Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

February 2005
OL-3968-04

This document describes the Route Processor Redundancy Plus (RPR+) feature on the Cisco uBR10012 universal broadband router. RPR+ and DOCSIS Stateful Switchover (DSSO) support in Cisco IOS® Software for fast route processor failover without DOCSIS line card reboot.

With RPR+ and DOCSIS SSO, the Cisco uBR10012 can rapidly fail over from the active route processor to the standby processor without the reloading of the cable line cards. However, even though the cable line cards are not reset, the new active route processor needs to perform certain recovery procedures in order for cable line card traffic-flow to resume. A Cisco implementation provides priority-recovery procedures for those modems carrying voice, providing more rapid recovery of voice services.

Note From Cisco IOS release 12.2SC onwards, NSF and SSO is recommended and supported on the Cisco uBR10012 router. For SSO configuration details, see the "Configuring SSO" section in the Stateful Switchover guide at the following link:
http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/sso26s.html#wp1338159

Feature History for RPR+ on the Cisco uBR10012 Universal Broadband Router

Release	Modification
12.2(11)BC3	This feature was introduced.
12.3(9a)BC	RPR+ functionality introduced in support of the Cisco uBR10012 Performance Routing Engine 2 (PRE2) modules.
12.3(17a)BC	• DSX Messages and Synchronized PHS Information introduced for switchover support. • High Availability Support for Encrypted IP Multicast introduced for switchover support.

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** at the login dialog box and follow the instructions that appear.

Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Contents

Prerequisites for Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

- You must have the same image on both the active and standby RPs to support RPR+. If one or more RPs does not have an RPR+ image, the router reverts to RPR mode on both RPs.
- Two PRE1 or PRE2 modules must be installed in the Cisco uBR10012 chassis. The order number for the PRE1 module is UBR10-PRE1. You cannot mix PRE modules with PRE1 or PRE2 modules in the same chassis.

Note The PRE module no longer ships with the Cisco uBR10012 chassis.

- For full redundancy, the Fast Ethernet port on the standby RP must have its own connection to the network. The console port on the standby RP must also be connected to a terminal, either by connecting it to a second terminal or by using a terminal server or other device to connect it to the same terminal used by the PRE1 or PRE2 module.
- Both PRE1 or PRE2 modules must be configured with the same amount of onboard SDRAM. A standby RP cannot come online as the active RP if the standby RP has a smaller amount of SDRAM than the active RP.

Restrictions for Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

ARP Filtering Statistics

The Cisco uBR10012 router maintains ARP filtering statistics on the Performance Routing Engine (PRE) module. Statistics are viewed with the **show cable arp-filter** command for a specified interface. When a switchover event occurs, as in RPR+ Redundancy, these ARP filtering statistics are reset to zero.

For additional information about ARP filtering, refer to the following document on Cisco.com:

- *Cable ARP Filtering*

  http://www.cisco.com/en/US/docs/cable/cmts/feature/cblarpfl.html

Command-line Interface Synchronization and SNMP

Command-line interface (CLI) configuration commands are synchronized only with the standby Performance Routing Engine (PRE) module. Simple Network Management Protocol (SNMP) persistence is not supported through a PRE1 or PRE2 switchover. Any configuration that is done with SNMP commands is not synchronized with the standby PRE module.

Console Port Usage After a PRE1 or PRE2 Module Switchover

When an active RP fails, and the standby RP becomes the active RP, you must use the console port on the new active RP to give command-line interface (CLI) commands and display statistics for the system. If you have connected your PC or terminal to the console port on an active RP and a switchover occurs, you no longer are able to access the console and the display shows "Standby console disabled."

To access the console, move the PC or terminal's serial cable to the console port on the other PRE1 or PRE2 module, which is now acting as the active RP.

Encrypted Multicast

Encrypted multicast is not supported during a line card switchover nor during a PRE1 or PRE2 switchover.

External Management Stations

External management stations lose connectivity with the cable modem termination system (CMTS) during PRE1 or PRE2 switchover. Stations must reestablish connectivity after the switchover between PRE1 or PRE2 modules is complete.

Flap Detection on WAN Interfaces During Switchover

Neighboring routers detect flapping on WAN interfaces during a switchover. The neighboring routers reconverge after the switchover is complete.

Note Cable interfaces do not flap during a switchover. Service may be temporarily suspended for approximately 30 seconds during a switchover and reinitialization, but service to cable interfaces does not stop.

Link States Reinitialized After Switchover

The synchronization of link states is not maintained between the active and standby RP. Link states are reinitialized after switchover

MIB Variables Reinitialized After Switchover

All MIB variables will be re-initialized following a switchover.

Telnet Sessions Disconnected During Switchover

A switchover automatically disconnects any Telnet sessions on the active (failed) RP.

Information About Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

When two route processors (RPs) are installed in a Cisco uBR10012 router chassis, one RP acts as the active RP, and the other acts as a backup, or standby, RP. If the active RP fails, or is removed from the system, the standby RP detects the failure and initiates a switchover. During a switchover, the standby RP assumes control of the router, connects with the network interfaces, and activates the local network management interface and system console.

Using the RPR+ feature, the standby RP is fully initialized and configured. This allows RPR+ to dramatically shorten the switchover time if the active RP fails, or if a manual switchover is performed. Because both the startup configuration and running configuration are continually synchronized from the active to the standby RP, line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a link flap (that is, the link does not go down and back up).

Each RP contains all the resources required to operate the router, such as bootflash memory, Flash disks, Ethernet ports, and console port. In the default operation, the secondary RP also synchronizes the major systems files, such as the Cisco IOS startup configuration file, so that during a switchover, the secondary RP can duplicate the active RP's configuration. This process also resets the cable and network uplink interfaces.

This section describes the switchover process with RPR+, including synchronization between the active and standby RPs, and includes the following topics:

Benefits

DOCSIS Stateful Switchover (DSSO)

DOCSIS stateful switchover (DSSO) increases service uptime by instantaneously switching over between dual route processors should one processor fail. Switchover takes place without resetting or reloading line cards or affecting related subsystems or processes. The advantage of DOCSIS Stateful Switchover (DSSO) (with RPR+) is that a switchover between the primary and standby RP will not require the cable interfaces to be reset, nor do the modems reregister or go offline. Furthermore, the cable modems retain their service IDs (SIDs) through the switchover.

Standard RPR

In standard RPR, the system implemented Extended High System Availability (EHSA) redundancy, wherein the standby RP suspended its initialization midway through the startup process. To complete the initialization during a switchover, all line cards were reset and the switch fabric was reinitialized. Because initialization of the standby RP was suspended before configuration was parsed, chassis discovery and startup configuration parsing were conducted during the switchover.

Improved Switchover Time with RPR+

RPR+ provides a faster switchover by fully initializing and fully configuring the standby RP. The configuration data on the standby RP is fully synchronized with the active RP. With RPR+, the communication with line cards is reinitialized, but the line cards are not reset.

Supported Cable Interface Line Cards and Interface Modules

Beginning with Cisco IOS Release 12.2(11)BC3, the Cisco uBR10012 router supports the following cable interface line cards and interface modules with RPR+ and PRE1 or PRE2 modules:

- Cisco uBR10-LCP2-MC16C/MC16E/MC16S Line Card
- Cisco uBR10-LCP2-MC28C/B Line Card
- Cisco uBR10-MC5X20S Cable Interface Line Card
- Cisco uBR10-SRP-OC12SML/SMI DPT Adapter Card
- Cisco uBR10012 OC-48 DPT/POS Interface Module

Terminology Changes with Cisco IOS Release 12.2(11)BC3

In Cisco IOS Release 12.2(11)BC3 and later, the following High Availability terms for the Cisco uBR10012 universal broadband router have been changed:

Old Term	New Term
Failover	Switchover
N+1 Redundancy	1:n Redundancy
Primary RP	Active RP
Secondary RP	Standby RP

Synchronization

To achieve the benefits of RPR+, the chassis and slot configuration information is synchronized from the active RP to the standby RP at startup and whenever changes to the active RP configuration occur. This synchronization occurs in two separate phases:

1. When a standby RP first comes online, the configuration information is synchronized in bulk from the active RP to the standby RP.
2. When configuration changes occur, an incremental synchronization from the active RP to the standby RP is conducted. Incremental synchronizations contain either the modifications to the shelf configuration or the trigger that caused the modification.

Synchronization During Initialization

When a system with RPR+ is initialized, the active RP performs a chassis discovery (discovery of the number and type of line cards and fabric cards in the system) and parses the startup configuration file.

The active RP then synchronizes this data to the standby RP and instructs the standby RP to complete its initialization. This method ensures that both RPs contain the same configuration information.

Note Even though the standby RP is fully initialized, it interacts only with the active RP to receive incremental changes to the configuration files as they occur. CLI commands on the standby RP are not supported.

Synchronization of Startup Configuration

The startup configuration is a text file stored in the RP's NVRAM. During system startup, the startup configuration file is copied from the active RP to the standby RP. Any existing startup configuration file on the standby RP is overwritten.

The startup configuration file is also synchronized whenever you perform the following operations:

- CLI command: **copy system:running-config nvram:startup-config**
- CLI command: **copy running-config startup-config**
- CLI command: **write memory**
- CLI command: **copy filename nvram:startup-config**
- SNMP SET of MIB variable ccCopyEntry in CISCO_CONFIG_COPY MIB
- System Configuration Saved on **reload** command.
- System Configuration Saved on **redundancy force-failover** command.

Note Synchronization of the startup configuration file is enabled by default in RPR+ mode. Because this is necessary for RPR+ functionality, the command [**no**] **auto-sync startup-config** is not available in RPR+ mode. This command is available only in standard RPR mode. For additional information on the use of [**no**] **auto-sync startup-config** with standard RPR, see the *Route Processor Redundancy for the Cisco uBR10012 Universal Broadband Router*.

Incremental Synchronization of the Running Configuration

When both RPs are fully initialized, any further changes to the running configuration are synchronized to the standby RP as they occur.

CLI commands

CLI changes to the running configuration are synchronized from the active RP to the standby RP. In effect, the CLI command is run on both the active and the standby RP.

SNMP SET Commands

Configuration changes caused by an SNMP SET are also synchronized on a case-by-case basis. Currently only two SNMP configuration SETs are supported on the Cisco uBR10012 router:

- **shut/no-shut** (of an interface)
- **link up/down trap enable/disable**

Changes to Chassis State

- Any changes to the chassis state because of line card insertion or removal are synchronized over to the standby RP.
- Changes to the chassis state because of switch card insertion or removal, or from configuration changes to the alarm or power supply cards, are not synchronized to the standby RP. The standby learns these configuration changes using a discovery and reconciliation process during a switchover.
- Information regarding line card states is not synced. Line cards that are not on line at the time of a switchover (that is, any cards not running the Cisco IOS software and not communicating with the active RP) are reset and reloaded during a switchover. This process does not add downtime.

The RPR+ Switchover Process

A switchover occurs when the standby RP takes over responsibilities from the active RP. The switchover can occur automatically if the standby RP has determined that the active RP has failed, or an operator can initiate a manual switchover whenever desired.

A switchover triggers the following events:

1. If this is a manual switchover, the active RP verifies that the standby RP is present and is running Cisco IOS software that supports the RPR feature. If so, it instructs the standby RP to begin switchover procedures, and the active RP either attempts to reload its configured Cisco IOS software image or enters ROM monitor mode, depending on the setting of its configuration register.
2. The standby RP completes its initialization procedures, which includes completely loading the Cisco IOS software, verifying the physical components of the Cisco uBR10012 chassis, and parsing the startup configuration file. The standby RP is configured identically to the previous active RP, including the IP address for its onboard Fast Ethernet management interface.
3. The standby RP assumes responsibility as the active RP and brings the Cisco uBR10012 chassis into a known state, which includes resetting all installed and enabled line cards and respective interfaces.

Note Resetting the Gigabit Ethernet and OC-12 Packet Over SONET (POS) line cards will interrupt traffic for approximately 30 seconds. The cable interface is not reset, and in support of DOCSIS requirements, the cable modems do not go offline.

Note Depending on the network configuration and on the configuration of the Ethernet/Fast Ethernet interfaces, the network could take between 3 to 25 seconds after an RPR+ switchover before all end-to-end connections are fully restored. During that time it is possible that some packets might be dropped.

4. The new active RP begins normal systems operations, including passing traffic.

Note Depending on the setting of the PRE1 or PRE2 module's configuration register, it either reloads the Cisco IOS software or is left in the ROM monitor state. If the PRE1 or PRE2 module is in the ROM monitor state, it does not begin functioning as a standby RP until it is reloaded with the **hw-module sec-cpu reset** command.

Note The backup PRE1 or PRE2 module starts forwarding traffic immediately to cable modems, presuming that the interfaces are up, and that all the FIB, adjacency, service flow, classifiers, and Virtual Traffic Management System (VTMS) queue information are correctly configured.

Redundant File Systems

Both the active and standby RPs have active file systems that can be accessed to store and transfer files. Table 1 lists the available file systems, the filenames that you can use with CLI commands to access the file systems, and a short description of each.

Table 1 Cisco uBR10012 Router File Systems

File System	Filename for CLI Commands	Description
Bootflash Secondary bootflash	bootflash: sec-bootflash:	Stores image and dump files.
NVRAM Secondary NVRAM	nvram: sec-nvram:	Typically stores the system default configuration file and startup configuration file.
System	system:	Stores the running configuration and other system files.
Disk 0 Disk 1 Slot 0 Slot 1 Secondary Disk 0 Secondary Disk 1 Secondary Slot 0 Secondary Slot 1	disk0: disk1: slot0: slot1: sec-disk0: sec-disk1: sec-slot0: sec-slot1:	Disk refers to an ATA Flash disk (48 or 128 MB). Slot refers to a Flash memory card (8, 16, or 20 MB).[1] 0 refers to the left slot on the PRE1 or PRE2 module. 1 refers to the right slot on the PRE1 or PRE2 module. The sec prefix refers to the Flash disk or card in the standby RP.
FTP TFTP RCP	ftp: tftp: rcp:	Protocols used to transfer files to and from remote devices.

1. Because of the small file system, the slot devices are not typically used on the Cisco uBR10012 router. The disk and sec-disk file systems are typically used instead.

You can use the privileged EXEC commands **dir**, **del**, and **copy** to manage the contents of the file systems. You can also use the commands **mkdir** and **rmdir** to create and remove directories on Flash disks. You cannot use the commands **squeeze** and **undelete** on Flash disks.

Note For more information about using these file systems, see the "File Management" manual in the *Cisco IOS Release 12.2 Configuration Fundamentals Configuration Guide*.

