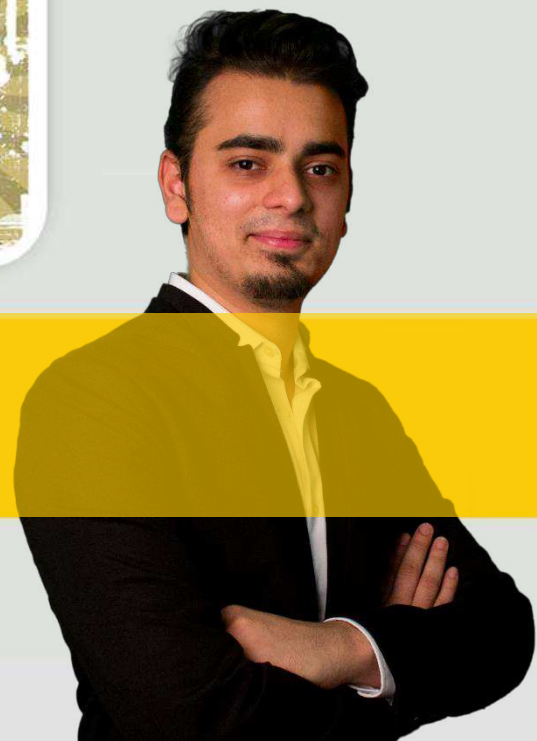


Routing
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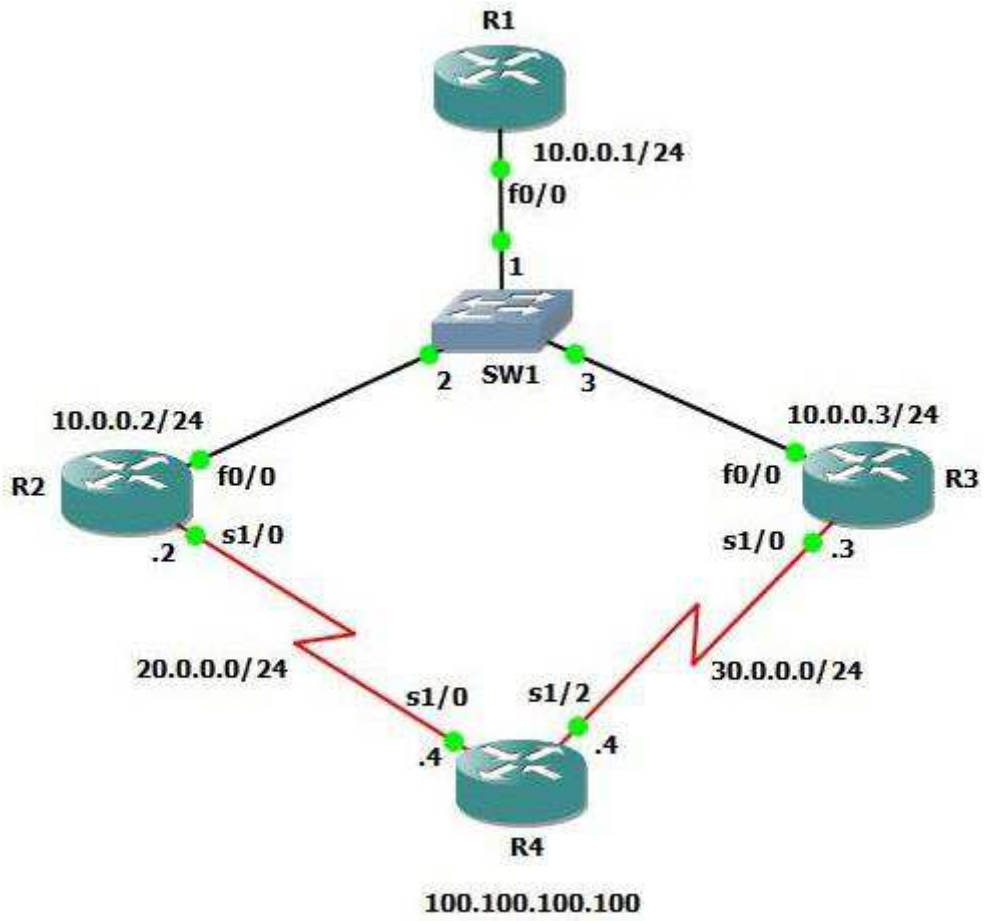


HSRP



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HSRP Topology



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LAB 1: Configure HSRP:

Task 1: Configure HSRP for IPv4

Step 1 Configure HSRP Basic Configuration

R1:

```
interface f0/0
ip address 10.0.0.1 255.255.255.0
no shutdown
exit

ip route 100.0.0.0 255.0.0.0 10.0.0.5
```

R2:

```
interface f0/0
ip address 10.0.0.2 255.255.255.0
no shutdown
exit

interface serial 1/0
ip address 20.0.0.2 255.255.255.0
no shutdown
exit

ip route 100.0.0.0 255.0.0.0 20.0.0.4
```

```
interface f0/0
standby 1 ip 10.0.0.5
exit
```

R3:

```
interface f0/0
ip address 10.0.0.3 255.255.255.0
no shutdown
exit

interface serial 1/0
ip address 30.0.0.3 255.255.255.0
no shutdown
exit
```

```
ip route 100.0.0.0 255.0.0.0 30.0.0.4
```

```
interface f0/0  
standby 1 ip 10.0.0.5  
exit
```

R4:

```
interface serial 1/0  
ip address 20.0.0.4 255.255.255.0  
no shutdown  
exit
```

```
interface serial 1/2  
ip address 30.0.0.4 255.255.255.0  
no shutdown  
exit  
interface loopback 1  
ip address 100.100.100.100 255.255.255.0  
exit
```

```
ip route 0.0.0.0 0.0.0.0 20.0.0.2  
ip route 0.0.0.0 0.0.0.0 30.0.0.3
```

Task 2: Verification

Step 1 Verify Active and Standby State in HSRP

R2:

```
R2#show standby
```

```
FastEthernet0/0 - Group 1
```

```
State is Active
```

```
2 state changes, last state change 00:23:16
```

```
Virtual IP address is 10.0.0.5
```

```
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 1.608 secs
```

```
Preemption disabled
```

```
Active router is local
```

```
Standby router is 10.0.0.3, priority 100 (expires in 8.196 sec)
```

```
Priority 100 (default 100)
```

```
Group name is "hsrp-Fa0/0-1" (default)
```

R3:

R3#show standby

FastEthernet0/0 - Group 1

State is Standby

1 state change, last state change 00:00:14

Virtual IP address is 10.0.0.5

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 0.260 secs

Preemption disabled

Active router is 10.0.0.2, priority 100 (expires in 9.096 sec)

Standby router is local

Priority 100 (default 100)

Group name is "hsrp-Fa0/0-1" (default)

R3#debug standby

HSRP debugging is on

*Mar 1 00:45:36.363: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

*Mar 1 00:45:36.839: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

R3#

*Mar 1 00:45:39.363: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

*Mar 1 00:45:39.891: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

*Mar 1 00:45:39.919: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

R3#

*Mar 1 00:45:42.363: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

*Mar 1 00:45:42.871: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

R3#

*Mar 1 00:45:45.363: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

*Mar 1 00:45:45.871: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

R3#

*Mar 1 00:45:48.363: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

*Mar 1 00:45:48.851: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

*Mar 1 00:45:48.899: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 100 vIP 10.0.0.5

Task 3: Understanding HSRP Failover for Active Routers

Step 1 Shutdown the Active router

```
R2:  
interface f0/0  
shutdown
```

Step 2 Verify HSRP Automatic Gateway selection to Router 3 form Standby state to Active state

```
R3:  
R3#debug standby  
HSRP debugging is on
```

```
*Mar 1 00:47:28.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
*Mar 1 00:47:29.063: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
*Mar 1 00:47:31.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:47:34.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:47:37.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
*Mar 1 00:47:37.635: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:47:40.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:47:43.139: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
```

```
R3#sh standby  
FastEthernet0/0 - Group 1  
State is Active  
2 state changes, last state change 00:01:09  
Virtual IP address is 10.0.0.5  
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 2.036 secs  
Preemption disabled  
Active router is local  
Standby router is unknown  
Priority 100 (default 100)  
Group name is "hsrp-Fa0/0-1" (default)
```

Step 3 Increase the Priority for current Standby Router

```
R2:  
interface f0/0  
standby 1 priority 200  
exit
```

```
R3:  
R3#debug standby  
HSRP debugging is on
```

```
1 00:56:38.655: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 200 vIP 10.0.0.5  
R3#  
*Mar 1 00:56:40.147: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
*Mar 1 00:56:40.991: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:56:41.671: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 200 vIP 10.0.0.5  
R3#  
*Mar 1 00:56:43.147: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
R3#  
*Mar 1 00:56:44.675: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 200 vIP 10.0.0.5
```

Step 4 Preempt to claim status by Router 2

```
R2:  
interface f0/0  
standby 1 priority 200  
standby 1 preempt
```

Step 5 Verify HSRP Failover for Router 2 form Standby state to Active state

```
R3:  
R3#debug standby  
HSRP debugging is on
```

```
*Mar 1 00:59:25.147: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5  
*Mar 1 00:59:25.215: HSRP: Fa0/0 Interface adv in, Active, active 1, passive 1, from  
10.0.0.2  
*Mar 1 00:59:25.215: HSRP: Fa0/0 Grp 1 Coup in 10.0.0.2 Standby pri 200 vIP 10.0.0.5  
*Mar 1 00:59:25.219: HSRP: Fa0/0 Grp 1 Active: j/Coup rcvd from higher pri router  
(200/10.0.0.2)  
*Mar 1 00:59:25.219: HSRP: Fa0/0 Grp 1 Active router is 10.0.0.2, was local
```

```

*Mar 1 00:59:25.219: HSRP: Fa0/0 Nbr 10.0.0.2 active for group 1
*Mar 1 00:59:25.219: HSRP: Fa0/0 Grp 1 Standby router is unknown, was 10.0.0.2
*Mar 1 00:59:25.223: HSRP: Fa0/0 Nbr 10.0.0.2 no longer standby for group 1 (Active)
*Mar 1 00:59:25.223: HSRP: Fa0/0 Grp 1 Active -> Speak
*Mar 1 00:59:25.223: %HSRP-5-STATECHANGE: FastEthernet0/0 Grp 1 state Active ->
Speak
*Mar 1 00:59:25.223: HSRP: Fa0/0 Interface adv out, Passive, active 0 passive 1
*Mar 1 00:59:25.227: HSRP: Fa0/0 Grp 1 Redundancy "hsrp-Fa0/0-1" state Active ->
Speak
*Mar 1 00:59:25.231: HSRP: Fa0/0 Grp 1 Deactivating MAC 0000.0c07.ac01
*Mar 1 00:59:25.231: HSRP: Fa0/0 Grp 1 Removing 0000.0c07.ac01 from MAC address
filter
*Mar 1 00:59:25.235: HSRP: Fa0/0 Grp 1 MAC addr update Delete from SMF
0000.0c07.ac01
*Mar 1 00:59:25.235: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Speak pri 100 vIP 10.0.0.5
*Mar 1 00:59:25.239: HSRP: Fa0/0 IP Redundancy "hsrp-Fa0/0-1" update, Active ->
Speak
*Mar 1 00:59:25.247: HSRP: Fa0/0 Interface adv in, Active, active 1, passive 0, from
10.0.0.2
*Mar 1 00:59:25.247: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5
R3#
*Mar 1 00:59:28.199: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5
*Mar 1 00:59:28.239: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Speak pri 100 vIP 10.0.0.5
*Mar 1 00:59:31.183: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

```

```

R3#show standby
FastEthernet0/0 - Group 1
State is Standby
4 state changes, last state change 00:02:00
Virtual IP address is 10.0.0.5
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 2.560 secs
Preemption disabled
Active router is 10.0.0.2, priority 200 (expires in 8.580 sec)
Standby router is local
Priority 100 (default 100)
Group name is "hsrp-Fa0/0-1" (default)

```


R2:

R2#show standby

FastEthernet0/0 - Group 1

State is Active

5 state changes, last state change 00:00:41

Virtual IP address is 10.0.0.5

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 0.100 secs

Preemption enabled

Active router is local

Standby router is 10.0.0.3, priority 100 (expires in 8.204 sec)

Priority 200 (configured 200)

Group name is "hsrp-Fa0/0-1" (default)

