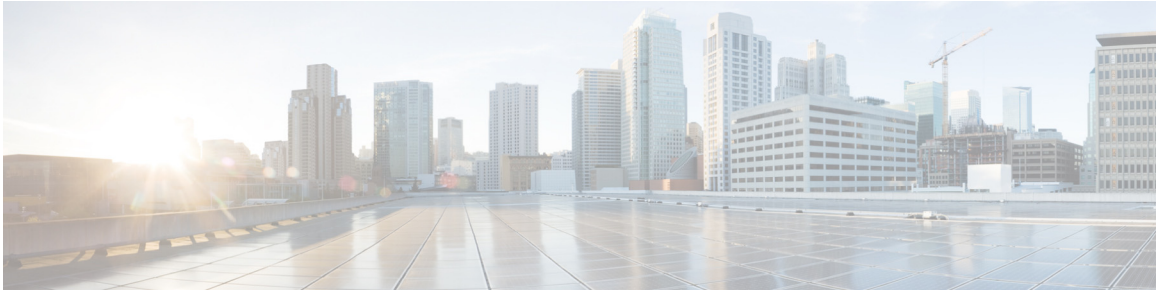

1:1 Supervisor Card Redundancy

First Published: January 8, 2009
Last Updated: June 17, 2010

This document describes high availability and redundancy features of the Supervisor card on the Cisco RF Gateway 10 (RFGW-10) Universal Edge Quadrature Amplitude Modulation (UEQAM).

High availability is a critical requirement in networks to provide continuous access to applications and data. It is required to minimize downtime and ensure maximum productivity in a network.

Supervisor high availability is achieved through:

- Route Processor Redundancy (RPR)
- Stateful Switchover (SSO)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module and to see a list of the releases in which each feature is supported, see the "Feature Information for 1:1 Supervisor Card Redundancy" section on page 87.

Use Cisco Feature Navigator to find information about platform support and Cisco IOS, Catalyst OS, and Cisco IOS XE software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

Prerequisites for 1:1 Supervisor Card Redundancy

- The Supervisor cards should be installed in the Cisco RFGW-10 chassis in slots 1 and 2.
- Both Supervisor cards in the chassis should be SUP-V/10-Gigabit Ethernet cards and use the same Cisco IOS software image.

Restrictions for 1:1 Supervisor Card Redundancy

- If SSO mode of Supervisor redundancy is configured and the Cisco IOS images on both the Supervisor cards is not the same, then the Supervisor switches to RPR redundancy mode.

Information About 1:1 Supervisor Card Redundancy

This section describes the types of high availability, supervisor redundancy, and the need and cause for a Supervisor switchover on the Cisco RFGW-10:

Supervisor Redundancy

The Cisco RFGW-10 supports two redundant Supervisor cards—one Active card and one Standby card. In a switchover, the standby Supervisor card takes over the active Supervisor card. Running the Supervisor card in RPR or SSO operating mode enables Supervisor redundancy.

The Cisco RF Gateway 10 Supervisor Engine 7-E uplink ports are not recommended for data or management traffic in Supervisor Redundancy Mode.

The Supervisor 7-E card has four uplink ports on its front panel. Only the top two ports are active in redundancy mode. However, in redundancy mode, packet loss occurs in the traffic paths between the uplink ports on the standby Supervisor card and the switch fabric on the active Supervisor card. There is no packet loss for uplink ports on active supervisors.

The uplink ports on the Cisco RFGW-10 DS-384 and the Cisco RFGW-10 DS-48 line cards are recommended for data and management traffic.

Need for Supervisor Redundancy

In a switchover scenario, if the active Supervisor card fails and the Standby card takes over or a manual switchover is performed, the standby Supervisor card becomes the active Supervisor. The standby Supervisor card is automatically initialized with the startup configuration of the active Supervisor card, thus shortening the switchover time.

The switchover time for a Supervisor card in RPR mode could vary from 30 seconds or longer depending on the configuration. The switchover time for a Supervisor card in SSO mode is less than 1 second.

In addition to the minimal switchover time, Supervisor redundancy supports:

- Online Insertion and Removal (OIR) of the standby Supervisor card—OIR is usually performed for maintenance. When the standby Supervisor card is inserted, the active Supervisor card detects it. The standby Supervisor boots partially initialized in an RPR mode and fully initialized in the SSO mode

Note Before removing a Supervisor card from the chassis at runtime, ensure that the card is in the standby mode. If the card is in active mode, execute the **redundancy force-switchover** command to change the card to the standby mode, and then remove the card from the chassis.

