?
Accessing tftp://10.1.1.2/s3223-ipbasek9-mz.122-18.SXF6.bin...
Loading s3223-ipbasek9-mz.122-18.SXF6.bin from 10.1.1.2
(via FastEthernet1/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 27966916 bytes]
27966916 bytes copied in 222.684 secs (125590 bytes/sec)
Verifying compressed Cisco IOS image checksum...
Verified compressed Cisco IOS image checksum for disk0:
/s3223-ipbasek9-mz.122-18.SXF6.bin
Cat-6509#
```

```
<#root>

Cat-6509#

copy tftp subordinatedisk0:

Address or name of remote host []? 10.1.1.2
Source filename []? s3223-ipbasek9-mz.122-18.SXF6.bin
Destination filename [s3223-ipbasek9-mz.122-18.SXF6.bin]?
Accessing tftp://10.1.1.2/s3223-ipbasek9-mz.122-18.SXF6.bin...
Loading s3223-ipbasek9-mz.122-18.SXF6.bin from 10.1.1.2
(via FastEthernet1/1):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 27966916 bytes]
27966916 bytes copied in 275.427 secs (101540 bytes/sec)
Verifying compressed Cisco IOS image checksum...
Verified compressed Cisco IOS image checksum for subordinatedisk0:
/s3223-ipbasek9-mz.122-18.SXF6.bin
Cat-6509#
```

9. Configure the boot statement to boot the new image and save the configuration.

```
<#root>

Cat-6509#

show run

Building configuration...

Current configuration : 4933 bytes
!
upgrade fpd auto
version 12.2
```

```
service timestamps debug uptime
service timestamps log datetime msec
no service password-encryption
service counters max age 5
!
hostname Cat-6509
!

boot system disk0:s3223-ipbasek9-mz.122-18.SXF.bin


!--- This is the current boot statement.

!
no aaa new-model
ip subnet-zero

!--- Output suppressed.
```

<#root>

Cat-6509#

conf t

```
Enter configuration commands, one per line.  End with CNTL/Z.
Cat-6509(config)#
```

no boot system disk0:s3223-ipbasek9-mz.122-18.SXF.bin

!--- This removes the current boot statement.

<#root>

Cat-6509(config)#

boot system disk0:s3223-ipbasek9-mz.122-18.SXF6.bin

!--- This modifies the boot statement to boot from the new image.

Cat-6509(config)#

^Z

Cat-6509#

<#root>

Cat-6509#

copy run start

```
!--- This also triggers a manual synchronization of
!--- startup configuration on the standby Supervisor Engine.

Destination filename [startup-config]?
Building configuration...

*Oct 13 03:21:05.331:

%PFINIT-SP-5-CONFIG_SYNC:
Sync'ing the startup configuration to the standby Router. [OK]

Cat-6509#
```

<#root>

```
Cat-6509#
```

show bootvar


```
!--- This verifies the modified boot statements.
```

BOOT variable = disk0:s3223-ipbasek9-mz.122-18.SXF6.bin

```
,12;
CONFIG_FILE variable does not exist
BOOTLDR variable =
Configuration register is 0x2102

Standby is up
Standby has 983040K/65536K bytes of memory.
```

Standby BOOT variable = disk0:s3223-ipbasek9-mz.122-18.SXF6.bin

```
,12;
Standby CONFIG_FILE variable does not exist
Standby BOOTLDR variable =
Standby Configuration register is 0x2102
```

✎ **Note**: The configuration register in the startup-config must be set to **autoboot (0x2102)**.

---

10. Reset the standby Supervisor Engine.

✎ **Note**: Before you reset the standby Supervisor Engine, make sure you wait long enough to ensure that all configuration synchronization changes have completed.

<#root>

```
Cat-6509#
```

hw-module module 6 reset

```
!--- This resets the standby Supervisor Engine in slot 6.

Proceed with reset of standby supervisor? [confirm]
% reset issued for standby supervisor
Cat-6509#
*Oct 13 03:21:50.507: %OIR-SP-3-PWRCYCLE: Card in module 6,
is being power-cycled (Module reset)
*Oct 13 03:21:50.895: %PFREDUN-SP-6-ACTIVE: Standby processor
removed or reloaded, changing to Simplex mode
*Oct 13 03:24:27.163:

%PFREDUN-SP-4-VERSION_MISMATCH:
Defaulting to RPR mode (Different software versions)


!--- Redundancy mode changes to RPR during software upgrade.

*Oct 13 03:24:28.183: %PFREDUN-SP-6-ACTIVE: Standby initializing for RPR mode
*Oct 13 03:24:28.467: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00
to ensure console debugging output.
```

11. Wait for the standby Supervisor Engine to come online and synchronize the configuration.

```
<#root>

*Oct 13 03:24:28.599:

%PFINIT-SP-5-CONFIG_SYNC:
Sync'ing the startup configuration to the standby Router.


*Oct 13 03:24:30.883: %DIAG-SP-6-RUN_MINIMUM: Module 6:
Running Minimal Diagnostics...
*Oct 13 03:24:33.486: %DIAG-SP-6-DIAG_OK: Module 6:
Passed Online Diagnostics
*Oct 13 03:24:33.722: %OIR-SP-6-INSCARD: Card inserted in slot 6,
interfaces are now online
Cat-6509#
```

12. Verify the redundancy status.

Note: In order to run in RPR+ or SSO redundancy mode, image versions must be the same on the standby and active Supervisor Engines. In these redundancy modes, the active Supervisor Engine checks the image version of the standby Supervisor Engine when the standby Supervisor Engine comes online. If the image on the standby Supervisor Engine does not match the image on the active Supervisor Engine, the software sets the redundancy mode to RPR while a software upgrade is performed, and sets it back to SSO when the software upgrade is complete.

```
<#root>

Cat-6509#

show module
```

```
Mod Ports Card Type                           Model             Serial No.
--- ----- ------------------------------------ ----------------- -----------
  5    9  Supervisor Engine 32 8GE (Active)    WS-SUP32-GE-3B    SAD084401JD


6    9  Supervisor Engine 32 8GE (Cold)

       WS-SUP32-GE-3B      SAD084401GG
  7   48  48 port 10/100 mb RJ45               WS-X6348-RJ-45    SAL0618006V

Mod MAC addresses                     Hw    Fw           Sw           Status
--- -------------------------------- ------ ------------ ------------ -------


5

  0030.f273.a008 to 0030.f273.a013   0.406 12.2(18r)SX2

12.2(18)SXF

  Ok


6

  0030.f273.9f90 to 0030.f273.9f9b   0.406 12.2(18r)SX2

12.2(18)SXF6

 Ok
  7  0009.1264.b648 to 0009.1264.b677   6.1   5.4(2)       8.5(0.46)RFW Ok
```

!--- Output suppressed.

<#root>

Cat-6509#

show redundancy states