DSX Messages and Synchronized PHS Information

Cisco IOS Release 12.3(17a)BC introduces support for PHS rules in a High Availability environment. In this release, and later releases, PHS rules synchronize and are supported during a switchover event of these types:

- Route Processor Redundancy Plus (RPR+) for the Cisco uBR10012 router, with Active and Standby Performance Routing Engines (PREs)
- HCCP N+1 Redundancy, with Working and Protect cable interface line cards

For further information about DSX messages and Payload Header Suppression (PHS) information on the Cisco CMTS, refer to these documents, and additional DOCSIS PHS information:

- *Cable DOCSIS 1.1 FAQs*, Cisco TAC Document 12182

  http://www.cisco.com/en/US/tech/tk86/tk168/technologies_q_and_a_item09186a0080174789.shtml
- *DOCSIS 1.1 for the Cisco CMTS*

  http://www.cisco.com/en/US/docs/cable/cmts/feature/guide/ufg_docs.html

High Availability Support for Encrypted IP Multicast

Cisco IOS Release 12.3(17a)BC introduces support for IP Multicast streams during switchover events in a High Availability environment. This feature is supported for Route Processor Redundancy Plus (RPR+), N+1 Redundancy, and encrypted BPI+ streams.

For additional information about IP Multicast and High Availability, refer to these documents on Cisco.com:

- *Cisco CMTS Universal Broadband Router MIB Specifications Guide*

  http://www.cisco.com/en/US/docs/cable/cmts/mib/reference/guide/mibv5ubr.html
- *Dynamic Shared Secret for the Cisco CMTS*

  http://www.cisco.com/en/US/docs/cable/cmts/feature/ubrdmic.html
- *IP Multicast in Cable Networks,* White Paper

  http://www.cisco.com/en/US/technologies/tk648/tk828/technologies_case_study0900aecd802e2ce2.html
- *N+1 Redundancy for the Cisco Cable Modem Termination System*

  http://www.cisco.com/en/US/docs/cable/cmts/feature/guide/uFGnpls1.html

How to Configure, Verify, and Troubleshoot Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

This section provides the following procedures to configure and verify RPR+ and high availability on the Cisco uBR10012 router.

Configuring RPR+ on the Cisco uBR10012 Universal Broadband Router

The default redundancy mode in the Cisco uBR10012 router is standard Route Processor Redundancy (RPR). Perform the steps below to enable RPR+ on the Cisco uBR10012 router.

Prerequisites

To enable RPR+, both route processors must be running the same version of Cisco IOS software.

Note If necessary, refer to the "Upgrading Cisco IOS Software Images" section on page 14 to change the image on the Cisco uBR10012 router. Reload is required.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **main-cpu**
4. **auto-sync** *option*
5. **no auto-sync** *option* (optional)
6. **CTRL-Z**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**main-cpu** **Example:** `Router(config)# main-cpu`	Enters the main CPU configuration mode. (This configures the active RP, not the standby RP.) Refer to main-cpu, page 41, for additional command syntax information.
Step 4	**auto-sync** *option* **Example:** `Router(config-r-mc)# auto-sync standard`	Specifies the files to be synchronized. Refer to auto-sync, page 27, for additional command syntax information. **Note** Cisco strongly recommends that you use the **auto-sync standard** command to ensure that all system files remain synchronized between the two PRE1 or PRE2 modules.
Step 5	**no auto-sync** *option* **Example:** `Router(config-r-mc)# no auto-sync standard`	(Optional) Specifies that one or more files should not be synchronized. *Option* can be any of the values specified previously. **Note** The **no auto-sync** command is not typically used in production plants.
Step 6	**CTRL-Z** **Example:** `Router(config-r-mc)# CTRL-Z`	Returns to privileged EXEC mode.
Step 7	**copy running-config startup-config** **Example:** `Router# copy running-config startup-config`	Saves the current configuration as the default startup configuration.

Verifying RPR+ Configuration

Perform the steps below to verify that RPR+ is configured on the Cisco uBR10012 router:

SUMMARY STEPS

1. **enable**
2. **show startup-config**
3. **show redundancy**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show startup-config** **Example:** `Router# show startup-config` `...` `redundancy` `main-cpu` `auto-sync standard` `...`	Displays the startup configuration and verify that the lines configuring redundancy appear. **Note** If the **auto-sync** line contains anything other than **standard**, it indicates that only some of the required system files are being synchronized between the two PRE1 or PRE2 modules. Verify that this is the desired configuration. If necessary, refer to the "Configuring RPR+ on the Cisco uBR10012 Universal Broadband Router" section on page 11 to reconfigure the router for **auto-sync standard** operation.
Step 3	**show redundancy** **Example:** `Router# show redundancy` `PRE1 A (This PRE1) : Primary` `PRE1 B : Secondary` `...`	Displays the current RPR state. The active RP typically is shown in slot A. **Note** Additional example command output is available immediately below, and in the "show redundancy" section on page 53.

Examples

If a switchover has occurred, the **show redundancy** command displays information similar to the following, showing that the active RP has changed slots (in this case, moving from slot A to slot B):

```
Router# show redundancy

PRE1 A : Secondary
PRE1 B (This PRE1) : Primary
Redundancy state is REDUNDANCY_PEERSECONDARY_INITED
Secondary RP information....
Secondary is up.
Secondary BOOT variable = bootflash:ubr10k-k8p6-mz
Secondary CONFIG_FILE variable =
Secondary BOOTLDR variable = bootflash:c10k-eboot-mz
Secondary Configuration register is 0x2
Router#
```

If the standby RP is not installed or is not operational, the **show redundancy** command displays information similar to the following:

```
Router# show redundancy

PRE1 A (This PRE1) : Primary
PRE1 B : Secondary
Redundancy state is REDUNDANCY_PEERSECONDARY_NONOPERATIONAL
Secondary RP information....
Secondary RP is not up
```

Note The **show redundancy** command shows whether the PRE1 A slot or PRE1 B slot contains the active (Primary) PRE1 module. The other PRE1 slot will always be marked as Secondary, even if a second PRE1 module is not installed.

Upgrading Cisco IOS Software Images

RPR+ is enabled by default with the Cisco IOS Release 12.2(11)BC3 and later releases. Use this set of procedures when you need to upgrade your Cisco IOS to a release that supports RPR+ on the Cisco uBR10012 router.

Cisco IOS software upgrade involves these three procedures:

- Creating Additional Disk Space (Optional), page 14
- Copying the Cisco IOS Image, page 15
- Resetting a PRE1 or PRE2 Module or Line Card After Upgrade, page 16

Prerequisites

Note You are required to have the same image on both the active and standby RPs to support RPR+. If one or more RPs does not have an RPR+ image, the router reverts to RPR mode on both RPs.

Creating Additional Disk Space (Optional)

(Optional) To create additional disk space in preparation for the RPR+ image, issue the following commands from global configuration mode on the active and standby RPs (where *slot* is the RP slot number and *filename* is the RPR+ image file name).

SUMMARY STEPS

1. **delete slot** *slot*:*filename* or **delete sec-slot** *slot*:*filename*
2. **squeeze flash:**

DETAILED STEPS

Step 1	**delete slot 0:***filename* or **delete sec-slot 0:***filename* **Example:** `Router(config)# delete slot 0:ubr10k-p6-mz` or `Router(config)# delete sec-slot 0:ubr10k-p6-mz`	Deletes an old file from the active or standby RP to make room for the new file.
Step 2	**squeeze flash:** **Example:** `Router(config)# squeeze flash:`	Permanently deletes all files marked "delete" on a Flash memory device, recovering space on the device.

Copying the Cisco IOS Image

To copy the Cisco IOS image from a TFTP server, and to set the boot variable on the active RP, issue the following commands in global configuration mode (where *filename* is the RPR+ image fil name).

SUMMARY STEPS

1. **copy tftp:**//*tftp-server/filename* **bootflash:***filename*
   or
   copy tftp://*tftp-server/filename* **sec-bootflash:***filename*
2. **boot system bootflash:***filename*
3. **write memory**
4. **show bootvar**

DETAILED STEPS.

Step 1	**copy tftp://***tftp-server/filename* **bootflash:***filename* or **copy tftp://***tftp-server/filename* **sec-bootflash:***filename* **Example:** `Router# copy tftp://tftp-server/ubr10k-p6-mz bootflash:ubr10k-p6-mz` or `Router# copy tftp://tftp-server/ubr10k-p6-mz sec-bootflash:ubr10k-p6-mz`	Copies the Cisco IOS image from a TFTP server to the bootflash of the active or standby RP. This command allows you to change software images without requiring access to the TFTP monitor mode. The image you download is made available to the Cisco uBR10012 router on the next reload (reboot).
Step 2	**boot system bootflash:***filename* **Example:** `Router# boot system bootflash:ubr10k-p6-mz`	Sets the BOOT environment variable. This variable specifies the location and name of the system image file to use when automatically booting the system.
Step 3	**write memory** **Example:** `Router# write memory`	Saves the configuration.
Step 4	**show bootvar** **Example:** `Router# show bootvar`	Displays the contents of the BOOT variable, the name of the configuration file pointed to by the CONFIG_FILE variable, the contents of the BOOTLDR variable, and the configuration register setting.

Resetting a PRE1 or PRE2 Module or Line Card After Upgrade

To reset a particular route processor (RP) or a particular line card, use the **hw-module reset** command in privileged EXEC mode.

SUMMARY STEPS

1. **hw-module reset**

DETAILED STEPS.

Step 1	**hw-module sec-cpu reset** **Example:** `Router# hw-module sec-cpu reset`	Resets the specified RP or line card slot. **Note** Refer to hw-module reset, page 39 for additional command syntax information.

Reloading Cisco IOS (Restarting the System)

To reload the operating system, use the **reload** command in privileged EXEC mode.

Note This reload is required if you are reloading an RPR+ image, but optional otherwise. The **reload** command restarts the entire system, including both the active and standby RPs.

SUMMARY STEPS

1. **reload**

DETAILED STEPS.

Step 1	`Router# reload` **Example:** `Router# reload`	Reloads the operating system and restarts the router.

Note If you are upgrading from a Cisco IOS image previously configured with RPR+ to a newer image with RPR+, the procedure is now complete. When the new active RP comes up, it will automatically configure RPR+ from the configuration information in the startup configuration (synchronized from the old active RP).

Performing a Manual Route Processor Switchover

For testing or maintenance, you may need to perform a manual switchover in which your standby RP becomes your active RP. Perform the following steps to force a manual switchover between RPs.

SUMMARY STEPS

1. **show cable modem**
2. **redundancy force-failover main-cpu**
3. **show cable modem**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**show cable modem** **Example:** `Router> show cable modem`	Displays information for the registered and unregistered cable modems supported by the active RP. The output from this command provides information that confirms successful switchover in pending steps. **Note** For additional command options and examples, refer to show cable modem, page 47.
Step 2	**redundancy force-failover main-cpu** **Example:** `Router# configure terminal`	Forces a switchover on the active RP. The standby RP becomes the active RP with a switchover time of approximately 30 seconds or less. **Note** The modems do not redefine their ranges and the line cards do not reset during switchover. **Note** For additional command information and examples, refer to redundancy force-failover main-cpu, page 42.
Step 3	**show cable modem** **Example:** `Router> enable`	Displays information for the registered and unregistered cable modems supported by the newly active RP (formerly the standby RP). **Note** For additional command options and examples, refer to the "show cable modem" section on page 47.

Troubleshooting Route Processor Redundancy Plus

If RPR+ is not enabled after mode rpr-plus is run, verify that both the active and standby RPs are running Cisco IOS Release 12.2(11)BC3 or a later release.

Note If the active RP detects a different version of the image on the standby RP, the system automatically reverts to standard RPR behavior.

Configuration Examples for Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

This section provides the following command examples that display the configuration and status of RPR+ on a Cisco uBR10012 router chassis with active and standby RPs. These commands all illustrate the same Cisco uBR10012 chassis:

- **show redundancy**
- **show running configuration**
- **show version**

The following **show redundancy** command displays the slots for the primary RP (PRE in slot 15), the secondary RP (PRE in slot 7), and additional redundancy mode information.

```
Router# show redundancy

Primary PRE in slot 15:
Secondary PRE in slot 7:
Preferred PRE: 15
Operating Redundancy Mode: RPR Plus
Auto synch: startup-config running-config
switchover timer 8 seconds [default]
```