- Software Upgrade

Tip While performing a software upgrade, load the new image on the standby Supervisor card. This minimizes the switchover downtime on the Supervisor card.

Causes for Supervisor Switchover

Some of the possible causes that can trigger a switchover from the active Supervisor card to the standby Supervisor card are:

- A software crash or hardware failure or fault on the active Supervisor card
- Standby Supervisor card detects failed active Supervisor card
- Reloading the active Supervisor card by executing the reload command—forcing manual switchover
- Lack of response of the active Supervisor card to the polls or the heartbeat maintained between the active and standby Supervisor card
- A hardware diagnostic failure is detected

Route Processor Redundancy

In Route Processor Redundancy (RPR) mode, the standby Supervisor card completes its initialization but suspends just before parsing the startup-config. The standby Supervisor card monitors the active Supervisor card, and switches over when it detects a failure on the active Supervisor card. When the standby Supervisor card becomes active, the TCC cards and all the line cards in the chassis are reset, and the startup-config is parsed. There is a traffic outage in this mode because the line cards are reset.

The switchover time of the active Supervisor card can be 30 seconds or more depending on the configuration.

The following are synchronized between the active and the standby Supervisor cards:

- Startup system configuration
- Boot variable
- Configuration register
- Calendar
- VLAN database

The following are not synchronized between the active and standby Supervisor cards:

- State configuration
- Running configuration
- Routing tables and forwarding shortcuts
- MAC address table
- Dynamic protocols such as DHCP

Switchover

The standby Supervisor card loads a Cisco IOS software image at startup and initializes itself in standby mode. In the event of a switchover, the standby Supervisor card reinitializes itself as the active Supervisor card, reloads all the line cards, and restarts the system. Because all line cards are reloaded, adjacent routers detect the physical link failure for most types of point-to-point connections. The standby Supervisor card parses the complete configuration, completes the booting sequence, resets the modules to perform self diagnostics, waits for the modules to come online and builds routing tables, MAC address tables, and dynamic protocols.

Stateful Switchover

In Stateful Switchover (SSO) mode, the standby Supervisor card is fully initialized and configured. This allows SSO to shorten the switchover time if the active Supervisor card fails, or if a manual switchover is performed. Both the startup and running configurations are continually synchronized from the active to the standby Supervisor cards, and the line cards are not reset during a switchover. The interfaces remain up during this transfer, so neighboring routers do not detect a physical link flap (the link does not go down and come back up).

The line cards, Layer 2 protocols, and application state information are synchronized and the standby Supervisor card is in a “hot” standby ready state to take over immediately. As the standby Supervisor card recognizes the hardware link status of every link, ports that were previously active remain active after a switchover has taken place.

The following are synchronized between the active and the standby Supervisor cards:

- Startup and running configuration
- Platform state information such as interface state, heartbeat state, and line card redundancy state
- Application state information
- Layer 2 feature configurations

The following are not synchronized between the active and the standby Supervisor cards:

- All Layer 3 protocols including OSPF
- Boot image
- Multicast PIM and IGMP precools
- L2VPNv3

Switchover

In the event of a switchover, the standby Supervisor card becomes the active Supervisor card. As the standby Supervisor card is continuously synchronized with the startup and running configuration, switchover downtime is minimal. The state information synchronization (often called “checkpointing”) from the active Supervisor card to the standby Supervisor card occurs at normal run time. At the switchover, the newly active Supervisor card immediately uses the state information previously synchronized (checkpointed).

The line cards are not reset as part of the switchover. The Supervisor card reconciles the line card state information with its own state information on switchover. SSO-aware features or protocols such as DHCP protocols are check pointed during switchover. Non-SSO aware features or protocols such as OSPF, BGP, Multicast PIM and IGMP, and L2VPNv3 protocols are quickly available on the standby as the standby Supervisor card is completely initialized.

Benefits of SSO

SSO provides a faster switchover compared to Route Processor Redundancy (RPR) by fully initializing and configuring the standby Supervisor card. By using check pointed state information, the time required for routing protocols to converge is minimized. As protocol information, application information, and user session information are maintained during the switchover, improved network availability is provided and line cards continuously forward network traffic with no loss of sessions.

Accessing the Standby Supervisor Card

The following activities can be performed on the standby Supervisor card.

Commands	Description
dir slavebootflash: or **dir slaveslot0:**	Lists the contents of the standby bootflash: device or slot0.
delete slavebootflash:<*filename*> or **delete slaveslot0:**<*filename*>	Deletes a specific filename from the standby devices.
squeeze slavebootflash: or **squueze slaveslot0:**	Performs the squeeze function.

Commands	Description
format slavebootflash: or **format slaveslot0:**	Formats the standby devices.
copy <source> slavebootflash: or **copy <source> slaveslot0:**	Copies files to standby devices.

Supervisor Redundancy SSO Support on Cisco RFGW-10

The following features are supported for Supervisor Redundancy in SSO mode.

Platform

Configuration Synchronization

The running configuration and the startup configuration are synchronized from the active Supervisor card to the standby Supervisor card. The running configuration is synchronized line by line. The commands are executed on the active Supervisor card and then on the standby Supervisor card. Parser Return Code (PRC) is used to verify the active and standby Supervisor card have the same path of execution for the command.

All interfaces and ports are synchronized as part of the configuration.

Alarm management

Syslog alarms are synchronized to the standby Supervisor card at run time. Active alarms reside on each line card. On a Supervisor switchover, the newly active Supervisor card receives the alarms from the line cards.

Line card management

The state of line cards progresses through events such as line card insertion, line card removal, line card partial reset, and line card full reset. These events and the corresponding line card states are check pointed from the active Supervisor card to the standby Supervisor card. At the Supervisor switchover, the newly active Supervisor card continues to manage the line cards with the check pointed state information.

RF Switch

The RF switch management maintains state information on all the RF switch cards, whether or not the card is present in the system. The state information is synchronized from the active Supervisor to the standby Supervisor card whenever the RF switch is inserted or removed.

DEPI

In the Cisco IOS Release12.2(50)SQ, DEPI is configured in one of the two modes—manual mode via static DEPI path configuration or protocol mode via dynamic DEPI protocol. In DEPI manual mode, the Supervisor switchover does not affect the statically configured DEPI connections. Hence, the switchover interruption to DEPI data traffic is in subseconds.

In DEPI protocol mode, the DEPI control plane is SSO-unaware as the underlying IOS L2TPv3 protocol is SSO-unaware. Neither the L2TPv3 protocol state nor the DEPI state is checkpointed from the active Supervisor card to the standby Supervisor card. During Supervisor switchover, the DEPI control plane and data plane are recovered as follows with minimal service outage time:

- DEPI control plane and data plane reestablishment—At Supervisor switchover, the newly active Supervisor card reestablishes the DEPI control connections and data sessions with its CMTS peer. The IDs of reestablished sessions fall into the same DEPI session ID range as before.

- DEPI data plane nonstop forwarding (NSF)—While the newly active Supervisor card is re-establishing the DEPI connections and data sessions, the Cisco RFGW-10 receives and processes DEPI data traffic that the CMTS continues to forward through the existing data sessions. This nonstop forwarding function minimizes the service outage time for a couple of seconds. The existing data sessions are removed after the new sessions are established.

Video

The Video SSO feature is available in Cisco IOS Release 12.2(50)SQ1 and later.

Video sessions on the Cisco RFGW-10 are either unicast or multicast sessions created manually or remotely using Generic QAM Interface (GQI). At run time, the video session state information is check pointed from the active Supervisor card to the standby Supervisor card.

Unicast video sessions continue to forward traffic during Supervisor card switchover with about one second outage time.

Multicast video sessions may experience a longer outage time during Supervisor card switchover. For a small number of SDV sessions (for example, 1,000), the outage time is typically less than 4 seconds. For a large number of SDV sessions (for example, 10,000), the outage time is around 10 seconds. This is because, in Cisco IOS Release 12.2(50)SQ1, the underlying multicast function is not SSO-aware although the video session state is synchronized to the standby Supervisor card. The SSO performance of multicast video sessions will be improved in a future release.

Supervisor Uplink Configuration

To configure Supervisor uplink, use the following command in configuration mode:

```
Router(config)# hw-module uplink select [all | gigabitethernet | tengigabitethernet]
```

When Supervisor uplink is configured, only specific uplink ports are active and available for uplink connectivity. If you try to configure other uplink ports, an error message similar to the following is displayed:

```
% WARNING: Interface GigabitEthernet1/5 is usable/operational only in 'all' or % 'gigabit'
uplink configuration when only one supervisor is present in the % chassis in slot 1.
```

Table 1, Table 2, and Table 3 show the valid port configurations for uplink.

