Lab 8.4.1: Investigating the Routing Table Lookup Process

Learning Objectives

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

- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Determine level 1 and level 2 routes.
- Modify the configuration to reflect static and default routing.
- Enable classful routing and investigate classful routing behavior.
- Enable classless routing and investigate classless routing behavior.

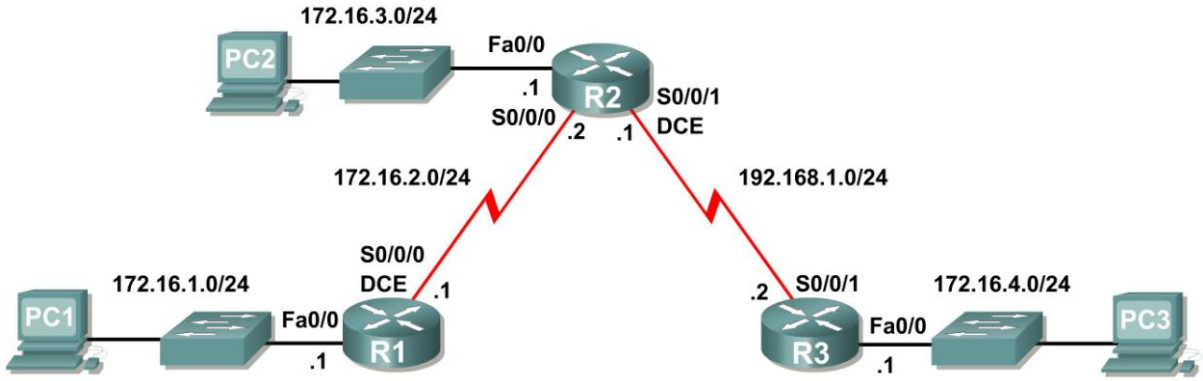
Scenarios

In this lab activity, there are two separate scenarios. In the first scenario, you will examine level 1 and level 2 routes in the routing table. In the second scenario, you will examine classful and classless routing behavior.

- Scenario A: Level 1 and Level 2 Routes
- Scenario B: Classful and Classless Routing Behavior

Scenario A: Level 1 and Level 2 Routes

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	172.16.1.1	255.255.255.0	N/A
	S0/0/0	172.16.2.1	255.255.255.0	N/A
R2	Fa0/0	172.16.3.1	255.255.255.0	N/A
	S0/0/0	172.16.2.2	255.255.255.0	N/A
	S0/0/1	192.168.1.1	255.255.255.0	N/A
R3	Fa0/0	172.16.4.1	255.255.255.0	N/A
	S0/0/1	192.168.1.2	255.255.255.0	N/A
PC1	NIC	172.16.1.10	255.255.255.0	172.16.1.1
PC2	NIC	172.16.3.10	255.255.255.0	172.16.3.1
PC3	NIC	172.16.4.10	255.255.255.0	172.16.4.1

Task 1: Prepare the Network.

Step 1: Cable a network that is similar to the one in the Topology Diagram.

You can use any current router in your lab as long as it has the required interfaces shown in the topology.

Note: If you use 1700, 2500, or 2600 routers, the router outputs and interface descriptions will appear different.

Step 2: Clear any existing configurations on the routers.

Task 2: Perform Basic Router Configurations.

Perform basic configuration of the R1, R2, and R3 routers according to the following guidelines:

1. Configure the router hostname.
2. Disable DNS lookup.
3. Configure an EXEC mode password.
4. Configure a message-of-the-day banner.
5. Configure a password for console connections.
6. Configure a password for VTY connections.

Task 3: Configure and Activate Serial and Ethernet Addresses.

Step 1: Configure interfaces on R1, R2, and R3.

Configure the interfaces on the R1, R2, and R3 routers with the IP addresses from the table under the Topology Diagram.

Step 2: Verify IP addressing and interfaces.

Use the **`show ip interface brief`** command to verify that the IP addressing is correct and that the interfaces are active.

When you have finished, be sure to save the running configuration to the NVRAM of the router.

Step 3: Configure Ethernet interfaces of PC1, PC2, and PC3.

Configure the Ethernet interfaces of PC1, PC2, and PC3 with the IP addresses and default gateways from the table under the Topology Diagram.

Step 4: Test the PC configuration by pinging the default gateway from the PC.

Task 4: Configure RIP.

Configure RIP version 1 routing on each of the routers. Include **`network`** statements for each of the directly connected networks.

Task 5: Observe Routes Being Deleted and Added to the Routing Table.

Step 1: View the routing table on the R1 router.

What networks are shown in the routing table?

172.16.0.0/16

172.16.1.0/16

172.16.2.0/24

172.16.3.0/24

179.168.1.0/24

Step 2: Use the `debug ip routing` command to observe changes in the routing table as they occur on the R1 router.

```
R1#debug ip routing
IP routing debugging is on
```

Step 3: Shut down the Serial0/0/0 interface and observe the debug output.

```
R1(config-if)#shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to administratively
down
RT: interface Serial0/0/0 removed from routing table
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down
RT: del 172.16.2.0 via 0.0.0.0, connected metric [0/0]
RT: delete network route to 172.16.2.0
RT: NET-RED 172.16.2.0/24
RT: del 172.16.3.0 via 172.16.2.2, rip metric [120/1]
RT: delete network route to 172.16.3.0
RT: NET-RED 172.16.3.0/24
RT: del 192.168.1.0 via 172.16.2.2, rip metric [120/1]
RT: delete network route to 192.168.1.0
RT: NET-RED 192.168.1.0/24
```

Step 4: View the routing table on the R1 router and observe the changes that occurred when the Serial0/0/0 interface was disabled.

```
R1# show ip route

<Output omitted>

Gateway of last resort is not set

     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.1.0 is directly connected, FastEthernet0/0
R1#
```


Step 5: Enable the Serial0/0/0 interface and observe the debug output.

```
R1(config-if)#no shutdown

RT: SET_LAST_RDB for 172.16.2.0/24
    NEW rdb: is directly connected

RT: add 172.16.2.0/24 via 0.0.0.0, connected metric [0/0]
RT: NET-RED 172.16.2.0/24RT: SET_LAST_RDB for 172.16.0.0/16
    NEW rdb: via 172.16.2.2

RT: add 172.16.3.0/24 via 172.16.2.2, rip metric [120/1]
RT: NET-RED 172.16.3.0/24RT: SET_LAST_RDB for 192.168.1.0/24
    NEW rdb: via 172.16.2.2

RT: add 192.168.1.0/24 via 172.16.2.2, rip metric [120/1]
RT: NET-RED 192.168.1.0/24
```

Why is the route to 172.16.2.0/24 added first?

direct connect

Why is there a delay before the other routes are added?

RIP is sent every 30 second

Step 6: Disable the debug output with either the `no debug ip routing` or the `undebug all` command.

Task 6: Determine Level 1 and Level 2 Routes

Step 1: Examine the R1 routing table.

```
R1#show ip route

<Output ommited>

Gateway of last resort is not set

     172.16.0.0/24 is subnetted, 3 subnets
C       172.16.1.0/24 is directly connected, FastEthernet0/0
C       172.16.2.0/24 is directly connected, Serial0/0/0
R       172.16.3.0/24 [120/1] via 172.16.2.2, 00:00:14, Serial0/0/0
R    192.168.1.0/24 [120/1] via 172.16.2.2, 00:00:14, Serial0/0/0
R1#
```

Which of these routes are level 1 routes?

172.16.0.0/16

192.168.1.0/24

Why are these routes level 1 routes?

classful

Are any of the level 1 routes ultimate routes?

yes

192.168.1.0/24

Why is this route an ultimate route?

exit route

interface s0/0/1

Are any of the level 1 routes parent routes?

172.16.0.0/16

Why is this route a level 1 parent route?

no exit interface

Which of the routes are level 2 routes?

172.16.0.0/16

172.16.1.0/24

172.16.2.0/24

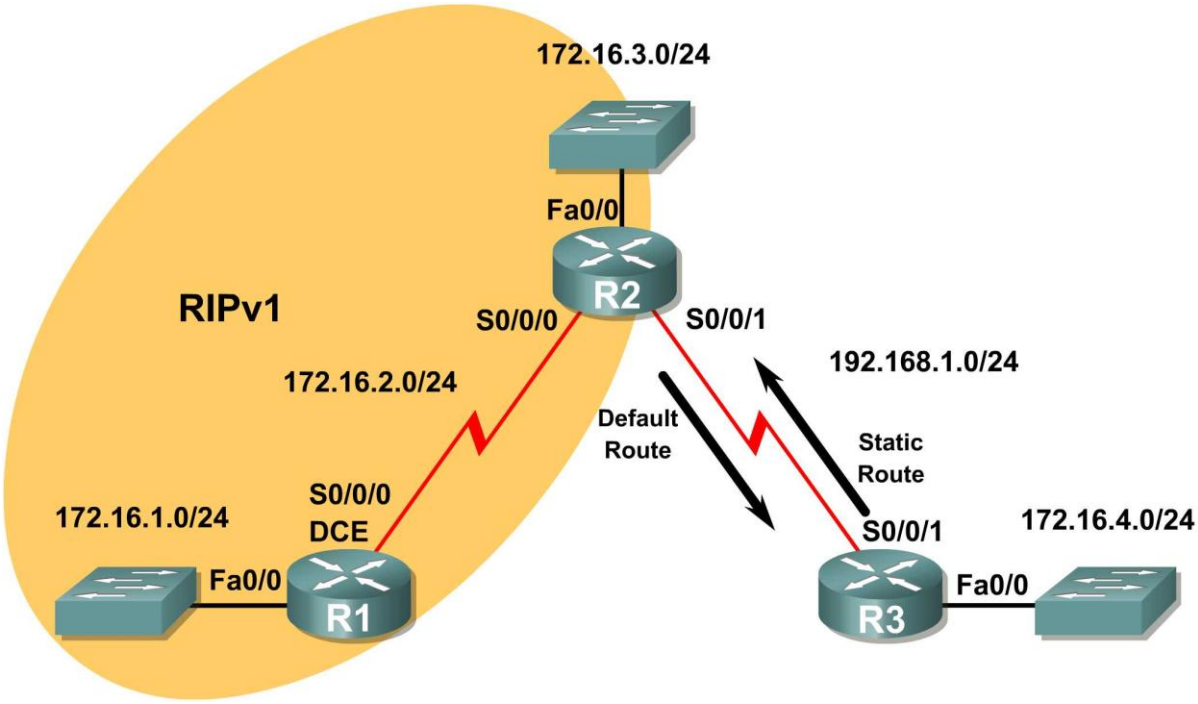
172.16.3.0/24

Why are these routes level 2 routes?

they are subnets of 172.16.0.0/16

Scenario B: Classful and Classless Routing Behavior

Topology Diagram



Task 1: Make Changes between Scenario A and Scenario B

Step 1: Remove the RIP configuration from R3 and configure a static route to 172.16.0.0/16.

```
R3(config)#no router rip
R3(config)#ip route 172.16.0.0 255.255.0.0 Serial0/0/1
```

Step 2: Remove the 192.168.1.0 network from the R2 RIP configuration.

```
R2(config)#router rip
R2(config-router)#no network 192.168.1.0
```

Step 3: Add a static default route to R3 on the R2 router.

Include the **default-information originate** command in the configuration so that the default static route is included in the RIP updates.

```
R2(config)#ip route 0.0.0.0 0.0.0.0 Serial0/0/1
R2(config)#router rip
R2(config-router)#default-information originate
```


Task 2: Enable Classful Routing Behavior on the Routers

Step 1: Use the `no ip classless` command to configure the route lookup process to use classful route lookups.

R1

```
R1(config)#no ip classless
```

R2

```
R2(config)#no ip classless
```

R3

```
R3(config)#no ip classless
```

Step 2: Examine the routing table on the R2 router.

```
R2#show ip route

<output omitted>

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     172.16.0.0/24 is subnetted, 4 subnets
R       172.16.1.0 [120/1] via 172.16.2.1, 00:00:00, Serial0/0/0
C       172.16.2.0 is directly connected, Serial0/0/0
C       172.16.3.0 is directly connected, FastEthernet0/0
C    192.168.1.0/24 is directly connected, Serial0/0/1
S*   0.0.0.0/0 is directly connected, Serial0/0/1

R2#
```

Step 3: Ping from R2 to PC3 and observe the results.

```
R2#ping 172.16.4.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.4.10, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

The ping is unsuccessful because the router is using classful routing behavior.

The route lookup process on the R2 router searches the routing table and finds that the first 16 bits of the destination address are a match with the parent route 172.16.0.0/16. Since the destination address matches the parent route, the child routes are checked.

What are the child routes of the 172.16.0.0/16 parent network?

_____ 172.16.1.0/24 _____

_____ 172.16.2.0/24 _____

_____ 172.16.3.0/24 _____

How many bits in the destination address must match in order for a packet to be forwarded using one of the child routes? 24

Does the destination address of the ping packets match any of the child routes of 172.16.0.0/16? no

Since the **no ip classless** command has been used to configure the R2 router to use classful routing behavior, once a level 1 match is found the router will not search beyond the child routes for a lesser match. Even though there is a default static route configured, it will not be used, and the packet will be dropped.

Task 3: Enable Classless Routing Behavior on the Routers

Step 1: Use the ip classless command to reenable classless routing.

R1

```
R1(config)#ip classless
```

R2

```
R2(config)#ip classless
```

R3

```
R3(config)#ip classless
```

Step 2: Examine the routing table on R2.

Notice that the routing table is the still the same even though the router configuration has been changed to use classless routing behavior.

```
R2#show ip route

<output omitted>

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     172.16.0.0/24 is subnetted, 4 subnets
R       172.16.1.0 [120/1] via 172.16.2.1, 00:00:00, Serial0/0/0
C       172.16.2.0 is directly connected, Serial0/0/0
C       172.16.3.0 is directly connected, FastEthernet0/0
C    192.168.1.0/24 is directly connected, Serial0/0/1
S*   0.0.0.0/0 is directly connected, Serial0/0/1
R2#
```

Step 3: Repeat the ping from R2 to PC3 and observe results.

```
R2#ping 172.16.4.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.4.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent, round-trip min/avg/max = 28/28/28 ms
```

The ping is successful this time because the router is using classless routing behavior.

The destination address of the packet is a match with the level 1 parent route 172.16.0.0/16 but there is not a match with any of the child routes of this parent route.

Since classless routing behavior is configured, the router will now continue to search the routing table for a route where there may be fewer bits that match, but the route is still a match. The mask of a default route is /0, which means that no bits need to match. In classless routing behavior, if no other route matches, the default route will always match.

```
S*   0.0.0.0/0 is directly connected, Serial0/0/1
```

Since there is a default route configured on the R2 router, this route is used to forward the packets to PC3.

Step 4: Examine the routing table on R3 to determine how the traffic generated by the ping command is returned to R2.

