FHRP—SSO Aware HSRP

The FHRP—SSO Aware HSRP feature alters the behavior of Hot Standby Router Protocol (HSRP) when a router with redundant Route Processors (RPs) is configured for Stateful Switchover (SSO) redundancy mode. One RP is active, and the other RP is standby. SSO enables the standby RP to take over if the active RP fails.

With this feature, HSRP SSO information is synchronized to the standby RP, allowing traffic that is sent using the HSRP virtual IP address to be continuously forwarded during a switchover without a loss of data or a path change. Additionally, if both RPs fail on the active HSRP router, then the standby HSRP router takes over as the active HSRP router.

The feature is enabled by default when the redundancy mode is SSO.

History for FHRP—SSO Aware HSRP Feature

Release	Modification
12.2(25)S	This feature was introduced.
12.2(27)SBC	This feature was integrated into Cisco IOS Release 12.2(27)SBC.

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.

Contents

CISCO SYSTEMS

Information About FHRP—SSO Aware HSRP

You should understand the following concepts that relate to the FHRP—SSO Aware HSRP feature:

- HSRP Standby Groups, page 2
- SSO Dual-Route Processors and Cisco Nonstop Forwarding, page 3
- HSRP and SSO Working Together, page 3

HSRP Standby Groups

HSRP is typically used for end-hosts that are directly connected to HSRP routers and provides failover services. A group of routers configured with HSRP is commonly called an HSRP standby group as shown in Figure 1 (inside the dotted area), and the group works together to present a single virtual router.

Figure 1   **Typical HSRP Configuration**
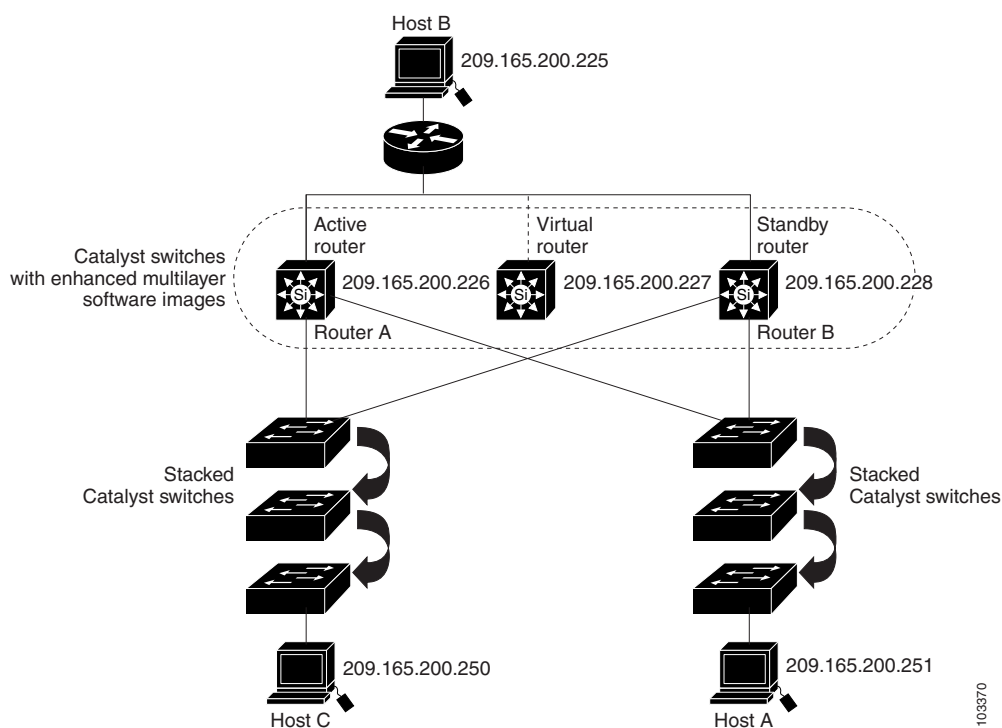
The group elects one router to function as an active router that handles traffic sent to the virtual router, and one router to function as a standby router that takes over forwarding packets on behalf of the virtual router if the active router fails. The hosts forward packets to the virtual router IP/MAC address, and the active router processes the packets.

If the standby router fails and there is another router in the standby group that is not the current active router, then that router becomes the standby router.

Within the HSRP group, the routers periodically advertise state information using messages.

