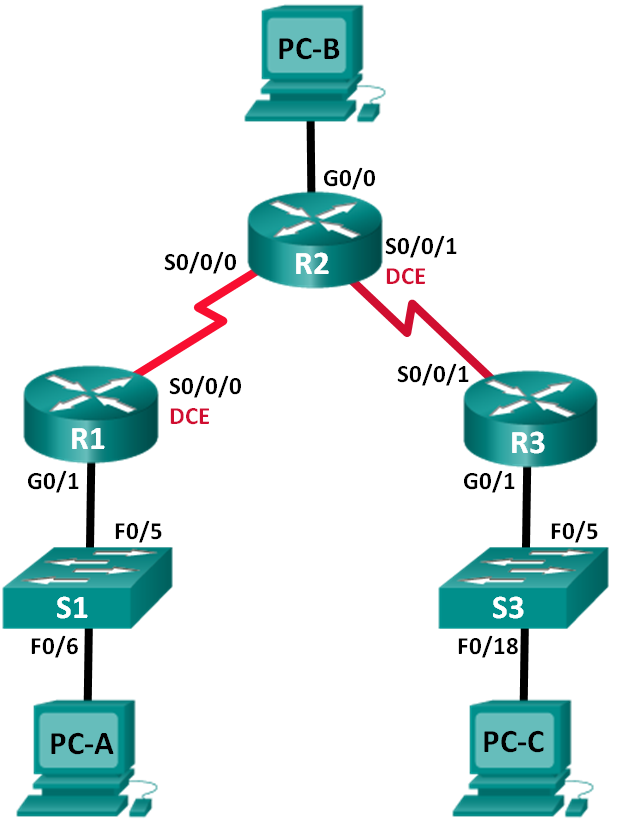
Lab – Configuring Basic RIPv2 and RIPng (Instructor Version)

**Instructor Note**: Red font color or Gray highlights indicate text that appears in the instructor copy only.

1. Topology



1. 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 |

1. Objectives

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.

Part 3: Configure IPv6 on Devices

Part 4: Configure and Verify RIPng Routing

* Configure and verify RIPng is running on routers.
* Examine routing tables.
* Configure a default route.
* Verify end-to-end connectivity.

1. 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.

RIPng (RIP Next Generation) is a distance-vector routing protocol for routing IPv6 addresses, as defined by RFC 2080. RIPng is based on RIPv2 and has the same administrative distance and 15-hop limitation.

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. You will then configure the network topology with IPv6 addresses, configure RIPng, propagate a default route, and use CLI commands to display and verify RIPng routing information.

**Note**: The routers used with CCNA hands-on labs are Cisco 1941 Integrated Services Routers (ISRs) with Cisco IOS Release 15.2(4)M3 (universalk9 image). The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

**Note**: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Instructor Note**: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

1. Required Resources

* 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
* 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
* 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet and Serial cables as shown in the topology

1. Build the Network and Configure Basic Device Settings

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

* 1. Cable the network as shown in the topology.
  2. Initialize and reload the router and switch.
  3. Configure basic settings for each router and switch.
     1. Disable DNS lookup.
     2. Configure device names as shown in the topology.
     3. Configure password encryption.
     4. Assign **class** as the privileged EXEC password.
     5. Assign **cisco** as the console and vty passwords.
     6. Configure a MOTD banner to warn users that unauthorized access is prohibited.
     7. Configure **logging synchronous** for the console line.
     8. Configure the IP address listed in the Addressing Table for all interfaces.
     9. Configure a description to each interface with an IP address.
     10. Configure the clock rate if applicable to the DCE serial interface.
     11. Copy the running-configuration to the startup-configuration.
  4. Configure PC hosts.

Refer to the Addressing Table for PC host address information.

* 1. Test connectivity.

At this point, the PCs are unable to ping each other.

* + 1. Each workstation should be able to ping the attached router. Verify and troubleshoot if necessary.
    2. The routers should be able to ping one another. Verify and troubleshoot if necessary.

1. 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.

* 1. Configure RIPv2 routing.
     1. 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.