```
       my state = 13 -ACTIVE
     peer state = 4  -STANDBY COLD
           Mode = Duplex
           Unit = Primary
        Unit ID = 5

Redundancy Mode (Operational) = rpr
Redundancy Mode (Configured)  = sso
Redundancy State              = rpr
```

!--- Output suppressed.
!--- This verifies that the operational redundancy mode has
!--- changed to RPR during the software upgrade.

13. Manually switchover to the standby Supervisor Engine in slot 6.

<#root>

Cat-6509#

redundancy force-switchover

!--- This reloads the active unit and forces switchover to standby [confirm].

Preparing for switchover..
*Oct 13 03:50:38.167: %SYS-SP-3-LOGGER_FLUSHING:
System pausing to ensure console debugging output.
*Oct 13 03:50:38.167: %OIR-SP-6-CONSOLE:
Changing console ownership to switch processor

!--- Output suppressed.

<#root>

MAC based EOBC installed

00:00:04: %SYS-3-LOGGER_FLUSHING: System pausing to ensure
console debugging output.

00:00:04: %PFREDUN-6-STANDBY: Initializing as STANDBY processor

!--- This Supervisor Engine is initialized as standby.

00:00:05: %SYS-3-LOGGER_FLUSHING: System pausing to ensure
console debugging output.
00:00:04: %SYS-3-LOGGER_FLUSHED: System was paused for 00:00:00
to ensure console debugging output.

!--- Output suppressed.

<#root>

Press RETURN to get started!

00:01:21: STDBY: RP: Currently running ROMMON from S (Gold) region
*Oct 13 03:54:38.319: %SYS-STDBY-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M),
Version 12.2(18)SXF6, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 19:43 by tinhuang
*Oct 13 03:54:38.343: %SYS-STDBY-6-BOOTTIME:
Time taken to reboot after reload = 240 seco

Cat-6509-sdby>
Standby console disabled

!--- The Supervisor Engine in slot 5 now becomes the standby.

The old active Supervisor Engine in slot 5 reboots with the new image and becomes the standby Supervisor Engine.

Note: Establish a console connection to the Supervisor Engine in slot 6 simultaneously when the switchover is initiated from Supervisor Engine in slot 5.

Note: In middle of the software upgrade procedure, the operational redundancy mode is RPR. This is evident from the **show redundancy states** command output shown in step 12. In RPR redundancy, during switchover, all switching modules are powered on again. So there is be a few minutes of downtime. During normal switchovers, if the operational redundancy is SSO, the installed switching modules are not reloaded, as both the startup and config that runs are synchronized continually from active to standby supervisor engine. The new active supervisor engine uses the current configuration.

---

14. Monitor the console messages on Supervisor Engine in slot 6.

```
<#root>

!--- Output suppressed.

00:01:21: %PFREDUN-SP-STDBY-6-STANDBY: Ready for RPR mode
00:01:22: %SYS-SP-STDBY-3-LOGGER_FLUSHED: System was paused for 00:00:00
to ensure console debugging output.

00:27:23: %PFREDUN-SP-STDBY-6-ACTIVE: Initializing as ACTIVE processor


!--- The Supervisor Engine is initialized as active.

00:27:23: %SYS-SP-STDBY-3-LOGGER_FLUSHED: System was paused for 00:00:00
to ensure console debugging output.

!--- Output suppressed.




00:27:48: %SYS-SP-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_sp Software (s3223_sp-IPBASEK9-M),
Version 12.2(18)SXF6, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 19:43 by tinhuang
00:27:48: SP: Currently running ROMMON from S (Gold) region
*Oct 13 03:51:07.331: %OIR-SP-6-INSPS: Power supply inserted in slot 1
*Oct 13 03:51:07.387: %C6KPWR-SP-4-PSOK: power supply 1 turned on.
*Oct 13 03:51:09.907: %C6KENV-SP-4-FANHIOUTPUT:
```

```
Version 2 high-output fan-tray is in effect
*Oct 13 03:51:13.419: %OIR-SP-6-INSCARD:
Card inserted in slot 6, interfaces are now online
Cat-6509>

!--- The Supervisor Engine in slot 6 now becomes the active.
```

15. Verify the status of the modules from the active Supervisor Engine.

```
<#root>

!--- Output suppressed.

*Oct 13 03:53:46.531: %PFREDUN-SP-6-ACTIVE: Standby initializing for SSO mode
*Oct 13 03:53:46.703: %SYS-SP-3-LOGGER_FLUSHED: System was paused for 00:00:00
to ensure console debugging output.
*Oct 13 03:53:48.199: %PFINIT-SP-5-CONFIG_SYNC: Sync'ing the startup configuration
to the standby Router.
*Oct 13 03:54:22.919: %DIAG-SP-6-RUN_MINIMUM: Module 5:
Running Minimal Diagnostics...
*Oct 13 03:54:25.547: %DIAG-SP-6-DIAG_OK: Module 5:
Passed Online Diagnostics
*Oct 13 03:54:26.299: %OIR-SP-6-INSCARD: Card inserted in slot 5,
interfaces are now online.

!--- Output suppressed.

Cat-6509>

enable

Cat-6509#

show module


Mod Ports Card Type                                   Model              Serial No.
--- ----- ------------------------------------- ------------------ -----------


5    9   Supervisor Engine 32 8GE (Hot)

        WS-SUP32-GE-3B      SAD084401JD


6    9   Supervisor Engine 32 8GE (Active)

         WS-SUP32-GE-3B      SAD084401GG

!--- The active Supervisor Engine is in slot 6 and standby is in slot 5.

  7   48   48 port 10/100 mb RJ45                     WS-X6348-RJ-45     SAL0618006V

Mod MAC addresses                       Hw     Fw           Sw           Status
--- ---------------------------------- ------ ------------ ------------ -------
  5  0030.f273.a008 to 0030.f273.a013   0.406 12.2(18r)SX2 12.2(18)SXF6 Ok
  6  0030.f273.9f90 to 0030.f273.9f9b   0.406 12.2(18r)SX2 12.2(18)SXF6 Ok
  7  0009.1264.b648 to 0009.1264.b677   6.1   5.4(2)       8.5(0.46)RFW Ok
```

!--- Output suppressed.

16. Verify the redundancy status to see if the system performs as expected.

<#root>

Cat-6509#

show redundancy

Redundant System Information :

          Available system uptime = 10 hours, 12 minutes
Switchovers system experienced = 1
              Standby failures = 1
        Last switchover reason = user initiated

                 Hardware Mode = Duplex

Configured Redundancy Mode = sso
      Operating Redundancy Mode = sso

!--- This verifies that software has set the redundancy mode
!--- back to SSO after the software upgrade.

              Maintenance Mode = Disabled
                Communications = Up

Current Processor Information :

Active Location = slot 6
        Current Software state = ACTIVE

       Uptime in current state = 7 minutes
                 Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 19:43 by tinhuang
                          BOOT = disk0:s3223-ipbasek9-mz.122-18.SXF6.bin,12;
                   CONFIG_FILE =
                       BOOTLDR =
        Configuration register = 0x2102

Peer Processor Information :

Standby Location = slot 5
        Current Software state = STANDBY HOT

       Uptime in current state = 2 minutes
                 Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M), Version 12.2(18)SXF6,

```
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 19:43 by tinhuang
                          BOOT = disk0:s3223-ipbasek9-mz.122-18.SXF6.bin,12;
                CONFIG_FILE =
                    BOOTLDR =
        Configuration register = 0x2102
```

> ✎ **Note**: You can force another switchover in which the standby Supervisor Engine becomes the active Supervisor Engine in order to restore the original roles of the Supervisor Engines (their active and standby status).

17. Verify the image version that runs on the Supervisor Engine after the software upgrade.

