Experiment No. 9

## Configuring Basic RIPv2 and RIPng

LEARNING OBJECTIVE:

Upon completion of this lab, you will be able to:

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Configure and Verify RIPv2 Routing

- Configure and verify RIPv2 is running on routers.
- Configure a passive interface.
- Examine routing tables.
- Disable automatic summarization.
- Configure a default route.
- Verify end-to-end connectivity.

TOPOLOGY
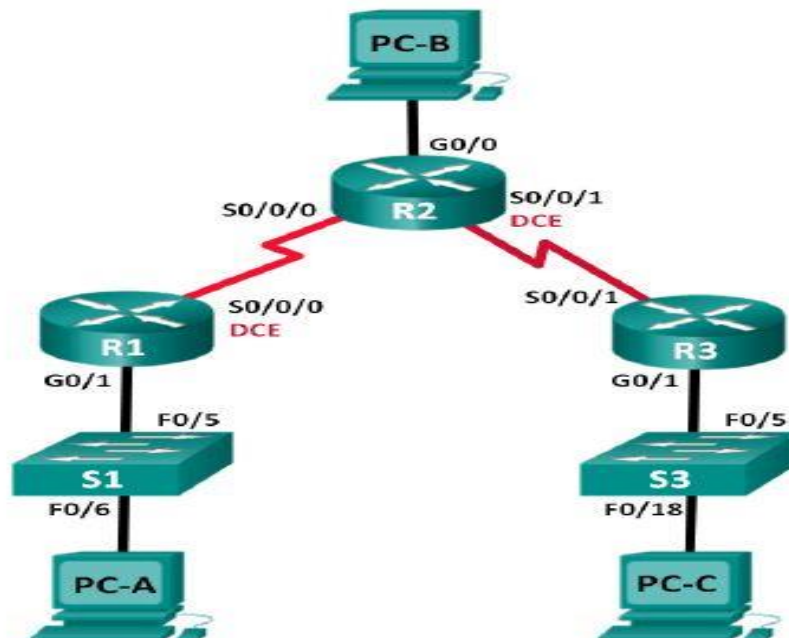
ADDRESSING TABLE:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/1	172.30.10.1	255.255.255.0	N/A
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A
R2	G0/0	209.165.201.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A
R3	G0/1	172.30.30.1	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
S1	N/A	VLAN 1	N/A	N/A
S3	N/A	VLAN 1	N/A	N/A
PC-A	NIC	172.30.10.3	255.255.255.0	172.30.10.1
PC-B	NIC	209.165.201.2	255.255.255.0	209.165.201.1
PC-C	NIC	172.30.30.3	255.255.255.0	172.30.30.1

Background Scenario:

RIP version 2 (RIPv2) is used for routing of IPv4 addresses in small networks. RIPv2 is a classless, distancevector 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.

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings.

Step 1: Cable the network as shown in the topology.
Step 2: Initialize and reload the router and switch.

Step 3: Configure basic settings for each router and switch.

a. Disable DNS lookup.
b. Configure device names as shown in the topology.
c. Configure password encryption.
d. Assign **class** as the privileged EXEC password.

e. Assign **cisco** as the console and vty passwords.

f. Configure a MOTD banner to warn users that unauthorized access is prohibited.

g. Configure **logging synchronous** for the console line.

h. Configure the IP address listed in the Addressing Table for all interfaces.

i. Configure a description to each interface with an IP address.

j. Configure the clock rate if applicable to the DCE serial interface.

k. Copy the running-configuration to the startup-configuration.

Step 4: Configure PC hosts.

Refer to the Addressing Table for PC host address information.

Step 5: Test connectivity.

At this point, the 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. Verify and troubleshoot if necessary.

Part 2: Configure and Verify RIPv2 Routing

In Part 2, you will configure RIPv2 routing on all routers in the network and then verify that 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.

Step 1: Configure RIPv2 routing.

a. On R1, configure RIPv2 as the routing protocol and advertise the appropriate 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-interface** command 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 **network** statement to add appropriate networks and prevent routing updates on the LAN interface.

c. Configure RIPv2 on R2. 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 current state of network.

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

> `R2#` **show ip interface brief**

b. Check connectivity between PCs.

> From PC-A, is it possible to ping PC-B? _____ Why?
>
> No, R2 is not advertising the route to PC-B.

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

> No, R1 and R3 do not have routes to the specific subnets on the remote router.

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

> No, R2 is not advertising the route to PC-B.

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

> No, R1 and R3 do not have routes to the specific subnets on the remote router.

c. Verify that RIPv2 is running on the routers.

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

d. Examine the automatic summarization of routes.

> `R1#` **show ip protocols**

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**

R1 displays only its own subnets for the 172.30.0.0 network. R1 does not have any routes for the 172.30.0.0 subnets on R3.

> `R1#` **show ip route**

R3 only displays its own subnets for the 172.30.0.0 network. R3 does not have any routes for the 172.30.0.0 subnets on R1

> `R3#` **show ip route**

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-summary** command 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 will it 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
```

```
R1# show ip route
```

```
R3# show ip route
```

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 route** command. This forwards any unknown destination address traffic to the R2 G0/0 toward PC-B, simulating the Internet by setting a Gateway of Last Resort on the R2 router.

```
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
```

Step 6: Verify connectivity.

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

Were the pings successful? _____ Yes / No

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

Were the pings successful? _____ Yes / No

Reflection

1. Why would you turn off automatic summarization for RIPv2?

_____

_____

_____

2. In both scenarios, how did R1 and R3 learn the pathway to the Internet?

_____

_____

_____

CONCLUSION & COMMENTS: