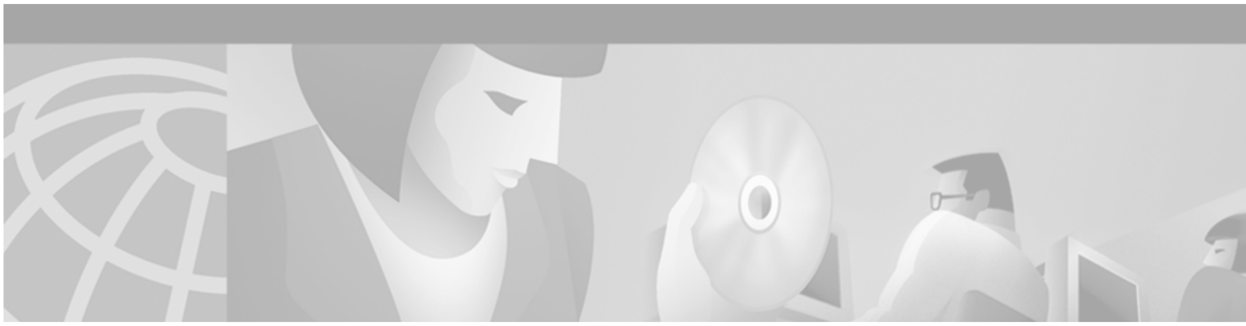


Configuring Line Cards on the Cisco 7500 Series

This appendix describes software configuration commands needed to configure line cards with certain Cisco IOS software features for Cisco 7500 series routers.

Note On the Cisco 7507 and Cisco 7513 routers, you can install two Route Switch Processor (RSP) cards in a single router to improve system availability. This feature was introduced in Cisco IOS Release 11.1(4) as the "High System Availability (HSA)" feature. Because High Availability (HA) has since come to apply to a variety of Cisco IOS hardware and software features that allow for 99.9999% uptime for Cisco devices, this feature is now referred to as the "Dual RSP" feature.

Note Boot ROM revision 11.1(2) or higher is required for HSA to work with an RSP2 line card.

The boot ROM is on a SIMM on the RSP2 and cannot be upgraded. You can identify the boot ROM version on your RSP2 by issuing the **show version | begin ROM** command in privileged EXEC mode.

Performing a Single Line Card Reload

The **service single-slot-reload-enable** global configuration command allows you to enable the Single Line Card Reload feature, a High Availability (HA) feature for Cisco 7500 series routers. When this feature is enabled, if a single line card crashes, only the line card that failed is reloaded. The physical lines and the routing protocols on the other line cards remain active (note that some packets may be dropped while the card reloads, but only packets that depend on the crashed card will be affected).

A single line card reload is substantially faster than the Cbus Complex process used in some early Cisco IOS releases.

The Cisco 7500 Single Line Card Reload feature works on all RSP images.

Note The Single Line Card Reload feature is disabled by default. Enabling this feature is highly recommended.

Configuring Dual RSPs on Cisco 7500 Series Routers

To configure Dual RSP operation, you must have a Cisco 7507 or Cisco 7513 router containing two RSP processor cards. For Dual RSP compatibility, download a Cisco IOS software subset image that has a "v" in it. For example, rsp-jv-mz, rsp-ajv-mz, and rsp-pv-mz are all Dual RSP-compatible Cisco IOS subset images.

Two RSP cards in a router provide the most basic level of increased system availability through a "cold restart" feature. A "cold restart" means that when one RSP card fails, the other RSP card reboots the router. In this way, your router is never in a failed state for very long, thereby increasing system availability.

When one RSP card takes over operation from another, system operation is interrupted. This change is similar to issuing the **reload** EXEC command. The following events occur when one RSP card fails and the other takes over:

- The router stops passing traffic.
- Route information is lost.
- All connections are lost.
- The backup or "slave" RSP card becomes the active or "master" RSP card that reboots and runs the router. Thus, the slave has its own image and configuration file so that it can act as a single processor.

Note Having Dual RSPs does not impact performance in terms of packets per second or overall bandwidth. The Dual RSP feature does not provide fault-tolerance or redundancy.

Understanding Master and Slave Operation

A router configured for Dual RSP operation has one RSP card that is the master and one that is the slave. The master RSP card functions as if it were a single processor, controlling all functions of the router. The slave RSP card does nothing but actively monitor the master for failure.

A system crash can cause the master RSP to fail or go into a nonfunctional state. When the slave RSP detects a nonfunctional master, the slave resets itself and takes part in *master-slave arbitration*. Master-slave arbitration is a ROM monitor process that determines which RSP card is the master and which is the slave upon startup (or reboot).

If a system crash causes the master RSP to fail, the slave RSP becomes the new master RSP and uses its own system image and configuration file to reboot the router. The failed RSP card now becomes the slave. The failure state of the slave (formerly the master) can be accessed from the console via the **show stacks** EXEC command.