* + 1. Configure RIPv2 on R3 and use the **network** statement to add appropriate networks and prevent routing updates on the LAN interface.
    2. 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.

* 1. Examine current state of network.
     1. 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**

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

* + 1. 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.

* + 1. 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.

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)

When issuing the **debug ip rip** command on R2, what information is provided that confirms RIPv2 is running?

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RIP: sending v2 updates to 224.0.0.9 via Serial 0/0/0 (10.1.1.2).

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

When issuing the **show run** command on R3, what information is provided that confirms RIPv2 is running?

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**router rip**

**version 2**

* + 1. 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, Serial0/0/1

[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 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**

<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 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**

<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 them here.

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172.30.0.0/16

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.

* 1. Disable automatic summarization.
     1. 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**

* + 1. Issue the **clear ip route \*** command to clear the routing table.

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

R1# **clear ip route \***

* + 1. 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**

<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

* + 1. Use the **debug ip rip** command on R2 to exam the RIP updates.

**R2# debug ip rip**

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

What routes are in the RIP updates that are received from R3?

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172.30.30.0/24

Are the subnet masks now included in the routing updates? \_\_\_\_\_\_\_\_\_ yes

* 1. Configure and redistribute a default route for Internet access.
     1. 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**

* + 1. 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**

* 1. Verify the routing configuration.
     1. 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

How can you tell from the routing table that the subnetted network shared by R1 and R3 has a pathway for Internet traffic?

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There is a Gateway of Last Resort, and the default route shows up in the table as being learned via RIP.

* + 1. View the routing table on R2.

How is the pathway for Internet traffic provided in its routing table?

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R2 has a static default route to 0.0.0.0 via 209.165.201.2, which is directly connected to G0/0.

* 1. Verify connectivity.
     1. Simulate sending traffic to the Internet by pinging from PC-A and PC-C to 209.165.201.2.

Were the pings successful? \_\_\_\_\_\_ Yes

* + 1. Verify that hosts within the subnetted network can reach each other by pinging between PC-A and PC-C.

Were the pings successful? \_\_\_\_\_\_ Yes

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

1. Configure IPv6 on Devices

In Part 3, you will configure all interfaces with IPv6 addresses and verify connectivity.

1. Addressing Table

|  |  |  |  |
| --- | --- | --- | --- |
| Device | Interface | IPv6 Address / Prefix Length | Default Gateway |
| R1 | G0/1 | 2001:DB8:ACAD:A::1/64  FE80::1 link-local | N/A |
|  | S0/0/0 | 2001:DB8:ACAD:12::1/64  FE80::1 link-local | N/A |
| R2 | G0/0 | 2001:DB8:ACAD:B::2/64  FE80::2 link-local | N/A |
|  | S0/0/0 | 2001:DB8:ACAD:12::2/64  FE80::2 link-local | N/A |
|  | S0/0/1 | 2001:DB8:ACAD:23::2/64  FE80::2 link-local | N/A |
| R3 | G0/1 | 2001:DB8:ACAD:C::3/64  FE80::3 link-local | N/A |
|  | S0/0/1 | 2001:DB8:ACAD:23::3/64  FE80::3 link-local | N/A |
| PC-A | NIC | 2001:DB8:ACAD:A::A/64 | FE80::1 |
| PC-B | NIC | 2001:DB8:ACAD:B::B/64 | FE80::2 |
| PC-C | NIC | 2001:DB8:ACAD:C::C/64 | FE80::3 |

* 1. Configure PC hosts.

Refer to the Addressing Table for PC host address information.

* 1. Configure IPv6 on routers.

**Note**: Assigning an IPv6 address in addition to an IPv4 address on an interface is known as dual stacking. This is because both IPv4 and IPv6 protocol stacks are active.

* + 1. For each router interface, assign the global and link local address from the Addressing Table.
    2. Enable IPv6 routing on each router.
    3. Enter the appropriate command to verify IPv6 addresses and link status. Write the command in the space below.

