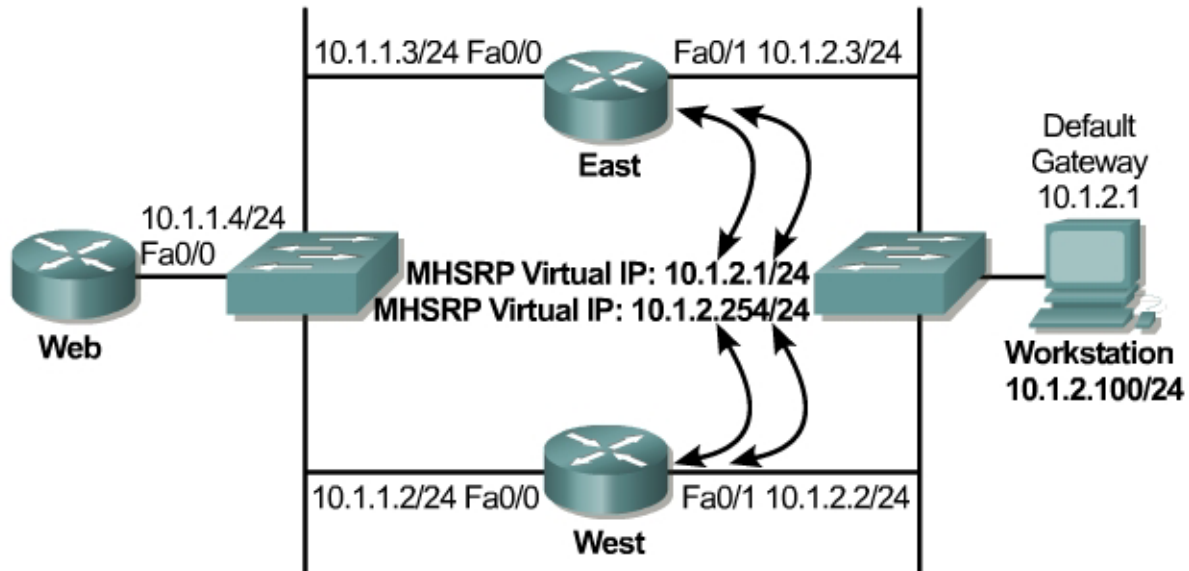


Lab 6.2.2.2 Multigroup Hot Standby Router Protocol



Objective

Configure Multigroup Hot Standby Router Protocol (MHSRP) on a pair of routers to provide redundant router services to a network.

Scenario

There are two routers connected to the network. After installing HSRP the user realizes that all the LAN traffic is forwarded through the active HSRP router. This is not the most efficient use of the bandwidth. Use the Multigroup HSRP for load balancing between the East and the West router.

Step 1

Cable the lab as shown in the diagram. Before beginning a lab, the configurations on all the routers should be cleared and then reloaded or power cycled to reset their default configurations. Delete the **vlan.dat** and startup configuration files on the switches before reloading them.

Note The routers require two Ethernet interfaces therefore Cisco 2621 routers or equivalent with dual Ethernet interfaces are required to complete this lab.

When routers are connecting to the switches it takes approximately 30 seconds for the link to be established due to the STP process on the switches. HSRP is configured to provide a fast fail-over mechanism that is transparent to the users. Therefore to maximize the benefits of HSRP, change the router connected switch ports to spanning-tree PortFast (Fa0/2 - Fa0/3). If the router is connected to a hub or switch with PortFast configured, the interface should come up within 5 seconds.

```
Switch#configure terminal
Switch(config)#hostname PCSwitch
```

```
PCSwitch(config)#interface range fastethernet 0/2 -3
PCSwitch(config-if-range)#spanning-tree portfast
PCSwitch(config-if-range)#^Z
PCSwitch#
```

```
Switch#configure terminal
Switch(config)#hostname WebSwitch
WebSwitch(config)#interface range fastethernet 0/2 -3
WebSwitch(config-if-range)#spanning-tree portfast
WebSwitch(config-if-range)#^Z
WebSwitch#
```

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname PCSwitch
PCSwitch(config)#interface range fastethernet 0/2 -3
PCSwitch(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 2 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking mode.
PCSwitch(config-if-range)#^Z
PCSwitch#
```

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname WebSwitch
WebSwitch(config)#interface range fastethernet 0/2 -3
WebSwitch(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 2 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking mode.
WebSwitch(config-if-range)#^Z
WebSwitch#
```

Step 2

Configure the Web router to act as a Web server. Configure the router with a username, VTY and secret passwords, IP address, and enable HTTP management services as shown below.

```
Router(config)#hostname Web
Web(config)#interface fastethernet0/0
Web(config-if)#ip address 10.1.1.4 255.255.255.0
Web(config-if)#no shutdown
Web(config-if)#line vty 0 4
Web(config-line)# password cisco
Web(config-line)#login
Web(config-line)#enable password class
Web(config-line)#ip http server
```

Step 3

Configure the East and West routers.

```
Router(config)#hostname West
West(config)#interface fastethernet 0/0
West(config-if)#ip address 10.1.1.2 255.255.255.0
West(config-if)#no shutdown
West(config-if)#interface fastethernet 0/1
West(config-if)#ip address 10.1.2.2 255.255.255.0
West(config-if)#no shutdown
West(config-if)#line vty 0 4
West(config-line)# password cisco
West(config-line)#login
West(config-line)#enable password class
West(config-line)#exit

Router(config)#hostname East
East(config)#interface fastethernet 0/0
East(config-if)#ip address 10.1.1.3 255.255.255.0
East(config-if)#no shutdown
East(config-if)#interface fastethernet 0/1
East(config-if)#ip address 10.1.2.3 255.255.255.0
East(config-if)#no shutdown
East(config-if)#line vty 0 4
East(config-line)# password cisco
East(config-line)#login
East(config-line)#enable password class
East(config-line)#exit
```

Step 4

Configure Enhanced Interior Gateway Routing Protocol (EIGRP) on all routers.

```
Web(config)#router eigrp 10
Web(config-router)#network 10.0.0.0

West(config)#router eigrp 10
West(config-router)#network 10.0.0.0

East(config)#router eigrp 10
East(config-router)#network 10.0.0.0
```

Step 5

Turn on HSRP using the **standby ip** command at the interface level.

Turn on HSRP on the 10.1.2.0 network.

```
West(config)#interface fastethernet 0/1
West(config-if)#standby ip 10.1.2.1
West(config-if)#standby preempt

East(config)#interface fastethernet 0/1
East(config-if)#standby ip 10.1.2.1
East(config-if)#standby preempt
```

Check the HSRP configuration with a **show standby** command on both routers.

```
East#show standby
FastEthernet0/1 - Group 0
  Local state is Active, priority 150, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 2.078
```

```
Virtual IP address is 10.1.2.1 configured
Active router is local
Standby router is unknown
Virtual mac address is 0000.0c07.ac00
7 state changes, last state change 00:00:03
IP redundancy name is "hsrp-Fa0/1-0" (default)
```

```
West#show standby
FastEthernet0/1 - Group 0
  Local state is Standby, priority 100, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 2.296
  Virtual IP address is 10.1.2.1 configured
  Active router is 10.1.2.3, priority 150 expires in 7.988
  Standby router is local
  7 state changes, last state change 00:00:03
  IP redundancy name is "hsrp-Fa0/1-0" (default)
```

Step 6

ping the Web router at 10.1.1.4 from the workstation to test HSRP operation. Observe the lights on the routers and switch ports.

1. Was the **ping** successful?

If the ping does not work, go back and troubleshoot the configuration.

Change the IP address of the workstation to another valid IP address (For example, 10.1.2.101) and then **ping** 10.1.1.4 again. Observe the lights on the routers and switch ports. Repeat this process several times using other valid IP addresses for the workstation. Notice the packets are forwarded over the same router each time. The HSRP active router is sitting idle.

Step 7

To utilize both paths from the host network to the server network, configure Multigroup HSRP (MHSRP) between East and West. East and West are both configured with the same two HSRP groups. For group 1, East is the active router and West is the standby router. For group 2, West is the active router and East is the standby router. Configure half of the host default gateways using HSRP group 1 virtual IP address. Configure the other half of the host default gateways using HSRP group 2 virtual IP address.

