Configuring Bidirectional Forwarding and Detection over Switched Virtual Interface

This chapter describes how to configure Bidirectional Forwarding and Detection (BFD) over Switched Virtual Interface(SVI) on Cisco 7600 series routers.

Note For complete syntax and usage information of the commands used in this chapter, see the Cisco 7600 Series Routers Command References at this URL:

http://www.cisco.com/en/US/products/hw/routers/ps368/prod_command_reference_list.html

This chapter consists of these sections:

Understanding BFD over SVI

Switched Virtual Interface (SVI) is a type of interface designed to provide basic Layer 3 functions for Layer 2 switch ports that belongs to a specific Virtual Local Area Network (VLAN). SVI connects a Layer 2 domain to a Layer 3 routing domain through an IP address configured on the VLAN interface.

When you use SVI in layer 2 networks to provide access to Layer3 routing domain, you can use Bidirectional Forwarding Detection (BFD) to detect data traffic failures in the network.

Note You should run the **platform bfd allow-svi** command on the15.1(1)S software before downgrading the software version from 15.1(1)S to 15.0(1)S when BFD over SVI feature is configured.

Restrictions and Usage Guidelines

Follow these restrictions and guidelines when you configure the BFD over SVI feature:

- BFD over SVI is supported on all the hardware platforms where BFD is supported.

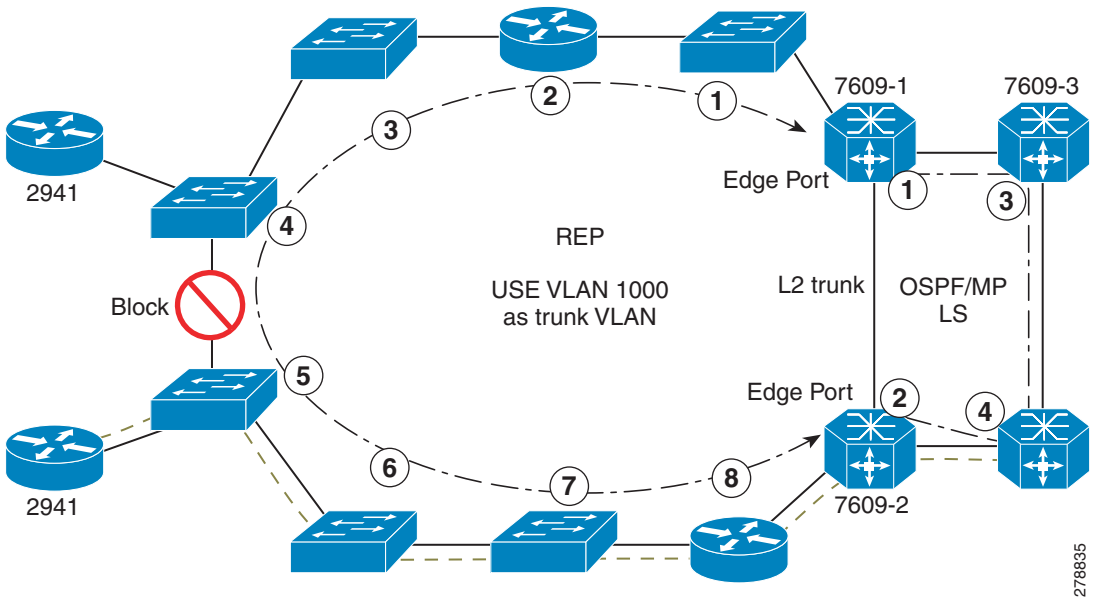
- Timer support for BFD over SVI is similar to the BFD timer values supported on main and sub interfaces.
- If BFD runs on a port channel, BFD over SVI has a timer value restriction of 750 * 3 milliseconds.
- Run **no ip redirect** command on all the BFD interfaces to optimize the data path on the C7600 series routers.

Sample Network with BFD over SVI

Figure 62-1 shows an example of a network with BFD over SVI on REP enabled ring topology. The Cell Site Routers (CSR) on the left side of the network are aggregated on the C7600 routers over Layer 2 networks. The SVI configured on C7600 provides Layer 3 services to CSRs.