```
<#root>

Cat-6509#

show version

Cisco Internetwork Operating System Software
Cisco IOS (tm) s3223_rp Software (s3223_rp-IPBASEK9-M),
Version 12.2(18)SXF6, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 19:43 by tinhuang
Image text-base: 0x40101040, data-base: 0x42D28000

ROM: System Bootstrap, Version 12.2(17r)SX3, RELEASE SOFTWARE (fc1)

BOOTLDR: s3223_rp Software (s3223_rp-IPBASEK9-M),
Version 12.2(18)SXF6, RELEASE SOFTWARE (fc1)


!--- Output suppressed.
```

The procedure to upgrade Cisco IOS software on redundant Supervisor Engines is complete.

Hybrid Mode

In this section, you are presented with the information to upgrade the software images on a Catalyst 6500 Series Switch with redundant Supervisor Engines and MSFC that runs in Hybrid mode.

It is recommended that a console connection be available for both Supervisor Engines for this procedure. The console port on the active Supervisor Engine is active and that on the standby Supervisor Engine is inactive.

> ✎ **Note**: The software images that this document uses are for example purposes only. Replace the images with the images that you use in your switch environment.

Upgrade Catalyst OS

Complete these steps in order to upgrade the Catalyst OS image on the active and standby Supervisor Engines:

1. Establish a console connection to the active Supervisor Engine and verify the image version that runs on the Supervisor Engines.

   <#root>

   Console> (enable)

   show version

   ```
   WS-C6509 Software, Version NmpSW: 8.4(1)
   Copyright (c) 1995-2004 by Cisco Systems
   NMP S/W compiled on Dec 27 2004, 18:36:22

   System Bootstrap Version: 12.2
   System Boot Image File is 'disk0:cat6000-sup32pfc3k8.8-5-6.bin'
   System Configuration register is 0x2102

   Hardware Version: 2.0  Model: WS-C6509  Serial #: SCA044903GE

   PS1  Module: WS-CAC-3000W    Serial #: SNI0803AL1X

   Mod Port Model                Serial #     Versions
   --- ---- ------------------ ----------- -------------------------------------
   5   9    WS-SUP32-GE-3B

        SAD084401JD Hw : 0.406
                                             Fw : 12.2
                                             Fw1: 8.5(6)


   Sw : 8.5(6)
                                             Sw1: 8.5(6)

            WS-F6K-PFC3B       SAD083905FJ Hw : 1.0
                                             Sw :

   6   9    WS-SUP32-GE-3B

        SAD084401GG Hw : 0.406
                                             Fw : 12.2
                                             Fw1: 8.5(6)


   Sw : 8.5(6)
                                             Sw1: 8.5(6)


   !--- Output suppressed.
   ```

   The images that this document uses are for example purposes only. Replace the images with the images that you use in your switch environment.

Note: If you try to establish a console connection to the standby Supervisor Engine, this message displays as shown in the next code example.

```
<#root>

This module is now in standby mode.
Console is disabled for standby supervisor
```

2. Check the status of the Supervisor Engine modules.

```
<#root>

Console> (enable)

show module

Mod Slot Ports Module-Type              Model              Sub Status
--- ---- ----- ------------------------ ------------------ --- --------
5   5    9     1000BaseX Supervisor     WS-SUP32-GE-3B     yes ok
15  5    1     Multilayer Switch Feature WS-F6K-MSFC2A     no  ok
6   6    9     1000BaseX Supervisor     WS-SUP32-GE-3B     yes standby
16  6    1     Multilayer Switch Feature WS-F6K-MSFC2A     no  standby

!--- The active Supervisor Engine and MSFC are in slot 5
!--- and standby is in slot 6.

7   7    48    10/100BaseTX Ethernet    WS-X6348-RJ-45     no  ok

!--- Output suppressed.
```

Note: The module status of the standby Supervisor Engine and MSFC in the **show module** command output is shown as standby in CatOS.

3. Verify the redundancy mode status from the active Supervisor Engine.

```
<#root>

Console> (enable)

show system highavailability

Highavailability: disabled

Highavailability versioning: disabled
Highavailability Operational-status: OFF(high-availability-not-enabled)
```

```
Console> (enable)
```

Note: The default redundancy mode of operation in CatOS is fast switchover.

Note: High availability versioning option allows you to run the different software images on the active and standby Supervisor Engines. High availability versioning is disabled by default. If the software versions of the two Supervisor Engines are different, or if the NVRAM configuration of the two Supervisor Engines is different, and if you do not enable high availability versioning, the active Supervisor Engine automatically downloads its software image and configuration to the standby Supervisor Engine.

---

4. Verify the boot variables for both of the Supervisor Engines.

<#root>

```
Console> (enable)
```

show boot 5

BOOT variable = bootdisk:cat6000-sup32pfc3k8.8-5-6.bin

```
,1;
CONFIG_FILE variable = bootflash:switch.cfg
```

Configuration register is 0x2102

```
ignore-config: disabled
auto-config: non-recurring, overwrite, sync disabled
ROMMON console baud: 9600
boot: image specified by the boot system commands

Image auto sync is enabled
Image auto sync timer is 120 seconds
```

<#root>

```
Console> (enable)
```

show boot 6

BOOT variable = bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-6.bin

```
,1;
CONFIG_FILE variable =
```

```
Configuration register is 0x2102

ignore-config: disabled
auto-config: non-recurring, overwrite, sync disabled
ROMMON console baud: 9600
boot: image specified by the boot system commands

Image auto sync is enabled
Image auto sync timer is 120 seconds
```

5. Log your console session as a best practice.

   The log enables you to capture a record of the session and compare the log to the steps in this document, if you need to troubleshoot.

   For example, in HyperTerminal, choose **Transfer** > **Capture Text** in order to log a console session. Refer to Understand the Terminal Connection to a Console Port on Catalyst Switches for more information.

6. Issue the **copy config tftp** command on the Supervisor Engine and the **copy start tftp** command on the MSFC in order to back up the configuration.

   If you back up the configuration, the file can serve as a reference after the upgrade. Refer to Managing Software Images and Working with Configuration Files on Catalyst Switches for more information on use of the **copy config tftp** and **copy start tftp** commands to back up configuration files.

7. Verify that the CatOS image (cat6000-sup32*) required for upgrade is on either active Supervisor Engine bootflash (**bootdisk:**) or the CompactFlash card (**disk0:**).

   ```
   <#root>

   Console> (enable)

   dir bootdisk:

    2277    -rw-   10025748     Oct 18 2006 23:34:28 cat6000-sup32pfc3k8.8-5-6.bin
    4725    -rw-   10028036     Oct 19 2006 23:37:18 cat6000-sup32pfc3k8.8-5-7.bin

   !--- Output suppressed.

   220229632 bytes available (35536896 bytes used)
   ```

   If you do not have the CatOS image for upgrade on either active Supervisor Engine bootflash (**bootdisk:**) or the CompactFlash card (**disk0:**), go to step 8. If you have the CatOS image installed, go to step 9.

8. Complete this step only if the CatOS image (cat6000-sup32*) is not present in either the active Supervisor Engine bootflash (**bootdisk:**) or the CompactFlash card (**disk0:**).**Step 7**determines the need for this step.

   Note: You need to format the CompactFlash if it has never been used before, or if it was formatted with use of the Cisco IOS Software algorithm. In order to format CompactFlash card

on a Supervisor Engine 32, issue the [format disk0:](#) command. You can also free up space as necessary on the Flash devices. Issue the **delete bootdisk: filename** or **delete disk0: filename** command in order to delete the file.

Load the new Catalyst OS software image into either the bootflash or CompactFlash card of only the active Supervisor Engine. Issue the **copy tftp bootdisk:** or **copy tftp disk0:** command in order to download the new image to the active Supervisor Engine bootflash or to the CompactFlash card.

```
<#root>

Console> (enable)

copy tftp bootdisk:

IP address or name of remote host []? 10.1.1.2
Name of file to copy from []?cat6000-sup32pfc3k8.8-5-7.bin
128626688 bytes available on device bootdisk, proceed (y/n) [n]? y
/
File has been copied successfully.
Console> (enable)
```

Note: In order to copy the new image to the standby Supervisor Engine bootflash or CompactFlash, you can issue the **copy y/bootdisk:<image.bin> x/bootdisk:** or **copy y/bootdisk:<image.bin> x/disk0:** command (where **y** is the active Supervisor Engine module number and **x** is the standby Supervisor Engine module number given in the **show module** command output).

Verify that the new image is copied into the bootflash or CompactFlash card of the active Supervisor Engine.

```
<#root>

Console> (enable)

dir bootdisk:

 2277   -rw-  10025748     Oct 18 2006 23:34:28 cat6000-sup32pfc3k8.8-5-6.bin
 4725   -rw-  10028036     Oct 19 2006 23:37:18 cat6000-sup32pfc3k8.8-5-7.bin

!--- Output suppressed.

220229632 bytes available (35536896 bytes used)
```

9. Modify the image auto sync timer to the lowest value of 10 seconds in order to speed up the sync process.

By default, it is 120 seconds.

```
<#root>
```

```
Console> (enable)

set boot sync timer 10


Image auto sync timer set to 10 seconds.
```

10. Clear the current boot variable on the active Supervisor Engine.

```
<#root>

Console> (enable)

clear boot system all
```

> ✎ **Note**: When you clear the boot variable on the active Supervisor Engine, this does not clear the boot variable on the standby Supervisor Engine. You need to issue the **clear boot system all 6** command in order to manually clear the boot variable on the standby Supervisor Engine. This step is optional.

```
<#root>

Console> (enable)

show boot 6


BOOT variable = bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-6.bin

,1;
CONFIG_FILE variable = bootflash:switch.cfg

Configuration register is 0x2102
ignore-config: disabled
auto-config: non-recurring, overwrite, sync disabled
ROMMON console baud: 9600
boot: image specified by the boot system commands

Image auto sync is enabled
Image auto sync timer is 10 seconds
```

11. Set the boot variable on the active Supervisor Engine in order to boot the new Catalyst OS software image.

```
<#root>

Console> (enable)

set boot system flash bootdisk:
cat6000-sup32pfc3k8.8-5-7.bin prepend

BOOT variable = bootdisk:cat6000-sup32pfc3k8.8-5-7.bin,1;
```

```
Console> (enable) 2006 Oct 19 04:37:55 %SYS-5-SUP_IMGSYNC:
File synchronization process will start in 10 seconds
2006 Oct 19 04:38:06 %SYS-5-SUP_IMGSYNCSTART:Active supervisor is
synchronizing bootdisk:cat6000-sup32pfc3k8.8-5-7.bin
2006 Oct 19 04:39:50 %SYS-5-SUP_IMGSYNCFINISH:Active supervisor has
synchronized bootdisk:cat6000-sup32pfc3k8.8-5-7.bin
```

You need to format the CompactFlash if it has never been used before, or if it was formatted with use of the Cisco IOS Software algorithm. In order to format CompactFlash card on a Supervisor Engine 32, issue the format disk0: command. You can also free up space as necessary on the Flash devices. Issue the **delete bootdisk: filename** or **delete disk0: filename** command in order to delete the file.

Load the new Catalyst OS software image into either the bootflash or CompactFlash card of only the active Supervisor Engine. Issue the **copy tftp bootdisk:** or **copy tftp disk0:** command in order to download the new image to the active Supervisor Engine bootflash or to the CompactFlash card.

```
<#root>

Console> (enable)

show boot


BOOT variable = bootdisk:cat6000-sup32pfc3k8.8-5-7.bin

,1;
CONFIG_FILE variable =


Configuration register is 0x2102

ignore-config: disabled
auto-config: non-recurring, overwrite, sync disabled
ROMMON console baud: 9600
boot: image specified by the boot system commands

Image auto sync is enabled
Image auto sync timer is 10 seconds




Console> (enable)
```

Note: When you download a new image to the active Supervisor Engine, it is copied to the file system (in bootflash or on a Flash PC card). Because you did or did not configure this image as the boot image, the newly downloaded image is not copied to the standby Supervisor Engine automatically. In order to initiate the synchronization function between the active and standby Supervisor Engines, you must configure this newly downloaded image as the boot image on the

✎ active Supervisor Engine. Synchronization occurs when you change the boot variable. In approximately 120 seconds (here, 10 seconds), the image set as the boot entry on the active Supervisor Engine is copied to the bootflash on the standby Supervisor Engine. This is the image synchronization. This is an internal TFTP of the Catalyst OS image file and takes a few minutes to complete.

✎ **Note**: The configuration register in the startup-config must be set to autoboot (0x2102).

---

12. When the images have been synchronized, verify that the new image is located on the standby Supervisor Engine and the boot variable is properly set.