With Dual RSP operation, the following items are important to note:

- An RSP card that acts as the slave runs a different software version than it does when it acts as the master. The slave mode software is a subset of the master mode software.
- The two RSP cards need not run the same master software image and configuration file. When the slave reboots the system and becomes the new master, it uses its own system image and configuration file to reboot the router.
- When enabled, automatic synchronization mode automatically ensures that the master and slave RSP card have the same configuration file.

- Both hardware and software failures can cause the master RSP to enter a nonfunctional state, but the system does not indicate the type of failure.
- The console is always connected to master. A Y cable is shipped with your Cisco 7507 or Cisco 7513 router. The "top" of the Y cable plugs into the console port on each RSP card, and the "bottom" of the Y cable plugs into a terminal or terminal server. The master RSP card has ownership of the Y cable in that the slave Universal Asynchronous Receiver Transmitter (UART) drivers are disabled. Thus, no matter which RSP card is configured as the master, your view of the internetwork environment is always from the master's perspective. Refer to your product's hardware installation and maintenance publication for information on properly installing the Y cable.

Understanding Dual RSP Implementation Methods

There are two common ways to use the Dual RSP feature, as follows:

- Simple hardware backup. Use this method to protect against an RSP card failure. With this method, you configure both RSP cards with the same software image and configuration information. Also, you configure the router to automatically synchronize configuration information on both cards when changes occur.
- Software error protection. Use this method to protect against critical Cisco IOS software errors in a particular release. With this method, you configure the RSP cards with different software images, but with the same configuration information. If you are using new or experimental Cisco IOS software, consider using the software error protection method.

You can also use Dual RSPs for advanced implementations. For example, you can configure the RSP cards with the following implementations:

- Same software images but different configuration files
- Different software images and different configuration files
- Widely varied configuration files (for example, various features or interfaces can be turned off and on per card)

Note Although other uses are possible, the configuration information in this guide describes commands for only the two common methods—simple hardware backup and software error protection.

Dual RSP Configuration Task List

To configure Dual RSP operation, perform the tasks described in the following sections. The first two and last two tasks are required for both implementations. The third and fourth tasks relates to simple hardware backup. The fifth task relates to software error protection only.

- Specifying the Default Slave RSP (both implementations)
- Ensuring That Both RSP Cards Contain the Same Configuration File (both implementations)
- Ensuring That Both RSP Cards Contain the Same System Image (simple hardware backup only)
- Ensuring That Both RSP Cards Contain the Same Microcode Image (simple hardware backup only)
- Specifying Different Startup Images for the Master and Slave RSPs (software error protection only)
- Setting Environment Variables on the Master and Slave RSP (both implementations)
- Monitoring and Maintaining Dual RSP Operation (both implementations)

Specifying the Default Slave RSP

To specify the default slave RSP card, use the following command in global configuration mode:

Command	Purpose
`Router(config)# **slave default-slot** *processor-slot-number*`	Specifies the slave RSP card.

After specifying the default slave card, save the running configuration to the startup configuration using the **copy running-config startup-config** or **copy system:running-config nvram:startup-config** EXEC command. When the system is rebooted, the RSP specification will take effect (if both RSP cards are operational): The specified default slave becomes the slave RSP card and the other RSP card takes over as the master RSP card.

The router uses the default slave information when booting as follows:

- If a system boot is due to powering up the router or using the **reload** EXEC command, then the specified default slave will be the slave RSP.
- If a system boot is due to a system crash or hardware failure, then the system ignores the default slave designation and makes the crashed or faulty RSP the slave RSP.

If you do not specifically define the default slave RSP, the RSP card located in the higher number processor slot is the default slave. On the Cisco 7507 router, processor slot 3 contains the default slave RSP. On the Cisco 7513 router, processor slot 7 contains the default slave RSP.

The following example sets the default slave RSP to processor slot 2 on a Cisco 7507 router:

```
Router# configure terminal
Router (config)# slave default-slot 2
Router (config)# end
Router# copy system:running-config nvram:startup-config
```

Ensuring That Both RSP Cards Contain the Same Configuration File

With both the simple hardware backup and software error protection implementation methods, you always want your master and slave configuration files to match. To ensure that they match, turn on automatic synchronization. In automatic synchronization mode, the master copies its startup configuration to the slave's startup configuration when you issue a **copy** EXEC command that specifies the master's startup configuration (**nvram:startup-config**) as the target.

Automatic synchronization mode is on by default; in the event that you need to reenable the automatic synchronization, use the following commands in privileged EXEC mode:

	Command	Purpose
Step 1	`Router# **configure terminal**`	Enters global configuration mode.
Step 2	`Router# **slave auto-sync config**`	Reenables automatic synchronization mode.
Step 3	`Router# **end**`	Exits configuration mode.

