

Upgrading Redundant Route Processors on the Catalyst 8540

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Introduction

The Catalyst 8540 consists of a 13-slot chassis that accepts both ATM and Ethernet interface modules. The five middle slots of the chassis are reserved for two sets of processor cards:

- **Switch processors (SPs)** Form the high-speed switch fabric that provides the physical pathway from ingress port to egress port.



- **Route processors (RPs)** Provide standard system components, such as the CPU, DRAM, and onboard Flash memory as well as PCMCIA card slots to store the system image.



The Catalyst 8540 supports redundant RPs. This document explains how to upgrade the Cisco IOS® software image on a system using two RPs.

Prerequisites

Requirements

1. Ensure that your Catalyst 8540 meets the requirements for full redundancy status:
 - ◆ Both route processors must be the same hardware version. Use the **show hardware** command to verify that the two RPs are the same hardware version.

Note: Both RPs must have or not have a clock module.

```
8540#show hardware
```

```
C8540 named 8540, Date: 11:08:36 UTC Tue Jul 13 2001
```

Slot	Ctrlr-Type	Part No.	Rev	Ser No	Mfg Date	RMA No.	Hw Vrs	Tst	EEP
4/*	Route Proc	73-2644-05	B0	025006XL	May 04 99 0		5.7		
8/*	Route Proc	73-2644-05	B0	024902YR	May 04 99 0		5.7		

- ◆ Both route processors must use the same functional images. Use the **show functional-image-info slot [4,8]** command to verify that the FPGA versions are identical.

```
8540#show functional-image-info slot 4
Details for cpu Image on slot: 4
Functional Version of the FPGA Image: 4.4
```

```
8540#show functional-image-info slot 8
Details for cpu Image on slot: 8
Functional Version of the FPGA Image: 4.4
```

- ◆ Both route processors must have the same amount of memory and must be running the same system image. Use the **show version** command to verify this.

```
8540#show version
[output omitted]
cisco C8540MSR (R5000) processor with 262144K bytes of memory.
R5000 processor, Implementation 35, Revision 2.1 (512KB Level 2 Cache)
```

2. Verify that an IP address is assigned to the RP.

```
8540#show ip interface ethernet 0
Ethernet0 is up, line protocol is up
Internet address is 10.0.0.1/24
Broadcast address is 255.255.255.255
```

If necessary, assign an IP address.

```
8540#configure terminal
8540(config)#ip address 10.0.0.1 255.255.255.0
```

3. Ensure that you can connect to your TFTP server by pinging its IP address. If the TFTP server is on a different IP network, configure the address of the default gateway for the Ethernet port's IP address.

Components Used

The information in this document is based on the Catalyst 8540.

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, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Primary and Secondary RPs

Primary and secondary are terms used to describe which RP is active and which RP is standby. The RP in slot 4 or slot 8 can be primary (the RP in slot 4 is not always the primary). Use the **show redundancy** command to determine the current primary and secondary RPs in your system.

Note: Comments are in blue italics and refer to the line above the comment.

```
8540#show redundancy
```

```
This CPU is the PRIMARY
```

```

Primary
-----
Slot:                               4

!--- The RP in slot 4 is primary.

CPU Uptime:                         13 minutes
ILMI sysUpTime:                     13 minutes
Image:                              PNNI Software (cat8540m-WP-M),
Version 12.1(5.0)W7(10), MAINTENANCE INTERIM SOFTWARE

Time Since :
  Last Running Config. Sync:        12 minutes
  Last Startup Config. Sync:        12 minutes
Module Syncs are ENABLED
Init Sync is Complete
Last Restart Reason:                Normal boot

Secondary
-----
State:                               UP
Slot:                                8

!--- The RP in slot 8 is secondary.

Uptime:                              13 minutes
Image:                              PNNI Software (cat8540m-WP-M),
Version 12.1(5.0)W7(10), MAINTENANCE INTERIM SOFTWARE

```

Use the **show version** command to ensure that a primary RP recognizes the secondary RP.

```

8540#show version
Cisco Internetwork Operating System Software
IOS (tm) PNNI Software (cat8540m-WP-M), Version 12.1(5.0)W7(10),
MAINTENANCE INTERIM SOFTWARE
[output omitted]
cisco C8540MSR (R5000) processor with 262144K/256K bytes of memory.
R5000 CPU at 200Mhz, Implementation 35, Rev 2.1, 512KB L2 Cache
Last reset from power-on
3 Ethernet/IEEE 802.3 interface(s)
2 Gigabit Ethernet/IEEE 802.3 interface(s)
17 ATM network interface(s)
505K bytes of non-volatile configuration memory.

8192K bytes of Flash internal SIMM (Sector size 256K).
Secondary is up
Secondary has 262144K bytes of memory.

!--- Primary recognizes the secondary.

Configuration register is 0x0

```

The primary RP on the Catalyst 8540 serves as the system master. The secondary RP runs in standby mode. In this mode, the secondary RP is partially booted with the Cisco IOS software, but no configuration is loaded. This sample output of the **show run** command was captured from a secondary RP. Note how the command returns an essentially blank running configuration for the secondary RP.

```

8540#show run
Building configuration...

Current configuration:
!

```

```

version 12.0
no service slave-log
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service prompt config max-servers 0 max-servers 0
!
hostname sec-esc-8540-b(MSR)
!
!
spd headroom 1024
facility-alarm core-temperature major 60
facility-alarm core-temperature minor 50
redundancy
  main-cpu
    sync config startup
    sync config running
!
!
interface ATM0
!
!
line con 0
  transport input none
line vty 0 4
!
end

```

In standby mode, the secondary RP caches configuration information provided by the master. On actual failover, the secondary RP enables higher-layer protocols such as spanning tree and CDP. It also enables routing protocols and related CEF adjacency and FIB tables.

