**Liberty University**

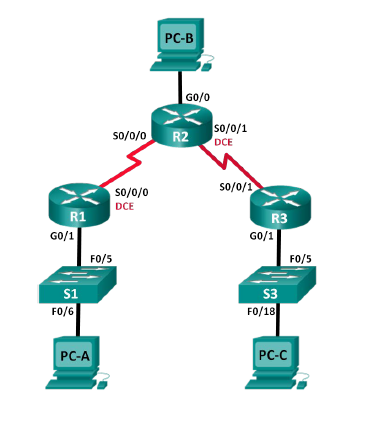
**CSIS 331**

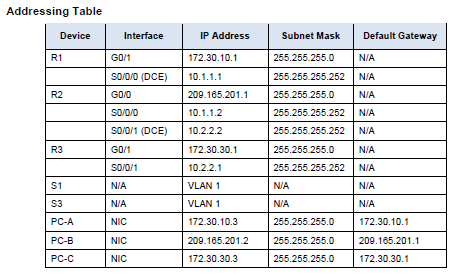
**Lab 10 Instructions**

**\*\*\*Please use the Topology and Instructions below to create a Packet Tracer from scratch. There will not be a Packet Tracer provided for you, you must create it new. If the routers do not have enough interfaces; you will need to go to the physical tab of the router and add the correct interface card to the existing router. Make sure the router is powered down while this is going on. Please reach out to your instructor if you have issues.\*\*\***

**Packet Tracer:**

*[Adapted from Cisco Networking Academy Routing and Switching 3.2.1.9]*





**Objectives**

**Configure and Verify RIPv2 Routing**

• Configure RIPv2 on the routers and verify that it is running.

• Configure a passive interface.

• Examine routing tables.

• Disable automatic summarization.

• Configure a default route.

• Verify end-to-end connectivity.

**Background / Scenario**

RIP version 2 (RIPv2) is used for routing of IPv4 addresses in small networks. RIPv2 is a classless, distance-vector routing protocol, as defined by RFC 1723. Because RIPv2 is a classless routing protocol, subnet masks are included in the routing updates. By default, RIPv2 automatically summarizes networks at major network boundaries. When automatic summarization has been disabled, RIPv2 no longer summarizes networks to their classful address at boundary routers.

In this lab, you will configure the network topology with RIPv2 routing, disable automatic summarization, propagate a default route, and use CLI commands to display and verify RIP routing information.

**Configure and Verify RIPv2 Routing**

You will now configure RIPv2 routing on all routers in the network and then verify that the routing tables are updated correctly. After RIPv2 has been verified, you will disable automatic summarization, configure a default route, and verify end-to-end connectivity.

PCs are unable to ping each other.

a. Each workstation should be able to ping the attached router. Verify and troubleshoot if necessary.

b. The routers should be able to ping one another.

**Step 1: Configure RIPv2 routing.**

a. Configure RIPv2 on R1as the routing protocol and advertise the appropriate connected networks.

R1# config t

R1(config)# router rip

R1(config-router)# version 2

R1(config-router)# passive-interface g0/1

R1(config-router)# network 172.30.0.0

R1(config-router)# network 10.0.0.0

The passive-interfacecommand stops routing updates out the specified interface. This process prevents unnecessary routing traffic on the LAN. However, the network that the specified interface belongs to is still advertised in routing updates that are sent out across other interfaces.

b. Configure RIPv2 on R3 and use the networkstatement to add the appropriate connected networks and prevent routing updates on the LAN interface.

c. Configure RIPv2 on R2 and use the network statements to add the appropriate connected networks. Do not advertise the 209.165.201.0 network.

**Note**: It is not necessary to make the G0/0 interface passive on R2 because the network associated with this interface is not being advertised.

**Step 2: Examine the current state of the network.**

a. The status of the two serial links can quickly be verified using the show ip interface briefcommand on R2.

R2# show ip interface brief

Interface IP-Address OK? Method Status Protocol

Embedded-Service-Engine0/0 unassigned YES unset administratively down down

GigabitEthernet0/0 209.165.201.1 YES manual up up

GigabitEthernet0/1 unassigned YES unset administratively down down

Serial0/0/0 10.1.1.2 YES manual up up

Serial0/0/1 10.2.2.2 YES manual up up

b. Check connectivity between PCs. List your finding in the ping table.