The following **show running configuration** command displays RPR+ information such as main-cpu and auto-sync status.

```
Router# show run

Building configuration...

Current configuration : 10895 bytes
!
version 12.2
no parser cache
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
service udp-small-servers max-servers no-limit
!
hostname "Router"
!
boot system flash bootflash:ubr10k-k8p6-mz.999-99.122BC_UB_030303
redundancy
 no keepalive-enable
 main-cpu
  auto-sync standard
no logging rate-limit
enable password cisco
!
facility-alarm intake-temperature major 49
facility-alarm intake-temperature minor 40
facility-alarm intake-temperature critical 57
facility-alarm core-temperature major 53
facility-alarm core-temperature minor 45
facility-alarm core-temperature critical 60
card 1/0 1gigethernet-1
card 1/1 2cable-tccplus
card 3/0 1oc12pos-1
card 4/0 1gigethernet-1
card 5/0 2cable-mc28c
card 5/1 cable-lcp
card 6/0 2cable-mc28c
card 7/0 2cable-mc28c
card 8/0 1cable-mc16s
card 8/1 1cable-mc16s
```

```
cable modem max-cpe unlimited
cable spectrum-group 1 band 8000000 20000000
cable modulation-profile 1 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fixed uw16
cable modulation-profile 1 initial 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 1 station 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 1 short 6 75 6 8 16qam scrambler 152 no-diff 144 shortened uw8
cable modulation-profile 1 long 8 220 0 8 16qam scrambler 152 no-diff 160 shortened uw8
cable modulation-profile 2 request 0 16 0 8 qpsk scrambler 152 no-diff 64 fixed uw16
cable modulation-profile 2 initial 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 2 station 5 34 0 48 qpsk scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 2 short 6 75 6 8 16qam scrambler 152 no-diff 144 shortened uw8
cable modulation-profile 2 long 8 220 0 8 16qam scrambler 152 no-diff 160 shortened uw8
no cable qos permission create
no cable qos permission update
cable qos permission modems
no cable service flow inactivity-threshold
cable time-server
ip subnet-zero
ip cef table resolution-timer 1
no ip domain lookup
ip host abrick 223.255.254.254
ip dhcp relay information option
!
ip dhcp pool modems-c6
   network 1.6.1.64 255.255.255.224
   bootfile schcfr_new.cm
   next-server 1.10.41.3
   default-router 1.10.41.3
   option 7 ip 1.10.41.3
   option 4 ip 1.6.1.65
   option 2 hex ffff.8f80
!
ip dhcp pool modems-c5
   network 1.5.1.64 255.255.255.224
   bootfile schcfr_new.cm
   next-server 1.5.1.65
   default-router 1.5.1.65
   option 7 ip 1.5.1.65
   option 4 ip 1.5.1.65
   option 2 hex ffff.8f80
!
ip dhcp pool modems-c7
   network 1.7.1.64 255.255.255.224
   bootfile up2-down2-nobpi.cm
   next-server 1.10.41.3
   default-router 1.10.41.3
   option 7 ip 1.10.41.3
   option 4 ip 1.7.1.65
   option 2 hex ffff.8f80
!
ip dhcp pool modems-c8
   network 1.8.1.64 255.255.255.224
   bootfile schcfr_new.cm
   next-server 1.8.1.65
   default-router 1.8.1.65
   option 7 ip 1.8.1.65
   option 4 ip 1.8.1.65
   option 2 hex ffff.8f80
!
ip dhcp pool modems-c51
   network 1.9.1.64 255.255.255.224
   bootfile config.cm
   next-server 1.10.41.3
   default-router 1.10.41.3
   option 7 ip 1.10.41.3
   option 4 ip 1.9.1.65
   option 2 hex ffff.8f80
!
ip multicast-routing
!
!
```

```
interface Loopback1
 ip address 222.1.1.1 255.255.255.0
!
interface FastEthernet0/0/0
 ip address 1.10.41.3 255.255.0.0
 no ip proxy-arp
 no ip route-cache
 no ip mroute-cache
 load-interval 30
 no cdp enable
!
interface GigabitEthernet1/0/0
 ip address 1.1.1.1 255.255.0.0
 no negotiation auto
 no cdp enable
!
interface POS3/0/0
 ip address 200.200.0.1 255.255.0.0
 shutdown
 crc 32
 no cdp enable
 pos ais-shut
!
interface GigabitEthernet4/0/0
 no ip address
 negotiation auto
 no cdp enable
!
interface Cable5/0/0
 no ip address
 load-interval 30
 no keepalive
 cable bundle 1 master
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream frequency 441000000
 cable downstream channel-id 60
 cable upstream 0 spectrum-group 1
 cable upstream 0 power-level 0
 no cable upstream 0 concatenation
 cable upstream 0 data-backoff automatic
 no cable upstream 0 shutdown
 cable upstream 1 power-level 0
 cable upstream 1 shutdown
 cable upstream 2 power-level 0
 cable upstream 2 shutdown
 cable upstream 3 power-level 0
 cable upstream 3 shutdown
 hccp 1 working 5
 hccp 1 channel-switch 5 uc wavecom-ma 1.10.41.6 2 1.10.41.5 1
 hccp 1 channel-switch 5 nru rfswitch-group 1.10.41.7 80080000 1
 hccp 1 reverttime 6
!
interface Cable5/0/0.1
 ip address 111.111.111.1 255.255.255.0 secondary
 ip address 1.5.1.65 255.255.255.224
 ip pim sparse-mode
 ip helper-address 1.10.41.3
 ip igmp static-group 239.0.0.11
 ip igmp static-group 239.0.0.12
 ip igmp static-group 239.0.0.14
 ip igmp static-group 239.0.0.16
 ip igmp static-group 239.0.0.32
 ip igmp static-group 239.0.0.35
 ip igmp static-group 239.0.0.36
 cable source-verify dhcp
 cable dhcp-giaddr policy
!
interface Cable5/0/1
 no ip address
 cable downstream annex B
 cable downstream modulation 64qam
```

```
 cable downstream interleave-depth 32
 cable downstream channel-id 1
 cable upstream 0 shutdown
 cable upstream 1 shutdown
 cable upstream 2 shutdown
 cable upstream 3 shutdown
!
interface Cable6/0/0
 no ip address
 no keepalive
 cable bundle 1
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream frequency 441000000
 cable downstream channel-id 70
 cable upstream 0 frequency 12000000
 cable upstream 0 power-level 0
 no cable upstream 0 shutdown
 cable upstream 1 power-level 0
 cable upstream 1 shutdown
 cable upstream 2 power-level 0
 cable upstream 2 shutdown
 cable upstream 3 power-level 0
 cable upstream 3 shutdown
 hccp 1 working 6
 hccp 1 channel-switch 6 uc wavecom-ma 1.10.41.6 2 1.10.41.5 2
 hccp 1 channel-switch 6 nru rfswitch-group 1.10.41.7 80080000 2
!
interface Cable6/0/1
 no ip address
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream channel-id 1
 cable upstream 0 shutdown
 cable upstream 1 shutdown
 cable upstream 2 shutdown
 cable upstream 3 shutdown
!
interface Cable7/0/0
 no ip address
 no keepalive
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream frequency 441000000
 cable downstream channel-id 60
 cable upstream 0 power-level 0
 no cable upstream 0 concatenation
 no cable upstream 0 shutdown
 cable upstream 1 power-level 0
 cable upstream 1 shutdown
 cable upstream 2 power-level 0
 cable upstream 2 shutdown
 cable upstream 3 power-level 0
 cable upstream 3 shutdown
 hccp 1 protect 5 222.1.1.1
 hccp 1 channel-switch 5 nru rfswitch-group 1.10.41.7 80080000 1
 hccp 1 channel-switch 5 uc wavecom-ma 1.10.41.6 2 1.10.41.5 1
 hccp 1 protect 6 222.1.1.1
 hccp 1 channel-switch 6 uc wavecom-ma 1.10.41.6 2 1.10.41.5 2
 hccp 1 channel-switch 6 nru rfswitch-group 1.10.41.7 80080000 2
 hccp 1 timers 5000 15000
!
interface Cable7/0/1
 no ip address
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream channel-id 1
 cable upstream 0 shutdown
 cable upstream 1 shutdown
```

```
 cable upstream 2 shutdown
 cable upstream 3 shutdown
!
interface Cable8/0/0
 no ip address
 ip access-group 99 in
 no keepalive
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream frequency 441000000
 cable downstream channel-id 60
 cable upstream 0 spectrum-group 1
 cable upstream 0 power-level 0
 cable upstream 0 modulation-profile 2 1
 no cable upstream 0 shutdown
 cable upstream 1 power-level 0
 cable upstream 1 shutdown
 cable upstream 2 power-level 0
 cable upstream 2 threshold  cnr-profile1 21 cnr-profile2 11 Corr-Fec 11 Uncorr-Fec 21
 cable upstream 2 shutdown
 cable upstream 3 power-level 0
 cable upstream 3 shutdown
 cable upstream 4 shutdown
 cable upstream 5 shutdown
 hccp 2 working 8
 hccp 2 channel-switch 8 uc wavecom-ma 1.10.41.6 2 1.10.41.5 1
 hccp 2 channel-switch 8 nru rfswitch-group 1.10.41.7 80080000 1
!
interface Cable8/0/0.1
 ip address 1.8.1.65 255.255.255.224
 cable source-verify dhcp
!
interface Cable8/1/0
 no ip address
 no keepalive
 cable downstream annex B
 cable downstream modulation 64qam
 cable downstream interleave-depth 32
 cable downstream frequency 441000000
 cable downstream channel-id 60
 cable upstream 0 power-level 0
 no cable upstream 0 shutdown
 cable upstream 1 power-level 0
 cable upstream 1 shutdown
 cable upstream 2 power-level 0
 cable upstream 2 shutdown
 cable upstream 3 power-level 0
 cable upstream 3 shutdown
 cable upstream 4 power-level 0
 cable upstream 4 shutdown
 cable upstream 5 power-level 0
 cable upstream 5 shutdown
 hccp 2 protect 8 222.1.1.1
 hccp 2 channel-switch 8 uc wavecom-ma 1.10.41.6 2 1.10.41.5 1
 hccp 2 channel-switch 8 nru rfswitch-group 1.10.41.7 80080000 1
 hccp 2 timers 5000 15000
 no hccp 2 revertive
!
ip default-gateway 1.10.0.1
ip classless
ip route 1.9.0.0 255.255.0.0 1.10.0.1
ip route 2.6.0.0 255.255.0.0 200.200.0.2
ip route 223.255.254.254 255.255.255.255 1.10.0.1
no ip http server
ip pim bidir-enable
!
ip access-list standard XYZ
 permit any
ip access-list standard pqRS
 permit any
no logging linecard
access-list 3 permit 210.221.55.46
```

```
access-list 99 permit any
access-list 110 permit ip any any
access-list 110 permit udp any eq bootps any
access-list 111 permit udp any eq bootps any
arp 1.10.41.6 0020.4a51.1776 ARPA
arp 1.10.41.5 0020.4a51.00ea ARPA
no cdp run
snmp-server manager
tftp-server bootflash:up2-down2-nobpi.cm alias up2-down2-nobpi.cm
tftp-server bootflash:tony11.cm alias tony11.cm
tftp-server bootflash:up2-down2.cm alias up2-down2.cm
tftp-server bootflash:new-privacy.cm alias new-privacy.cm
tftp-server bootflash:10.cm alias 10.cm
tftp-server bootflash:att-10plus.cm alias att-10plus.cm
tftp-server bootflash:schcfr_new.cm alias schcfr_new.cm
tftp-server bootflash:test11.cm alias test11.cm
tftp-server bootflash:4us16ds.cm alias 4us16ds.cm
!
alias exec scm show cable modem
alias exec sqos show cable qos profile
alias exec shc show hccp
alias exec nd no debug all
alias exec sr show running-config
alias exec sip show ip interface b
alias exec dc debug hccp channel-switch
alias exec spm sh proc mem | in HCCP
alias exec de debug hccp event
alias exec ds debug hccp sync
alias exec dp debug hccp plane
alias exec dt debug hccp timing
alias exec dipc debug cr10k-rp ipc
alias exec dpm debug hccp plane message
alias exec dpp debug hccp plane packet
alias exec sib show ip int br
alias exec shb show hccp br
alias exec scs show cable spectrum-group
!
line con 0
 exec-timeout 0 0
line aux 0
 stopbits 1
 speed 19200
line vty 0 4
 exec-timeout 0 0
 password lab
 login
 length 0
!
end
```

The following **show version** command displays active and standby RP status.

```
Router# show version

Cisco Internetwork Operating System Software
IOS (tm) 10000 Software (UBR10K-K8P6-M), Version 12.2(122BC.030303.)
Copyright (c) 1986-2003 by cisco Systems, Inc.
Compiled Mon 03-Mar-03 21:23 by
Image text-base: 0x60008954, data-base: 0x61B00000

ROM: System Bootstrap, Version 12.0(9r)SL2, RELEASE SOFTWARE (fc1)

amit-rp2 uptime is 57 minutes
System returned to ROM by reload at 02:05:40 UTC Sun Nov 26 2000
System image file is "bootflash:ubr10k-k8p6-mz.999-99.122BC_UB_030303"

cisco uBR10000 (PRE1-RP) processor with 393215K/131072K bytes of memory.
Processor board ID TBA05191959
R7000 CPU at 262Mhz, Implementation 39, Rev 2.1, 256KB L2, 2048KB L3 Cache
Backplane version 1.0, 8 slot

Last reset from other pre
Toaster processor tmc0 is running.
```

```
Toaster processor tmc1 is running.
1 OC12 POS controller (1 POS)
1 TCCplus card(s)
1 FastEthernet/IEEE 802.3 interface(s)
1 Gigabit Ethernet/IEEE 802.3 interface(s)
1 Packet over SONET network interface(s)
8 Cable Modem network interface(s)
509K bytes of non-volatile configuration memory.

125440K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
32768K bytes of Flash internal SIMM (Sector size 256KB).
Secondary is up.
Secondary has 524288K bytes of memory.

Configuration register is 0x0
```

Additional References

To access documentation for the Cisco uBR10012 universal broadband router and router components, use the following URL:

http://www.cisco.com/en/US/products/hw/cable/ps2209/tsd_products_support_series_home.html

The following documents provide additional information about the Cisco uBR10012 universal broadband router, supporting line cards and interface modules, and feature configuration.

Document	Description
Release Notes for Cisco uBR10012 Universal Broadband Router for Cisco IOS Release 12.2 BC	Describes the enhancements and caveats provided in Cisco IOS Release 12.2(11)BC3.
Cisco IOS CMTS Cable Command Reference	Contains the cable-specific commands for the Cisco uBR7100 series, Cisco uBR7200 series, and Cisco uBR10012 universal broadband routers.
Cisco Cable Modem Termination System Feature Guide	Document describes software features contained in the Cisco Cable Modem Termination System (CMTS). Each chapter describes a feature; the supported releases; benefits; restrictions; any supported standards, MIBs, or RFCs; any prerequisites; and the configuration tasks and examples used to set up and implement the feature. The CMTS features are used by the Cisco uBR7100 series, the Cisco uBR7200 series, and the Cisco uBR10012 universal broadband routers.
Technical Support for the Cisco uBR10012 Universal Broadband Router	Web page provides an index of technical support information.

Supported Standards, MIBs, and RFCs

MIBs	MIBs Link
• No new or modified MIBs are supported by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/cisco/web/support/index.html

Command Reference

This section provides information about the following commands that configure and monitor RPR+ on the Cisco uBR10012 router. Support for these commands begins or continues with Cisco IOS Software Release 12.2(11)BC3, and continues with later software releases in this Cisco IOS release train.

- auto-sync
- debug checkpoint
- debug cr10k-rp
- debug redundancy
- hw-module reset
- main-cpu
- redundancy force-failover main-cpu
- secondary aux
- show cable modem
- show checkpoint
- show redundancy
- switchover timeout

Note For additional information about the Cisco IOS commands supported by the Cisco uBR10012 router, refer to the *Cisco Broadband Cable Command Reference Guide* on Cisco.com.

auto-sync

To configure those system files that automatically synchronize the active and standby Performance Routing Engine (PRE1 or PRE2) modules, use the **auto-sync** command in redundancy configuration (main-cpu) mode. To disable the synchronization of all or some files, use the **no** form of this command.

auto-sync {**bootvar** | **config-register** | **standard** | **running-config** | **startup-config**}

no auto-sync {**bootvar** | **config-register** | **standard** | **running-config** | **startup-config**}

Syntax Description

bootvar	Specifies that the PRE1 or PRE2 modules should synchronize the following boot variables: • BOOT—Set by the **boot system** *device:filename* command • CONFIG_FILE—Set by the **boot config** *device:filename* command • BOOTLDR—Set by the **boot bootldr** *device:filename* command
config-register	Specifies that the PRE1 or PRE2 modules should synchronize the configuration register values.
standard	Specifies that the PRE1 or PRE2 modules should synchronize all of the system files (default).
running-config	Specifies that the PRE1 or PRE2 modules should synchronize the run-time configuration files.
startup-config	Specifies that the PRE1 or PRE2 modules should synchronize the startup configuration files.