```
R3#show ip route

<output omitted>

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
S       172.16.0.0/16 is directly connected, Serial0/0/1
C       172.16.4.0/24 is directly connected, FastEthernet0/0
C    192.168.1.0/24 is directly connected, Serial0/0/1
R3#
```

Notice that in the routing table for R3, both the 172.16.4.0/24 subnet route and the 172.16.0.0/16 classful network route are level 2 child routes of the 172.16.0.0/16 parent route. In this case, R3 uses the 172.16.0.0/16 child route and forwards the return traffic out Serial 0/0/1 back to R2.

Lab 8.4.2: Show IP Route Challenge Lab

Addressing Table

Device	Interface	IP Address	Subnet Mask
R1	Loopback 0	192.168.1.1	255.255.255.0
	FastEthernet 0/0	172.16.1.1	255.255.255.224
	FastEthernet 0/1	172.16.3.1	255.255.255.128
	Serial 0/0/0	10.10.10.5	255.255.255.252
	Serial 0/0/1	10.10.10.9	255.255.255.252
R2	Serial 0/0/0	10.10.10.1	255.255.255.252
	FastEthernet 0/0	172.16.2.1	255.255.255.192
	FastEthernet 0/1	172.16.3.193	255.255.255.248
R3	Serial 0/0/0	10.10.10.6	255.255.255.252
	Serial 0/0/1	10.10.10.2	255.255.255.252
	FastEthernet 0/0	172.16.3.129	255.255.255.192
	FastEthernet 0/1	172.16.1.193	255.255.255.248
R4	Serial 0/0/0	10.10.10.10	255.255.255.252
	Serial 0/0/1	10.10.10.13	255.255.255.252
	FastEthernet 0/0	172.16.4.1	255.255.255.224
	FastEthernet 0/1	172.16.2.65	255.255.255.224
R5	Serial 0/0/0	10.10.10.14	255.255.255.252
	FastEthernet 0/0	172.16.4.129	255.255.255.128
	FastEthernet 0/1	172.16.1.33	255.255.255.240

Learning Objectives

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

- Determine network topology based on the outputs from the show ip route command.
- Cable a network according to the Topology Diagram.
- Determine router interface addressing based on outputs.
- Perform basic configuration tasks on a router.
- Determine level 1 and level 2 routes.

Scenario

In this lab activity, you will determine the topology of a network using the outputs from the **show ip route command.** You must draw a topology diagram and determine the interface addressing on each router. Then you must build and configure the network based on the outputs. The DTE and DCE assignment is at your discretion. When complete, the outputs from your network must match those given below.

Task 1: Examine the router outputs.

Step 1: Examine the output from the R1 router.

```
R1#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o – ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/30 is subnetted, 4 subnets
R       10.10.10.0 [120/1] via 10.10.10.6, 00:00:09, Serial0/0/0
C       10.10.10.4 is directly connected, Serial0/0/0
C       10.10.10.8 is directly connected, Serial0/0/1
R       10.10.10.12 [120/1] via 10.10.10.10, 00:00:09, Serial0/0/1
     172.16.0.0/16 is variably subnetted, 10 subnets, 5 masks
C       172.16.1.0/27 is directly connected, FastEthernet0/0
R       172.16.1.32/28 [120/2] via 10.10.10.10, 00:00:09, Serial0/0/1
R       172.16.1.192/26 [120/1] via 10.10.10.6, 00:00:09, Serial0/0/0
R       172.16.2.0/26 [120/2] via 10.10.10.6, 00:00:09, Serial0/0/0
R       172.16.2.64/27 [120/1] via 10.10.10.10, 00:00:09, Serial0/0/1
C       172.16.3.0/25 is directly connected, FastEthernet0/1
R       172.16.3.128/26 [120/1] via 10.10.10.6, 00:00:09, Serial0/0/0
R       172.16.3.192/29 [120/2] via 10.10.10.6, 00:00:09, Serial0/0/0
R       172.16.4.0/27 [120/1] via 10.10.10.10, 00:00:09, Serial0/0/1
R       172.16.4.128/25 [120/2] via 10.10.10.10, 00:00:09, Serial0/0/1
C    192.168.1.0/24 is directly connected, Loopback0
S*   0.0.0.0/0 is directly connected, Loopback0
```


Step 2: Examine the output from the R2 router.

```
R2#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o – ODR
       P - periodic downloaded static route

Gateway of last resort is 10.10.10.2 to network 0.0.0.0

     10.0.0.0/30 is subnetted, 4 subnets
C       10.10.10.0 is directly connected, Serial0/0/0
R       10.10.10.4 [120/1] via 10.10.10.2, 00:00:04, Serial0/0/0
R       10.10.10.8 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0
R       10.10.10.12 [120/3] via 10.10.10.2, 00:00:04, Serial0/0/0
     172.16.0.0/16 is variably subnetted, 10 subnets, 5 masks
R       172.16.1.0/27 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0
R       172.16.1.32/28 [120/4] via 10.10.10.2, 00:00:04, Serial0/0/0
R       172.16.1.192/26 [120/1] via 10.10.10.2, 00:00:04, Serial0/0/0
C       172.16.2.0/26 is directly connected, FastEthernet0/0
R       172.16.2.64/27 [120/3] via 10.10.10.2, 00:00:04, Serial0/0/0
R       172.16.3.0/25 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0
R       172.16.3.128/26 [120/1] via 10.10.10.2, 00:00:04, Serial0/0/0
C       172.16.3.192/29 is directly connected, FastEthernet0/1
R       172.16.4.0/27 [120/3] via 10.10.10.2, 00:00:04, Serial0/0/0
R       172.16.4.128/25 [120/4] via 10.10.10.2, 00:00:04, Serial0/0/0
R    192.168.1.0/24 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0
R*   0.0.0.0/0 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0
```

Step 3: Examine the output from the R3 router.

