Route Processor Redundancy (RPR)

Note
- For complete syntax and usage information for the commands used in this chapter, see these publications:

  http://www.cisco.com/en/US/products/ps11846/prod_command_reference_list.html

- Cisco IOS Release 15.4SY supports only Ethernet interfaces. Cisco IOS Release 15.4SY does not support any WAN features or commands.

- In route processor redundancy (RPR) redundancy mode, the ports on a supervisor engine in standby mode are disabled.

- RPR supports IPv6 multicast traffic.

Tip For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

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Prerequisites for RPR

None.

Restrictions for RPR

General RPR Restrictions

• When a redundant supervisor engine is in standby mode, the two Gigabit Ethernet interfaces on the standby supervisor engine are always active.

• Supervisor engine redundancy does not provide supervisor engine mirroring or supervisor engine load balancing. Only one supervisor engine is active.

• Configuration changes made through SNMP are not synchronized to the standby supervisor engine. After you configure the switch through SNMP, copy the running-config file to the startup-config file on the active supervisor engine to trigger synchronization of the startup-config file on the standby supervisor engine.

• Supervisor engine switchover takes place after the failed supervisor engine completes a core dump. A core dump can take up to 15 minutes. To get faster switchover time, disable core dump on the supervisor engines.

• You cannot perform configuration changes during the startup (bulk) synchronization. If you attempt to make configuration changes during this process, the following message is generated:

```
Config mode locked out till standby initializes
```

• If configuration changes occur at the same time as a supervisor engine switchover, these configuration changes are lost.

Hardware Restrictions for RPR

• Cisco IOS supports redundant configurations where the supervisor engines are identical. If they are not identical, one will boot first and become active and hold the other supervisor engine in a reset condition.

• Each supervisor engine must have the resources to run the switch on its own, which means all supervisor engine resources are duplicated, including all flash devices.

• Make separate console connections to each supervisor engine. Do not connect a Y cable to the console ports.

• Except during an FSU, both supervisor engines must have the same system image (see the "Copying Files to the RP" section on page 10-6).

• The configuration register must be set to $0x2102$ (`config-register 0x2102`).

Note   There is no support for booting from the network.

Information About RPR

Supervisor Engine Redundancy Overview

The switch supports fault resistance by allowing a standby supervisor engine to take over if the primary supervisor engine fails. RPR supports a switchover time of 2 or more minutes.

The following events cause a switchover:

- A hardware failure on the active supervisor engine
- Clock synchronization failure between supervisor engines
- A manual switchover

RPR Operation

RPR supports the following features:

- Auto-startup and bootvar synchronization between active and standby supervisor engines
- Hardware signals that detect and decide the active or standby status of supervisor engines
- Clock synchronization every 60 seconds from the active to the standby supervisor engine
- A standby supervisor engine that is booted but not all subsystems are up: if the active supervisor engine fails, the standby supervisor engine become fully operational
- An operational supervisor engine present in place of the failed unit becomes the standby supervisor engine
- Support for fast software upgrade (FSU) (see Chapter 7, "Fast Software Upgrade".)

When the switch is powered on, RPR runs between the two supervisor engines. The supervisor engine that boots first becomes the RPR active supervisor engine. The route processor (RP) and Policy Feature Card (PFC) become fully operational. The RP and PFC on the standby supervisor engine come out of reset but are not operational.

In a switchover, the standby supervisor engine become fully operational and the following occurs:

- All switching modules power up again
- Remaining subsystems on the RP (including Layer 2 and Layer 3 protocols) are brought up
- Access control lists (ACLs) are reprogrammed into supervisor engine hardware

Note   In a switchover, there is a disruption of traffic because some address states are lost and then restored after they are dynamically redetermined.

Supervisor Engine Configuration Synchronization

> **Note** Configuration changes made through SNMP are not synchronized to the standby supervisor engine. After you configure the switch through SNMP, copy the running-config file to the startup-config file on the active supervisor engine to trigger synchronization of the startup-config file on the standby supervisor engine.

During RPR mode operation, the startup-config files and the config-register configurations are synchronized by default between the two supervisor engines. In a switchover, the new active supervisor engine uses the current configuration.

Default Settings for RPR

None.

How to Configure RPR

Configuring RPR Mode

To configure RPR mode, perform this task:

	Command	Purpose
Step 1	`Router(config)# redundancy`	Enters redundancy configuration mode.
Step 2	`Router(config-red)# mode rpr`	Configures RPR. When this command is entered, the standby supervisor engine is reloaded and begins to work in RPR mode.

This example shows how to configure the system for RPR:

```
Router> enable
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# redundancy
Router(config-red)# mode rpr
Router(config-red)# end
Router# show running-config
Router# show redundancy states
```

Synchronizing the Supervisor Engine Configurations

During normal operation, the startup-config and config-registers configuration are synchronized by default between the two supervisor engines. In a switchover, the new active supervisor engine uses the current configuration.

✎
Note   Do not change the default auto-sync configuration.

Displaying the Redundancy States

To display the redundancy states, perform this task:

Command	Purpose
Router# **show redundancy states**	Displays the redundancy states.

This example shows how to display the redundancy states:

```
Router# show redundancy states
my state = 13 -ACTIVE
     peer state = 8  -STANDBY HOT
           Mode = Duplex
           Unit = Primary
        Unit ID = 1

Redundancy Mode (Operational) = Route Processor Redundancy
Redundancy Mode (Configured)  = Route Processor Redundancy
     Split Mode = Disabled
   Manual Swact = Enabled
 Communications = Up

   client count = 11
 client_notification_TMR = 30000 milliseconds
        keep_alive TMR = 9000 milliseconds
     keep_alive count = 0
   keep_alive threshold = 18
         RF debug mask = 0x0
```

In this example, the system cannot enter the redundancy state because the second supervisor engine is disabled or missing:

```
Router# show redundancy states
      my state = 13 -ACTIVE
    peer state = 1  -DISABLED
          Mode = Simplex
          Unit = Primary
       Unit ID = 1

Redundancy Mode (Operational) = rpr
Redundancy Mode (Configured)  = rpr
Redundancy State              = Non Redundant
    Maintenance Mode = Disabled
 Communications = Down      Reason: Simplex mode
```

```
      client count = 11
 client_notification_TMR = 30000 milliseconds
        keep_alive TMR = 4000 milliseconds
      keep_alive count = 0
  keep_alive threshold = 7
          RF debug mask = 0x0
```

Copying Files to the RP

Use the following command to copy a file to the **bootflash:** device on an active RP:

```
Router# copy source_device:source_filename bootflash:target_filename
```

Use the following command to copy a file to the **bootflash:** device on a standby RP:

```
Router# copy source_device:source_filename slavebootflash:target_filename
```

Tip   For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

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