Table 1 Only 10-Gigabit Ethernet Ports for Uplink

Uplink Interface	Slot 1: Supervisor V 10GE Slot 2: Empty	Slot 1:Empty Slot2: Supervisor V 10GE	Slot1: Supervisor V 10GE Slot2: Supervisor V 10GE
10GE 1/1	Active	N/A	Active
10GE 1/2	Active	N/A	Not Active
10GE 2/1	N/A	Active	Active
10GE 2/2	N/A	Active	Not Active

Table 2 Only Gigabit Ethernet Ports for Uplink

Uplink Interface	Slot 1: Supervisor V 10GE Slot 2: Empty	Slot 1:Empty Slot2: Supervisor V 10GE	Slot1: Supervisor V 10GE Slot2: Supervisor V 10GE
GE 1/3	Active	N/A	Active
GE 1/4	Active	N/A	Active
GE 1/5	Active	N/A	Not Active
GE 1/6	Active	N/A	Not Active
GE 2/3	N/A	Active	Active
GE 2/4	N/A	Active	Active
GE 2/5	N/A	Active	Not Active
GE 2/6	N/A	Active	Not Active

Table 3 Both 10-Gigabit Ethernet and Gigabit Ethernet Ports for Uplink

Uplink Interface	Slot 1: Supervisor V 10GE Slot 2: Empty	Slot 1:Empty Slot2: Supervisor V 10GE	Slot1: Supervisor V 10GE Slot2: Supervisor V 10GE
10GE 1/1	Active	N/A	Active
10GE 1/2	Active	N/A	Not Active
10GE 2/1	N/A	Active	Active
10GE 2/2	N/A	Active	Not Active
GE 1/3	Active	N/A	Active
GE 1/4	Active	N/A	Active
GE 1/5	Active	N/A	Not Active
GE 1/6	Active	N/A	Not Active
GE 2/3	N/A	Active	Active
GE 2/4	N/A	Active	Active
GE 2/5	N/A	Active	Not Active
GE 2/6	N/A	Active	Not Active

Forcing a Switchover Between Active and Standby Supervisor

This section describes how to do a manual switchover between the active and standby Supervisor cards on the Cisco RFGW-10:

- Forcing RPR Switchover, page 74
- Reloading the Supervisor Cards, page 74
- Forcing Stateful Switchover, page 75

Forcing RPR Switchover

To force the active Supervisor card to standby mode and the standby to active, use the **redundancy force-switchover command** in privileged EXEC mode:

Before the **redundancy** command is used, ensure that the active and standby Supervisor cards have a high availability Cisco IOS image installed and configured for Route Processor Redundancy (RPR) mode. Before the system switches over, it verifies that the standby Supervisor card is ready to take over. If the current running configuration is different from the startup configuration, the system prompts to save the running configuration before the switchover is performed.

A manual switchover is performed for one of the following reasons:

- When an active Supervisor card is upgraded or replaced.
- When the Cisco IOS software is upgraded on the standby Supervisor card and is required to start using the new software image. This allows the upgrade of the software on the former active Supervisor card without interrupting system operations.
- When testing switchover operations on the system.

The following example shows a switchover being initiated manually:

```
Router# redundancy force-switchover
Proceed with switchover to standby Supervisor? [confirm] y
```

Note Press **enter** or **y** to confirm the action to begin the switchover. If you press any other key, the switchover is aborted.

The following example shows a switchover failure because the standby Supervisor card is either not ready, not available, or not installed:

```
Router# redundancy force-switchover
There is no STANDBY present. Failed to force switchover
```

Reloading the Supervisor Cards

To reset the standby Supervisor card or to reset both the active and standby Supervisor cards, use the **redundancy reload** command in privileged EXEC mode:

```
Router# redundancy reload {peer | shelf}
```

Use **peer** to reload only the standby Supervisor card and use **shelf** to reload both the active and standby Supervisor cards.

The following example shows how to reset the standby Supervisor card:

```
Router# redundancy reload peer
```

```
Reload peer? [confirm] y
Preparing to reload peer
```

Note Press **enter** or **y** to confirm the action to begin the switchover. If you press any other key, the switchover is aborted.

