



## Route Processor Redundancy Plus (RPR+)

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Route Processor Redundancy (RPR) provides an alternative to the High System Availability (HSA) feature. HSA enables a system to reset and use a standby Route Switch Processor (RSP) if the active RSP fails. Using RPR, you can reduce unplanned downtime because RPR enables a quicker switchover between an active and standby RSP if the active RSP experiences a fatal error.

RPR Plus (RPR+) is an enhancement of the RPR feature. RPR+ keeps the Versatile Interface Processors (VIPs) from being reset and reloaded when a switchover occurs between the active and standby RSPs.

### Feature History for the Route Processor Redundancy Plus (RPR+) Feature

Release	Modification
12.0(19)ST1	This feature was introduced.
12.0(22)S	This feature was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This feature was integrated into Cisco IOS Release 12.2(14)S.
12.3(7)T	This feature was integrated into Cisco IOS Release 12.3(7)T.

### Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel**

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## Prerequisites for Route Processor Redundancy Plus (RPR+)

RPR and RPR+ require a Cisco 7500 series router loaded with two RSP16s, one RSP16 and one RSP8, two RSP8s, or a combination of RSP2s and RSP4s. If you are using the one RSP16 and one RSP8 combination, you must use the same memory—256 MB—in both RSPs because the secondary RSP must be able to support the primary RSP during a failover.

## Restrictions for Route Processor Redundancy Plus (RPR+)

- RSP1s do not support RPR or HSA.
- RPR is supported only on routers that support dual RSPs. Only the Cisco 7507 and Cisco 7513 support dual RSPs.
- RPR+ operates only in a system with VIPs as the line cards. Systems with legacy interface processors default to RPR.
- In RPR+ mode, configuration changes done through Simple Network Management Protocol (SNMP) may not be automatically configured on the standby RSP after a switchover occurs.
- RPR+ does not work on routers configured with MPLS.

## Information About Route Processor Redundancy Plus (RPR+)

To configure Route Processor Redundancy Plus (RPR+), you should understand the following concepts:

- [RPR, page 2](#)
- [RPR+, page 2](#)

### RPR

Route Processor Redundancy (RPR) provides an alternative to the High System Availability (HSA) feature currently available on Cisco 7500 series routers. HSA enables a system to reset and use a standby Route Switch Processor (RSP) if the active RSP fails.

Using RPR, you can reduce unplanned downtime. RPR enables a quicker switchover between an active and standby RSP if the active RSP experiences a fatal error. When you configure RPR, the standby RSP loads a Cisco IOS image on bootup and initializes itself in standby mode. In the event of a fatal error on the active RSP, the system switches to the standby RSP, which reinitializes itself as the active RSP, reloads all of the line cards, and restarts the system.

### RPR+

The RPR+ feature is an enhancement of the RPR feature on Cisco 7500 series routers. RPR+ keeps the VIPs from being reset and reloaded when a switchover occurs between the active and standby RSPs. Because VIPs are not reset and microcode is not reloaded on the VIPs, and the time needed to parse the configuration is eliminated, switchover time is reduced to 30 seconds.

Table 1 describes the average time for a router to switchover to a standby RSP if the active RSP fails.

**Table 1** Average Switchover Time Comparison Table

Feature	Time to Immediately Switch a Packet on New RSP After Failover	Expected Overall Time to Have New RSP in New High Availability State After Failover	Notes
HSA	10 minutes	20 minutes	System default.
RPR	5 minutes	15 minutes	VIPs and legacy interface processors (IPs) supported.
RPR+	30 seconds	11 minutes	VIPs supported. <sup>1</sup>

- Legacy IPs default to RPR. To allow RPR+ for VIPs when up to two legacy IPs exist in the router, you must configure the **service single-slot-reload-enable** command. If you do not enable the **service single-slot-reload-enable** command or if you have more than two legacy IPs, all the line cards are reloaded.



**Note**

Table 1 shows average switchover times. Recovery time will vary depending on the configuration of the router.

In Table 1 we have noted that RPR+ supports up to two legacy IPs in the router if the **service single-slot-reload-enable** command is configured. By default, the existence of any legacy IPs in the router causes all the line cards to be reloaded during an RPR+ switchover and a message similar to the following to be displayed:

```
%HA-2-MAX_NO_Quiesce: 1 linecard(s) not quiesced exceeds limit of 0, all slots will be reloaded.
```

If the `service single-slot-reload-enable` command is configured, then the NO\_Quiesce limit is set to two, allowing two quiesce failures during an RPR+ switchover. When more than two legacy IPs exist in the router, all the line cards are reloaded during an RPR+ switchover, and a message similar to the following is displayed:

```
%HA-2-MAX_NO_Quiesce: 3 linecard(s) not quiesced exceeds limit of 2, all slots will be reloaded.
```

## How to Configure Route Processor Redundancy Plus (RPR+)

This section contains the following tasks:

- [Copying an Image onto Active and Standby RSPs, page 3](#) (required)
- [Setting the Configuration Register Boot Variable, page 5](#) (optional)
- [Configuring RPR+, page 7](#) (required)
- [Verifying RPR+, page 9](#) (optional)

### Copying an Image onto Active and Standby RSPs

Perform this task to use TFTP to copy a high availability Cisco IOS image onto the active and standby RSPs.