Defaults

The system defaults to synchronizing all system files (**auto-sync standard**).

Command Modes

Redundancy configuration, main-cpu mode

Command History

Release	Modification
12.2(4)XF1	This command supports Route Processor Redundancy (RPR) with the Cisco uBR10012 router.
12.2(11)BC3	This command supports Route Processor Redundancy Plus (RPR+) with the Cisco uBR10012 router.

Usage Guidelines

By default, the system synchronizes all system files, which is the typical setting for most applications. However, you might want to not synchronize certain files for specialized applications.

For example, if you have configured the active and standby PRE1 or PRE2 modules to run different versions of Cisco IOS software, you might want to use different configuration files as well. In this case, you would not synchronize the startup configuration file.

Examples

The following example shows the system being configured to synchronize only the startup configuration file:

```
router(config)# redundancy
router(config-r)# main-cpu
router(config-r-mc)# auto-sync startup-config
router(config-r-mc)# exit
router(config-r)# exit
router(config)#
```

The following example shows how to configure the system to synchronize all system files except for the startup configuration file. This typically is done when the two PRE1 or PRE2 modules are running different software images.

```
router(config)# redundancy
router(config-r)# main-cpu
router(config-r-mc)# no auto-sync startup-config
router(config-r-mc)# auto-sync config-register
router(config-r-mc)# auto-sync bootvar
router(config-r-mc)# exit
router(config-r)# exit
router(config)#
```

Related Commands

Command	Description
main-cpu	Enters main CPU redundancy configuration mode.

debug cable interface

To display debug messages for a specific cable interface, or for traffic related to a specific MAC address or Service ID (SID) on that interface, use the **debug cable interface** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug cable interface cable {*slot/port* | *slot/subslot/port*} [**mac-address** *address* [*mask*] | **sid** *number*] [**verbose**]

no debug cable interface cable {*slot/port* | *slot/subslot/port*} [**mac-address** *address* [*mask*] | **sid** *number*] [**verbose**]

Syntax Description

slot/subslot/port	Identifies the cable interface on the Cisco uBR10012 router. The following are the valid values: • *slot* = 5 to 8 • *subslot* = 0 or 1 • *port* = 0 to 4 (depending on the cable interface)
mac-address *address mask*	(Optional) Specifies that debugging is to be done only on traffic related to the specified MAC *address*. An optional *mask* can be specified to indicate a range of MAC addresses. The *mask* is ANDed with the *address* to determine which bits of the address must match to be included in the debugging display.
sid *number*	(Optional) Specifies that debugging is to be done only on traffic related to the specified SID. The valid range is 1 to 8191.
verbose	(Optional) Displays detailed debug information.

Defaults

Debugging for the cable interfaces is not enabled, which means most of the other **debug cable** commands will not display any output, even when debugging is enabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(6)T	This command was introduced.

Usage Guidelines

The **debug cable interface** command must be used to enable debugging on a cable interface before other **debug** commands can be used on that interface. The **mac-address** and **sid** options can be used to restrict the debug output to only those messages that are related to a specific MAC address or SID, so that the volume of debug messages does not affect system performance.

Examples

The following example shows how to enable debugging on the cable interface in slot 6:

```
Router# debug cable interface c6/0
Router# show debug
```

```
CMTS specific:
  Debugging is on for Cable6/0
Router#
```

The following shows how to enable verbose debugging on the cable interface in slot 6:

```
Router# debug cable interface c6/0 verbose
Router# show debug
CMTS specific:
  Debugging is on for Cable6/0 (verbose)
Router#
```

The following example shows how to enable debugging on the cable interface in slot 6 for all traffic coming from CMs and other devices with MAC addresses that match the address range 0010.0000.0000 through 0010.00FF.FFFF (0010.00xx.xxxx):

```
Router# debug cable interface c6/0 mac-address 0010.0000.0000 FFFF.FF00.0000
Router# show debug
CMTS specific:
  Debugging is on for Cable6/0, Address 0010.0000.0000, Mask ffff.ff00.0000
Router#
```

Related Commands

Command	Description
debug cable dynsrv	Displays debugging information about DOCSIS 1.1 dynamic service flow messages.
debug cable mac-address	Enables debugging on traffic from CMs with the specific MAC address or within the specific MAC address range.

debug checkpoint

The Checkpointing Facility is a software subsystem by which information is transferred from the active RP to the standby RP. To enable debugging of the Checkpointing Facility (CF) subsystem on the Cisco uBR10012 router, use the **debug checkpoint** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug checkpoint [**all** | **errors** | **messages** | **temporary** | **timers**]

no debug checkpoint [**all** | **errors** | **messages** | **temporary** | **timers**]

Syntax Description

all	(Optional) Enables all checkpoint debugging types.
errors	(Optional) Enables debugging of any checkpoint errors that occur.
messages	(Optional) Enables debugging for the messages that are sent during checkpoint operations.
temporary	(Optional) Enables basic checkpoint debugging (default).
timers	(Optional) Enables debugging of the checkpoint timers.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)BC3	This command was introduced for the Cisco uBR10012 universal broadband router.

Usage Guidelines

The **debug checkpoint** command enables debugging of the Checkpoint Facility (CF) subsystem, which manages the passing of messages from the active to standby cards. It also handles sequencing and throttling, as needed, during redundancy operations.

Examples

The following example shows how to enable debugging messages for the CF subsystem:

```
Router# debug checkpoint

Router#
```

Related Commands

Command	Description
debug cable interface	Enables debugging on a specific cable interface.
debug cable mac-address	Enables debugging for a specific cable modem, as identified by its hardware (MAC) address.

debug cr10k-rp

To enable debugging of the subsystems on the active Performance Routing Engine (PRE1 or PRE2) module on the Cisco uBR10012 router, use the **debug cr10k-rp pkt** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug cr10k-rp [**cli** | **drv** | **ha-all** | **ha-msg** | **ha-timing** | **ipc** | **oir** | **pkt** [**conditional** [**peek** *byte*]] | **sid** | **spec**]

no debug cr10k-rp [**cli** | **drv** | **ha-all** | **ha-msg** | **ha-timing** | **ipc** | **oir** | **pkt** [**conditional** [**peek** *byte*]] | **sid** | **spec**]

Syntax Description

cli	(Optional) Displays debugging messages for the command-line interface (CLI) commands run on the processor.
drv	(Optional) Displays debugging messages for the processor's driver software.
ha-all	(Optional) Displays debugging messages related to High Availability (HA) redundancy events such as switchovers.
ha-msg	(Optional) Displays debugging messages for HA bulk synchronization operations.
ha-timing	(Optional) Displays debugging messages related to HA timing events.
ipc	(Optional) Displays debugging messages for the processor's interprocess communications (IPC) system.
oir	(Optional) Displays debugging messages for online insertion and removal (OIR) operations.
pkt	(Optional) Displays debugging messages for the packets that the PRE1 or PRE2 module processes.
conditional	(Optional) Enables conditional debugging for the packets processed by the PRE1 or PRE2 module.
peek *byte*	(Optional) Specifies that debugging should show the value for a specific byte in each packet processed by the PRE. The valid range for *byte* is from 1 to 120.
sid	(Optional) Displays debugging messages for the service IDs (SIDs) processed by the PRE1 or PRE2 module.
spec	(Optional) Displays debugging messages for spectrum management operations.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)BC1	This command was introduced for the Cisco uBR10012 universal broadband router.
12.2(11)BC2	The **conditional** and **peek** options were added for the **pkt** keyword.
12.2(11)BC3	The **ha-all**, **ha-msg**, and **ha-timing** options were added to support High-Availability 1:n redundancy operations.

Usage Guidelines

The **debug cr10k-rp pkt** command enables debugging of the different subsystems that are active on the PRE1 or PRE2 modules in the Cisco uBR10012 router. You can perform general debugging by giving the command without any options, or you can limit the debugging output to a specific subsystem by specifying one of the optional keywords.

In Cisco IOS Release 12.2(11)BC2 and later releases, you can use the **conditional** option, together with the **debug cable mac-address** and **debug cable interface** commands, to display information about selected packets. The command displays only those packets that match the specified cable interface or MAC address options.

Together with the **conditional** option, you can also optionally specify the **peek** keyword to create specifically match only those packets that contain a matching MAC address at the specified location in the datagram. This can be useful for examining certain types of packets, such as Dynamic Host Configuration Protocol (DHCP) or Address Resolution Protocol (ARP) packets.

Examples

The following example shows typical output for CLI debugging messages:

```
Router# debug cr10k-rp cli

CR10K RP debug CLI debugging is on

Failed setting clock for slot 2, subunit 1
SNMP Info download failed for slot 2, subunit 1
Config change command for unknown interface!!!
```

The following example shows typical output for IPC debugging messages:

```
Router# debug cr10k-rp ipc

CR10K RP debug IPC debugging is on

plugin_card__c10k_sch_card_event: hwidb=Cable8/1/0 if_num=0 event=6

00:03:14: clc_if_stats_event: If stats from Ca8/1/0
00:03:14: Merge: on Ca8/1/0
00:03:14:         Outputs         Tot_Outs     TotTxBytes
00:03:14:  RP       0            40           7103
00:03:14:  SIC      0            0            0
00:03:14:  LC       0            40            7103

plugin_card__c10k_sch_card_event: hwidb=Cable8/1/1 if_num=1 event=6

00:03:14: clc_if_stats_event: If stats from Ca8/1/1
00:03:14: Merge: on Ca8/1/1plugin_card__c10k_sch_card_event: hwidb=Cable6/0/0 if_num=0
event=6

00:03:15: clc_if_stats_event: If stats from Ca6/0/0
00:03:15:
Merge: on Ca6/0/0
00:03:15:         Outputs         Tot_Outs     TotTxBytes
00:03:15:  RP       0            0            0
00:03:15:  SIC      0            0            0
00:03:15:  LC       0            0            0
```

The following example shows typical output for IPC debugging messages when you are shutting down and reenabling a cable interface:

```
Router# debug cr10k-rp ipc

CR10K RP debug IPC debugging is on
Router# configure terminal
Router(config)# interface c6/0/0
Router(config-if)# shutdown

schrp_cli_cmd: slot=6 subunit=100 slotunit=8 cmdtype=101F
c10k_card_send_nbcmd_eventrsp: nbcmd_id=0x611CE998 hwidb=6B3DF60
plugin_card__c10k_sch_card_event: hwidb=0x6B3DF60 interface_num=0 event=4096
sch_handle_sch_event: erso_type=0x1001
sch_handle_sch_rp_cfg_ersp(): hwidb=0x6B3DF60 msg_size=0x0 0x78  ersp_size=0x0 0x78
type=0x1001
plugin_card__c10k_sch_card_event: hwidb=0x6B3DF60 interface_num=0 event=4
c10k_sch_link_state_event: hwidb=0x6B3DF60 unit=0 seq=34 reason=2 event_state=1

Router(config-if)# no shutdown

Router(config-if)# schrp_cli_cmd: slot=6 subunit=100 slotunit=8 cmdtype=101F
schrp_cli_cmd: SCH_API_CMD_GET_INIT_DS hwidb=6B3DF60
c10k_card_send_nbcmd_eventrsp: nbcmd_id=0x611CE998 hwidb=6B3DF60
plugin_card__c10k_sch_card_event: hwidb=0x6B3DF60 interface_num=0 event=4096
sch_handle_sch_event: erso_type=0x1001
sch_handle_sch_rp_cfg_ersp(): hwidb=0x6B3DF60 msg_size=0x0 0x950  ersp_size=0x0 0x950
type=0x1001
c10k_card_send_nbcmd_eventrsp: nbcmd_id=0x611CE998 hwidb=6B3DF60
plugin_card__c10k_sch_card_event: hwidb=0x6B3DF60 interface_num=0 event=4096
sch_handle_sch_event: erso_type=0x1001
sch_handle_sch_rp_cfg_ersp(): hwidb=0x6B3DF60 msg_size=0x0 0x20  ersp_size=0x0 0x20
type=0x1001
plugin_card__c10k_sch_card_event: hwidb=0x6B3DF60 interface_num=0 event=4
c10k_sch_link_state_event: hwidb=0x6B3DF60 unit=0 seq=35 reason=2 event_state=1
```

The following example shows a typical display for the **debug cr10k-rp pkt conditional** command, which displays packets for SID 2 on cable interface 6/1/0:

```
Router# debug cable interface c6/1/0 sid 2
Router# debug cr10k-rp pkt conditional
Router# show debug

CR10K PACKET:
  Dump cr10k packets to/from RP conditionally
```

The following example shows how to enable conditional debugging of packets, displaying only those packets that contain the desired MAC address at byte 92 in the datagram:

```
Router# debug cr10k-rp pkt conditional peek 92
Router# debug cable interface c6/1/0 mac-address 00C0.abcd.ef00
Router# show debug

CR10K PACKET:
  Dump cr10k packets to/from RP conditionally
    Additionally, peeking inside transmitted pkts at offset 92
```

Both types of packet debugging generate output similar to the following example:

```
Jun 19 13:07:32.316: RPTX: Using Downstream Service Flow ID : 16939, SID : 2  V5
Jun 19 13:07:32.316: RPTX to Cobalt: 0x801B634, size=111
006F0000 00057010 422B2488 00020000 10000006 10000010 950701DB 00016440
D1420800 4500004B 2B260000 FF11187A A4789781 A478978F CD7E00A1 0037D2CA
302D0201 00040670 75626C69 63A02002 03062B27 02010002 01003013 3011060D
  ....
```

```
Jun 19 13:07:32.316: RPTX: Using Downstream Service Flow ID : 16939, SID : 2  V5
Jun 19 13:07:32.316: RPTX to Cobalt: 0x8023834, size=111
006F0000 00057010 422B2488 00020000 10000006 10000010 950701DB 00016440
D1420800 4500004B 2B270000 FF111879 A4789781 A478978F CD7E00A1 0037D2CB
302D0201 00040670 75626C69 63A02002 03062B28 02010002 01003013 3011060D
  ....
```

Table 2 explains the information contained in the display for each packet:

Table 2 debug cr10k-rp pkt Field Descriptions

Field	Description
RPIX: Using Downstream Service Flow ID	Service flow ID (SFID) for this packet.
SID	Service ID (SID) for this packet.
RPTX or RPRX	Whether this packet is transmitted (RPTX) or received (RPRX) by the processor.
Size	Size of the packet's datagram in decimal.
Packet Dump	First 96 bytes of the packet's datagram in hexadecimal. The command then displays an ellipses (. . .) if the datagram is larger than 96 bytes.

The following example shows typical output for SID debugging messages:

```
Router# debug cr10k-rp sid

CR10K RP debug SID debugging is on

(Cable 6/1/0:2): CM Offline - MAC 00C0.1234.5678, SID 113
(Cable 6/1/0:2): -Shutdown CM- SID 231
(Cable 6/1/0:2): CM Shutdown - MAC 00C0.2210.a01c, SID 231
(Cable 6/1/0:2): CM Remove - MAC 00C0.2210.a01c, SID 231
Call SID replace with old IP addr 10.10.13.18 new IP addr 10.10.13.121
(Cable 5/1/1:1) - New CM 00C0.1122.bcab, SID 396
(Cable 5/1/0:1) - New CM 00C0.8723.11F0, SID 397
(Cable 5/1/0:1) - CM Init FAILED - MAC 00C0.8723.11F0, SID 397
```

The following example shows typical output for spectrum management debugging messages for a particular interface:

```
Router# debug cable interface c6/1/0 sid 2
Router# debug cr10k-rp pkt spec

CR10K RP debug Spectrum debugging is on

(Cable 5/0/0:4) Release frequency (11600000, 3200000) from group 12
(Cable 5/0/0:4) Frequency request (10000000 - 13200000) from group 12 approved
(Cable 7/0/0:1) Frequency request (12000000 - 13600000) from group 2 approved
(Cable 7/0/0:1) Release frequency (12800000, 1600000) from group 2
(Cable 7/0/0:1) Frequency request (12000000 - 15200000) from group 2 approved
(Cable 7/0/0:2) Frequency request (20000000 - 21600000) from group 22 approved
(Cable 7/0/0:2) Release frequency (20800000, 1600000) from group 22
(Cable 7/0/0:2) Frequency request (20000000 - 23200000) from group 22 approved
(Cable 7/0/0:3) Frequency request (20000000 - 21600000) from group 22 approved
(Cable 7/0/0:3) Release frequency (20800000, 1600000) from group 22
(Cable 7/0/0:4) Release frequency (20800000, 1600000) from group 22
(Cable 7/0/0:4) Frequency request (20000000 - 20400000) from group 22 approved
(Cable 7/0/0:5) Frequency request (20000000 - 21600000) from group 22 approved
(Cable 7/0/0:5) Release frequency (20800000, 1600000) from group 22
```

```
(Cable 7/0/0:5) Frequency request (20000000 - 20200000) from group 22 approved
(Cable 7/0/0:6) Frequency request (20000000 - 21600000) from group 22 approved
Release frequency request sent to slot 7 subslot 0
(Cable 7/0/0:6) Frequency request (21400000 - 21800000) from group %d rejected because of
overlapping band
```

The following example shows the typical messages for the **ha-timing** option. These messages show the total time it takes to synchronize all of the cable modems on a cable interface after a switchover, as well as the total time it takes for all cable modems to recover and come online. These messages also show the total time it took the HCCP and DOCSIS protocol subsystems to synchronize after a switchover.

```
Router# debug cable interface c6/1/0
Router# debug cr10k-rp ha-timing

CR10K RP debug High Availability timing

PRE_HA: c6/1/0 Total modems 234 bulk sync'ed in 531 msec
    (delay: 20 msec; CM's per loop:10)
PRE_HA: c6/1/0 Total modems (234) recovered in 1124 msec
PRE_HA: Completed hccp bulksync in 335 msecs
PRE_HA: Completed docsis bulksync in 751 msecs
```

The following example shows the typical messages for the **ha-msg** option. These messages show the total time it takes to synchronize all of the cable modems on a cable interface after a switchover, as well as the total time it takes to recover and come online. These messages also show the total time it took the Hot-standby Connection-to-Connection Protocol (HCCP) and DOCSIS protocol subsystems to synchronize after a switchover.

```
Router# debug cable interface c6/1/0
Router# debug cr10k-rp ha-msg

CR10K RP debug High Availability msg

PRE_HA_BUGMSG
PRE REDUNDANCY: Bulk sync completed
PRE REDUNDANCY: Recv bulk sync complete - sending ack
PRE REDUNDANCY: Send bulk sync ack failed");
PRE RF: Waiting for bulk sync ack
PRE REDUNDANCY: Bulk sync completed
PRE REDUNDANCY: Recv bulk sync complete - sending ack
PRE REDUNDANCY: Send bulk sync ack failed
PRE RF: Waiting for bulk sync ack
```

Related Commands

Command	Description
debug cable interface	Enables debugging on a specific cable interface.
debug cable mac-address	Enables debugging for a specific cable modem, as identified by its hardware (MAC) address.

debug redundancy

To enable debugging of the Route Processor Redundancy (RPR) feature and its background procedures, use the **debug redundancy** command in privileged EXEC mode.

debug redundancy {**alarms** | **all** | **configsync** | **fsm** | **keepalive** | **peer-monitor** | **services** | **timesync**}

Syntax Description

alarms	Enables debugging messages for alarms sent because of redundancy procedures.
all	Enables all redundancy debugging messages.
configsync	Enables debugging messages for the synchronization of the configuration files.
fsm	Enables debugging for changes in the redundancy finite state machine (FSM).
keepalive	Enables debugging messages for the keepalive messages sent between Performance Routing Engine (PRE1 or PRE2) modules.
peer-monitor	Enables debugging messages for the standby RP's monitoring of the active RP.
rf-fsm	Enables debugging for changes in the redundancy finite state machine (FSM).
services	Enables debugging for the services requested during redundancy processing.
timesync	Enables debugging messages for time synchronization procedures.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)XF1	This command was introduced for the Cisco uBR10012 router.
12.2(11)BC3	The **fsm** option was renamed to **rf-fsm**.

Examples

The following example shows all redundancy debugging messages being enabled:

```
Router# debug redundancy all

Redundancy All debugging is on

Router#
```

The following example shows typical messages that the **debug redundancy alarms** command displays:

```
Router# debug redundancy alarms

Redundancy Alarms debugging is on
Router#

01:28:48: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=KEEPALIVE_FAILURE(7))
slave_down: generating Secondary-Down alarm
Asserting alarm : SEC_FAILURE

01:28:48: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=PEER_REDUNDANCY_STATE_CHANGE(5))
```

The following example shows the typical state changes that the **debug redundancy fsm** command displays when the standby RP is reset:

```
Router# debug redundancy fsm

Redundancy FSM debugging is on
Router#

01:15:30: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=KEEPALIVE_FAILURE(7))
Flushing IPC entries in FSM queue

01:15:30: ehsa_fsm: state change, events: major=2 minor=1
REDUNDANCY_PEERSECONDARY_INITED(9) => REDUNDANCY_PEERSECONDARY_NONOPERATIONAL(6)

01:15:31: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=PEER_REDUNDANCY_STATE_CHANGE(5))

01:15:31: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=KEEPALIVE_FAILURE(7))
Flushing IPC entries in FSM queue

01:15:31: ehsa_fsm: state change, events: major=2 minor=1
REDUNDANCY_PEERSECONDARY_INITED(9) => REDUNDANCY_PEERSECONDARY_NONOPERATIONAL(6)

01:15:31: %REDUNDANCY-5-PEER_MONITOR_EVENT: Primary detected a secondary crash
(raw-event=PEER_REDUNDANCY_STATE_CHANGE(5))
```

The following example shows the messages that are displayed by the **debug redundancy keepalive** command:

```
Router# debug redundancy keepalive

Redundancy Keepalive debugging is on
Router#

Sent keepalive
Received keepalive
Sent keepalive
Received keepalive
Sent keepalive
Received keepalive
Sent keepalive
```

Related Commands

Command	Description
associate	Associates two line cards for automatic protection switching (APS) redundancy protection.
auto-sync	Configures what system files the active and standby RPs automatically synchronize.
main-cpu	Enters main CPU redundancy configuration mode.
redundancy	Enters redundancy configuration mode.
redundancy force-failover main-cpu	Forces a switchover so that the standby route processor (RP) becomes the active RP.

hw-module reset

To reset a particular Performance Routing Engine (PRE1 or PRE2) module or a particular line card, use the **hw-module reset** command in privileged EXEC mode.

hw-module {**main-cpu** | **pre** {**A**|**B**} | **sec-cpu** | **slot** *slot-number* | **subslot** *slot/card*} **reset** [**hold** | **release**]

Syntax Description

main-cpu	Resets the PRE1 or PRE2 module that is currently acting as the active PRE1 or PRE2 module.
pre {**A**|**B**}	Resets the PRE1 or PRE2 module that is physically in either PRE slot A (left slot) or PRE slot B (right slot).
sec-cpu	Resets the PRE1 or PRE2 module that is currently acting as the standby PRE1 or PRE2 module.
slot *slot-number*	Resets the line cards that are physically present in the specified slot-number. Valid range is from 1 to 8.
subslot *slot/card*	Resets the line card that is physically present in the slot with the specified slot number (valid range is from 1 to 8) and card number (valid range is from 0 to 1).
hold	(Optional) Holds the card in its reset state so that it does not begin reinitialization procedures.
release	(Optional) A previously held card should be released from the reset state, allowing it to complete reinitialization procedures.

Defaults

No default behavior or values

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)XF1	This command was introduced for the Cisco uBR10012 router.
12.2(11)BC3	The **hw-module main-cpu** and **hw-module pre** commands were modified tyo reset both PRE modules.

Usage Guidelines

The **hw-module reset** command typically is used to reset a standby PRE1 or PRE2 module so that it can load a new version of Cisco IOS software. However, this command can also be used to reset the active PRE1 or PRE2 module, as well as any other line card in the Cisco uBR10012 chassis.

Caution If the standby PRE1 or PRE2 module is installed and configured, resetting the active PRE1 or PRE2 module triggers a failover, so that the standby PRE1 or PRE2 module becomes the active PRE1 or PRE2 module.

Note The hold and release options are not needed for normal operations but are typically used for debugging and lab tests.

The following example shows the standby PRE1 module being reset:

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

The following example shows the active PRE1 module being reset and kept in the reset state (which will trigger a failover to the standby PRE1 module):

```
Router# hw-module main-cpu reset hold
Router#
```

The following example shows the PRE1 module in PRE slot B being reset:

```
Router# hw-module pre B reset
Router#
```

Note The **hw-module pre B reset** command resets the PRE1 or PRE2 module that is physically present in slot B, regardless of whether the module is the active or standby PRE1 or PRE2 module.

Related Commands

Command	Description
hw-module shutdown	Shuts down a PRE1 or PRE2 module or line card.
microcode	Reloads the microcode software images on one or all line cards that support downloadable microcode.
microcode reload	Reloads the microcode software images on one or all line cards that support downloadable microcode.
redundancy force-failover main-cpu	Forces a manual failover between the active and standby PRE1 or PRE2 modules.

main-cpu

To enter main-CPU redundancy configuration mode, so that you can configure the synchronization of the active and secondary Performance Routing Engine (PRE1 or PRE2) modules, use the **main-cpu** command in redundancy configuration mode.

main-cpu

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values

Command Modes

Redundancy configuration

Command History

Release	Modification
12.2(4)XF	This command was introduced for the Cisco uBR10012 router.
12.2(11)BC3	Support for the **switchover timeout** command was added.

Usage Guidelines

When you enter main-CPU redundancy configuration mode, the prompt changes to the following:

```
Router(config-r-mc)#
```

After you enter main-CPU redundancy configuration mode, you can use the **auto-sync** command to specify which files are synchronized between the active and standby route processors (RPs). In Cisco IOS Release 12.2(11)BC3 and later releases, you can also use the **switchover timeout** command to specify the amount of time that the standby RP should wait when it first detects that the active RP is not active and when it initiates a switchover and becomes the active RP.

To leave main-CPU redundancy configuration mode and to return to redundancy configuration mode, use the **exit** command.

Examples

The following example shows how to enter main-CPU redundancy mode and the commands that are available there:

```
Router# config t
Router(config)# redundancy
Router(config-r)# main-cpu
Router(config-r-mc)# ?

Main Cpu redundancy configuration commands:
  auto-sync   Sync elements
  exit        Exit from main-cpu configuration mode
  no          Negate a command or set its defaults
  switchover  Configuration of switchover

Router(config-r-mc)#
```

Related Commands

Command	Description
associate	Associates two line cards for Automatic Protection Switching (APS) redundancy protection.
auto-sync	Configures which files are synchronized between the active and standby RPs.
redundancy	Enters redundancy configuration mode.
switchover timeout	Configures the switchover timeout period of the PRE1 or PRE2 module.

redundancy force-failover main-cpu

To force a failover, so that the standby Performance Routing Engine (PRE1 or PRE2) module becomes the active PRE1 or PRE2 module, use the **redundancy force-failover main-cpu** command in privileged EXEC mode.

redundancy force-failover main-cpu

Syntax Description

This command has no keywords or arguments.

Defaults

No default behavior or values

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)XF1	This command was introduced for the Cisco uBR10012 router.

Usage Guidelines

The **redundancy force-failover main-cpu** command initiates a manual failover, so that the standby PRE1 or PRE2 module becomes the active PRE1 or PRE2 module and assumes full responsibilities for router operations. This command requires that both PRE1 or PRE2 modules are running a Cisco IOS software image that supports the Route Processor Redundancy (RPR) feature.

A manual failover is typically done for one of the following reasons:

- You want to upgrade or replace the active PRE1 or PRE2 module.
- You have upgraded the Cisco IOS software on the standby PRE1 or PRE2 module and want the standby PRE1 or PRE2 module to begin using the new software image. This also allows you to upgrade the software on the former active PRE1 or PRE2 module without interrupting systems operations.
- You want to test failover operation on the system.

A failover can also be manually initiated by removing the active PRE1 or PRE2 module from the chassis, but using the **redundancy force-failover main-cpu** command provides a more graceful failover, without generating hardware alarms.

Tip Wait two to three minutes after a failover before switching the system back to the original PRE1 or PRE2 module, to allow the system to stabilize and to allow both PRE1 or PRE2 modules to be ready for the switch.

Examples

The following example shows a failover being manually initiated:

```
Router# redundancy force-failover main-cpu

Proceed with switchover to standby PRE? [confirm] y
.
.
.
```

Note Pressing **Enter** or **y** confirms the action and begins the failover. Pressing any other key aborts the failover and returns control to the current active PRE1 or PRE2 module.

The following example shows a failover being attempted but failing because the standby PRE1 or PRE2 module is not ready, is not available, or is not installed:

```
Router# redundancy force-failover main-cpu

Proceed with switchover to standby PRE? [confirm]
Standby PRE not ready, switchover aborted.
Router#
```

Note In some versions of Cisco IOS software, a failed software switchover will show the following message:

```
Unable to communicate with standby PRE, switchover aborted.
```

The following example shows the complete information for a forced switchover using the **redundancy force-failover main-cpu** command.

Note The output of your system may vary, depending on the number of line cards and interfaces configured.

```
Router# redundancy force-failover main-cpu

Proceed with switchover to standby PRE? [confirm]

*Nov 26 09:38:13.315: %SYS-5-SWITCHOVER: Switchover requested
System Bootstrap, Version 12.0(9r)SL2, RELEASE SOFTWARE (fc1)
Copyright (c) 2000 by cisco Systems, Inc.

Reset Reason Register = RESET_REASON_RESET_REG (0x76)
C10000 platform with 524288 Kbytes of main memory

*Nov 26 09:38:16.403: %REDUNDANCY-5-PEER_MONITOR_EVENT: Secondary received a switchover (raw-event=P
EER_REDUNDANCY_STATE_CHANGE(5))
*Nov 26 09:38:16.451: %IPCOIR-5-CARD_DETECTED: Card type 1gigethernet-1 (0x166) in slot 4/0
*Nov 26 09:38:16.451: %IPCOIR-2-CARD_UP_DOWN: Card in slot 4/0 is up.  Notifying 1gigethernet-1 driver.
*Nov 26 09:38:16.539: %IPCOIR-5-CARD_DETECTED: Card type 1cable-mc16s (0xF5) in slot 8/0
*Nov 26 09:38:16.539: %IPCOIR-2-CARD_UP_DOWN: Card in slot 8/0 is up.  Notifying 1cable-mc16s driver.
*Nov 26 09:38:16.595: %UBR10000-5-UPDOWN: Interface Cable8/0/0 Port U1, changed state to administratively down
*Nov 26 09:38:16.603: %UBR10000-5-UPDOWN: Interface Cable8/0/0 Port U2, changed state to administratively down
*Nov 26 09:38:16.611: %UBR10000-5-UPDOWN: Interface Cable8/0/0 Port U3, changed state to administratively down
*Nov 26 09:38:16.615: %UBR10000-5-UPDOWN: Interface Cable8/0/0 Port U4, changed state to administratively down
*Nov 26 09:38:16.623: %UBR10000-5-UPDOWN: Interface Cable8/0/0 Port U5, changed state to administratively down
*Nov 26 09:38:16.659: %IPCOIR-5-CARD_DETECTED: Card type cable-lcp (0x254) in slot 5/1
*Nov 26 09:38:16.663: %IPCOIR-2-CARD_UP_DOWN: Card in slot 5/1 is up.  Notifying cable-lcp driver.
*Nov 26 09:38:16.727: %IPCOIR-5-CARD_DETECTED: Card type 1cable-mc16s (0xF5) in slot 8/1
*Nov 26 09:38:16.735: %IPCOIR-2-CARD_UP_DOWN: Card in slot 8/1 is up.  Notifying 1cable-mc16s driver.
*Nov 26 09:38:16.791: %UBR10000-5-UPDOWN: Interface Cable8/1/0 Port U1, changed state to administratively down
*Nov 26 09:38:16.795: %UBR10000-5-UPDOWN: Interface Cable8/1/0 Port U2, changed state to administratively down
*Nov 26 09:38:16.803: %UBR10000-5-UPDOWN: Interface Cable8/1/0 Port U3, changed state to administratively down
*Nov 26 09:38:16.811: %UBR10000-5-UPDOWN: Interface Cable8/1/0 Port U4, changed state to administratively down
*Nov 26 09:38:16.815: %UBR10000-5-UPDOWN: Interface Cable8/1/0 Port U5, changed state to administratively down
*Nov 26 09:38:16.827: %IPCOIR-5-CARD_DETECTED: Card type 2cable-mc28c (0x235) in slot 7/0
*Nov 26 09:38:16.827: %IPCOIR-2-CARD_UP_DOWN: Card in slot 7/0 is up.  Notifying 2cable-mc28c driver.
*Nov 26 09:38:16.887: %UBR10000-5-UPDOWN: Interface Cable7/0/0 Port U1, changed state to administratively down
*Nov 26 09:38:16.891: %UBR10000-5-UPDOWN: Interface Cable7/0/0 Port U2, changed state to administratively down
*Nov 26 09:38:16.899: %UBR10000-5-UPDOWN: Interface Cable7/0/0 Port U3, changed state to administratively down
*Nov 26 09:38:16.907: %IPCOIR-5-CARD_DETECTED: Card type 2cable-mc28c (0x235) in slot 5/0
*Nov 26 09:38:16.907: %UBR10000-5-UPDOWN: Interface Cable7/0/1 Port U0, changed state to administratively down
*Nov 26 09:38:16.915: %UBR10000-5-UPDOWN: Interface Cable7/0/1 Port U1, changed state to administratively down
*Nov 26 09:38:16.923: %UBR10000-5-UPDOWN: Interface Cable7/0/1 Port U2, changed state to administratively down
*Nov 26 09:38:16.927: %UBR10000-5-UPDOWN: Interface Cable7/0/1 Port U3, changed state to administratively down
*Nov 26 09:38:16.935: %C10KGE-3-GBIC_MISSING: Interface GigabitEthernet4/0/0, Gigabit Interface Converter
(GBIC) missing
```

```
*Nov 26 09:38:16.939: %IPCOIR-2-CARD_UP_DOWN: Card in slot 5/0 is up.  Notifying 2cable-mc28c driver.
*Nov 26 09:38:16.999: %UBR10000-5-UPDOWN: Interface Cable5/0/0 Port U1, changed state to administratively down
*Nov 26 09:38:17.007: %UBR10000-5-UPDOWN: Interface Cable5/0/0 Port U2, changed state to administratively down
*Nov 26 09:38:17.011: %UBR10000-5-UPDOWN: Interface Cable5/0/0 Port U3, changed state to administratively down
*Nov 26 09:38:17.019: %IPCOIR-5-CARD_DETECTED: Card type 2cable-mc28c (0x235) in slot 6/0
*Nov 26 09:38:17.023: %UBR10000-5-UPDOWN: Interface Cable5/0/0 Port U0, changed state to up
*Nov 26 09:38:17.023: %UBR10000-5-UPDOWN: Interface Cable5/0/1 Port U0, changed state to administratively down
*Nov 26 09:38:17.031: %UBR10000-5-UPDOWN: Interface Cable5/0/1 Port U1, changed state to administratively down
*Nov 26 09:38:17.035: %UBR10000-5-UPDOWN: Interface Cable5/0/1 Port U2, changed state to administratively down
*Nov 26 09:38:17.043: %UBR10000-5-UPDOWN: Interface Cable5/0/1 Port U3, changed state to administratively down
*Nov 26 09:38:17.051: %SNMP-5-LINK_UP: LinkUp:Interface Cable5/0/0-upstream0 changed state to up
*Nov 26 09:38:17.055: %IPCOIR-2-CARD_UP_DOWN: Card in slot 6/0 is up.  Notifying 2cable-mc28c driver.
*Nov 26 09:38:17.103: %UBR10000-5-UPDOWN: Interface Cable6/0/0 Port U0, changed state to up
*Nov 26 09:38:17.111: %UBR10000-5-UPDOWN: Interface Cable6/0/0 Port U1, changed state to administratively down
*Nov 26 09:38:17.119: %UBR10000-5-UPDOWN: Interface Cable6/0/0 Port U2, changed state to administratively down
*Nov 26 09:38:17.123: %UBR10000-5-UPDOWN: Interface Cable6/0/0 Port U3, changed state to administratively down
*Nov 26 09:38:17.131: %SNMP-5-LINK_UP: LinkUp:Interface Cable6/0/0-upstream0 changed state to up
*Nov 26 09:38:17.135: %UBR10000-5-UPDOWN: Interface Cable6/0/1 Port U0, changed state to administratively down
*Nov 26 09:38:17.139: %UBR10000-5-UPDOWN: Interface Cable6/0/1 Port U1, changed state to administratively down
*Nov 26 09:38:17.147: %UBR10000-5-UPDOWN: Interface Cable6/0/1 Port U2, changed state to administratively down
*Nov 26 09:38:17.155: %UBR10000-5-UPDOWN: Interface Cable6/0/1 Port U3, changed state to administratively down
*Nov 26 09:38:18.399: %IPCOIR-5-CARD_DETECTED: Card type 1oc12pos-1 (0x164) in slot 3/0
*Nov 26 09:38:18.399: %IPCOIR-2-CARD_UP_DOWN: Card in slot 3/0 is up.  Notifying 1oc12pos-1 driver.
*Nov 26 09:38:18.451: %LINK-3-UPDOWN: Interface GigabitEthernet4/0/0, changed state to down
*Nov 26 09:38:18.451: %SNMP-5-LINK_DOWN: LinkDown:Interface GigabitEthernet4/0/0 changed state to down
*Nov 26 09:38:18.539: %LINK-3-UPDOWN: Interface Cable8/0/0, changed state to up
*Nov 26 09:38:18.735: %LINK-3-UPDOWN: Interface Cable8/1/0, changed state to up
*Nov 26 09:38:18.827: %LINK-3-UPDOWN: Interface Cable7/0/0, changed state to up
*Nov 26 09:38:18.831: %LINK-3-UPDOWN: Interface Cable7/0/1, changed state to up
*Nov 26 09:38:18.939: %LINK-3-UPDOWN: Interface Cable5/0/0, changed state to up
*Nov 26 09:38:18.943: %LINK-3-UPDOWN: Interface Cable5/0/1, changed state to up
*Nov 26 09:38:19.055: %LINK-3-UPDOWN: Interface Cable6/0/0, changed state to up
*Nov 26 09:38:19.055: %LINK-3-UPDOWN: Interface Cable6/0/1, changed state to up
*Nov 26 09:38:20.935: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet4/0/0, changed state to down
*Nov 26 09:38:20.935: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable8/0/0, changed state to up
*Nov 26 09:38:20.935: %SNMP-5-LINK_UP: LinkUp:Interface Cable8/0/0-downstream changed state to up
*Nov 26 09:38:20.935: %SNMP-5-LINK_UP: LinkUp:Interface Cable8/0/0 changed state to up
*Nov 26 09:38:20.939: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable8/1/0, changed state to up
*Nov 26 09:38:20.939: %SNMP-5-LINK_UP: LinkUp:Interface Cable8/1/0-downstream changed state to up
*Nov 26 09:38:20.939: %SNMP-5-LINK_UP: LinkUp:Interface Cable8/1/0 changed state to up
*Nov 26 09:38:21.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable7/0/0, changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable7/0/0-downstream changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable7/0/0 changed state to up
*Nov 26 09:38:21.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable7/0/1, changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable7/0/1-downstream changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable7/0/1 changed state to up
*Nov 26 09:38:21.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable5/0/0, changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable5/0/0-downstream changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable5/0/0 changed state to up
*Nov 26 09:38:21.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable5/0/1, changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable5/0/1-downstream changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable5/0/1 changed state to up
*Nov 26 09:38:21.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable6/0/0, changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable6/0/0-downstream changed state to up
*Nov 26 09:38:21.067: %SNMP-5-LINK_UP: LinkUp:Interface Cable6/0/0 changed state to up
*Nov 26 09:38:21.071: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable6/0/1, changed state to up
*Nov 26 09:38:21.071: %SNMP-5-LINK_UP: LinkUp:Interface Cable6/0/1-downstream changed state to up
*Nov 26 09:38:21.071: %SNMP-5-LINK_UP: LinkUp:Interface Cable6/0/1 changed state to up
*Nov 26 09:38:23.411: %UBR10KTCC-1-NOTCC: No working TCCplus card available in the system
*Nov 26 09:38:24.147: %SNMP-5-LINK_UP: LinkUp:Interface FastEthernet0/0/0 changed state to up
*Nov 26 09:38:24.155: %LINK-5-CHANGED: Interface FastEthernet0/0/0, changed state to reset
*Nov 26 09:38:24.155: %SNMP-5-LINK_DOWN: LinkDown:Interface FastEthernet0/0/0 changed state to down
*Nov 26 09:38:25.155: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/0, changed state to down
*Nov 26 09:38:26.091: %IPCOIR-5-CARD_DETECTED: Card type 2cable-tccplus (0x2AF) in slot 1/1
*Nov 26 09:38:26.091: %IPCOIR-2-CARD_UP_DOWN: Card in slot 1/1 is up.  Notifying 2cable-tccplus driver.
*Nov 26 09:38:29.155: %SNMP-5-LINK_DOWN: LinkDown:Interface FastEthernet0/0/0 changed state to down
*Nov 26 09:38:33.491: %HCCP-5-STANDBY: Grp 2 Mbr 8 Protect: change state from active to standby.
*Nov 26 09:38:33.575: %HCCP-5-STANDBY: Grp 1 Mbr 6 Protect: change state from active to standby.
*Nov 26 09:38:33.575: %HCCP-5-CHANOFF: Grp 1 Mbr 5 Protect: turning off channel.
*Nov 26 09:38:34.155: %LINK-3-UPDOWN: Interface FastEthernet0/0/0, changed state to up
*Nov 26 09:38:34.155: %SNMP-5-LINK_UP: LinkUp:Interface FastEthernet0/0/0 changed state to up
*Nov 26 09:38:34.491: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable8/1/0, changed state to down
*Nov 26 09:38:34.575: %LINEPROTO-5-UPDOWN: Line protocol on Interface Cable7/0/0, changed state to down
*Nov 26 09:38:35.155: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/0, changed state to up
*Nov 26 09:39:33.491: %HCCP-5-STATICSYNC: Grp 2 Mbr 8 Protect: receiving static sync.
```

```
*Nov 26 09:39:33.575: %HCCP-5-STATICSYNC: Grp 1 Mbr 6 Protect: receiving static sync.
*Nov 26 09:39:33.575: %HCCP-5-STATICSYNC: Grp 1 Mbr 5 Protect: receiving static sync.
*Nov 26 09:40:16.631: %HCCP-5-SWITCHOVERREADY: Grp 2 Mbr 8 Working: ready to switchover.
*Nov 26 09:40:17.019: %HCCP-5-SWITCHOVERREADY: Grp 1 Mbr 5 Working: ready to switchover.
*Nov 26 09:40:17.131: %HCCP-5-SWITCHOVERREADY: Grp 1 Mbr 6 Working: ready to switchover.
```

secondary aux

To enable the auxiliary port on the standby PRE1 or PRE2 module, use the **secondary aux** command in redundancy configuration (main-cpu) mode mode. To disable the auxiliary port, use the **no** form of this command.

secondary aux

no secondary aux

Syntax Description

This command has no arguments or keywords.

Defaults

The auxiliary port on the standby RP is disabled.

Command Modes

Redundancy configuration (main-cpu)

Command History

Release	Modification
12.2(11)BC3	This command was introduced for the Cisco uBR10012 router.