**From PC-A, is it possible to ping PC-B? Why?**

**From PC-A, is it possible to ping PC-C? Why?**

**From PC-C, is it possible to ping PC-B? Why?**

**From PC-C, is it possible to ping PC-A? Why?**

c. Verify that RIPv2 is running on the routers.

You can use the debug ip rip, show ip protocols, and show runcommands to confirm that RIPv2 is running. The show ip protocolscommand output for R1 is shown below.

R1# show ip protocols

Routing Protocol is "rip"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Sending updates every 30 seconds, next due in 7 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Redistributing: rip

Default version control: send version 2, receive 2

Interface Send Recv Triggered RIP Key-chain

Serial0/0/0 2 2

Automatic network summarization is in effect

Maximum path: 4

Routing for Networks:

10.0.0.0

172.30.0.0

Passive Interface(s):

GigabitEthernet0/1

Routing Information Sources:

Gateway Distance Last Update

10.1.1.2 120

Distance: (default is 120)

**Answer question 1 on the Answer Sheet.**

When you are finished observing the debugging outputs, issue the undebug all command at the privileged EXEC prompt.

**Answer question 2 on the Answer Sheet.**

d. Examine the automatic summarization of routes.

The LANs connected to R1 and R3 are composed of discontiguous networks. R2 displays two equal-cost paths to the 172.30.0.0/16 network in the routing table. R2 displays only the major classful network address of 172.30.0.0 and does not display any of the subnets for this network.

R2# show ip route

<Output omitted>

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.1.1.0/30 is directly connected, Serial0/0/0

L 10.1.1.2/32 is directly connected, Serial0/0/0

C 10.2.2.0/30 is directly connected, Serial0/0/1

L 10.2.2.2/32 is directly connected, Serial0/0/1

R 172.30.0.0/16 [120/1] via 10.2.2.1, 00:00:23, Serial0/00/1

[120/1] via 10.1.1.1, 00:00:09, Serial0/0/0

209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks

C 209.165.201.0/24 is directly connected, GigabitEthernet0/0

L 209.165.201.1/32 is directly connected, GigabitEthernet0/0

R1 displays only its own subnet for the 172.30.10.0/24 network. R1 does not have a route for the 172.30.30.0/24 subnet on R3.

R1# show ip route

<Output omitted>

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.1.1.0/30 is directly connected, Serial0/0/0

L 10.1.1.1/32 is directly connected, Serial0/0/0

R 10.2.2.0/30 [120/1] via 10.1.1.2, 00:00:21, Serial0/0/0

172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 172.30.10.0/24 is directly connected, GigabitEthernet0/1

L 172.30.10.1/32 is directly connected, GigabitEthernet0/1

R3 only displays its own subnet for the 172.30.30.0/24 network. R3 does not have a route for the 172.30.10.0/24 subnets on R1.

R3# show ip route

<Output omitted>

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.2.2.0/30 is directly connected, Serial0/0/1

L 10.2.2.1/32 is directly connected, Serial0/0/1

R 10.1.1.0/30 [120/1] via 10.2.2.2, 00:00:23, Serial0/0/1

172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 172.30.30.0/24 is directly connected, GigabitEthernet0/1

L 172.30.30.1/32 is directly connected, GigabitEthernet0/1

**Use the debug ip rip command on R2 to determine the routes received in the RIP updates from R3 and list it on Question 3 Answer Sheet.**

R3 is not sending any of the 172.30.0.0 subnets, only the summarized route of 172.30.0.0/16, including the subnet mask. Therefore, the routing tables on R1 and R2 do not display the 172.30.0.0 subnets on R3.

**Step 3: Disable automatic summarization.**

a. The no auto-summarycommand is used to turn off automatic summarization in RIPv2. Disable auto summarization on all routers. The routers will no longer summarize routes at major classful network boundaries. R1 is shown here as an example.

R1(config)# **router rip**

R1(config-router)# **no auto-summary**

b. Issue the clear ip route \*command to clear the routing table.

R1(config-router)# **end**

R1# **clear ip route \***

c. Examine the routing tables. Remember that it will take some time to converge the routing tables after clearing them.

The LAN subnets connected to R1 and R3 should now be included in all three routing tables.

R2# show ip route

<Output omitted>

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks

C 10.1.1.0/30 is directly connected, Serial0/0/0

L 10.1.1.2/32 is directly connected, Serial0/0/0

C 10.2.2.0/30 is directly connected, Serial0/0/1

L 10.2.2.2/32 is directly connected, Serial0/0/1

172.30.0.0/16 is variably subnetted, 3 subnets, 2 masks

R 172.30.0.0/16 [120/1] via 10.2.2.1, 00:01:01, Serial0/0/1

[120/1] via 10.1.1.1, 00:01:15, Serial0/0/0

R 172.30.10.0/24 [120/1] via 10.1.1.1, 00:00:21, Serial0/0/0

R 172.30.30.0/24 [120/1] via 10.2.2.1, 00:00:04, Serial0/0/1

209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks

C 209.165.201.0/24 is directly connected, GigabitEthernet0/0

L 209.165.201.1/32 is directly connected, GigabitEthernet0/0

R1# show ip route

<Output omitted>

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.1.1.0/30 is directly connected, Serial0/0/0

L 10.1.1.1/32 is directly connected, Serial0/0/0

R 10.2.2.0/30 [120/1] via 10.1.1.2, 00:00:12, Serial0/0/0

172.30.0.0/16 is variably subnetted, 3 subnets, 2 masks

C 172.30.10.0/24 is directly connected, GigabitEthernet0/1

L 172.30.10.1/32 is directly connected, GigabitEthernet0/1

R 172.30.30.0/24 [120/2] via 10.1.1.2, 00:00:12, Serial0/0/0

R3# show ip route

<Output omitted>

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.2.2.0/30 is directly connected, Serial0/0/1

L 10.2.2.1/32 is directly connected, Serial0/0/1

R 10.1.1.0/30 [120/1] via 10.2.2.2, 00:00:23, Serial0/0/1

172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks

C 172.30.30.0/24 is directly connected, GigabitEthernet0/1

L 172.30.30.1/32 is directly connected, GigabitEthernet0/1

R 172.30.10.0 [120/2] via 10.2.2.2, 00:00:16, Serial0/0/1

d. Use the debug ip ripcommand on R2 to examine the RIP updates.

R2# debug ip rip

After 60 seconds, issue the **no debug ip rip** command.

**Answer Questions 4 and 5 on the Answer Sheet.**

**Step 4: Configure and redistribute a default route for Internet access.**

a. From R2, create a static route to network 0.0.0.0 0.0.0.0, using the ip routecommand. This forwards any traffic with an unknown destination address to PC-B at 209.165.201.2, simulating the Internet by setting a Gateway of Last Resort on router R2.

R2(config)# ip route 0.0.0.0 0.0.0.0 209.165.201.2

b. R2 will advertise a route to the other routers if the default-information originate command is added to its RIP configuration.

R2(config)# router rip

R2(config-router)# default-information originate

**Step 5: Verify the routing configuration.**

a. View the routing table on R1.

R1# show ip route

<Output omitted>

Gateway of last resort is 10.1.1.2 to network 0.0.0.0

R\* 0.0.0.0/0 [120/1] via 10.1.1.2, 00:00:13, Serial0/0/0

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks

C 10.1.1.0/30 is directly connected, Serial0/0/0

L 10.1.1.1/32 is directly connected, Serial0/0/0

R 10.2.2.0/30 [120/1] via 10.1.1.2, 00:00:13, Serial0/0/0

172.30.0.0/16 is variably subnetted, 3 subnets, 2 masks

C 172.30.10.0/24 is directly connected, GigabitEthernet0/1

L 172.30.10.1/32 is directly connected, GigabitEthernet0/1

R 172.30.30.0/24 [120/2] via 10.1.1.2, 00:00:13, Serial0/0/0

**Answer Question 6 on the Answer Sheet.**

b. View the routing table on R2.

**Answer Question 7 on the Answer Sheet.**

**Step 6: Verify connectivity.**

a. Simulate sending traffic to the Internet by pinging from PC-A and PC-C to 209.165.201.2.

**Answer Question 8 on the Answer Sheet.**

b. Verify that hosts within the subnetted network can reach each other by pinging between PC-A and PC-C.

**Answer Question 9 on the Answer Sheet.**

**Note**: It may be necessary to disable the PCs firewall.

**Answer the Reflection Questions 1 and 2 , Paste R1, R2 and R3 Output onto the Answer Sheet.**