Each RP supports an internal port and an external Ethernet port assigned one of these names depending on the redundancy status:

- **primary RP** controller0 and ethernet0
- **secondary RP** controller-sec0 and ethernetsec-0

Console access to the secondary RP must be done directly through the secondary's own console port and not via the primary. Telnet access to the secondary RP is not possible since the two RPs share a single IP and MAC address pair that is "owned" by the primary RP.

Upgrade Procedure

Complete these steps:

Note: This example assumes that you want to download a Cisco IOS image to the PCMCIA card in slot0 of the RPs.

1. Download the Cisco IOS image for the 8540 you wish to upgrade from the Cisco Software Center (registered customers only) software page to your TFTP server.
2. Copy the Cisco IOS image from your TFTP server to Flash memory on each RP.

- ◆ Specify the device named **slot0:** to copy the image to the PC card slot0 on the primary RP.

```

8540#dir slot0:
8540#delete slot0:
8540#squeeze slot0:

```

```

8540#copy tftp ?
bootflash:      Copy to bootflash: file system
flash:          Copy to flash: file system
ftp:            Copy to ftp: file system
null:           Copy to null: file system
nvram:          Copy to nvram: file system
rcp:            Copy to rcp: file system
rcsf:           Copy to rcsf: file system
running-config  Update (merge with) current system configuration
sec-bootflash:  Copy to sec-bootflash: file system
sec-nvram:      Copy to sec-nvram: file system
sec-rcsf:       Copy to sec-rcsf: file system
sec-slot0:    Copy to sec-slot0: file system
sec-slot1:    Copy to sec-slot1: file system
slot0:       Copy to slot0: file system
slot1:       Copy to slot1: file system
startup-config  Copy to startup configuration
system:         Copy to system: file system
tftp:           Copy to tftp: file system

```

```

8540#copy tftp slot0:
Address or name of remote host []? 10.0.0.1
Source filename []? cat8540m-wp-mz.121-6.EY.bin
Destination filename [cat8540m-wp-mz.121-6.EY.bin]?

```

- ◆ Specify the device named **sec-slot0**: to copy the image to PC card slot0 on the secondary RP.

```

8540#copy tftp sec-slot0:

Address or name of remote host [10.0.0.1]?
Source filename [cat8540m-wp-mz.121-6.EY.bin]?
Destination filename [cat8540m-wp-mz.121-6.EY.bin]?

```

Important: The only time that you specify a sec-x device name is when you download a Cisco IOS image to the secondary RP. Each RP boots only from its own Flash memory devices. The primary sees the contents of the secondary's Flash to support loading an image from your TFTP server. The secondary RP does not see the primary's Flash contents.

Note: With the current bootloader image, only the primary RP supports network booting via a TFTP server. The secondary must boot from the bootflash or from a Flash card.

3. Each RP uses the boot variables from the configuration in its own onboard NVRAM. The primary RP automatically synchronizes both the running and the startup configurations. The redundant RP has and uses the same boot statements (if any) as the primary.

If your configuration file on the primary RP specifies an image in slot0, then the secondary RP also specifies an image in slot0 since it uses the same (synced) configuration file.

- ◆ Specify the Cisco IOS image in slot0 as the image that each RP should boot from with this command:

```
8540(config)# boot system flash slot0:cat8540m-wp-mz.121-6.EY.bin
```

- ◆ Verify your configuration change with the **show running** and **show bootvar** commands.

```

8540#show bootvar
BOOT variable = slot0:cat8540m-wp-mz.121-6.EY.bin
CONFIG_FILE variable =
BOOTLDR variable =
Configuration register is 0x0

```

4. This example assumes that the primary RP is in slot 4 and the secondary RP is in slot 8. When ready, soft-reset slot 4 with the **reload** command. After the reboot, execute the **show redundancy** command and confirm that the reloaded RP in slot 4 runs the image that you need. The RP in slot 8 is now the primary RP.

5. When a secondary RP becomes the primary, it loads a full configuration and does not load a new version of Cisco IOS. Execute the **reload** command again and force slot 8 (the new primary RP) to load the new software version. Use the **show redundancy** command to confirm the expected results.

8540 RP Redundancy Frequently Asked Questions

Q. Can I load different versions of Cisco IOS on the two route processors?

A. Yes, your Catalyst 8540 can have different versions on the two RPs. However, your system must have the same image on both RPs to be considered redundant. If Cisco IOS detects a mismatch in versions, you see log messages warning of a "conditionally redundant" system that requires a software upgrade.

Q. Which RP becomes the primary and which RP becomes the secondary after a power cycle?

A. The answer depends on whether RP switchover commands were executed before the power cycle:

1. If you did not execute the **redundancy force-failover main-cpu** command before power cycling, the RP which was primary before the power cycle appears again as primary. The reason is that the redundancy status is saved through power on-off cycles via a master-slave register on each RP.
2. If you did execute the **redundancy force-failover main-cpu** command before power cycling, one of these results occurs. The result that occurs depends on whether the new primary (after the switchover) was reloaded:
 - ◆ If the new primary was not reloaded and you perform a power cycle just after switchover, the original primary comes up as new primary.
 - ◆ If the new primary was reloaded with the secondary still in ROMmon, the new primary comes up as primary after power cycle.

When the secondary RP in slot 8 becomes primary, it continues to serve as the system master, and there is no preempt command that causes the RP in slot 4 to take over again.

Related Information

- [How the Router Uses the Boot Field](#)
- [Software Installation and Upgrade Procedure](#)
- [Managing Configuration Files, System Images, and Functional Images on the Catalyst 8540](#)
- [Configuring Redundancy and Extended High System Availability \(Catalyst 8540 MSR\)](#)
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