

FHRP - HSRP Multiple Group Optimization

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Information About FHRP - Multiple Group Optimization

The Multiple Group Optimization (MGO) feature is specifically designed for subinterfaces. It operates with minimal Layer three configurations, provided the physical interface remains active.

HSRP Multiple Group Optimization

The configuration of many hundreds of subinterfaces on the same physical interface, with each subinterface having its own HSRP group, can cause the processes of negotiation and maintenance of multiple HSRP groups to have a detrimental impact on network traffic and CPU utilization.

Only one HSRP group is required on a physical interface for the purposes of electing active and standby devices. This group is known as the *primary* group. Other HSRP groups may be created on each subinterface and linked to the primary group via the group name. These linked HSRP groups are known as *client* or *subordinate* groups.

In a scenario where a following group is in the backup state and its peer is in the master state, the following group stays in the backup state even if the peer's subinterface goes down. MGO client groups do not participate in the HSRP election process. Instead, they inherit the state of their master group. These client groups do not maintain peer state awareness and do not exchange protocol election packets.

The only traffic sent by MGO client groups includes periodic MAC refresh packets. These packets maintain the Virtual MAC address entries on connected switches. These MAC refresh packets are sent based on a configurable MAC refresh timer. They do not participate in the election process.

How to configure FHRP - Multiple Group Optimization

Configuring Multiple HSRP Groups for Load Balancing

Perform this task to configure multiple HSRP groups for load balancing.

Multiple HSRP groups enable redundancy and load-sharing within networks and allow redundant devices to be more fully utilized. A device actively forwarding traffic for one HSRP group can be in standby or in the listen state for another group.

If two devices are used, then Device A would be configured as active for group 1 and standby for group 2. Device B would be standby for group 1 and active for group 2. Fifty percent of the hosts on the LAN would be configured with the virtual IP address of group 1 and the remaining hosts would be configured with the virtual IP address of group 2. See the Example: Multiple HSRP for Load Balancing section for a diagram and configuration example.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address** *ip-address mask* [**secondary**]
5. **standby** [*group-number*] **priority** *priority*
6. **standby** [*group-number*] **preempt** [**delay** {**minimum** | **reload** | **sync**} *delay*]
7. **standby** [*group-number*] **ip** [*ip-address*] **secondary**]
8. On the same device, repeat Steps 5 through 7 to configure the device attributes for different standby groups.
9. **exit**
10. Repeat Steps 3 through 9 on another device.

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**interface** *type number* **Example:** `Device(config)# interface GigabitEthernet 0/0/0`	Configures an interface type and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* [**secondary**] **Example:** `Device(config-if)# ip address 10.0.0.1 255.255.255.0`	Specifies a primary or secondary IP address for an interface.
Step 5	**standby** [*group-number*] **priority** *priority* **Example:** `Device(config-if)# standby 1 priority 110`	Configures HSRP priority.
Step 6	**standby** [*group-number*] **preempt** [**delay** {**minimum** | **reload** | **sync**} *delay*] **Example:** `Device(config-if)# standby 1 preempt`	Configures HSRP preemption.
Step 7	**standby** [*group-number*] **ip** [*ip-address*] **secondary**] **Example:** `Device(config-if)# standby 1 ip 10.0.0.3`	Activates HSRP.
Step 8	On the same device, repeat Steps 5 through 7 to configure the device attributes for different standby groups.	For example, Device A can be configured as an active device for group 1 and be configured as an active or standby device for another HSRP group with different priority and preemption values.
Step 9	**exit** **Example:** `Device(config-if)# exit`	Exits to global configuration mode.
Step 10	Repeat Steps 3 through 9 on another device.	Configures multiple HSRP and enables load balancing on another device.

Improving CPU and Network Performance with HSRP Multiple Group Optimization

Perform this task to configure multiple HSRP client groups.

The **standby follow** command configures an HSRP group to become a subordinate of another HSRP group.

HSRP client groups follow the primary HSRP with a slight, random delay so that all client groups do not change at the same time.

Note When you use the standby follow command on sub-interfaces, the HSRP peer state shows as unknown. This behaviour is expected and is not a cause for concern. Client groups follow the master group's state without direct peer communication.

An example for HSRP following group:

```
router#sh standby gig0/0/1.10 br
          P indicates configured to preempt.
          |
Interface   Grp  Pri P State   Active          Standby         Virtual IP
Gi0/0/1.10  0  100   Active  local           unknown         1.1.1.1
```

Use the **standby mac-refresh** *seconds* command to directly change the HSRP client group refresh interval. The default interval is 10 seconds and can be configured to as much as 255 seconds.

Note

- Client or subordinate groups must be on the same physical interface as the primary group.
- A client group takes its state from the group it is following. Therefore, the client group does not use its timer, priority, or preemption settings. A warning is displayed if these settings are configured on a client group:

```
Device(config-if)# standby 1 priority 110
%Warning: This setting has no effect while following another group.
Device(config-if)# standby 1 timers 5 15
    % Warning: This setting has no effect while following another group.
Device(config-if)# standby 1 preempt delay minimum 300
    % Warning: This setting has no effect while following another group.
```

Before you begin

Configure the HSRP primary group using the steps in the Configuring Multiple HSRP Groups for Load Balancing section.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address** *ip-address mask* [**secondary**]
5. **standby mac-refresh** *seconds*
6. **standby** *group-number* **follow** *group-name*
7. **exit**
8. Repeat Steps 3 through 6 to configure additional HSRP client groups.

DETAILED STEPS

Procedure

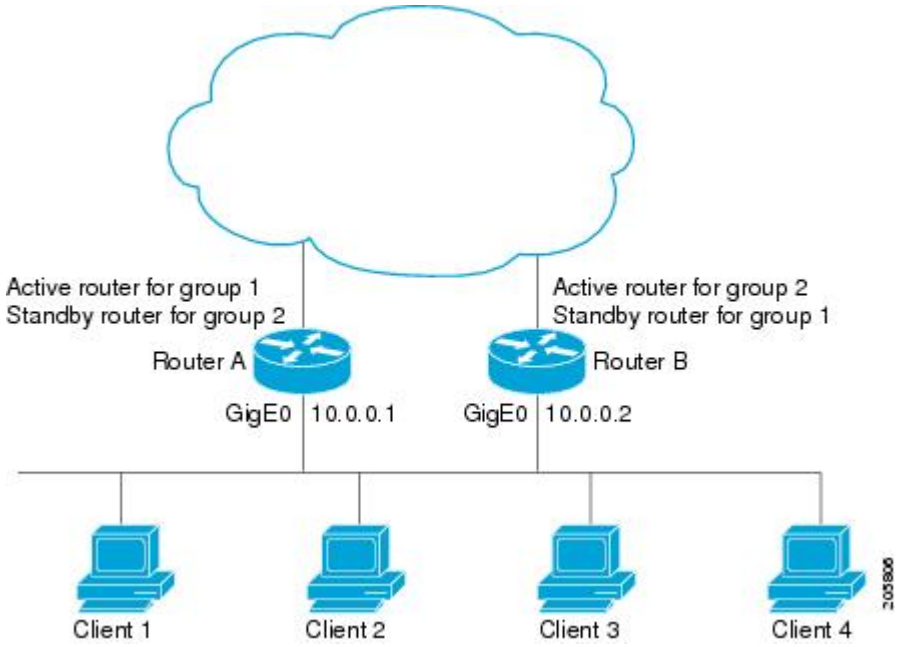
	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Device(config)# interface GigabitEthernet 0/0/0`	Configures an interface type and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* [**secondary**] **Example:** `Device(config-if)# ip address 10.0.0.1 255.255.255.0`	Specifies a primary or secondary IP address for an interface.
Step 5	**standby mac-refresh** *seconds* **Example:** `Device(config-if)# standby mac-refresh 30`	Configures the HSRP client group refresh interval.
Step 6	**standby** *group-number* **follow** *group-name* **Example:** `Device(config-if)# standby 1 follow HSRP1`	Configures an HSRP group as a client group.
Step 7	**exit** **Example:** `Device(config-if)# exit`	Exits to global configuration mode.
Step 8	Repeat Steps 3 through 6 to configure additional HSRP client groups.	Configures multiple HSRP client groups.