The routing of upstream traffic from CSR towards 7600 routers is achieved through static routes on CSRs, which points to one of the C7600 routers (7609-1) as a primary route, and to an alternate C7600 router (7609-2) that acts as a back-up node and as a secondary route. The static route preference is configured using the metric value in the static route configuration.

Figure 62-1 BFD over SVI Network



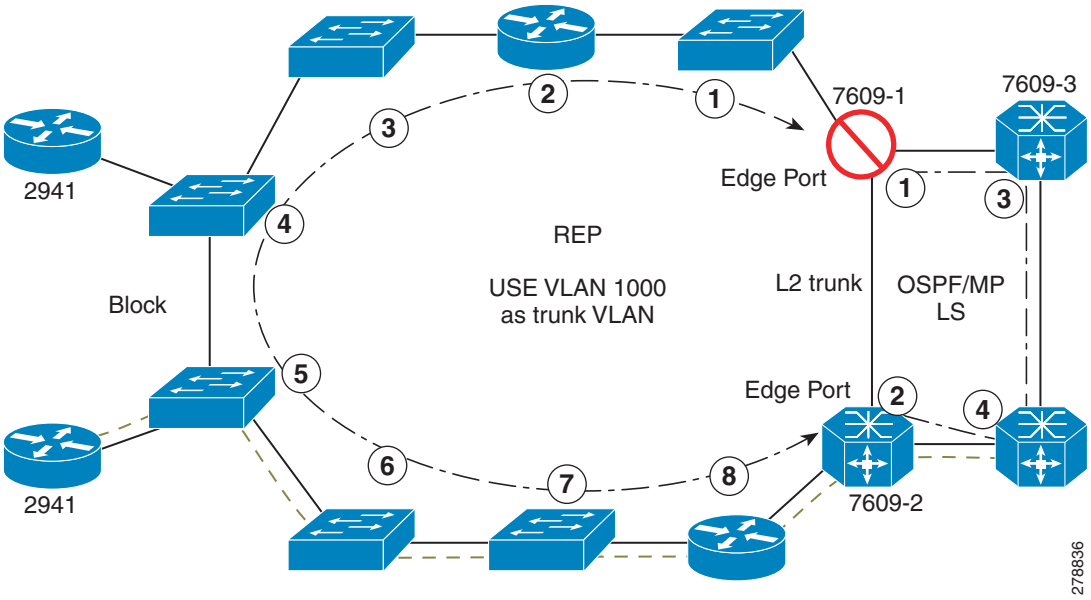
In such a topology, you can deploy node failure protection and link failure protection to handle data traffic failures in the network.

Node Failure

Node failure is handled through BFD protected static routes. If the primary node fails, BFD detects the failure and triggers a re-convergence of the network through the backup node. Since static routes are used on CSRs, the re-convergence only requires initialization of the secondary or backup route.

Figure 62-2 explains a node failure in a network with BFD over SVI on a REP enabled ring topology. The routers 7609-1, 7609-2 and the two 2941 routers in the network are protected nodes. If there is a failure on the primary node (7609-1), traffic is redirected to the secondary node (7609-2). The Layer 2 nodes that are numbered from 1 to 8 are not protected.

Figure 62-2 Node Failure



When the primary node encounters a failure, the following events take place:

