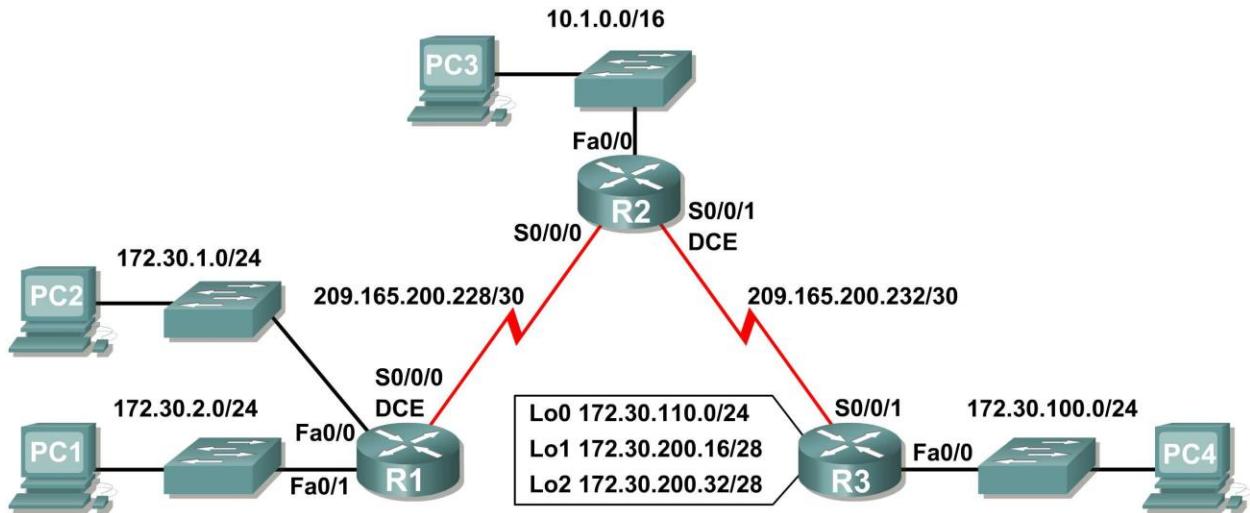


# CEL 51, DCCN, Monsoon 2020

## 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.

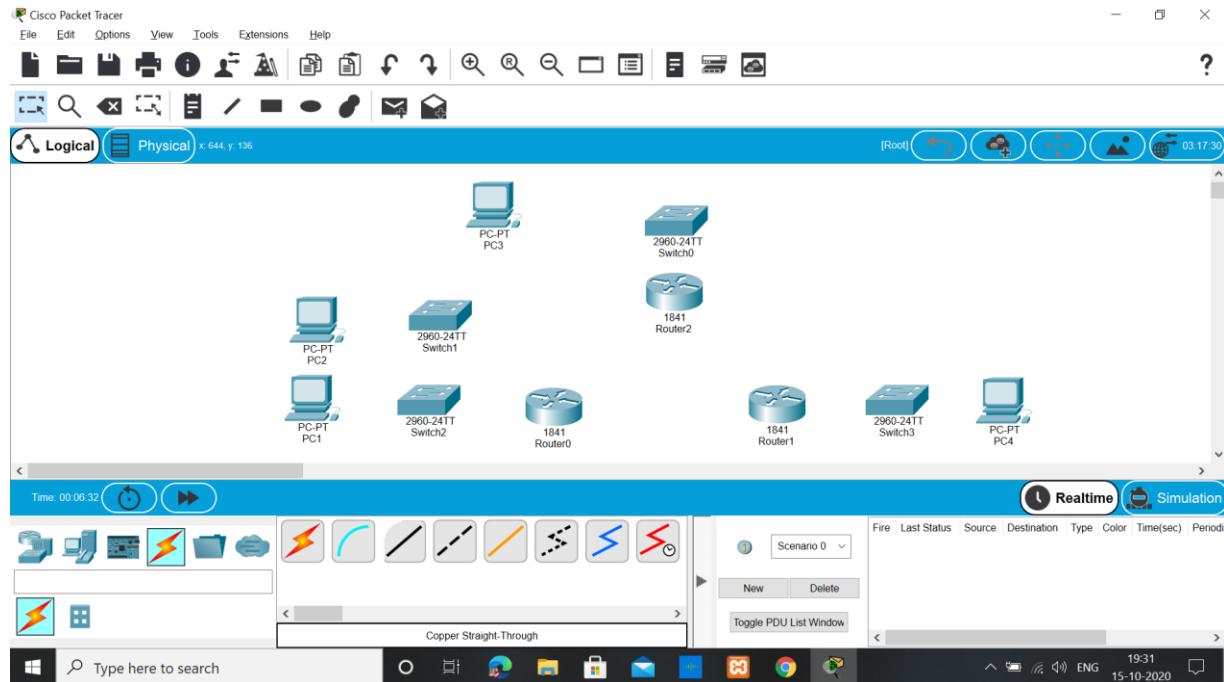
## Scenario

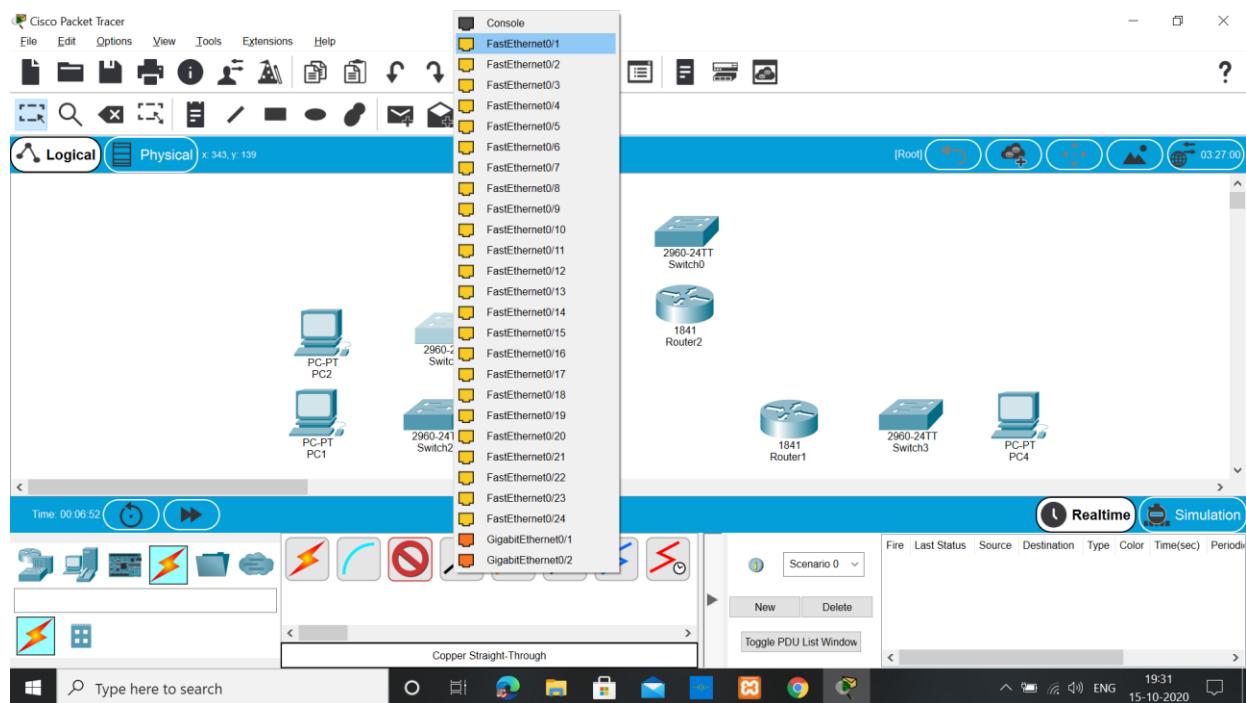
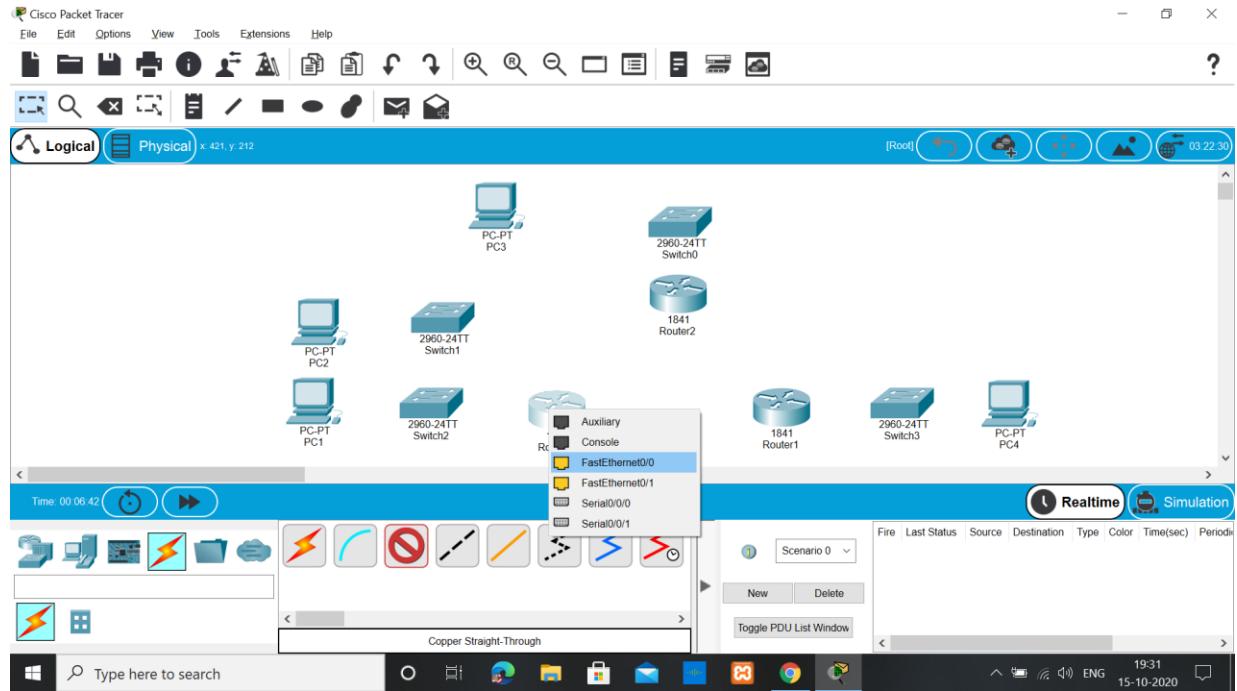
The network shown in the Topology Diagram contains a discontiguous network, 172.30.0.0. This network has been subnetted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and 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.

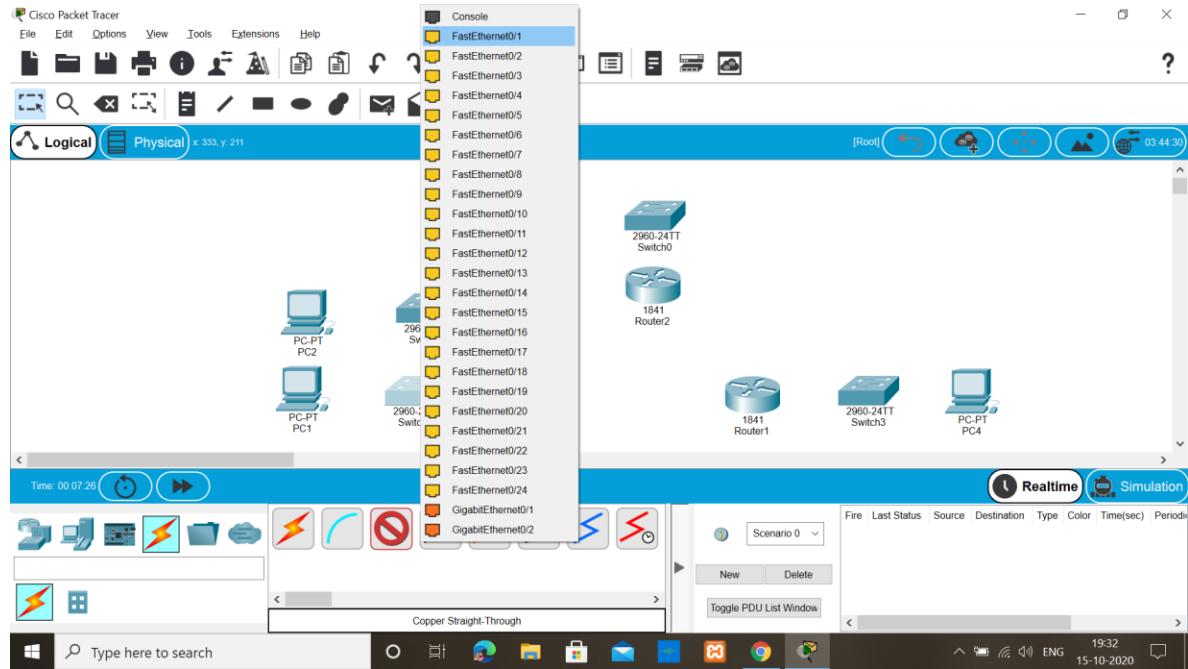
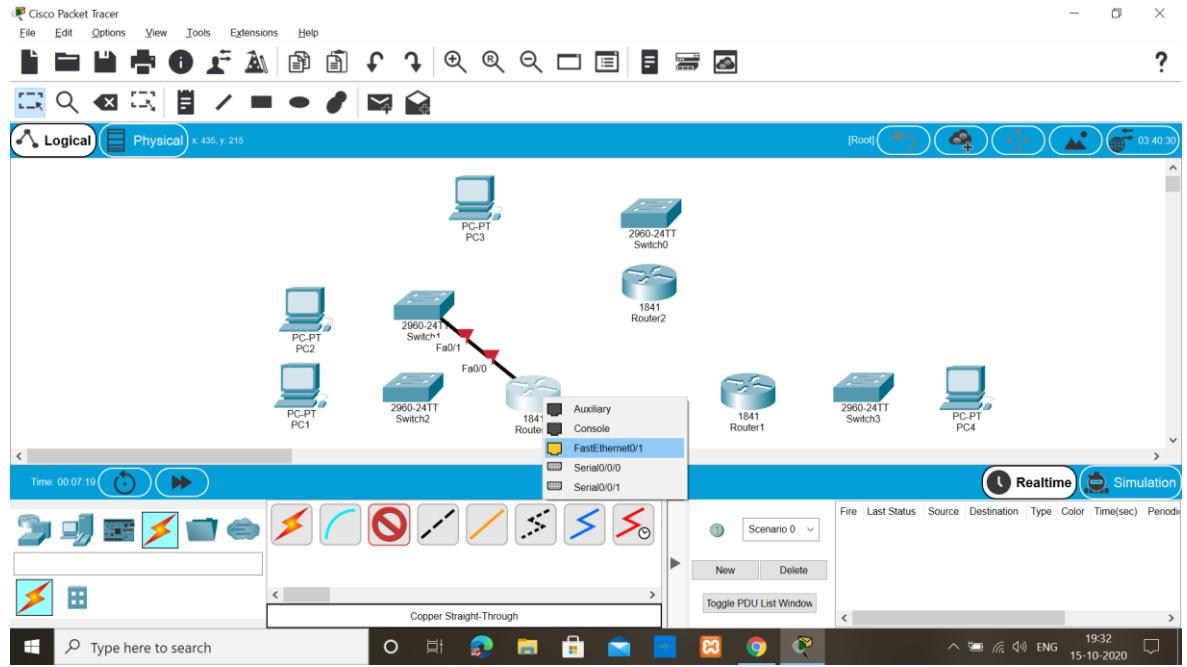
### Task 1: Cable, Erase, and Reload the Routers.

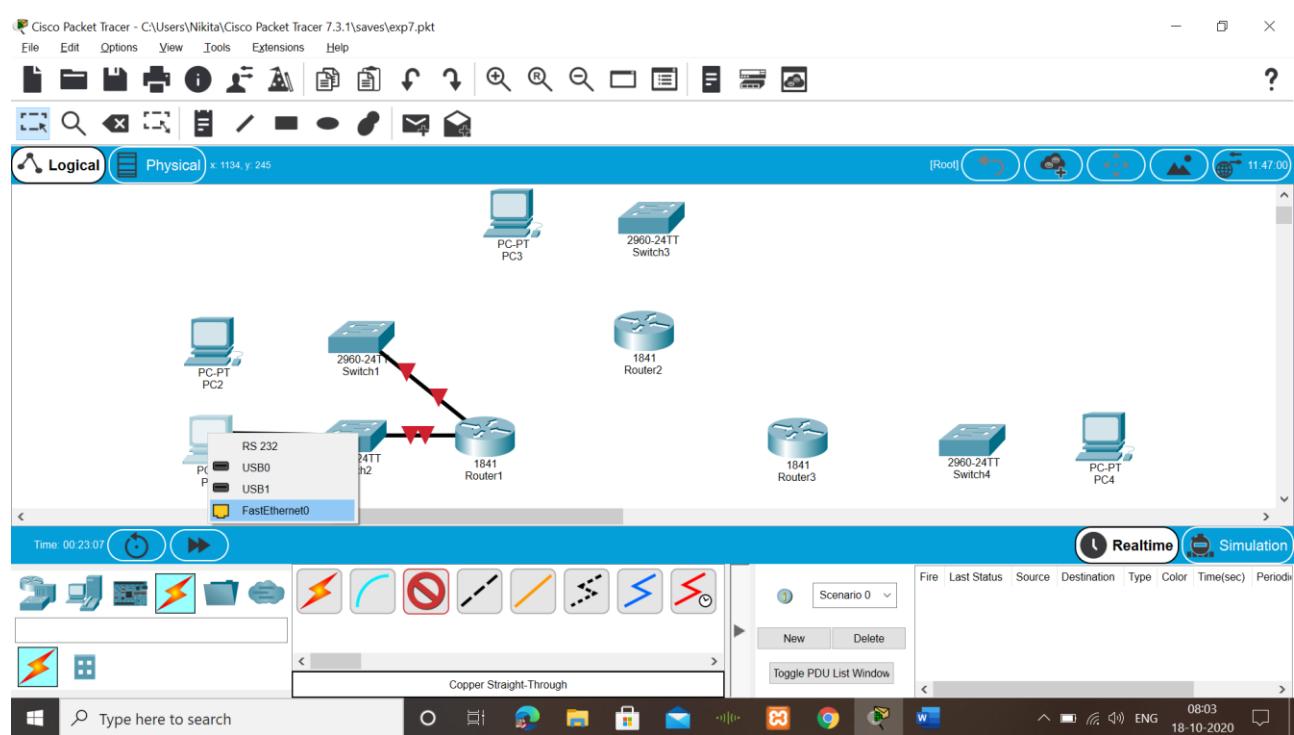
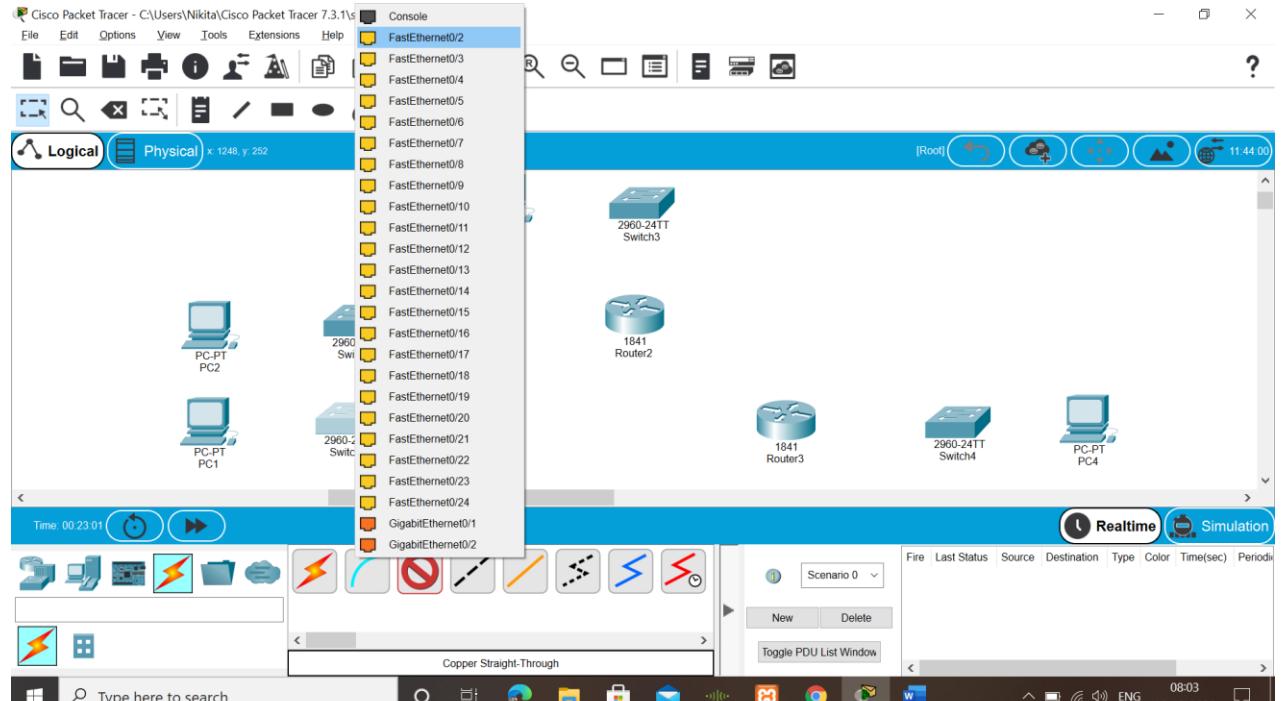
#### Step 1: Cable a network.

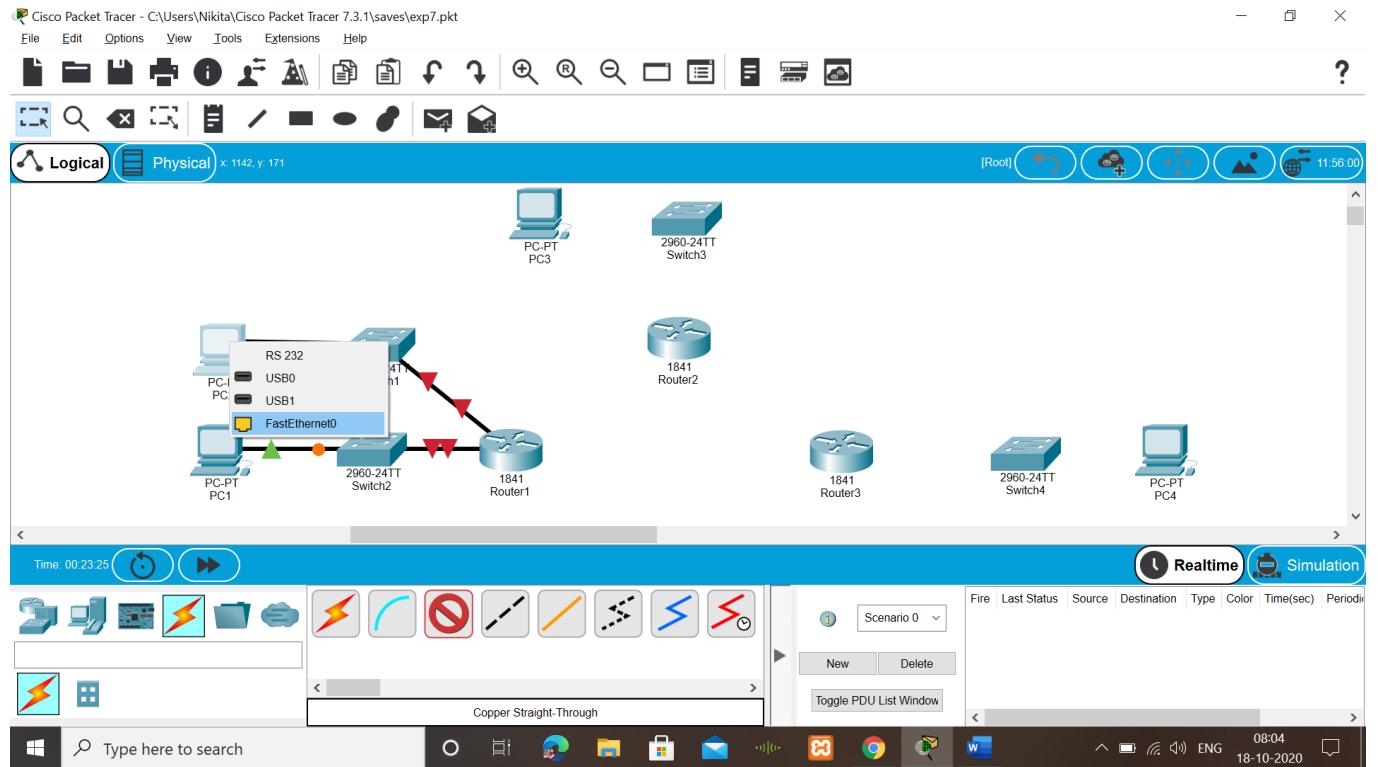
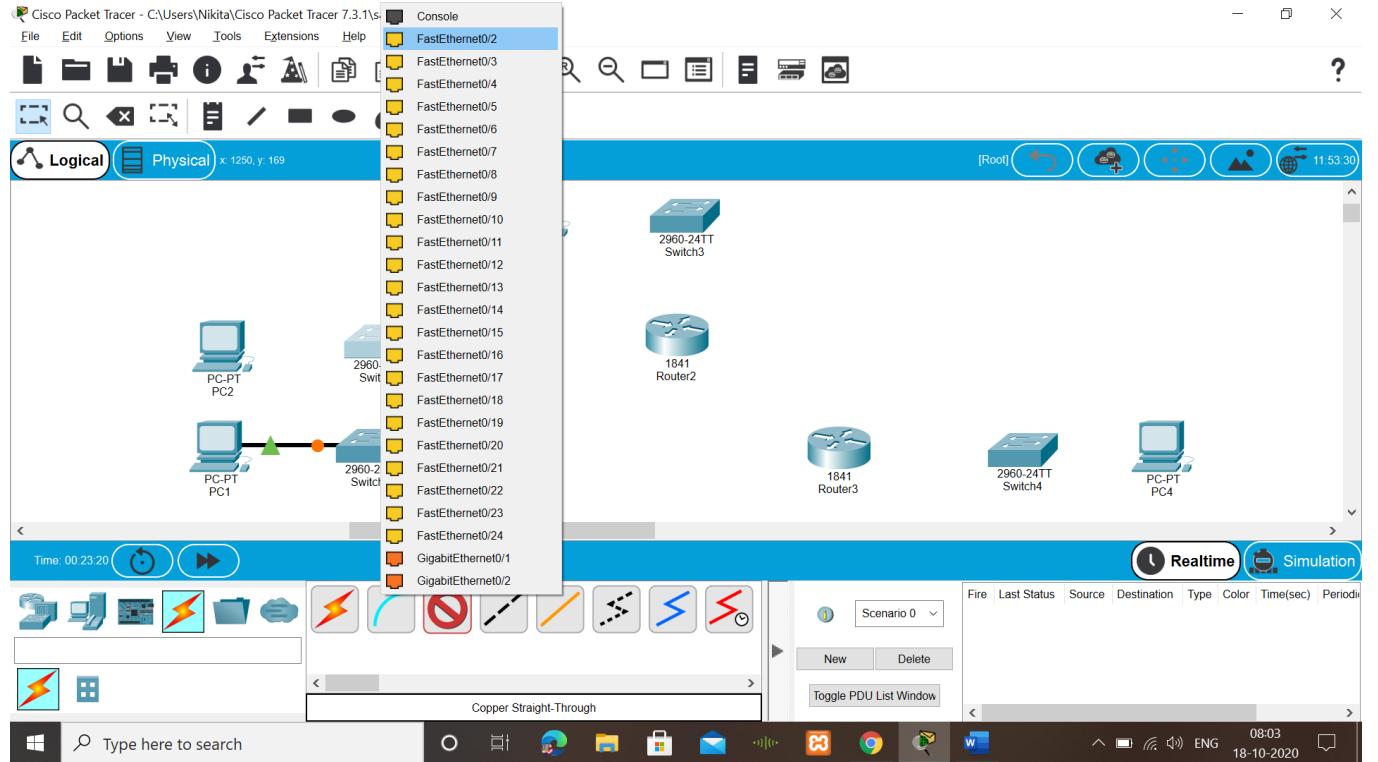
Cable a network that is similar to the one in the Topology Diagram.

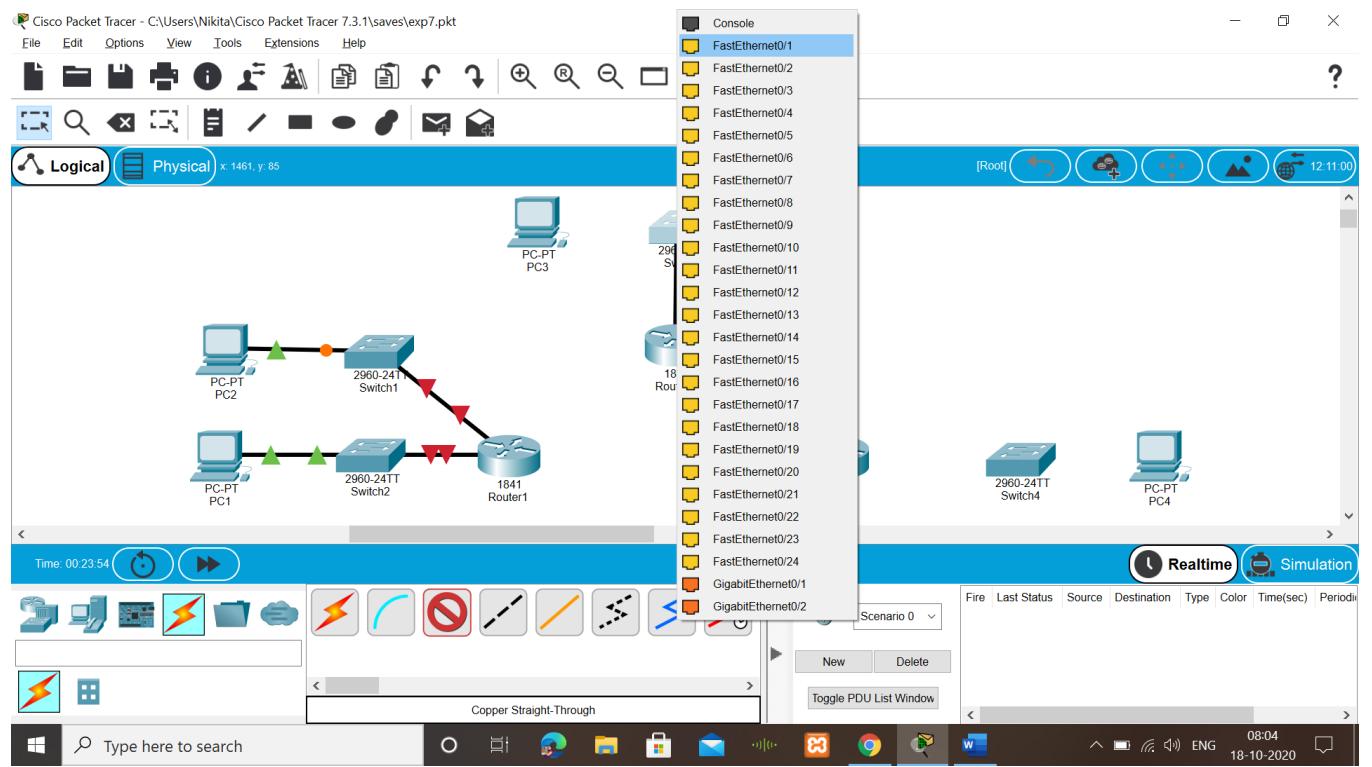
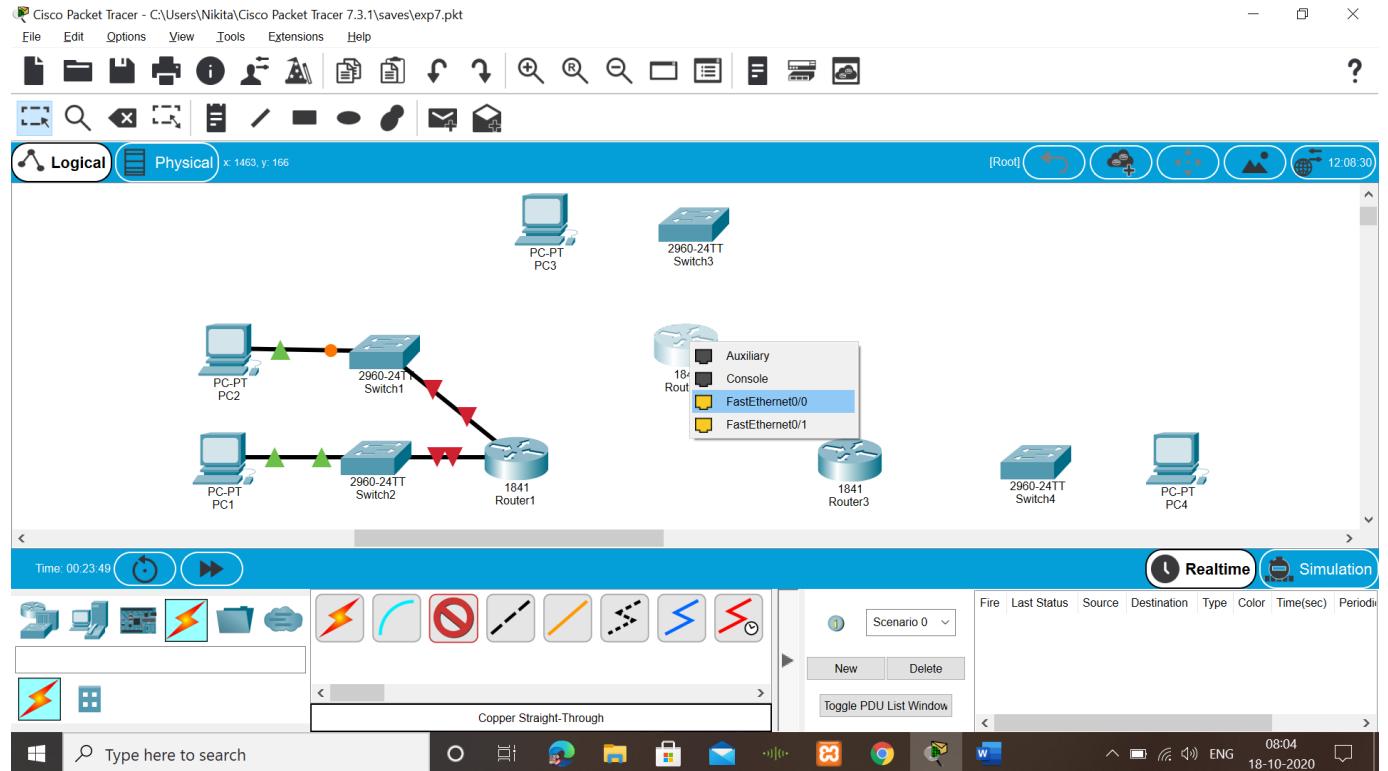


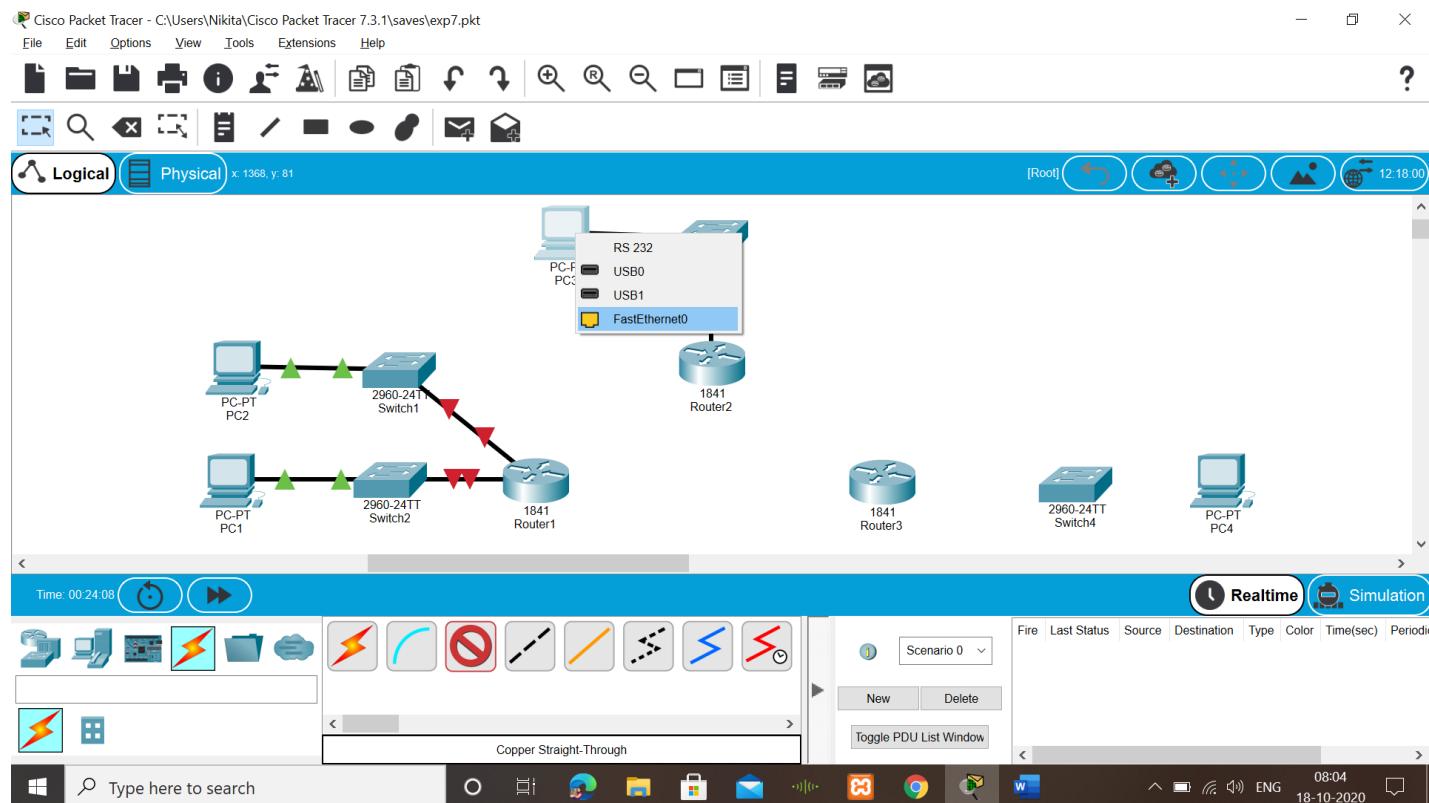
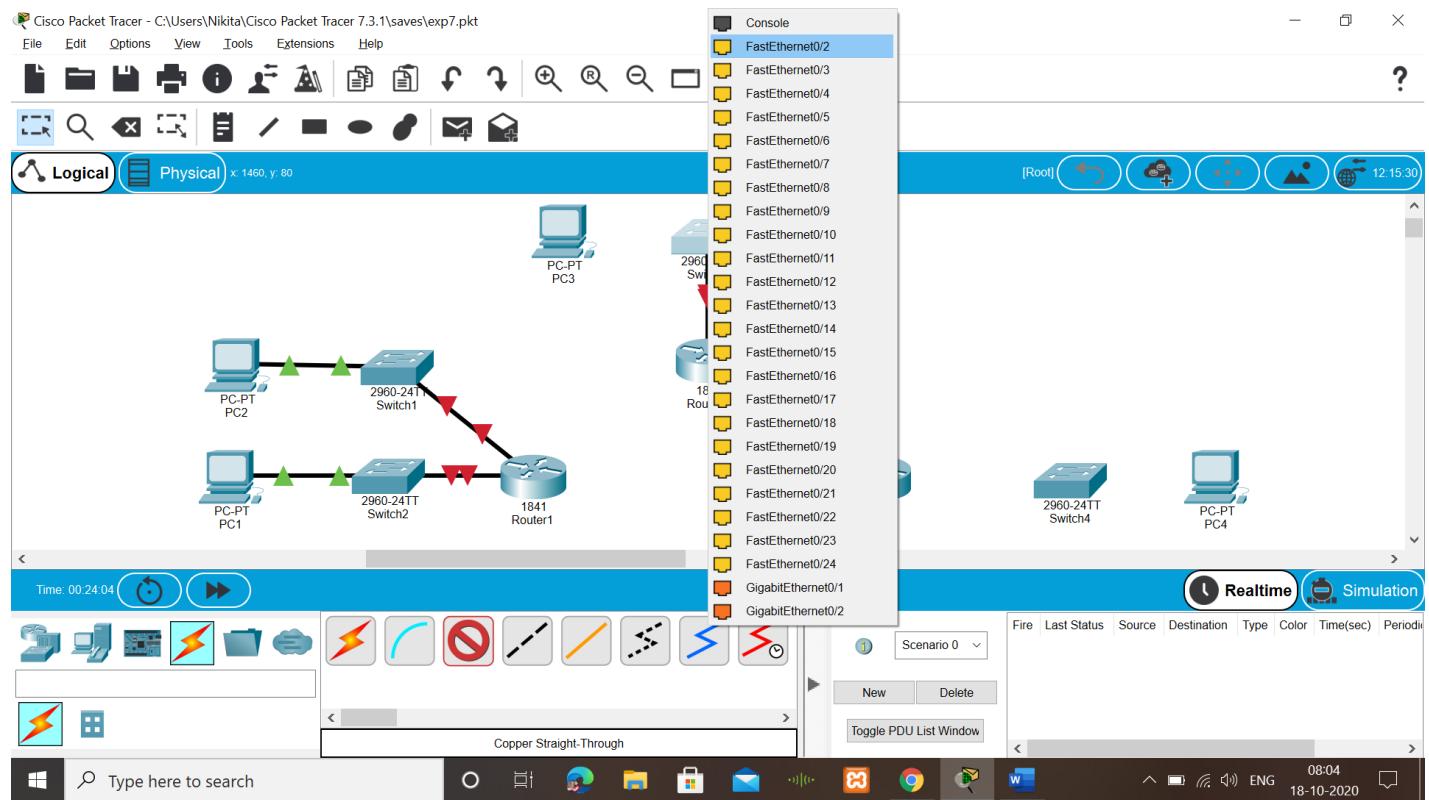


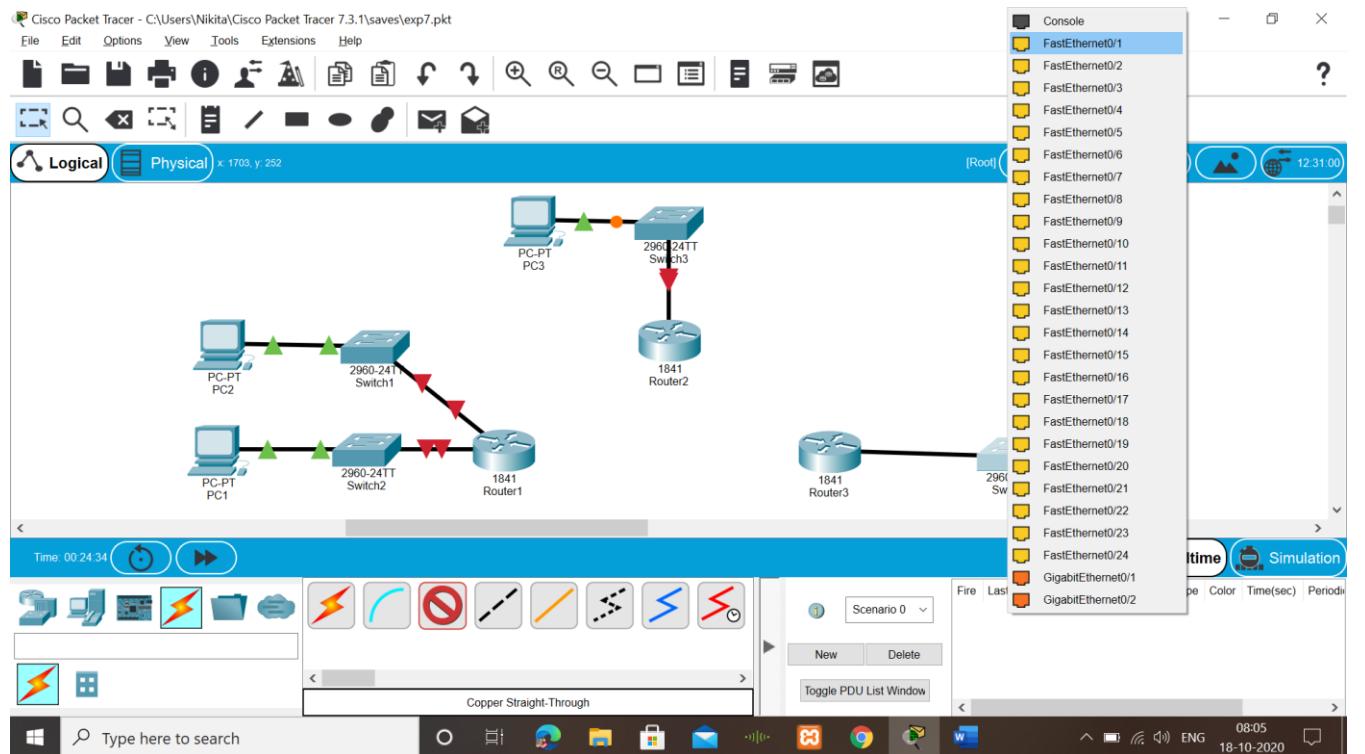
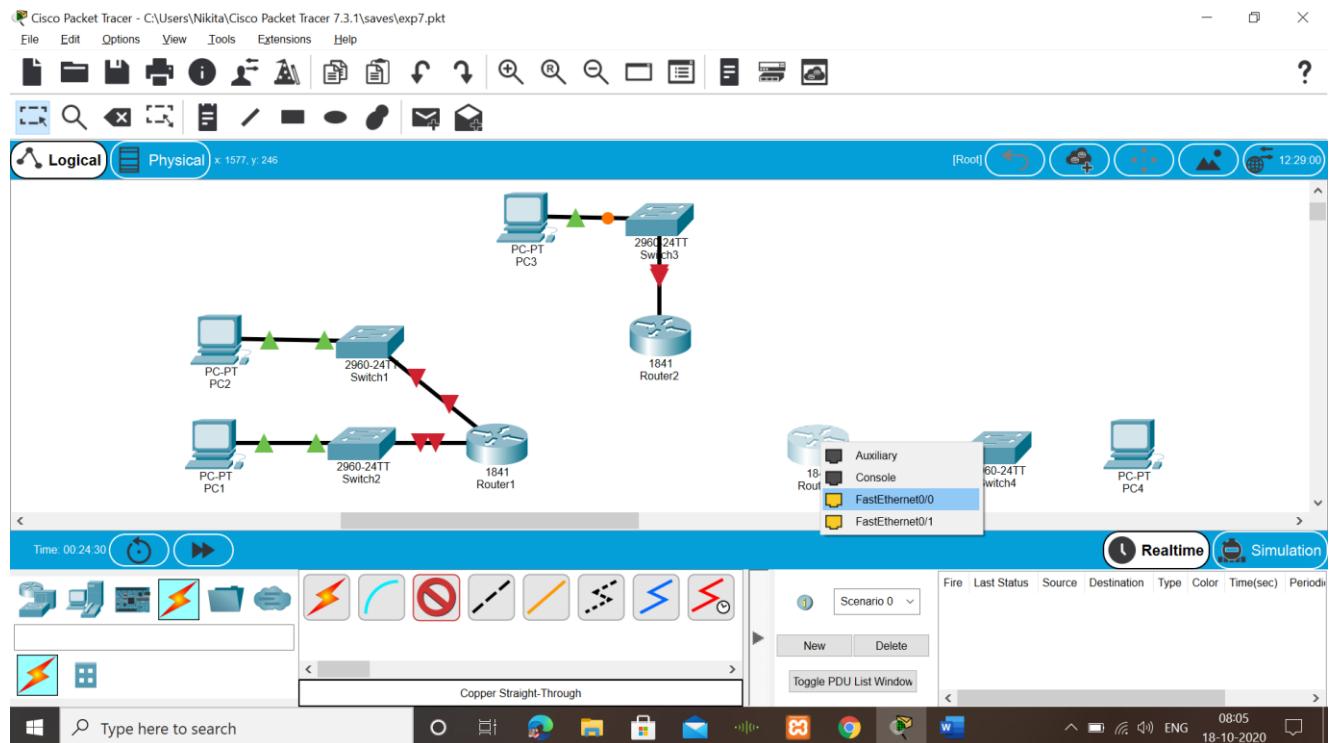


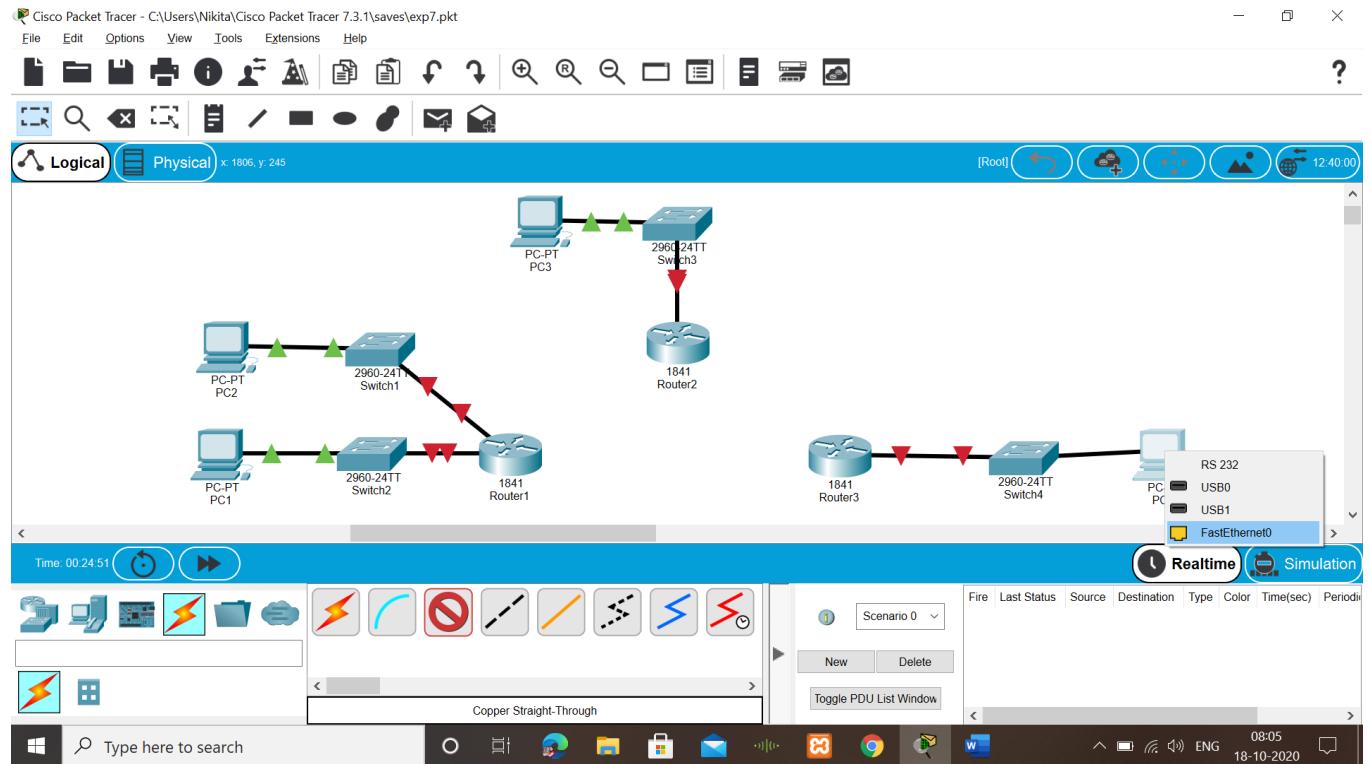
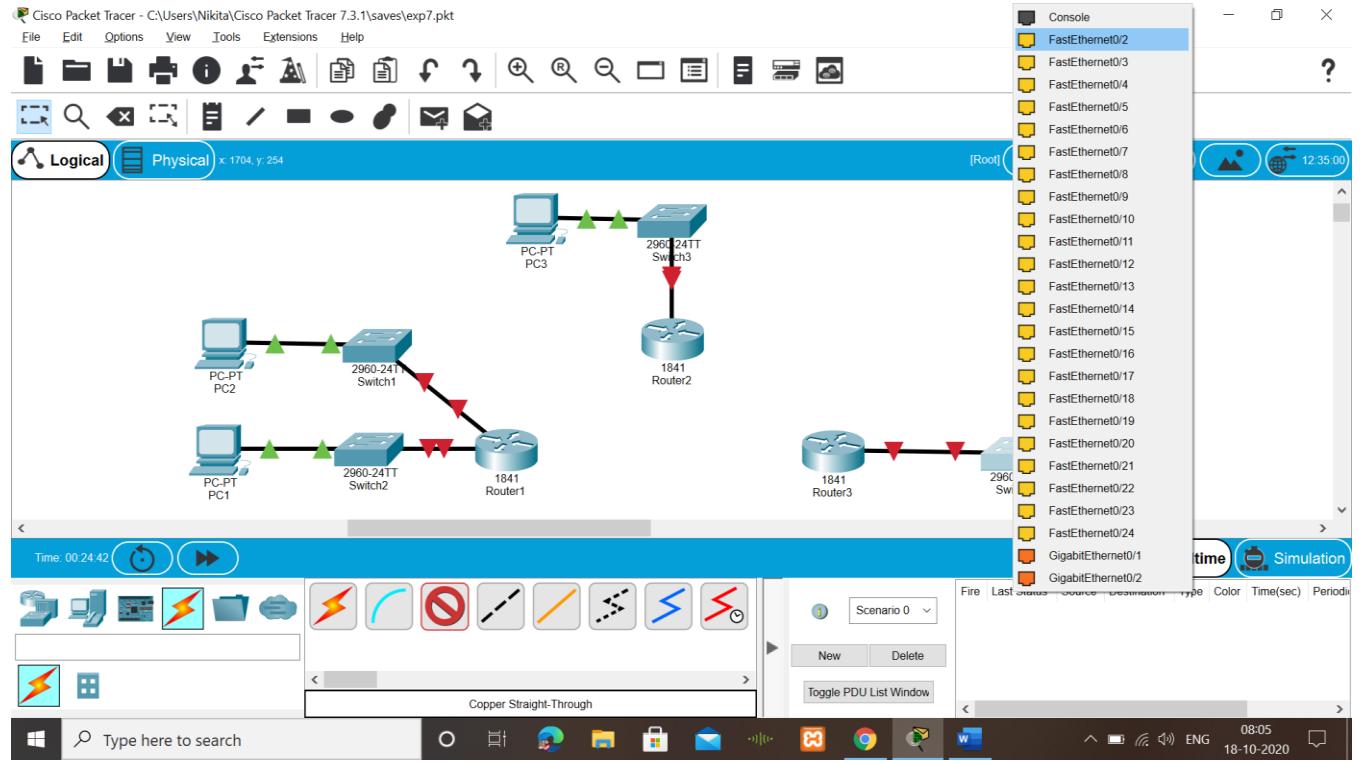


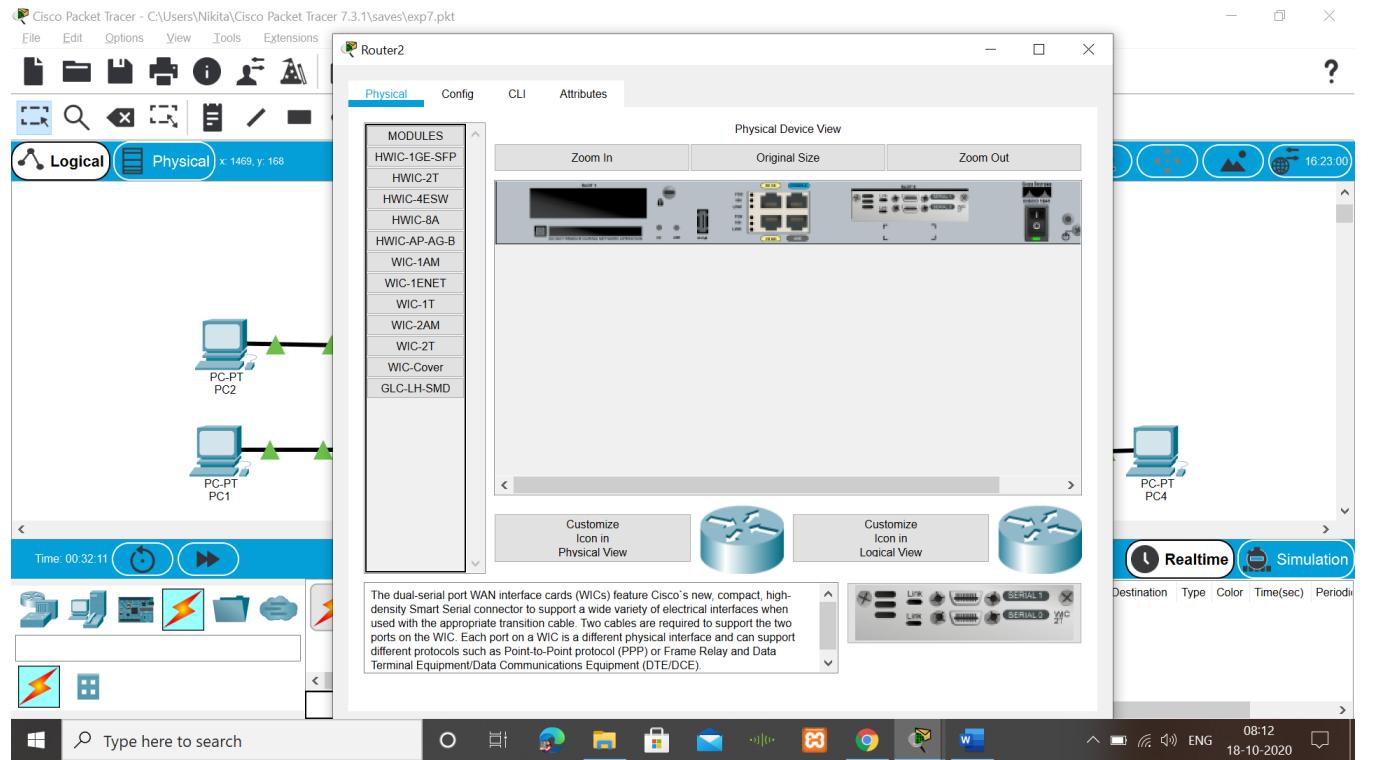
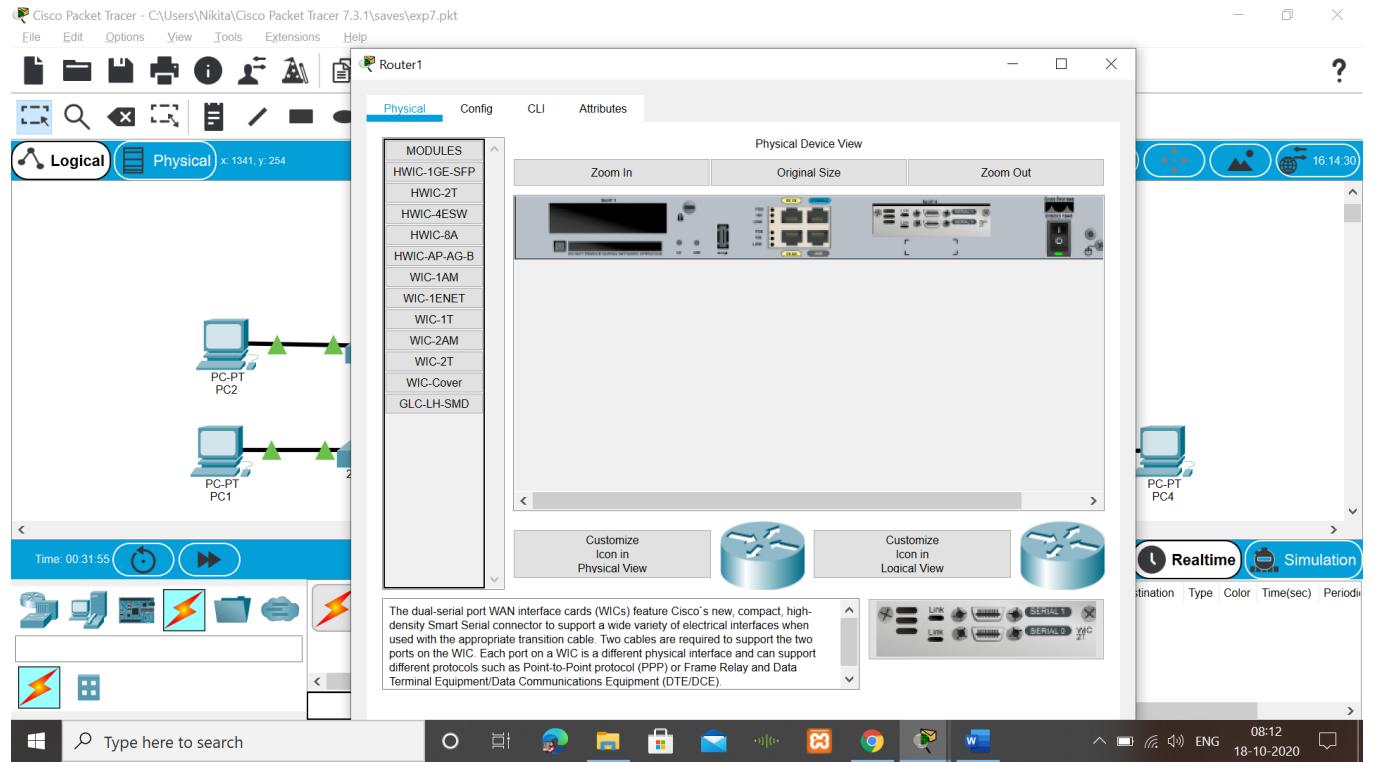


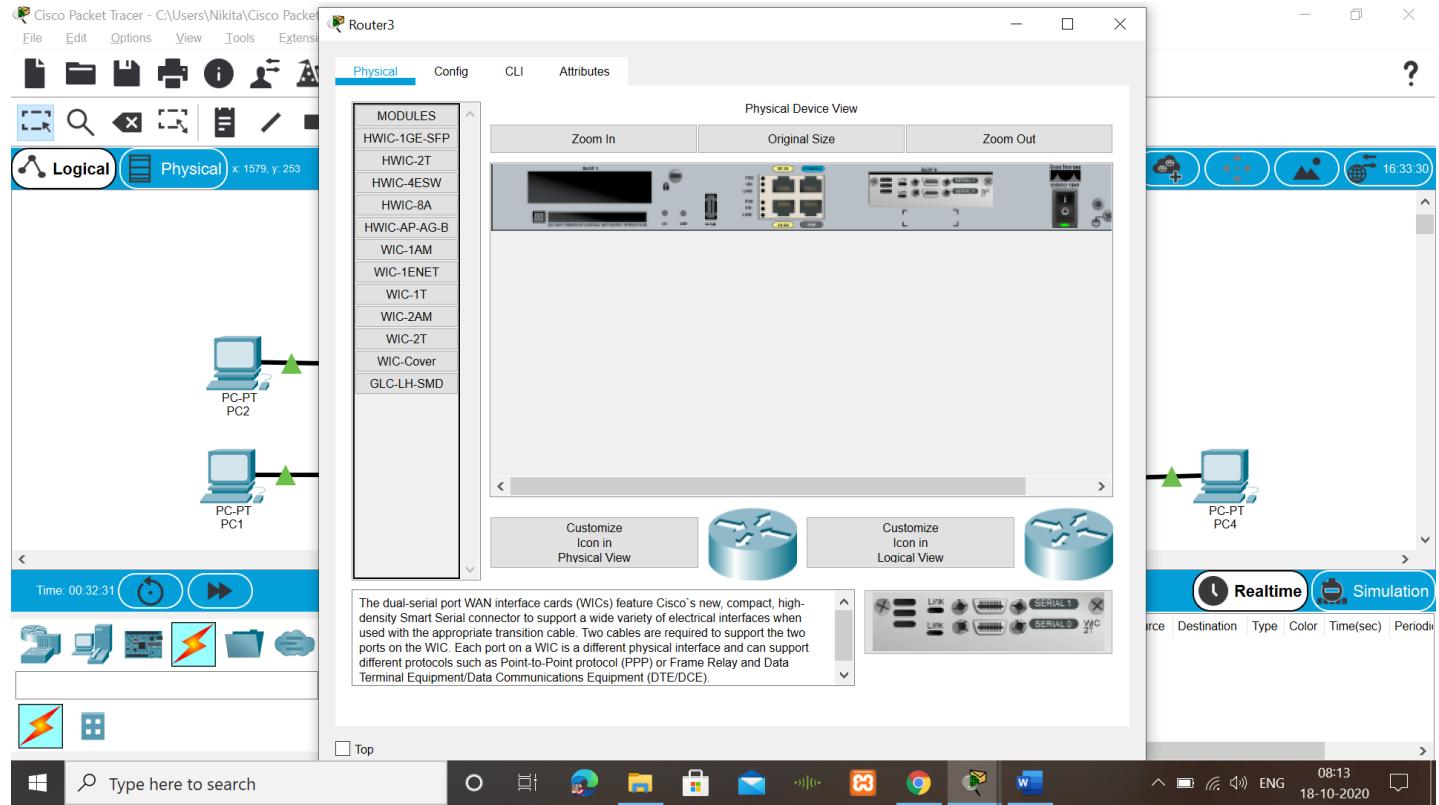


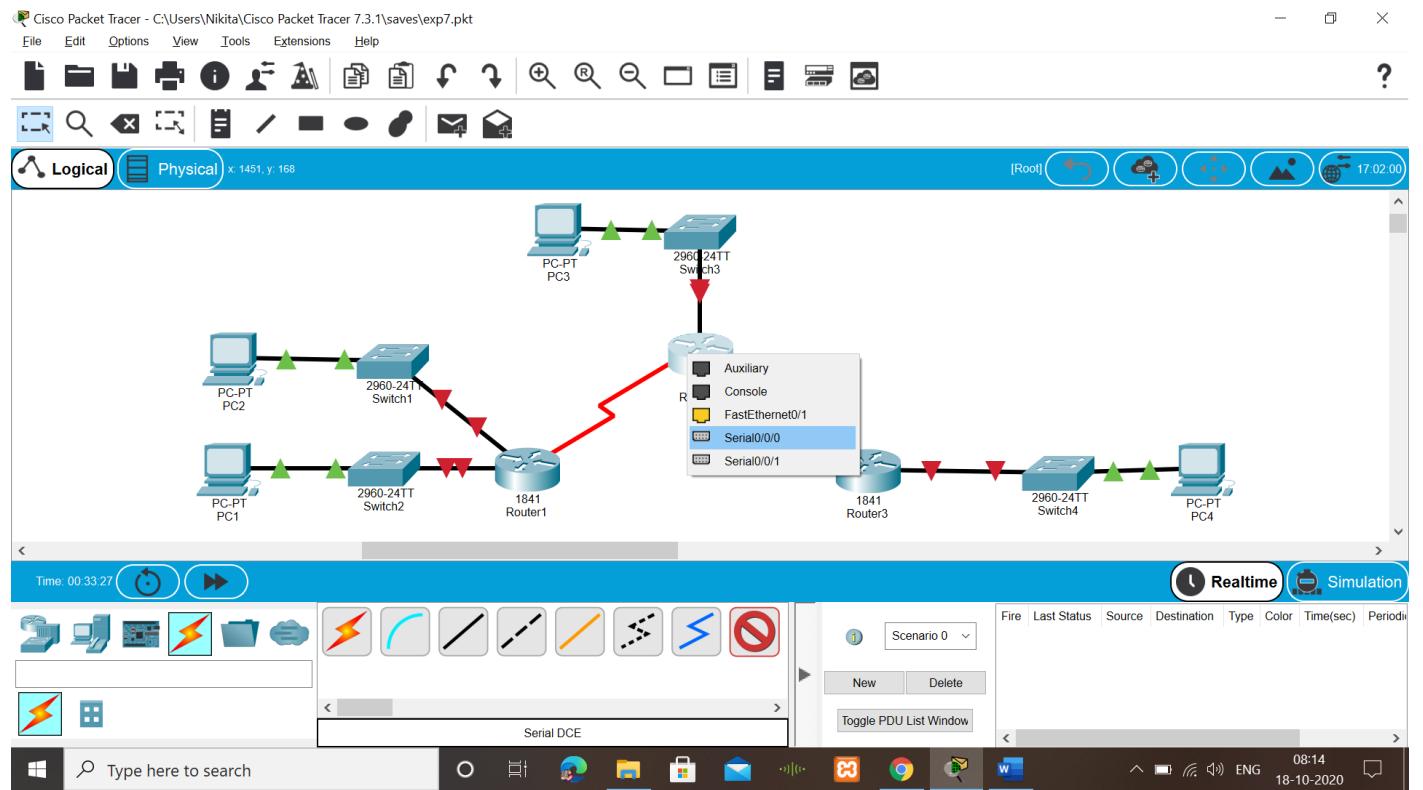
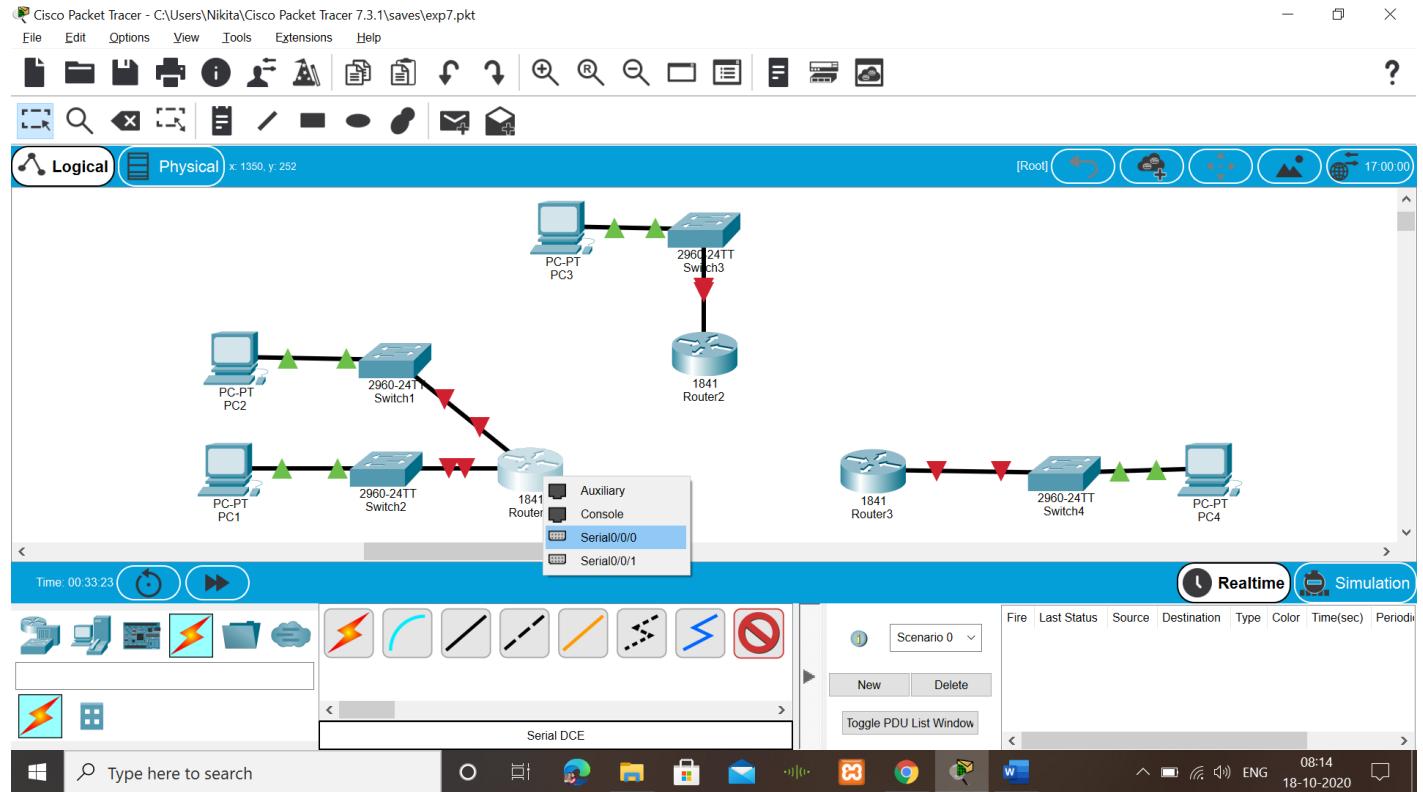


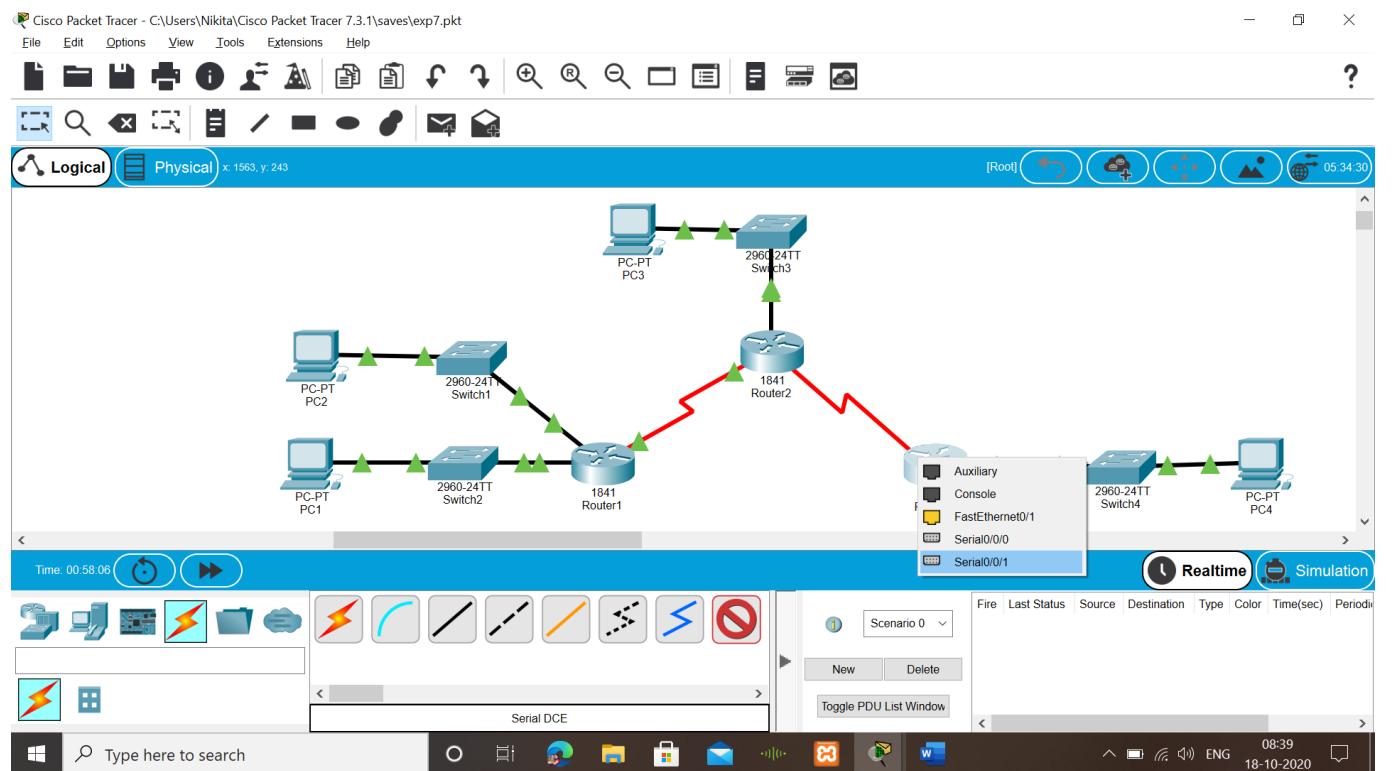
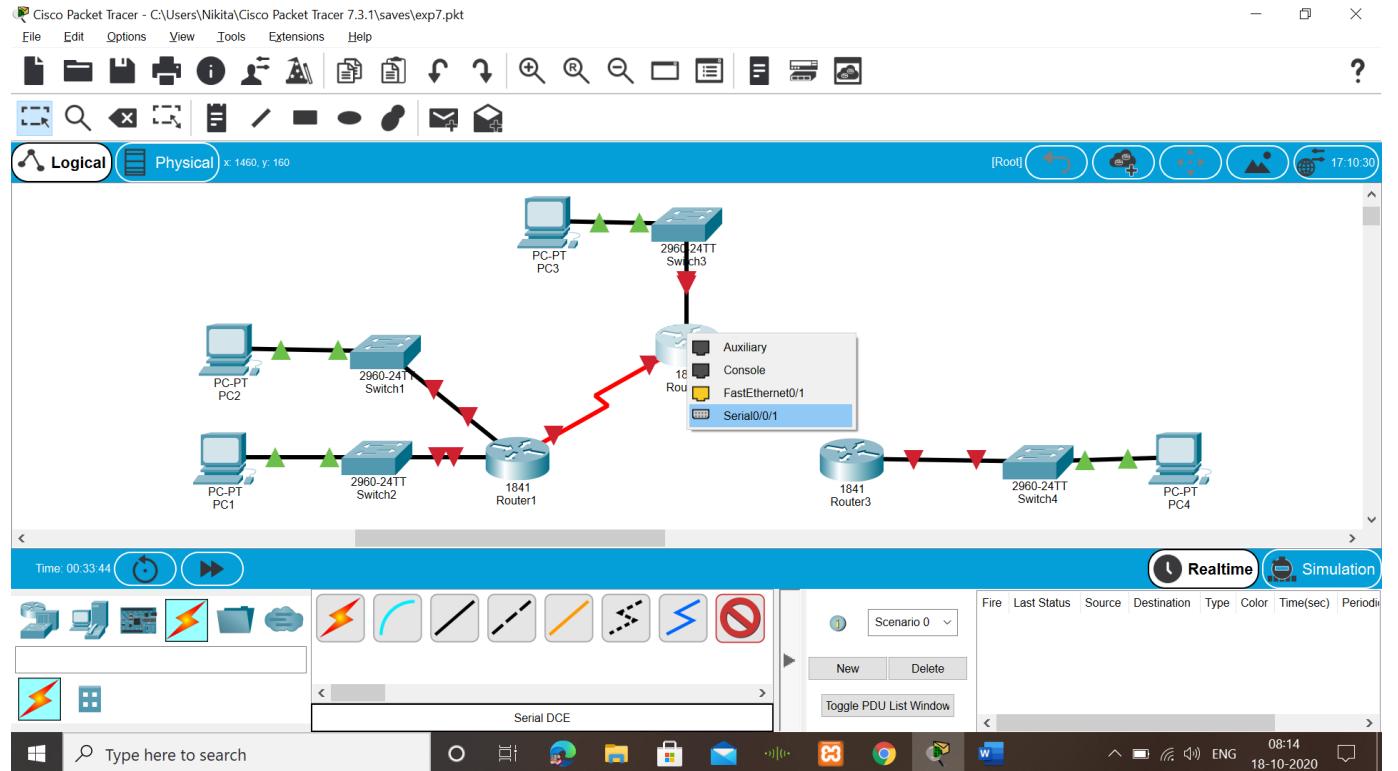






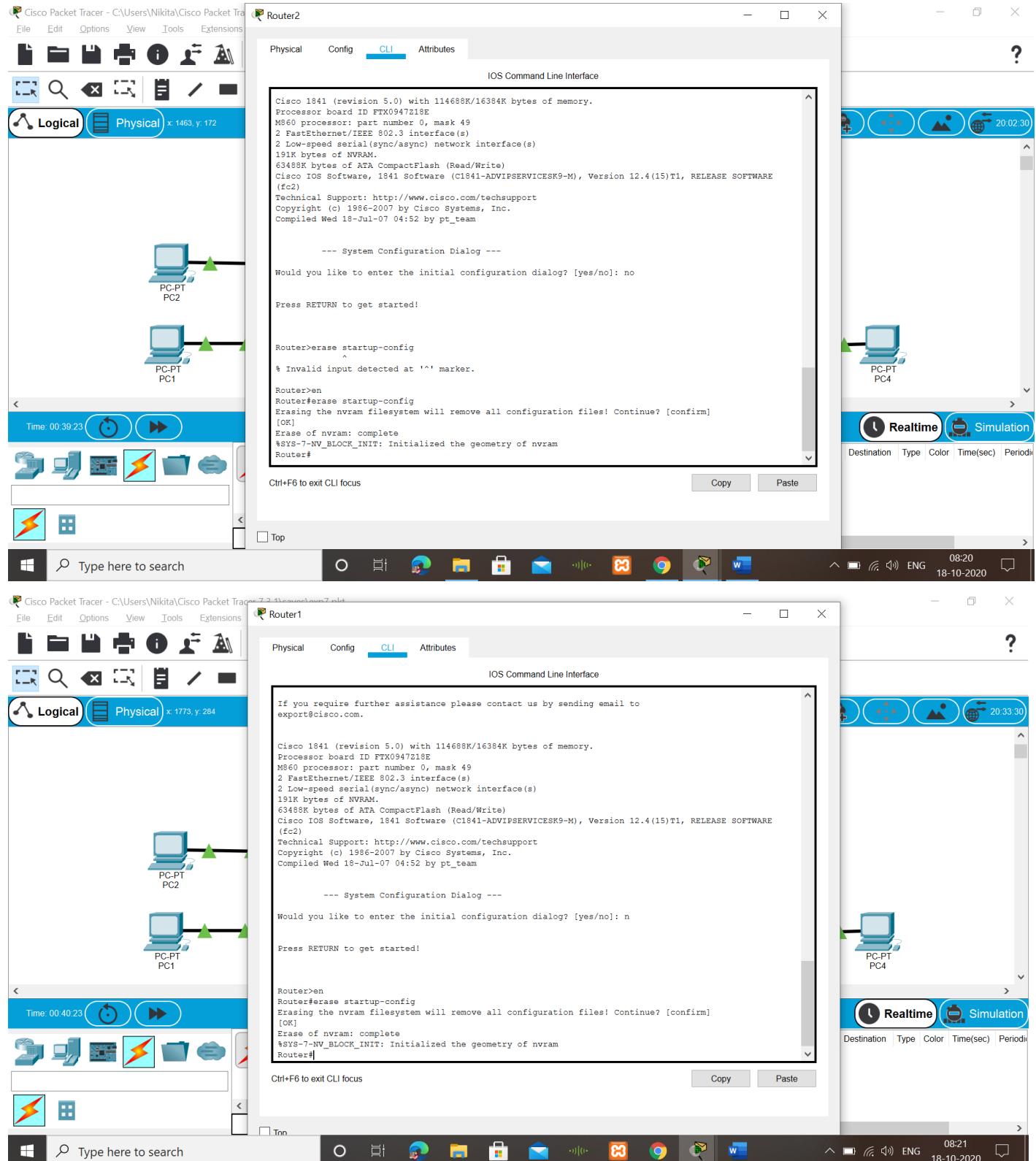


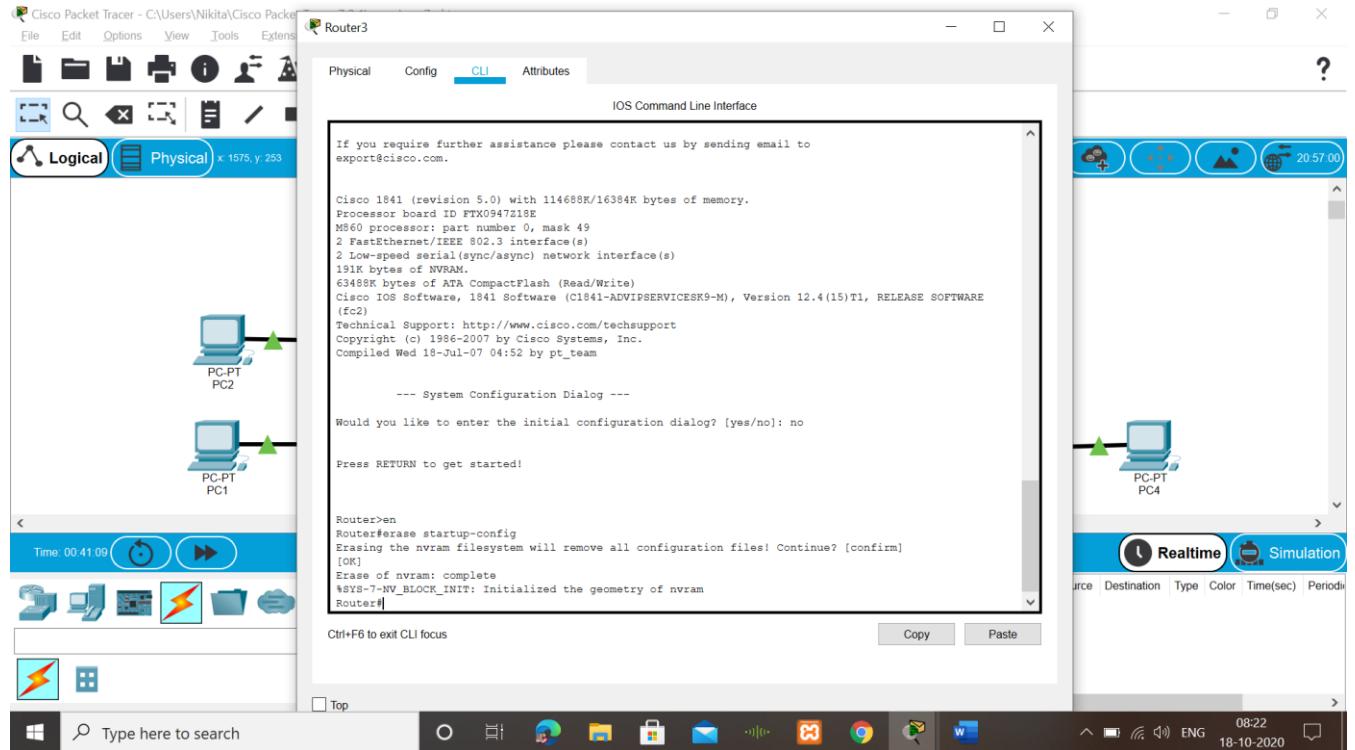




## Step 2: Clear the configuration on each router.

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.



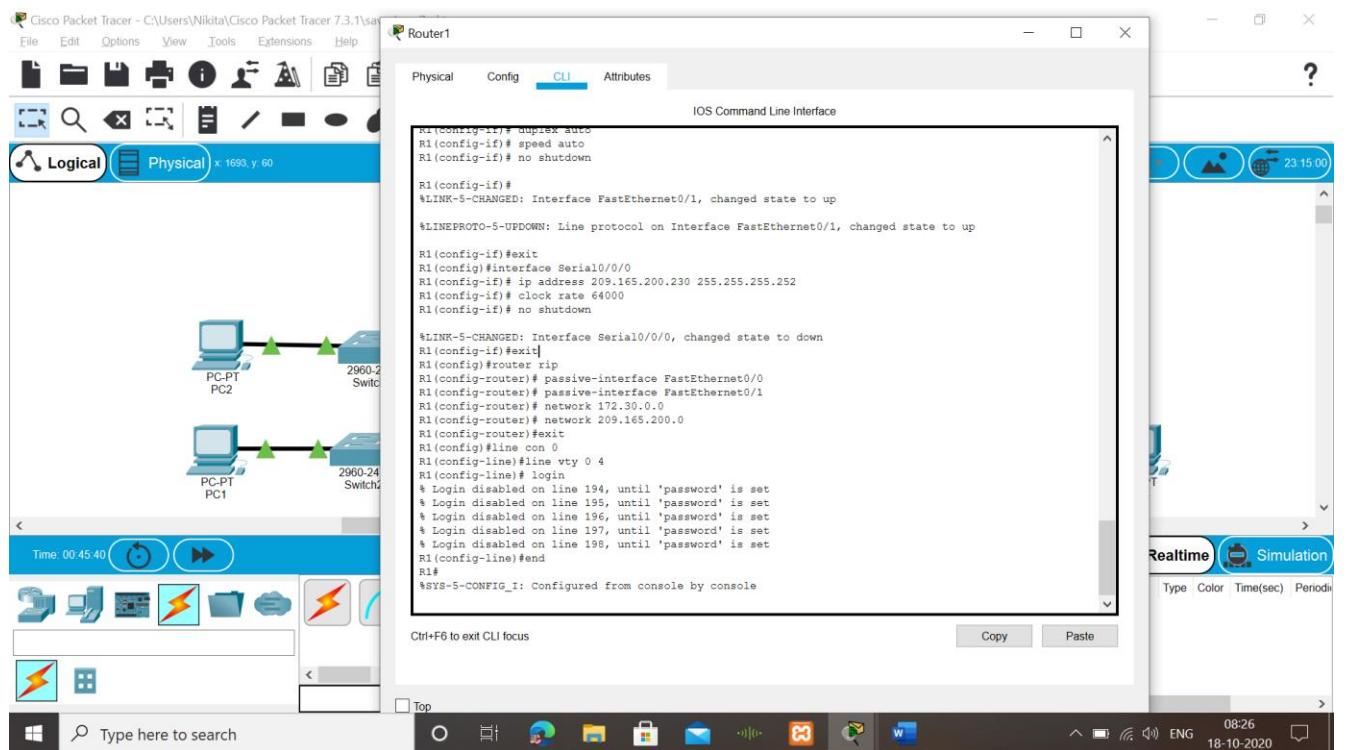
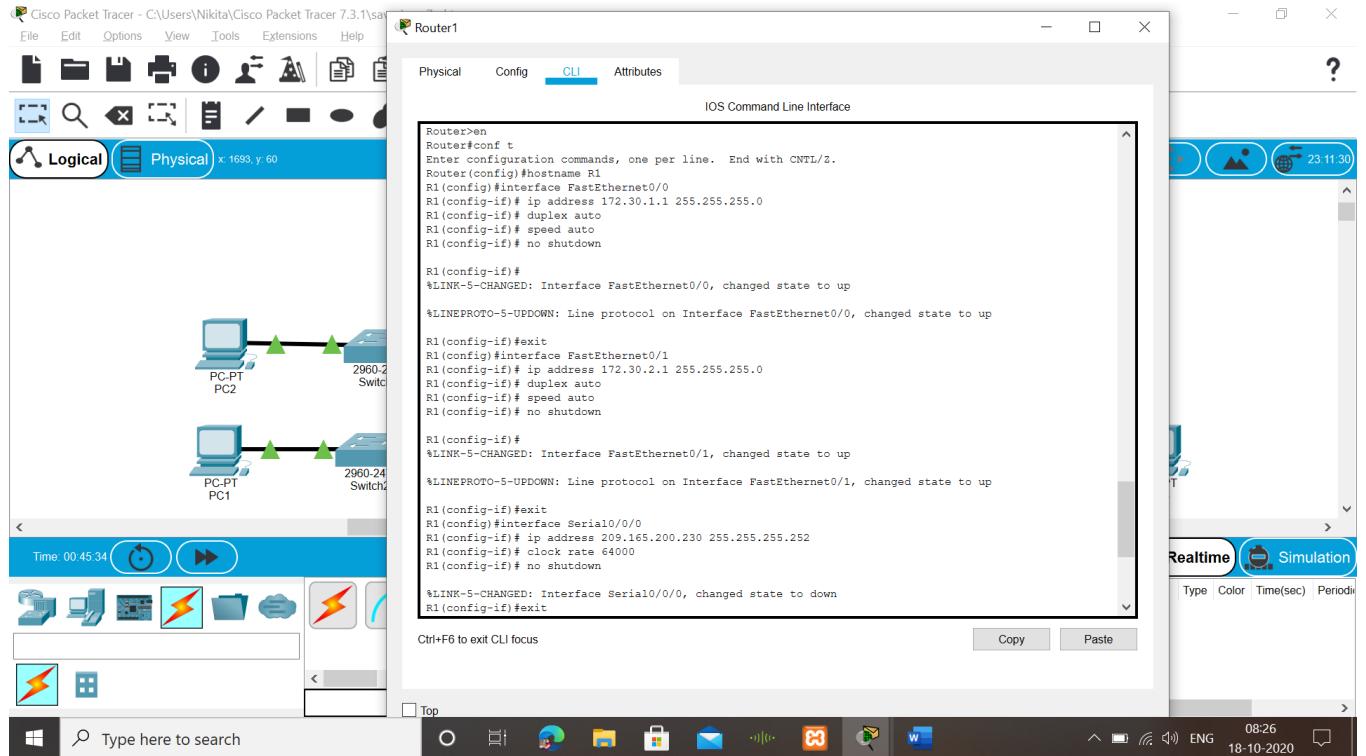


## Task 2: Load Routers with the Supplied Scripts.

### Step 1: Load the following script onto R1.

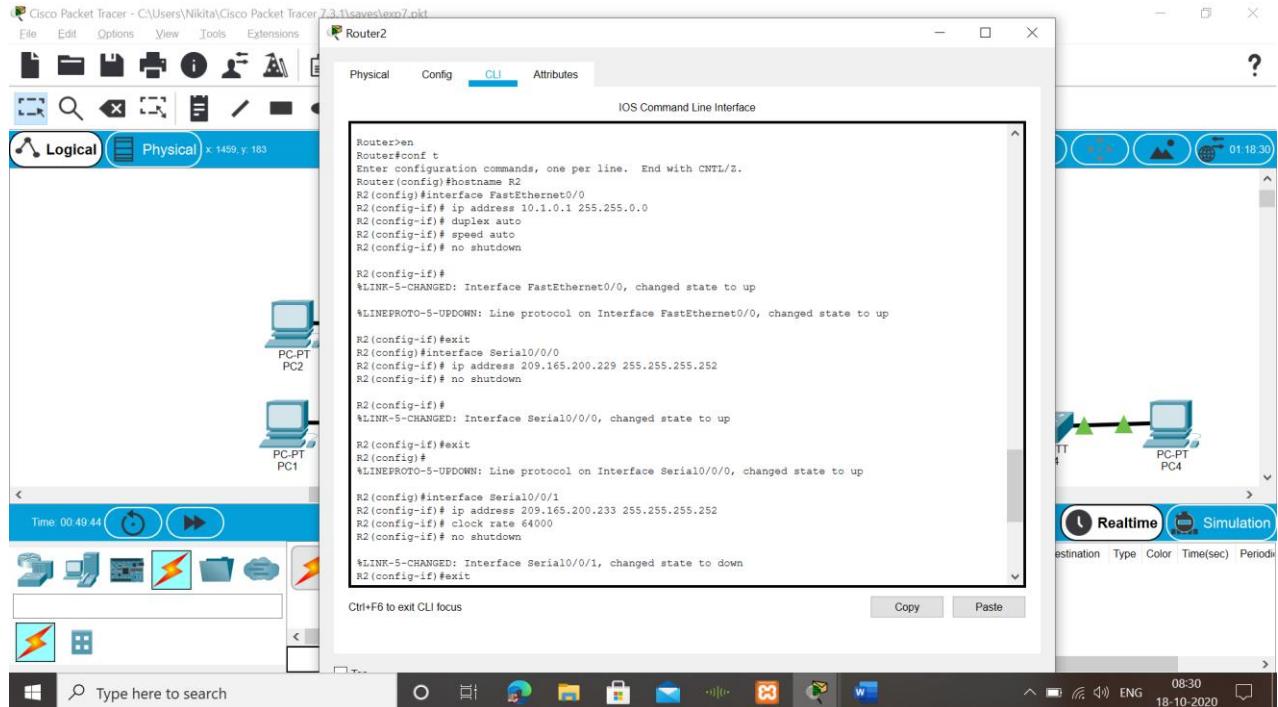
```
!
hostname R1
!
!
!
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/1
 ip address 172.30.2.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface Serial0/0/0
 ip address 209.165.200.230 255.255.255.252
 clock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

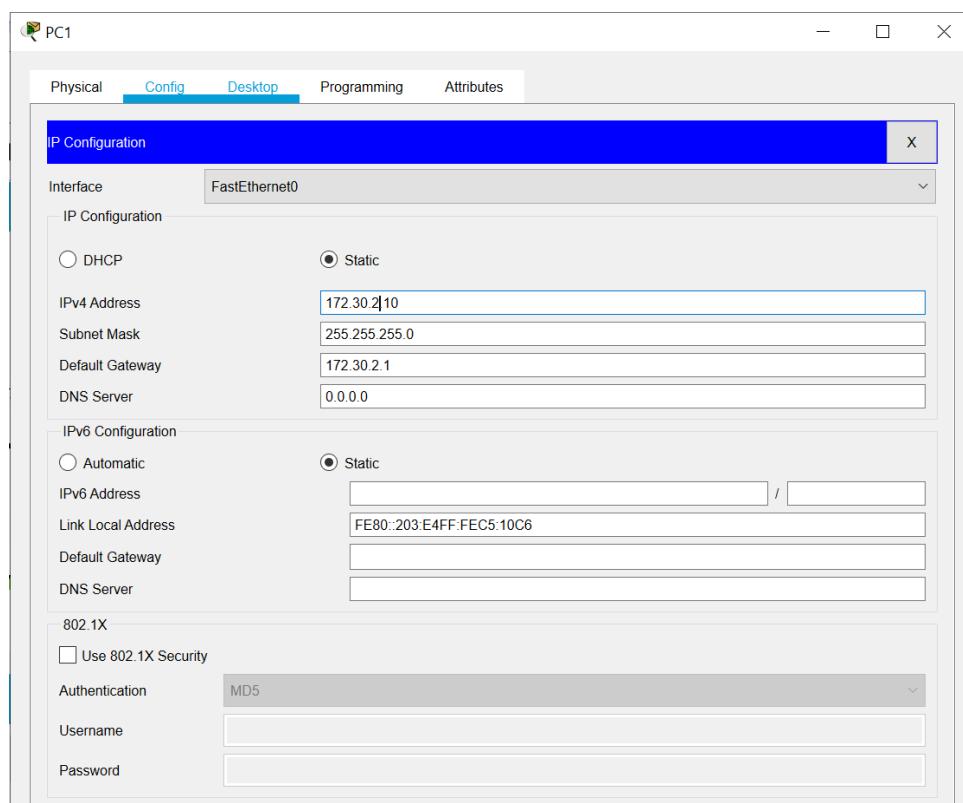
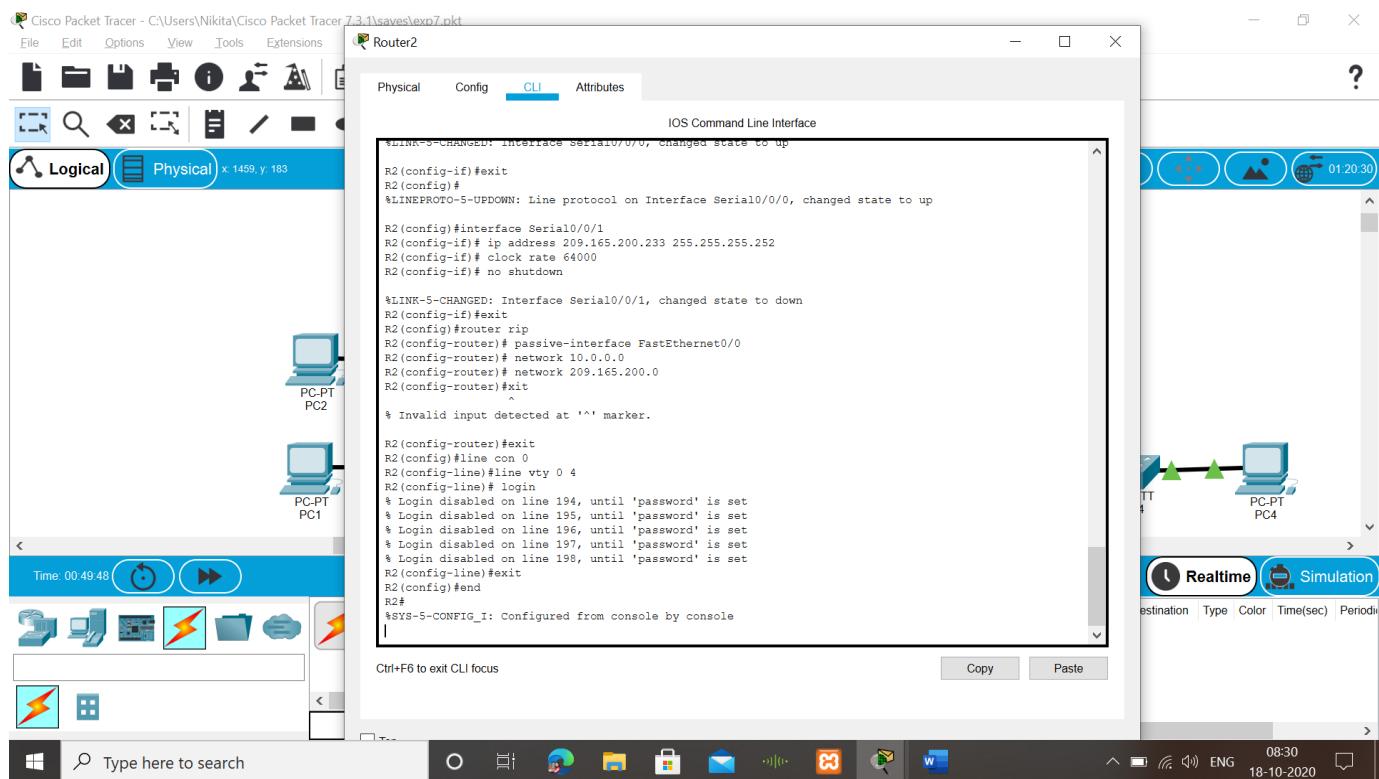
```
line con 0
line vty 0 4
    login
!
End
```



**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
```





PC2

Physical Config Desktop Programming Attributes

IP Configuration

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::200:CFE:FE49:7A02

Default Gateway: [ ]

DNS Server: [ ]

802.1X

Use 802.1X Security

Authentication: MD5

Username: [ ]

Password: [ ]

PC3

Physical Config Desktop Programming Attributes

IP Configuration

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::2E0:B0FF:FE49:350C

Default Gateway: [ ]

DNS Server: [ ]

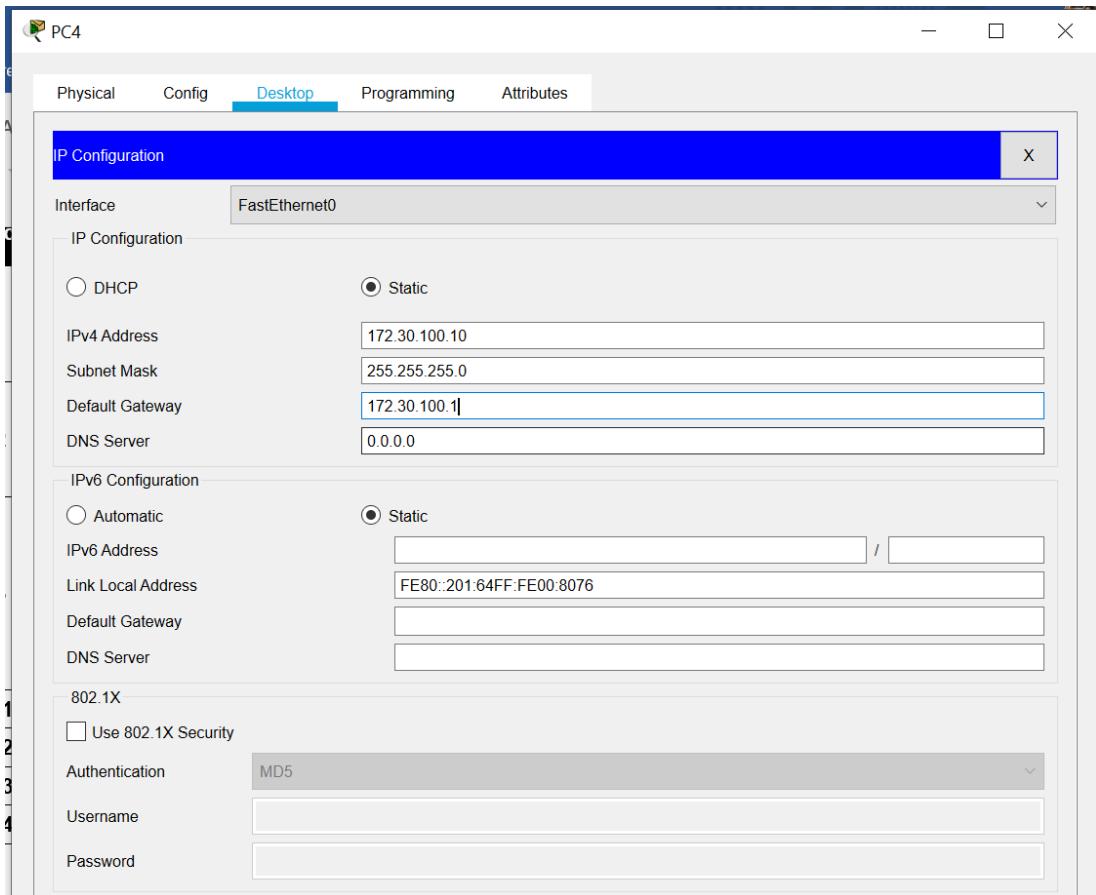
802.1X

Use 802.1X Security

Authentication: MD5

Username: [ ]

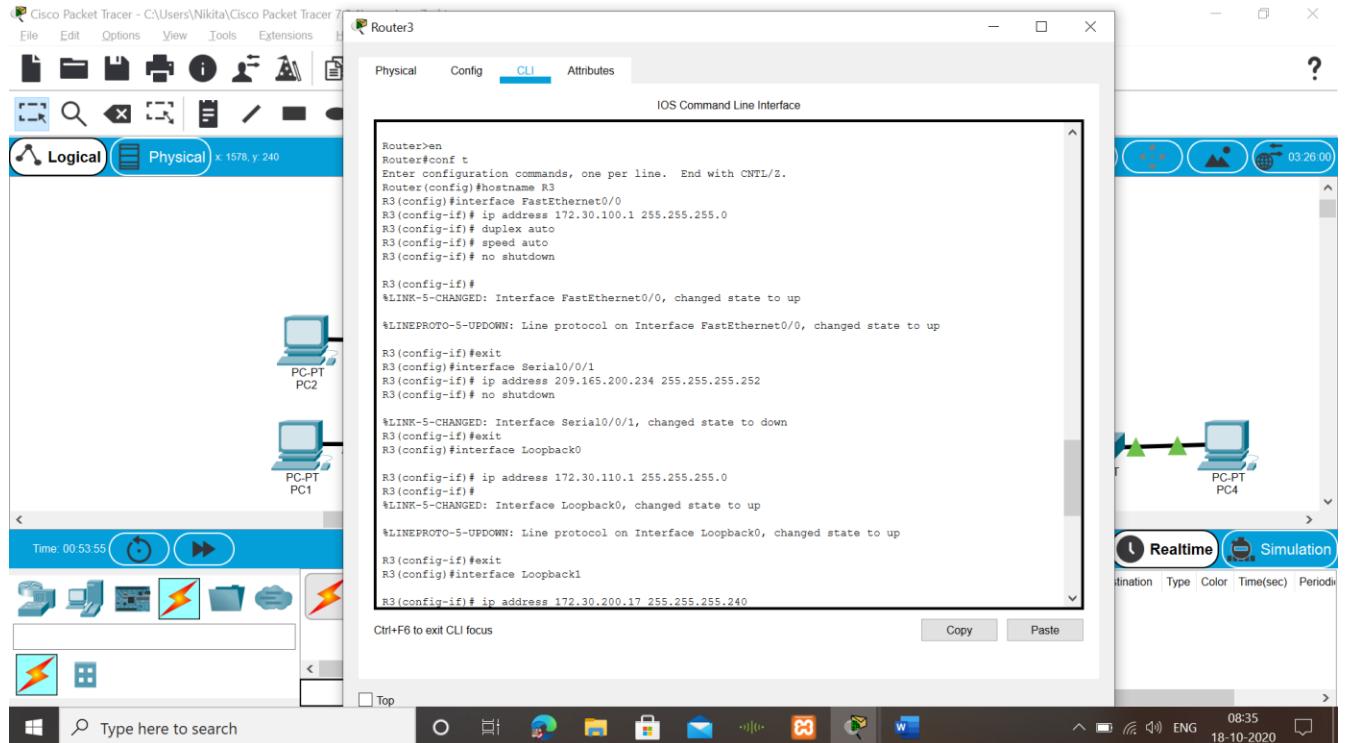
Password: [ ]

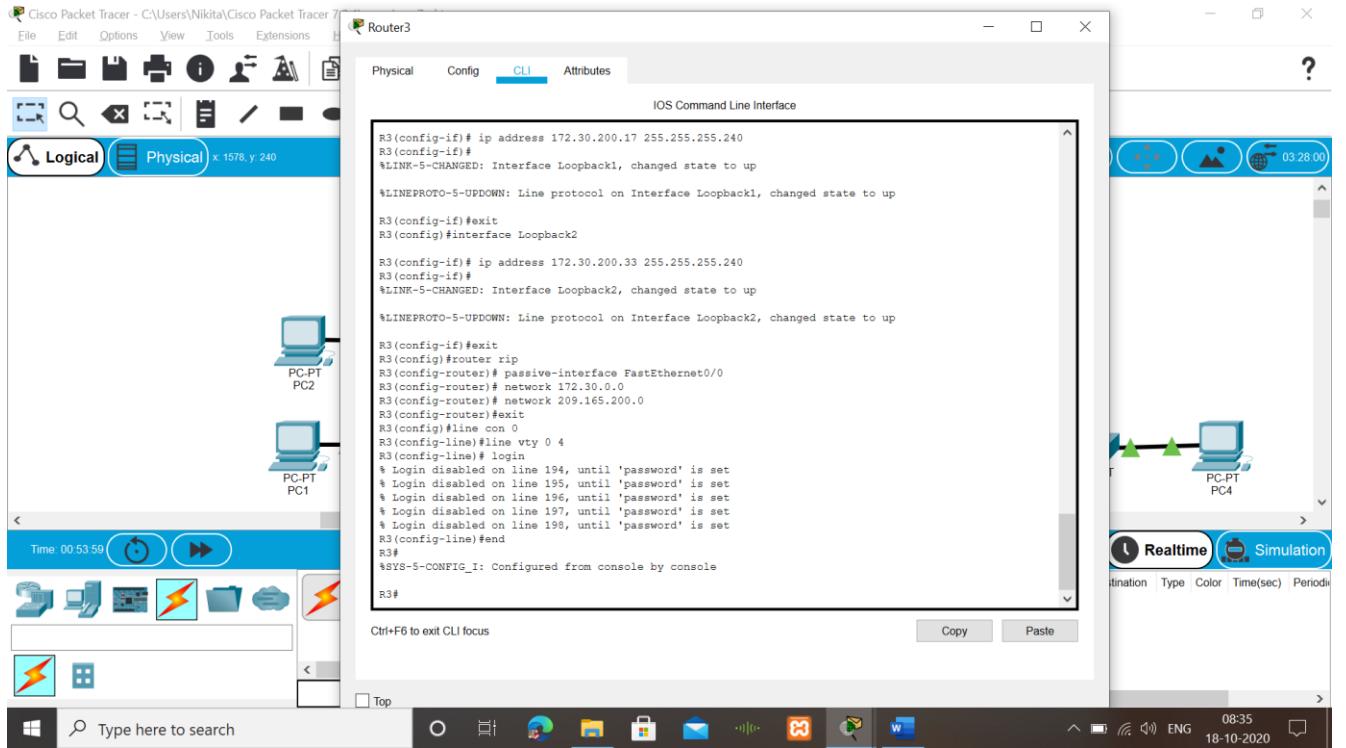


**Step 3: Load the following script onto R3.**

```
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
```



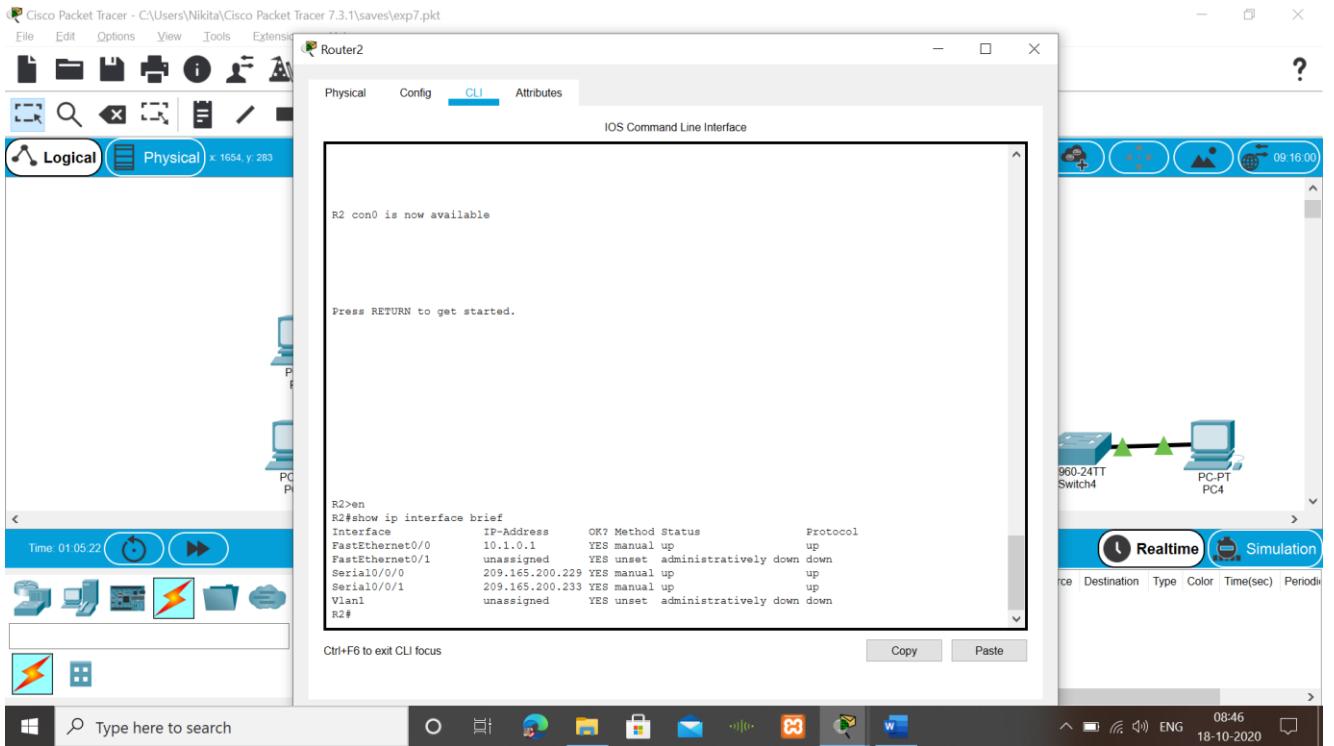


### Task 3: Examine the Current Status of the Network.

#### 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.

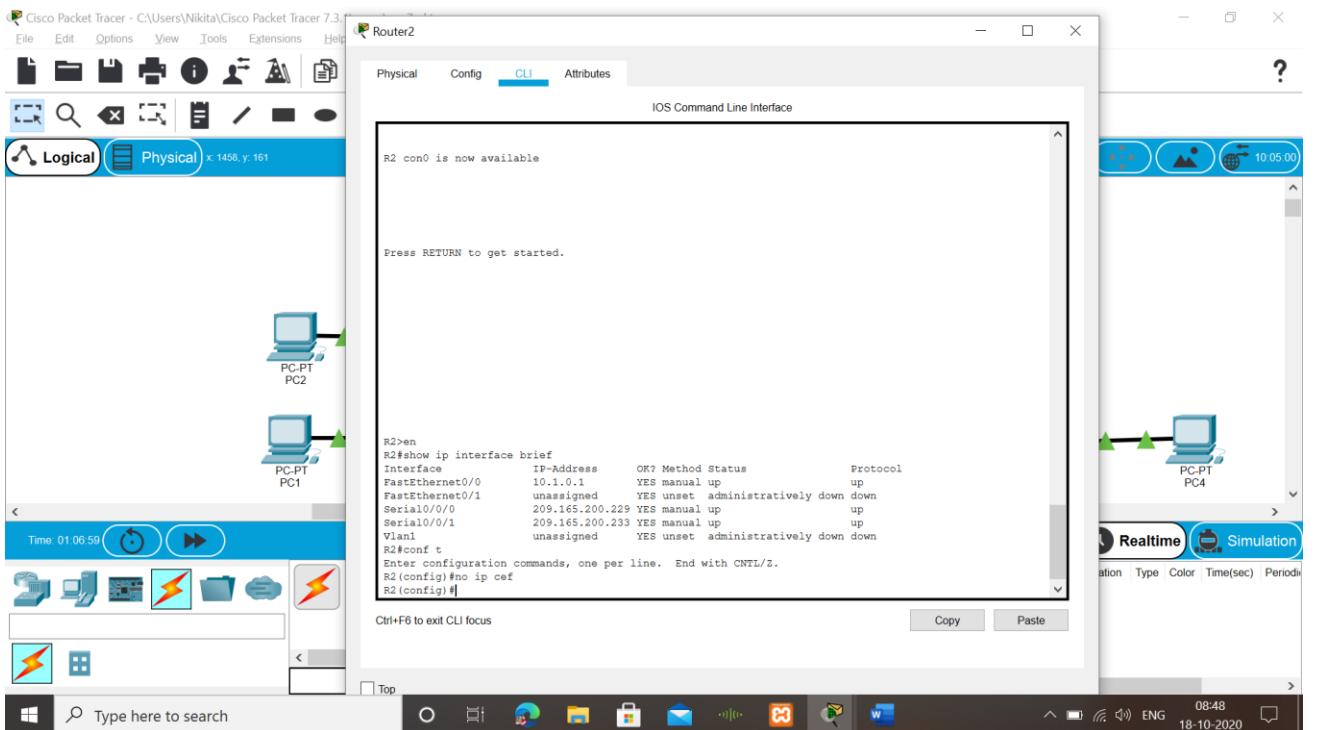
```
R2#show ip interface brief
```

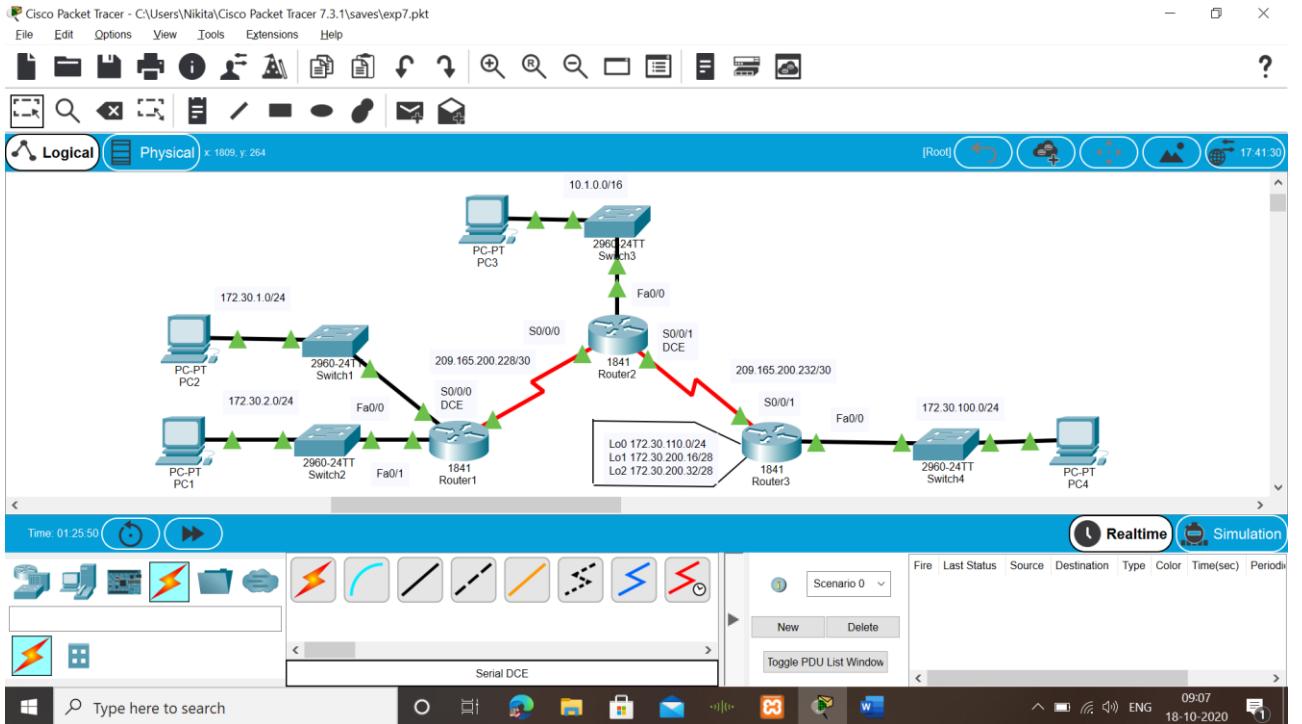


## Step 2: Check the connectivity from R2 to the hosts on the R1 and R3 LANs.

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 pinging 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:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 15/17/19 ms
```

The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router2. The user has entered the command `ping 172.30.2.10`. The output indicates that 5 ICMP Echoes were sent to 172.30.2.10, and all 5 were successful, resulting in a 100% success rate. The round-trip times for each echo are listed as 15, 17, and 19 ms.

5/5 (100%) success rate

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

\_\_\_\_\_5/5(100%) success rate\_\_\_\_\_

The screenshot shows a Windows application window titled "Router2". The tab bar at the top has four tabs: "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is selected, indicated by a blue underline. The main area is labeled "IOS Command Line Interface". Inside the interface, there is a large black rectangular box containing the command-line output. Below this box, the text "Press RETURN to get started." is displayed. The output of the ping command is as follows:

```
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 = 15/17/19 ms

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 = 7/16/22 ms

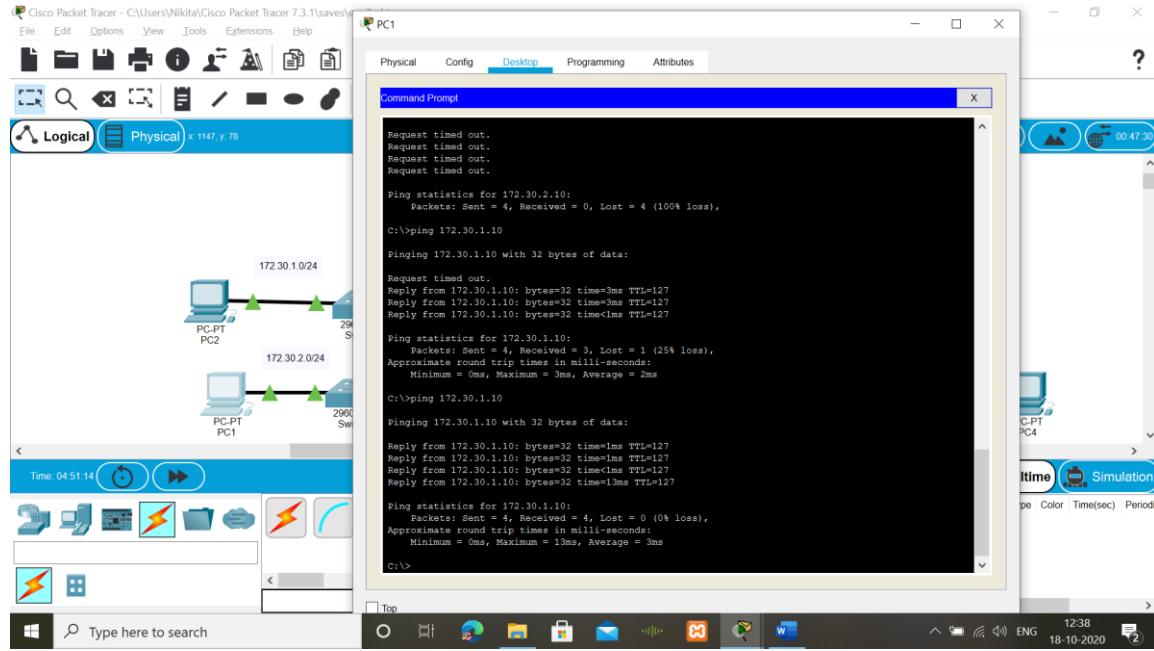
R2>
```

At the bottom left of the window, the text "Ctrl+F6 to exit CLI focus" is visible. At the bottom right, there are two buttons: "Copy" and "Paste".

### Step 3: Check the connectivity between the PCs.

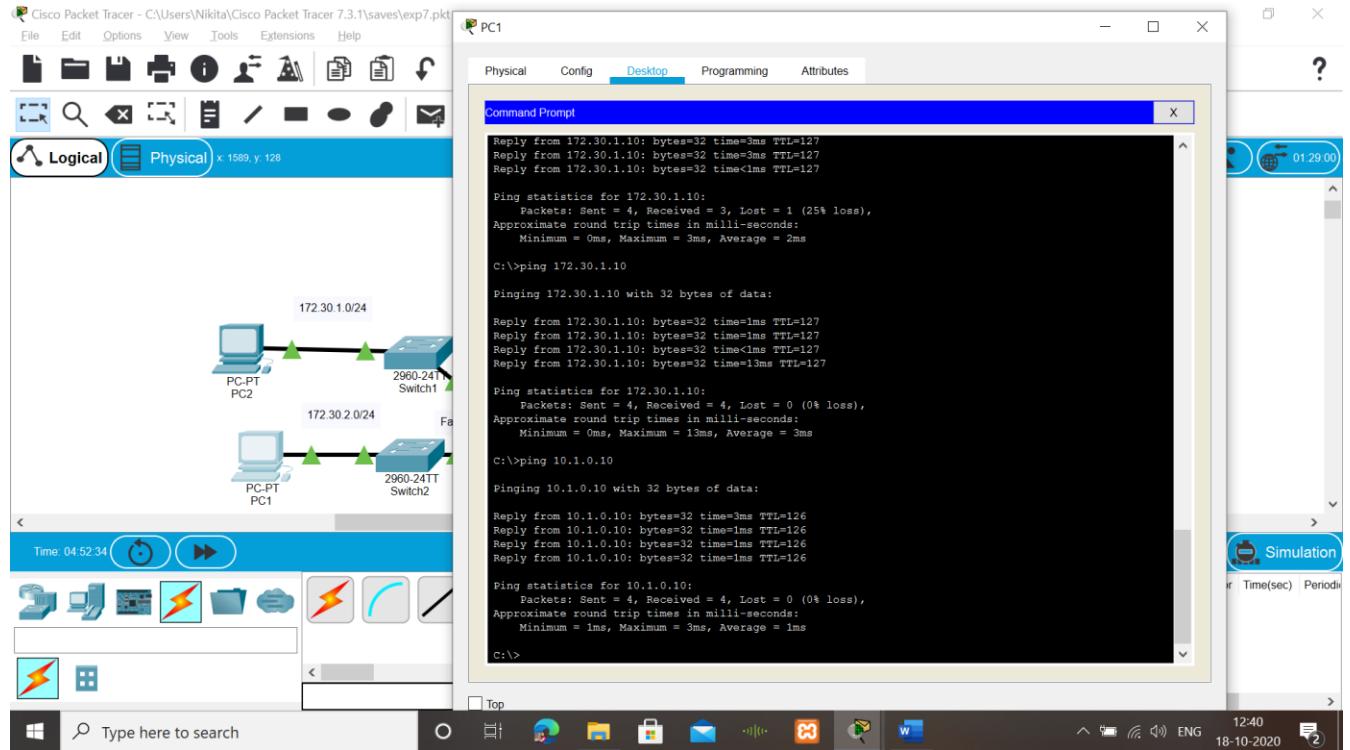
From the PC1, is it possible to ping PC2? Yes\_\_\_\_\_

What is the success rate? 100%\_\_\_\_\_



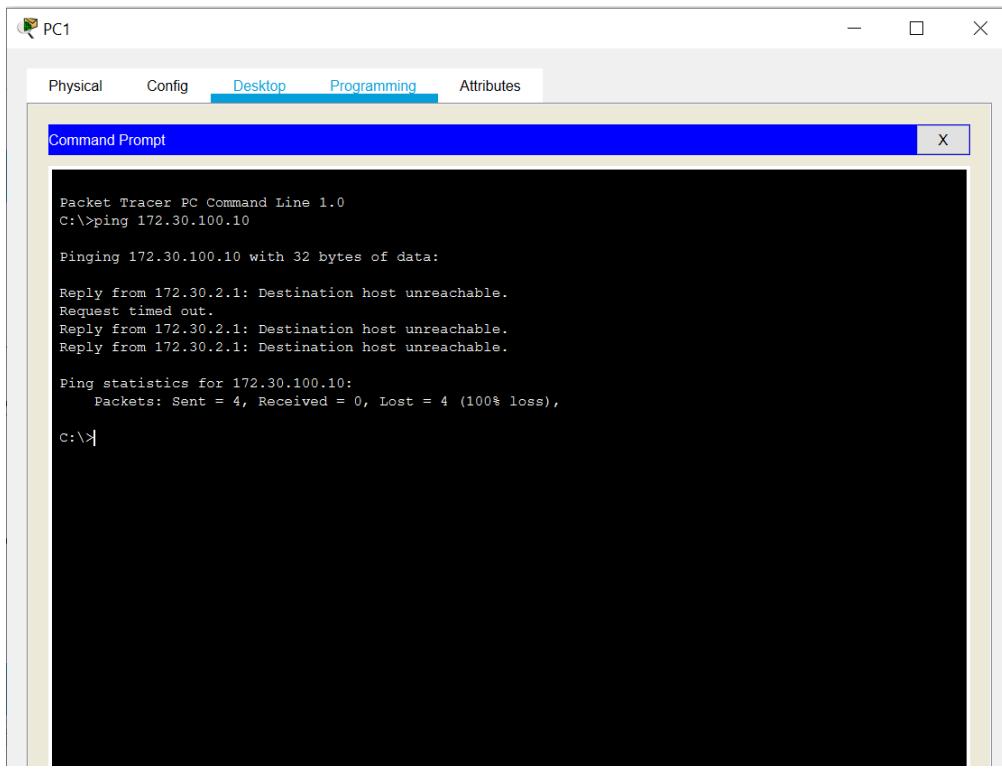
From the PC1, is it possible to ping PC3? Yes

What is the success rate? 100%



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

What is the success rate? 0%



PC1

Physical Config Desktop Programming Attributes

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:>ping 172.30.100.10

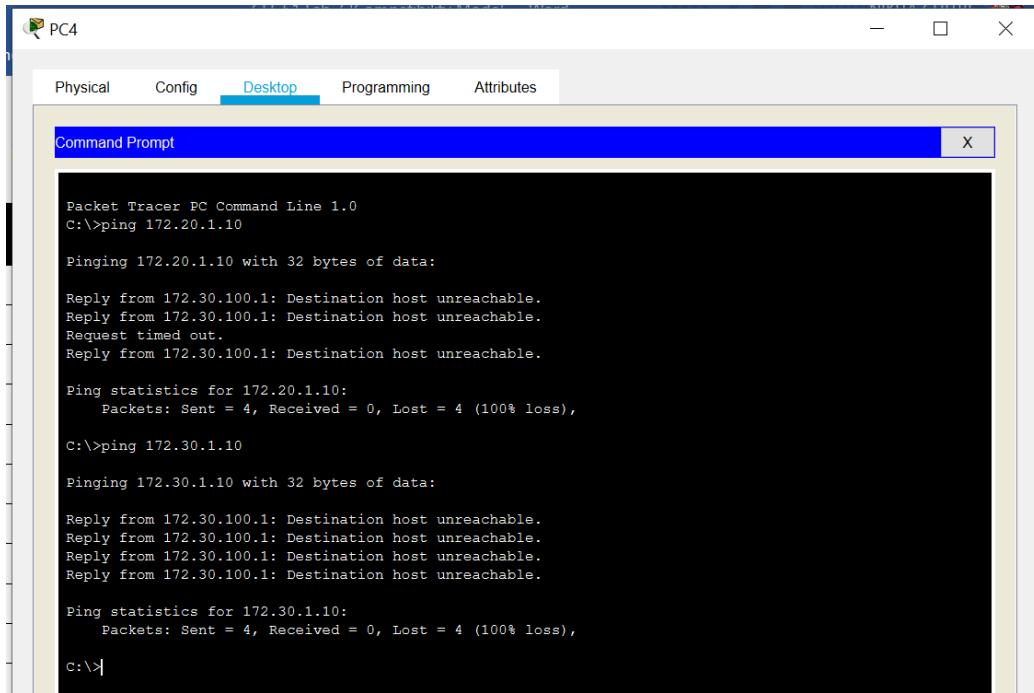
Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.2.1: Destination host unreachable.
Request timed out.
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:>
```

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

What is the success rate? 0%



PC4

Physical Config Desktop Programming Attributes

Command Prompt X

```
Packet Tracer PC Command Line 1.0
C:>ping 172.20.1.10

Pinging 172.20.1.10 with 32 bytes of data:

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

Ping statistics for 172.20.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
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.

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

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

What is the success rate? 50%

```
C:\>
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=15ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=28ms 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 = 15ms, Maximum = 28ms, Average = 21ms

C:\>|
```

#### 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>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 40 percent (2/5), round-trip min/avg/max = 1/25/24 ms

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 60 percent (3/5), round-trip min/avg/max = 1/16/20 ms

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, 00:00:08, Serial0/0/0  
[120/1] via 209.165.200.234, 00:00:05, 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#

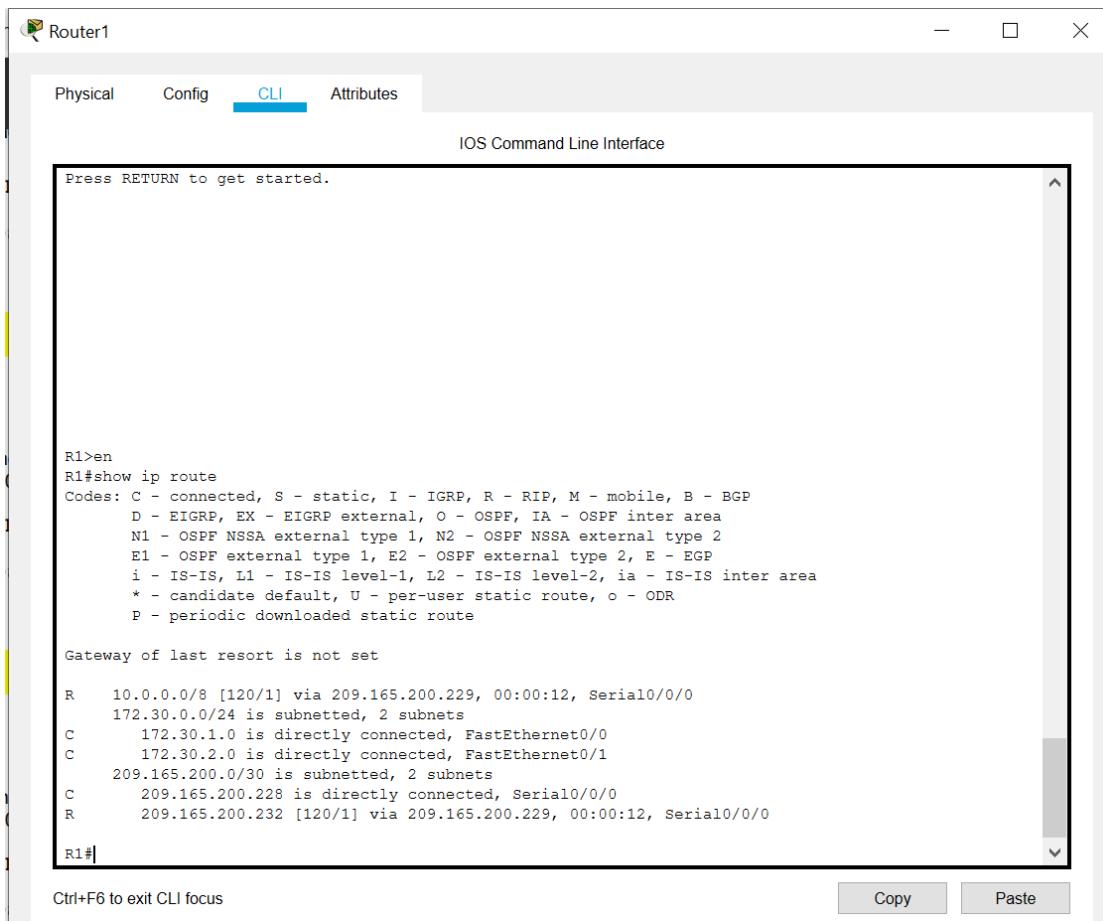
Ctrl+F6 to exit CLI focus

Copy Paste

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

Both R1 and R3 are configured with interfaces on a discontiguous 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
```



The image shows a software interface titled "Router1" with a tab bar at the top. The "CLI" tab is selected, indicated by a blue underline. Below the tab bar is a header "IOS Command Line Interface". A message "Press RETURN to get started." is displayed above the command-line area. The main window contains the output of the "show ip route" command. The output shows the following routes:

```
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, 00:00:12, 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, 00:00:12, Serial0/0/0

R1#
```

At the bottom left, a keybinding "Ctrl+F6 to exit CLI focus" is shown. At the bottom right are "Copy" and "Paste" buttons.

#### 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
```

The screenshot shows the Router3 CLI interface. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. Below the tab bar is the text 'IOS Command Line Interface'. The main window displays the output of the 'show ip route' command:

```
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, 00:00:01, 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, 00:00:01, Serial0/0/1
C      209.165.200.232 is directly connected, Serial0/0/1
```

At the bottom left is the prompt 'R3#', and at the bottom right are 'Copy' and 'Paste' buttons. A note 'Ctrl+F6 to exit CLI focus' is also present.

### 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.

The screenshot shows the Cisco Router2 CLI interface. The title bar says "Router2". Below it is a tab bar with "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". It contains the following text:

```
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
    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
    172.30.0.0 in 1 hops

R2#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

R2#undebugIP: received v1 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0 in 1 hops
g
% Incomplete command.
R2#undebug all
All possible debugging has been turned off
R2#
```

At the bottom left is the text "Ctrl+F6 to exit CLI focus". At the bottom right are "Copy" and "Paste" buttons.

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
```

#### 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
```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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 172.30.0.0 metric 2
  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 172.30.0.0 metric 2
  network 209.165.200.228 metric 1

R2#undebug all
All possible debugging has been turned off
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#exit
R2(config)#exit
R2#
SYS-5-CONFIG_I: Configured from console by console

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 = 1/2/8 ms

R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

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

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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

  10.0.0.0/16 is subnetted, 1 subnets
    R  10.1.0.0 [120/1] via 209.165.200.229, 00:00:13, 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, 00:00:13, Serial0/0/0
    R  172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:13, Serial0/0/0
    R  172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:13, Serial0/0/0
    R  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, 00:00:13, Serial0/0/0

R1#
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router rip
R1(config-router)#version 1
R1(config-router)#exit
R1(config)#

```

Ctrl+F6 to exit CLI focus      Copy      Paste

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

The screenshot shows the Router3 CLI interface with the 'CLI' tab selected. The command entered is 'show ip route'. The output displays the IP routes configured on the router, including direct connections and learned routes via RIP. It also shows the configuration mode prompt where RIP version 1 was enabled.

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
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

  10.0.0.0/16 is subnetted, 1 subnets
R    10.1.0.0 [120/1] via 209.165.200.233, 00:00:17, 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, 00:00:17, Serial0/0/1
R      172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:17, 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, 00:00:17, Serial0/0/1
C      209.165.200.232 is directly connected, Serial0/0/1

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3 (config)#router rip
R3 (config-router)#version 1
R3 (config-router)#exit
R3 (config)#

```

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.

The screenshot shows the Router1 CLI interface with the 'CLI' tab selected. The command entered is 'show ip protocols'. The output shows that RIP is the active routing protocol, version 2, with a maximum path of 4. It lists the networks being advertised and the routing information sources.

```
R1# show ip protocols
Router1
Physical Config CLI Attributes
IOS Command Line Interface

C    209.165.200.228 is directly connected, Serial0/0/0
R    209.165.200.232 [120/1] via 209.165.200.229, 00:00:09, Serial0/0/0

R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 4 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 not 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      00:01:47
  Distance: (default is 120)
R1#

```

## Task 5: Examine the Automatic Summarization of Routes.

The LANs connected to R1 and R3 are still composed of discontiguous 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

The screenshot shows a Windows-style application window titled "Router2". At the top, there are tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the command-line output:

```
R2#undebugRIP: received v1 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0 in 1 hops
g
% Incomplete command.
R2#undebug all
All possible debugging has been turned off
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

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, 00:00:11, Serial0/0/0
      [120/1] via 209.165.200.234, 00:00:02, 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#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A status bar at the very bottom says "Ctrl+F6 to exit CLI focus".

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

The screenshot shows a Windows-style application window titled "Router1". At the top, there are tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the command-line output:

```
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        00:00:26
Distance: (default is 120)
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, 00:00:12, 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, 00:00:12, Serial0/0/0

R1#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A status bar at the very bottom says "Ctrl+F6 to exit CLI focus".

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

```
Router3 - - X
Physical Config CLI Attributes
IOS Command Line Interface

209.165.200.0/30 is subnetted, 2 subnets
R     209.165.200.228 [120/1] via 209.165.200.233, 00:00:01, Serial0/0/1
C     209.165.200.232 is directly connected, Serial0/0/1

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

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, 00:00:23, 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
R     209.165.200.0/30 is subnetted, 2 subnets
R       209.165.200.228 [120/1] via 209.165.200.233, 00:00:23, Serial0/0/1
C       209.165.200.232 is directly connected, Serial0/0/1

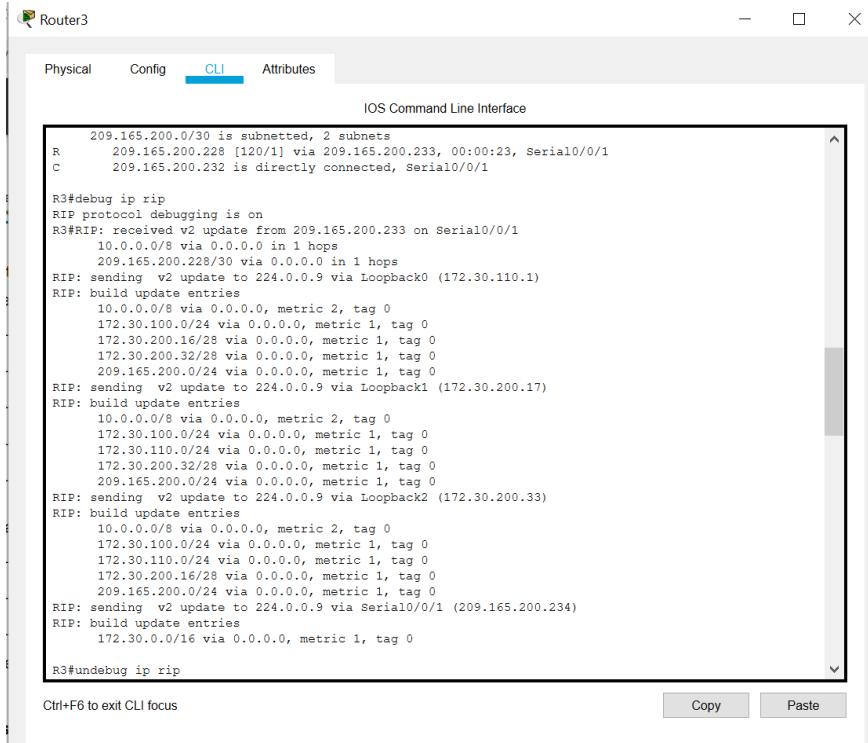
R3#
```

Ctrl+F6 to exit CLI focus

Copy

Paste

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



The image shows a Cisco IOS Command Line Interface (CLI) window titled "Router3". The tab bar at the top has "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Below the tab bar is the text "IOS Command Line Interface". The main area contains the output of the "debug ip rip" command. The output shows RIP protocol debugging is on, and it lists various RIP updates sent from R3. It includes entries for networks like 209.165.200.0/30, 10.0.0.0/8, 172.30.100.0/24, 172.30.110.0/24, 172.30.200.16/28, and 209.165.200.16/28. It also shows entries for receiving updates from 209.165.200.233 via Serial0/0/1 and sending updates to 209.165.200.234 via Serial0/0/1. At the bottom of the output, "R3#undebbug ip rip" is shown. Below the CLI window, there is a status bar with "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste".

```
209.165.200.0/30 is subnetted, 2 subnets
R  209.165.200.228 [120/1] via 209.165.200.233, 00:00:23, Serial0/0/1
C  209.165.200.232 is directly connected, Serial0/0/1

R3#debug ip rip
RIP protocol debugging is on
R3#RIP: received v2 update from 209.165.200.233 on Serial0/0/1
  10.0.0.0/8 via 0.0.0.0 in 1 hops
  209.165.200.228/30 via 0.0.0.0 in 1 hops
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
  172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
  172.30.110.0/24 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 Loopback2 (172.30.200.33)
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
  172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
  172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
  209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.234)
RIP: build update entries
  172.30.0.0/16 via 0.0.0.0, metric 1, tag 0

R3#undebbug ip rip
```

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

\_\_\_\_\_10.0.0.0/8\_\_\_\_\_

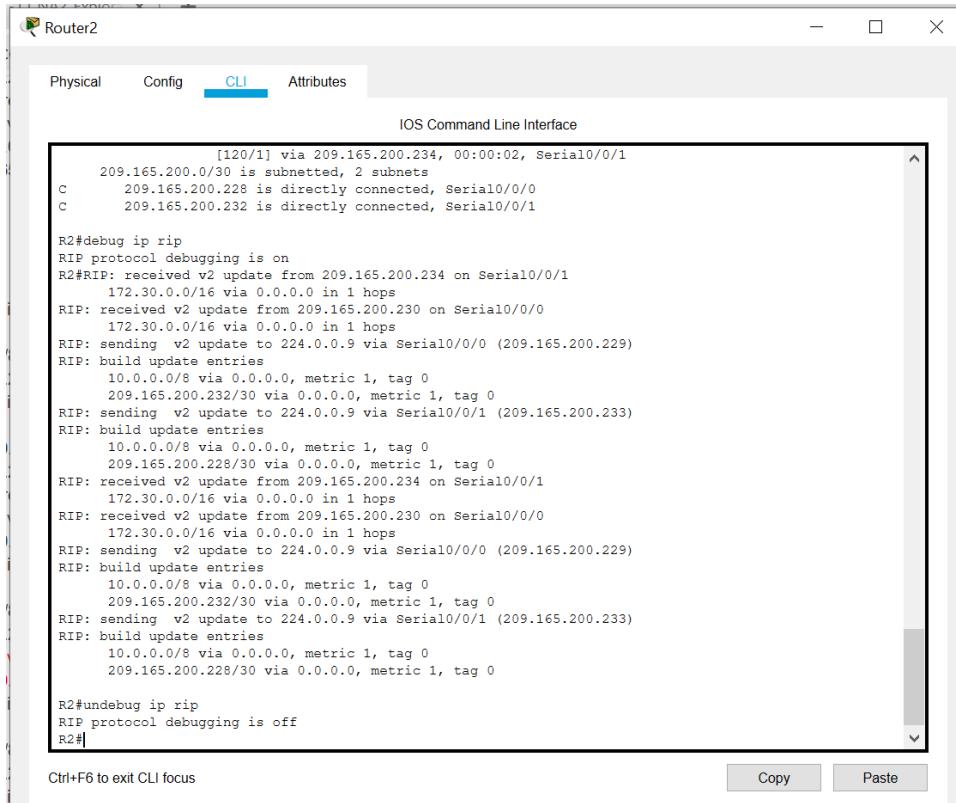
\_\_\_\_\_172.30.100.0/24\_\_\_\_\_

\_\_\_\_\_172.30.110.0/24\_\_\_\_\_

\_\_\_\_\_172.30.200.16/28\_\_\_\_\_

\_\_\_\_\_209.165.200.16/28\_\_\_\_\_

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



The image shows a Windows command-line interface window titled "Router2". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the "IOS Command Line Interface". The output of the "R2#debug ip rip" command is shown, detailing various RIP events such as route updates and builds. At the bottom of the window, there are "Copy" and "Paste" buttons.

```
[120/1] via 209.165.200.234, 00:00:02, 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#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: received v2 update from 209.165.200.230 on Serial0/0/0
 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
 10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
 209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
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: received v2 update from 209.165.200.230 on Serial0/0/0
 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
 10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
 209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
RIP: undebug ip rip
RIP protocol debugging is off
R2#
```

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
```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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: received v2 update from 209.165.200.230 on Serial0/0/0
    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
    10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
    209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.230 on Serial0/0/0
    172.30.0.0/16 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.230 on Serial0/0/0
    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
    10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
    209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
R2#undebug ip rip
RIP protocol debugging is off
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#no auto-summary
R2(config-router)#exit
R2(config)#[
```

Ctrl+F6 to exit CLI focus      Copy      Paste

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

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1 con0 is now available

Press RETURN to get started.

R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router rip
R1(config-router)#no auto-summary
R1(config-router)#exit
R1(config)#[
```

Ctrl+F6 to exit CLI focus      Copy      Paste

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

The screenshot shows the Cisco IOS CLI interface. The 'CLI' tab is active. The command `no auto-summary` has been entered, as indicated by the cursor at the end of the line. The output window displays various RIP-related messages and configuration details.

```
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
 172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
 172.30.110.0/24 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 Loopback2 (172.30.200.33)
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
 172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
 172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
 209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.234)
RIP: build update entries
 172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.233 on Serial0/0/1
 10.0.0.0/8 via 0.0.0.0 in 1 hops
 209.165.200.228/30 via 0.0.0.0 in 1 hops

R3#undebug ip rip
RIP protocol debugging is off
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#no auto-summary
R3(config-router)#exit
R3(config)#[
```

Ctrl+F6 to exit CLI focus      Copy      Paste

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.

The screenshot shows the Cisco IOS CLI interface. The 'CLI' tab is active. The command `no auto-summary` has been entered, as indicated by the cursor at the end of the line. The output window displays various RIP-related messages and configuration details.

```
R2#show ip route
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#no auto-summary
R2(config-router)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

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, 00:02:01, Serial0/0/0
      [120/1] via 209.165.200.234, 00:00:43, Serial0/0/0
R    172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:13, Serial0/0/0
R    172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:13, Serial0/0/0
R    172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:14, Serial0/0/1
R    172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:14, Serial0/0/1
R    172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:14, Serial0/0/1
R    172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:14, 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#[
```

Ctrl+F6 to exit CLI focus      Copy      Paste

R1#show ip route

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router rip
R1(config-router)#no auto-summary
R1(config-router)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

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 is possibly down, routing via 209.165.200.229, Serial0/0/0
R    10.1.0.0/16 [120/1] via 209.165.200.229, 00:00:23, 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, 00:00:23, Serial0/0/0
R      172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:23, Serial0/0/0
R      172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:23, Serial0/0/0
R      172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:23, Serial0/0/0
      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, 00:00:23, Serial0/0/0

R1#
```

Ctrl+F6 to exit CLI focus      Copy      Paste

R3#show ip route

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#no auto-summary
R3(config-router)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

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

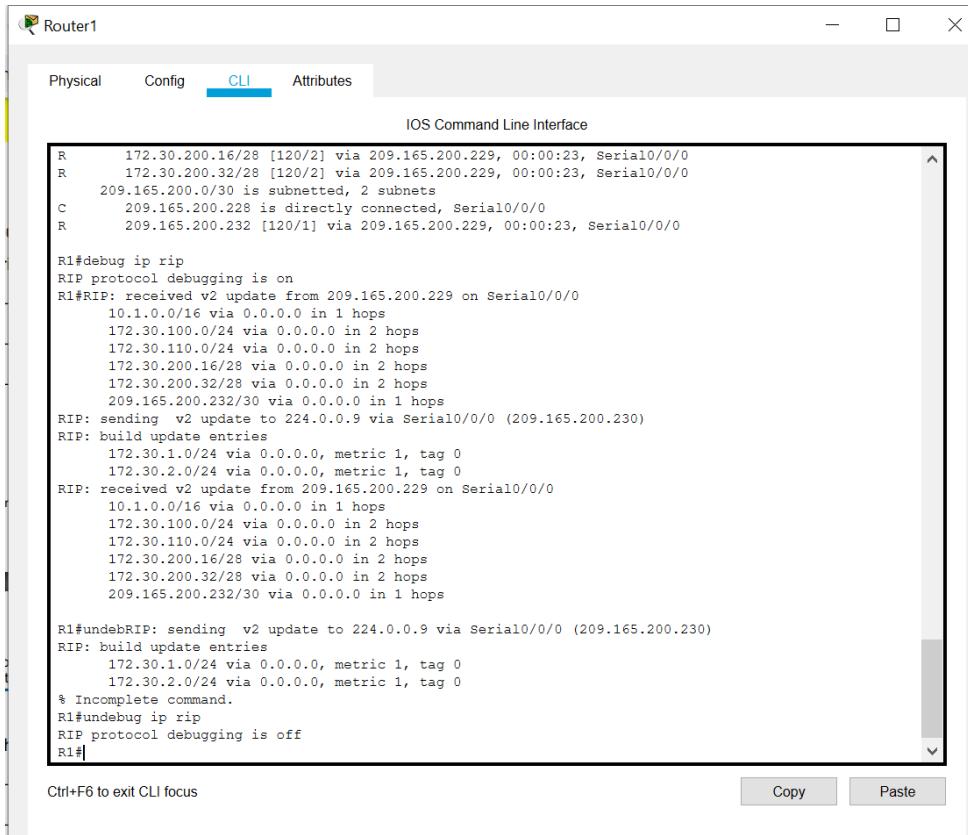
Gateway of last resort is not set

  10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
R    10.0.0.0/8 is possibly down, routing via 209.165.200.233, Serial0/0/1
R    10.1.0.0/16 [120/1] via 209.165.200.233, 00:00:16, 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, 00:00:16, Serial0/0/1
R      172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:16, 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, 00:00:16, Serial0/0/1
C      209.165.200.232 is directly connected, Serial0/0/1

R3#
```

Ctrl+F6 to exit CLI focus      Copy      Paste

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



The screenshot shows a Cisco IOS CLI interface titled "Router1". The "CLI" tab is selected. The output of the `debug ip rip` command is displayed in a scrollable text area. The output includes RIP routing table entries and log messages for received and sent updates. At the bottom of the window, there are "Copy" and "Paste" buttons.

```
R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:23, Serial0/0/0
R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:23, Serial0/0/0
 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, 00:00:23, serial0/0/0

R1#debug ip rip
RIP protocol debugging is on
R1#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
  172.30.100.0/24 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
  172.30.100.0/24 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

R1#undebugRIP: 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
* Incomplete command.
R1#undebug ip rip
RIP protocol debugging is off
R1#
```

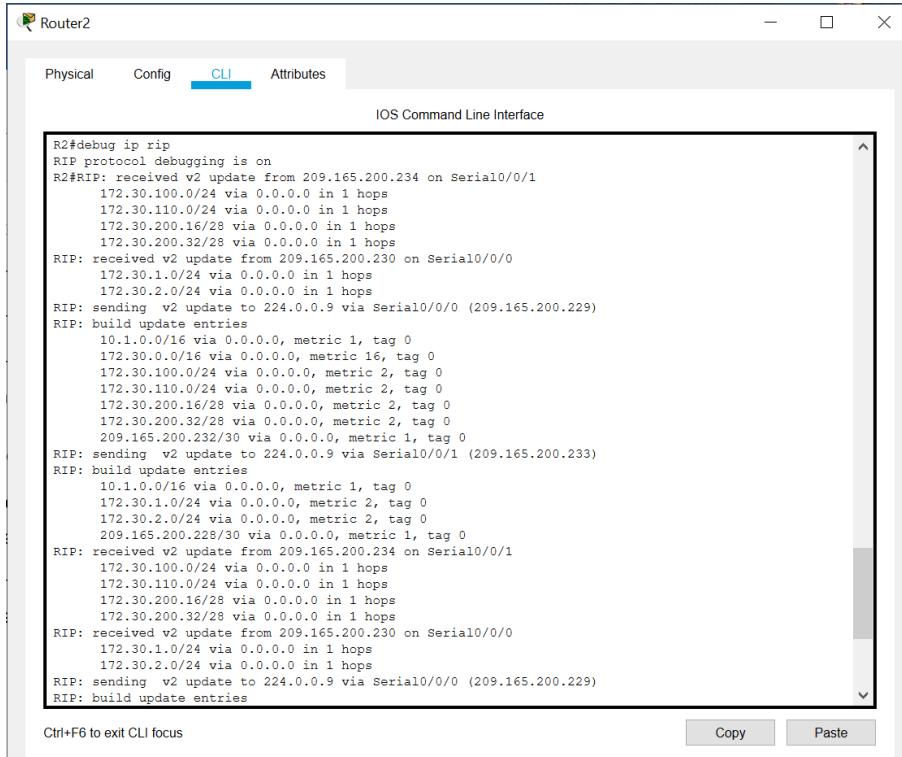
Ctrl+F6 to exit CLI focus      Copy      Paste

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

\_\_\_\_\_ 172.30.1.0/24 \_\_\_\_\_

\_\_\_\_\_ 172.30.2.0/24 \_\_\_\_\_

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



The screenshot shows the Router2 CLI interface with the 'CLI' tab selected. The window title is 'Router2'. The main area displays the following command-line session:

```
R2#debug ip rip
RIP protocol debugging is on
R2#RIP: received v2 update from 209.165.200.234 on Serial0/0/1
    172.30.100.0/24 via 0.0.0.0 in 1 hops
    172.30.110.0/24 via 0.0.0.0 in 1 hops
    172.30.200.16/28 via 0.0.0.0 in 1 hops
    172.30.200.32/28 via 0.0.0.0 in 1 hops
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: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
    10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
    172.30.0.0/16 via 0.0.0.0, metric 16, tag 0
    172.30.100.0/24 via 0.0.0.0, metric 2, tag 0
    172.30.110.0/24 via 0.0.0.0, metric 2, tag 0
    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
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
    10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
    172.30.1.0/24 via 0.0.0.0, metric 2, tag 0
    172.30.2.0/24 via 0.0.0.0, metric 2, tag 0
    209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
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
    172.30.200.16/28 via 0.0.0.0 in 1 hops
    172.30.200.32/28 via 0.0.0.0 in 1 hops
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: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons.

\_\_\_\_\_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 con0 is now available

Press RETURN to get started.

```
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 = 13/20/46 ms
R2>
```

Ctrl+F6 to exit CLI focus

Copy Paste

100%

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

Press RETURN to get started.

```
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 = 13/20/46 ms
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 = 4/11/19 ms
R2>
```

Ctrl+F6 to exit CLI focus

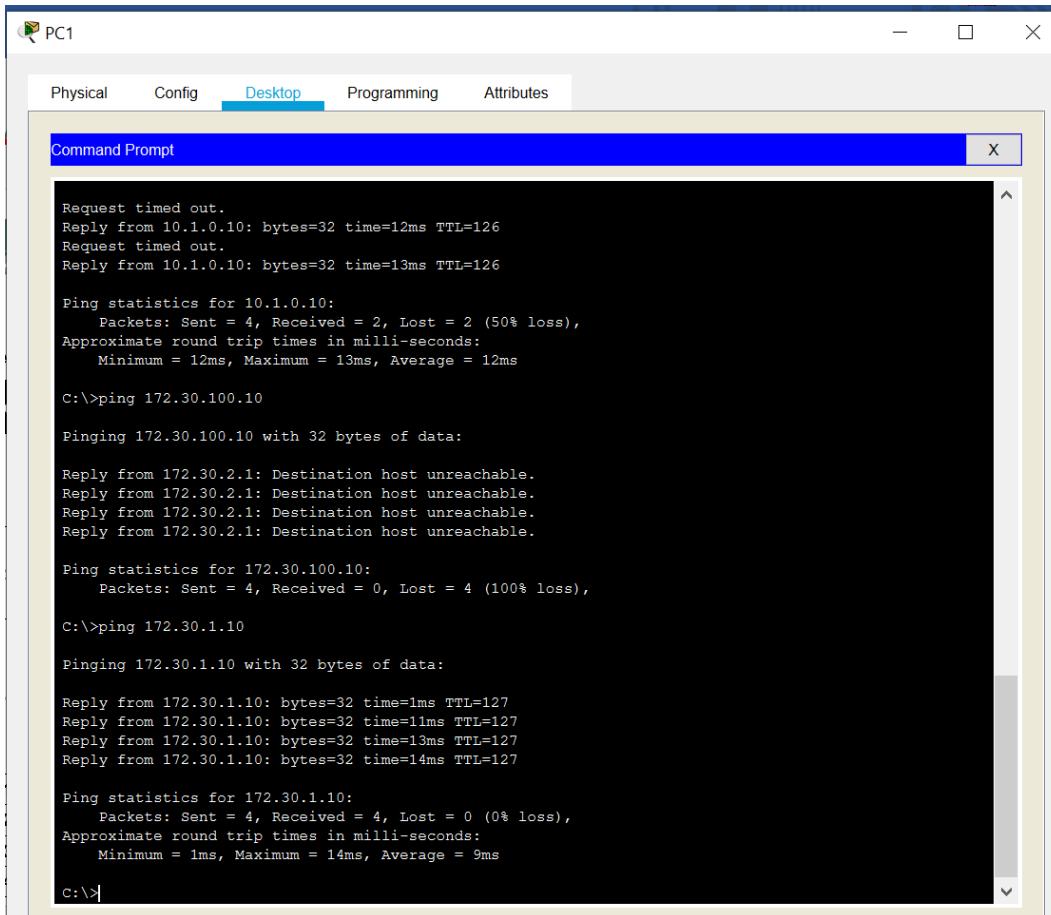
Copy Paste

100%

## Step 2: Check the connectivity between the PCs.

From PC1, is it possible to ping PC2? Yes

What is the success rate? 100%

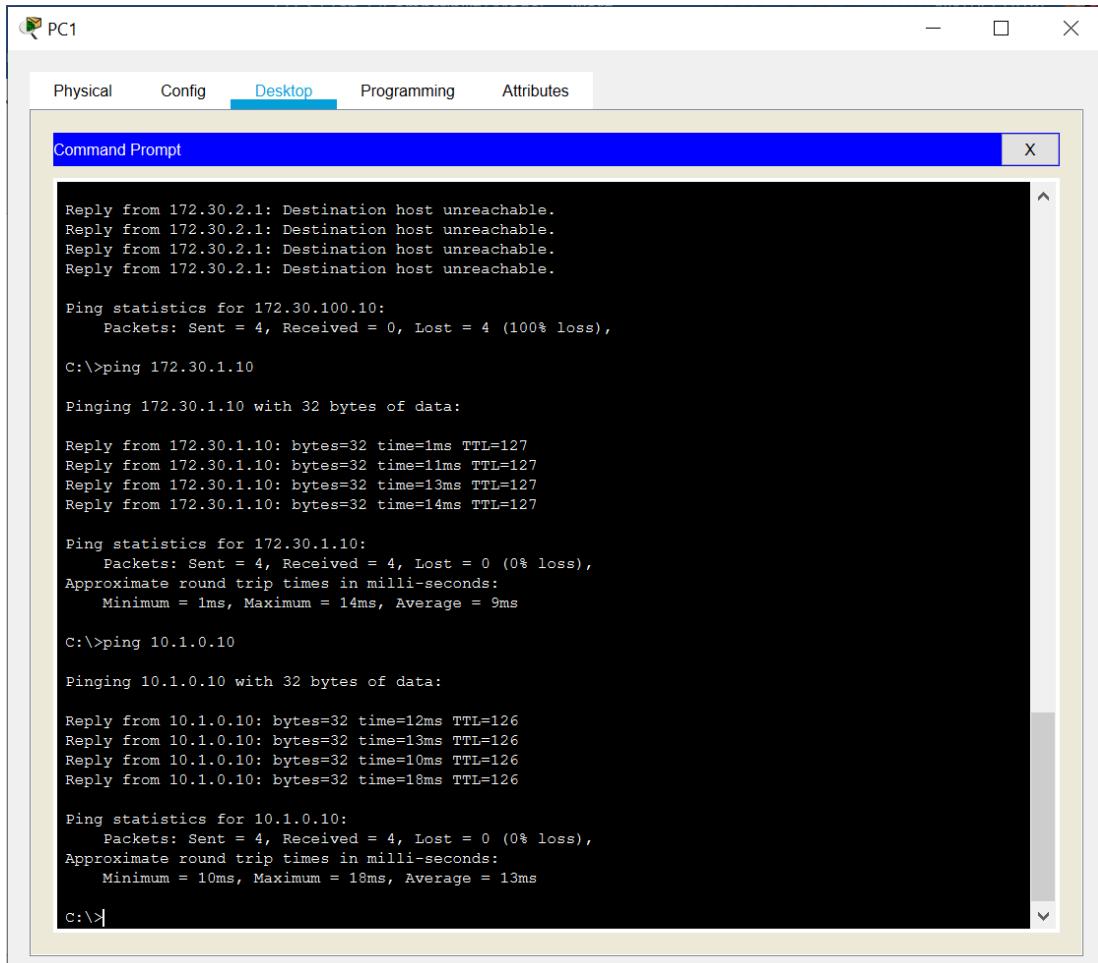


The screenshot shows a Windows Command Prompt window titled "PC1". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area is a black terminal window titled "Command Prompt" with an "X" button in the top right corner. The terminal displays the following command-line session:

```
Request timed out.  
Reply from 10.1.0.10: bytes=32 time=12ms TTL=126  
Request timed out.  
Reply from 10.1.0.10: bytes=32 time=13ms 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 = 12ms, Maximum = 13ms, Average = 12ms  
  
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.  
  
Ping statistics for 172.30.100.10:  
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 1ms, Maximum = 14ms, Average = 9ms  
  
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=11ms TTL=127  
Reply from 172.30.1.10: bytes=32 time=13ms TTL=127  
Reply from 172.30.1.10: bytes=32 time=14ms 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 = 1ms, Maximum = 14ms, Average = 9ms  
  
C:\>
```

From PC1, is it possible to ping PC3? yes

What is the success rate? 100%

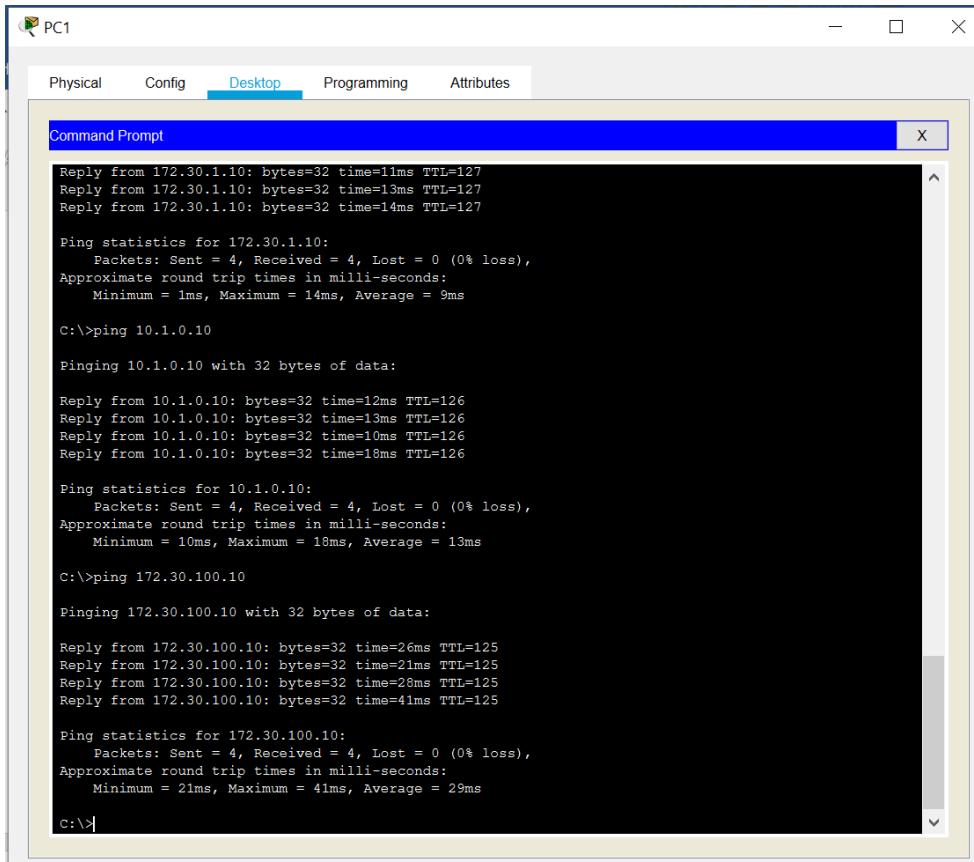


The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window has a blue header bar with the title and standard window controls (minimize, maximize, close). Below the header is a menu bar with tabs: "Physical", "Config", "Desktop" (which is selected and highlighted in blue), "Programming", and "Attributes". The main area of the window is a black terminal-like interface displaying command-line output. The output shows several ping operations:

```
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:\>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=11ms TTL=127  
Reply from 172.30.1.10: bytes=32 time=13ms TTL=127  
Reply from 172.30.1.10: bytes=32 time=14ms 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 = 1ms, Maximum = 14ms, Average = 9ms  
  
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=12ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=13ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=10ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=18ms 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 = 10ms, Maximum = 18ms, Average = 13ms  
  
c:\>
```

From PC1, is it possible to ping PC4? \_\_\_\_\_yes\_\_\_\_\_

What is the success rate?\_\_100%\_\_



The screenshot shows a Windows desktop environment with a window titled "PC1". Inside the window, there is a tab bar with "Physical", "Config", "Desktop" (which is selected), and "Programming", "Attributes". Below the tab bar is a "Command Prompt" window. The command prompt output shows several ping operations:

```
Reply from 172.30.1.10: bytes=32 time=11ms TTL=127
Reply from 172.30.1.10: bytes=32 time=13ms TTL=127
Reply from 172.30.1.10: bytes=32 time=14ms 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 = 1ms, Maximum = 14ms, Average = 9ms

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=12ms TTL=126
Reply from 10.1.0.10: bytes=32 time=13ms TTL=126
Reply from 10.1.0.10: bytes=32 time=10ms TTL=126
Reply from 10.1.0.10: bytes=32 time=19ms 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 = 10ms, Maximum = 18ms, Average = 13ms

C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

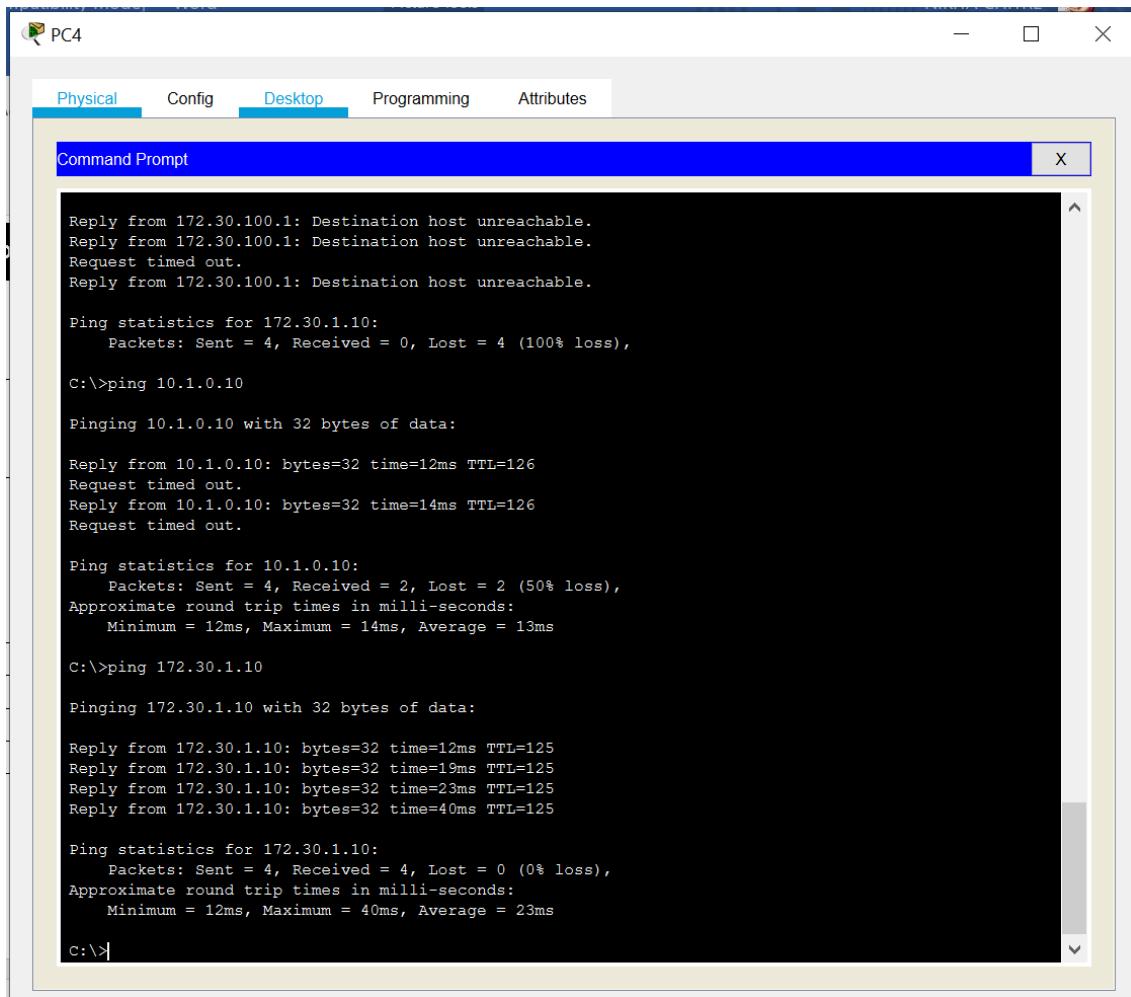
Reply from 172.30.100.10: bytes=32 time=26ms TTL=125
Reply from 172.30.100.10: bytes=32 time=21ms TTL=125
Reply from 172.30.100.10: bytes=32 time=28ms TTL=125
Reply from 172.30.100.10: bytes=32 time=41ms TTL=125

Ping statistics for 172.30.100.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 21ms, Maximum = 41ms, Average = 29ms

C:\>
```

From PC4, is it possible to ping PC2? yes

What is the success rate? 100%

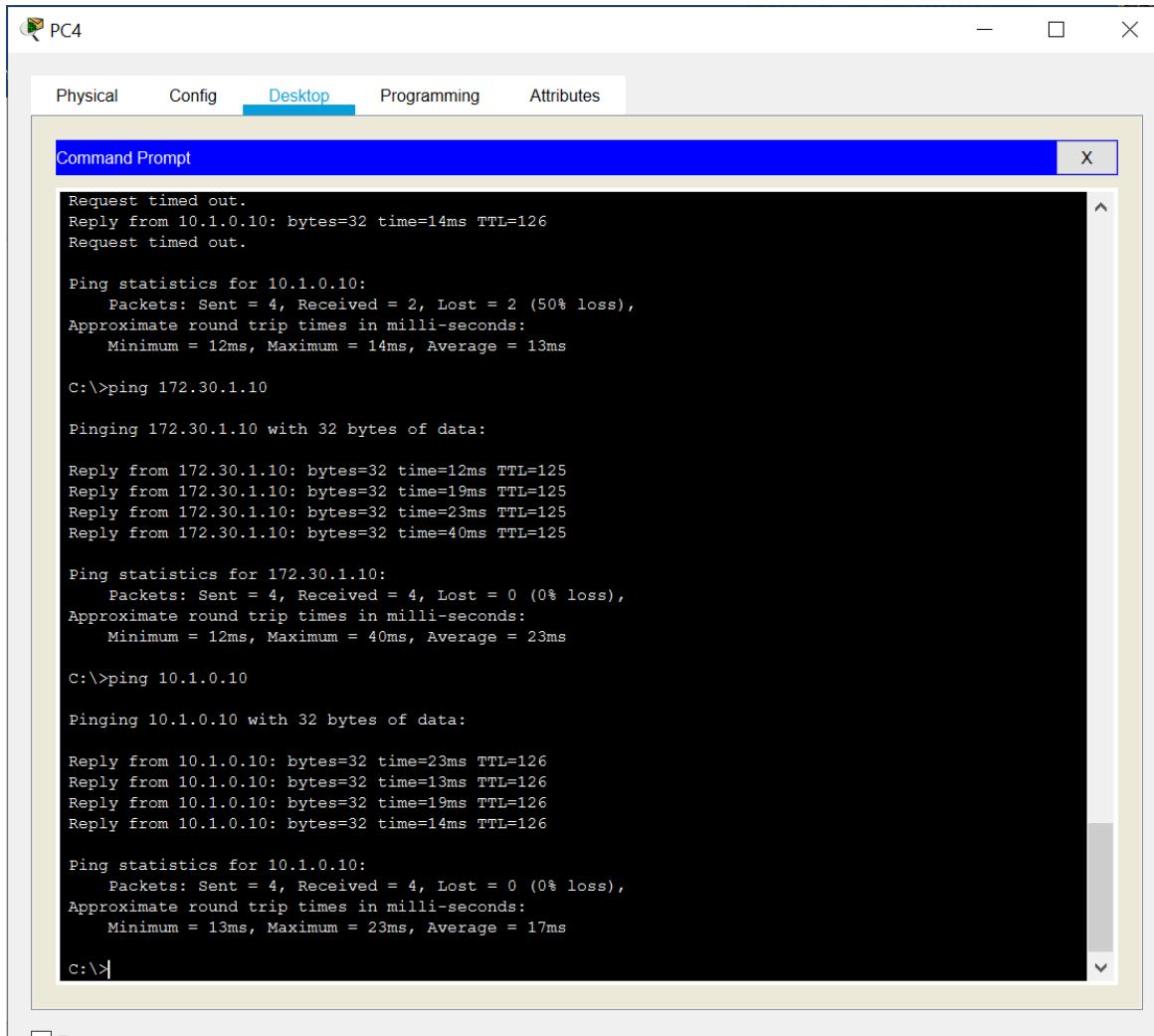


The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window is part of a software interface with tabs for "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". The command prompt itself displays the following output:

```
Reply from 172.30.100.1: Destination host unreachable.  
Reply from 172.30.100.1: Destination host unreachable.  
Request timed out.  
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:\>ping 10.1.0.10  
  
Pinging 10.1.0.10 with 32 bytes of data:  
  
Reply from 10.1.0.10: bytes=32 time=12ms TTL=126  
Request timed out.  
Reply from 10.1.0.10: bytes=32 time=14ms 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 = 12ms, Maximum = 14ms, Average = 13ms  
  
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=12ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=19ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=23ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=40ms 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 = 12ms, Maximum = 40ms, Average = 23ms  
  
C:\>
```

From PC4, is it possible to ping PC3? \_\_\_\_\_yes\_\_\_\_\_

What is the success rate? \_\_\_\_\_100%\_\_\_\_\_



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window is part of a software interface with tabs for "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". The command prompt itself displays the following output:

```
Request timed out.  
Reply from 10.1.0.10: bytes=32 time=14ms 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 = 12ms, Maximum = 14ms, Average = 13ms  
  
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=12ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=19ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=23ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=40ms 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 = 12ms, Maximum = 40ms, Average = 23ms  
  
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=23ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=13ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=19ms TTL=126  
Reply from 10.1.0.10: bytes=32 time=14ms 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 = 13ms, Maximum = 23ms, Average = 17ms  
  
c:\>
```

## 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.

Router1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
!
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.30.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 209.165.200.230 255.255.255.252
 clock rate 64000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 passive-interface FastEthernet0/0
 passive-interface FastEthernet0/1
 network 172.30.0.0
 network 209.165.200.0
 no auto-summary
!
ip classless
!
in flow-export version 9
```

Ctrl+F6 to exit CLI focus

Copy   Paste

Router1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
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

      10.0.0.0/16 is subnetted, 1 subnets
R        10.1.0.0 [120/1] via 209.165.200.229, 00:00:15, 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, 00:00:15, Serial0/0/0
R          172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:15, Serial0/0/0
R          172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:15, Serial0/0/0
R          172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:15, Serial0/0/0
      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, 00:00:15, Serial0/0/0

R1#
R1#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
FastEthernet0/0     172.30.1.1      YES manual up           up
FastEthernet0/1     172.30.2.1      YES manual up           up
Serial0/0/0         209.165.200.230 YES manual up           up
Serial0/0/1         unassigned       YES unset administratively down down
Vlan1              unassigned       YES unset administratively down down

R1#show ip protocols
```

Ctrl+F6 to exit CLI focus

Copy   Paste

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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, 00:00:15, Serial0/0/0

R1#
R1#show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
FastEthernet0/0    172.30.1.1     YES manual up           up
FastEthernet0/1    172.30.2.1     YES manual up           up
Serial0/0/0        209.165.200.230 YES manual up           up
Serial0/0/1        unassigned     YES unset administratively down down
Vlan1              unassigned     YES unset administratively down down
R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 24 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 not 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        00:00:00
  Distance: (default is 120)
R1#
Ctrl+F6 to exit CLI focus
```

Copy Paste

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
!
!
!
interface FastEthernet0/0
ip address 10.1.0.1 255.255.0.0
duplex auto
speed auto
!
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
ip address 209.165.200.229 255.255.255.252
!
interface Serial0/0/1
ip address 209.165.200.233 255.255.255.252
clock rate 64000
!
interface Vlan1
no ip address
shutdown
!
router rip
version 2
passive-interface FastEthernet0/0
network 10.0.0.0
network 209.165.200.0
no auto-summary
!
ip classless
!
ip flow-export version 9
```

Ctrl+F6 to exit CLI focus

Copy Paste

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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   10.0.0.0 is directly connected, FastEthernet0/0
  172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R     172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:15, Serial0/0/0
R     172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:15, Serial0/0/0
R     172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R     172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R     172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R     172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
C     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#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
FastEthernet0/0    10.1.0.1        YES manual up           up
FastEthernet0/1    unassigned       YES unset administratively down down
Serial0/0/0        209.165.200.229 YES manual up           up
Serial0/0/1        209.165.200.233 YES manual up           up
Vlan1              unassigned       YES unset administratively down down

R2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 17 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
      Serial0/0/1    2      2
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.230      120          00:00:09
    209.165.200.234      120          00:00:29
  Distance: (default is 120)
R2#
```

Ctrl+F6 to exit CLI focus      Copy      Paste

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
FastEthernet0/0    10.1.0.1        YES manual up           up
FastEthernet0/1    unassigned       YES unset administratively down down
Serial0/0/0        209.165.200.229 YES manual up           up
Serial0/0/1        209.165.200.233 YES manual up           up
Vlan1              unassigned       YES unset administratively down down

R2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 17 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
      Serial0/0/1    2      2
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.230      120          00:00:09
    209.165.200.234      120          00:00:29
  Distance: (default is 120)
R2#
```

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Router3

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

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
!
interface FastEthernet0/0
ip address 172.30.100.1 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/0/0
no ip address
clock rate 2000000
shutdown
!
interface Serial0/0/1
ip address 209.165.200.234 255.255.255.252
!
interface Vlan1
no ip address
shutdown
!
router rip
version 2
passive-interface FastEthernet0/0
network 172.30.0.0

```

Ctrl+F6 to exit CLI focus      **Copy**    **Paste**

Router3

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```

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

      10.0.0.0/16 is subnetted, 1 subnets
R        10.1.0.0 [120/1] via 209.165.200.233, 00:00:16, 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, 00:00:16, Serial0/0/1
R          172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:16, 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, 00:00:16, Serial0/0/1
C        209.165.200.232 is directly connected, Serial0/0/1

R3#show ip interface brief
Interface          IP-Address      OK? Method Status          Protocol
FastEthernet0/0     172.30.100.1    YES manual up           up
FastEthernet0/1     unassigned      YES unset administratively down down
Serial0/0/0         unassigned      YES unset administratively down down
Serial0/0/1         209.165.200.234 YES manual up           up
Loopback0           172.30.110.1    YES manual up           up
Loopback1           172.30.200.17   YES manual up           up
Loopback2           172.30.200.33   YES manual up           up
Vlan1              unassigned      YES unset administratively down down

```

Ctrl+F6 to exit CLI focus      **Copy**    **Paste**

```
R3#show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
FastEthernet0/0    172.30.100.1   YES manual up           up
FastEthernet0/1    unassigned      YES unset administratively down down
Serial0/0/0        unassigned      YES unset administratively down down
Serial0/0/1        209.165.200.234 YES manual up           up
Loopback0          172.30.110.1   YES manual up           up
Loopback1          172.30.200.17  YES manual up           up
Loopback2          172.30.200.33  YES manual up           up
Vlan1              unassigned      YES unset administratively down down

R3#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 12 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
      Loopback0     2      2
      Loopback1     2      2
      Loopback2     2      2
      Serial0/0/1   2      2
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.233      120          00:00:16
  Distance: (default is 120)

Ctrl+F6 to exit CLI focus
```

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## 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.

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

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 = 15/17/19 ms

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 = 7/16/22 ms

R2>en
R2#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
R2#
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1 con0 is now available

Press RETURN to get started.

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#
```

Ctrl+F6 to exit CLI focus      **Copy**      **Paste**