Examples

The following example shows how to enable the auxiliary port on the standby PRE1 or PRE2 module.

```
Router# config t
Router(config)# redundancy
Router(config-r)# main-cpu
Router(config-r-mc)# secondary aux
Router(config-r-mc)# exit
Router(config-f)# exit
Router(config)#
```

Related Commands

Command	Description
main-cpu	Enters main-CPU redundancy configuration mode, so that you can configure the synchronization of the active and standby RPs.
redundancy	Configures the synchronization of system files between the active and standby RPs.
redundancy force-failover main-cpu	Forces a manual switchover between the active and standby RPs.

show cable modem

To display information for the registered and unregistered cable modems, use the **show cable modem** command in privileged EXEC mode.

show cable modem [*ip-address* | *interface* | *mac-address*] [*options*]

Note Several options in the **show cable modem** command do not pause the screen to display the information page by page, even if the **terminal length** command has been used to set the page size of your terminal. Paging and pausing the display could result in outdated or stale information for cable modems, and thus produce an incorrect snapshot of the system's current cable modem state. To capture or review this information, use your terminal program's capture buffer to save the information to a file, and then review it offline.

Syntax Description

ip-address	IP address of a specific cable modem to be displayed. You can also specify the IP address for a CPE device behind a cable modem, and information for that cable modem will be displayed.
interface	Displays all cable modems on a specific cable modem termination system (CMTS) cable interface.
mac-address	Identifies the MAC address of a specific cable modem to be displayed. If you specify the MAC address for a customer premises equipment (CPE) device behind a cable modem, and information for that cable modem is displayed.
Available options when displaying information for a cable interface or for a single cable modem	
access-group	Displays access group.
connectivity	Displays connectivity content.
counters	Displays cable counters.
errors	Displays error details for one or all cable modems.
flap	Displays flap content.
mac	Displays the DOCSIS MAC version and capabilities.
maintenance	Displays station maintenance error statistics.
offline	Displays cable modems that are offline.
phy	Displays the DOCSIS PHY layer content.
registered	Displays information for cable modems that have registered with the CMTS.
remote-query	Displays the signal-to-noise ratio (SNR) and power statistics that the CMTS has acquired from polling the cable modems. **Note** See the **cable modem remote-query** command in the *Cisco Broadband Cable Command Reference Guide* for more information about this option.

summary [**total**]	Displays the total number, number of active, and number of registered cable modems per interface. This option can also be used with the **mac**, **total**, **upstream** and **vendor** options to display details for specific line cards and ports. The optional **total** keyword displays a footer line showing the totals for each column. The following combinations are possible: • **show cable modem summary total**—Displays a summary and a total for all cable modems on the chassis. • **show cable modem summary cable** *x/0* **total**—Displays a summary of cable modems on a specified card. • **show cable modem summary cable** *x/0* **upstream** *port1 port2* **total**—Displays a summary of cable modems on the specified card and specified range of ports. The port1 value must be less than the port2 value. • **show cable modem summary cable** *x/0* **cable** *y/0* **total**—Displays a summary of cable modems on the specified range of cards. • **show cable modem summary cable** *x/0* **cable** *y/0* **upstream** *port1 port2* **total**—Displays a summary of cable modems on the specified range of ports on the specified range of cards. **Note** When specifying a range of cable interfaces or ports, you must specify the lower-numbered interface first and the higher-numbered interface second.
unregistered	Displays information for cable modems that have not registered with the CMTS.
vendor	Displays the vendor name for each cable modem. If the vendor name has not been defined by the cable modem vendor command, displays the vendor's Organizational Unique Identifier (OUI). **Note** The Institute of Electrical and Electronics Engineers (IEEE) is the official issuer of OUI values. The IEEE OUI website is at http://standards.ieee.org/develop/regauth/oui/public.html .
verbose	Displays detailed information.
Available options when displaying information for a single cable modem	
classifiers	Displays the classifiers for the modem.
classifiers cache	Displays the classifiers in the cache maintained for each cable modem. (This cache is based on IP header field values and speeds up classifier lookups and reduces per-packet processing overhead.)
classifiers verbose	Displays detailed information for the modem's classifiers.
cpe	Displays the CPE devices accessing the cable interface through the cable modem.
cnr	(For Cisco uBR-MC16S only) Displays the upstream carrier-to-noise ratio (CNR) for the specified cable modem (in dB).

Command Modes Privileged EXEC

Command History

Release	Modification
11.3XA	This command was introduced.
11.3(5)NA	The output was reorganized and the Receive Power field was added.
12.0(4)XI	The output was expanded to show the primary service identifier (SID) and the customer premises equipment (CPE) count.
12.0(7)T	The **detail** option was replaced with the **verbose** option.
12.0(7)XR and 12.1(1a)T1	The output of this command was enhanced to show that the Cisco CMTS has detected an unstable return path for a particular cable modem and has compensated with a power adjustment. An asterisk (*) appears in the power adjustment field for a modem when a power adjustment has been made; an exclamation point (!) appears when the cable modem has reached its maximum power transmit level and cannot increase its power level further.
12.1(4)CX and 12.2(4)BC1	Support was added for the Cisco uBR10012 router.
12.1(10)EC1	Adds an exclamation point to cable modems that have exceeded the maximum delay/timing offset specified by the **cable map advance** command.
12.1(11b)EC1, 12.2(8)BC2	The output for the Online State field was updated for the **cable tftp-enforce** command. A pound sign (#) appears next to the state value when a cable modem was allowed to come online without attempting to download a DOCSIS configuration file through the cable interface with the Cisco CMTS.
12.2(15)BC1	Additional lines were added to the **show cable modem verbose** displays, for one or all cable modems, to show information about the dynamic shared-secret feature. Cable modems that fail the dynamic secret authentication checks and then come online are marked with an exclamation point (!), so that this situation can be investigated.
12.2(15)CX	The **verbose** option displays the sysDescr field for each cable modem, when the **cable modem remote-query** command has been configured. Other fields have also been added to support DOCSIS 2.0 (ATDMA) operation.

Usage Guidelines

After a switchover occurs, you can use the **show cable modem** command to display the status of all recognized cable modems. This status should be similar, if not identical, to the status before the switchover. The CMTS can communicate with all cable modems at the DOCSIS MAC layer (using the modem's MAC address). However, the CMTS cannot communicate with a cable modem or CPE device at the IP layer (using the IP address) until the cable modem (or one of its CPE devices) transmits an IP packet.

This allows the CMTS to rebuild its IP address table using the IP addresses of devices that are actually active on the network, instead of using the previous information, which could have become stale since the switchover.

Examples

The following **show cable modem** command output shows the registered and unregistered cable modems supported by the active route processor (RP) prior to the manual switchover. The information from the **show cable modem** command can be used before and after manual switchover to verify success (refer also to **redundancy force-failover main-cpu**).

```
Router# show cable modem

MAC Address    IP Address      I/F       MAC         Prim RxPwr  Timing  Num BPI
                                         State       Sid  (db)   Offset  CPE Enb
0008.0eae.6be4 1.8.1.66        C8/0/0/U0 init(o)     1    0.25   747     0   N
0007.0e03.62dd 1.8.1.67        C8/0/0/U0 online      2    -0.25  2808    0   N
0007.0e03.6351 1.8.1.68        C8/0/0/U0 online      3    0.00   2809    0   N
0007.0e01.8de9 1.8.1.69        C8/0/0/U0 online      4    -0.50  2807    0   N
```

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History

Release	Modification
12.2(11)BC3	This command was introduced to support Cisco high availability (HA) redundancy operations.

show checkpoint

The Checkpointing Facility is a software subsystem by which information is transferred from the active route processor (RP) to the standby RP. To display information about the Checkpoint Facility (CF) subsystem on a Cisco cable modem termination system (CMTS), use the **show checkpoint** command in privileged EXEC mode.

show checkpoint {**clients** | **statistics**}

Syntax Description

clients	List of current checkpoint clients.
statistics	Current status for checkpoint operations.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)BC3	This command was introduced to support Cisco high availability (HA) redundancy operations.

Usage Guidelines

The CF subsystem manages the passing of messages from the active to standby interfaces. It also handles sequencing and throttling, as needed during redundancy operations. The **show checkpoint** command displays information about the clients (other processes on the CMTS that are sending checkpoint messages) and run-time status for checkpoint operations.

Examples

The following shows typical output for the **show checkpoint clients** command:

```
Router# show checkpoint clients

                        Check Point List of Clients

 CHKPT on ACTIVE server.

Client Name    Client ID     Msg Send     Msg len  Bundling
                            (number of)   (Total)
------------------------------------------------------------
CHKPT DevTest          3          0           0             On
CHKPT EXAMPLE          2          0           0             On
CR10K RP CHKPT        20          0           0             On


Router#
```

The following shows typical output for the **show checkpoint statistics** command:

```
Router# show checkpoint statistics

             Check Point Status

 CHKPT on ACTIVE server.

Number of chkpt messages currently in hold queue 0
CHKPT MAX MTU size = 1422
IPC MAX MTU size = 4096
CHKPT Pending msg timer  = 100 ms
```

Related Commands

Command	Description
hccp authentication	Changes the minimum time between frequency hops.
hccp check version	Exits bypass version mode, and returns to normal Hot-standby Connection-to-Connection Protocol (HCCP) operation.
hccp ds-switch	Specifies the downstream upconverter module for a working CMTS or protect CMTS (obsolete command).
hccp protect	Allows you to configure a Cisco CMTS to be a Protect CMTS for a specified Working CMTS in a 1+1 redundancy environment.
hccp working	Allows you to designate a Cisco CMTS to be a Working CMTS in a 1+1 redundancy environment.
show cable ha	Displays information about Cisco high availability operations and configuration.
show hccp	Displays information for all cable interfaces on which one or more HCCP groups and authentication modes have been configured.
show hccp interface	Displays group information for a specific cable interface on which one or more groups and authentication modes have been configured.

show redundancy

To display the current redundancy status, use the **show redundancy** command in privileged EXEC mode.

show redundancy {clients | counters | history| states}

Syntax Description

clients	Provides a Redundancy Facility (RF) client list.
counters	Lists Redundancy Facility (RF) operational counters.
history	Summarizes Redundancy Facility (RF) history.
states	Lists Redundancy Facility (RF) states.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(4)XF1	This command was introduced for the Cisco uBR10012 router.
12.2(11)BC3	The command was enhanced to show the version of Cisco IOS software that is running on the secondary PRE module.

Usage Guidelines

The **show redundancy** command shows whether the PRE A slot or PRE B slot contains the active (primary) Performance Routing Engine (PRE1 or PRE2) module, the status of the standby RP, and the values for the standby RP's boot variables and configuration register. In Cisco IOS Release 12.2(13)BC1 and later releases, it also shows the version of Cisco IOS software that is running on the secondary PRE module.

Note The **show redundancy** command always shows the correct location of the active RP. The other PRE slot is marked as **secondary**, even if a standby RP is not installed.

Examples

The following example shows a typical display from the **show redundancy** command. The active RP is in PRE slot A, and the standby RP is in PRE slot B.

```
Router# show redundancy

PRE A (This PRE)   : Primary
PRE B              : Secondary

Redundancy state is REDUNDANCY_PEERSECONDARY_INITED

Secondary PRE information....
Secondary is up.
Secondary has 524288K bytes of memory.
Secondary BOOT variable = bootflash:ubr10k-k8p6-mz.999-99.122BC_UB_030303,1;
Secondary CONFIG_FILE variable =
Secondary BOOTLDR variable =
Secondary Configuration register is 0x0
```

```
Secondary version:
Cisco Internetwork Operating System Software
IOS (tm) 10000 Software (UBR10K-K8P6-M), Version 12.2(122BC.030303.)
Copyright (c) 1986-2003 by cisco Systems, Inc.
Compiled Mon 03-Mar-03 21:23 by
```

The following example shows the same display after a switchover has occurred. The **show redundancy** command now shows that the active (primary) RP has changed slots (in this case, moving from slot A to slot B):

```
Router# show redundancy

 PRE A              : Secondary
 PRE B (This PRE)   : Primary

 Redundancy state is REDUNDANCY_PEERSECONDARY_INITED

 Secondary PRE information....
 Secondary is up.
 Secondary BOOT variable = bootflash:ubr10k-k8p6-mz
 Secondary CONFIG_FILE variable =
 Secondary BOOTLDR variable = bootflash:c10k-eboot-mz
 Secondary Configuration register is 0x2

 Secondary version:
 Cisco Internetwork Operating System Software
 IOS (tm) 10000 Software (UBR10K-K8P6-M), Released Version 12.2(13)BC2
 Copyright (c) 1986-2003 by cisco Systems, Inc.
 Compiled 26 08-Feb-03 11:28 by texbnt

Router#
```

The following example shows a typical display when the standby RP is not installed or is not operational. The standby RP is shown as not up, and its boot variables and configuration register are not shown.

```
Router# show redundancy

 PRE A (This PRE)   : Primary
 PRE B              : Secondary

 Redundancy state is REDUNDANCY_PEERSECONDARY_NONOPERATIONAL

 Secondary PRE information....
 Secondary PRE is not up

Router#
```

The following example shows a typical display for the **show redundancy clients** command:

```
Router# show redundancy clients

 clientID = 0       clientSeq = 0        RF_INTERNAL_MSG
 clientID = 25      clientSeq = 130      CHKPT RF
 clientID = 5       clientSeq = 170      RFS client
 clientID = 50      clientSeq = 530      Slot RF
 clientID = 65000   clientSeq = 65000    RF_LAST_CLIENT
```

The following example shows a typical display for the **show redundancy counters** command:

```
Router# show redundancy counters

Redundancy Facility OMs
               comm link up = 1
        comm link down down = 0

          invalid client tx = 0
          null tx by client = 0
                tx failures = 0
      tx msg length invalid = 0

      client not rxing msgs = 0
 rx peer msg routing errors = 0
           null peer msg rx = 0
         errored peer msg rx = 0

                 buffers tx = 1009
     tx buffers unavailable = 0
                 buffers rx = 1006
      buffer release errors = 0

 duplicate client registers = 0
  failed to register client = 0
       Invalid client syncs = 0
```

