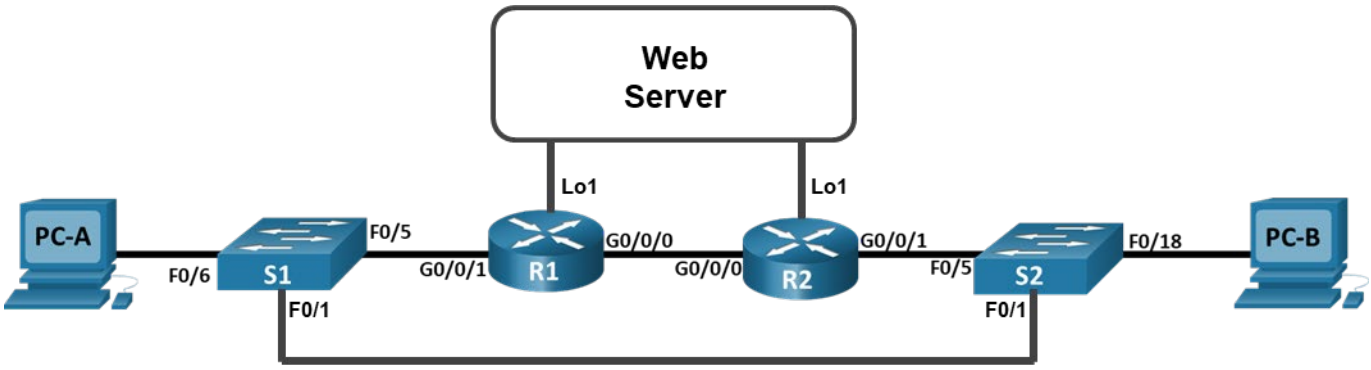
Networking Academy

LAB - HSRP Configuration



Addressing Table

Device	Interface	IP Address	Default Gateway
R1	G0/0	10.1.1.1/30	N/A
	G0/1	192.168.1.1/24	
	Lo1 (Web Server)	206.165.200.226/27	
R2	G0/0	10.1.1.2/30	N/A
	G0/1	192.168.1.2/24	
	Lo1 (Web Server)	206.165.200.226/27	
HSRP Virtual Gateway	Virtual	192.168.1.254/24	N/A
S1	VLAN 1	192.168.1.11/24	192.168.1.1
S2	VLAN 1	192.168.1.12/24	192.168.1.2
PC-A	NIC	192.168.1.101/24	192.168.1.1
PC-B	NIC	192.168.1.102/24	192.168.1.2

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Objectives

In this Packet Tracer activity, you will learn how to configure Hot Standby Router Protocol (HSRP) to provide redundant default gateway devices to hosts on LANs. After configuring HSRP, you will test the configuration to verify that hosts are able to use the redundant default gateway if the current gateway device becomes unavailable.

- Configure an HSRP active router.
- Configure an HSRP standby router.
- Verify HSRP operation.

Background / Scenario

Spanning Tree Protocol 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 a gateway router fails. First Hop Redundancy Protocols (FHRPs) provide redundant default gateways for end devices with no additional end-user configuration necessary. By using a FHRP, two or more routers can share the same virtual IP address and MAC address and can act as a single virtual router. Hosts on the network are configured with a shared IP address as their default gateway. In this Packet Tracer activity, you will configure Cisco's Hot Standby Router Protocol (HSRP), which is an FHRP.

You will configure HSRP on routers R1 and R2, which serve as the default gateways for the hosts on VLAN 1. When you configure HSRP, you will create a virtual gateway that uses the same default gateway address for hosts in the VLAN. If one gateway router becomes unavailable, the second router will take over using the same default gateway address that was used by the first router. Because the hosts on the LAN are configured with the IP address of the virtual gateway as the default gateway, the hosts will regain connectivity to remote networks after HSRP activates the remaining router.

Instructions

Part 1: Build the Network and Configure Basic Device Settings

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 basic settings for each router and switch.

a. Erase the startup-config and delete vlan.dat (S1, S2)

b. Assign a device name to each router and switch.

c. Configure the **IP address listed in the Addressing Table for the interfaces and VLAN1**.

d. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.

e. Assign **class** as the privileged EXEC encrypted password.

f. Assign **cisco** as the console password and enable login.

g. Assign **cisco** as the VTY password and enable login.

h. Encrypt the plaintext passwords.

i. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.

j. Save the running configuration to the startup configuration file.