SSO Dual-Route Processors and Cisco Nonstop Forwarding

SSO functions in networking devices (usually edge devices) that support dual RPs. SSO provides RP redundancy by establishing one of the RPs as the active processor and the other RP as the standby processor. SSO also synchronizes critical state information between the RPs so that network state information is dynamically maintained between RPs.

SSO is generally used with Cisco Nonstop Forwarding (NSF). Cisco NSF enables forwarding of data packets to continue along known routes while the routing protocol information is being restored following a switchover. With NSF, users are less likely to experience service outages.

HSRP and SSO Working Together

The FHRP—SSO Aware HSRP feature enables the Cisco IOS HSRP subsystem software to detect that a standby RP is installed and the system is configured in SSO redundancy mode. Further, if the active RP fails, no change occurs to the HSRP group itself and traffic continues to be forwarded through the current active gateway router.

Prior to this feature, when the active HSRP router primary RP failed, it would stop participating in the HSRP group and trigger another router in the group to take over as the active HSRP router.

The SSO-Aware HSRP feature is required to preserve the forwarding path for traffic destined to the HSRP virtual IP through a RP switchover.

Configuring SSO on the edge router enables the traffic on the Ethernet links to continue during an RP failover without the Ethernet traffic switching over to an HSRP standby router (and then back, if preemption is enabled).

How to Enable FHRP—SSO Aware HSRP

This section contains the following tasks:

Enabling FHRP—SSO Aware HSRP

The feature is enabled by default when the redundancy mode is set to SSO. Perform this task to enable or disable the FHRP—SSO Aware HSRP feature.

Note You may want to disable this feature if you have LAN segments that should switch HSRP traffic to a redundant device while SSO maintains traffic flow for other connections.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **redundancy**

4. **mode sso**

5. **exit**

6. **no standby sso**

7. **standby sso**

8. **exit**

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	`redundancy`
	
	Example:
	`Router(config)# redundancy`
		Enters redundancy configuration mode.

Step 4	`mode sso`
	
	Example:
	`Router(config-red)# mode sso`
		Enables HSRP SSO mode for all HSRP groups and sets the redundancy configuration mode to SSO on both the active and standby RPs.
		
		Note After performing this step, the FHRP—SSO Aware HSRP feature is enabled on interfaces that are configured for HSRP, and the standby RP is automatically reset.

Step 5	`exit`
	
	Example:
	`Router(config-red)# exit`
		Exits redundancy configuration mode.

Step 6	`no standby sso`
	
	Example:
	`Router(config)# no standby sso`
		Disables HSRP SSO mode for all HSRP groups and when you have LAN segments that should switch HSRP traffic to a redundant device while SSO is maintaining traffic flow for other connections.

Step 7	`standby sso`
	
	Example:
	`Router(config)# standby sso`
		Enables the FHRP—SSO Aware HSRP feature if you have disabled the functionality.

Step 8	`exit`
	
	Example:
	`Router(config)# exit`
		Exits global configuration mode.

Verifying FHRP—SSO Aware HSRP

To verify or debug HSRP SSO operation, perform the following steps.

SUMMARY STEPS

1. **show standby**
2. **debug standby events ha**

DETAILED STEPS

Step 1   **show standby**

Use the **show standby** command to display the state of the standby RP, for example:

```
Router# show standby

Ethernet0/0/1 - Group 1
 State is Init (standby RP, peer state is Active)
 Virtual IP address is 10.1.0.7
 Active virtual MAC address is unknown
  Local virtual MAC address is 000a.f3fd.5001 (bia)
 Hello time 1 sec, hold time 3 sec
 Authentication text "authword"
 Preemption enabled
 Active router is unknown
 Standby router is unknown
 Priority 110 (configured 120)
  Track object 1 state Down decrement 10
 IP redundancy name is "name1" (cfgd)
```

Step 2   **debug standby events ha**

Use the **debug standby events ha** command to display the active and standby RPs, for example:

```
Router# debug standby events ha

!Active RP

*Apr 27 04:13:47.755: HSRP: Et0/0/1 Grp 101 RF Encode state Listen into sync buffer
*Apr 27 04:13:47.855: HSRP: CF Sync send ok
*Apr 27 04:13:57.755: HSRP: Et0/0/1 Grp 101 RF Encode state Speak into sync buffer
*Apr 27 04:13:57.855: HSRP: CF Sync send ok
*Apr 27 04:14:07.755: HSRP: Et0/0/1 Grp 101 RF Encode state Standby into sync buffer
*Apr 27 04:14:07.755: HSRP: Et0/0/1 Grp 101 RF Encode state Active into sync buffer
*Apr 27 04:14:07.863: HSRP: CF Sync send ok
*Apr 27 04:14:07.867: HSRP: CF Sync send ok

!Standby RP

*Apr 27 04:11:21.011: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:21.011: HSRP: Et0/0/1 Grp 101 RF sync state Init -> Listen
*Apr 27 04:11:31.011: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:31.011: HSRP: Et0/0/1 Grp 101 RF sync state Listen -> Speak
*Apr 27 04:11:41.071: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:41.071: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:41.071: HSRP: Et0/0/1 Grp 101 RF sync state Speak -> Standby
*Apr 27 04:11:41.071: HSRP: Et0/0/1 Grp 101 RF sync state Standby -> Active
```

Configuration Examples for FHRP—SSO Aware HSRP

This section provides the following configuration examples:

Enabling Standby SSO Configuration: Example

The following example shows how to enable HSRP and standby SSO:

```
standby ip 10.10.10.0
standby timers 3 10
standby priority 5
standby preempt
standby track 6
standby authentication abcdefgh
standby sso
```

Redundancy Configuration for SSO: Example

The following example shows how to configure redundancy mode for SSO:

```
redundancy
 mode sso
```

Additional References

The following sections provide references related to the FHRP—SSO Aware HSRP feature.

Related Documents

Related Topic	Document Title
RPR+ and RP redundancy overview	*Route Processor Redundancy Plus for the Cisco 12000 Series Internet Routers*, Release 12.0(17)ST
Cisco NSF overview and configuration	*Cisco Nonstop Forwarding*, Release 12.0(23)S
	"Nonstop Forwarding Enhanced FIB Refresh" section in the Configuring Epochs to Clear and Rebuild Cisco Express Forwarding and Adjacency Tables module
SSO overview and configuration	*SNMP for Stateful Switchover*, Release 12.0(22)S
	Stateful Switchover, Release 12.0(22)S
HSRP overview and commands	*Configuring HSRP*
	Cisco IOS IP Application Services Command Reference

Standards

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

MIBs

MIBs	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

RFCs	Title
RFC 2281	*Hot Standby Router Protocol*

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of 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/techsupport

Command Reference

This section documents modified commands only.

- **debug standby events**
- **standby sso**

debug standby events

To display events related to Hot Standby Router Protocol (HSRP), use the **debug standby events** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug standby events [[**all**] | [**api** | **ha** | **hsrp** | **redundancy** | **track**]] [**detail**]

no debug standby events

Syntax Description

all	(Optional) All HSRP events.
api	(Optional) HSRP application programming interface (API) events.
ha	(Optional) High availability (HA) events.
hsrp	(Optional) HSRP protocol events.
redundancy	(Optional) HSRP redundancy events.
track	(Optional) HSRP tracking events.
detail	(Optional) Detailed debugging information.

Command Modes   Privileged EXEC

Command History

Release	Modification
12.1	This command was introduced.
12.2(25)S	The **ha** keyword was added.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines   You can filter the debug output using interface and HSRP group conditional debugging. To enable interface conditional debugging, use the **debug condition interface** command. To enable HSRP conditional debugging, use the **debug condition standby** command.

Examples   The following example shows how to enable the debugging of the active and standby Route Processors (RPs) on an active RP console. The HSRP group is configured on the active RP, and the HSRP state is active.

```
Router# debug standby events ha

!Active RP

*Apr 27 04:13:47.755: HSRP: Et0/0/1 Grp 101 RF Encode state Listen into sync buffer
*Apr 27 04:13:47.855: HSRP: CF Sync send ok
*Apr 27 04:13:57.755: HSRP: Et0/0/1 Grp 101 RF Encode state Speak into sync buffer
*Apr 27 04:13:57.855: HSRP: CF Sync send ok
*Apr 27 04:14:07.755: HSRP: Et0/0/1 Grp 101 RF Encode state Standby into sync buffer
*Apr 27 04:14:07.755: HSRP: Et0/0/1 Grp 101 RF Encode state Active into sync buffer
*Apr 27 04:14:07.863: HSRP: CF Sync send ok
*Apr 27 04:14:07.867: HSRP: CF Sync send ok
```

```
!Standby RP

*Apr 27 04:11:21.011: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:21.011: HSRP: Et0/0/1 Grp 101 RF sync state Init -> Listen
*Apr 27 04:11:31.011: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:31.011: HSRP: Et0/0/1 Grp 101 RF sync state Listen -> Speak
*Apr 27 04:11:41.071: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:41.071: HSRP: RF CF client 32, entity 0 got msg len 24
*Apr 27 04:11:41.071: HSRP: Et0/0/1 Grp 101 RF sync state Speak -> Standby
*Apr 27 04:11:41.071: HSRP: Et0/0/1 Grp 101 RF sync state Standby -> Active
```

