C H A P T E R **16**

Configuring High Availability

The Cisco MDS 9500 Series of multilayer directors support application restartability and nondisruptive supervisor switchability. The switches are protected from system failure by redundant hardware components and a high availability software framework.

This chapter includes the following sections:

About High Availability

The high availability (HA) software framework provides the following:

- Ensures nondisruptive software upgrade capability. See Chapter 14, "Software Images."
- Provides redundancy for supervisor module failure by using dual supervisor modules.
- Performs nondisruptive restarts of a failed process on the same supervisor module. A service running on the supervisor modules and on the switching module tracks the HA policy defined in the configuration and takes action based on this policy. This feature is also available in switches in the Cisco MDS 9200 Series and the Cisco MDS 9100 Series.
- Protects against link failure using the PortChannel (port aggregation) feature. This feature is also available in switches in the Cisco MDS 9200 Series and in the Cisco MDS 9100 Series. See Chapter 23, "Configuring PortChannels."
- Provides management redundancy using the Virtual Router Redundancy Protocol (VRRP). This feature is also available in switches in the Cisco MDS 9200 Series and in the Cisco MDS 9100 Series.

  See the "Virtual Router Redundancy Protocol" section on page 49-16

- Provides switchovers if the active supervisor fails. The standby supervisor, if present, takes over without disrupting storage or host traffic.

  Directors in the Cisco MDS 9500 Series have two supervisor modules (sup-1 and sup-2) in slots 5 and 6 (Cisco MDS 9509 and 9506 Switches) or slots 7 and 8 (Cisco MDS 9513 Switch). When the switch powers up and both supervisor modules are present, the supervisor module that comes up first enters the active mode and the supervisor module that comes up second enters the standby mode. If

both supervisor modules come up at the same time, sup-1 becomes active. The standby supervisor module constantly monitors the active supervisor module. If the active supervisor module fails, the standby supervisor module takes over without any impact to user traffic.

> **Note** For high availability, you need to connect the ethernet port for both active and standby supervisors to the same network or virtual LAN. The active supervisor owns the one IP address used by these ethernet connections. On a switchover, the newly activated supervisor takes over this IP address.

Switchover Mechanisms

Switchovers occur by one of the following two mechanisms:

- The active supervisor module fails and the standby supervisor module automatically takes over.
- You manually initiate a switchover from an active supervisor module to a standby supervisor module.

Once a switchover process has started another switchover process cannot be started on the same switch until a stable standby supervisor module is available.

> **Caution** If the standby supervisor module is not in a stable state (ha-standby), a switchover is not performed.

HA Switchover Characteristics

An HA switchover has the following characteristics:

- It is stateful (nondisruptive) because control traffic is not impacted.
- It does not disrupt data traffic because the switching modules are not impacted.
- Switching modules are not reset.

Initiating a Switchover

To manually initiate a switchover from an active supervisor module to a standby supervisor module, reset the active supervisor module using Device Manager. Once the switchover process has started, another switchover process cannot be started on the same switch until a stable standby supervisor module is available.

To perform a switchover using Device Manager, follow these steps:

Step 1   Ensure that an HA switchover is possible by clicking **Physical > Modules** to verify the presence of multiple modules.
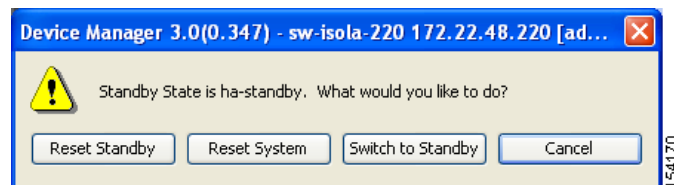
You see the screen shown in Figure 16-1.

Figure 16-1   Modules Screen Shows Current Supervisor

Step 2   Click **Admin** > **Reset Switch** on the main Device Manager screen.

Figure 16-2   Reset Switch Dialog Box

Step 3   Click **Switch to Standby**.

Switchover Guidelines

Be aware of the following guidelines when performing a switchover:

- When you manually initiate a switchover, system messages indicate the presence of two supervisor modules.

- A switchover can only be performed when two supervisor modules are functioning in the switch.

- The modules in the chassis are functioning as designed.

Process Restartability

Process restartability provides the high availability functionality in Cisco MDS 9000 Family switches. It ensures that process-level failures do not cause system-level failures. It also restarts the failed processes automatically. This vital process functions on infrastructure that is internal to the switch.

See the "Displaying System Processes" section on page 68-1.

Synchronizing Supervisor Modules

The running image is automatically synchronized in the standby supervisor module by the active supervisor module. The boot variables are synchronized during this process.

The standby supervisor module automatically synchronizes its image with the running image on the active supervisor module.

See the .

The following conditions identify when automatic synchronization is possible:

- If the internal state of one supervisor module is `Active with HA standby` and the other supervisor module is `HA-standby`, the switch is operationally HA and can do automatic synchronization.

- If the internal state of one of the supervisor modules is `none`, the switch cannot do automatic synchronization.

Table 16-1 lists the possible values for the redundancy states.

Table 16-1   Redundancy States

State	Description
Not present	The supervisor module is not present or is not plugged into the chassis.
Initializing	The diagnostics have passed and the configuration is being downloaded.
Active	The active supervisor module and the switch is ready to be configured.
Standby	A switchover is possible.
Failed	The switch detects a supervisor module failure on initialization and automatically attempts to power-cycle the module three (3) times. After the third attempt it continues to display a failed state.
Offline	The supervisor module is intentionally shut down for debugging purposes.
At BIOS	The switch has established connection with the supervisor and the supervisor module is performing diagnostics.
Unknown	The switch is in an invalid state. If it persists, call TAC.

Table 16-2 lists the possible values for the supervisor module states.

Table 16-2   Supervisor States

State	Description
Active	The active supervisor module in the switch is ready to be configured.
HA standby	A switchover is possible.
Offline	The switch is intentionally shut down for debugging purposes.
Unknown	The switch is in an invalid state and requires a support call to TAC.

Table 16-3 lists the possible values for the internal redundancy states.

Table 16-3   Internal States

State	Description
HA standby	The HA switchover mechanism in the standby supervisor module is enabled (see the "HA Switchover Characteristics" section on page 16-2).
Active with no standby	A switchover is possible.

Table 16-3 ***Internal States (continued)***

State	Description
Active with HA standby	The active supervisor module in the switch is ready to be configured. The standby module is in the HA-standby state.
Shutting down	The switch is being shut down.
HA switchover in progress	The switch is in the process of changing over to the HA switchover mechanism.
Offline	The switch is intentionally shut down for debugging purposes.
HA synchronization in progress	The standby supervisor module is in the process of synchronizing its state with the active supervisor modules.
Standby (failed)	The standby supervisor module is not functioning.
Active with failed standby	The active supervisor module and the second supervisor module is present but is not functioning.
Other	The switch is in a transient state. If it persists, call TAC.