```
R3#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o – ODR
       P - periodic downloaded static route

Gateway of last resort is 10.10.10.5 to network 0.0.0.0
```



```
     10.0.0.0/30 is subnetted, 4 subnets
C       10.10.10.0 is directly connected, Serial0/0/1
C       10.10.10.4 is directly connected, Serial0/0/0
R       10.10.10.8 [120/1] via 10.10.10.5, 00:00:04, Serial0/0/0
R       10.10.10.12 [120/2] via 10.10.10.5, 00:00:04, Serial0/0/0
     172.16.0.0/16 is variably subnetted, 10 subnets, 5 masks
R       172.16.1.0/27 [120/1] via 10.10.10.5, 00:00:04, Serial0/0/0
R       172.16.1.32/28 [120/3] via 10.10.10.5, 00:00:04, Serial0/0/0
C       172.16.1.192/26 is directly connected, FastEthernet0/1
R       172.16.2.0/26 [120/1] via 10.10.10.1, 00:00:03, Serial0/0/1
R       172.16.2.64/27 [120/2] via 10.10.10.5, 00:00:04, Serial0/0/0
R       172.16.3.0/25 [120/1] via 10.10.10.5, 00:00:04, Serial0/0/0
C       172.16.3.128/26 is directly connected, FastEthernet0/0
R       172.16.3.192/29 [120/1] via 10.10.10.1, 00:00:03, Serial0/0/1
R       172.16.4.0/27 [120/2] via 10.10.10.5, 00:00:04, Serial0/0/0
R       172.16.4.128/25 [120/3] via 10.10.10.5, 00:00:04, Serial0/0/0
R    192.168.1.0/24 [120/1] via 10.10.10.5, 00:00:04, Serial0/0/0
R*   0.0.0.0/0 [120/1] via 10.10.10.5, 00:00:04, Serial0/0/0
```

Step 4: Examine the output from the R4 router.

```
R4#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 10.10.10.9 to network 0.0.0.0

     10.0.0.0/30 is subnetted, 4 subnets
R       10.10.10.0 [120/2] via 10.10.10.9, 00:00:14, Serial0/0/0
R       10.10.10.4 [120/1] via 10.10.10.9, 00:00:14, Serial0/0/0
C       10.10.10.8 is directly connected, Serial0/0/0
C       10.10.10.12 is directly connected, Serial0/0/1
     172.16.0.0/16 is variably subnetted, 10 subnets, 5 masks
R       172.16.1.0/27 [120/1] via 10.10.10.9, 00:00:14, Serial0/0/0
R       172.16.1.32/28 [120/1] via 10.10.10.14, 00:00:17, Serial0/0/1
R       172.16.1.192/26 [120/2] via 10.10.10.9, 00:00:14, Serial0/0/0
R       172.16.2.0/26 [120/3] via 10.10.10.9, 00:00:14, Serial0/0/0
C       172.16.2.64/27 is directly connected, FastEthernet0/1
R       172.16.3.0/25 [120/1] via 10.10.10.9, 00:00:14, Serial0/0/0
R       172.16.3.128/26 [120/2] via 10.10.10.9, 00:00:14, Serial0/0/0
R       172.16.3.192/29 [120/3] via 10.10.10.9, 00:00:14, Serial0/0/0
C       172.16.4.0/27 is directly connected, FastEthernet0/0
R       172.16.4.128/25 [120/1] via 10.10.10.14, 00:00:17, Serial0/0/1
R    192.168.1.0/24 [120/1] via 10.10.10.9, 00:00:14, Serial0/0/0
R*   0.0.0.0/0 [120/1] via 10.10.10.9, 00:00:14, Serial0/0/0
```


Step 5: Examine the output from the R5 router.

