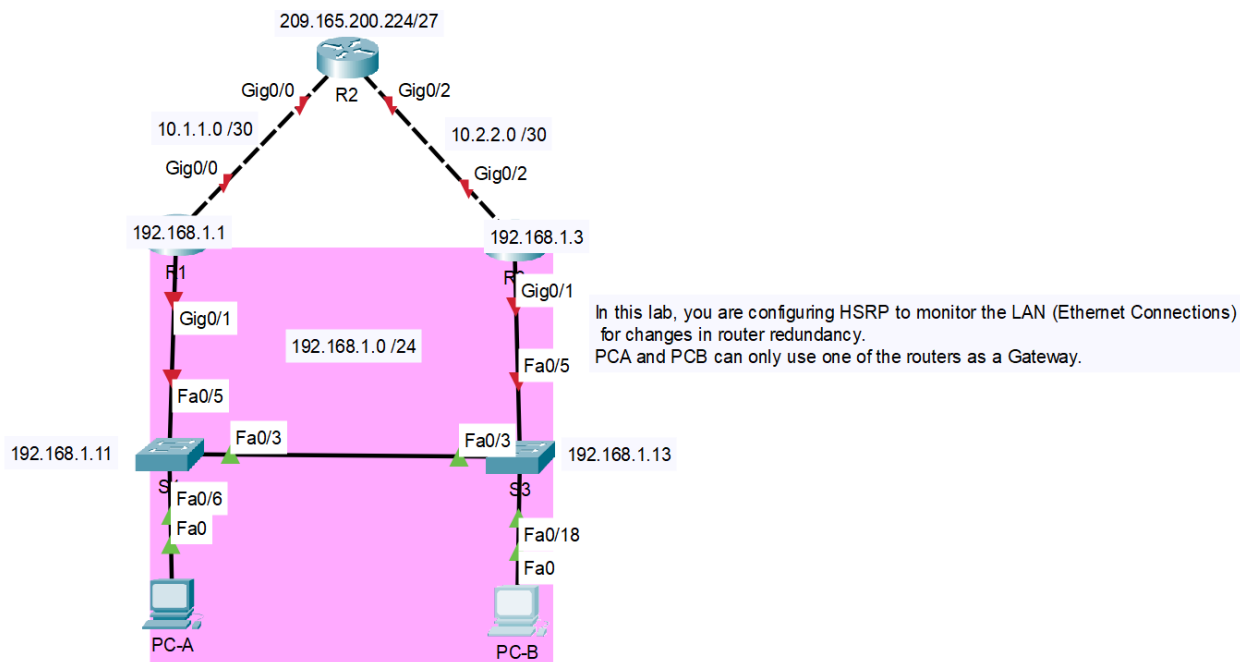


Hardware Lab 7 - Configuring HSRP and Static Routing E124 Users

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/1	192.168.1.1	255.255.255.0	N/A
	G0/0	10.1.1.1	255.255.255.252	N/A
R2	G0/0	10.1.1.2	255.255.255.252	N/A
	G0/2	10.2.2.2	255.255.255.252	N/A
	Lo1	209.165.200.225	255.255.255.224	N/A
R3	G0/1	192.168.1.3	255.255.255.0	N/A
	G0/2	10.2.2.1	255.255.255.252	N/A
S1	VLAN 1	192.168.1.11	255.255.255.0	192.168.1.1
S3	VLAN 1	192.168.1.13	255.255.255.0	192.168.1.3
PC-A	NIC	192.168.1.31	255.255.255.0	192.168.1.1
PC-C	NIC	192.168.1.33	255.255.255.0	192.168.1.3

Objectives

Part 1: Build the Network and Verify Connectivity

Part 2: Configure First Hop Redundancy using HSRP

Background / Scenario

Spanning tree provides loop-free redundancy between switches within a LAN. However, it does not provide redundant default gateways for end-user devices within the network if one of the routers fails. First Hop Redundancy Protocols (FHRPs) provide redundant default gateways for end devices with no end-user configuration necessary. In this lab, you will configure Cisco's Hot Standby Routing Protocol (HSRP), a First Hop Redundancy Protocol (FHRP).

Part 1: Build the Network and Verify Connectivity

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure PC hosts.

Step 3: Configure basic settings for each router.

- Configure the device name as shown in the topology.
- Configure IP addresses for the routers as listed in the Addressing Table.
- You can copy the configuration for **R2**, the text file is on BS.

Step 4: Verify connectivity between PC-A and PC-C.

Ping from PC-A to PC-C. Were the ping results successful? _____

If the pings are not successful, troubleshoot the basic device configurations before continuing.

Note: It may be necessary to disable the PC firewall to successfully ping between PCs.

Step 5: Configure routing.

Configure static routing on R1 to the missing networks (networks that are not connected to R1). Use slide 26 as a guide. A sample has been shown for R1, please work with your partner to complete the rest of the static routing for **R1 and R3**. There are two static routes needed per router. You can use next hop IP or exit interface.

```
R1(config)# ip route 10.2.2.0 255.255.255.252 10.1.1.2
```

Step 6: Verify connectivity.

- From PC-A, you should be able to ping every interface on R1, R2, R3, and PC-C. Were all pings successful? _____
If the pings are not successful, troubleshoot the basic device configurations before continuing.
- From PC-C, you should be able to ping every interface on R1, R2, R3, and PC-A. Were all pings successful? _____
If the pings are not successful, troubleshoot the basic device configurations before continuing.

