Supervisor Redundancy

The Supervisor Redundancy feature reduces unplanned downtime. It enables a quicker switchover between active and standby Supervisors when a fatal error occurs on the active Supervisor. When you configure Supervisor Redundancy, the standby Supervisor is synchronized with the active Supervisor. If a fatal error occurs on the active Supervisor, the system immediately switches to the standby Supervisor.

Your software release may not support all the features that are documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. The Feature Information Table at the end of this document provides information about the documented features and lists the releases in which each feature is supported.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://tools.cisco.com/ITDIT/CFN/. An account on http://www.cisco.com/ is not required.

Contents

Hardware Compatibility Matrix for the Cisco cBR Series Routers

Note The hardware components that are introduced in a given Cisco IOS-XE Release are supported in all subsequent releases unless otherwise specified.

Table 1: Hardware Compatibility Matrix for the Cisco cBR Series Routers

Cisco CMTS Platform	Processor Engine	Interface Cards
Cisco cBR-8 Converged Broadband Router	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 Supervisor: • PID—CBR-SUP-250G • PID—CBR-CCAP-SUP-160G	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 CCAP Line Cards: • PID—CBR-LC-8D30-16U30 • PID—CBR-LC-8D31-16U30 • PID—CBR-RF-PIC • PID—CBR-RF-PROT-PIC • PID—CBR-CCAP-LC-40G • PID—CBR-CCAP-LC-40G-R • PID—CBR-CCAP-LC-G2-R • PID—CBR-SUP-8X10G-PIC • PID—CBR-2X100G-PIC Digital PICs: • PID—CBR-DPIC-8X10G • PID—CBR-DPIC-2X100G Cisco cBR-8 Downstream PHY Module: • PID—CBR-D31-DS-MOD Cisco cBR-8 Upstream PHY Modules: • PID—CBR-D31-US-MOD

Note Do not use DPICs (8X10G and 2x100G) to forward IP traffic, as it may cause buffer exhaustion, leading to line card reload.

The only allowed traffic on a DPICs DEPI, UEPI, and GCP traffic from the Cisco cBR-8 router to Remote PHY devices. Other traffic such as DHCP, SSH, and UTSC should flow via another router, since DPICs cannot be used for normal routing.

Prerequisites for Supervisor Redundancy

- Two Supervisors (that is, two Supervisor Cards and two Supervisor PICs) must be installed in the Cisco cBR chassis.

- Both Supervisors must be running identical software releases. If there is release mismatch, when inserting the standby Supervisor, either the standby Supervisor or the active Supervisor may be impacted, even reloaded. So before inserting the new standby Supervisor, make sure it will boot with the identical software release as the active Supervisor.

Information About Supervisor Redundancy

The Supervisor redundancy feature enables the Cisco cBR router to use two Supervisors in a redundant configuration, so that if the active Supervisor fails or becomes inactive, the system automatically performs a switchover , where the standby Supervisor takes over and assumes full responsibility for systems operations.

The Supervisor redundancy feature does not require a full reboot of the system to perform a switchover. When the system boots up, the standby Supervisor performs full initialization, which includes self initialization, running configuration synchronization from the active Supervisor, and SSO feature data synchronization from the active Supervisor, then it enters into hot standby state and monitors the active Supervisor. If the standby Supervisor detects a failure in the active Supervisor, it can quickly assume the active responsibility for systems operations.

Each Supervisor contains all the resources required to operate the router, such as bootflash memory, hard disks, Ethernet ports, and console port. In the default operation, the standby Supervisor also synchronizes the major systems files, such as the running configuration file, so that during a switchover, the standby Supervisor can duplicate the active Supervisor's configuration.

You can use Cisco IOS CLI commands to access the standby Supervisor resources, such as the bootflash and hard disk. For example, you can use the **dir** command to list the contents of a device, or use the **copy** command to transfer files between the active and standby Supervisor.

