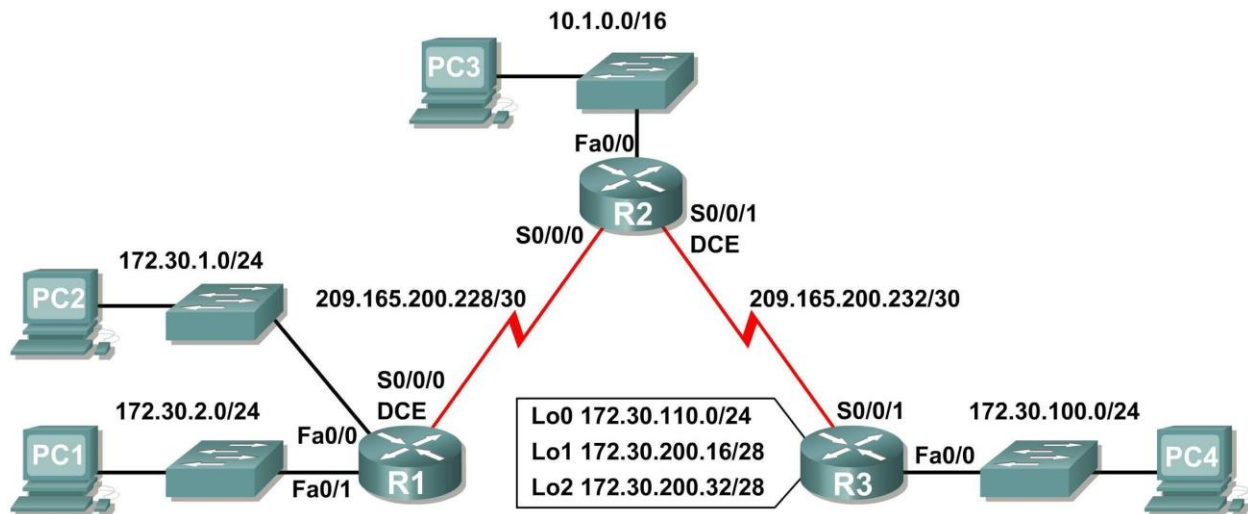


Yash Shah
2018130049
Roll No 55

CEL 51, DCCN, Monsoon 2020 Lab 7: RIPv2 Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	172.30.1.1	255.255.255.0	N/A
	Fa0/1	172.30.2.1	255.255.255.0	N/A
	S0/0/0	209.165.200.230	255.255.255.252	N/A
R2	Fa0/0	10.1.0.1	255.255.0.0	N/A
	S0/0/0	209.165.200.229	255.255.255.252	N/A
	S0/0/1	209.165.200.233	255.255.255.252	N/A
R3	Fa0/0	172.30.100.1	255.255.255.0	N/A
	S0/0/1	209.165.200.234	255.255.255.252	N/A
	Lo0	172.30.110.1	255.255.255.0	N/A
	Lo1	172.30.200.17	255.255.255.240	N/A
	Lo2	172.30.200.33	255.255.255.240	N/A
PC1	NIC	172.30.2.10	255.255.255.0	172.30.2.1
PC2	NIC	172.30.1.10	255.255.255.0	172.30.1.1

PC3	NIC	10.1.0.10	255.255.0.0	10.1.0.1
PC4	NIC	172.30.100.10	255.255.255.0	172.30.100.1

Learning Objectives

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

- Cable a network according to the Topology Diagram.
- Load provided scripts onto the routers.
- Examine the current status of the network.
- Configure RIPv2 on all routers.
- Examine the automatic summarization of routes.
- Examine routing updates with `debug ip rip`.
- Disable automatic summarization.
- Examine the routing tables.
- Verify network connectivity.
- Document the RIPv2 configuration.

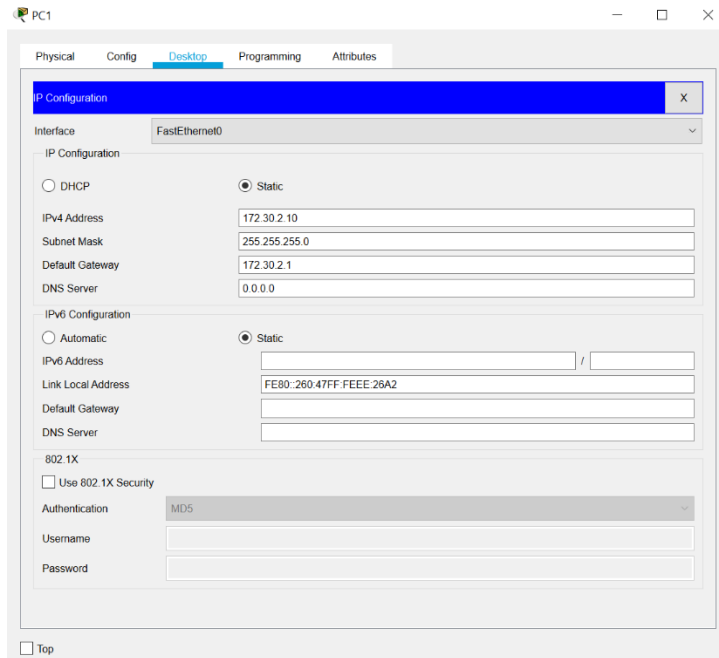
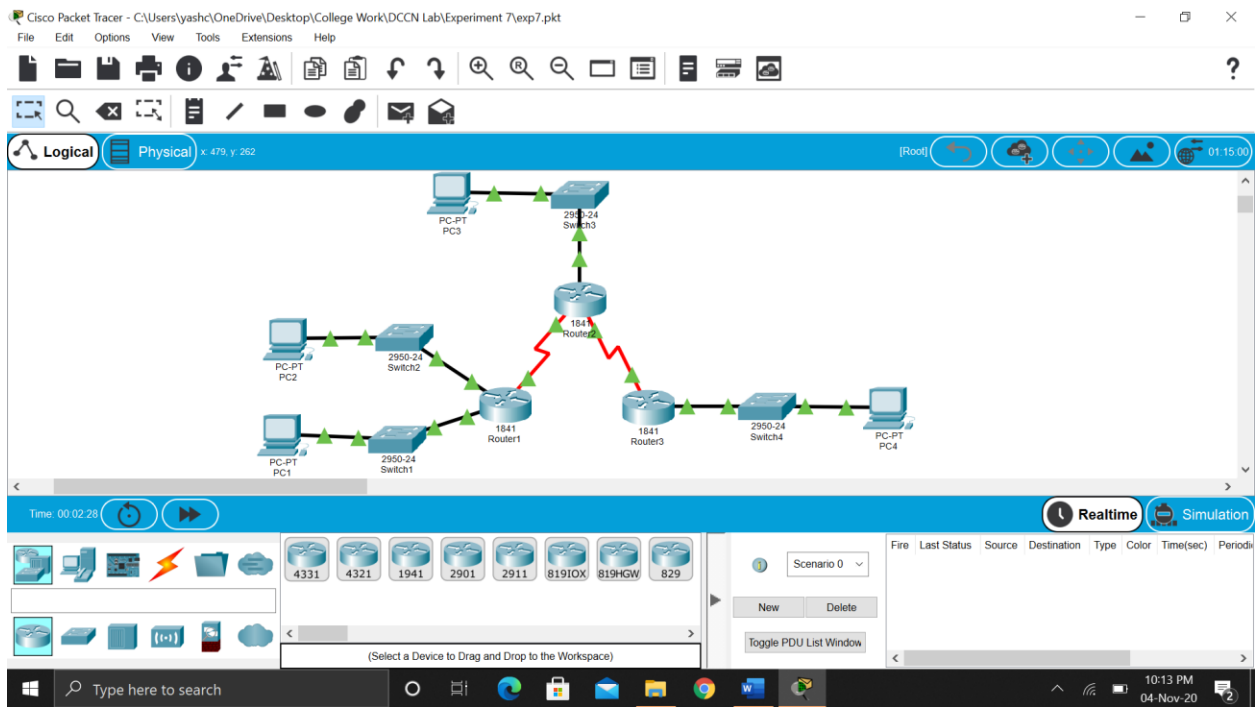
Scenario

The network shown in the Topology Diagram contains a discontinuous network, 172.30.0.0. This network has been subnetted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and 209.165.200.232/30. This can be an issue when the routing protocol used does not include enough information to distinguish the individual subnets. RIPv2 is a classless routing protocol that can be used to provide subnet mask information in the routing updates. This will allow VLSM subnet information to be propagated throughout the network.

Task 1: Cable, Erase, and Reload the Routers.

Step 1: Cable a network.

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



PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.30.1.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::2603:EFF:FE4D:CE40

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

Top

PC3

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.1.0.10

Subnet Mask 255.255.0.0

Default Gateway 10.1.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::2605:CFF:FE5E:A142

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

Top

PC4

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 172.30.100.10

Subnet Mask: 255.255.255.0

Default Gateway: 172.30.100.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::207:ECFF:FE15:6036

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

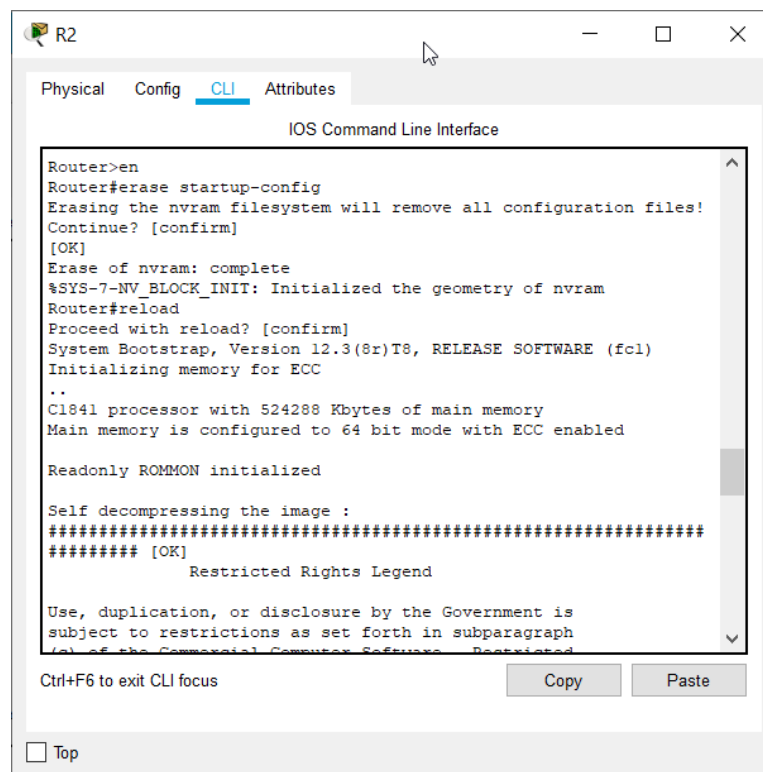
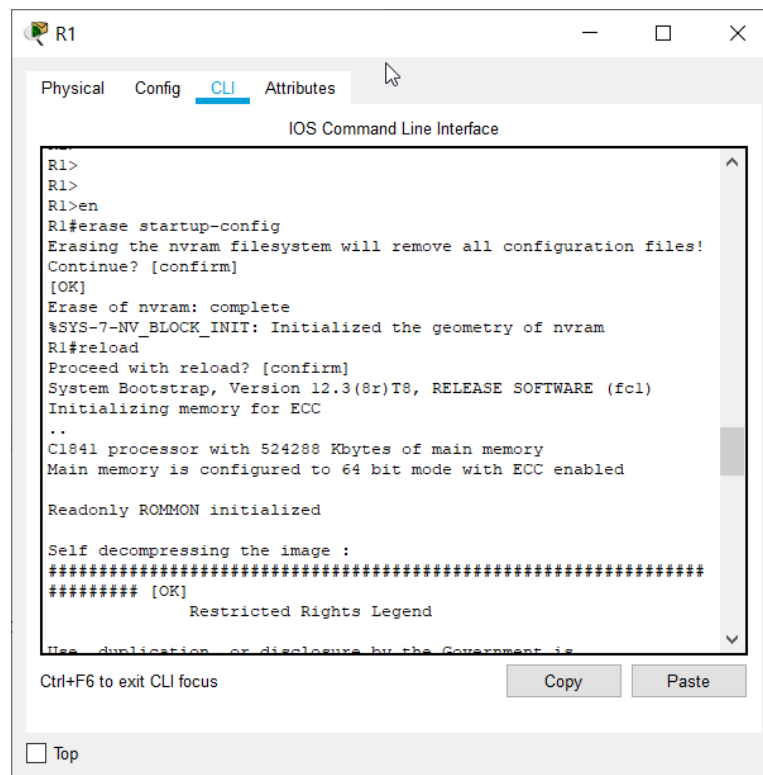
Password:

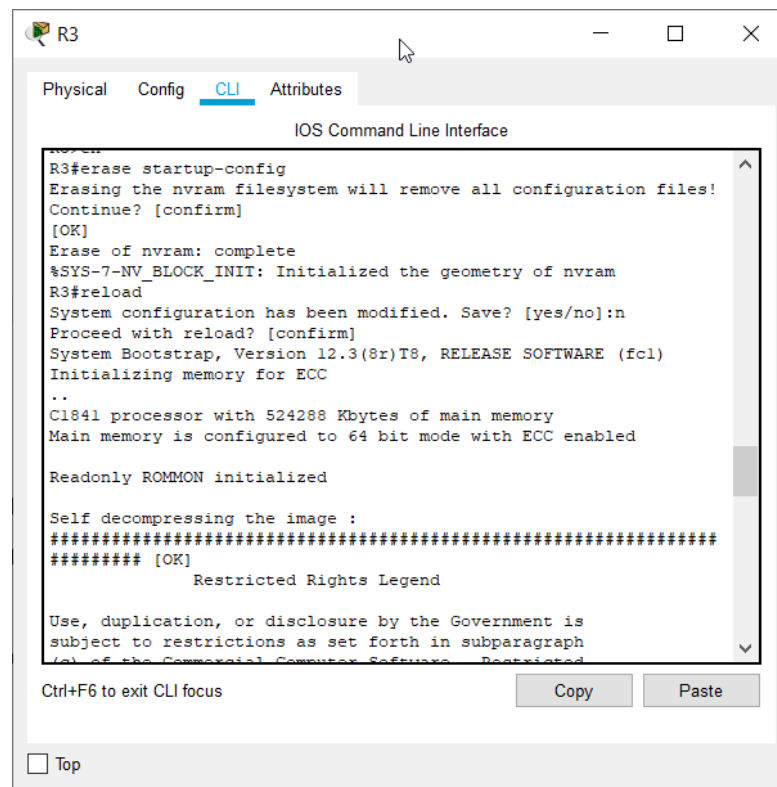
☐ Top

Step 2: Clear the configuration on each router.

Clear the configuration on each of routers using the **erase startup-config** command and then **reload** the routers. Answer **no** if asked to save changes.

```
Router>en
Router# erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#
Router#
Router#
```





Task 2: Load Routers with the Supplied Scripts.

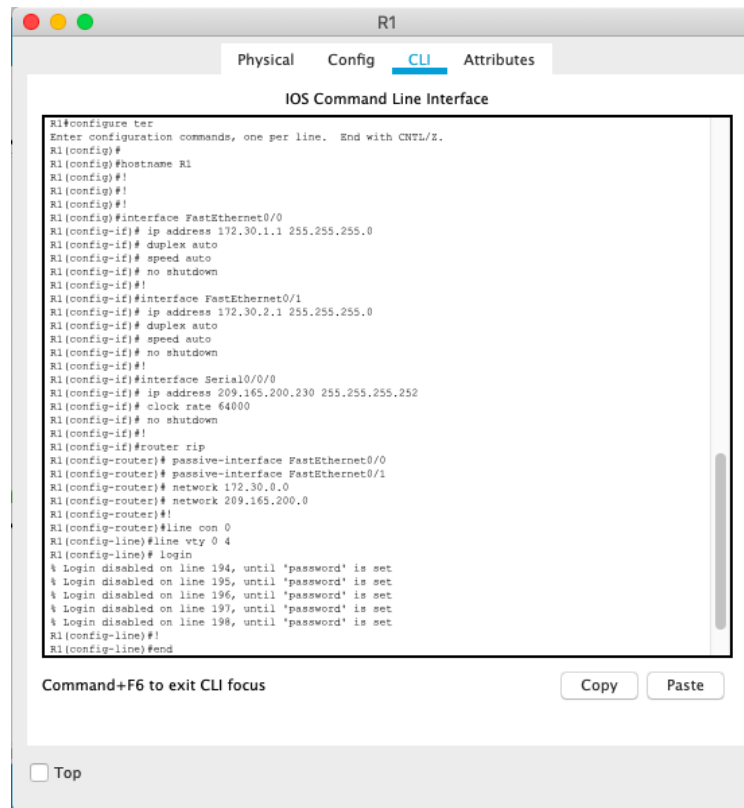
Step 1: Load the following script onto R1.

```
hostname R1
!
!
!
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/1
 ip address 172.30.2.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface Serial0/0/0
 ip address 209.165.200.230 255.255.255.252
 clock rate 64000
 no shutdown
!
router rip
 passive-interface FastEthernet0/0
 passive-interface FastEthernet0/1
 network 172.30.0.0
 network 209.165.200.0
!
line con 0
line vty 0 4
```

```

login
!
end

```



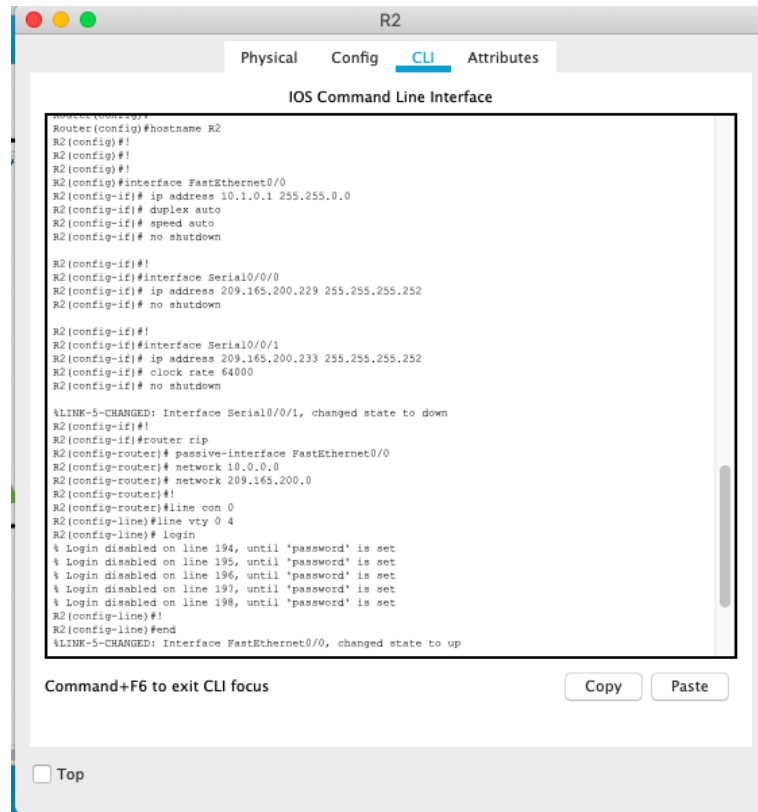
Step 2: Load the following script onto R2.

```

hostname R2
!
!
!
interface FastEthernet0/0
 ip address 10.1.0.1 255.255.0.0
 duplex auto
 speed auto
 no shutdown
!
interface Serial0/0/0
 ip address 209.165.200.229 255.255.255.252
 no shutdown
!
interface Serial0/0/1
 ip address 209.165.200.233 255.255.255.252
 clock rate 64000
 no shutdown
!
router rip
 passive-interface FastEthernet0/0
 network 10.0.0.0
 network 209.165.200.0
!
line con 0
line vty 0 4
 login
!

```


end



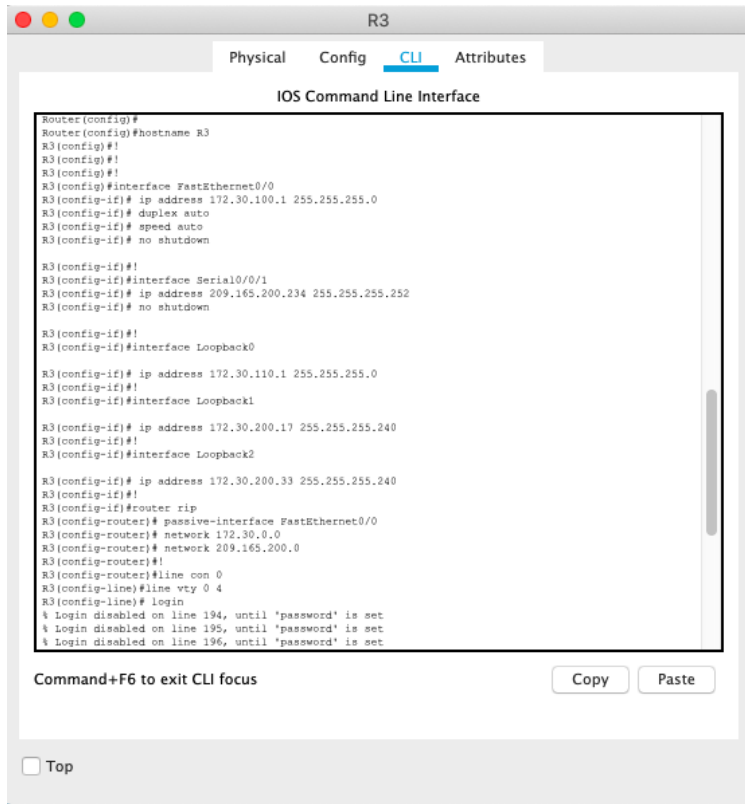
Step 3: Load the following script onto R3.

```
hostname R3
!
!
!
interface FastEthernet0/0
 ip address 172.30.100.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface Serial0/0/1
 ip address 209.165.200.234 255.255.255.252
 no shutdown
!
interface Loopback0
 ip address 172.30.110.1 255.255.255.0
!
interface Loopback1
 ip address 172.30.200.17 255.255.255.240
!
interface Loopback2
 ip address 172.30.200.33 255.255.255.240
!
router rip
 passive-interface FastEthernet0/0
 network 172.30.0.0
 network 209.165.200.0
!
line con 0
```

```

line vty 0 4
  login
!
end

```

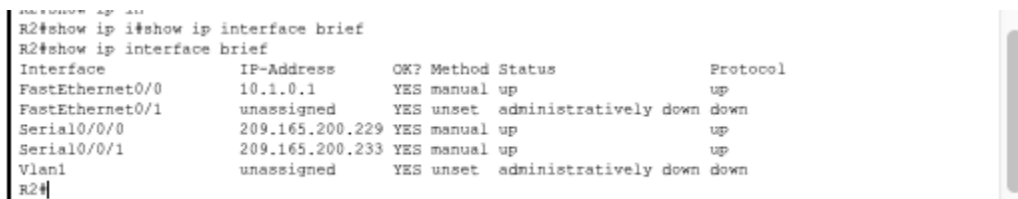


Task 3: Examine the Current Status of the Network.

Step 1: Verify that both serial links are up.

The two serial links can quickly be verified using the `show ip interface brief` command on R2.

```
R2#show ip interface brief
```



Step 2: Check the connectivity from R2 to the hosts on the R1 and R3 LANs.

Note: For the 1841 router, you will need to disable IP CEF to obtain the correct output from the `ping` command. Although a discussion of IP CEF is beyond the scope of this course, you may disable IP CEF by using the following command in global configuration mode:

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

From the R2 router, how many ICMP messages are successful when pingng PC1?

```
R2#ping 172.30.2.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:
!U!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/18/37 ms

R2#
```

60 percent (3/5)

From the R2 router, how many ICMP messages are successful when pinging PC4?

```
R2#ping 172.30.100.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.100.10, timeout is 2 seconds:
!U!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/1/1 ms

R2#
```

60 percent (3/5)

Step 3: Check the connectivity between the PCs.

From the PC1, is it possible to ping PC2? **Yes**

```
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

What is the success rate? **100%**

From the PC1, is it possible to ping PC3? **Yes**

```
C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

Request timed out.
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>
```

What is the success rate? **50%**

From the PC1, is it possible to ping PC4? **No**

```
C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.

Ping statistics for 172.30.100.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

What is the success rate? **0%**

From the PC4, is it possible to ping PC2? **No**

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.100.1: Destination host unreachable.
Request timed out.
Reply from 172.30.100.1: Destination host unreachable.
Reply from 172.30.100.1: Destination host unreachable.

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

What is the success rate? **0%**

From the PC4, is it possible to ping PC3? **Yes**

```
C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=25ms TTL=126
Request timed out.

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 25ms, Average = 13ms

C:\>
```

What is the success rate? **50%**

Step 4: View the routing table on R2.

Both the R1 and R3 are advertising routes to the 172.30.0.0/16 network; therefore, there are two entries for this network in the R2 routing table. The R2 routing table only shows the major classful network address of 172.30.0.0—it does not show any of the subnets for this network that are used on the LANs attached to R1 and R3. Because the routing metric is the same for both entries, the router alternates the routes that are used when forwarding packets that are destined for the 172.30.0.0/16 network.

R2#**show ip route**

```

R2>
R2>
R2>en
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 not set

    10.0.0.0/16 is subnetted, 1 subnets
C       10.1.0.0 is directly connected, FastEthernet0/0
R       172.30.0.0/16 [120/1] via 209.165.200.230, 00:00:02, Serial0/0/0
           [120/1] via 209.165.200.234, 00:00:27, Serial0/0/1
    209.165.200.0/30 is subnetted, 2 subnets
C       209.165.200.228 is directly connected, Serial0/0/0
C       209.165.200.232 is directly connected, Serial0/0/1

```

Step 5: Examine the routing table on the R1 router.

Both R1 and R3 are configured with interfaces on a discontinuous network, 172.30.0.0. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network—in this case, the two serial networks 209.165.200.228/30 and 209.165.200.232/30. Classful routing protocols like RIPv1 summarize networks at major network boundaries. Both R1 and R3 will be summarizing 172.30.0.0/24 subnets to 172.30.0.0/16. Because the route to 172.30.0.0/16 is directly connected, and because R1 does not have any specific routes for the 172.30.0.0 subnets on R3, packets destined for the R3 LANs will not be forwarded properly.

```

R1#show ip route
R1>en
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

R       10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:06, Serial0/0/0
    172.30.0.0/24 is subnetted, 2 subnets
C       172.30.1.0 is directly connected, FastEthernet0/0
C       172.30.2.0 is directly connected, FastEthernet0/1
    209.165.200.0/30 is subnetted, 2 subnets
C       209.165.200.228 is directly connected, Serial0/0/0
R       209.165.200.232 [120/1] via 209.165.200.229, 00:00:06, Serial0/0/0

```

Step 6: Examine the routing table on the R3 router.

R3 only shows its own subnets for 172.30.0.0 network: 172.30.100/24, 172.30.110/24, 172.30.200.16/28, and 172.30.200.32/28. R3 does not have any routes for the 172.30.0.0 subnets on R1.

```

R3#show ip route

```

```

R3>
R3>en
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 not set

R   10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
    172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks
C    172.30.100.0/24 is directly connected, FastEthernet0/0
C    172.30.110.0/24 is directly connected, Loopback0
C    172.30.200.16/28 is directly connected, Loopback1
C    172.30.200.32/28 is directly connected, Loopback2
    209.165.200.0/30 is subnetted, 2 subnets
R    209.165.200.228 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
C    209.165.200.232 is directly connected, Serial0/0/1

R3#

```

Step 7: Examine the RIPv1 packets that are being received by R2.

Use the `debug ip rip` command to display RIP routing updates.

R2 is receiving the route 172.30.0.0, with 1 hop, from both R1 and R3. Because these are equal cost metrics, both routes are added to the R2 routing table. Because RIPv1 is a classful routing protocol, no subnet mask information is sent in the update.

R2#`debug ip rip`

```

R2#debug ip rip
RIP protocol debugging is on
R2#RIP: received v1 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
    172.30.0.0 in 1 hops
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.228 metric 1
RIP: received v1 update from 209.165.200.234 on Serial0/0/1

```

R2 is sending only the routes for the 10.0.0.0 LAN and the two serial connections to R1 and R3. R1 and R3 are not receiving any information about the 172.30.0.0 subnet routes.

When you are finished, turn off the debugging.

R2#`undebug all`

```

-----
172.30.200.16/28 via 0.0.0.0, metric 2, tag 0
172.30.200.32/28 via 0.0.0.0, metric 2, tag 0
209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
unde
R2#undebug all
All possible debugging has been turned off
R2#

```

Task 4: Configure RIP Version 2.

Step 1: Use the `version 2` command to enable RIP version 2 on each of the routers.

```
R2(config)#router rip
R2(config-router)#version 2
```

```
R2(config)#
R2(config)#
R2(config)#router rip
R2(config-router)#
R2(config-router)#version 2
R2(config-router)#
R2(config-router)#
```

```
R1(config)#router rip
R1(config-router)#version 2
```

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#
```

```
R3(config)#router rip
R3(config-router)#version 2
```

```
R3(config)#
R3(config)#
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#
```

RIPv2 messages include the subnet mask in a field in the routing updates. This allows subnets and their masks to be included in the routing updates. However, by default RIPv2 summarizes networks at major network boundaries, just like RIPv1, except that the subnet mask is included in the update.

Step 2: Verify that RIPv2 is running on the routers.

The `debug ip rip`, `show ip protocols`, and `show run` commands can all be used to confirm that RIPv2 is running. The output of the `show ip protocols` command for R1 is shown below.

```
R1# show ip protocols
R1#
R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 3 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  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:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
  Routing Information Sources:
    Gateway         Distance      Last Update
    209.165.200.229    120          00:00:10
  Distance: (default is 120)
R1#
```

Task 5: Examine the Automatic Summarization of Routes.

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

R2#show ip route

```
R2#
R2#
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 not set

    10.0.0.0/16 is subnetted, 1 subnets
C       10.1.0.0 is directly connected, FastEthernet0/0
R       172.30.0.0/16 [120/1] via 209.165.200.230, 00:00:23, Serial0/0/0
           [120/1] via 209.165.200.234, 00:00:27, Serial0/0/1
    209.165.200.0/30 is subnetted, 2 subnets
C       209.165.200.228 is directly connected, Serial0/0/0
C       209.165.200.232 is directly connected, Serial0/0/1

R2#
```

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

R1#show ip route

```
R1>
R1>
R1>en
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

R       10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:26, Serial0/0/0
    172.30.0.0/24 is subnetted, 2 subnets
C       172.30.1.0 is directly connected, FastEthernet0/0
C       172.30.2.0 is directly connected, FastEthernet0/1
    209.165.200.0/30 is subnetted, 2 subnets
C       209.165.200.228 is directly connected, Serial0/0/0
R       209.165.200.232 [120/1] via 209.165.200.229, 00:00:26, Serial0/0/0

R1#
```


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

R3#show ip route

```
R3#
R3#
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 not set

R    10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:03, Serial0/0/1
     172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks
C     172.30.100.0/24 is directly connected, FastEthernet0/0
C     172.30.110.0/24 is directly connected, Loopback0
C     172.30.200.16/28 is directly connected, Loopback1
C     172.30.200.32/28 is directly connected, Loopback2
     209.165.200.0/30 is subnetted, 2 subnets
R     209.165.200.228 [120/1] via 209.165.200.233, 00:00:03, Serial0/0/1
C     209.165.200.232 is directly connected, Serial0/0/1

R3#
```

Use the output of the `debug ip rip` command to answer the following questions:

What entries are included in the RIP updates sent out from R3?

```
R3#
R3#debug ip rip
RIP protocol debugging is on
R3#RIP: sending v2 update to 224.0.0.9 via Loopback0 (172.30.110.1)
RIP: build update entries
     10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
     172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
     172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
     172.30.200.32/28 via 0.0.0.0, metric 1, tag 0
     209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Loopback1 (172.30.200.17)
RIP: build update entries
     10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
```

10.0.0.0/8

172.30.100.0/24

172.30.200.16/28

172.30.200.32/28

209.165.200.0/24

On R2, what routes are in the RIP updates that are received from R3?

```
R2#
R2#debug ip rip
RIP protocol debugging is on
R2#RIP: received v2 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0/16 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
    10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
    209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
```

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. This is why R2 and R1 are not seeing the 172.30.0.0 subnets on R3.

Task 6: Disable Automatic Summarization.

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 network boundaries.

```
R2(config)#router rip
R2(config-router)#no auto-summary
```

```
R2(config)#
R2(config)#
R2(config)#router rip
R2(config-router)#no auto-summary
R2(config-router)#
```

```
R1(config)#router rip
R1(config-router)#no auto-summary
```

```
R1(config)#
R1(config)#
R1(config)#router rip
R1(config-router)#no auto-summary
R1(config-router)#
```

```
R3(config)#router rip
R3(config-router)#no auto-summary
```

```
R3(config)#
R3(config)#
R3(config)#
R3(config)#router rip
R3(config-router)#no auto-summary
R3(config-router)#
R3(config-router)#
```

Command+F6 to exit CLI focus

The **show ip route** and **ping** commands can be used to verify that automatic summarization is off.

Task 7: Examine the Routing Tables.

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

R2#show ip route

```
R2#
R2#
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 not set

    10.0.0.0/16 is subnetted, 1 subnets
C       10.1.0.0 is directly connected, FastEthernet0/0
    172.30.0.0/16 is variably subnetted, 7 subnets, 3 masks
R       172.30.0.0/16 [120/1] via 209.165.200.230, 00:01:10, Serial0/0/0
           [120/1] via 209.165.200.234, 00:01:09, Serial0/0/1
R       172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:17, Serial0/0/0
R       172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:17, Serial0/0/0
R       172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:13, Serial0/0/1
R       172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:13, Serial0/0/1
R       172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:13, Serial0/0/1
R       172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:13, Serial0/0/1
    209.165.200.0/30 is subnetted, 2 subnets
R2#
```

R1#show ip route

```
R1#
R1#
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

    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
R       10.0.0.0/8 [120/1] via 209.165.200.229, 00:02:00, Serial0/0/0
R       10.1.0.0/16 [120/1] via 209.165.200.229, 00:00:10, Serial0/0/0
    172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
C       172.30.1.0/24 is directly connected, FastEthernet0/0
C       172.30.2.0/24 is directly connected, FastEthernet0/1
R       172.30.100.0/24 [120/2] via 209.165.200.229, 00:00:10, Serial0/0/0
R       172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:10, Serial0/0/0
R       172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:10, Serial0/0/0
R       172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:10, Serial0/0/0
    209.165.200.0/30 is subnetted, 2 subnets
C       209.165.200.228 is directly connected, Serial0/0/0
R1#
```

R3#show ip route

```

R3#
R3#
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 not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
R   10.0.0.0/8 [120/1] via 209.165.200.233, 00:02:35, Serial0/0/1
R   10.1.0.0/16 [120/1] via 209.165.200.233, 00:00:19, Serial0/0/1
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R   172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:19, Serial0/0/1
R   172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:19, Serial0/0/1
C   172.30.100.0/24 is directly connected, FastEthernet0/0
C   172.30.110.0/24 is directly connected, Loopback0
C   172.30.200.16/28 is directly connected, Loopback1
C   172.30.200.32/28 is directly connected, Loopback2
209.165.200.0/30 is subnetted, 2 subnets
R   209.165.200.228 [120/1] via 209.165.200.233, 00:00:19, Serial0/0/1
R3#

```

Use the output of the `debug ip rip` command to answer the following questions:

What entries are included in the RIP updates sent out from R1?

```

R1#undw
R1#unde
R1#undebug allRIP: received v2 update from 209.165.200.229 on Serial0/0/0
10.1.0.0/16 via 0.0.0.0 in 1 hops
172.30.100.0/24 via 0.0.0.0 in 2 hops
172.30.110.0/24 via 0.0.0.0 in 2 hops
172.30.200.16/28 via 0.0.0.0 in 2 hops
172.30.200.32/28 via 0.0.0.0 in 2 hops
209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.230)
RIP: build update entries
172.30.1.0/24 via 0.0.0.0, metric 1, tag 0
172.30.2.0/24 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
10.1.0.0/16 via 0.0.0.0 in 1 hops

```

172.30.1.0/24

172.30.2.0/24

On R2, what routes are in the RIP updates that are received from R1?

```

R2#
R2#
R2#debug ip rip
RIP protocol debugging is on
R2#RIP: received v2 update from 209.165.200.230 on Serial0/0/0
172.30.1.0/24 via 0.0.0.0 in 1 hops
172.30.2.0/24 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
172.30.100.0/24 via 0.0.0.0 in 1 hops
172.30.110.0/24 via 0.0.0.0 in 1 hops

```

172.30.1.0/24

172.30.2.0/24

Are the subnet masks now included in the routing updates? **YES**

Task 8: Verify Network Connectivity.

Step 1: Check connectivity between R2 router and PCs.

From R2, how many ICMP messages are successful when pinging PC1?

```
R2#
R2#
R2#
R2#ping 172.30.2.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/14/48 ms

R2#
```

100 percent (5/5)

From R2, how many ICMP messages are successful when pinging PC4?

```
R2#ping 172.30.100.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.100.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/5/24 ms

R2#
```

100 percent (5/5)

Step 2: Check the connectivity between the PCs.

From PC1, is it possible to ping PC2? **Yes**

```
C:\>
C:\>
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: bytes=32 time=2ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\>
```

What is the success rate? **100%**

From PC1, is it possible to ping PC3? **Yes**

```
C:\>
C:\>
C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>
```

What is the success rate? **100%**

From PC1, is it possible to ping PC4? **Yes**

```
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.100.10: bytes=32 time=3ms TTL=125
Reply from 172.30.100.10: bytes=32 time=2ms TTL=125
Reply from 172.30.100.10: bytes=32 time=2ms TTL=125
Reply from 172.30.100.10: bytes=32 time=2ms TTL=125

Ping statistics for 172.30.100.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>
```

What is the success rate? **100%**

From PC4, is it possible to ping PC2? **Yes**

```
C:\>
C:\>
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: bytes=32 time=2ms TTL=125
Reply from 172.30.1.10: bytes=32 time=2ms TTL=125
Reply from 172.30.1.10: bytes=32 time=14ms TTL=125
Reply from 172.30.1.10: bytes=32 time=18ms TTL=125

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 18ms, Average = 9ms

C:\>
```

What is the success rate? **100%**

From PC4, is it possible to ping PC3? **Yes**

```
C:\>
C:\>
C:\>
C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=6ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 6ms, Average = 2ms

C:\>
```

What is the success rate? **100%**

Task 9: Documentation

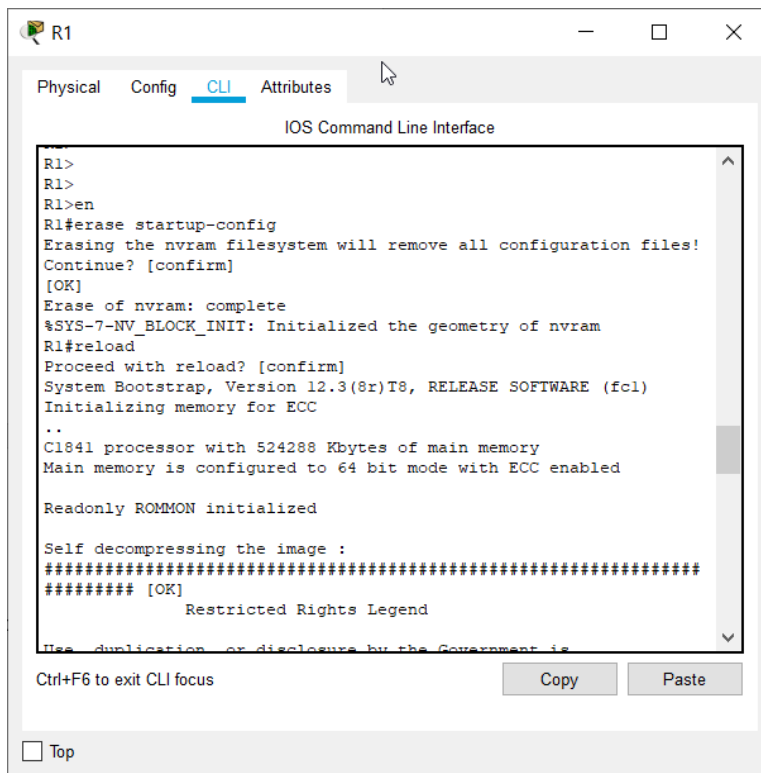
On each router, capture the following command output to a text (.txt) file and save for future reference.

- **show running-config**
- **show ip route**
- **show ip interface brief**
- **show ip protocols**

If you need to review the procedures for capturing command output, refer to Lab 1.5.1.

Task 10: Clean Up

Erase the configurations and reload the routers. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.



The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The command history shows the following sequence of commands and outputs:

```
R1>
R1>
R1>en
R1#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
R1#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Initializing memory for ECC
..
C1841 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

Self decompressing the image :
#####
##### [OK]
Restricted Rights Legend
Use, duplication, or disclosure by the Government is
```

At the bottom of the CLI window, there is a status bar with the text 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'. Below the CLI window, there is a checkbox labeled 'Top'.