```
R5#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B – BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E – EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o – ODR
       P - periodic downloaded static route

Gateway of last resort is 10.10.10.13 to network 0.0.0.0

     10.0.0.0/30 is subnetted, 4 subnets
R       10.10.10.0 [120/3] via 10.10.10.13, 00:00:21, Serial0/0/0
R       10.10.10.4 [120/2] via 10.10.10.13, 00:00:21, Serial0/0/0
R       10.10.10.8 [120/1] via 10.10.10.13, 00:00:21, Serial0/0/0
C       10.10.10.12 is directly connected, Serial0/0/0
     172.16.0.0/16 is variably subnetted, 10 subnets, 5 masks
R       172.16.1.0/27 [120/2] via 10.10.10.13, 00:00:21, Serial0/0/0
C       172.16.1.32/28 is directly connected, FastEthernet0/1
R       172.16.1.192/26 [120/3] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.2.0/26 [120/4] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.2.64/27 [120/1] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.3.0/25 [120/2] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.3.128/26 [120/3] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.3.192/29 [120/4] via 10.10.10.13, 00:00:21, Serial0/0/0
R       172.16.4.0/27 [120/1] via 10.10.10.13, 00:00:21, Serial0/0/0
C       172.16.4.128/25 is directly connected, FastEthernet0/0
R    192.168.1.0/24 [120/2] via 10.10.10.13, 00:00:21, Serial0/0/0
R*   0.0.0.0/0 [120/2] via 10.10.10.13, 00:00:21, Serial0/0/0
```


Task 2: Create a diagram of the network based on the router outputs.

Step 1: Draw a diagram of the network based on your interpretation of the router outputs in the space provided below.

Step 2: Document the interface addresses in the Addressing Table.

Task 3: Build and Configure the Diagram using Packet Tracer.

Step 1: Build the topology diagram in Packet Tracer. Use 1841 or 2811 routers.

Step 2: Configure the interfaces with the appropriate IP address and subnet mask.

Step 3: Configure the appropriate routing protocol for each router and advertise all directly connected networks.

Step 4: Verify that configurations match the router outputs from Task 1.

Task 4: Identify Routing Processes.

Step 1: Examine the R1 routing table.

What are the IP addresses of the directly connected neighbors of the R1 router?

10.10.10.4

10.10.10.8

172.16.1.0/27

Which routes did R1 learn from the directly connected neighbors?

10.10.10.0

10.10.10.12

172.16.1.32/28

172.16.1.192/26

172.16.2.0/26

172.16.2.64/27

172.16.3.128/26

172.16.3.192/29

172.16.4.0/27

172.16.4.128/25

Step 2: Examine the R2 routing table.

How many total networks/subnets did R2 learn from its neighbors?

13

Where would R2 send packets to networks not currently in its routing table? Why?

r3

What does the statement " **R* 0.0.0.0/0 [120/2] via 10.10.10.2, 00:00:04, Serial0/0/0**" at the end of the R2 routing table represent?

unknown address sent to 10.10.10.2

Step 3: Examine the R3 routing table.

Which Level 2 routes did R3 learn about from its neighbors?

10.10.10.8

10.10.10.12

172.16.1.0/27

172.16.1.32/28

172.16.2.0/26

172.16.2.64/27

172.16.3.0/25

172.16.3.192/29

172.16.4.0/27

172.16.4.128/25

192.168.1.0/24

Which networks are directly connect to R3?

10.10.10.0

10.10.10.4

172.16.1.192/26

172.16.3.128/26

Step 4: Examine the R4 routing table.

Which network is the furthest distance from R4 and how many hops away is it?

3 hops 172.16.2.0/26

How many usable host addresses are on the network furthest from R4? 62

Step 5: Examine the R5 routing table.

How many routers must a packet pass through to get from R5 to network 172.16.2.0/26? 4

Why is the "Gateway of last resort" for R5 listed as 10.10.10.13?

next hop address