The following example shows the system response when a standby Supervisor card is not installed in the router:

```
Router# redundancy reload peer

System is running in SIMPLEX mode, reload anyway? [confirm] n
Peer reload not performed.
```

The following example shows how to reload both Supervisor cards:

```
Router# redundancy reload shelf

Reload the entire shelf [confirm] y
Preparing to reload entire shelf
```

Note Press **enter** or **y** to confirm the action to begin the switchover. If you press any other key, the switchover is aborted.

Forcing Stateful Switchover

The following commands are used to perform a manual switchover from the active Supervisor card to the standby Supervisor card:

- **redundancy force-switchover**: Launches the switchover if the standby Supervisor card is in hot standby state. Use this command to initiate a switchover as it verifies the state of the standby Supervisor card
- **reload**: Resets the Supervisor card

Note The **redundancy force-failover main-cpu** command is not supported in SSO mode.

How to Configure 1:1 Supervisor Card Redundancy

This section describes how to configure 1:1 Supervisor card redundancy in Cisco RFGW-10:

- Configuring Route Processor Redundancy, page 76
- Configuring Stateful Switchover, page 79

Configuring Route Processor Redundancy

This section describes how to configure Route Processor Redundancy (RPR).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**
4. **mode rpr**
5. **main-cpu**
6. **auto-sync** {**startup-config** | **config_register** | **bootvar** | **standard**}
7. **exit**
8. **write memory**

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 the global configuration mode.
Step 3	**`redundancy`** **Example:** `Router(config)# redundancy`	Enters redundancy configuration mode.
Step 4	**`mode rpr`** **Example:** `Router(config-red)# mode rpr`	Sets the mode as Route Processor Redundancy (RPR).
Step 5	**`main-cpu`** **Example:** `Router(config-red)# main-cpu`	Enters main-cpu mode to configure redundancy of the Supervisor card.

	Command or Action	Purpose
Step 6	**auto-sync** {**startup-config** | **config_register** | **bootvar** | **standard**} **Example:** `Router(config-red-mc)# auto-sync standard`	Enables automatic synchronization of the active Supervisor card configuration to standby. • **startup-config**—Specifies that the Supervisor cards should synchronize the startup configuration files. • **config_register**—Specifies that the Supervisor cards should synchronize the configuration register values. • **bootvar**—Specifies that the Supervisor cards 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 • **standard**—(Default) Specifies that the Supervisor cards should synchronize all of the system files. The **no** form of the command specifies that one or more files should not be synchronized. **Note** We strongly recommend that you use the **auto-sync standard** command to ensure that all system files are synchronized between the two Supervisor modules. The **no auto-sync** command is not typically used in production plants.
Step 7	**exit** **Example:** `Router(config-red-mc)# exit`	Exits global, redundancy configuration, and main-cpu modes, and returns to privileged EXEC mode.
Step 8	**write memory** **Example:** `Router# write memory`	Saves your settings to the nonvolatile random access memory (NVRAM) to ensure that the system retains the settings after a power cycle.

Example:

The following example shows how to enter RPR and main-CPU redundancy mode:

```
Router# configure terminal
Router(config)# redundancy
Router(config-red)# mode rpr
Router(config-red)# main-cpu
Router(config-red-mc)# auto-sync standard
Router(config-red-mc)# exit
Router# write memory
```

Configuring Stateful Switchover

This section describes how to configure Stateful Switchover (SSO).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**
4. **mode sso**
5. **exit**
6. **write memory**

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 the global configuration mode.
Step 3	**redundancy** **Example:** `Router(config)# redundancy`	Enters redundancy configuration mode.
Step 4	**mode sso** **Example:** `Router(config-red)# mode sso`	Sets the mode as Stateful Switchover (SSO).
Step 5	**exit** **Example:** `Router(config-red-mc)# exit`	Exits global, redundancy configuration, and main-cpu modes, and returns to privileged EXEC mode.
Step 6	**write memory** **Example:** `Router# write memory`	Saves your settings to the nonvolatile random access memory (NVRAM) to ensure that the system retains the settings after a power cycle.