```
<#root>

Console> (enable)

show boot 6


BOOT variable = bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-7.bin

,
1;bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-6.bin,1;
CONFIG_FILE variable = bootflash:switch.cfg


Configuration register is 0x2102

ignore-config: disabled
auto-config: non-recurring, overwrite, sync disabled
ROMMON console baud: 9600
boot: image specified by the boot system commands

Image auto sync is enabled
Image auto sync timer is 10 seconds
```

✎ **Note**: The image file has a BTSYNC appended to the beginning of the filename. This is to designate that it has been synchronized from the boot-time image of the active Supervisor Engine.

```
<#root>

Console> (enable) dir 6/bootdisk:

2    -rw-   10025748    Oct 19 2006 00:34:08 BTSYNC_cat6000-sup32pfc3k8.8-5-6.bin

2450   -rw-   10028036    Oct 19 2006 04:39:23 BTSYNC_cat6000-sup32pfc3k8.8-5-7.bin


235708416 bytes available (20058112 bytes used)
```

```
Console> (enable)
```

13. Enable high availability versioning on the active Supervisor Engine.

    With high availability versioning enabled, you can have two different but compatible images on the active and standby Supervisor Engines. The active Supervisor Engine exchanges image version information with the standby Supervisor Engine and determines whether the images are compatible to enable high availability. If the active and standby Supervisor Engines do not run compatible image versions, you cannot enable high availability.

    Note: If two software images are incompatible, the software upgrade process impacts the system operation (that is, be greater than the one to three second switchover time of a high-availability switchover) and no NVRAM configuration changes are synchronized between Supervisor Engines.

    Note: There is no software image version compatibility in the 8.x software release train. This includes major releases, such as 8.1(x) to 8.2(x) to 8.3(x) and so on. This also includes sub-releases, such as 8.1(1) to 8.1(2), 8.2(1) to 8.2(2) and so on.

    ```
    <#root>

    Console> (enable)

    set system highavailability versioning enable

    Image versioning enabled.
    ```

    Note: Before the standby Supervisor Engine that runs the new software becomes active, versioning must be enabled. This allows the standby Supervisor Engine to reboot under the new version of CatOS while it remains the standby Supervisor Engine.

14. Reset the standby Supervisor Engine.

    ```
    <#root>

    Console> (enable)

    reset 6

    This command will reset module 6.
    Do you want to continue (y/n) [n]?

    y

    2006 Oct 19 05:24:38 %SYS-5-MOD_RESET:Module 6 reset from Console//
    Resetting module 6...
    Console> (enable) 2006 Oct 19 05:24:50 %SYS-1-SYS_LCPERR1:Module 16:
    RP requested reset of peer RP: MSFC on module 16 will be reset
    2006 Oct 19 05:27:14 %SYS-5-SUP_MODSBY:Module 6 is in standby mode
    2006 Oct 19 05:27:31 %SYS-5-PORT_SSUPOK:Ports on standby supervisor
    ```

```
(module 6) are up
2006 Oct 19 05:27:31 %SYS-3-MOD_PORTINTFINSYNC:Port Interface in sync for Module 6
2006 Oct 19 05:28:29 %SYS-5-MOD_OK:Module 16(WS-F6K-MSFC2A,SAD0844049E) is online




Console> (enable)
```

The standby Supervisor Engine reboots with the new Catalyst OS image. It remains the standby Supervisor Engine and does not affect the operation of the active Supervisor Engine.

15. After the standby Supervisor Engine has rebooted, verify that it runs the new Catalyst OS image.

```
<#root>

Console> (enable)

show version

WS-C6509 Software, Version NmpSW: 8.5(6)
Copyright (c) 1995-2006 by Cisco Systems
NMP S/W compiled on Aug 15 2006, 22:15:41

System Bootstrap Version: 12.2
System Boot Image File is 'bootdisk:cat6000-sup32pfc3k8.8-5-6.bin'
System Configuration register is 0x2102

Hardware Version: 2.0  Model: WS-C6509  Serial #: SCA044903GE

PS1  Module: WS-CAC-3000W    Serial #: SNI0803AL1X

Mod Port Model              Serial #    Versions
--- ---- ------------------ ----------- -------------------------------------
5   9    WS-SUP32-GE-3B     SAD084401JD Hw : 0.406
                                        Fw : 12.2
                                        Fw1: 8.5(6)
                                        Sw : 8.5(6)
                                        Sw1: 8.5(6)
         WS-F6K-PFC3B       SAD083905FJ Hw : 1.0
                                        Sw :
6   9    WS-SUP32-GE-3B     SAD084401GG Hw : 0.406

                                        Fw : 12.2
                                        Fw1: 8.5(7)


Sw : 8.5(7)
                                        Sw1: 8.5(7)

         WS-F6K-PFC3B       SAD08390376 Hw : 1.0

!--- Output suppressed.
```

16. Verify the redundancy status from the active Supervisor Engine.

```
<#root>

Console> (enable)

show system highavailability

Highavailability: disabled
Highavailability versioning: enabled
Highavailability Operational-status: OFF(high-availability-not-enabled)
```

17. Manually switchover to the standby Supervisor Engine in slot 6.

```
<#root>

Console> (enable)

reset 5

This command will force a switch-over to the standby Supervisor module.
Do you want to continue (y/n) [n]?

y

2006 Oct 19 05:40:13 %SYS-5-MOD_RESET:Module 5 reset from Console//




Console> (enable)
```

The old active Supervisor Engine in slot 5 reboots with the new image and becomes the standby Supervisor Engine.

Note: Establish a console connection to the Supervisor Engine in slot 6 simultaneously when the switchover is initiated from Supervisor Engine in slot 5.

18. Wait for the modules to come online and verify the status of the modules from the active Supervisor Engine (slot 6).

```
<#root>

Console> (enable) show module
Mod Slot Ports Module-Type              Model               Sub Status
--- ---- ----- ------------------------ ------------------- --- --------

5   5    9     1000BaseX Supervisor     WS-SUP32-GE-3B      yes standby

15  5    1     Multilayer Switch Feature WS-F6K-MSFC2A       no  standby

6   6    9     1000BaseX Supervisor     WS-SUP32-GE-3B      yes ok

16  6    1     Multilayer Switch Feature WS-F6K-MSFC2A       no  ok
7   7    48    10/100BaseTX Ethernet     WS-X6348-RJ-45      no  ok
```

```
!--- Output suppressed.
```

```
Console> (enable)
```

19. Disable high availability versioning on the active Supervisor Engine.

```
<#root>

Console> (enable)

set system highavailability versioning disable

Image versioning disabled.
Console> (enable) 2006 Oct 19 05:48:48 %SYS-5-SUP_IMGSYNC:
File synchronization process will start in 10 seconds
2006 Oct 19 05:48:59 %SYS-5-SUP_IMGSYNCSTART:Active supervisor is
synchronizing bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-7.bin
2006 Oct 19 05:49:01 %SYS-5-SUP_IMGSYNCFINISH:Active supervisor has
synchronized bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-7.bin
```

```
Console> (enable)
```

If the system operates as expected, the boot configuration on the standby Supervisor Engine (now slot 5) needs to be updated. You can do this when you disable the versioning on the new active Supervisor Engine, which automatically enables the image synchronization feature.

20. Verify the image version that runs on the Supervisor Engines after the software upgrade.