Switchover Procedure

A switchover occurs when the standby Supervisor takes over responsibilities from the active Supervisor. The switchover can occur automatically if the standby Supervisor has determined that the active Supervisor 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 Supervisor verifies that the standby Supervisor is present and has entered into SSO. If so, it instructs the standby Supervisor to begin switchover procedures, and the active Supervisor 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 Supervisor assumes responsibility as the active Supervisor and brings the Cisco cBR chassis into active state, and continues the service as active Supervisor.

3. The new active Supervisor begins normal systems operations, including passing traffic.

Note The Supervisor does not begin functioning as a standby Supervisor until it is booted up with a proper Cisco IOS software.

Is Supervisor Switchover Failing?

The usual phenomenon for a Supervisor switchover to be affected is when the active Supervisor has these issues:

- Supervisor hangs

- Login to Supervisor console or Telnet to chassis fails

- Interface cards unable to connect to active Supervisor, hence crashing

- Cable modems drop offline

- Chassis reload required

- Reset of active Supervisor required to restore service

Note In case there is hardware issue with the Supervisor, do not reinsert the faulty Supervisor in the chassis. Inserting a faulty Supervisor (although a standby Supervisor) may cause the interface card to switch to the faulty Supervisor causing the interface card to crash and cable modems to go offline.

Using Redundant File Systems

Both the active and standby Supervisors have active file systems that can be accessed to store and transfer files. The table below 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.

File System	File Name for CLI Commands	Description
• Bootflash • Flash • Hard disk • USB • Standby bootflash • Standby hard disk • Standby USB	• bootflash: • flash: • harddisk: • usb0: • usb1: • stby-bootflash: • stby-harddisk: • stby-usb0: • stby-usb1:	Stores image, crash file, core files, saved configuration files, and various user files.

File System	File Name for CLI Commands	Description
• System • Temporary system • Null • Tar • Syslog • CNS • RCSF	• system: • tmpsys: • null: • tar: • syslog: • cns: • revrcsf:	Stores the running configuration and other system files.
• NVRAM • Standby NVRAM • Standby RCSF	• nvram: • stby-nvram: • stby-rcsf:	Typically stores the system default configuration file and startup configuration file.
• TFTP • RCP • PRAM • FTP • HTTP • SCP • HTTPS	• tftp: • rcp: • pram: • ftp: • http: • scp: • https:	Protocols used to transfer files to and from remote devices.

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 bootflash or hard disks.

Following is a sample output of the **show file systems** command on the Cisco cBRrouter:

```
Router# show file systems

File Systems:

Size(b)         Free(b)      Type  Flags  Prefixes
            -           -    opaque    rw    system:
            -           -    opaque    rw    tmpsys:
*   7800705024   1574408192    disk    rw    bootflash:
    7800705024   1574408192    disk    rw    flash:
   98394218496   79534682112    disk    rw    harddisk:
    8009056256   8009023488    disk    rw    usb1:
      33554432     33507452   nvram    rw    stby-nvram:
            -           -    opaque    rw    null:
            -           -    opaque    ro    tar:
            -           -    network    rw    tftp:
            -           -    opaque    wo    syslog:
      33554432     33508476   nvram    rw    nvram:
            -           -    network    rw    rcp:
            -           -    network    rw    pram:
```

```
              -              -    network   rw   ftp:
              -              -    network   rw   http:
              -              -    network   rw   scp:
              -              -    network   rw   https:
              -              -     opaque   ro   cns:
              -              -      nvram   rw   stby-rcsf:
     7800705024     1635270656      disk   rw   stby-bootflash:
    98394218496    89040576512      disk   rw   stby-harddisk:
              -              -       disk   rw   stby-usb0:
     1000787968      301559808      disk   rw   stby-usb1:
              -              -     opaque   rw   revrcsf:
```

Console Port Usage After Supervisor Switchover

When an active Supervisor fails, and the standby Supervisor becomes the active Supervisor, you must use the console port on the new active Supervisor to give CLI commands and display statistics for the router. The standby Supervisor console is disabled by default and cannot be used to run any CLI commands. Following is an sample output of the standby Supervisor console:

```
Router-stby>
Standby console disabled
Router-stby>
```

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

Benefits

- The Supervisor is not a single point of hardware failure. If a permanent hardware failure in the active Supervisor occurs, the standby Supervisor recovers the system, increasing the level of network service and reliability.