Step 4	`Router(config)# **copy system:running-config nvram:startup-config**`
	or
	`Router(config)# **copy running-config startup-config**`
		Saves this information to the system startup configuration and copies the configuration to the slave's startup configuration.

Ensuring That Both RSP Cards Contain the Same System Image

For simple hardware backup, ensure that both RSP cards have the same system image.

To ensure that both RSP cards have the same system image, use the following commands in EXEC mode:

	Command	Purpose
Step 1	`Router# show bootvar`	Displays the contents of the BOOT environment variable to learn the current booting parameters for the master and slave RSP.
Step 2	`Router# dir {bootflash: | slot0: | slot1:}`	Verifies the location and version of the master RSP software image.
Step 3	`Router# dir {slavebootflash: | slaveslot0: | slaveslot1:}`	Determines if the slave RSP contains the same software image in the same location.
Step 4	`Router# copy {bootflash:[filename] | slot0:[filename] | slot1:[filename]}{slavebootflash:[filename] | slaveslot0:[filename] | slaveslot1:[filename]}`	If the slave RSP does not contain the same system image in the same location, copies the master's system image to the appropriate slave location. Note that you may also need to use the **delete** or **squeeze** EXEC command in conjunction with the **copy** command to accomplish this step.

The following example shows the process of ensuring that both RSP cards have the same system image. Note that because no environment variables are set, the default environment variables are in effect for both the master and slave RSP. Therefore, the router will boot the image in slot 0.

```
Router# show bootvar

BOOT variable =
CONFIG_FILE variable =
Current CONFIG_FILE variable =
BOOTLDR variable does not exist

Configuration register is 0x0

current slave is in slot 7
BOOT variable =
CONFIG_FILE variable =
BOOTLDR variable does not exist

Configuration register is 0x0

Router# dir slot0:
-#- -length- -----date/time------ name
1    3482498  May 4 1993 21:38:04 rsp-k-mz11.2

7993896 bytes available (1496 bytes used)

Router# dir slaveslot0:
-#- -length- -----date/time------ name
1    3482498  May 4 1993 21:38:04 rsp-k-mz11.1

7993896 bytes available (1496 bytes used)

Router# delete slaveslot0:rsp-k-mz11.1
Router# copy slot0:rsp-k-mz11.2 slaveslot0:rsp-k-mz11.2
```

Ensuring That Both RSP Cards Contain the Same Microcode Image

To ensure that interface processors will load the same microcode, regardless of which RSP is used, use the following commands in privileged EXEC mode:

	Command	Purpose
Step 1	Router# **show controller cbus**	Determines the microcode images used on the interface processors. If all interface processors are running from the bundled system microcode, no further action is required.
Step 2	Router# **dir** {**bootflash:** | **slot0:** | **slot1:**}	If any interface processors are running from the Flash file system, verifies the location and version of the master RSP's supplementary microcode.
Step 3	Router# **dir** {**slavebootflash:** | **slaveslot0:** | **slaveslot1:**}	Determines if the slave RSP contains the same microcode image in the same location.
Step 4	Router# **copy** {**bootflash:**[*filename*] | **slot0:**[*filename*] | **slot1:**[*filename*]} {**slavebootflash:**[*filename*] | **slaveslot0:**[*filename*] | **slaveslot1:**[*filename*]}	If the slave RSP does not contain the same microcode image in the same location, copies the master's microcode image to the appropriate slave location. Note that you also may need to use the **delete** or **squeeze** command in conjunction with the **copy** command to accomplish this step.