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k. Set the clock on the router to today's time and date.

Note: Use the question mark (**?**) to help with the correct sequence of parameters needed to execute this command.

Step 3: Verify Configure PC hosts.

Refer to the Addressing Table for PC host address information.

Part 2: Connectivity

Step 1: Trace the path to the Web Server from PC-A.

a. Go to the desktop of PC-A and open a command prompt.

b. Trace the path from PC-A to the Web Server by executing the **tracert 209.165.200.226** command.

Which devices are on the path from PC-A to the Web Server? Use the addressing table to determine the device names.

Step 2: Trace the path to the Web Server from PC-B.

Repeat the process in Step 1 from PC-B.

Which devices are on the path from PC-B to the Web Server?

Step 3: Observe the network behavior when R2 becomes unavailable.

a. Unplug the link between **R2** and **S2**.

b. Open a command prompt on PC-B. Execute the **tracert** command with the Web Server as the destination.

c. Compare the current output with the output of the command from Step 2.

What are the results?

d. Reconnect the link between R2 and S2.

e. After the link lights on the connection are both green, test the connection by pinging the Web Server. The ping should be successful.

Part 3: Configure HSRP Active and Standby Routers

Step 1: Configure HSRP on R1.

a. Configure HSRP on the G0/1 LAN interface of R1.

b. Specify the HSRP protocol version number. The most recent version is version **2**.

c. Configure the IP address of the virtual default gateway. This address must be configured on any hosts that require the services of the default gateway. It replaces the physical interface address of the router that has been previously configured on the hosts.

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Multiple instances of HSRP can be configured on a router. You must specify the HSRP group number to identify the virtual interface between routers in a HSRP group. This number must be consistent between the routers in the group. The group number for this configuration is **1**.

d. Designate the active router for the HSRP group. It is the router that will be used as the gateway device unless it fails or the path to it becomes inactive or unusable. Specify the priority for the router interface. The default value is **100**. A higher value will determine which router is the active router. If the priorities of the routers in the HSRP group are the same, then the router with the highest configured IP address will become the active router.

   R1 will operate as the active router and traffic from the two LANs will use it as the default gateway.

e. If it is desirable that the active router resume that role when it becomes available again, configure it to preempt the service of the standby router. The active router will take over the gateway role when it becomes operable again.

   What will the HSRP priority of R2 be when it is added to HSRP group 1?

Step 2: Configure HSRP on R2.

Configure R2 as the standby router.

a. Configure the R2 interface that is connected to LAN.

b. Repeat only steps 1b and 1c above.

Step 3: Verify HSRP Configuration

a. Verify HSRP by issuing the **show standby** command on R1 and R2. Verify the values for HSRP role, group, virtual IP address of the gateway, preemption, and priority. Note that HSRP also identifies the active and standby router IP addresses for the group.

   Using the output shown above, answer the following questions:

   Which router is the active router?

   What is the MAC address for the virtual IP address?

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

b. Use the **show standby brief** command on R1 and R2 to view an HSRP status summary.

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

   Which address should you use?

   Verify the new settings. Issue a ping from both PC-A and PC-C to the Web Server. Are the pings successful?

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Part 4: Observe HSRP Operation

Step 1: Make the active router become unavailable.

Open a command prompt on **PC-B** and enter the command **tracert 209.165.200.226**.

Does the path differ from the path used before HSRP was configured?

Step 2: Break the link to R1.

a. Unplug the cable that connects R1 to S1.

b. Immediately return to PC-B and execute the **tracert 209.165.200.226** command again. Observe the output of the command until the command completes execution. You may need to repeat the trace to see the full path.

How was this trace different from the previous trace?

HSRP undergoes a process to determine which router should take over when the active router becomes unavailable. This process takes time. Once the process is complete, the R2 standby router becomes active and is used as the default gateway for hosts on VLAN 1.

Step 3: Restore the link to R1.

a. Re-connect R1 to S1 cable.

b. Execute a trace from PC-B to the Web Server. You may need to repeat the trace to see the full path.

What path is used to reach the Web Server?

If the preempt command was not configured for the HSRP group on R1, would the results have been the same?

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