- The standby Supervisor can become the active Supervisor without the manual intervention of a system operator. This reduces the recovery time and the need for an instant response from the network administrators.

- The active Supervisor continues to dynamically synchronize the changed configuration and feature data with the standby Supervisor after the system reaches SSO. Therefore, the standby Supervisor always operates as a hot standby and ready to take over.

How to Configure Supervisor Redundancy

The Supervisor redundancy feature is automatically enabled when two Supervisor are installed in the Cisco cBR chassis. The active Supervisor automatically synchronizes the running configuration file with the standby Supervisor during the bootup of standby Supervisor.

Note The Cisco cBR router supports only the SSO mode for Supervisor redundancy. The default redundancy mode is SSO and this mode does not need any new configurations.

This section contains the following:

Forcing Switchover

To manually force a switchover, so that the standby Supervisor becomes active, use the **redundancy force-switchover** command in privileged EXEC mode on the active Supervisor. Manually forcing a switchover is useful in the following situations:

- You need to remove, replace, or upgrade the currently active Supervisor.

- A previous switchover has activated the standby Supervisor and you now want to restore the previously active Supervisor.

Tip Simply removing the active Supervisor also triggers a switchover, but using the **redundancy force-switchover** command does not generate a hardware alarm.

Before you begin

Ensure that the standby Supervisor is in the SSO state using the **show redundancy** command. For more information, see Verifying Supervisor Redundancy , on page 11.

Step 1 Set the configuration register as 0x02 and the load the appropriate image on both the Supervisors

Example:

```
Router# configure terminal
Router(config)# config-register 0x02
Router(config)# boot system bootflash:cbrsup-universalk9.2015-03-08_01.38_xxxxx.SSA.bin
```

Note Do not perform this step if you want to set the previous active Supervisor to stay in ROM monitor mode or manually boot it up after the switchover.

Step 2 Use the **redundancy force-switchover** command to force the switchover.

Example:

```
Router# redundancy force-switchover

Proceed with switchover to standby RP? [confirm]
Manual Swact = enabled

Jan 1 19:23:22.483 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: process exit with reload
fru code

Initializing Hardware ...

System Bootstrap, Version 12.2(20141120:061458) [153], DEVELOPMENT SOFTWARE
Copyright (c) 1994-2014 by cisco Systems, Inc.
Compiled Thu 11/20/2014 18:04:24.91 by xxxxx
```

The standby Supervisor becomes the active Supervisor.

Step 3   (Optional) If you have not performed Step 1, on page 7, the previous active Supervisor is put into the ROM monitor mode after the switchover. To enable the previous active Supervisor to become the new standby Supervisor, manually boot up the new standby Supervisor to enter into SSO mode.

Changing the System Boot Behavior

This section describes how to change the Cisco IOS software configuration register for modifying the system behavior when powering up or rebooting the system. The software configuration register is a 16 bit register in NVRAM that controls the following boot functions:

- Specifies the source of the Cisco IOS software image to be loaded

- Specifies whether the Cisco IOS software must ignore the contents of the saved configuration file in NVRAM memory

- Enables or disables the use of the Break function

Use the following procedure to change the software configuration register settings:

Step 1   Enter global configuration mode and use the **config-register** command to set the contents of the software configuration register to a new value.

Specify the new value as a 16 bit hexadecimal bitmask by using the values provided in the following table.

Table 2: Definition of Bits in the Software Configuration Register

Bit No.	Hex Value	Meaning/Function
00 to 03	0x0000 to 0x000F	Defines the source of the default Cisco IOS software image required to run the router: • 00—When powering up, the system remains at the ROM monitor prompt (rommon), awaiting a user command to boot the system manually by the rommon **boot** command. • 01—When powering up, the system automatically boots the first system image found in the flash memory's single in-line memory module (SIMM) on the Supervisor. • 02 to 0F—When powering up, the system automatically boots from a default Cisco IOS software image stored on a TFTP server in the network. For this setting, configure and enable the Network Management Ethernet port on the Supervisor. The port must be operational. This setting also enables boot system commands which can override the default filename.
06	0x0040	Causes system software to ignore the contents of the NVRAM configuration file.
07	0x0080	Enables the original equipment manufacturer (OEM) bit.
08	0x0100	Disables the Break function after 30 seconds.
09	0x0200	Not used.