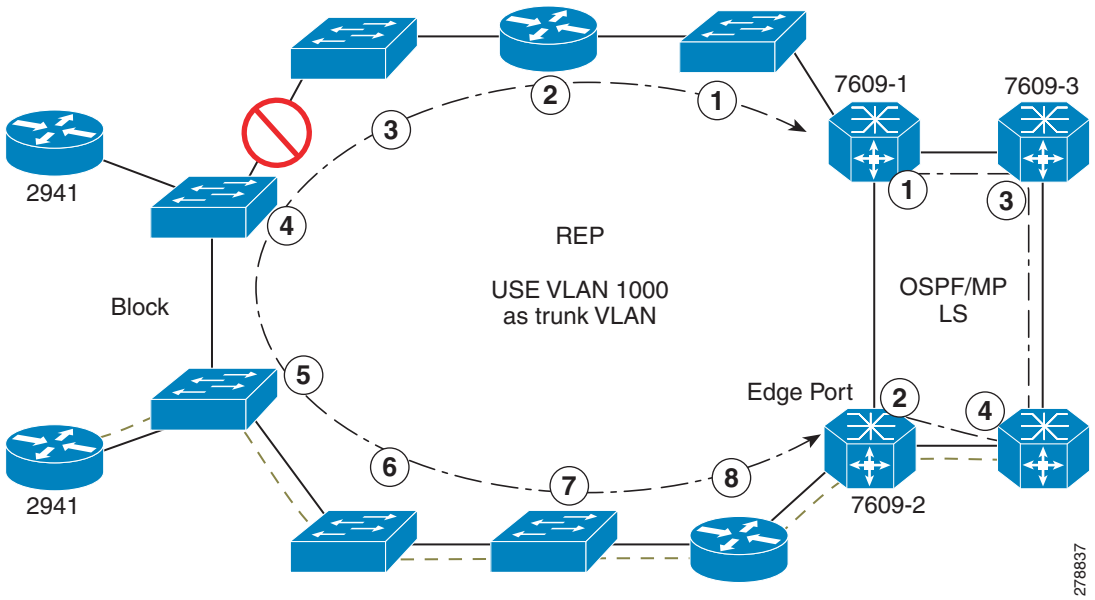
1. At Layer 2 level, REP detects that the primary path is faulty and opens the secondary path.
2. At Layer 3 level, BFD detects the primary node failure and trigger network convergence to the secondary node.

Link Failure

Link failure in the Layer 2 network is handled by REP. In most cases, REP detects a link failure in less than 100 milliseconds in the ring. In case the primary Layer 2 path fails, REP opens the secondary Layer 2 path for Layer 3 traffic.

Figure 62-3 explains link failure in a network with BFD over SVI. If there is a primary link failure in the Layer 2 ring, REP detects at the Layer 2 level that the primary path is faulty and opens the secondary path. As there is no node failure, BFD does not detect and trigger any network change.

Figure 62-3 Link Failure



REP should detect and act on any fault in the network before BFD. Otherwise, BFD may wrongly detect a node failure. If there is a link failure in the primary Layer 2 path and REP takes longer time than BFD to unblock the secondary path, BFD could wrongly detect a node failure. In that case, after unblocking the secondary path by REP, traffic flows through the secondary node.

For more information on configuring REP, see the following link:

http://www.cisco.com/en/US/docs/routers/7600/ios/15S/configuration/guide/rep.html

Configuring BFD over SVI

Perform these steps to configure BFD over SVI.

Summary Steps

1. **enable**
2. **configure terminal**
3. **interface vlan** *number*
4. **ip address** *ip-address mask*
5. **bfd interval** *milliseconds* **min_rx** *milliseconds* **multiplier** *interval-multiplier*
6. **ip route static bfd vlan** *number gateway*
7. **ip route** [**vrf** *vrf-name*] **mask** {*ip-address* | **vlan** *vlan-number* [*ip-address*]} [**dhcp**] [*distance*] [**name** *next-hop-name*] [**permanent** | **track** *number*] [**tag** *tag*]
8. **end**
9. **show ip static route**

Detailed Steps

	Command	Purpose
Step 1	`Router> enable`	Enables privileged EXEC mode.
Step 2	`Router# configure terminal`	Enters global configuration mode.

Step 3	`Router(config)# interface vlan number`
	
	Example:
	`Router(config)# interface vlan 100`
		Configures an interface and enters interface configuration mode.

Step 4	`Router(config-if)# ip address ip-address mask`
	Example:
	`Router(config-if)# ip address 10.0.0.1 255.255.255.0`
		Configures an IP address for the interface.

Step 5	`Router(config-if)# bfd interval milliseconds min_rx milliseconds multiplier interval-multiplier`
	Example:
	`Router(config-if)# bfd interval 500 min_rx 500 multiplier 5`
		Enables BFD on the interface and configures BFD session parameters.