R1:

R1#ping 100.100.100.100

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 100.100.100.100, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 76/96/124 ms

Task 4: Verify HSRP Failover using HSRP Tracking

Step 1 Shutdown the serial interface

R2:

```
interface serial 1/0  
shutdown
```

R2#show standby

FastEthernet0/0 - Group 1

State is Active

5 state changes, last state change 00:09:20

Virtual IP address is 10.0.0.5

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 0.596 secs

Preemption enabled

Active router is local

Standby router is 10.0.0.3, priority 100 (expires in 8.640 sec)

Priority 200 (configured 200)

Group name is "hsrp-Fa0/0-1" (default)

R3:

R3#debug standby

HSRP debugging is on

*Mar 1 01:07:38.231: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

R3#

*Mar 1 01:07:40.051: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

*Mar 1 01:07:40.255: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

R3#

*Mar 1 01:07:41.231: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

R3#

*Mar 1 01:07:43.255: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

*Mar 1 01:07:44.231: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

R3#

*Mar 1 01:07:46.291: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

*Mar 1 01:07:47.231: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

R3#

*Mar 1 01:07:49.247: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

*Mar 1 01:07:49.423: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Active pri 200 vIP 10.0.0.5

*Mar 1 01:07:50.231: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Standby pri 100 vIP 10.0.0.5

```
R3#show standby
FastEthernet0/0 - Group 1
State is Standby
4 state changes, last state change 00:10:16
Virtual IP address is 10.0.0.5
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 1.272 secs
Preemption disabled
Active router is 10.0.0.2, priority 200 (expires in 7.788 sec)
Standby router is local
Priority 100 (default 100)
Group name is "hsrp-Fa0/0-1" (default)
```

```
R1:
R1#ping 100.100.100.100
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 100.100.100.100, timeout is 2 seconds:

UUUUU

Success rate is 0 percent (0/5)

Step 2 Configure HSRP Track to track serial interface

```
R2:
int f0/0
standby 1 track serial 1/0 150
exit
```

```
interface serial 1/0
shutdown
```

*Mar 1 01:22:49.055: %TRACKING-5-STATE: 1 interface Se1/0 line-protocol Up->Down

*Mar 1 01:22:51.031: %LINK-5-CHANGED: Interface Serial1/0, changed state to administratively down

*Mar 1 01:22:52.031: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down

Step 6 Verify HSRP Failover of Router 3 form Standby state to Active state

```
R3:
R3#debug standby
HSRP debugging is on
R3#
*Mar 1 01:24:21.983: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
*Mar 1 01:24:22.951: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 50 vIP 10.0.0.5
R3#
*Mar 1 01:24:23.211: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
R3#
*Mar 1 01:24:24.983: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
*Mar 1 01:24:25.923: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 50 vIP 10.0.0.5
R3#
*Mar 1 01:24:27.983: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
R3#
*Mar 1 01:24:28.999: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 50 vIP 10.0.0.5
R3#
*Mar 1 01:24:30.983: HSRP: Fa0/0 Grp 1 Hello out 10.0.0.3 Active pri 100 vIP 10.0.0.5
*Mar 1 01:24:31.939: HSRP: Fa0/0 Grp 1 Hello in 10.0.0.2 Standby pri 50 vIP 10.0.0.5
R3#
```

```
R3#show standby
FastEthernet0/0 - Group 1
State is Active
5 state changes, last state change 00:01:36
Virtual IP address is 10.0.0.5
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 2.472 secs
Preemption enabled
Active router is local
Standby router is 10.0.0.2, priority 50 (expires in 7.428 sec)
Priority 100 (default 100)
Group name is "hsrp-Fa0/0-1" (default)
```

R2:

R2#show standby

FastEthernet0/0 - Group 1

State is Standby

7 state changes, last state change 00:00:58

Virtual IP address is 10.0.0.5

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 1.384 secs

Preemption enabled

Active router is 10.0.0.3, priority 100 (expires in 7.808 sec)

Standby router is local

Priority 50 (configured 200)

Track interface Serial1/0 state Down decrement 150

Group name is "hsrp-Fa0/0-1" (default)

R1:

R1#ping 100.100.100.100

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 100.100.100.100, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 60/87/108 ms