CHAPTER 46

Configuring HSRP and VRRP

This chapter describes how to use Hot Standby Router Protocol (HSRP) on the Catalyst 3750-X or 3560-X switch to provide routing redundancy for routing IP traffic without being dependent on the availability of any single router.Unless otherwise noted, the term *switch* refers to a Catalyst 3750-X or 3560-X standalone switch and to a Catalyst 3750-X switch stack.

You can also use a version of HSRP in Layer 2 mode to configure a redundant command switch to take over cluster management if the cluster command switch fails. For more information about clustering, see Chapter 6, "Clustering Switches" and see the *Getting Started with Cisco Network Assistant*, available on Cisco.com. If the switch is running the LAN base feature set, only Layer 2 mode is supported.

Cisco IOS Release 12.2(58)SE adds support for the Virtual Router Redundancy Protocol (VRRP) for IPv4 and IPv6 on switches running the IP base image.

For complete syntax and usage information for the commands used in this chapter, see these documents:

- Switch command reference for this release
- *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services, Release 12.4*: http://www.cisco.com/en/US/docs/ios/12_2/ipaddr/command/reference/fipras_r.html
- *Hot Standby Router Protocol Version 2* feature module: http://www.cisco.com/en/US/docs/ios/12_3t/12_3t4/feature/guide/gthsrpv2.html

This chapter consists of these sections:

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- Configuring HSRP, page 46-5
- Displaying HSRP Configurations, page 46-13
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Understanding HSRP

HSRP is Cisco's standard method of providing high network availability by providing first-hop redundancy for IP hosts on an IEEE 802 LAN configured with a default gateway IP address. HSRP routes IP traffic without relying on the availability of any single router. It enables a set of router interfaces to work together to present the appearance of a single virtual router or default gateway to the hosts on a LAN. When HSRP is configured on a network or segment, it provides a virtual Media Access Control (MAC) address and an IP address that is shared among a group of configured routers. HSRP allows two or more HSRP-configured routers to use the MAC address and IP network address of a virtual router. The virtual router does not exist; it represents the common target for routers that are configured to

provide backup to each other. One of the routers is selected to be the active router and another to be the standby router, which assumes control of the group MAC address and IP address should the designated active router fail.

Note Routers in an HSRP group can be any router interface that supports HSRP, including Catalyst 3750-X or 3560-X routed ports and switch virtual interfaces (SVIs). Switches running the LAN base feature set support only static routing on SVIs.

HSRP provides high network availability by providing redundancy for IP traffic from hosts on networks. In a group of router interfaces, the active router is the router of choice for routing packets; the standby router is the router that takes over the routing duties when an active router fails or when preset conditions are met.

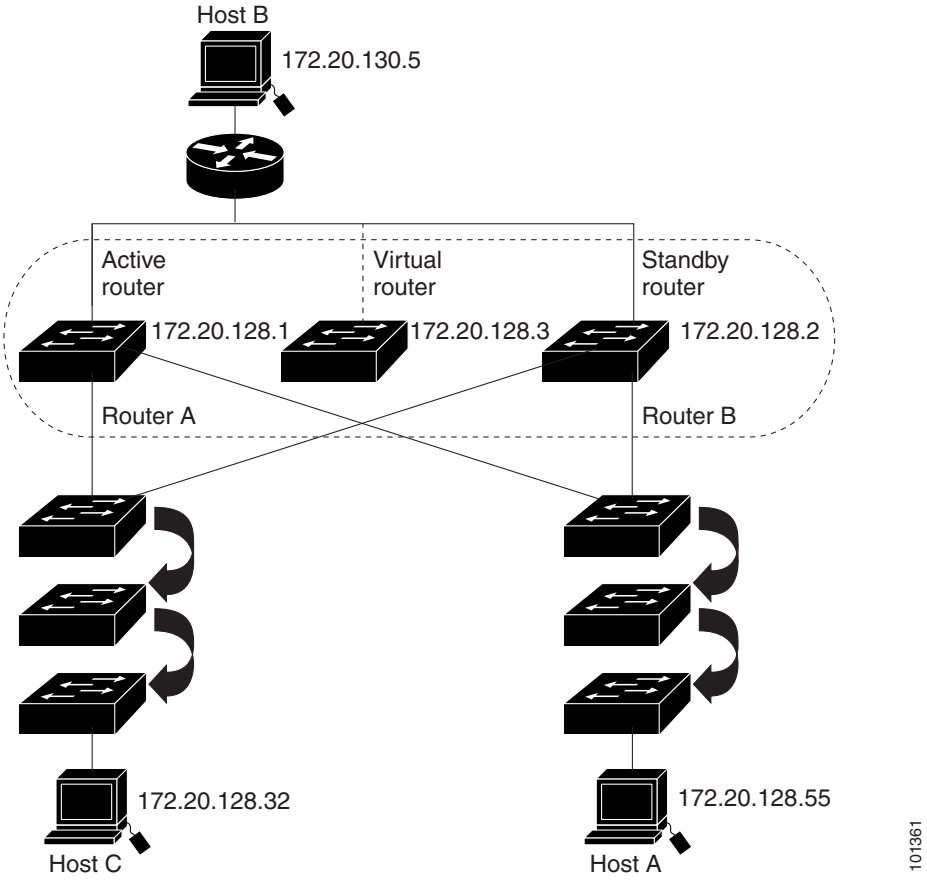
HSRP is useful for hosts that do not support a router discovery protocol and cannot switch to a new router when their selected router reloads or loses power. When HSRP is configured on a network segment, it provides a virtual MAC address and an IP address that is shared among router interfaces in a group of router interfaces running HSRP. The router selected by the protocol to be the active router receives and routes packets destined for the group's MAC address. For *n* routers running HSRP, there are *n +1* IP and MAC addresses assigned.

HSRP detects when the designated active router fails, and a selected standby router assumes control of the Hot Standby group's MAC and IP addresses. A new standby router is also selected at that time. Devices running HSRP send and receive multicast UDP-based hello packets to detect router failure and to designate active and standby routers. When HSRP is configured on an interface, Internet Control Message Protocol (ICMP) redirect messages are automatically enabled for the interface.

You can configure multiple Hot Standby groups among switches and switch stacks that are operating in Layer 3 to make more use of the redundant routers. To do so, specify a group number for each Hot Standby command group you configure for an interface. For example, you might configure an interface on switch 1 as an active router and one on switch 2 as a standby router and also configure another interface on switch 2 as an active router with another interface on switch 1 as its standby router.

Figure 46-1 shows a segment of a network configured for HSRP. Each router is configured with the MAC address and IP network address of the virtual router. Instead of configuring hosts on the network with the IP address of Router A, you configure them with the IP address of the virtual router as their default router. When Host C sends packets to Host B, it sends them to the MAC address of the virtual router. If for any reason, Router A stops transferring packets, Router B responds to the virtual IP address and virtual MAC address and becomes the active router, assuming the active router duties. Host C continues to use the IP address of the virtual router to address packets destined for Host B, which Router B now receives and sends to Host B. Until Router A resumes operation, HSRP allows Router B to provide uninterrupted service to users on Host C's segment that need to communicate with users on Host B's segment and also continues to perform its normal function of handling packets between the Host A segment and Host B.

Figure 46-1 Typical HSRP Configuration



HSRP Versions

The switch supports these HSRP versions:

- HSRPv1—Version 1 of the HSRP, the default version of HSRP. It has these features:
  - The HSRP group number can be from 0 to 255.
  - HSRPv1 uses the multicast address 224.0.0.2 to send hello packets, which can conflict with Cisco Group Management Protocol (CGMP) leave processing. You cannot enable HSRPv1 and CGMP at the same time; they are mutually exclusive.
- HSRPv2—Version 2 of the HSRP has these features:
  - To match the HSRP group number to the VLAN ID of a subinterface, HSRPv2 can use a group number from 0 to 4095 and a MAC address from 0000.0C9F.F000 to 0000.0C9F.FFFF.
  - HSRPv2 uses the multicast address 224.0.0.102 to send hello packets. HSRPv2 and CGMP leave processing are no longer mutually exclusive, and both can be enabled at the same time.
  - HSRPv2 has a different packet format than HRSPv1.

    A switch running HSRPv1 cannot identify the physical router that sent a hello packet because the source MAC address of the router is the virtual MAC address.