Step 6	`Router(config-if)# ip route static bfd vlan vlan-number gateway`
	Example:
	`Router(config-if)# ip route static bfd vlan 100 10.0.10.2`
		Specifies a static route for the BFD neighbor.

Step 7	`Router(config-if)# ip route [vrf vrf-name] prefix mask {ip-address | vlan vlan-number [ip-address]} [dhcp] [distance] [name next-hop-name] [permanent | track number] [tag tag]`
	Example:
	`Router(config-if)# ip route vrf red 10.0.0.0 255.0.0.0 vlan 100 10.0.10.2`
		Specifies a static route.

Step 8	`Router(config-if)# end`	Exits interface configuration mode and returns to privileged EXEC mode.
Step 9	`Router# show ip static route`	(Optional) Displays local static Routing Information Base (RIB) information.

Note If you are downgrading the software version from 15.1(1)S to 15.0(1)S and you have BFD over SVI configuration, you should first run the **platform bfd allow-svi** command on the15.1(1)S software and then start the software downgrade.

The following example shows BFD over SVI configuration on routers A and B in the same VLAN and verifies the configuration. The **show bfd neighbors details** command is used to verify that BFD session is created.

```
RouterA# show run
Building configuration...
Current configuration : 119 bytes
interface Vlan100
 ip address 51.1.1.2 255.255.255.0
 no ip redirects
 bfd interval 500 min_rx 500 multiplier 3
end
ip route static bfd Vlan100 51.1.1.1
ip route 60.1.0.0 255.255.0.0 Vlan100 51.1.1.1
```

```
RouterB# show run
Building configuration...
Current configuration : 119 bytes
interface Vlan100
 ip address 51.1.1.1 255.255.255.0
 no ip redirects
 bfd interval 500 min_rx 500 multiplier 3
end
ip route static bfd Vlan100 51.1.1.2
ip route 10.1.0.0 255.255.0.0 Vlan100 51.1.1.2

RouterA# show bfd neighbors details
NeighAddr                         LD/RD    RH/RS     State     Int
51.1.1.1                           1/2     Up        Up        Vl100
Session state is UP and using echo function with 500 ms interval.
OurAddr: 51.1.1.2
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 1000000, MinRxInt: 1000000, Multiplier: 3 Received MinRxInt: 1000000, Received
Multiplier: 3 Holddown (hits): 0(0), Hello (hits): 1000(447) Rx Count: 335, Rx Interval
(ms) min/max/avg: 1/533592/2465 last: 24 ms ago Tx Count: 451, Tx Interval (ms)
min/max/avg: 1/26236/4077 last: 628 ms ago Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: CEF IPv4 Static
Uptime: 00:04:43
Last packet: Version: 1                  - Diagnostic: 0
             State bit: Up               - Demand bit: 0
             Poll bit: 0                 - Final bit: 0
             Multiplier: 3               - Length: 24
             My Discr.: 2                - Your Discr.: 1
             Min tx interval: 1000000    - Min rx interval: 1000000
             Min Echo interval: 500000

RouterB# show bfd neighbors details
NeighAddr                         LD/RD    RH/RS     State     Int
51.1.1.2                           2/1     Up        Up        Vl100
Session state is UP and using echo function with 500 ms interval.
OurAddr: 51.1.1.1
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 1000000, MinRxInt: 1000000, Multiplier: 3 Received MinRxInt: 1000000, Received
Multiplier: 3 Holddown (hits): 0(0), Hello (hits): 1000(1904) Rx Count: 395, Rx Interval
(ms) min/max/avg: 1/534840/2230 last: 228 ms ago Tx Count: 1908, Tx Interval (ms)
min/max/avg: 1/28616/1210 last: 268 ms ago Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: CEF IPv4 Static
Uptime: 00:05:39
Last packet: Version: 1                  - Diagnostic: 0
             State bit: Up               - Demand bit: 0
             Poll bit: 0                 - Final bit: 0
             Multiplier: 3               - Length: 24
             My Discr.: 1                - Your Discr.: 2
             Min tx interval: 1000000    - Min rx interval: 1000000
             Min Echo interval: 500000
```