Bit No.	Hex Value	Meaning/Function
10	0x0400	Specifies that broadcast packets are based on the 0.0.0.0 IP address.
11 and 12	0x0800 to 0x1000	Defines the console baud rate (the default value is 9600 baud).
13	0x2000	Boots an image from the boot flash memory.
14	0x4000	Specifies that the broadcast packets must use the subnet broadcast address.
15	0x8000	Enables diagnostic messages and ignores the contents of the NVRAM configuration file.

For example, to configure the router to boot to the ROM monitor prompt, set the configuration register to **0x2100** with the following commands:

Example:

```
Router# config t
Router(config)# config-register 0x2100
Router(config)#
```

Tip   The typical bitmask for normal use is 0x2102. It specifies that the router must load the Cisco IOS software from the flash memory and boot to the Cisco IOS CLI prompt. The Break key is enabled only for 30 seconds. Hence, if required, you can break to the ROM monitor prompt.

Step 2   Exit the global configuration mode.

Example:

```
Router(config)# exit
Router#
```

Step 3   View the new software configuration register setting using the **show version** command.

The last line shows the settings of the configuration register:

Example:

```
Router# show version
Cisco IOS XE Software, Version 2015-03-04_00.38_xxxxx
Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental  \
Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
This software is an Engineering Special
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Wed 04-Mar-15 00:21 by xxxxx


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or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON

Router uptime is 14 minutes
```

```
Uptime for this control processor is 17 minutes
System returned to ROM by SSO Switchover
System image file is "bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin"
Last reload reason: Reload Command



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cisco cBR1013 (CBR) processor (revision CBR) with 3647635K/6147K bytes of memory.
Processor board ID CSJ13152101
16 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
50331648K bytes of physical memory.
7739391K bytes of eUSB flash at bootflash:.
97620247K bytes of SATA hard disk at harddisk:.
979258K bytes of USB flash at usb1:.

Configuration register is 0x2
```

When you modify the configuration register, the **show version** command shows both the current value of the register and the value that will be used during the next reboot or reload.

Step 4   Perform one of the following to save the new software configuration register settings in the configuration file:

- Use the **copy running-config startup-config** command.
- Use the **write** command.

Example:

```
Router# copy running-config startup-config


Router# write
Building configuration...
[OK]
```

Step 5   The changes to the software configuration register will take effect the next time the router is rebooted or restarted. To manually reboot the router, use the **reload** command:

Example:

```
Router# reload
System configuration has been modified. Save? [yes/no]: yes
Proceed with reload? [confirm]
```

Saving a Configuration File to the Bootflash or Hard Disk

This section describes how to copy a configuration file to a bootflash or hard disk and configure the Cisco cBR router.

Step 1 Copy the configuration file to the bootflash or hard disks in both Supervisors.

Example:

```
Router# copy running-config bootflash:cbr8-config
Router# copy running-config stby-bootflash:cbr8-config
Router# copy running-config harddisk:cbr8-config
Router# copy running-config stby-harddisk:cbr8-config
```

Step 2 (Optional) If the configuration file is currently on a TFTP server, copy the file from the TFTP server to the bootflash or hard disk in each Supervisor.

Example:

```
Router# copy tftp://192.168.100.10/router-config bootflash:cbr8-config
Router# copy tftp://192.168.100.10/router-config stby-bootflash:cbr8-config
Router# copy tftp://192.168.100.10/router-config harddisk:cbr8-config
Router# copy tftp://192.168.100.10/router-config stby-harddisk:cbr8-config
```

Verifying the Supervisor Redundancy Configuration

This section contains the following topics:

Verifying Supervisor Redundancy

Step 1 View the startup configuration and verify whether the lines for configuring redundancy appear:

Example:

```
Router# show startup-config

...
redundancy
mode sso
...
```

Step 2 View the current Supervisor redundancy state by running the **show redundancy** command.