HSRPv2 has a different packet format than HSRPv1. A HSRPv2 packet uses the type-length-value (TLV) format and has a 6-byte identifier field with the MAC address of the physical router that sent the packet.

If an interface running HSRPv1 gets an HSRPv2 packet, the type field is ignored.

Multiple HSRP

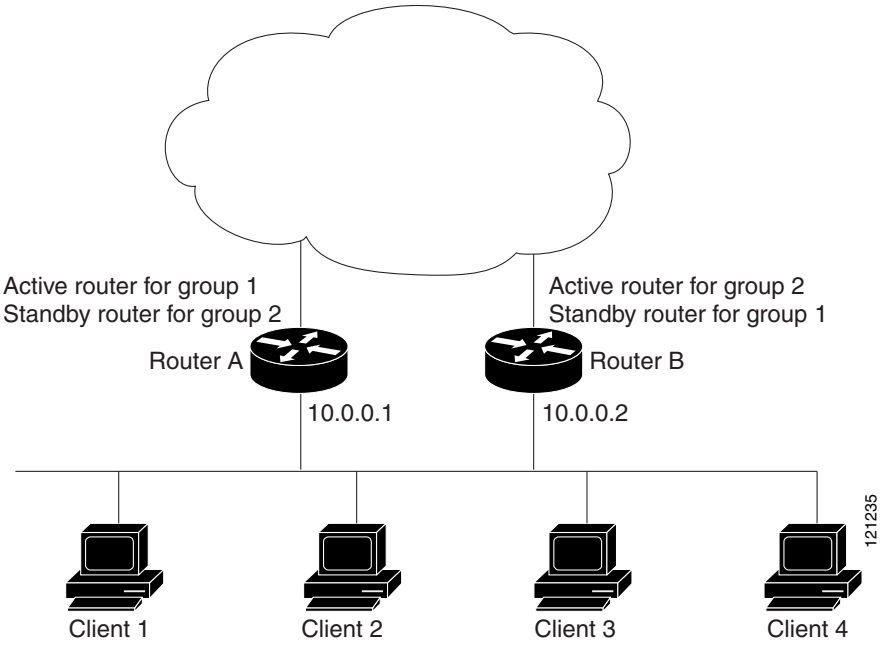
The switch supports Multiple HSRP (MHSRP), an extension of HSRP that allows load sharing between two or more HSRP groups. You can configure MHSRP to achieve load-balancing and to use two or more standby groups (and paths) from a host network to a server network.

In Figure 46-2, half the clients are configured for Router A, and half the clients are configured for Router B. Together, the configuration for Routers A and B establishes two HSRP groups. For group 1, Router A is the default active router because it has the assigned highest priority, and Router B is the standby router. For group 2, Router B is the default active router because it has the assigned highest priority, and Router A is the standby router. During normal operation, the two routers share the IP traffic load. When either router becomes unavailable, the other router becomes active and assumes the packet-transfer functions of the router that is unavailable.

See the "Configuring MHSRP" section on page 46-10 for the example configuration steps.

Note For MHSRP, you need to enter the **standby preempt** interface configuration command on the HSRP interfaces so that if a router fails and then comes back up, preemption restores load sharing.

Figure 46-2 MHSRP Load Sharing



HSRP and Switch Stacks

HSRP hello messages are generated by the stack master. If an HSRP-active stack master fails, a flap in the HSRP active state might occur. This is because HSRP hello messages are not generated while a new stack master is elected and initialized, and the standby router might become active after the stack master fails.

Configuring HSRP

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- HSRP Configuration Guidelines, page 46-6
- Enabling HSRP, page 46-6
- Configuring HSRP Priority, page 46-8
- Configuring MHSRP, page 46-10
- Configuring HSRP Authentication and Timers, page 46-10
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Default HSRP Configuration

Table 46-1 Default HSRP Configuration

Feature	Default Setting
HSRP version	Version 1
HSRP groups	None configured
Standby group number	0
Standby MAC address	System assigned as: 0000.0c07.acXX, where *XX* is the HSRP group number
Standby priority	100
Standby delay	0 (no delay)
Standby track interface priority	10
Standby hello time	3 seconds
Standby holdtime	10 seconds

HSRP Configuration Guidelines

- HSRPv2 and HSRPv1 are mutually exclusive. HSRPv2 is not interoperable with HSRPv1 on an interface and the reverse.
- In the procedures, the specified interface must be one of these Layer 3 interfaces:
  - Routed port: a physical port configured as a Layer 3 port by entering the **no switchport** interface configuration command.
  - SVI: a VLAN interface created by using the **interface vlan** *vlan_id* global configuration command and by default a Layer 3 interface.
  - Etherchannel port channel in Layer 3 mode: a port-channel logical interface created by using the **interface port-channel** *port-channel-number* global configuration command and binding the Ethernet interface into the channel group. For more information, see the "Configuring Layer 3 EtherChannels" section on page 42-15.
- All Layer 3 interfaces must have IP addresses assigned to them. See the "Configuring Layer 3 Interfaces" section on page 15-42.
- The version of an HSRP group can be changed from HSRPv2 to HSRPv1 only if the group number is less than 256.
- If you change the HSRP version on an interface, each HSRP group resets because it now has a new virtual MAC address.
- Only on mixed stacks of Catalyst 3750-X or Catalyst 3750-E and 3750 switches:
  - HSRP for IPv4 and HSRP for IPv6 are mutually exclusive. You cannot enable both at the same time.
  - HSRP groups can be configured up to 32 instances.
  - Configure only one instance of a First Hop Redundancy Protocol (FHRP). The switches support HSRPv1, HSRPv2, and HSRP for IPv6.
  - When configuring group numbers for HSRPv2 and HSRP, you must use group numbers in ranges that are multiples of 256. Valid ranges are 0 to 255, 256 to 511, 512 to 767, 3840 to 4095, and so on.

    Examples of valid and invalid group numbers:

    If you configure groups with the numbers 2, 150, and 225, you cannot configure another group with the number 3850. It is not in the range of 0 to 255.

    If you configure groups with the numbers 520, 600, and 700, you cannot configure another group with the number 900. It is not in the range of 512 to 767.

Enabling HSRP

The **standby ip** interface configuration command activates HSRP on the configured interface. If an IP address is specified, that address is used as the designated address for the Hot Standby group. If no IP address is specified, the address is learned through the standby function. You must configure at least one Layer 3 port on the LAN with the designated address. Configuring an IP address always overrides another designated address currently in use.

When the **standby ip** command is enabled on an interface and proxy ARP is enabled, if the interface's Hot Standby state is active, proxy ARP requests are answered using the Hot Standby group MAC address. If the interface is in a different state, proxy ARP responses are suppressed.

Beginning in privileged EXEC mode, follow these steps to create or enable HSRP on a Layer 3 interface:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface** *interface-id*	Enter interface configuration mode, and enter the Layer 3 interface on which you want to enable HSRP.
Step 3	**standby version** {**1** | **2**}	(Optional) Configure the HSRP version on the interface. • 1— Select HSRPv1. • 2— Select HSRPv2. If you do not enter this command or do not specify a keyword, the interface runs the default HSRP version, HSRP v1.
Step 4	**standby** [*group-number*] **ip** [*ip-address* [**secondary**]]	Create (or enable) the HSRP group using its number and virtual IP address. • (Optional) *group-number*—The group number on the interface for which HSRP is being enabled. The range is 0 to 255; the default is 0. If there is only one HSRP group, you do not need to enter a group number. • (Optional on all but one interface) *ip-address*—The virtual IP address of the hot standby router interface. You must enter the virtual IP address for at least one of the interfaces; it can be learned on the other interfaces. • (Optional) **secondary**—The IP address is a secondary hot standby router interface. If neither router is designated as a secondary or standby router and no priorities are set, the primary IP addresses are compared and the higher IP address is the active router, with the next highest as the standby router.
Step 5	**end**	Return to privileged EXEC mode.
Step 6	**show standby** [*interface-id* [*group*]]	Verify the configuration.
Step 7	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no standby** [*group-number*] **ip** [*ip-address*] interface configuration command to disable HSRP.

This example shows how to activate HSRP for group 1 on an interface. The IP address used by the hot standby group is learned by using HSRP.

Note This procedure is the minimum number of steps required to enable HSRP. Other configuration is optional.