Table 1 describes the significant fields shown in the display.

Table 1   debug standby events Field Descriptions

Field	Description
RF	Redundancy facility–Internal mechanism that makes Stateful Switchover (SSO) work.
CF	Checkpoint facility—Internal mechanism that makes SSO work.

Related Commands

Command	Description
debug condition interface	Enables interface conditional debugging.
debug condition standby	Enable HSRP conditional debugging.
debug standby errors	Displays HSRP errors.
debug standby events icmp	Displays HSRP packets

standby sso

To enable the Hot Standby Router Protocol (HSRP) Stateful Switchover (SSO), use the **standby sso** command in global configuration mode. To disable HSRP SSO, use the **no** form of this command.

standby sso

no standby sso

Syntax Description	This command has no arguments or keywords.
Defaults	This command is enabled.
Command Modes	Global configuration

Command History

Release	Modification
12.2(25)S	This command was introduced.
12.2(27)SBC	This command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

Use the **standby sso** command to enable HSRP SSO. This is the default when redundancy mode SSO is configured. When standby SSO is enabled, traffic sent using an HSRP virtual IP address continues through the HSRP group member using the current path while a Route Processor (RP) switchover occurs. The HSRP state is maintained and kept synchronized across the redundant RPs within the chassis.

If you want the traffic to switch to a redundant device (another chassis) even though the redundant RP is capable of taking over, then the feature can be disabled by using the **no** form of the command. If the command is disabled and if the primary HSRP router fails, the HSRP state is not maintained across RP switchover and traffic targeted to the HSRP virtual IP address is handled by the standby HSRP router.

Examples

The following example shows how to reenable standby SSO for HSRP if it has been disabled:

```
standby sso
```

Related Commands

Command	Description
debug standby events	Displays standby events related to HSRP.
show standby	Displays HSRP information.

Glossary

active HSRP router—The primary router in an HSRP group.

active RP—The RP that controls the system, provides network services, runs the routing protocols, and presents the system management interface.

HSRP—Hot Standby Router Protocol. Protocol that provides high network availability and transparent network-topology changes. HSRP creates a router group with a lead router that services all packets sent to the HSRP address. The lead router is monitored by other routers in the group, and if it fails, one of these standby HSRP routers inherits the lead position and the HSRP group address.

NSF—Nonstop Forwarding. The ability of a router to continue to forward traffic to a router that may be recovering from a failure. Also, the ability of a router recovering from a failure to continue to correctly forward traffic sent to it by a peer.

RF—Redundancy Facility. A structured, functional interface used to notify its clients of active and standby state progressions and events.

RP—Route Processor. A generic term for the centralized control unit in a chassis. Platforms usually use a platform-specific term, such as RSP on the Cisco 7500, the PRE on the Cisco 10000, or the SUP+MSFC on the Cisco 7600.

RPR+—An enhanced Route Processor Redundancy (RPR) in which the standby RP is fully initialized.

SSO—Stateful Switchover. SSO refers to the implementation of Cisco IOS software that allows applications and features to maintain a defined state between an active and standby RP. When a switchover occurs, forwarding and sessions are maintained. Along with NSF, SSO makes an RP failure undetectable to the network.

standby HSRP router—The backup router in an HSRP group.

standby RP—The backup RP.

switchover—An event in which system control and routing protocol execution are transferred from the active RP to the standby RP. Switchover may be a manual operation or may be induced by a hardware or software fault. Switchover may include transfer of the packet forwarding function in systems that combine system control and packet forwarding in an indivisible unit.

Note Refer to *Internetworking Terms and Acronyms* for terms not included in this glossary.