The active Supervisor is typically shown in slot 4 (SUP0).

```
Router# show redundancy

Redundant System Information :
------------------------------
Available system uptime = 28 minutes
Switchovers system experienced = 0
Standby failures = 0
```

```
Last switchover reason = none

Hardware Mode = Duplex
Configured Redundancy Mode = sso
Operating Redundancy Mode = sso
Maintenance Mode = Disabled
Communications = Up

Current Processor Information :
------------------------------
Active Location = slot 4
Current Software state = ACTIVE
Uptime in current state = 28 minutes
Image Version = Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
 Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
This software is an Engineering Special
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Wed 04-Mar-15 00:21 by xxxxx
BOOT = bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin,12;
CONFIG_FILE = bootflash:startup_config1419513118
Configuration register = 0x2

Peer Processor Information :
------------------------------
Standby Location = slot 5
Current Software state = STANDBY HOT
Uptime in current state = 24 minutes
Image Version = Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
 Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
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Compiled Wed 04-Mar-15 00:21 by xxxxx
BOOT = bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin,12;
CONFIG_FILE = bootflash:startup_config1419513118
Configuration register = 0x2
```

If a switchover occurs, the **show redundancy** command shows that the active Supervisor has changed slots, moving from slot 4 (SUP0) to slot 5 (SUP1). The output is similar to the one in the following example.

```
Router# show redundancy

Redundant System Information :
------------------------------
Available system uptime = 39 minutes
Switchovers system experienced = 1
Standby failures = 0
Last switchover reason = user forced

Hardware Mode = Duplex
Configured Redundancy Mode = sso
Operating Redundancy Mode = sso
Maintenance Mode = Disabled
Communications = Up

Current Processor Information :
------------------------------
Active Location = slot 5
Current Software state = ACTIVE
Uptime in current state = 10 minutes
Image Version = Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
 Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
This software is an Engineering Special
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```

```
Compiled Wed 04-Mar-15 00:21 by xxxxx
BOOT = bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin,12;
CONFIG_FILE = bootflash:startup_config1419513118
Configuration register = 0x2

Peer Processor Information :
----------------------------
Standby Location = slot 4
Current Software state = STANDBY HOT
Uptime in current state = 4 minutes
Image Version = Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
 Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
This software is an Engineering Special
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Wed 04-Mar-15 00:21 by xxxxx
BOOT = bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin,12;
CONFIG_FILE = bootflash:startup_config1419513118
Configuration register = 0x2
```

If the standby Supervisor is not installed or is not operational, the **show redundancy** command gives an output similar to the following example:

```
Router# show redundancy

Redundant System Information :
------------------------------
Available system uptime = 31 minutes
Switchovers system experienced = 1
Standby failures = 0
Last switchover reason = user forced

Hardware Mode = Simplex
Configured Redundancy Mode = sso
Operating Redundancy Mode = Non-redundant
Maintenance Mode = Disabled
Communications = Down Reason: Failure

Current Processor Information :
------------------------------
Active Location = slot 5
Current Software state = ACTIVE
Uptime in current state = 2 minutes
Image Version = Cisco IOS Software, IOS-XE Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
 Version 15.5(20150302:044048) [v155_2_s_xe315_throttle-xxxxx-XE315_0301 121]
This software is an Engineering Special
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Wed 04-Mar-15 00:21 by xxxxx
BOOT = bootflash:cbrsup-universalk9.2015-03-04_00.38_xxxxx.SSA.bin,12;
CONFIG_FILE = bootflash:startup_config1419513118
Configuration register = 0x2

Peer (slot: 4) information is not available because it is in 'DISABLED' state
```

The **show redundancy** command shows details of the redundancy state, software state, system uptime, image version, boot, configuration file, and configuration register information.

After supervisor redundancy, the following messages are displayed, for example:

```
CLC 3/0: May 20 07:26:01.992: %CBR-4-RECONCL_CM_FINISH_CLC: Reconciliation (cdm->ios) for slot 3
finished: total 7, success 5, failed 2, ios-only 2, cdm-only 0, mismatch 0, offline 0,
in-transaction-reconl 0, in-transaction-recover 0.
```

Where:

total indicates the overall number of cable modems on each linecard before failover.

success indicates the number of modems, which are remained online during failover.

failed indicates the number of cable modems which have failed reconciliation check, and deleted from database.

ios-only indicates the number of cable modems which has data entry in linecard iosd only, and have been deleted from database.

cdm-only indicates the number of cable modems which has data entry in linecard cdman (us-schedular) only, and have been deleted from database.

mismatch indicates the number of cable modems which with data mismatch in the modem instance or service-flows after failover. These modems have been deleted from database.

offline indicates the number of cable modems which are dropped offline during failover.

in-transaction-reconl indicates the number of cable modems that are deleted due to in dsx operations during failover.

in-transaction-recover indicates the number of cable modems during in dsx operations during failover.

Verifying Supervisor Switchover

Step 1   Verify the LEDs on the Supervisor Card.

When a Supervisor becomes active, the RP ACT and FP ACT LEDs on the Supervisor Card illuminate green to indicate that they have initialized and acting as the active Supervisor. The RP ACT and FP ACT on standby Supervisor Card are off. For more information, see Monitoring the Supervisor in the Cisco cBR Chassis.

Step 2   Verify the Supervisor switchover by running the **show redundancy switchover history** command.

If the original Supervisor is in slot 4 (SUP0) and the standby Supervisor is in slot 5 (SUP1), the output is similar to the following sample:

Example:

```
Router# show redundancy switchover history

Index Previous Current Switchover Switchover
      active   active  reason     time
----- -------- ------- ---------- ----------
1     48       49      user forced 19:23:11 CST Sun Jan 1 2012
```

The value 48 indicates SUP0 and 49 indicates SUP1.

After supervisor redundancy, a messages is displayed, below is an example:

```
CLC 3/0: May 20 07:26:01.992: %CBR-4-RECONCL_CM_FINISH_CLC: Reconciliation (cdm->ios) for
slot 3 finished: total 7, success 5, failed 2, ios-only 2, cdm-only 0, mismatch 0, offline
 0, in-transaction-reconl 0, in-transaction-recover 0.
```

Table 3: Message Description

Name	Description
total	Overall amount of cable modems on each linecard before failover.
success	Indicates the number of cable modems remain online during failover.
failed	Indicates the number of cable modems failed reconciliation check, and have been deleted from database.
ios-only	Indicates the number of cable modems which has data entry in linecard iosd only, and have been deleted from database.
cdm-only	Indicates the number of cable modems which has data entry in linecard cdman (us-schedular) only, and have been deleted from database.
mismatch	Indicates the number of cable modems with data mismatch in the modem instance or service-flows after failover. These modems have been deleted from database.
offline	Indicates the number of cable modems dropped offline during failover.
in-transaction-reconl	Indicates the number of cable modems deleted due to in dsx operations during failover.
in-transaction-recove	Indicates the number of cable modems during in dsx operations during failover.

Configuration Example for Supervisor Redundancy

The following example shows the relevant portion of the Cisco IOS configuration file for the default configuration of the Supervisor Redundancy feature. Use this configuration for most of the applications:

```
Router# show running-config | sec redundancy

redundancy
 mode sso

Router#
```

Additional References

Related Documents

Related Topic	Document Title
CMTS commands	Cisco IOS CMTS Cable Command Reference
Stateful Switchover	Stateful Switchover

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Supervisor Redundancy

Use Cisco Feature Navigator to find information about the platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to the https://cfnng.cisco.com/ link. An account on the Cisco.com page is not required.

Note The following table lists the software release in which a given feature is introduced. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 4: Feature Information for Supervisor Redundancy

Feature Name	Releases	Feature Information
Supervisor Redundancy	Cisco IOS XE Fuji 16.7.1	This feature was integrated on Cisco cBR Series Converged Broadband Routers.