```
<#root>

Console> (enable) show version
WS-C6509 Software, Version NmpSW: 8.5(7)
Copyright (c) 1995-2006 by Cisco Systems
NMP S/W compiled on Oct 13 2006, 11:01:19

System Bootstrap Version: 12.2

System Boot Image File is 'bootdisk:BTSYNC_cat6000-sup32pfc3k8.8-5-7.bin'

System Configuration register is 0x2102

Hardware Version: 2.0  Model: WS-C6509  Serial #: SCA044903GE

PS1  Module: WS-CAC-3000W    Serial #: SNI0803AL1X

Mod Port Model                Serial #    Versions
--- ---- ------------------- ----------- -------------------------------------
```

```
5   9    WS-SUP32-GE-3B

      SAD084401JD Hw : 0.406
                                              Fw : 12.2
                                              Fw1: 8.5(7)


Sw : 8.5(7)
                                              Sw1: 8.5(7)

          WS-F6K-PFC3B        SAD083905FJ Hw : 1.0
                                          Sw :
6   9    WS-SUP32-GE-3B

      SAD084401GG Hw : 0.406
                                              Fw : 12.2
                                              Fw1: 8.5(7)


Sw : 8.5(7)
                                              Sw1: 8.5(7)

          WS-F6K-PFC3B        SAD08390376 Hw : 1.0

!--- Output suppressed.
```

✎ **Note**: You can force another switchover in which the standby Supervisor Engine becomes the active Supervisor Engine in order to restore the original roles of the Supervisor Engines (their active and standby status).

The procedure to upgrade Catalyst OS software on redundant Supervisor Engines is complete.

Upgrade Cisco IOS

Complete these steps in order to upgrade the Cisco IOS image on the active and standby MSFCs when the switch runs in the Hybrid mode:

1. Establish a console connection to the active Supervisor Engine and verify the module status.


```
<#root>

Console> (enable) show module
Mod Slot Ports Module-Type              Model              Sub Status
--- ---- ----- ------------------------ ------------------ --- --------
5   5    9     1000BaseX Supervisor     WS-SUP32-GE-3B     yes ok

15  5    1     Multilayer Switch Feature WS-F6K-MSFC2A      no  ok


!--- Both the active supervisor and active MSFC are in slot 5.

6   6    9     1000BaseX Supervisor     WS-SUP32-GE-3B     yes standby

16  6    1     Multilayer Switch Feature WS-F6K-MSFC2A      no  standby
```

```
!--- Both the standby supervisor and standby MSFC are in slot 6.

7   7    48    10/100BaseTX Ethernet     WS-X6348-RJ-45      no  ok

!--- Output suppressed.
```

✎ **Note**: In RPR mode, the standby MSFC is not shown in the **show module** command output.

---

2. Issue the **switch console** command in order to access the active MSFC.

```
<#root>

Console> (enable)

switch console


Trying Router-15...
Connected to Router-15.
Type ^C^C^C to switch back...
```

If you are connected through a Telnet session or if the active MSFC is on the standby Supervisor Engine, issue the **session 15** or **session 16** command in order to access the active MSFC.

✎ **Note**: Active MSFC can either be on the active or standby Supervisor Engine in Hybrid mode.

---

3. Verify the image version that runs on the active MSFC before you perform the upgrade.

```
<#root>

Router#

show version

Cisco Internetwork Operating System Software
IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Fri 09-Sep-05 18:06 by ccai
Image text-base: 0x40101040, data-base: 0x422E8000

ROM: System Bootstrap, Version 12.2(17r)SX3, RELEASE SOFTWARE (fc1)

BOOTLDR: MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF,
RELEASE SOFTWARE (fc1)


Router uptime is 19 minutes
System returned to ROM by power-on

System image file is "bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF.bin"
```

!--- Output suppressed.

4. Verify the redundancy status from the active MSFC.

<#root>

Router#

show redundancy

Redundant System Information :

         Available system uptime = 20 minutes
Switchovers system experienced = 0
               Standby failures = 0
          Last switchover reason = none

                   Hardware Mode = Duplex

Configured Redundancy Mode = Stateful SwitchOver - SSO
     Operating Redundancy Mode = Stateful SwitchOver - SSO

!--- MSFCs run in the SSO redundancy mode.

                Maintenance Mode = Disabled
                  Communications = Up

Current Processor Information :

Active Location = slot 5

           Current Software state = ACTIVE
          Uptime in current state = 10 minutes
                    Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Fri 09-Sep-05 18:06 by ccai

BOOT = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF.bin

,1;
                     CONFIG_FILE =
                         BOOTLDR =
          Configuration register = 0x2102

Peer Processor Information :

Standby Location = slot 6

           Current Software state = STANDBY HOT

```
         Uptime in current state = 9 minutes
                   Image Version = Cisco Internetwork Operating System Software
      Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF,
      RELEASE SOFTWARE (fc1)
      Technical Support: http://www.cisco.com/techsupport
      Copyright (c) 1986-2005 by cisco Systems, Inc.
      Compiled Fri 09-Sep-05 18:06 by ccai


      BOOT = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF.bin

      ,1;
                        CONFIG_FILE =
                            BOOTLDR =
            Configuration register = 0x2102
```

5. Verify the boot variables for both of the MSFCs.

> <#root>
>
> Router#
>
> **show bootvar**
>
> **BOOT variable = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF.bin**
>
> ,1;
> CONFIG_FILE variable =
> BOOTLDR variable =
>
> **Configuration register is 0x2102**
>
>
> Standby is up
> Standby has 983040K/65536K bytes of memory.
>
>
> **Standby BOOT variable = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF.bin**
>
> ,1;
> Standby CONFIG_FILE variable =
> Standby BOOTLDR variable =
>
> **Standby Configuration register is 0x2102**

6. Issue the <u>dir bootflash:</u> command in order to verify if the new image (c6msfc2a*) required for the upgrade is present in the bootflash of both the MSFCs.

   If the image is not present, issue the **copy tftp bootflash:** or **copy tftp subordinatebootflash:** command in order to copy the new image to both the active and standby MSFC bootflashes.

   ✎ **Note**: If you have dual MSFCs, you must download the image onto the standby MSFC bootflash separately. The image does not automatically download to the standby MSFC.

7. Clear the current boot variables.

```
<#root>

Router#

conf t

Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#

no boot system flash bootflash:
c6msfc2a-ipbase_wan-mz.122-18.SXF.bin

Router(config)#

^Z

Router#

write memory


!--- This synchronizes both the active and standby MSFC start-up configurations.

Building configuration...
[OK]
Router#

show bootvar

BOOT variable =


CONFIG_FILE variable =
BOOTLDR variable =
Configuration register is 0x2102

Standby is up
Standby has 983040K/65536K bytes of memory.