The following example ensures that both RSP cards have the same microcode image. Notice that slots 0, 1, 4, 9, and 10 load microcode from the bundled software, as noted by the statement "software loaded from system." Slot 11, the Fast Serial Interface Processor (FSIP), does not use the microcode bundled with the system. Instead, it loads the microcode from slot0:pond/bath/rsp_fsip20-1. Thus, you must ensure that the slave RSP has a copy of the same FSIP microcode in the same location.

```
Router# show controller cbus

MEMD at 40000000, 2097152 bytes (unused 416, recarves 3, lost 0)
  RawQ 48000100, ReturnQ 48000108, EventQ 48000110
  BufhdrQ 48000128 (2948 items), LovltrQ 48000140 (5 items, 1632 bytes)
  IpcbufQ 48000148 (16 items, 4096 bytes)
  3571 buffer headers (48002000 - 4800FF20)
  pool0: 28 buffers, 256 bytes, queue 48000130
  pool1: 237 buffers, 1536 bytes, queue 48000138
  pool2: 333 buffers, 4544 bytes, queue 48000150
  pool3: 4 buffers, 4576 bytes, queue 48000158
  slot0: EIP, hw 1.5, sw 20.00, ccb 5800FF30, cmdq 48000080, vps 4096
    software loaded from system
    Ethernet0/0, addr 0000.0ca3.cc00 (bia 0000.0ca3.cc00)
      gfreeq 48000138, lfreeq 48000160 (1536 bytes), throttled 0
      rxlo 4, rxhi 42, rxcurr 0, maxrxcurr 2
      txq 48000168, txacc 48000082 (value 27), txlimit 27
                  .........
slot1: FIP, hw 2.9, sw 20.02, ccb 5800FF40, cmdq 48000088, vps 4096
    software loaded from system
    Fddi1/0, addr 0000.0ca3.cc20 (bia 0000.0ca3.cc20)
      gfreeq 48000150, lfreeq 480001C0 (4544 bytes), throttled 0
      rxlo 4, rxhi 165, rxcurr 0, maxrxcurr 0
      txq 480001C8, txacc 480000B2 (value 0), txlimit 95
 slot4: AIP, hw 1.3, sw 20.02, ccb 5800FF70, cmdq 480000A0, vps 8192
    software loaded from system
```

```
   ATM4/0, applique is SONET (155Mbps)
     gfreeq 48000150, lfreeq 480001D0 (4544 bytes), throttled 0
     rxlo 4, rxhi 165, rxcurr 0, maxrxcurr 0
     txq 480001D8, txacc 480000BA (value 0), txlimit 95
slot9: MIP, hw 1.0, sw 20.02, ccb 5800FFC0, cmdq 480000C8, vps 8192
   software loaded from system
   T1 9/0, applique is Channelized T1
     gfreeq 48000138, lfreeq 480001E0 (1536 bytes), throttled 0
     rxlo 4, rxhi 42, rxcurr 0, maxrxcurr 0
     txq 480001E8, txacc 480000C2 (value 27), txlimit 27
                .......

slot10: TRIP, hw 1.1, sw 20.00, ccb 5800FFD0, cmdq 480000D0, vps 4096
   software loaded from system
   TokenRing10/0, addr 0000.0ca3.cd40 (bia 0000.0ca3.cd40)
     gfreeq 48000150, lfreeq 48000200 (4544 bytes), throttled 0
     rxlo 4, rxhi 165, rxcurr 1, maxrxcurr 1
     txq 48000208, txacc 480000D2 (value 95), txlimit 95
               .........

slot11: FSIP, hw 1.1, sw 20.01, ccb 5800FFE0, cmdq 480000D8, vps 8192
   software loaded from flash slot0:pond/bath/rsp_fsip20-1
   Serial11/0, applique is Universal (cable unattached)
     gfreeq 48000138, lfreeq 48000240 (1536 bytes), throttled 0
     rxlo 4, rxhi 42, rxcurr 0, maxrxcurr 0
     txq 48000248, txacc 480000F2 (value 5), txlimit 27
              ..........

Router# dir slot0:pond/bath/rsp_fsip20-1
-#- -length- -----date/time------ name
3   10242    Jan 01 1995 03:46:31 pond/bath/rsp_fsip20-1

Router# dir slaveslot0:pond/bath/rsp_fsip20-1
No such file

4079832 bytes available (3915560 bytes used)

Router# copy slot0:pond/bath/rsp_fsip20-1 slaveslot0:
4079704 bytes available on device slaveslot0, proceed? [confirm]

Router# dir slaveslot0:pond/bath/rsp_fsip20-1
-#- -length- -----date/time------ name
3   10242    Mar 01 1993 02:35:04 pond/bath/rsp_fsip20-1

4069460 bytes available (3925932 bytes used)
```

Specifying Different Startup Images for the Master and Slave RSPs

For software error protection, the RSP cards should have different system images.

When the factory sends you a new Cisco 7507 or Cisco 7513 router with two RSPs, you receive the same system image on both RSP cards. For the software error protection method, you need two different software images on the RSP cards. Thus, you copy a desired image to the master RSP card and modify the **boot system** global configuration commands to reflect booting two different system images. Each RSP card uses its own image to boot the router when it becomes the master.

To specify different startup images for the master and slave RSP, use the following commands beginning in EXEC mode:

	Command	Purpose
Step 1	`Router# dir {bootflash: | slot0: | slot1:}`	Verifies the location and version of the master RSP software image.
Step 2	`Router# dir {slavebootflash: | slaveslot0: | slaveslot1:}`	Determines if the slave RSP contains the same software image in the same location.
Step 3	`Router# copy source-url {bootflash: | slot0: | slot1:}`	Copies a different system image to the master RSP.
Step 4	`Router# configure terminal`	Enters configuration mode from the terminal.

Step 5	`Router(config)# boot system flash bootflash:[filename]`
	`Router(config)# boot system flash slot0:[filename]`
	`Router(config)# boot system flash slot1:[filename]`
		From global configuration mode, configures the master RSP to boot the new image from the appropriate location.