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**show ipv6 interface brief**

R1# **show ipv6 interface brief**

GigabitEthernet0/0 [administratively down/down]

GigabitEthernet0/1 [up/up]

FE80::1

2001:DB8:ACAD:A::1

Serial0/0/0 [up/up]

FE80::1

2001:DB8:ACAD:12::1

Serial0/0/1 [administratively down/down]

* + 1. Each workstation should be able to ping the attached router. Verify and troubleshoot if necessary.
    2. The routers should be able to ping one another. Verify and troubleshoot if necessary.

1. Configure and Verify RIPng Routing

In Part 4, you will configure RIPng routing on all routers, verify that routing tables are updated correctly, configure and distribute a default route, and verify end-to-end connectivity.

* 1. Configure RIPng routing.

With IPv6, it is common to have multiple IPv6 addresses configured on an interface. The network statement has been eliminated in RIPng. RIPng routing is enabled at the interface level instead, and is identified by a locally significant process name as multiple processes can be created with RIPng.

* + 1. Issue the **ipv6 rip Test1 enable** command for each interface on R1 that is to participate in RIPng routing, where **Test1** is the locally significant process name.

R1(config)# **interface g0/1**

R1(config)# **ipv6 rip Test1 enable**

R1(config)# **interface s0/0/0**

R1(config)# **ipv6 rip Test1 enable**

* + 1. Configure RIPng for the serial interfaces on R2 with **Test2** as the process name. Do not configure for the G0/0 interface.

R2(config)# **interface s0/0/0**

R2(config)# **ipv6 rip Test2 enable**

R2(config)# **interface s0/0/1**

R2(config)# **ipv6 rip Test2 enable**

* + 1. Configure RIPng for each interface on R3 with **Test3** as the process name.

R3(config)# **interface g0/1**

R3(config)# **ipv6 rip Test3 enable**

R3(config)# **interface s0/0/1**

R3(config)# **ipv6 rip Test3 enable**

* + 1. Verify that RIPng is running on the routers.

The **show ipv6 protocols**, **show run**, **show ipv6 rip database**, and **show ipv6 rip** *process name* commands can all be used to confirm that RIPng is running. On R1, issue the **show ipv6 protocols** command.

R1# **show ipv6 protocols**

IPv6 Routing Protocol is "connected"

IPv6 Routing Protocol is "ND"

IPv6 Routing Protocol is "rip Test1"

Interfaces:

Serial0/0/0

GigabitEthernet0/1

Redistribution:

None

How is the RIPng listed in the output?

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RIPng is listed by process name.

* + 1. Issue the **show ipv6 rip Test1** command.

R1# **show ipv6 rip Test1**

RIP process "Test1", port 521, multicast-group FF02::9, pid 314

Administrative distance is 120. Maximum paths is 16

Updates every 30 seconds, expire after 180

Holddown lasts 0 seconds, garbage collect after 120

Split horizon is on; poison reverse is off

Default routes are not generated

Periodic updates 1, trigger updates 0

Full Advertisement 0, Delayed Events 0

Interfaces:

GigabitEthernet0/1

Serial0/0/0

Redistribution:

None

How are RIPv2 and RIPng similar?

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\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answers will vary. Both RIPV2 and RIPng have an administrative distance of 120, use hop count as the metric, and send updates every 30 seconds.

* + 1. Inspect the IPv6 routing table on each router. Write the appropriate command used to view the routing table in the space below.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**show ipv6 route**

R1# **show ipv6 route**

IPv6 Routing Table - 7 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2

D - EIGRP, EX - EIGRP external

C 2001:DB8:ACAD:A::/64 [0/0]

via ::, GigabitEthernet0/1

L 2001:DB8:ACAD:A::1/128 [0/0]

via ::, GigabitEthernet0/1

R 2001:DB8:ACAD:C::/64 [120/3]

via FE80::2, Serial0/0/0

C 2001:DB8:ACAD:12::/64 [0/0]

via ::, Serial0/0/0

L 2001:DB8:ACAD:12::1/128 [0/0]

via ::, Serial0/0/0

R 2001:DB8:ACAD:23::/64 [120/2]

via FE80::2, Serial0/0/0

L FF00::/8 [0/0]

via ::, Null0

On R1, how many routes have been learned by RIPng? \_\_\_\_\_\_\_\_\_ 2

On R2, how many routes have been learned by RIPng? \_\_\_\_\_\_\_\_\_ 2

On R3, how many routes have been learned by RIPng? \_\_\_\_\_\_\_\_\_ 2

* + 1. Check connectivity between PCs.