## Prerequisites

```
%Error copying tftp://image@server/tftpboot/file-location/image-name
enough space on
device).
```

## SUMMARY STEPS

- 1.
2. **copy tftp slotslot-number:**
- 3.

## DETAILED STEPS

---

### Step 1

Enables privileged EXEC mode. Enter your password if prompted.

```
Router> enable
```

```
Router# copy tftp slot0:
```

```
Address or name of remote host []? ip-address
```

```
172.18.2.3
```

```
Source filename []? image-name
```

```
rsp-pv-mz
```

```
Destination file name? [image-name1] <Return>
```

```
Accessing tftp://           /...
```

```
Router#
```

```
Address or name of remote host []?
```

---

## What to Do Next

[RPR+](#)” section on page 7.

“Configuring

## Setting the Configuration Register Boot Variable

hw-module slot image

- enable
- show version
- configure terminal
- 4. boot system flash slot                    :*[image-name]*
- 5.    *value*
- 6. exit
- 7.

Command or Action	Purpose
<b>Step 1</b>  <b>Example:</b>	<ul style="list-style-type: none"> <li>•</li> </ul>
<b>Step 2</b> <code>show version</code>	Displays the current configuration register setting at the end of the display.
<code>configure terminal</code>	
<code>boot system flash slotslot-number image-name</code>  <code>slot0:rsp-pv-mz</code>	<i>file-spec</i>
<i>value</i>	<i>value</i>  <i>image-name</i>
<code>exit</code>	
<code>reload</code>	

## Examples

configuration register setting. command; the output displays the current

```
Cisco IOS Software, C7500 Software (C7500-IPBASE-MZ), Version 12.3(7)T, RELEASE)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2004 by Cisco Systems, Inc.
Compiled Fri 16-Jan-04 18:03 by engineer

ROM: System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)
.
.
.
Configuration register is 0x2102
```

## Restrictions

### SUMMARY STEPS

- 1.
- 2.
- 3.
- 4.
- 5.
6. { | | }
- 8.
- 9.

<code>slot-number file-spec</code>	
<code>{     }</code>	
<code>Router(config-r)# mode rpr-plus</code>	
<code>Router(config-r)# exit</code>	

---

---

```
Router# copy system:running-config
nvram:startup-config
```

---

```
Router# hw-module sec-cpu reset
```

---

---

Router>

Router#

```
Operating mode is rpr-plus
redundancy mode rpr-plus
hw-module slot 2 image disk0:rsp-pv-mz
hw-module slot 3 image disk0:rsp-pv-mz
```

```
The system total uptime since last reboot is 5 days, 19 hours 36 minutes.
The system has experienced 27 switchovers.
The system has been active (become master) for 5 days, 15 hours 14 minutes.
```

Reason for last switchover:User forced.

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# Configuration Examples for Route Processor Redundancy Plus (RPR+)

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## Configuring RPR+: Example

```

!
hostname Router
!
boot system rcp://path/to/image/rsp-boot-mz
boot system tftp://path/to/image/rsp-boot-mz
boot bootldr bootflash:rsp-boot-mz
enable password password
!
redundancy
  mode rpr-plus ! Indicates that redundancy mode has been configured for RPR+.
!
hw-module slot 2 image slot0:rsp-pv-mz
hw-module slot 3 image slot0:rsp-pv-mz
ip subnet-zero
ip rcmd remote-username Router
ip cef distributed
ip host iphost 192.168.0.1
mpls traffic-eng auto-bw timers
!
!
controller T3 6/0/0
  clock source line
!
!
interface Ethernet0/0/0
  ip address 10.0.0.1 255.255.0.0
  no ip directed-broadcast

```

## Additional References

### Related Documents

Related Topic	Document Title
	<a href="#">Cisco IOS Configuration Fundamentals and Network Management Command Reference Release 12.3 T</a>
	<a href="#">Cisco IOS Configuration Fundamentals and Network Management Configuration Guide</a>
	<a href="#">Route Processor Redundancy and Fast Software Upgrade on Cisco 7500 Series Routers feature document, Release 12.0(16)ST</a>
	<a href="#">Cisco 7500 Single Line Card Reload feature document, Release 12.1(5a)E</a>

### Standards



### MIBs

MIBs	MIBs Link

## RFCs


## Technical Assistance


## Command Reference

*Command Reference*

*Cisco IOS Interface and Hardware Component*

*Cisco IOS Master Commands List*

**show redundancy (HSA redundancy)**

# Glossary

**Active RSP**

**HSA**

**RPR**

**RPR+**

**RSP**

**Standby RSP**



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## *Internetworking Terms and Acronyms*

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