Step 6	`Router(config)# boot system flash`
	`Router(config)# bootflash:[filename]`
	`Router(config)# boot system flash slot0:[filename]`
	`Router(config)# boot system flash slot1:[filename]`
		Also, add a **boot system** command that specifies the slave's boot image and location. This is the boot image that the slave uses when it becomes the master RSP and boots the system. Note that because the slave will boot this image when the slave is actually the new master RSP, the command syntax does not use a "**slave**" prefix.

Step 7	`Router(config)# boot system {rcp | tftp | ftp} [filename] [ip-address]`	(Optional) Configures the master RSP to boot from a network server.
Step 8	`Router(config)# config-register value`[1]	Sets the configuration register to enable the system to load the system image from a network server or from Flash.
Step 9	`Router(config)# end`	Exits configuration mode.

Step 10	`Router# copy system:running-config nvram:startup-config`
	OR
	`Router# copy running-config startup-config`
		Saves the configuration file to the master's startup configuration. Because automatic synchronization is turned on, this step saves the **boot system** commands to the master and slave startup configuration.

Step 11	`Router# reload`	Resets the router with the new configuration information.

1. Refer to the "Modifying the Configuration Register Boot Field" section on page 225 for more information on systems that can use this command to modify the software configuration register.

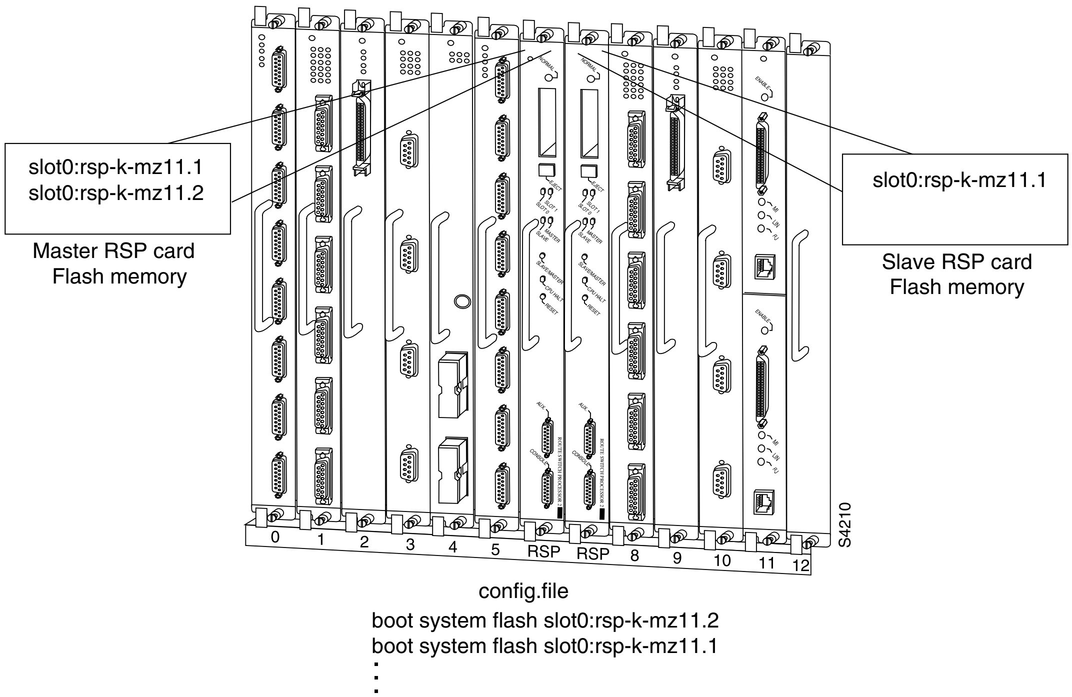
Upgrading to a New Software Version Example

In this example, assume the following:

- The master RSP is in processor slot 6 and the slave RSP is in processor slot 7 of a Cisco 7513 router.
- The system has the same image rsp-k-mz11.1 in PCMCIA slot 0 of both the master and slave RSP card.
- You want to upgrade to Cisco IOS Release 12.0, but you want to guard against software failures. So, you configure Dual RSP operation for software error protection.

Figure 31 illustrates the software error protection configuration for this example. The configuration commands for this configuration follow the figure.

Figure 31 Software Error Protection: Upgrading to a New Software Version



Because you always view the environment from the master RSP perspective, in the following command you view the master's slot 0 to verify the location and version of the master's software image:

```
Router# dir slot0:
-#- -length- -----date/time------ name
1    3482496  May 4 1993 21:38:04 rsp-k-mz11.1

7993896 bytes available (1496 bytes used)
```

Now view the slave's software image location and version:

```
Router# dir slaveslot0:
-#- -length- -----date/time------ name
1    3482496  May 4 1993 21:38:04 rsp-k-mz11.1

7993896 bytes available (1496 bytes used)
```

Because you want to run the Release 12.0 system image on one RSP card and the Release 11.1 system image on the other RSP card, copy the Release 12.0 system image to the master's slot 0:

```
Router# copy tftp: slot0:rsp-k-mz12.0
```

Enter global configuration mode and configure the system to boot first from a Release 12.0 system image and then from a Release 11.1 system image:

```
Router# configure terminal
Router (config)# boot system flash slot0:rsp-k-mz12.0
Router (config)# boot system flash slot0:rsp-k-mz11.1
```

With this configuration, when the slot 6 RSP card is master, it looks first in its PCMCIA slot 0 for the system image file rsp-k-mz11.2 to boot. Finding this file, the router boots from that system image. When the slot 7 RSP card is master, it also looks first in its slot 0 for the system image file rsp-k-mz12.0 to boot. Because that image does not exist in that location, the slot 7 RSP card looks for the system image file rsp-k-mz11.1 in slot 0 to boot. Finding this file in its PCMCIA slot 0, the router boots from that system image. In this way, each RSP card can reboot the system using its own system image when it becomes the master RSP card.

Configure the system further with a fault-tolerant booting strategy:

```
Router (config)# boot system tftp rsp-k-mz11.1 192.168.1.25
```

Set the configuration register to enable loading of the system image from a network server or from Flash and save the changes to the master and slave startup configuration file:

```
Router (config)# config-register 0x010F
Router (config)# end
Router# copy system:running-config nvram:startup-config
```

Reload the system so that the master RSP uses the new Release 12.0 system image:

```
Router# reload
```

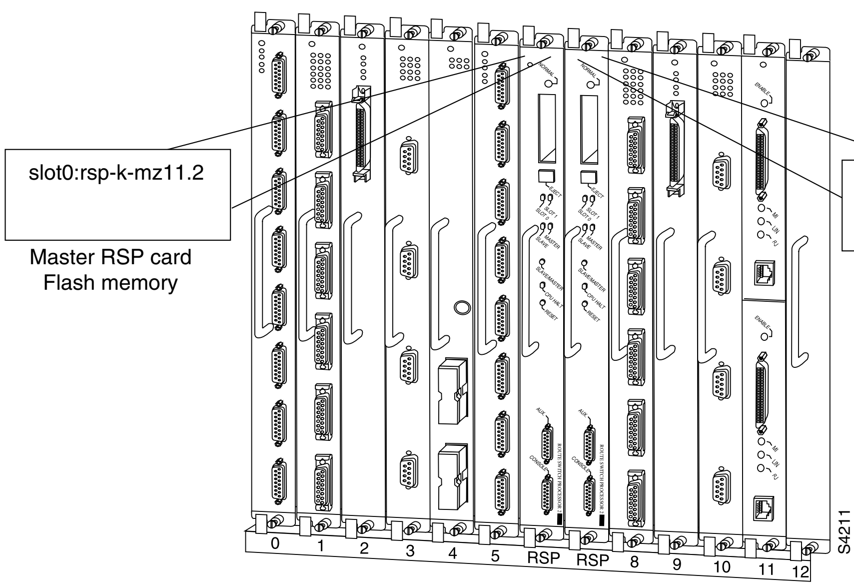
Dual RSP: Backing Up with an Older Software Version Example

In the following example, assume the following:

- The master RSP is in processor slot 6 and the slave RSP is in processor slot 7 of a Cisco 7513 router.
- The system has the same image rsp-k-mz11.2 in PCMCIA slot 0 of both the master and slave RSP card.
- You want to use to Cisco IOS Release 11.1 as backup to guard against software failures. So, you configure Dual RSP operation for software error protection.

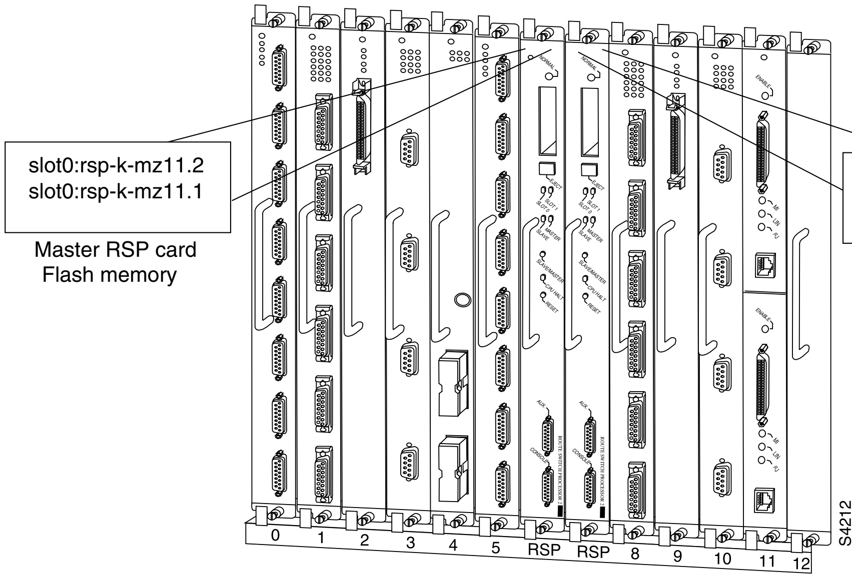
In this scenario, you begin with the configuration shown in Figure 32.