From PC-A, is it possible to ping PC-B? \_\_\_\_\_\_\_\_\_ no

From PC-A, is it possible to ping PC-C? \_\_\_\_\_\_\_\_\_ yes

From PC-C, is it possible to ping PC-B? \_\_\_\_\_\_\_\_\_ no

From PC-C, is it possible to ping PC-A? \_\_\_\_\_\_\_\_\_ yes

Why are some pings successful and others not?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

No route has been advertised to the 2001:DB8:ACAD:B::/64 network.

* 1. Configure and redistribute a default route.
     1. From R2, create a static default route to network ::0/64 using the **ipv6 route** command, and the IPv6 address of PC-B. This forwards any unknown destination address traffic to the R2 G0/0 interface toward PC-B, simulating the Internet. Write the command used in the space below.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

R2(config)# ipv6 route ::0/64 2001:db8:acad:b::b

* + 1. Static routes can be included in RIPng updates by using the **ipv6 rip** *process name* **default-information originate** command in interface configuration mode. Configure the serial links on R2 to send the default route in RIPng updates.

R2(config)# **int s0/0/0**

R2(config-rtr)# **ipv6 rip Test2 default-information originate**

R2(config)# **int s0/0/1**

R2(config-rtr)# **ipv6 rip Test2 default-information originate**

* 1. Verify the routing configuration.
     1. View the IPv6 routing table on R2.

R2# **show ipv6 route**

IPv6 Routing Table - 10 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2

D - EIGRP, EX - EIGRP external

S ::/64 [1/0]

via 2001:DB8:ACAD:B::B

R 2001:DB8:ACAD:A::/64 [120/2]

via FE80::1, Serial0/0/0

C 2001:DB8:ACAD:B::/64 [0/0]

via ::, GigabitEthernet0/1

L 2001:DB8:ACAD:B::2/128 [0/0]

via ::, GigabitEthernet0/1

R 2001:DB8:ACAD:C::/64 [120/2]

via FE80::3, Serial0/0/1

C 2001:DB8:ACAD:12::/64 [0/0]

via ::, Serial0/0/0

L 2001:DB8:ACAD:12::2/128 [0/0]

via ::, Serial0/0/0

C 2001:DB8:ACAD:23::/64 [0/0]

via ::, Serial0/0/1

L 2001:DB8:ACAD:23::2/128 [0/0]

via ::, Serial0/0/1

L FF00::/8 [0/0]

via ::, Null0

How can you tell from the routing table that R2 has a pathway for Internet traffic?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The static default route shows up in the R2 routing table.

S ::/64 [1/0]

via 2001:DB8:ACAD:B::B

* + 1. View the routing tables on R1 and R3.

How is the pathway for Internet traffic provided in their routing tables?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The default route shows up as a distributed RIPng route with a metric of 2.

R1:

R ::/0 [120/2]

via FE80::2, Serial0/0/0

R3:

R ::/0 [120/2]

via FE80::2, Serial0/0/1

* 1. Verify connectivity.

Simulate sending traffic to the Internet by pinging from PC-A and PC-C to 2001:DB8:ACAD:B::B/64.

Were the pings successful? \_\_\_\_\_\_ Yes

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

So the routers will no longer summarize routes at major classful network boundaries.

* 1. In both scenarios, how did R1 and R3 learn the pathway to the Internet? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

From RIP routing updates received from the router where the default route was configured (R2).

* 1. How are configuring RIPv2 and RIPng different?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Answers may vary. RIPv2 is configured through network statements where RIPng is configured on interfaces.

1. Router Interface Summary Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Router Interface Summary | | | | |
| Router Model | Ethernet Interface #1 | Ethernet Interface #2 | Serial Interface #1 | Serial Interface #2 |
| 1800 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 1900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2801 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 2811 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| **Note**: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface. | | | | |

1. Device Configs - Final
2. Router R1

R1# show run

Building configuration...