Example:

The following example shows how to enter SSO redundancy mode:

```
Router# configure terminal
Router(config)# redundancy
Router(config-red)# mode sso
Router(config-red)# exit
Router# write memory
```

How to Verify 1:1 Supervisor Card Redundancy

This section describes how to verify 1:1 Supervisor Card Redundancy in Cisco RFGW-10:

- Verifying Route Processor Redundancy, page 80
- Verifying Stateful Switchover, page 82

Verifying Route Processor Redundancy

The following is a sample output of the **show redundancy** command showing Supervisor Redundancy RPR mode configured the on the Cisco RFGW-10:

```
Router# show redundancy
Load for five secs: 8%/0%; one minute: 9%; five minutes: 10%
Time source is hardware calendar, *15:26:51.687 PDT Wed Sep 16 2009

Redundant System Information :
------------------------------
       Available system uptime = 2 days, 4 hours, 5 minutes
Switchovers system experienced = 0
              Standby failures = 1
        Last switchover reason = none

                 Hardware Mode = Simplex
    Configured Redundancy Mode = RPR
     Operating Redundancy Mode = RPR
              Maintenance Mode = Disabled
                Communications = Down      Reason: Simplex mode

Current Processor Information :
-------------------------------
               Active Location = slot 1
        Current Software state = ACTIVE
       Uptime in current state = 2 days, 4 hours, 5 minutes
                 Image Version = Cisco IOS Software, Catalyst 4500 L3 Switch Sof
tware (rfgw-ENTSERVICESK9-M), Version 12.2(122SQ_20090905)SQ EARLY DEPLOYMENT DA
TECODE BUILD, synced to 122_50_SG_THROTTLE_BASE_LABEL
Copyright (c) 1986-2009 by Cisco Systems, Inc.
Compiled Sat 05-Sep-09 04:24 by jdkerr
                          BOOT = bootflash:rfgw-entservicesk9-mz.122SQ_20090905,
12;
        Configuration register = 0x2

Peer (slot: 2) information is not available because it is in 'DISABLED' state
Router
```

To verify the current Supervisor redundancy status, use the following command in user EXEC or privileged EXEC mode:

```
Router# show redundancy [clients | counters | history | states]
```

The following is sample output of 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 is sample output of 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 is sample output of 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
```

The following is sample output of the **show redundancy states** command:

```
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
```

Verifying Stateful Switchover

The following is a sample output of the **show redundancy** command showing Supervisor redundancy SSO mode configured using the on the Cisco RFGW-10:

```
Router# show redundancy
Load for five secs: 8%/0%; one minute: 10%; five minutes: 10%
Time source is hardware calendar, *15:18:51.999 PDT Wed Sep 16 2009

Redundant System Information :
------------------------------
       Available system uptime = 2 days, 3 hours, 57 minutes
Switchovers system experienced = 0
              Standby failures = 0
        Last switchover reason = none

                 Hardware Mode = Duplex
    Configured Redundancy Mode = Stateful Switchover
     Operating Redundancy Mode = Stateful Switchover
              Maintenance Mode = Disabled
                Communications = Up

Current Processor Information :
-------------------------------
               Active Location = slot 1
        Current Software state = ACTIVE
       Uptime in current state = 2 days, 3 hours, 57 minutes
                 Image Version = Cisco IOS Software, Catalyst 4500 L3 Switch Sof
tware (rfgw-ENTSERVICESK9-M), Version 12.2(122SQ_20090905)SQ EARLY DEPLOYMENT DA
TECODE BUILD, synced to 122_50_SG_THROTTLE_BASE_LABEL
Copyright (c) 1986-2009 by Cisco Systems, Inc.
Compiled Sat 05-Sep-09 04:24 by jdkerr
                          BOOT = bootflash:rfgw-entservicesk9-mz.122SQ_20090905,
12;
```

```
        Configuration register = 0x2

Peer Processor Information :
----------------------------
              Standby Location = slot 2
        Current Software state = STANDBY HOT
       Uptime in current state = 2 days, 3 hours, 56 minutes
                 Image Version = Cisco IOS Software, Catalyst 4500 L3 Switch Sof
tware (rfgw-ENTSERVICESK9-M), Version 12.2(122SQ_20090905)SQ EARLY DEPLOYMENT DA
TECODE BUILD, synced to 122_50_SG_THROTTLE_BASE_LABEL
Copyright (c) 1986-2009 by Cisco Systems, Inc.
Compiled Sat 05-Sep-09 04:2
                          BOOT = bootflash:rfgw-entservicesk9-mz.122SQ_20090905,
12;
        Configuration register = 0x2Router
```

To verify the current Supervisor redundancy status, use the following command in user EXEC or privileged EXEC mode:

```
Router# show redundancy [clients | counters | history | states]
```

The following is sample output of the **show redundancy clients** command:

