Configuring HSRP BFD Peering

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Restrictions for HSRP BFD Peering

Hot Standby Router Protocol (HSRP) support for Bidirectional Forwarding Detection (BFD) is not available for all platforms and interfaces.

Information About HSRP BFD Peering

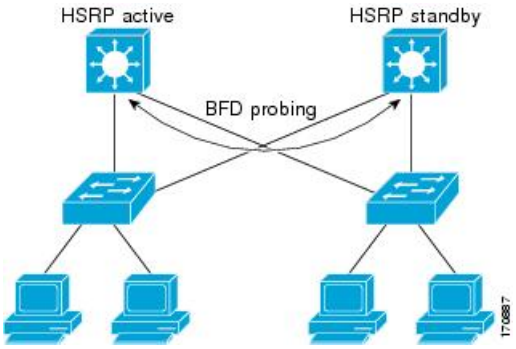
The HSRP BFD Peering feature introduces Bidirectional Forwarding Detection (BFD) in the Hot Standby Router Protocol (HSRP) group member health monitoring system. HSRP supports BFD as a part of the HSRP group member health monitoring system. Without BFD, HSRP runs as a process in a multiprocess system and cannot be guaranteed to be scheduled in time to service large numbers of groups with hello and hold timers, in milliseconds. BFD runs as a pseudopreemptive process and can therefore be guaranteed to run when required. Only one BFD session between two devices can provide early failover notification for multiple HSRP groups.

This feature is enabled by default. The HSRP standby device learns the real IP address of the HSRP active device from the HSRP hello messages. The standby device registers as a BFD client and asks to be notified if the active device becomes unavailable. When BFD determines that the connections between standby and active devices has failed, it will notify HSRP on the standby device which will immediately take over as the active device.

BFD provides a low-overhead, short-duration method of detecting failures in the forwarding path between two adjacent devices, including the interfaces, data links, and forwarding planes. BFD is a detection protocol that you enable at the interface and routing protocol levels. Cisco supports the BFD asynchronous mode, which depends on the sending of BFD control packets between two systems to activate and maintain BFD neighbor sessions between devices. Therefore, to create a BFD session, you must configure BFD on both systems (or BFD peers). When BFD is enabled on the interfaces and at the device level for HSRP, a BFD session is created, BFD timers are negotiated, and the BFD peers will begin to send BFD control packets to each other at the negotiated interval.

BFD provides fast BFD peer failure detection times independently of all media types, encapsulations, topologies, and routing protocols such as, Border Gateway Protocol (BGP), Enhanced Interior Gateway Routing Protocol (EIGRP), Hot Standby Router Protocol (HSRP), Intermediate System To Intermediate System (IS-IS), and Open Shortest Path First (OSPF). By sending rapid failure detection notices to the routing protocols in the local device to initiate the routing table recalculation process, BFD contributes to greatly reduce overall network convergence time. The figure below shows a simple network with two devices running HSRP and BFD.

Figure 1: HSRP BFD Peering



How to Configure HSRP BFD Peering

The following sections provide information about configuring HSRP BFD Peering:

Configuring BFD Session Parameters on an Interface

Perform this task to configure Bidirectional Forwarding Detection (BFD) on an interface by setting the baseline BFD session parameters on the interface. Repeat the steps in this task for each interface on which you want to run BFD sessions to BFD neighbors.

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:**	Enters interface configuration mode.

	Command or Action	Purpose
	`Device(config)# interface FastEthernet 6/0`	
Step 4	**bfd interval** *milliseconds* **min_rx** *milliseconds* **multiplier** *interval-multiplier* **Example:** `Device(config-if)# bfd interval 50 min_rx 50 multiplier 5`	Enables BFD on the interface.
Step 5	**end** **Example:** `Device(config-if)# end`	Exits interface configuration mode.

Configuring HSRP BFD Peering

Perform this task to enable Hot Standby Router Protocol (HSRP) Bidirectional Forwarding Detection (BFD) peering. Repeat the steps in this task for each interface over which you want to run BFD sessions to HSRP peers.

HSRP supports BFD peering by default. If HSRP BFD peering is disabled, you can reenable it at the device level to enable BFD support globally for all interfaces or you can reenable it on a per-interface basis at the interface level.

Before you begin

Before you proceed with this task:

- HSRP must be running on all participating devices.
- Cisco Express Forwarding must be enabled.

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	**ip cef** [**distributed**] **Example:** `Device(config)# ip cef`	Enables Cisco Express Forwarding or distributed Cisco Express Forwarding.
Step 4	**interface** *type number* **Example:** `Device(config)# interface FastEthernet 6/0`	Enters interface configuration mode.
Step 5	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.0.0.11 255.255.255.0`	Configures an IP address for the interface.
Step 6	**standby** [*group-number*] **ip** [*ip-address* [**secondary**]] **Example:** `Device(config-if)# standby 1 ip 10.0.0.11`	Activates HSRP.
Step 7	**standby bfd** **Example:** `Device(config-if)# standby bfd`	(Optional) Enables HSRP support for BFD on the interface.
Step 8	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode.
Step 9	**standby bfd all-interfaces** **Example:** `Device(config)# standby bfd all-interfaces`	(Optional) Enables HSRP support for BFD on all interfaces.
Step 10	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode.
Step 11	**show standby** [**neighbors**] **Example:**	(Optional) Displays information about HSRP support for BFD.

	Command or Action	Purpose
	`Device# show standby neighbors`	

Verifying HSRP BFD Peering

To verify Hot Standby Router Protocol (HSRP) Bidirectional Forwarding Detection (BFD) peering, use any of the following optional commands.

Procedure

Step 1 **show standby**

Use the **show standby** command to display HSRP information.