Current configuration : 1787 bytes

!

version 15.2

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R1

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

!

no ip domain lookup

ip cef

ipv6 unicast-routing

ipv6 cef

!

multilink bundle-name authenticated

!

!

redundancy

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/1

description R1 LAN

ip address 172.30.10.1 255.255.255.0

duplex auto

speed auto

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:ACAD:A::1/64

ipv6 rip Test1 enable

!

interface Serial0/0/0

description Link to R2

ip address 10.1.1.1 255.255.255.252

ipv6 address FE80::1 link-local

ipv6 address 2001:DB8:ACAD:12::1/64

ipv6 rip Test1 enable

clock rate 2000000

!

interface Serial0/0/1

no ip address

shutdown

!

router rip

version 2

passive-interface GigabitEthernet0/1

network 10.0.0.0

network 172.30.0.0

no auto-summary

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

ipv6 router rip Test1

!

control-plane

!

banner motd ^CUnauthorized access is strictly prohibited.^C

!

line con 0

password 7 045802150C2E

logging synchronous

login

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport input all

transport output pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

password 7 060506324F41

login

transport input all

!

scheduler allocate 20000 1000

!

end

1. Router R2

R2#show run

Building configuration...

Current configuration : 2073 bytes

!

version 15.2

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R2

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

!

no ip domain lookup

ip cef

ipv6 unicast-routing

ipv6 cef

!

!

!

!

redundancy

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

description R2 LAN

ip address 209.165.201.1 255.255.255.0

duplex auto

speed auto

ipv6 address FE80::2 link-local

ipv6 address 2001:DB8:ACAD:B::2/64

!

interface GigabitEthernet0/1

no ip address

shutdown

duplex auto

speed auto

!

interface Serial0/0/0

description Link to R1

ip address 10.1.1.2 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2001:DB8:ACAD:12::2/64

ipv6 rip Test2 enable

ipv6 rip Test2 default-information originate

!

interface Serial0/0/1

description Link to R3

ip address 10.2.2.2 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2001:DB8:ACAD:23::2/64

ipv6 rip Test2 enable

ipv6 rip Test2 default-information originate

clock rate 2000000

!

router rip

version 2

network 10.0.0.0

default-information originate

no auto-summary

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

ip route 0.0.0.0 0.0.0.0 209.165.201.2

!

ipv6 route ::/64 2001:DB8:ACAD:B::B

ipv6 router rip Test2

!

control-plane

!

banner motd ^CUnauthorized access is strictly prohibited.^C

!

line con 0

password 7 0822455D0A16

logging synchronous

login

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport input all

transport output pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

password 7 110A1016141D

login

transport input all

!

scheduler allocate 20000 1000

!

end

1. Router R3

R3#show run

Building configuration...

Current configuration : 1847 bytes

!

version 15.2

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R3

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

memory-size iomem 15

!

no ip domain lookup

ip cef

ipv6 unicast-routing

ipv6 cef

!

multilink bundle-name authenticated

!

!

redundancy

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/1

description R3 LAN

ip address 172.30.30.1 255.255.255.0

duplex auto

speed auto

ipv6 address FE80::3 link-local

ipv6 address 2001:DB8:ACAD:C::3/64

ipv6 rip Test3 enable

!

interface Serial0/0/0

no ip address

shutdown

clock rate 2000000

!

interface Serial0/0/1

description Link to R2

ip address 10.2.2.1 255.255.255.252

ipv6 address FE80::3 link-local

ipv6 address 2001:DB8:ACAD:23::3/64

ipv6 rip Test3 enable

!

router rip

version 2

passive-interface GigabitEthernet0/1

network 10.0.0.0

network 172.30.0.0

no auto-summary

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

ipv6 router rip Test3

!

control-plane

!

banner motd ^CUnauthorized access is strictly prohibited.^C

!

line con 0

password 7 02050D480809

logging synchronous

login

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport input all

transport output pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

password 7 14141B180F0B

login

transport input all

!

scheduler allocate 20000 1000

!

end