```
Router# show redundancy clients
Load for five secs: 11%/0%; one minute: 10%; five minutes: 11%
Time source is hardware calendar, *15:20:08.899 PDT Wed Sep 16 2009
 clientID = 0       clientSeq = 0        RF_INTERNAL_MSG
 clientID = 29      clientSeq = 60       Redundancy Mode RF
 clientID = 139     clientSeq = 61       IfIndex
 clientID = 3300    clientSeq = 62       Persistent Variable
 clientID = 25      clientSeq = 68       CHKPT RF
 clientID = 77      clientSeq = 75       Event Manager
 clientID = 22      clientSeq = 98       Network RF Client
 clientID = 88      clientSeq = 99       HSRP
 clientID = 71      clientSeq = 114      XDR RRP RF Client
 clientID = 24      clientSeq = 115      CEF RRP RF Client
 clientID = 75      clientSeq = 132      Tableid HA
 clientID = 520     clientSeq = 135      RFS RF
 clientID = 210     clientSeq = 136      Auth Mgr
 clientID = 5       clientSeq = 137      Config Sync RF clien
 clientID = 501     clientSeq = 145      LAN-Switch VTP VLAN
 clientID = 502     clientSeq = 147      LAN-Switch Port Mana
 clientID = 200     clientSeq = 165      ETHERNET OAM RF
 clientID = 201     clientSeq = 166      ETHERNET CFM RF
 clientID = 20      clientSeq = 177      IPROUTING NSF RF cli
 clientID = 55      clientSeq = 187      GALIOS_CONFIG_SYNC
 clientID = 34      clientSeq = 192      SNMP RF Client
 clientID = 35      clientSeq = 202      History RF Client
 clientID = 91      clientSeq = 223      REDSSOC
 clientID = 250     clientSeq = 226      EEM Server RF CLIENT
 clientID = 252     clientSeq = 228      EEM POLICY-DIR RF CL
 clientID = 54      clientSeq = 230      SNMP HA RF Client
 clientID = 57      clientSeq = 233      ARP
 clientID = 50      clientSeq = 240      FH_RF_Event_Detector
 clientID = 2001    clientSeq = 241      CAT4K CHASSIS
 clientID = 2002    clientSeq = 242      Link State
 clientID = 2003    clientSeq = 244      K2Man
 clientID = 2005    clientSeq = 248      Rkios
```

The following is sample output of the **show redundancy counters** command:

```
Router# show redundancy counters
Load for five secs: 12%/0%; one minute: 11%; five minutes: 11%
Time source is hardware calendar, *15:18:05.943 PDT Wed Sep 16 2009

Redundancy Facility OMs
               comm link up = 1
             comm link 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 = 23994
     tx buffers unavailable = 0
                 buffers rx = 20810
      buffer release errors = 0