Please go to Brightspace Quiz Page 1 HSRP and Static Routes Configuration and answer questions 1-3

Part 2: Configure First Hop Redundancy Using HSRP

Even though the topology has been designed with some redundancy (two routers and two switches on the same LAN network), both PC-A and PC-C are configured with only one gateway address. PC-A is using R1 and PC-C is using R3. If either of these routers or the interfaces on the routers went down, the PC could lose its connection to the Internet.

In Part 2, you will test how the network behaves both before and after configuring HSRP. To do this, you will determine the path that packets take to the loopback address on R2. You will answer questions on Moodle.

Step 1: Determine the path for Internet traffic for PC-A and PC-C.

From a command prompt on PC-A, issue a **tracert** command to the 209.165.200.225 loopback address of R2.

```
C:\ tracert 209.165.200.225
```

```
Tracing route to 209.165.200.225 over a maximum of 30 hops
```

```

  1         1 ms         1 ms         1 ms  192.168.1.1
  2        13 ms        13 ms        13 ms  209.165.200.225

```

Q4: What path did the packets take from PC-A to 209.165.200.225?

Q5: What path did the packets take from PC-C to 209.165.200.225?

Please go to the Brightspace Quiz Page 2 and answer questions 4 and 5.

Step 2: Start a ping session on PC-A, and break the connection between S1 and R1.

- a. From a command prompt on PC-A, issue a **ping -t** command to the **209.165.200.225** address on R2. Make sure you leave the command prompt window open.

Note: The pings continue until you press **Ctrl+C**, or until you close the command prompt window.

```
C:\ ping -t 209.165.200.225
```

```
Pinging 209.165.200.225 with 32 bytes of data:
```

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
```

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
```

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
```

```
<output omitted>
```

- b. As the ping continues, **disconnect** the Ethernet cable from F0/5 on S1. You can also shut down the S1 F0/5 interface, which creates the same result.

Q6: What happened to the ping traffic?

Q7: Would be the results if you repeat Steps 2a and 2b on PC-C and S3?

Please go to the Brightspace Quiz Page 2 and answer questions 6 and 7.

- c. **Reconnect** the Ethernet cables to F0/5 or enable the F0/5 interface on both S1 and S3, respectively. Re-issue pings to 209.165.200.225 from both PC-A and PC-C to make sure connectivity is re-established.

Step 3: Configure HSRP on R1 and R3.

In this step, you will configure HSRP and change the default gateway address on PC-A, PC-C, S1, and S2 to the virtual IP address for HSRP. R1 becomes the active router via configuration of the HSRP priority command.

a. **Configure HSRP on R1.**

```
R1(config)# interface g0/1
R1(config-if)# standby version 2
R1(config-if)# standby 1 ip 192.168.1.254
R1(config-if)# standby 1 priority 150
R1(config-if)# standby 1 preempt
```

b. **Configure HSRP on R3.**

```
R3(config)# interface g0/1
R3(config-if)# standby version 2
R3(config-if)# standby 1 ip 192.168.1.254
```

c. **Verify HSRP by issuing the show standby command on R1 and R3.**

```
R1# show standby
GigabitEthernet0/1 - Group 1 (version 2)
  State is Active
- - Output omitted - -
R3# show standby
GigabitEthernet0/1 - Group 1 (version 2)
  State is Standby
```

Using the output shown above, please go to the BS Quiz Page 3 answer questions 8 to 10 on Moodle.

Q8: Which router is the active router?

Q9: What is the MAC address for the virtual IP address?

Q10: What is the IP address and priority of the standby router?

d. **Use the show standby brief command on R1 and R3 to view an HSRP status summary. Sample output is shown below.**

```
R1# show standby brief
                P indicates configured to preempt.
                |
Interface  Grp  Pri P State  Active        Standby        Virtual IP
Gi0/1      1    150 P Active  local         192.168.1.3    192.168.1.254

R3# show standby brief
                P indicates configured to preempt.
                |
Interface  Grp  Pri P State  Active        Standby        Virtual IP
Gi0/1      1    100 Standby 192.168.1.1    local         192.168.1.254
```

Using the output shown above, please go to the BS Quiz Page 4 and answer questions 11-13.

e. **Change the default gateway address for PC-A, PC-C, S1, and S3.**

Q11 Which address should you use?

- f. Verify the new settings. Issue a ping from both PC-A and PC-C to the loopback address of R2.

Q12: Are the pings successful?

Step 4: Start a ping session on PC-A and break the connection between the switch that is connected to the Active HSRP router (R1).

- a. From a command prompt on PC-A, issue a **ping -t** command to the 209.165.200.225 address on R2. Ensure that you leave the command prompt window open.
- b. As the ping continues, disconnect the Ethernet cable from F0/5 on S1 or shut down the F0/5 interface.

Q13: What happened to the ping traffic?

Please type this answer for **Q13 on BS Quiz page 4**.

Step 5: Verify HSRP settings on R1 and R3.

- a. Issue the **show standby brief** command on R1 and R3.

Q14: Which router is the active router?

Reconnect the cable between the switch and the router or enable interface F0/5.

Q15: Now which router is the active router? Please type this answer for **Q15 on BS Quiz page 5**

Step 6: Change HSRP priorities **Slide 11 can help with the configuration for this step.**

- a. **Change** the HSRP priority to 200 on R3. Which is the active router? _____
- b. Issue the command to **change the active router** to R3 without changing the priority.
- c. Use a **show** command to verify that R3 is the active router.

For this task, please show your lecturer the changes you have made for HSRP priority and verify connectivity using pings.

Q16: Please verify your HSRP configuration to your Lecturer to obtain a grade.