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# standby 1 ip
Switch(config-if)# end
Switch# show standby
```

Configuring HSRP Priority

The **standby priority**, **standby preempt**, and **standby track** interface configuration commands are all used to set characteristics for finding active and standby routers and behavior regarding when a new active router takes over.

When configuring HSRP priority, follow these guidelines:

- Assigning a priority allows you to select the active and standby routers. If preemption is enabled, the router with the highest priority becomes the active router. If priorities are equal, the current active router does not change.
- The highest number (1 to 255) represents the highest priority (most likely to become the active router).
- When setting the priority, preempt, or both, you must specify at least one keyword (**priority**, **preempt**, or both).
- The priority of the device can change dynamically if an interface is configured with the **standby track** command and another interface on the router goes down.
- The **standby track** interface configuration command ties the router hot standby priority to the availability of its interfaces and is useful for tracking interfaces that are not configured for HSRP. When a tracked interface fails, the hot standby priority on the device on which tracking has been configured decreases by 10. If an interface is not tracked, its state changes do not affect the hot standby priority of the configured device. For each interface configured for hot standby, you can configure a separate list of interfaces to be tracked.
- The **standby track** *interface-priority* interface configuration command specifies how much to decrement the hot standby priority when a tracked interface goes down. When the interface comes back up, the priority is incremented by the same amount.
- When multiple tracked interfaces are down and *interface-priority* values have been configured, the configured priority decrements are cumulative. If tracked interfaces that were not configured with priority values fail, the default decrement is 10, and it is noncumulative.
- When routing is first enabled for the interface, it does not have a complete routing table. If it is configured to preempt, it becomes the active router, even though it is unable to provide adequate routing services. To solve this problem, configure a delay time to allow the router to update its routing table.

Beginning in privileged EXEC mode, use one or more of these steps to configure HSRP priority characteristics on an interface:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface** *interface-id*	Enter interface configuration mode, and enter the HSRP interface on which you want to set priority.
Step 3	**standby** [*group-number*] **priority** *priority*	Set a **priority** value used in choosing the active router. The range is 1 to 255; the default priority is 100. The highest number represents the highest priority. • (Optional) *group-number*—The group number to which the command applies. Use the **no** form of the command to restore the default values.

	Command	Purpose
Step 4	**standby** [*group-number*] **preempt** [**delay** [**minimum** *seconds*] [**reload** *seconds*] [**sync** *seconds*]]	Configure the router to **preempt**, which means that when the local router has a higher priority than the active router, it becomes the active router. • (Optional) *group-number*—The group number to which the command applies. • (Optional) **delay minimum**—Set to cause the local router to postpone taking over the active role for the number of seconds shown. The range is 0 to 36000 seconds (1 hour); the default is 0 (no delay before taking over). • (Optional) **delay reload**—Set to cause the local router to postpone taking over the active role after a reload for the number of seconds shown. The range is 0 to 36000 seconds (1 hour); the default is 0 (no delay before taking over after a reload). • (Optional) **delay sync**—Set to cause the local router to postpone taking over the active role so that IP redundancy clients can reply (either with an *ok* or *wait* reply) for the number of seconds shown. The range is 0 to 36000 seconds (1 hour); the default is 0 (no delay before taking over). Use the **no** form of the command to restore the default values.
Step 5	**standby** [*group-number*] **track** *type number* [*interface-priority*]	Configure an interface to track other interfaces so that if one of the other interfaces goes down, the device's Hot Standby priority is lowered. • (Optional) *group-number*—The group number to which the command applies. • *type*—Enter the interface type (combined with interface number) that is tracked. • *number*—Enter the interface number (combined with interface type) that is tracked. • (Optional) *interface-priority*—Enter the amount by which the hot standby priority for the router is decremented or incremented when the interface goes down or comes back up. The default value is 10.
Step 6	**end**	Return to privileged EXEC mode.
Step 7	**show running-config**	Verify the configuration of the standby groups.
Step 8	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no standby** [*group-number*] **priority** *priority* [**preempt** [**delay** *delay*]] and **no standby** [*group-number*] [**priority** *priority*] **preempt** [**delay** *delay*] interface configuration commands to restore default priority, preempt, and delay values.

Use the **no standby** [*group-number*] **track** *type number* [*interface-priority*] interface configuration command to remove the tracking.

This example activates a port, sets an IP address and a priority of 120 (higher than the default value), and waits for 300 seconds (5 minutes) before attempting to become the active router:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# standby ip 172.20.128.3
Switch(config-if)# standby priority 120 preempt delay 300
Switch(config-if)# end
```

Configuring MHSRP

To enable MHSRP and load-balancing, you configure two routers as active routers for their groups, with virtual routers as standby routers. This example shows how to enable the MHSRP configuration shown in Figure 46-2. You need to enter the **standby preempt** interface configuration command on each HSRP interface so that if a router fails and comes back up, the preemption occurs and restores load-balancing.

Router A is configured as the active router for group 1, and Router B is configured as the active router for group 2. The HSRP interface for Router A has an IP address of 10.0.0.1 with a group 1 standby priority of 110 (the default is 100). The HSRP interface for Router B has an IP address of 10.0.0.2 with a group 2 standby priority of 110.

Group 1 uses a virtual IP address of 10.0.0.3 and group 2 uses a virtual IP address of 10.0.0.4.

Router A Configuration

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# ip address 10.0.0.1 255.255.255.0
Switch(config-if)# standby 1 ip 10.0.0.3
Switch(config-if)# standby 1 priority 110
Switch(config-if)# standby 1 preempt
Switch(config-if)# standby 2 ip 10.0.0.4
Switch(config-if)# standby 2 preempt
Switch(config-if)# end
```

Router B Configuration

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# ip address 10.0.0.2 255.255.255.0
Switch(config-if)# standby 1 ip 10.0.0.3
Switch(config-if)# standby 1 preempt
Switch(config-if)# standby 2 ip 10.0.0.4
Switch(config-if)# standby 2 priority 110
Switch(config-if)# standby 2 preempt
Switch(config-if)# end
```

Configuring HSRP Authentication and Timers

You can optionally configure an HSRP authentication string or change the hello-time interval and holdtime.

When configuring these attributes, follow these guidelines:

- The authentication string is sent unencrypted in all HSRP messages. You must configure the same authentication string on all routers and access servers on a cable to ensure interoperation. Authentication mismatch prevents a device from learning the designated Hot Standby IP address and timer values from other routers configured with HSRP.
- Routers or access servers on which standby timer values are not configured can learn timer values from the active or standby router. The timers configured on an active router always override any other timer settings.
- All routers in a Hot Standby group should use the same timer values. Normally, the *holdtime* is greater than or equal to 3 times the *hellotime*.

Beginning in privileged EXEC mode, use one or more of these steps to configure HSRP authentication and timers on an interface:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface** *interface-id*	Enter interface configuration mode, and enter the HSRP interface on which you want to set authentication.
Step 3	**standby** [*group-number*] **authentication** *string*	(Optional) **authentication** *string*—Enter a string to be carried in all HSRP messages. The authentication string can be up to eight characters in length; the default string is **cisco.** (Optional) *group-number*—The group number to which the command applies.
Step 4	**standby** [*group-number*] **timers** *hellotime holdtime*	(Optional) Configure the time between hello packets and the time before other routers declare the active router to be down. • *group-number*—The group number to which the command applies. • *hellotime*—The hello interval in seconds. The range is from 1 to 255; the default is 3 seconds. • *holdtime*—The time in seconds before the active or standby router is declared to be down. The range is from 1 to 255; the default is 10 seconds.
Step 5	**end**	Return to privileged EXEC mode.
Step 6	**show running-config**	Verify the configuration of the standby groups.
Step 7	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no standby** [*group-number*] **authentication** *string* interface configuration command to delete an authentication string. Use the **no standby** [*group-number*] **timers** *hellotime holdtime* interface configuration command to restore timers to their default values.