Remove the original standby configuration before implementing MHSRP.

```
West(config)#interface fastethernet 0/1
West(config-if)#no standby ip 10.1.2.1

East(config)#interface fastethernet 0/1
East(config-if)# no standby ip 10.1.2.1

East(config)#interface fastethernet 0/1
East(config-if)#standby 1 ip 10.1.2.1
East(config-if)#standby 1 preempt
East(config-if)#standby 1 track fastethernet 0/0
East(config-if)#standby 2 ip 10.1.2.254
East(config-if)#standby 2 preempt
East(config-if)#standby 2 priority 95
East(config-if)#standby 2 track fastethernet 0/0

West(config)#interface fastethernet 0/1
West(config-if)#standby 1 ip 10.1.2.1
```

```

West(config-if)#standby 1 preempt
West(config-if)#standby 1 track fastethernet 0/0
West(config-if)#standby 1 priority 95
West(config-if)#standby 2 ip 10.1.2.254
West(config-if)#standby 2 preempt

West(config-if)#standby 2 track fastethernet 0/0

```

Check the HSRP configuration with a **show standby** command on both routers. The East router should be the Active router for HSRP Group 1 and Standby router for Group 2. The West router should be the Active router for Group 2 and Standby router for Group 1.

```

East#show standby
FastEthernet0/1 - Group 1
  Local state is Active, priority 100, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 0.778
  Virtual IP address is 10.1.2.1 configured
  Active router is local
  Standby router is 10.1.2.2, priority 95 expires in 7.472
  Virtual mac address is 0000.0c07.ac01
  2 state changes, last state change 00:28:47
  IP redundancy name is "hsrp-Fa0/1-1" (default)
  Priority tracking 1 interface, 1 up:
    Interface          Decrement  State
    FastEthernet0/0    10        Up
FastEthernet0/1 - Group 2
  Local state is Standby, priority 95, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 1.722
  Virtual IP address is 10.1.2.254 configured
  Active router is 10.1.2.2, priority 100 expires in 7.384
  Standby router is local
  4 state changes, last state change 00:16:27
  IP redundancy name is "hsrp-Fa0/1-2" (default)
  Priority tracking 1 interface, 1 up:
    Interface          Decrement  State
    FastEthernet0/0    10        Up

```

```

West#show standby
FastEthernet0/1 - Group 1
  Local state is Standby, priority 95, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 1.076
  Virtual IP address is 10.1.2.1 configured
  Active router is 10.1.2.3, priority 100 expires in 8.120
  Standby router is local
  1 state changes, last state change 00:18:25
  Priority tracking 1 interface, 1 up:
    Interface          Decrement  State
    FastEthernet0/0    10        Up
FastEthernet0/1 - Group 2
  Local state is Active, priority 100, may preempt
  Hellotime 3 sec, holdtime 10 sec
  Next hello sent in 0.312
  Virtual IP address is 10.1.2.254 configured
  Active router is local
  Standby router is 10.1.2.3, priority 95 expires in 8.172
  Virtual mac address is 0000.0c07.ac02
  1 state changes, last state change 00:17:44
  Priority tracking 1 interface, 1 up:
    Interface          Decrement  State
    FastEthernet0/0    10        Up

```

Step 8

Two default gateways for the LAN have been created. Half of the devices will be configured with one default gateway and the other half the other gateway. Each router is the active HSRP for one of the virtual IP address.

Configure the workstation with the default gateway address of 10.1.2.1. **Ping** the Web router.

2. Was the **ping** successful?

If not troubleshoot the network. Use the **show standby** command for assistance.

3. Which router forwarded the packets to the Web router?

Now change the default gateway address on the workstation to 10.1.2.254. **Ping** the Web router.

4. Which router forwarded the packets to the Web router?

Now the network is load balancing between the two HSRP routers.

Now test the redundancy of HSRP. Set the default gateway address to 10.1.2.1 on the workstation. **Ping** the Web router with the **-t** option. Disconnect the cable between the East Router and the switch attached to the workstation while observing the ping output.

5. Did the network recover from the failure?

Reconnect the cable between the East router and the switch connected to the workstation. Now change the default gateway address of the workstation to 10.1.1.254. Again, use the **-t** option and **ping** the Web router. Disconnect the cable between the West router and the switch connected to the workstation.

6. Did the network recover from the failure?

Step 9

The track feature recovers the network when the far side links fail. Reconnect all the cables. Disconnect the cable between the East Router and the switch attached to the Web router. Set the default gateway address to 10.1.2.1. **Ping** the Web router with the **-t** option. Reconnect the cable between the East router and the switch attached to the Web router.

7. Did the network recover from the failure?