Configuration Examples for FHRP - Multiple Group Optimization

Example: Configuring Multiple HSRP Groups for Load Balancing

You can use HSRP or multiple HSRP groups when you configure load sharing. In the figure below, half of the clients are configured for Router A, and half of the clients are configured for Router B. Together, the configuration for Routers A and B establish two Hot Standby 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. The **standby preempt** interface configuration command is necessary so that if a router goes down and then comes back up, preemption occurs and restores load sharing.

Figure 1: HSRP Load Sharing Example



The following example shows Router A configured as the active router for group 1 with a priority of 110 and Router B configured as the active router for group 2 with a priority of 110. The default priority level is 100. 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

```
Router(config)# hostname RouterA
!
Router(config)# interface GigabitEthernet 0/0/0
Router(config-if)# ip address 10.0.0.1 255.255.255.0
Router(config-if)# standby 1 priority 110
Router(config-if)# standby 1 preempt
Router(config-if)# standby 1 ip 10.0.0.3
```

```
Router(config-if)# standby 2 preempt
Router(config-if)# standby 2 ip 10.0.0.4
```

Router B Configuration

```
Router(config)# hostname RouterB
!
Router(config)# interface GigabitEthernet 0/0/0
Router(config-if)# ip address 10.0.0.2 255.255.255.0
Router(config-if)# standby 1 preempt
Router(config-if)# standby 1 ip 10.0.0.3
Router(config-if)# standby 2 priority 110
Router(config-if)# standby 2 preempt
Router(config-if)# standby 2 ip 10.0.0.4
```

Example: Improving CPU and Network Performance with HSRP Multiple Group Optimization

The following example shows how to configure an HSRP client and primary group:

```
Device(config)# interface GigabitEthernet0/0/0
Device(config-if)# no shutdown
Device(config-if)# standby mac-refresh 30
! Client Hello message interval
!
Device(config)# interface GigabitEthernet0/0/0.10
Device(config-subif)# encapsulation dot1q 10
Device(config-subif)# ip address 10.10.10.2 255.255.255.0
Device(config-subif)# standby 1 ip 10.10.10.1
Device(config-subif)# standby 1 priority 110
Device(config-subif)# standby 1 preempt
Device(config-subif)# standby 1 name HSRP1
! Server group
!
Device(config)# interface GigabitEthernet0/0/0.20
Device(config-subif)# encapsulation dot1q 20
Device(config-subif)# ip address 10.10.20.2 255.255.255.0
Device(config-subif)# standby 2 ip 10.10.20.1
Device(config-subif)# standby 2 follow HSRP1
! Client group
!
Device(config)# interface GigabitEthernet0/0/0.30
Device(config-subif)# encapsulation dot1q 30
Device(config-subif)# ip address 10.10.30.2 255.255.255.0
Device(config-subif)# standby 3 ip 10.10.30.1
Device(config-subif)# standby 3 follow HSRP1
! Client group
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
HSRP commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS First Hop redundancy Protocols Command Reference*
HSRP for IPv6	"HSRP for IPv6" module
Troubleshooting HSRP	Hot Standby Router Protocol: Frequently Asked Questions

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
CISCO-HSRP-MIB CISCO-HSRP-EXT-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
RFC 792	*Internet Control Message Protocol*
RFC 1828	*IP Authentication Using Keyed MD5*
RFC 2281	*Cisco Hot Standby Router Protocol*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for FHRP - HSRP Multiple Group Optimization

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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