This example shows how to configure *word* as the authentication string required to allow Hot Standby routers in group 1 to interoperate:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# standby 1 authentication word
Switch(config-if)# end
```

This example shows how to set the timers on standby group 1 with the time between hello packets at 5 seconds and the time after which a router is considered down to be 15 seconds:

```
Switch# configure terminal
Switch(config)# interface gigabitethernet1/0/1
Switch(config-if)# no switchport
Switch(config-if)# standby 1 ip
Switch(config-if)# standby 1 timers 5 15
Switch(config-if)# end
```

Enabling HSRP Support for ICMP Redirect Messages

ICMP redirect messages are automatically enabled on interfaces configured with HSRP. ICMP is a network layer Internet protocol that provides message packets to report errors and other information relevant to IP processing. ICMP provides diagnostic functions, such as sending and directing error packets to the host. This feature filters outgoing ICMP redirect messages through HSRP, in which the next hop IP address might be changed to an HSRP virtual IP address. For more information, see the *Cisco IOS IP Configuration Guide, Release 12.4*.

Configuring HSRP Groups and Clustering

When a device is participating in an HSRP standby routing and clustering is enabled, you can use the same standby group for command switch redundancy and HSRP redundancy. Use the **cluster standby-group** *HSRP-group-name* [**routing-redundancy**] global configuration command to enable the same HSRP standby group to be used for command switch and routing redundancy. If you create a cluster with the same HSRP standby group name without entering the **routing-redundancy** keyword, HSRP standby routing is disabled for the group.

This example shows how to bind standby group my_hsrp to the cluster and enable the same HSRP group to be used for command switch redundancy and router redundancy. The command can only be executed on the cluster command switch. If the standby group name or number does not exist, or if the switch is a cluster member switch, an error message appears.

```
Switch# configure terminal
Switch(config)# cluster standby-group my_hsrp routing-redundancy
Switch(config)# end
```

Troubleshooting HSRP for Mixed Stacks of Catalyst 3750-X, 3750-E and 3750 Switches

If one of the situations in Table 46-2 occurs, this message appears:

```
%FHRP group not consistent with already configured groups on the switch stack - virtual
MAC reservation failed
```

Table 46-2 Troubleshooting HSRP

Situation	Action
You configure more than 32 HSRP group instances.	Remove HSRP groups so that up to 32 group instances are configured.
You configure HSRP for IPv4 and HSRP for IPv6 at the same time	Configure either HSRP for IPv4 or HSRP for IPv6 on the switch.
You configure group numbers that are not in valid ranges of 256.	Configure group numbers in a valid range.

Displaying HSRP Configurations

From privileged EXEC mode, use this command to display HSRP settings:

show standby [*interface-id* [*group*]] [**brief**] [**detail**]

You can display HSRP information for the whole switch, for a specific interface, for an HSRP group, or for an HSRP group on an interface. You can also specify whether to display a concise overview of HSRP information or detailed HSRP information. The default display is **detail**. If there are a large number of HSRP groups, using the **show standby** command without qualifiers can result in an unwieldy display.

This is a an example of output from the **show standby** privileged EXEC command, displaying HSRP information for two standby groups (group 1 and group 100):

```
Switch# show standby
VLAN1 - Group 1
   Local state is Standby, priority 105, may preempt
   Hellotime 3 holdtime 10
   Next hello sent in 00:00:02.182
   Hot standby IP address is 172.20.128.3 configured
   Active router is 172.20.128.1 expires in 00:00:09
   Standby router is local
   Standby virtual mac address is 0000.0c07.ac01
   Name is bbb
VLAN1 - Group 100
   Local state is Active, priority 105, may preempt
   Hellotime 3 holdtime 10
   Next hello sent in 00:00:02.262
   Hot standby IP address is 172.20.138.51 configured
   Active router is local
   Standby router is unknown expired
   Standby virtual mac address is 0000.0c07.ac64
   Name is test
```

Configuring VRRP

VRRP is an election protocol that dynamically assigns responsibility for one or more virtual routers to the VRRP routers on a LAN, allowing several routers on a multi-access link to use the same virtual IP address. A VRRP router is configured to run VRRP in conjunction with one or more other routers attached to a LAN. In a VRRP configuration, one router is elected as the virtual router master, and the other routers act as backups in case it fails.

VRRP Limitations

- You can configure both HSRP and VRRP on a switch or switch stack. However, you cannot add a switch model that supports only one protocol to a stack that is configured for both protocols.
- The VRRP implementation on the switch does not support the MIB specified in RFC 2787.
- The VRRP implementation on the switch supports only text-based authentication.
- The switch supports VRRP only for IPv4.

For more VRRP information and configuration instructions, see the *Configuring VRRP* feature module.