Standby BOOT variable =

Standby CONFIG_FILE variable =
Standby BOOTLDR variable =
Standby Configuration register is 0x2102
```

8. On the active MSFC, specify that the new image is booted when the MSFCs are reloaded.

```
<#root>

Router#

conf t

Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#

boot system flash bootflash:
c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin
```

9. On the active MSFC, issue the **write memory** command in order to ensure that the standby MSFC

startup configuration also gets the boot information.

```
<#root>

Router(config)#

^Z

Router#

write memory

Building configuration...
[OK]
```

10. Verify the new boot variable settings.

```
<#root>

Router#

show bootvar

BOOT variable = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin

,1;
CONFIG_FILE variable =
BOOTLDR variable =
Configuration register is 0x2102

Standby is up
Standby has 983040K/65536K bytes of memory.


Standby BOOT variable = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin

,1;
Standby CONFIG_FILE variable =
Standby BOOTLDR variable =
Standby Configuration register is 0x2102
```

✎ **Note**: The configuration register in the startup-config must be set to **autoboot (0x2102)**.

11. Issue the redundancy reload peer command on the active MSFC in order to reload the standby MSFC.

```
<#root>

Router#

redundancy reload peer


Reload peer [confirm]
Preparing to reload peer
Router#
00:12:37: %RF-3-COMMUNICATION: Communication with the peer Route Processor (RP)
```

```
has been lost.
00:12:37: %RF-3-SIMPLEX_MODE: The peer Route Processor (RP) has been lost
00:13:44: %RF-3-VERSION_MISMATCH: Version Info mismatch; Not running same version
of software on each Route Processor (RP). Cannot run in SSO mode;
will go to RPR mode instead.
00:13:49: %RF-6-NEGOTIATED_RED_MODE: Negotiated Redundancy MODE is RPR
00:13:51: %RF-6-DUPLEX_MODE: The peer Route Processor (RP) has been detected
00:13:51: %RF-3-COMMUNICATION: Communication with the peer Route Processor (RP)
has been established.

!--- Output suppressed.

Router#
```

12. Issue the **show redundancy states** command after few minutes in order to ensure the standby MSFC is fully online.

```
<#root>

Router#

show redundancy states

        my state = 13 -ACTIVE


peer state = 4  -STANDBY COLD


          Mode = Duplex
          Unit = Primary
       Unit ID = 5

Redundancy Mode (Operational) = Route Processor Redundancy

Redundancy Mode (Configured)  = Stateful SwitchOver - SSO
Redundancy State              = Route Processor Redundancy

!--- Output suppressed.
```

Note: Your system is in RPR mode at this time, not in SSO mode. This is because when the two supervisors are on different images, SSO mode does not work. Once they both reload on the same image and the configurations sync, you are back in SSO mode.

---

13. Issue the **redundancy switch-activity force** command in order to perform a manual switchover to the standby MSFC.

```
<#root>

Router#

redundancy switch-activity force
```

```
This will reload the active unit and force a switch of activity [confirm]
Preparing to switch activity

00:16:08: %SYS-5-RELOAD: Reload requested Reload Reason: RF initiated reload.

!--- Output suppressed.

Router-sdby>

!--- The active MSFC reloads and becomes the standby MSFC.
```

The active MSFC reloads and the standby MSFC becomes the newly active MSFC that runs the new image.

14. Verify the image and redundancy mode that run on the standby MSFC.

```
<#root>

Router-sdby#

show version


Cisco Internetwork Operating System Software
Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 17:17 by tinhuang
Image text-base: 0x40101040, data-base: 0x423A8000

ROM: System Bootstrap, Version 12.2(17r)SX3, RELEASE SOFTWARE (fc1)

BOOTLDR: MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)


Router uptime is 2 minutes
System returned to ROM by power-on
System image file is "bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin"

!--- Output suppressed.
```

```
<#root>

Router-sdby#

show redundancy


Redundant System Information :
------------------------------
        Available system uptime = 29 minutes
Switchovers system experienced = 1
```

```
                    Hardware Mode = Duplex


    Configured Redundancy Mode = Stateful SwitchOver - SSO
         Operating Redundancy Mode = Stateful SwitchOver - SSO

                   Maintenance Mode = Disabled
                     Communications = Up

    Current Processor Information :
    ------------------------------


    Standby Location = slot 5
             Current Software state = STANDBY HOT

           Uptime in current state = 2 minutes
                      Image Version = Cisco Internetwork Operating System Software
    Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
    RELEASE SOFTWARE (fc1)
    Technical Support: http://www.cisco.com/techsupport
    Copyright (c) 1986-2006 by cisco Systems, Inc.
    Compiled Mon 18-Sep-06 17:17 by tinhuang
                              BOOT = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin,1;
                           BOOTLDR =
            Configuration register = 0x2102


    Peer (slot: 6, state: ACTIVE) information is not available because
    this is the standby processor
```
15. Enter **Ctrl-C** three times in order to go back to the Supervisor Engine and then verify the module status.

```
    Router#^C



    Router#^C



    Router#^C



    Console> (enable)



    <#root>
```

```
Console> (enable)

show module


Mod Slot Ports Module-Type              Model               Sub Status
--- ---- ----- ------------------------ ------------------- --- --------
5   5    9     1000BaseX Supervisor     WS-SUP32-GE-3B      yes ok

15  5    1     Multilayer Switch Feature WS-F6K-MSFC2A      no  standby

6   6    9     1000BaseX Supervisor     WS-SUP32-GE-3B      yes standby

16  6    1     Multilayer Switch Feature WS-F6K-MSFC2A      no  ok

7   7    48    10/100BaseTX Ethernet    WS-X6348-RJ-45      no  ok
```

> ✎ **Note**: If you issued the **session** command in order to access the MSFC, you must also issue the **exit** command and must not use the **Ctrl-C** keys.

16. Enter into the new active MSFC.

    <#root>

    ```
    Console> (enable)

    session 16

    Trying Router-16...
    Connected to Router-16.
    Escape character is '^]'.




    Router>
    ```

17. Verify the redundancy status to see if the system performs as expected.

    <#root>

    ```
    Router#

    show redundancy


    Redundant System Information :
    ------------------------------
           Available system uptime = 34 minutes
    Switchovers system experienced = 1
                 Standby failures = 0
           Last switchover reason = unsupported

                    Hardware Mode = Duplex
    ```

```
     Configured Redundancy Mode = Stateful SwitchOver - SSO
          Operating Redundancy Mode = Stateful SwitchOver - SSO


     !--- This verifies that software has set the redundancy mode
     !--- back to SSO after the software upgrade.

                  Maintenance Mode = Disabled
                    Communications = Up


Current Processor Information :
------------------------------


Active Location = slot 6

        Current Software state = ACTIVE
      Uptime in current state = 4 minutes
                 Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 17:17 by tinhuang
                          BOOT = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin,1;
                   CONFIG_FILE =
                       BOOTLDR =
        Configuration register = 0x2102


Peer Processor Information :
---------------------------


Standby Location = slot 5

        Current Software state = STANDBY HOT
      Uptime in current state = 3 minutes
                 Image Version = Cisco Internetwork Operating System Software
Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 17:17 by tinhuang
                          BOOT = bootflash:c6msfc2a-ipbase_wan-mz.122-18.SXF6.bin,1;
                   CONFIG_FILE =
                       BOOTLDR =
        Configuration register = 0x2102
```

18. Verify the image version that runs on the active MSFC after the upgrade.


```
<#root>

Router#

show version


Cisco Internetwork Operating System Software
Cisco IOS (tm) MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
```

```
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Mon 18-Sep-06 17:17 by tinhuang
Image text-base: 0x40101040, data-base: 0x423A8000

ROM: System Bootstrap, Version 12.2(17r)SX3, RELEASE SOFTWARE (fc1)

BOOTLDR: MSFC2A Software (C6MSFC2A-IPBASE_WAN-M), Version 12.2(18)SXF6,
RELEASE SOFTWARE (fc1)
```

✎ **Note**: You can force another switchover in which the standby MSFC becomes the active MSFC in order to restore the original roles of the MSFCs (their active and standby status).

The procedure to upgrade Cisco IOS software on redundant MSFCs in Hybrid mode is complete.

Upgrade VSS Core from Modular to Non-Modular Code

A full upgrade (chassis reboots) is required when you change major versions of the software (modular to non-modular), and not simply move to a new version of modular; for example, when you upgrade from s72033-advipservicesk9_wan-vz.122-33.SXI6.bin to s72033-advipservicesk9_wan-mz.122-33.SXI7.bin.

Issue the **show file system** command on the chassis in order to view the image locations.

This example shows two supervisors in each chassis:

```
<#root>

VSS#

show module switch all

Switch Number:    1    Role:   Virtual Switch Active

---------------------  -----------------------------

Mod Ports Card Type                             Model         Serial No.

--- ----- ------------------------------------- ------------- -----------

  1    5  Supervisor Engine 720 10GE (Active)   VS-S720-10G   SAL1223SVBW

  2    5  Supervisor Engine 720 10GE (RPR-Warm) VS-S720-10G   SAL1223SVBV
```

Complete these steps in order to upgrade the images to each supervisor in the VSS:

1. Use TFTP in order to load the image on the active supervisor (most likely sup-bootdisk).

2. Copy the same image to the secondary supervisor in the active chassis and to the two supervisors in the standby chassis. For example:

   • **copy sup-bootdisk:<image_name> sw1-slot2-sup-bootdisk:**

- **copy sup-bootdisk:<image_name> sw2-slot1-sup-bootdisk:**

- **copy sup-bootdisk:<image_name> sw2-slot2-sup-bootdisk:**

3. Use the <u>dir all</u> command in order to verify that the images are present.

4. Rewrite the boot statement (found in show run) in order to reflect the new image.

5. Use the **<u>write memory</u>** command in order to save the configuration.

6. Use the **<u>show bootvar</u> command in order to verify boot order and config register.**

Verify

There is currently no verification procedure available for this configuration.

Troubleshoot

Cannot Display Standby Stack Due to IPC Error

This error message can appear in the **<u>show version</u>** command output. A similar error can appear in the **show bootvar** command output. This error message appears only when you have redundant Supervisor Engines and both run on different Cisco IOS software releases. This scenario is common when you upgrade the Cisco IOS software release in the Supervisor Engines.

```
<#root>

Cat-6509#

show version

Cisco Internetwork Operating System Software
IOS (tm) c6sup2_rp Software (c6sup2_rp-JSV-M), Version 12.2(17d)SXB10, RELEASE SOFTWARE
(fc1)
Technical Support:
http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Thu 11-Aug-05 15:34 by kellythw
Image text-base: 0x40008FBC, data-base: 0x41F98000

ROM: System Bootstrap, Version 12.1(11r)E1, RELEASE SOFTWARE (fc1)
BOOTLDR: c6sup2_rp Software (c6sup2_rp-JSV-M), Version 12.2(17d)SXB10, RELEASE SOFTWARE
(fc1)

Cat-6509 uptime is 6 weeks, 5 days, 57 minutes
Time since Cat-6509 switched to active is 6 weeks, 5 days, 59 minutes
System returned to ROM by power-on (SP by power-on)
System restarted at 18:16:19 cst Mon Nov 20 2006
System image file is "disk0:c6k222-jsv-mz.122-17d.SXB10.bin"

cisco WS-C6509 (R7000) processor (revision 1.0) with 458752K/65536K bytes of memory.
Processor board ID SCA031400IM
R7000 CPU at 300Mhz, Implementation 0x27, Rev 3.3, 256KB L2, 1024KB L3 Cache
Last reset from power-on
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
```

```
TN3270 Emulation software.
17 Virtual Ethernet/IEEE 802.3  interface(s)
48 FastEthernet/IEEE 802.3 interface(s)
88 Gigabit Ethernet/IEEE 802.3 interface(s)
381K bytes of non-volatile configuration memory.

32768K bytes of Flash internal SIMM (Sector size 512K).
Standby is up
Standby has 227328K/34816K bytes of memory.



Cannot display standby stack due to IPC error

Configuration register is 0x2102



Cat-6509#

show bootvar

BOOT variable =
disk0:c6k222-jsv-mz.122-17d.SXB10.bin,1;sup-bootflash:c6sup22-jsv-mz.121-22.E1.bin,1
CONFIG_FILE variable =
BOOTLDR variable = bootflash:c6msfc2-boot-mz.121-22.E1.bin
Configuration register is 0x2102

Standby is up
Standby has 227328K/34816K bytes of memory.


Standby BOOT variable is unobtainable due to IPC error
Standby CONFIG_FILE variable is unobtainable due to IPC error
Standby BOOTLDR variable is unobtainable due to IPC error
Standby Configuration register is unobtainable due to IPC error
```

Once both supervisor engines run the same Cisco IOS software release, this error message must not be displayed.

Note: In case the Cisco IOS version is not known on the redundant Supervisor, the chassis can show this Supervisor as unknown due to a possible mismatch in the Cisco IOS code versions. However, you can access the secondary Supervisor via the console port and perform a Cisco IOS upgrade procedure in order to match the version of the Supervisor code. Once the code is upgraded, the standby Supervisor automatically downloads the active configuration and VLAN database from the active supervisor.

Related Information

- **Hardware Requirements for Catalyst 6000/Catalyst 6500 Redundancy**
- **Upgrading Software Images on Catalyst 6000/6500 Series Switches**
- **Upgrade Software Images on Catalyst Switch Layer 3 Modules**
- **Cisco Catalyst 6500 Series Switches**
- **LAN Switching Technology Support**
- **Cisco Technical Support & Downloads**