Figure 32 Software Error Protection: Backing Up with an Older Software Version, Part I



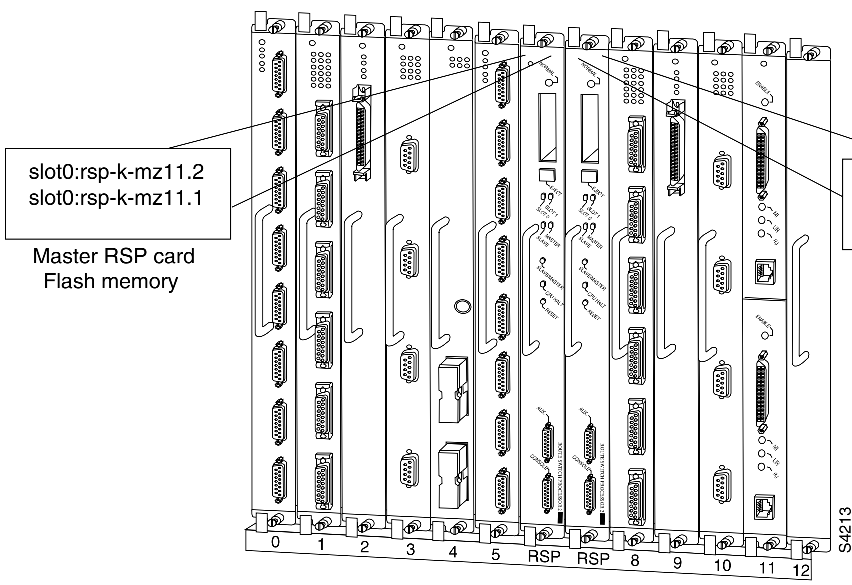
First, copy the rsp-k-mz11.1 image to the master and slave RSP card, as shown in Figure 33.

Figure 33 Software Error Protection: Backing Up with an Older Software Version, Part 2



Next, you delete the rsp-k-mz11.2 image from the slave RSP card. The final configuration is shown in Figure 34.

Figure 34 Software Error Protection: Backing Up with an Older Software Version, Part 3



The following commands configure software error protection for this example scenario.

View the master and slave slot 0 to verify the location and version of their software images:

```
Router# dir slot0:
-#- -length- -----date/time------ name
1    3482498  May 4 1993 21:38:04 rsp-k-mz11.2
```

```
7993896 bytes available (1496 bytes used)

Router# dir slaveslot0:
-#- -length- -----date/time------ name
1    3482498  May 4 1993 21:38:04 rsp-k-mz11.2

7993896 bytes available (1496 bytes used)
```

Copy the Release 11.1 system image to the master and slave slot 0:

```
Router# copy tftp: slot0:rsp-k-mz11.1
Router# copy tftp: slaveslot0:rsp-k-mz11.1
```

Delete the rsp-k-mz11.2 image from the slave RSP card:

```
Router# delete slaveslot0:rsp-k-mz11.2
```

Configure the system to boot first from a Release 11.2 system image and then from a Release 11.1 system image:

```
Router# configure terminal
Router (config)# boot system flash slot0:rsp-k-mz11.2
Router (config)# boot system flash slot0:rsp-k-mz11.1
```

Configure the system further with a fault-tolerant booting strategy:

```
Router (config)# boot system tftp rsp-k-mz11.1 192.168.1.25
```

Set the configuration register to enable loading of the system image from a network server or from Flash and save the changes to the master and slave startup configuration file:

```
Router (config)# config-register 0x010F
Router (config)# end
Router# copy system:running-config nvram:startup-config
```

Note You do not need to reload the router in this example, because the router is currently running the Release 11.2 image.

Setting Environment Variables on the Master and Slave RSP

You can set environment variables on both RSP cards in a Cisco 7507 and Cisco 7513 router.

Note When you configure Dual RSP operation, we recommend that you use the default environment variables. If you change the variables, we recommend setting the same device for equivalent environment variables on each RSP card. For example, if you set one RSP card's CONFIG_FILE environment variable device to NVRAM, set the other RSP card's CONFIG_FILE environment variable device to NVRAM as well.

You set environment variables on the master RSP just as you would if it were the only RSP card in the system. Refer to the following sections for more information on these steps:

- "Specifying the Startup System Image in the Configuration File" section on page 193 (in the "Loading and Maintaining System Images and Microcode" chapter).
- "Controlling Environment Variables" section on page 229.

- "Specifying the CONFIG_FILE Environment Variable on Class A Flash File Systems" section on page 167 (in the "Modifying, Downloading, and Maintaining Configuration Files" chapter).

You can set the same environment variables on the slave RSP card, manually or automatically. The following sections describe these two methods:

- Automatically Setting Environment Variables on the Slave RSP
- Manually Setting Environment Variables on the Slave RSP

Automatically Setting Environment Variables on the Slave RSP

With automatic synchronization turned on, the system automatically saves the same environment variables to the slave's startup configuration when you set the master's environment variables and save them.

Note Automatic synchronization mode is on by default. To turn off automatic synchronization, use the **no slave auto-sync config** global configuration command.

To set environment variables on the slave RSP when automatic synchronization is on, set the environment variables as described in the "Rebooting" chapter of this book. You can verify the boot variable using the **show bootvar** EXEC mode command.

Manually Setting Environment Variables on the Slave RSP

If you disable automatic synchronization of configuration files, you must manually synchronize the slave's configuration file to the master's configuration file to store environment variables on the slave RSP.

Once you set the master's environment variables, you can manually set the same environment variables on the slave RSP card using the **slave sync config** EXEC command.

To manually set environment variables on the slave RSP, perform the following procedure:

Step 1 Set the environment variables for the master RSP card as described in the "Rebooting" chapter of this book.

Step 2 Save the configuration using the **copy system:running-config nvram:startup-config** EXEC command.

Step 3 Save the same environment variable configuration to the slave RSP using the **slave sync config** privileged EXEC command. Issuing this command will synchronize the configuration files.

Step 4 Verify the environment variable settings using the **show bootvar** EXEC command.

Monitoring and Maintaining Dual RSP Operation

To monitor and maintain Dual RSP operation, complete the following tasks in the following sections:

- Overriding the Slave Image Bundled with the Master Image
- Manually Synchronizing Configuration Files

- Troubleshooting and Reloading a Failed RSP Card
- Disabling Access to the Slave Console
- Displaying Information About Master and Slave RSP Cards

Overriding the Slave Image Bundled with the Master Image

To override the slave image that is bundled with the master image, use the following command in global configuration mode:

Command	Purpose
`Router(config)# slave image {system	file-url}`	Specifies which image the slave runs.

Manually Synchronizing Configuration Files

To manually synchronize configuration files and ROM monitor environment variables on the master and slave RSP card, use the following command in privileged EXEC mode:

Command	Purpose
`Router(config)# slave sync config`	Manually synchronizes the master and slave configuration files.

Caution When you install a second RSP card for the first time, you *must* immediately configure it using the **slave sync config** command. This ensures that the new slave is configured consistently with the master. Failure to do so can result in an unconfigured slave RSP card taking over mastership of the router when the master fails, potentially rendering the network inoperable.

The **slave sync config** command is also a useful tool for more advanced implementation methods not discussed in this chapter.

Troubleshooting and Reloading a Failed RSP Card

When a new master RSP card takes over mastership of the router, it automatically reboots the failed RSP card as the slave RSP card. You can access the state of the failed RSP card in the form of a stack trace from the master console using the **show stacks** EXEC command.

The **debug oir** command is used to debug the online insertion and removal (OIR) feature (which is also known as hot-swapping or power-on servicing). The **debug oir** command often is useful in debugging problems related to OIR, including single line card reloading.

You can also manually reload a failed, inactive RSP card from the master console. This task returns the card to the active slave state. If the master RSP fails, the slave will be able to become the master. To manually reload the inactive RSP card, use the following command in global configuration mode:

Command	Purpose
`Router(config)# slave reload`	Reloads the inactive slave RSP card.

Disabling Access to the Slave Console

The slave console does not have enable password protection. Thus, a user connected to the slave console port can enter privileged EXEC mode and view or erase the configuration of the router. Use the **no slave terminal** global configuration command to disable slave console access and prevent security problems. When the slave console is disabled, users cannot enter commands.

If slave console access is disabled, the following message appears periodically on the slave console:

```
%%Slave terminal access is disabled. Use "slave terminal" command in master RSP
configuration mode to enable it.
```

Displaying Information About Master and Slave RSP Cards

To display information about both the master and slave RSP cards, use the following commands in EXEC mode, as needed:

Command	Purpose
`Router# show bootvar`	Displays the environment variable settings and configuration register settings for both the master and slave RSP cards.
`Router# show file systems`	Displays a list of Flash devices currently supported on the router.
`Router# show version`	Displays the software version running on the master and slave RSP card.
`Router# show stacks`	Displays the stack trace and version information of the master and slave RSP cards.