The following example shows a typical display for the **show redundancy history** command:

```
Router# show redundancy history

00:00:00 client added: RF_INTERNAL_MSG(0) seq=0
00:00:00 client added: RF_LAST_CLIENT(65000) seq=65000
00:00:00 client added: CHKPT RF(25) seq=130
00:00:01 client added: Slot RF(50) seq=530
00:00:15 client added: RFS client(5) seq=170
00:00:16 *my state = INITIALIZATION(2) *peer state = DISABLED(1)
00:00:16 RF_PROG_INITIALIZATION(100) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_INITIALIZATION(100) CHKPT RF(25) op=0 rc=11
00:00:16 RF_PROG_INITIALIZATION(100) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_INITIALIZATION(100) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_INITIALIZATION(100) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:16 *my state = NEGOTIATION(3) peer state = DISABLED(1)
00:00:16 RF_EVENT_GO_ACTIVE(512) op=0 rc=0
00:00:16 *my state = ACTIVE-FAST(9) peer state = DISABLED(1)
00:00:16 RF_STATUS_MAINTENANCE_ENABLE(403) CHKPT RF(25) op=0 rc=0
00:00:16 RF_STATUS_MAINTENANCE_ENABLE(403) RFS client(5) op=0 rc=0
00:00:16 RF_STATUS_MAINTENANCE_ENABLE(403) Slot RF(50) op=0 rc=0
00:00:16 RF_PROG_ACTIVE_FAST(200) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_FAST(200) CHKPT RF(25) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_FAST(200) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_FAST(200) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_FAST(200) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:16 *my state = ACTIVE-DRAIN(10) peer state = DISABLED(1)
00:00:16 RF_PROG_ACTIVE_DRAIN(201) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_DRAIN(201) CHKPT RF(25) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_DRAIN(201) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_DRAIN(201) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_DRAIN(201) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:16 *my state = ACTIVE_PRECONFIG(11) peer state = DISABLED(1)
00:00:16 RF_PROG_ACTIVE_PRECONFIG(202) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_PRECONFIG(202) CHKPT RF(25) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_PRECONFIG(202) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_PRECONFIG(202) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_PRECONFIG(202) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:16 *my state = ACTIVE_POSTCONFIG(12) peer state = DISABLED(1)
00:00:16 RF_PROG_ACTIVE_POSTCONFIG(203) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_POSTCONFIG(203) CHKPT RF(25) op=0 rc=11
```

```
00:00:16 RF_PROG_ACTIVE_POSTCONFIG(203) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_POSTCONFIG(203) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_ACTIVE_POSTCONFIG(203) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:16 *my state = ACTIVE(13) peer state = DISABLED(1)
00:00:16 RF_PROG_ACTIVE(204) RF_INTERNAL_MSG(0) op=0 rc=11
00:00:16 RF_PROG_ACTIVE(204) CHKPT RF(25) op=0 rc=11
00:00:16 RF_PROG_ACTIVE(204) RFS client(5) op=0 rc=11
00:00:16 RF_PROG_ACTIVE(204) Slot RF(50) op=0 rc=11
00:00:16 RF_PROG_ACTIVE(204) RF_LAST_CLIENT(65000) op=0 rc=11
00:00:25 Configuration parsing complete
00:00:30 System initialization complete
00:03:27 *my state = ACTIVE(13) *peer state = UNKNOWN(0)
00:03:29 RF_STATUS_PEER_PRESENCE(400) op=1 rc=0
00:03:29 RF_STATUS_PEER_PRESENCE(400) CHKPT RF(25) op=1 rc=0
00:03:29 RF_STATUS_PEER_PRESENCE(400) RFS client(5) op=1 rc=0
00:03:29 RF_STATUS_PEER_PRESENCE(400) Slot RF(50) op=1 rc=0
00:03:34 RF_STATUS_PEER_COMM(401) op=1 rc=0
00:03:34 RF_STATUS_PEER_COMM(401) CHKPT RF(25) op=1 rc=0
00:03:34 RF_STATUS_PEER_COMM(401) RFS client(5) op=1 rc=0
00:03:34 RF_STATUS_PEER_COMM(401) Slot RF(50) op=1 rc=0
00:03:34 RF_PROG_PLATFORM_SYNC(300) RF_INTERNAL_MSG(0) op=0 rc=11
00:03:34 RF_PROG_PLATFORM_SYNC(300) CHKPT RF(25) op=0 rc=11
00:03:34 RF_PROG_PLATFORM_SYNC(300) RFS client(5) op=0 rc=11
00:03:34 RF_PROG_PLATFORM_SYNC(300) Slot RF(50) op=0 rc=11
00:03:34 RF_PROG_PLATFORM_SYNC(300) RF_LAST_CLIENT(65000) op=0 rc=0
00:03:34 RF_EVENT_CLIENT_PROGRESSION(503) RF_LAST_CLIENT(65000) op=1 rc=0
00:03:34 RF_EVENT_PEER_PROG_DONE(506) RF_LAST_CLIENT(65000) op=300 rc=0
00:03:38 *my state = ACTIVE(13) *peer state = STANDBY COLD(4)
00:03:42 RF_EVENT_START_PROGRESSION(501) op=0 rc=0
00:03:42 RF_EVENT_STANDBY_PROGRESSION(502) RF_INTERNAL_MSG(0) op=5 rc=0
00:03:42 RF_PROG_STANDBY_CONFIG(102) RF_INTERNAL_MSG(0) op=0 rc=11
00:03:42 RF_PROG_STANDBY_CONFIG(102) CHKPT RF(25) op=0 rc=11
00:03:42 RF_PROG_STANDBY_CONFIG(102) RFS client(5) op=0 rc=0
00:03:42 RF_EVENT_CLIENT_PROGRESSION(503) RFS client(5) op=5 rc=0
00:03:47 *my state = ACTIVE(13) *peer state = STANDBY COLD-CONFIG(5)
00:03:48 RF_EVENT_PEER_PROG_DONE(506) RFS client(5) op=102 rc=11
00:03:48 RF_PROG_STANDBY_CONFIG(102) Slot RF(50) op=0 rc=11
00:03:48 RF_PROG_STANDBY_CONFIG(102) RF_LAST_CLIENT(65000) op=0 rc=11
00:03:48 RF_EVENT_CONTINUE_PROGRESSION(504) op=0 rc=0
00:03:48 RF_EVENT_STANDBY_PROGRESSION(502) RF_INTERNAL_MSG(0) op=6 rc=0
00:03:48 RF_PROG_STANDBY_FILESYS(103) RF_INTERNAL_MSG(0) op=0 rc=11
00:03:48 RF_PROG_STANDBY_FILESYS(103) CHKPT RF(25) op=0 rc=11
00:03:48 RF_PROG_STANDBY_FILESYS(103) RFS client(5) op=0 rc=11
00:03:48 RF_PROG_STANDBY_FILESYS(103) Slot RF(50) op=0 rc=11
00:03:48 RF_PROG_STANDBY_FILESYS(103) RF_LAST_CLIENT(65000) op=0 rc=11
00:03:48 RF_EVENT_CONTINUE_PROGRESSION(504) op=0 rc=0
00:03:48 RF_EVENT_STANDBY_PROGRESSION(502) RF_INTERNAL_MSG(0) op=7 rc=0
00:03:48 RF_PROG_STANDBY_BULK(104) RF_INTERNAL_MSG(0) op=0 rc=11
00:03:48 RF_PROG_STANDBY_BULK(104) CHKPT RF(25) op=0 rc=11
00:03:48 RF_PROG_STANDBY_BULK(104) RFS client(5) op=0 rc=11
00:03:48 RF_PROG_STANDBY_BULK(104) Slot RF(50) op=0 rc=0
00:03:48 RF_EVENT_CLIENT_PROGRESSION(503) Slot RF(50) op=7 rc=0
00:03:48 RF_EVENT_PEER_PROG_DONE(506) Slot RF(50) op=104 rc=11
00:03:48 RF_PROG_STANDBY_BULK(104) RF_LAST_CLIENT(65000) op=0 rc=11
00:03:48 RF_EVENT_CONTINUE_PROGRESSION(504) op=0 rc=0
00:03:48 RF_EVENT_STANDBY_PROGRESSION(502) RF_INTERNAL_MSG(0) op=8 rc=0
00:03:48 RF_PROG_STANDBY_HOT(105) RF_INTERNAL_MSG(0) op=0 rc=11
00:03:48 RF_PROG_STANDBY_HOT(105) CHKPT RF(25) op=0 rc=11
00:03:48 RF_PROG_STANDBY_HOT(105) RFS client(5) op=0 rc=11
00:03:48 RF_PROG_STANDBY_HOT(105) Slot RF(50) op=0 rc=11
00:03:48 RF_PROG_STANDBY_HOT(105) RF_LAST_CLIENT(65000) op=0 rc=0
00:03:48 RF_EVENT_CLIENT_PROGRESSION(503) RF_LAST_CLIENT(65000) op=8 rc=0
00:03:48 RF_EVENT_PEER_PROG_DONE(506) RF_LAST_CLIENT(65000) op=105 rc=0
00:03:51 *my state = ACTIVE(13) *peer state = STANDBY HOT(8)
```

The following example shows a typical display for **show redundancy states**:

```
Router# show redundancy states

       my state = 13 -ACTIVE
     peer state = 8  -STANDBY HOT
           Mode = Duplex
           Unit = Primary
        Unit ID = 0

  Redundancy Mode = Hot Standby Redundancy
Maintenance Mode = Disabled
    Manual Swact = Enabled
  Communications = Up

            client count = 5
client_notification_TMR = 30000 milliseconds
          RF debug mask = 0x0
```

Related Commands

Command	Description
associate	Associates two line cards for Automatic Protection Switching (APS) redundancy protection.
redundancy	Configures the synchronization of system files between the active and standby RPs.
redundancy force-failover main-cpu	Forces a manual switchover between the active and standby RPs.

switchover timeout

To configure the switchover timeout period of the performance routing engine (PRE1 or PRE2) module, use the **switchover timeout** command in redundancy configuration (main-cpu) mode. To reset the timeout period to its default value, use the **no** form of this command.

switchover timeout *timeout-period*

no switchover timeout

Syntax Description

timeout-period	Specifies the timeout, in milliseconds. The valid range is from 0 to 25000 milliseconds (25 seconds), where 0 specifies no timeout period.

Defaults

No timeout period (0)

Command Modes

Redundancy configuration (main-cpu)

Command History

Release	Modification
12.2(11)BC3	This command was introduced for the Cisco uBR10012 router.

Usage Guidelines

The **switchover timeout** command specifies how long the secondary PRE module should wait when it does not detect a heartbeat from the active route processor (RP) before initiating a switchover and assuming responsibility as the active RP. If set to 0, the secondaryRP initiates a switchover immediately when the active RP misses a scheduled heartbeat.

Examples

The following example shows how to set the timeout period to 60 milliseconds:

```
Router# config t
Router(config)# redundancy
Router(config-r)# main-cpu
Router(config-r-mc)# switchover timeout 60
Router(config-r-mc)# exit
Router(config-f)# exit
Router(config)#
```

Related Commands

Command	Description
main-cpu	Enters main-CPU redundancy configuration mode so that you can configure the synchronization of the active and standby RPs.
redundancy	Configures the synchronization of system files between the active and standby RPs.
redundancy force-failover main-cpu	Forces a manual switchover between the active and standby RPs.

System Messages for Route Processor Redundancy Plus on the Cisco uBR10012 Universal Broadband Router

CHKPT

This section describes system messages that are related to the Checkpoint Facility (CF) subsystem, which manages the passing of messages from the active to standby interfaces, and which also handles sequencing and throttling, as needed during redundancy operations.

```
%CHKPT-3-IPCPORT: Unable to create IPC port on ([chars]).
```

Explanation A severe checkpoint error occurred because the system was unable to allocate the resources needed to create a communications port for the Interprocess Communications (IPC) channel needed to transmit messages.

Recommended Action Verify that the cable modem termination system (CMTS) is running released software. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-3-IPCSESSION: Unable to open an IPC session for communicating with
([chars]). rc= [dec]
```

Explanation A severe checkpoint error occurred because the system was unable to establish an Interprocess Communications (IPC) session between interfaces, which is needed to transmit messages.

Recommended Action Verify that the cable modem termination system (CMTS) is running released software. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-3-RFREG: Unable to register checkpoint as client of RF.
```

Explanation A severe checkpoint error occurred because the system was unable to register with the redundancy facility (RF) so that it could begin the transmission of IPC messages between interfaces.

Recommended Action Verify that the cable modem termination system (CMTS) is running released software. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-4-INVALID: Invalid checkpoint client ID ([dec]).
```

Explanation A checkpoint client is using an old or stale client ID. This could be due to a synchronization delay, which typically will resolve itself.

Recommended Action No action is required.

```
%CHKPT-4-DUPID: Duplicate checkpoint client ID ([dec]).
```

Explanation A checkpoint client is using a client ID that is already assigned to another client. This could be due to a synchronization delay, which typically will resolve itself.

Recommended Action No action is required.

```
%CHKPT-3-NOMEM: Unable allocate resource for CF on ([chars]).
```

Explanation A severe checkpoint error occurred because the system was unable to allocate the resources (typically memory) on the indicated interface, as needed to create an Interprocess Communications (IPC) channel needed to transmit messages.

Recommended Action Verify that the cable modem termination system (CMTS) is running released software. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-3-ILLEGAL: ILLEGAL call to CF API on ([chars]) by ([chars]).
```

Explanation A severe software error occured with the Checkpoint Facility subsystem.

Recommended Action Verify that the CMTS is running released software. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-3-UNKNOWNMSG: Unknown message recieved from peer on standby for client
([dec]).
```

Explanation A severe software error occured with the Checkpoint Facility subsystem. This might indicate a Cisco IOS software mismatch between the active and standby interfaces, or between a line card and the performance routing engine (PRE) module.

Recommended Action Verify that the cable modem termination system (CMTS) is running released software. Reload the microcode on the affected line cards. If the problem persists, copy the error message exactly as it appears, and use the **show tech-support** command to collect information about the problem. If you cannot determine the nature of the error from the error message text or from the **show tech-support** command output, contact your Cisco technical support representative and provide the representative with the gathered information.

```
%CHKPT-4-DISABLED: Check Pointing is disabled. Client [chars] should not be
calling any CF API
```

Explanation A checkpoint client has attempted to send an Interprocess Communications (IPC) message after redundancy operations have been disabled. This can be due to lost IPC messages or delays in synchronization, which will eventually resolve themselves.

Recommended Action No action is required.

```
%CHKPT-4-SENDFAILED: Checkpointing send failed client ([dec])
```

Explanation A checkpoint client failed in an attempt to send an Interprocess Communications (IPC) message after redundancy operations have been disabled. This can be due to lost IPC messages or delays in synchronization, which will eventually resolve themselves.

Recommended Action No action is required.

LCINFO

This section describes system messages concerning the operation of line cards that are in the system.

```
%LCINFO-6-LCRESET: PRE switchover. Reset empty slot [dec/dec]
```

Explanation This message can occur during a switchover of PRE modules. The secondary PRE module that initiated the switchover examines each line card slot and issues a **hw-module reset** command for each slot that does not have a line card that is already running a Cisco IOS image. This ensures that any line cards that were in the process of download a Cisco IOS image at the time of the switchover are properly reset and reloaded.

Recommended Action No action is required.