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

The following is sample output of the **show redundancy history** command:

```
Router# show redundancy history
Load for five secs: 8%/0%; one minute: 10%; five minutes: 10%
Time source is hardware calendar, *15:16:40.079 PDT Wed Sep 16 2009
00:00:00 client added: RF_INTERNAL_MSG(0) seq=0
00:00:00 client added: RF_LAST_CLIENT(65000) seq=361
00:00:00 RF_STATUS_SEND_RF_STATE(408) RF_LAST_CLIENT(65000) op=1 rc=0
00:00:01 client added: IfIndex(139) seq=61
00:00:01 RF_STATUS_SEND_RF_STATE(408) IfIndex(139) op=1 rc=0
00:00:01 client added: ISSU Test Client(4005) seq=319
00:00:01 RF_STATUS_SEND_RF_STATE(408) ISSU Test Client(4005) op=1 rc=0
00:00:01 client added: RFS RF(520) seq=135
00:00:01 client added: DATA DESCRIPTOR RF CLIENT(141) seq=323
00:00:01 client added: ISSU process(3099) seq=316
00:00:01 RF_STATUS_SEND_RF_STATE(408) ISSU process(3099) op=1 rc=0
00:00:01 client added: Persistent Variable(3300) seq=62
00:00:01 RF_STATUS_SEND_RF_STATE(408) Persistent Variable(3300) op=1 rc=0
00:00:01 client added: REP Protocol(212) seq=278
00:00:01 RF_STATUS_SEND_RF_STATE(408) REP Protocol(212) op=1 rc=0
00:00:01 client added: History RF Client(35) seq=202
00:00:01 RF_STATUS_SEND_RF_STATE(408) History RF Client(35) op=1 rc=0
00:00:01 client added: CHKPT RF(25) seq=68
00:00:01 RF_STATUS_SEND_RF_STATE(408) CHKPT RF(25) op=1 rc=0
00:00:01 client added: XDR RRP RF Client(71) seq=114
00:00:01 RF_STATUS_SEND_RF_STATE(408) XDR RRP RF Client(71) op=1 rc=0
00:00:01 client added: Config Sync RF client(5) seq=137
00:00:01 RF_STATUS_SEND_RF_STATE(408) Config Sync RF client(5) op=1 rc=0
00:00:01 client added: Config Verify RF client(94) seq=292
00:00:01 RF_STATUS_SEND_RF_STATE(408) Config Verify RF client(94) op=1 rc=0
00:00:01 client added: Inline Power rf client(505) seq=294
00:00:01 RF_STATUS_SEND_RF_STATE(408) Inline Power rf client(505) op=1 rc=0
00:00:01 client added: Port Security(508) seq=297
00:00:01 RF_STATUS_SEND_RF_STATE(408) Port Security(508) op=1 rc=0
00:00:01 client added: LAN-Switch Port Manager(502) seq=147
```

```
00:00:01 RF_STATUS_SEND_RF_STATE(408) LAN-Switch Port Manager(502) op=1 rc=0
00:00:01 client added: LAN-Switch PAgP/LACP(510) seq=326
00:00:01 RF_STATUS_SEND_RF_STATE(408) LAN-Switch PAgP/LACP(510) op=1 rc=0
00:00:01 client added: LAN-Switch IP Host Table(509) seq=298
00:00:01 RF_STATUS_SEND_RF_STATE(408) LAN-Switch IP Host Table(509) op=1 rc=0
00:00:01 client added: CEF RRP RF Client(24) seq=115
00:00:01 RF_STATUS_SEND_RF_STATE(408) CEF RRP RF Client(24) op=1 rc=0
```

The following is sample output of the **show redundancy states** command:

```
Router# show redundancy states
Load for five secs: 8%/0%; one minute: 10%; five minutes: 11%
Time source is hardware calendar, *15:14:31.131 PDT Wed Sep 16 2009
       my state = 13 -ACTIVE
     peer state = 8  -STANDBY HOT
           Mode = Duplex
           Unit = Primary
        Unit ID = 1

Redundancy Mode (Operational) = Stateful Switchover
Redundancy Mode (Configured)  = Stateful Switchover
Redundancy State              = Stateful Switchover
     Maintenance Mode = Disabled
    Manual Swact = enabled
 Communications = Up

   client count = 59
 client_notification_TMR = 240000 milliseconds
          keep_alive TMR = 9000 milliseconds
        keep_alive count = 0
    keep_alive threshold = 18
           RF debug mask = 0x0
```

Additional References

The following sections provide references related to 1:1 Supervisor Card Redundancy feature.

Related Documents

Related Topic	Document Title
Cisco RFGW-10 commands	Cisco RF Gateway 10 Command Reference http://www.cisco.com/en/US/docs/cable/rf_gateway/command/reference/RFGW-10_Book.html
New Software Features in Cisco IOS Release 12.2SQ	Cisco RF Gateway 10 Software Feature and Configuration Guide http://www.cisco.com/en/US/docs/cable/rf_gateway/feature/guide/rfgw_scg.html

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified 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

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

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/techsupport

Feature Information for 1:1 Supervisor Card Redundancy

Table 4 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS, Catalyst OS, and Cisco IOS XE software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 4 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 4 Feature Information for 1:1 Supervisor Card Redundancy

Feature Name	Releases	Feature Information
1:1 Supervisor Card Redundancy	12.2(44)SQ	This feature was introduced in the Cisco IOS Release 12.2(44)SQ to support the Cisco RF Gateway 10. The following commands were introduced or modified: • **mode rpr** • **main-cpu** • **auto-sync** {**startup-config** | **config_register** | **bootvar** | **standard**} • **redundancy force-switchover** • **redundancy reload** {**peer** | **shelf**} • **hw-module uplink select** [**all** | **gigabitethernet** | **tengigabitethernet**] • **show redundancy** [**clients** | **counters** | **history** | **states**]
	12.2(50)SQ	Stateful Switchover (SSO) is supported in addition to RPR mode. The following commands were introduced or modified: • **mode** {**rpr** | **sso**}
	12.2(50)SQ1	Support for Video SSO is added.