Example:

```
Device# show standby

FastEthernet2/0 - Group 1
  State is Active
    2 state changes, last state change 00:08:06
  Virtual IP address is 10.0.0.11
  Active virtual MAC address is 0000.0c07.ac01
    Local virtual MAC address is 0000.0c07.ac01 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 2.772 secs
  Preemption enabled
  Active router is local
  Standby router is 10.0.0.2, priority 90 (expires in 8.268 sec)
    BFD enabled !
  Priority 110 (configured 110)
    Group name is "hsrp-Fa2/0-1" (default)
```

Step 2 **show standby brief**

Use the **show standby brief** command to display HSRP standby device information in brief.

Example:

```
Device# show standby brief

Interface   Grp  Pri P State   Active  Standby                     Virtual IP

Et0/0       4    120 P Active  local   172.24.1.2                  172.24.1.254
Et1/0       6    120 P Active  local   FE80::A8BB:CCFF:FE00:3401   FE80::5:73FF:FEA0:6
```

Step 3 **show standby neighbors** [*type number*]

Use the **show standby neighbors** command to display information about HSRP peer devices on an interface.

Example:

```
Device1# show standby neighbors
```

```
HSRP neighbors on FastEthernet2/0
    10.1.0.22
    No active groups
    Standby groups: 1
    BFD enabled !

Device2# show standby neighbors

HSRP neighbors on FastEthernet2/0
    10.0.0.2
    Active groups: 1
    No standby groups
    BFD enabled !
```

Step 4 **show bfd neighbors**

Use the **show bfd neighbors** command to display a line-by-line listing of existing Bidirectional Forwarding Detection (BFD) adjacencies.

Example:

```
Device# show bfd neighbors

IPv6 Sessions

NeighAddr                                LD/RD         RH/RS     State     Int

FE80::A8BB:CCFF:FE00:3401                 4/3          Up        Up        Et1/0
FE80::A8BB:CCFF:FE00:3401                 4/3          Up        Up        Et1/0
```

Step 5 **show bfd neighbors details**

Use the **details** keyword to display BFD protocol parameters and timers for each neighbor.

Example:

```
Device# show bfd neighbors details

OurAddr       NeighAddr     LD/RD  RH/RS   Holdown(mult)  State     Int
10.0.0.2      10.0.0.1       5/0    Down      0    (0 )   Down      Fa2/0
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 1000000, MinRxInt: 1000000, Multiplier: 3
Received MinRxInt: 0, Received Multiplier: 0
Holdown (hits): 0(0), Hello (hits): 1000(55)
Rx Count: 0, Rx Interval (ms) min/max/avg: 0/0/0 last: 3314120 ms ago
Tx Count: 55, Tx Interval (ms) min/max/avg: 760/1000/872 last: 412 ms ago
Registered protocols: HSRP !
Last packet: Version: 1            - Diagnostic: 0
             State bit: AdminDown  - Demand bit: 0
             Poll bit: 0           - Final bit: 0
             Multiplier: 0         - Length: 0
             My Discr.: 0          - Your Discr.: 0
             Min tx interval: 0    - Min rx interval: 0
             Min Echo interval: 0
```

Configuration Example for HSRP BFD Peering

Hot Standby Router Protocol (HSRP) supports Bidirectional Forwarding Detection (BFD) as a part of the HSRP group member health monitoring system. Without BFD, HSRP runs as a process in a multiprocess

system and cannot be guaranteed to be scheduled in time to service large numbers of groups with millisecond hello and hold timers. BFD runs as a pseudo-preemptive process and can therefore, be guaranteed to run when required. Only one BFD session between two devices can provide early failover notification for multiple HSRP groups.

In the following example, the **standby bfd** and the **standby bfd all-interfaces** commands are not displayed. HSRP support for BFD is enabled by default when BFD is configured on a device or an interface by using the **bfd interval** command. The **standby bfd** and **standby bfd all-interfaces** commands are needed only if BFD has been manually disabled on a device or an interface.

Device A

```
DeviceA(config)# ip cef
DeviceA(config)# interface FastEthernet2/0
DeviceA(config-if)#  no shutdown
DeviceA(config-if)# ip address 10.0.0.2 255.0.0.0
DeviceA(config-if)# ip router-cache cef
DeviceA(config-if)# bfd interval 200 min_rx 200 multiplier 3
DeviceA(config-if)# standby 1 ip 10.0.0.11
DeviceA(config-if)# standby 1 preempt
DeviceA(config-if)# standby 1 priority 110
DeviceA(config-if)# standby 2 ip 10.0.0.12
DeviceA(config-if)# standby 2 preempt
DeviceA(config-if)# standby 2 priority 110
```

Device B

```
DeviceB(config)# interface FastEthernet2/0
DeviceB(config-if)# ip address 10.1.0.22 255.255.0.0
DeviceB(config-if)# no shutdown
DeviceB(config-if)# bfd interval 200 min_rx 200 multiplier 3
DeviceB(config-if)# standby 1 ip 10.0.0.11
DeviceB(config-if)# standby 1 preempt
DeviceB(config-if)# standby 1 priority 90
DeviceB(config-if)# standby 2 ip 10.0.0.12
DeviceB(config-if)# standby 2 preempt
DeviceB(config-if)# standby 2 priority 80
```

Feature History for HSRP BFD Peering

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Gibraltar 16.11.1	HSRP BFD Peering	The HSRP BFD Peering feature introduces BFD in the HSRP group member health monitoring system. HSRP supports BFD as a part of the HSRP group member health monitoring system.

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.7.1	HSRP BFD Peering	This feature was implemented on supervisor modules C9400X-SUP-2 and C9400X-SUP-2XL, which were introduced in this release.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn.