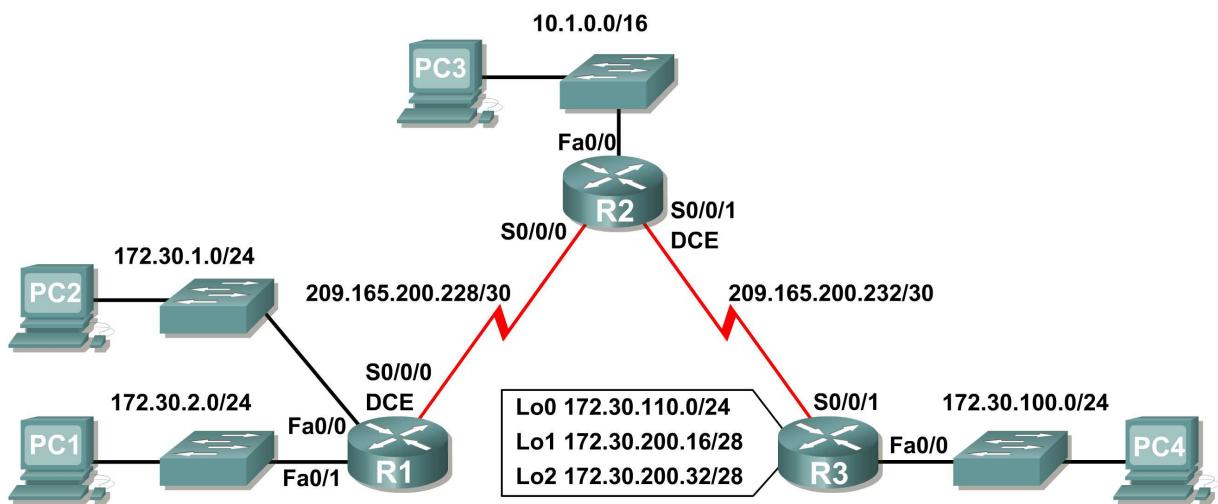


CEL 51, DCCN, Monsoon 2020

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.

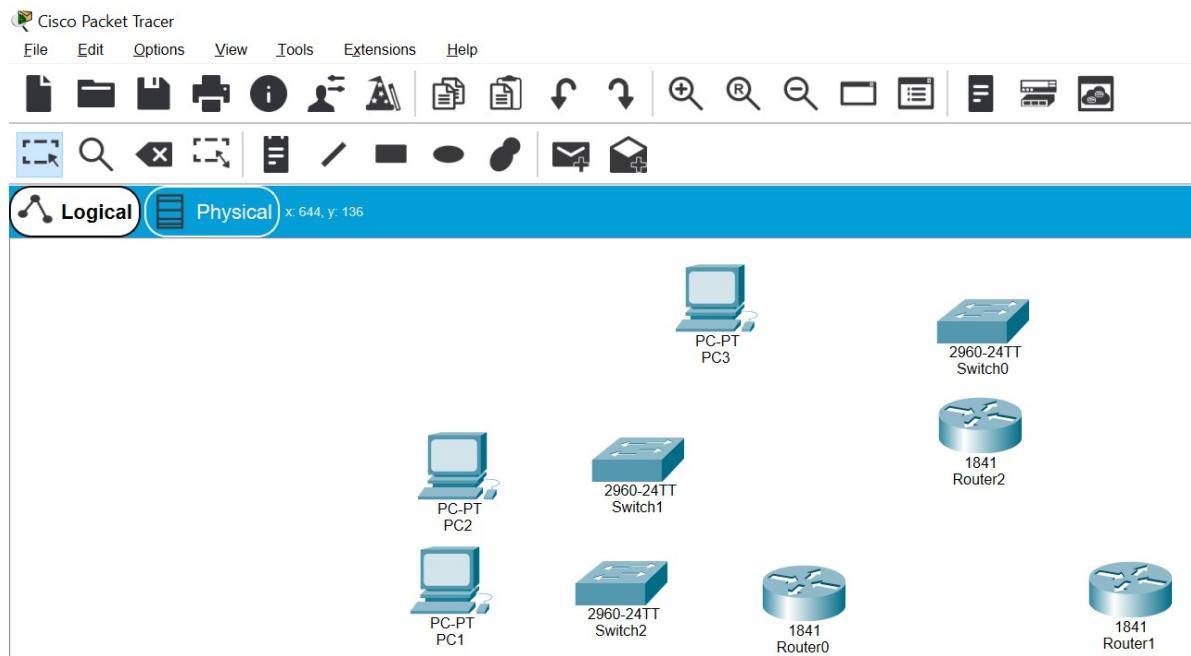
Scenario

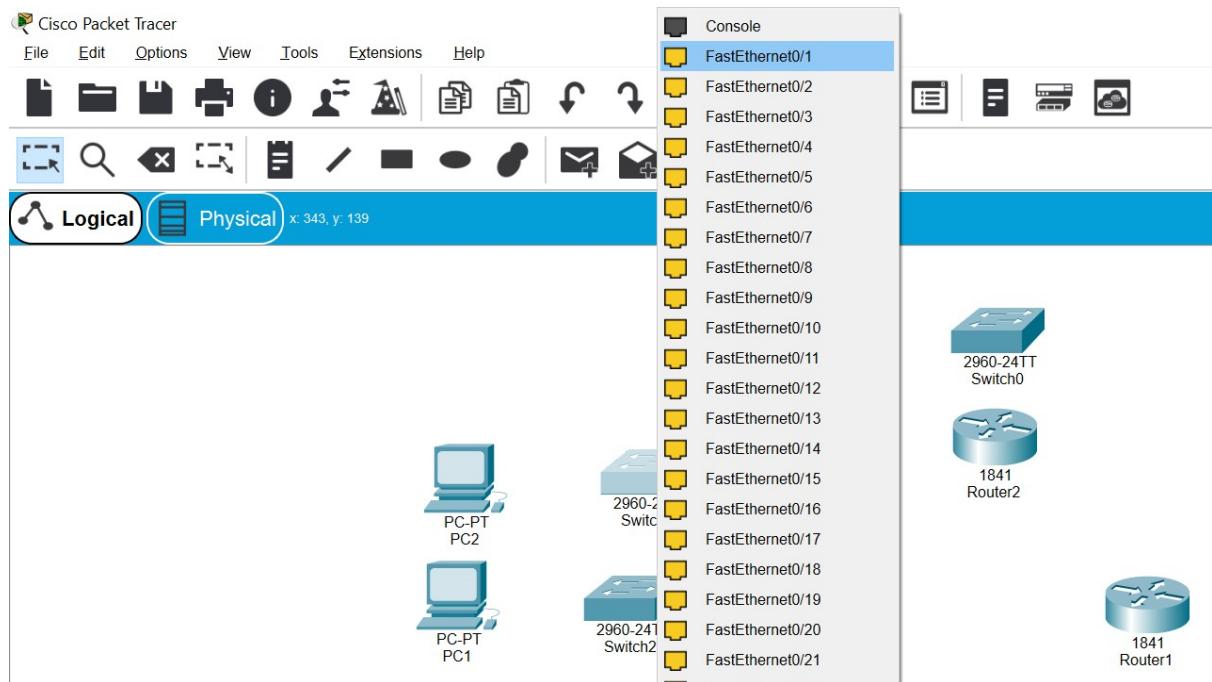
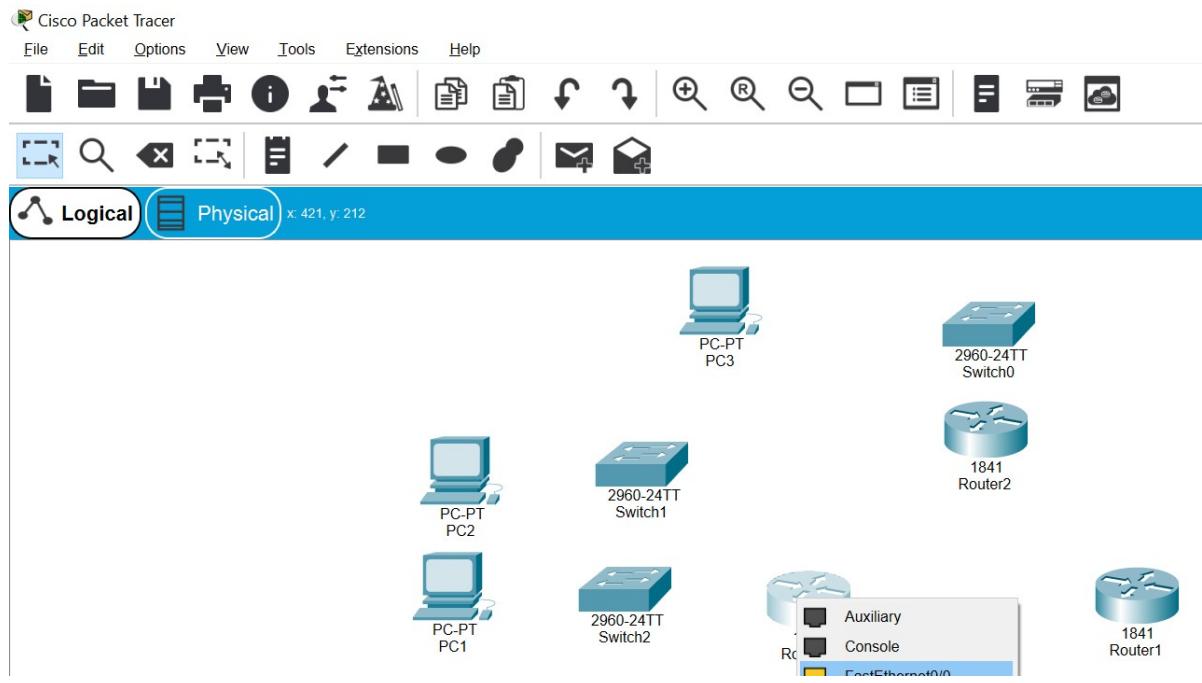
The network shown in the Topology Diagram contains a discontiguous network, 172.30.0.0. This network has been subnetted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and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

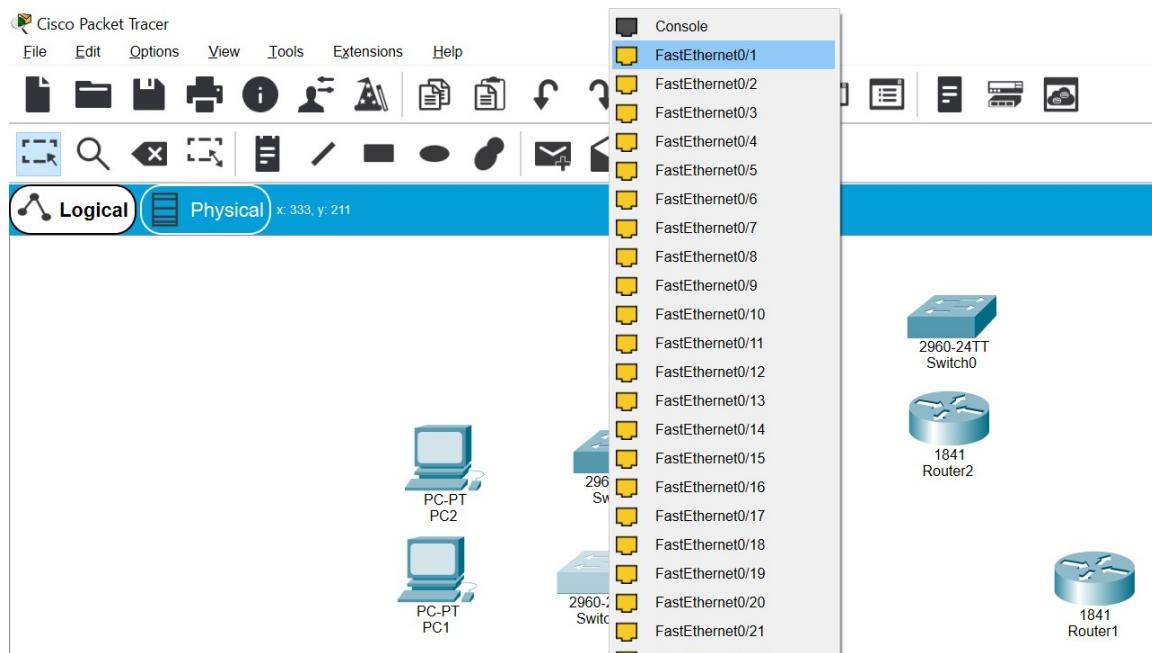
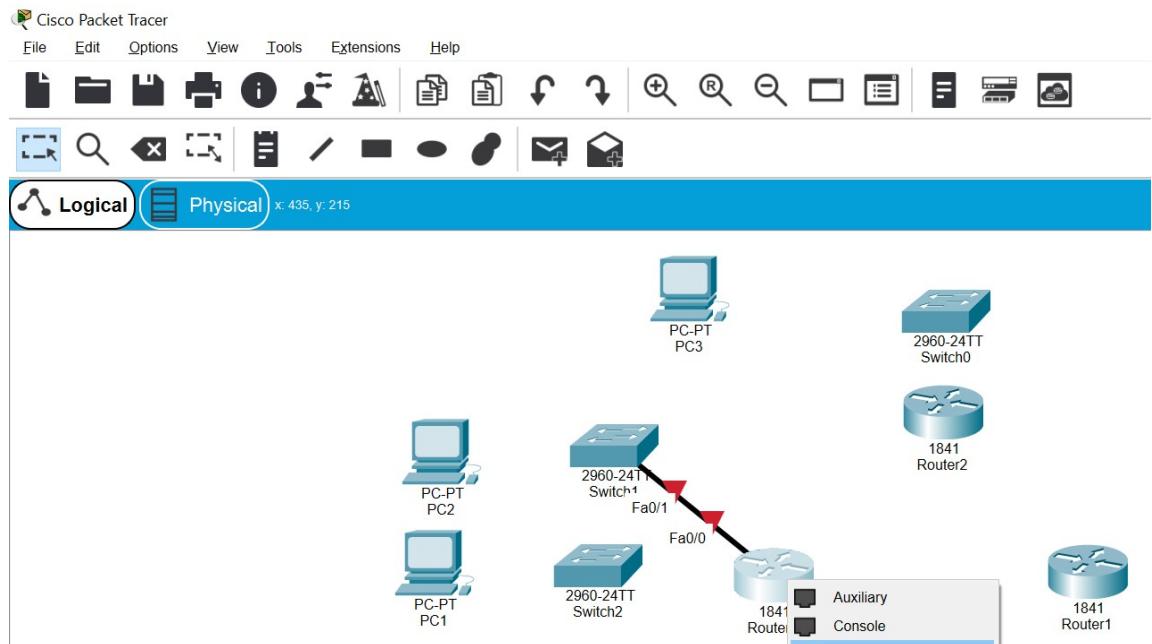
Task 1: Cable, Erase, and Reload the Routers.

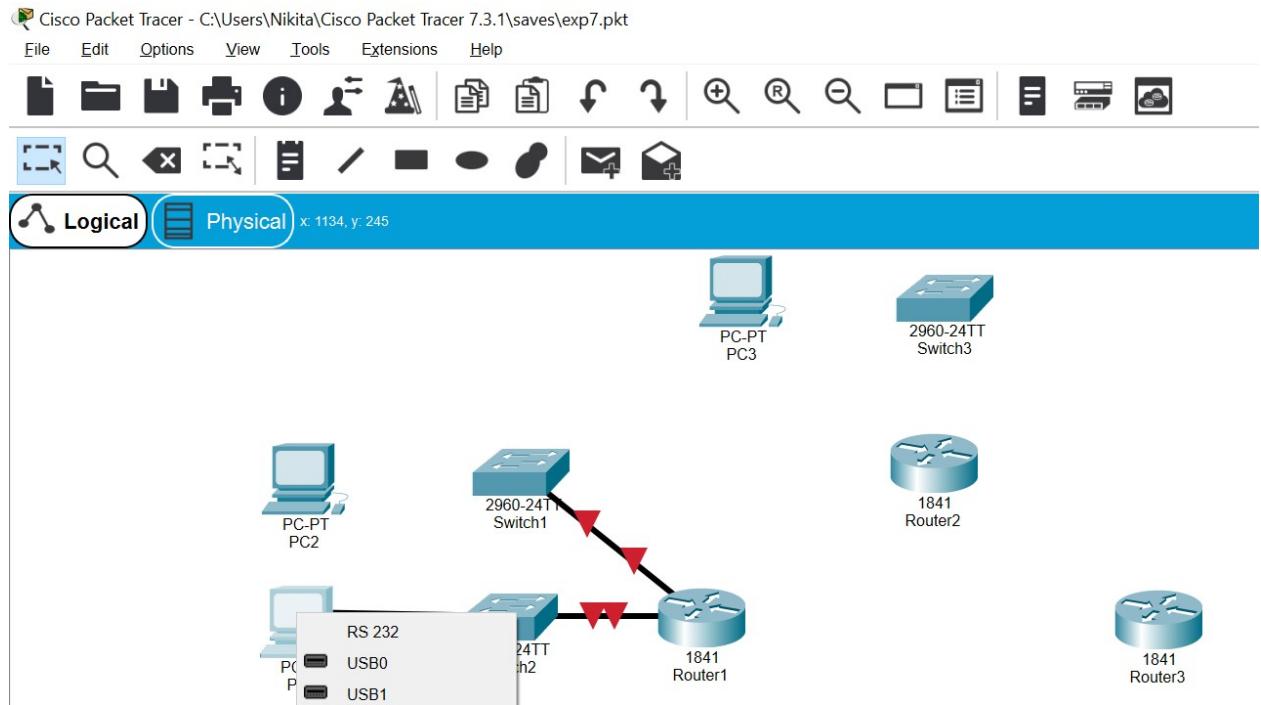
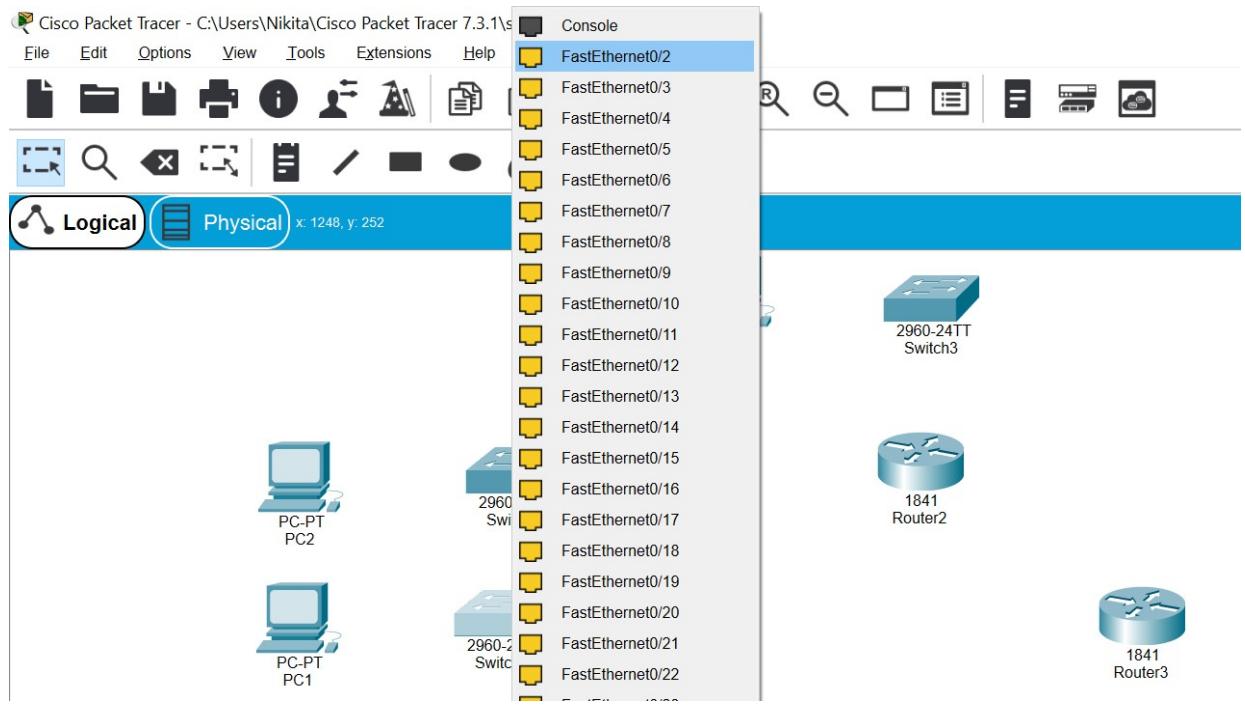
Step 1: Cable a network.

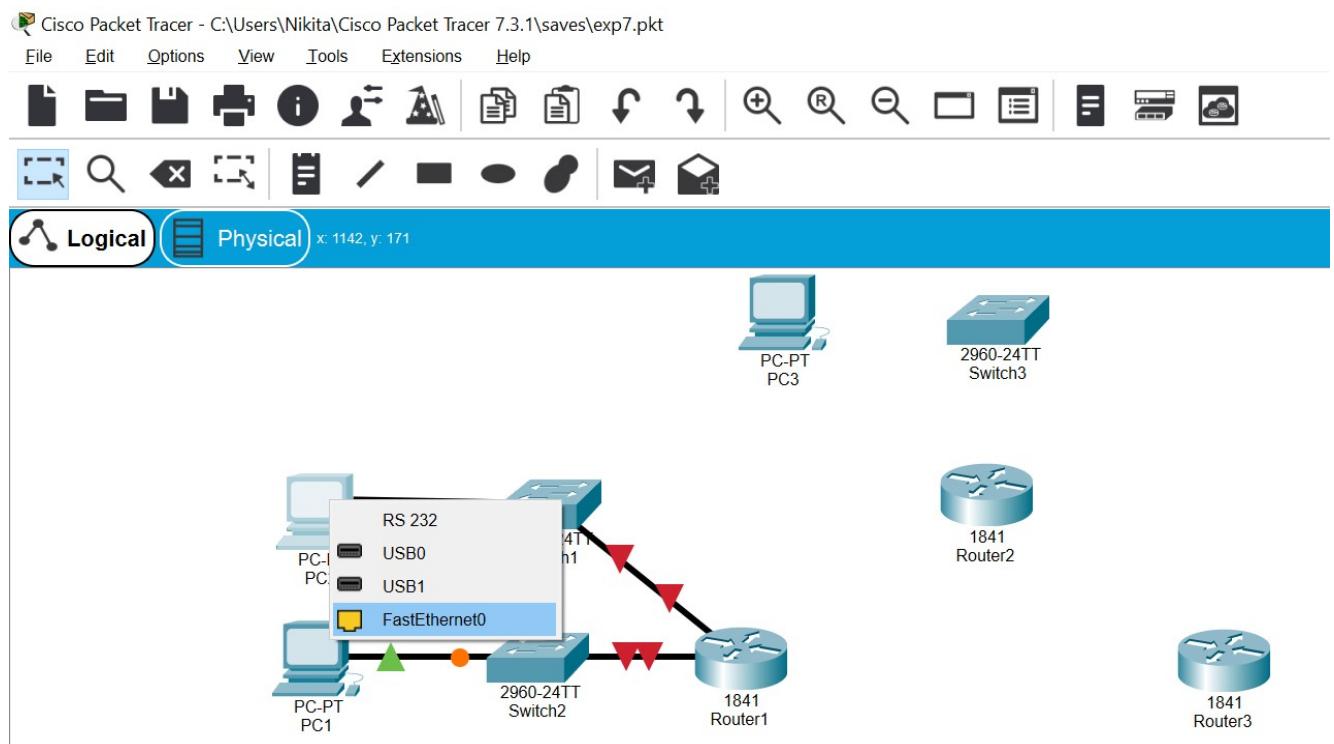
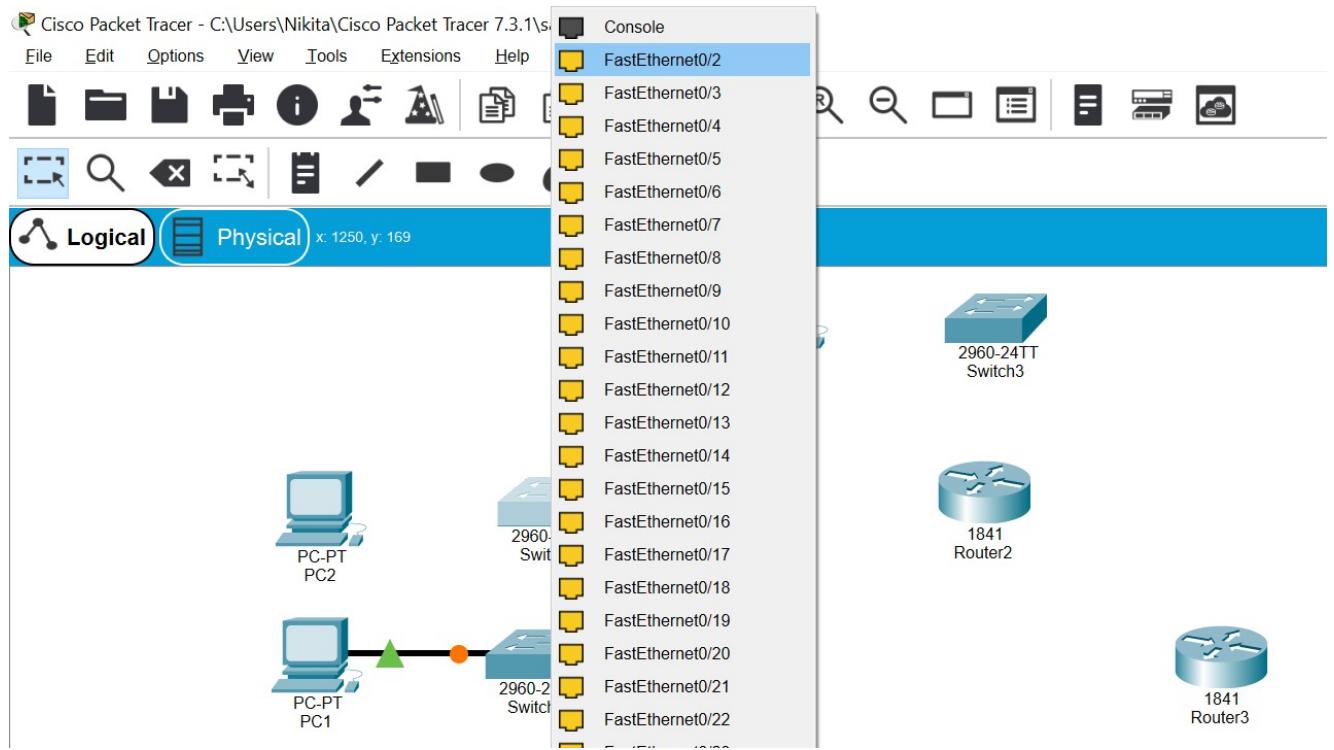
Cable a network that is similar to the one in the Topology Diagram.

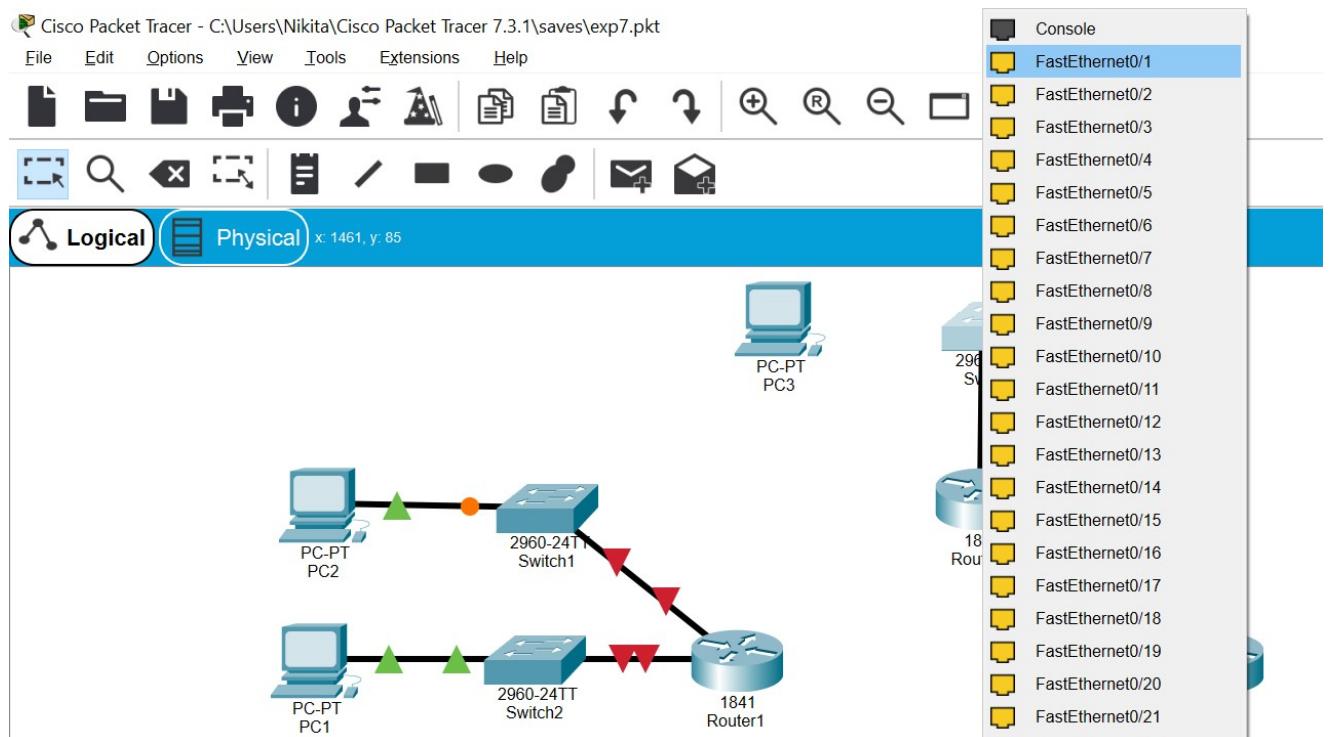
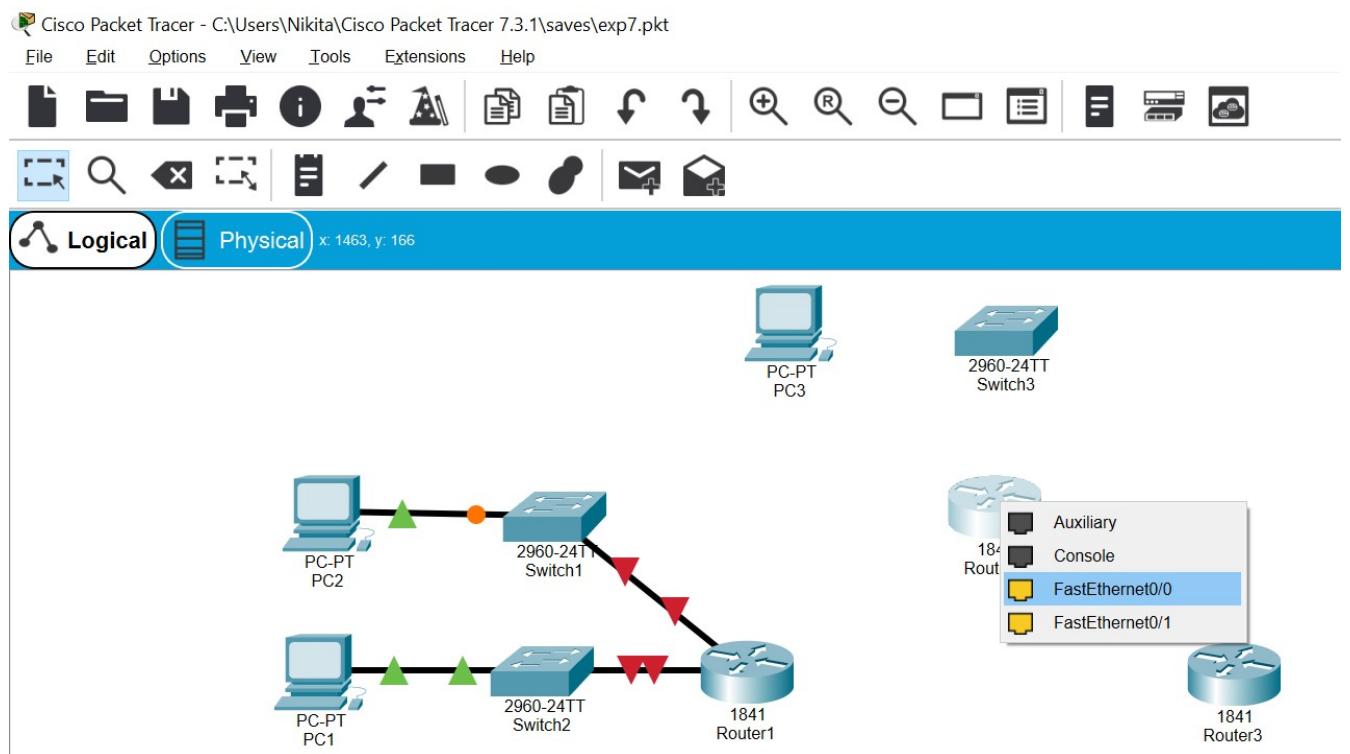


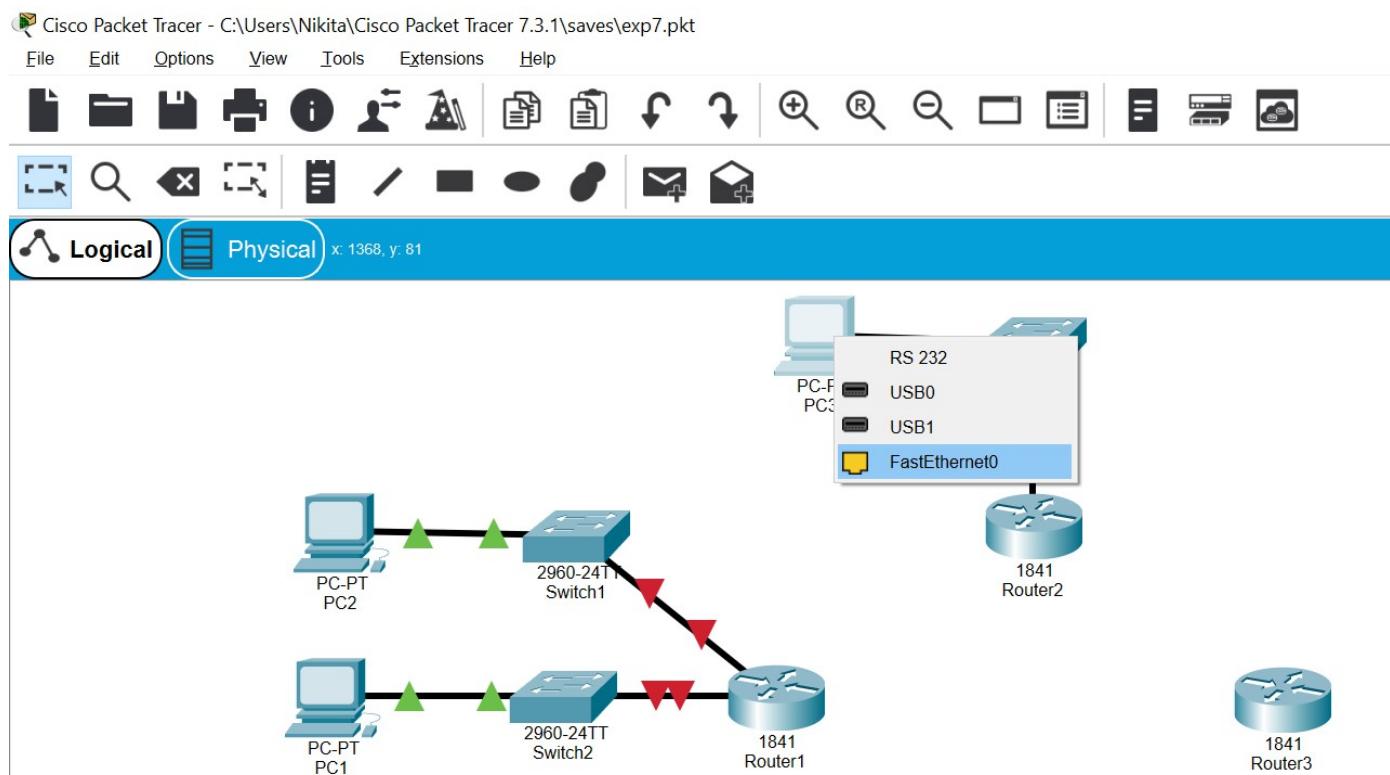
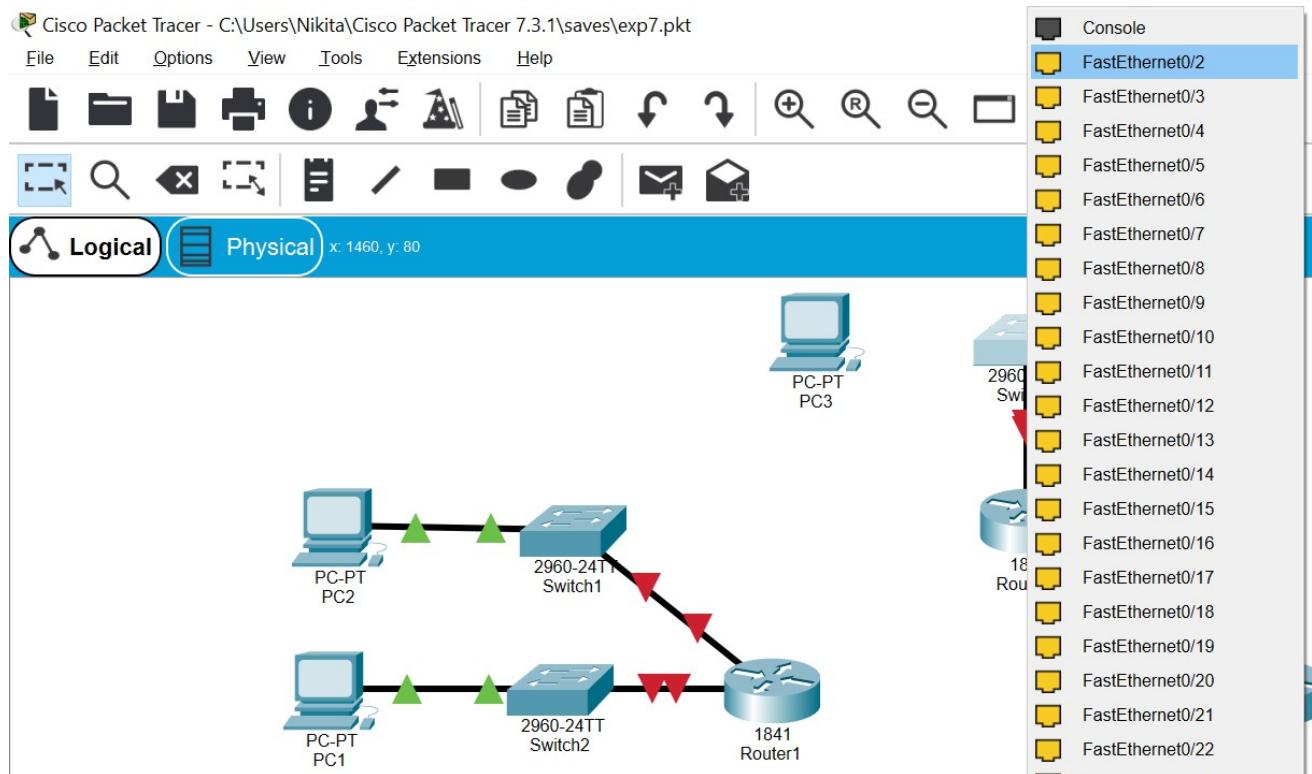


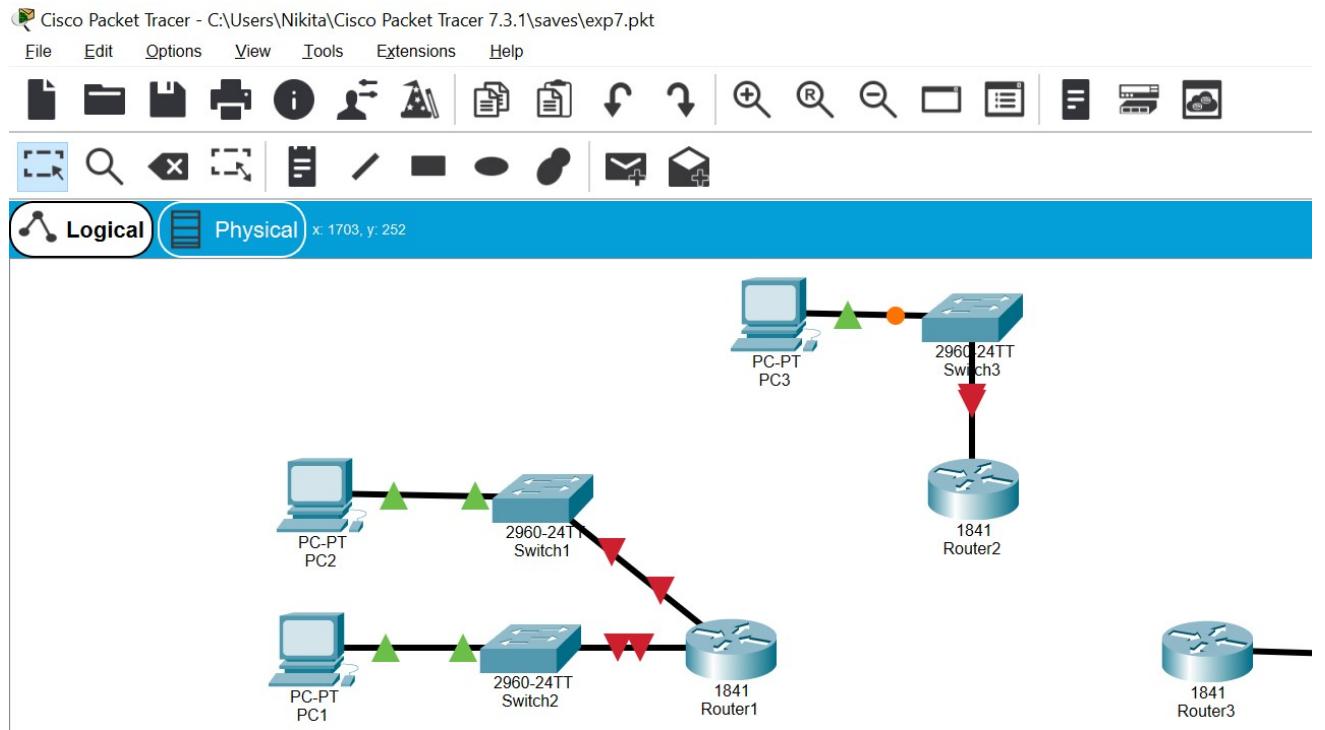
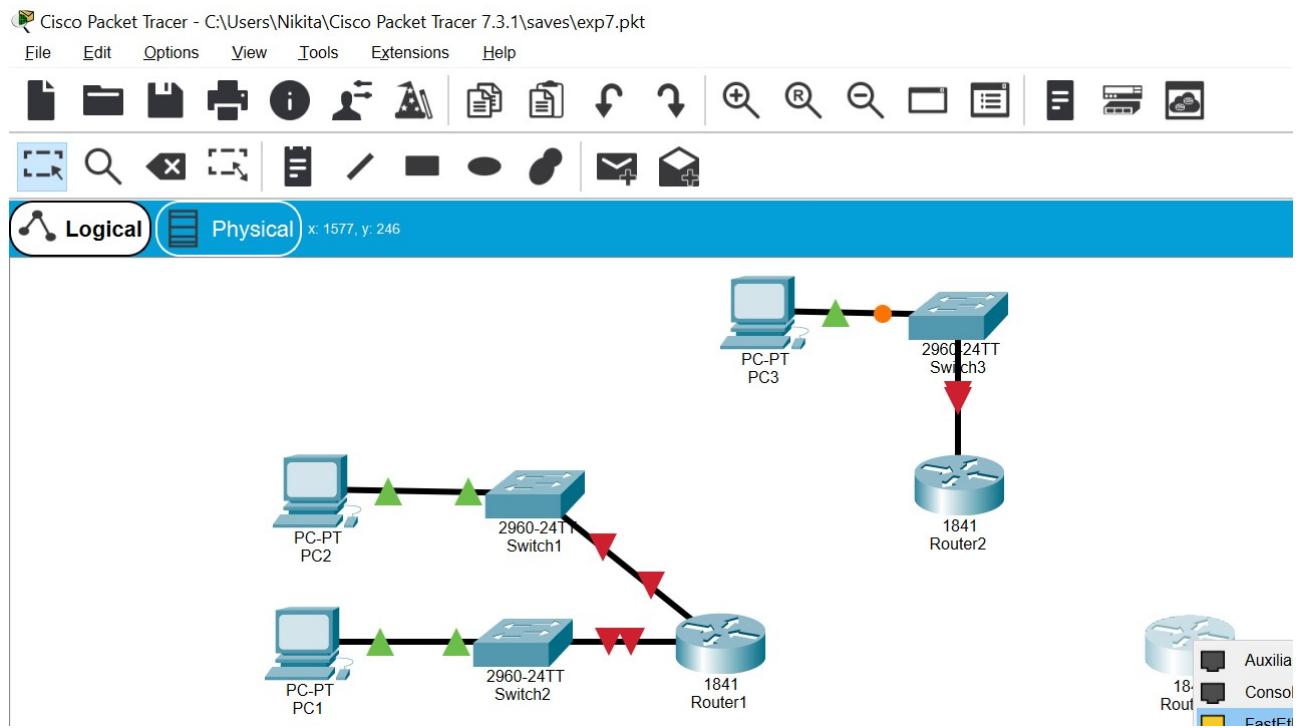


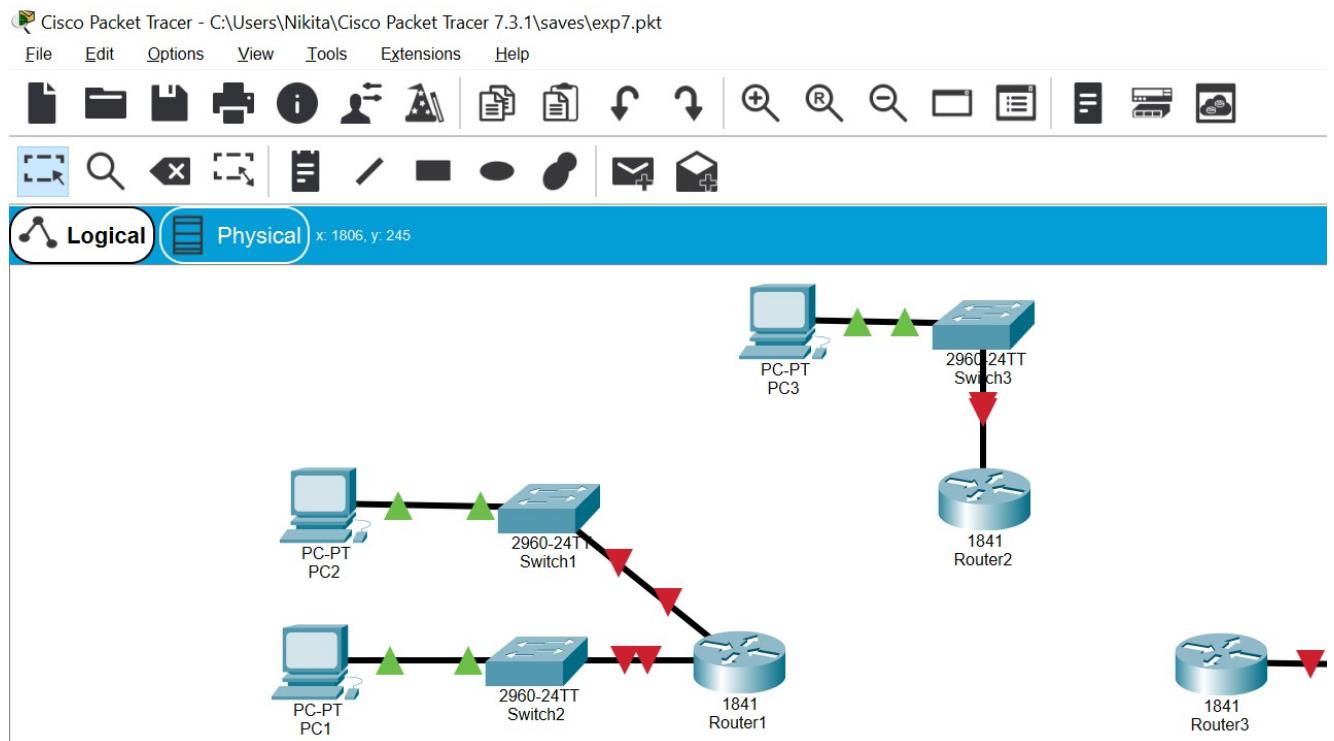
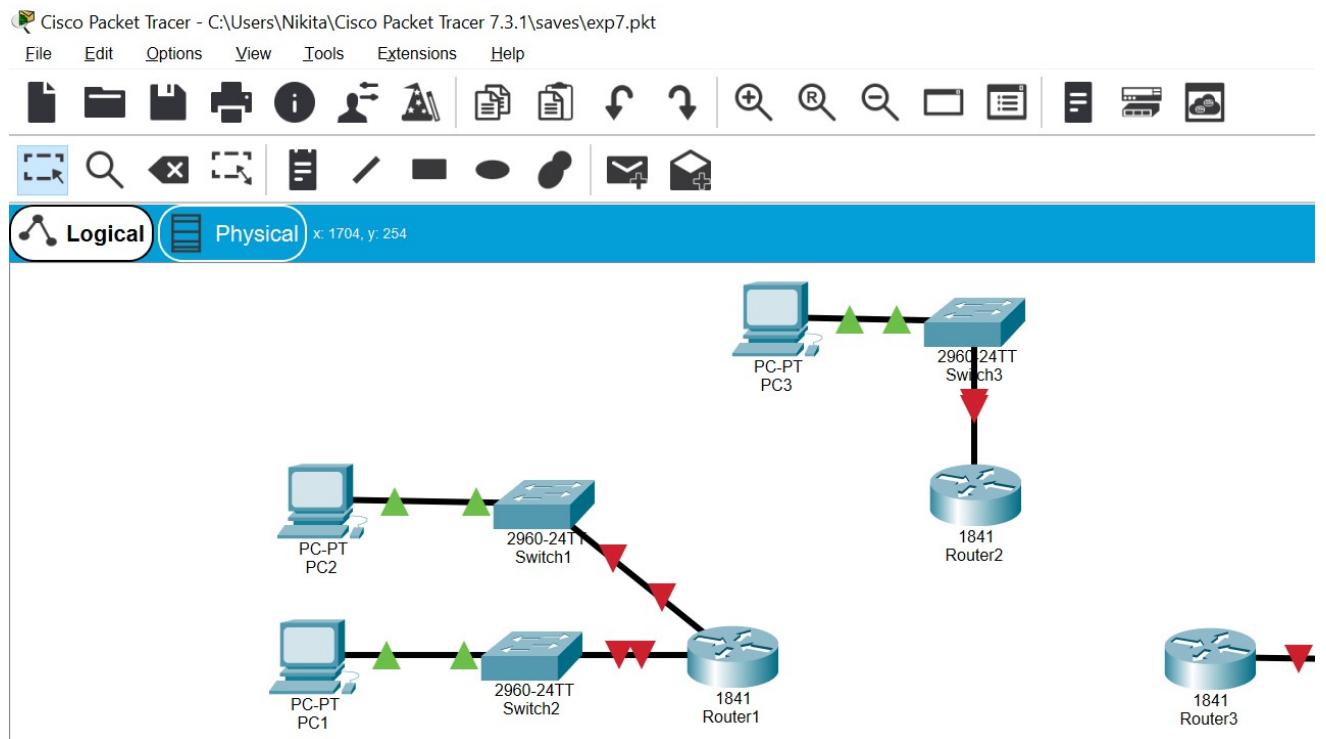


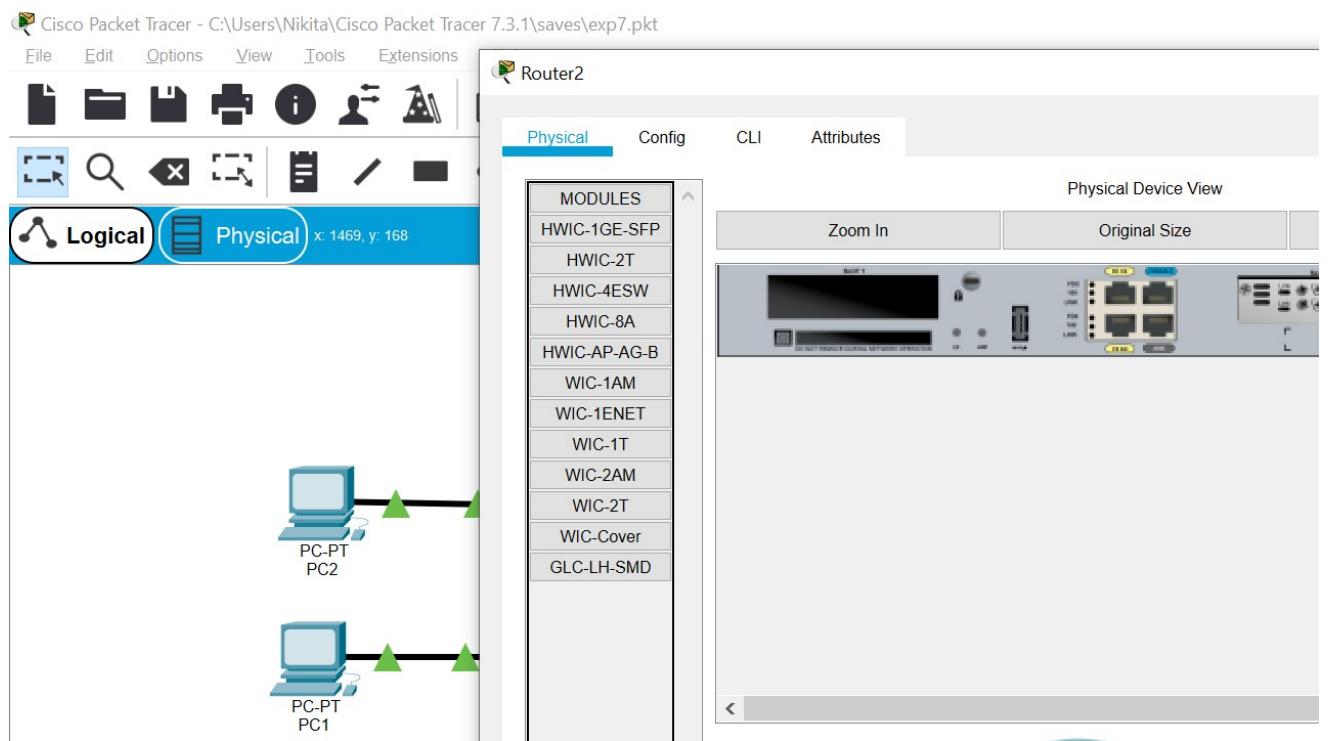
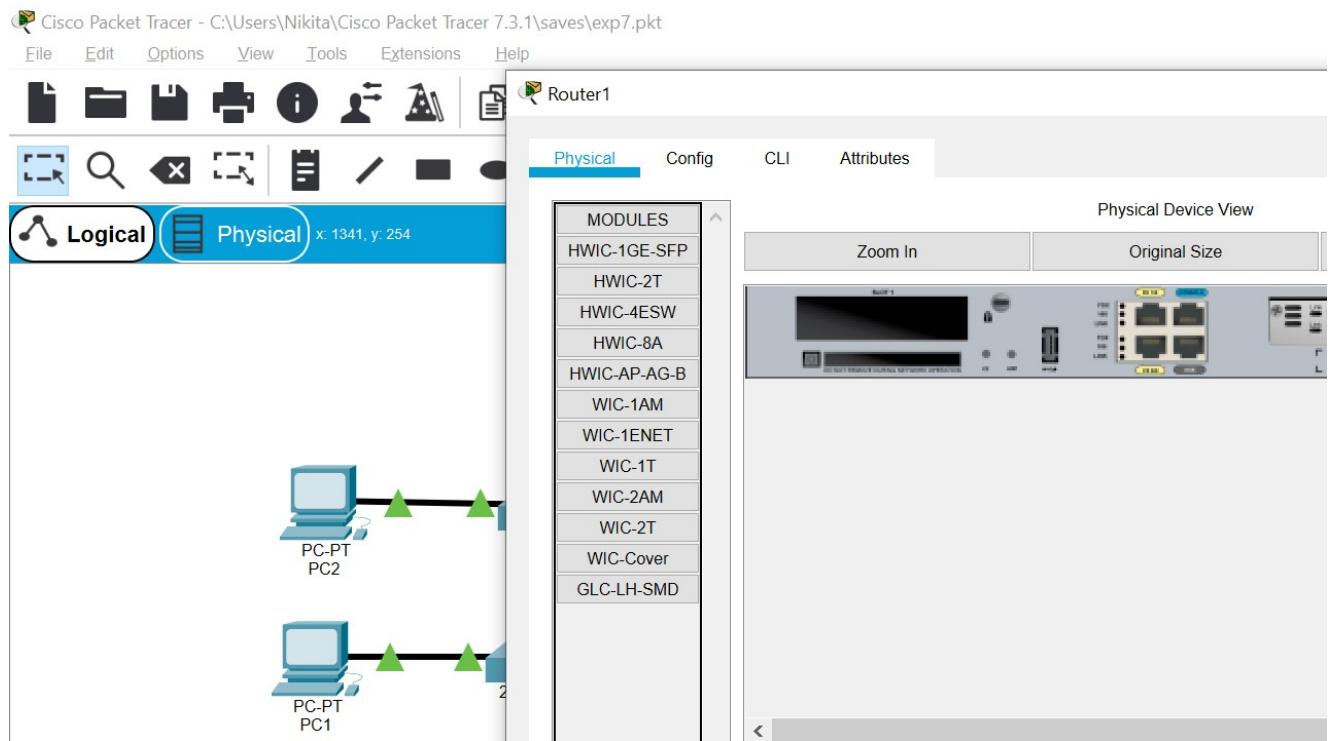


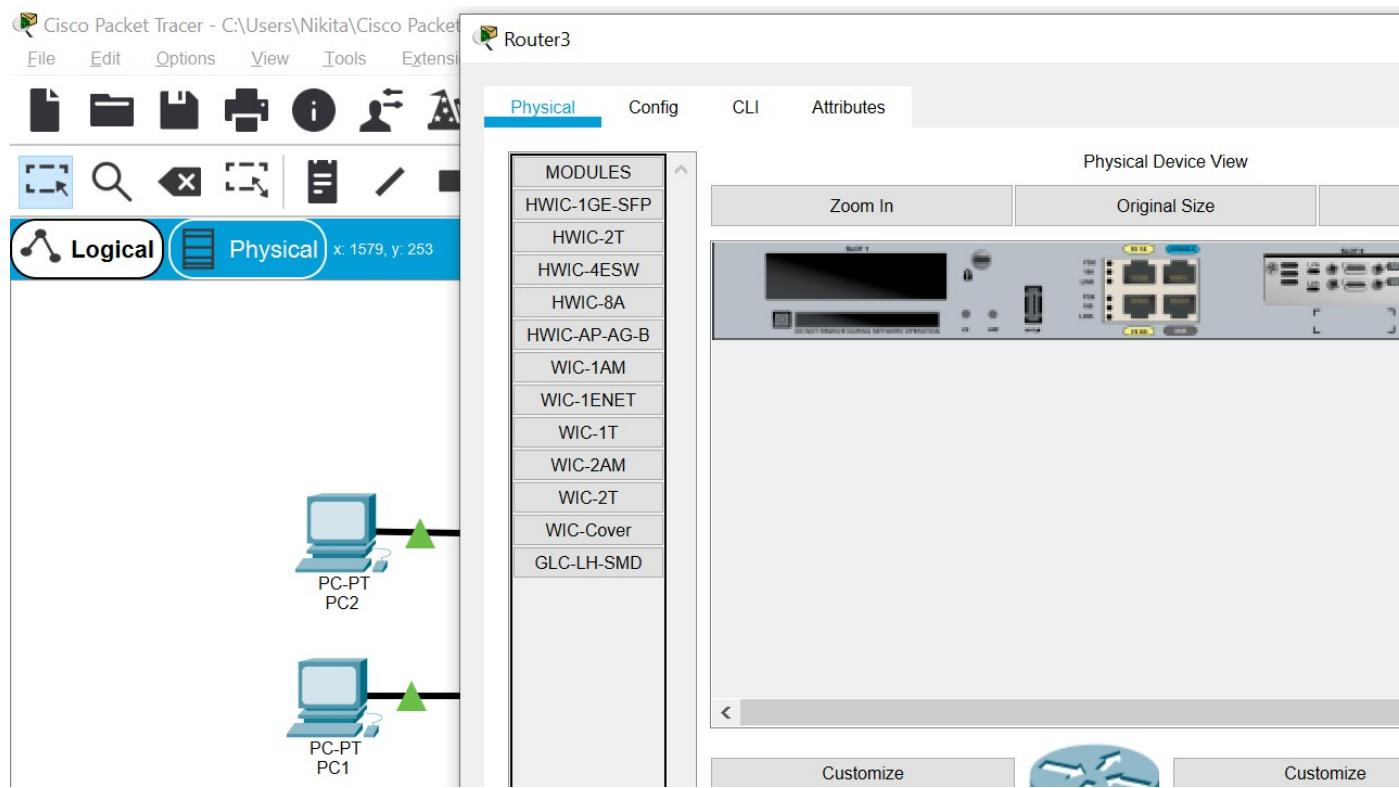


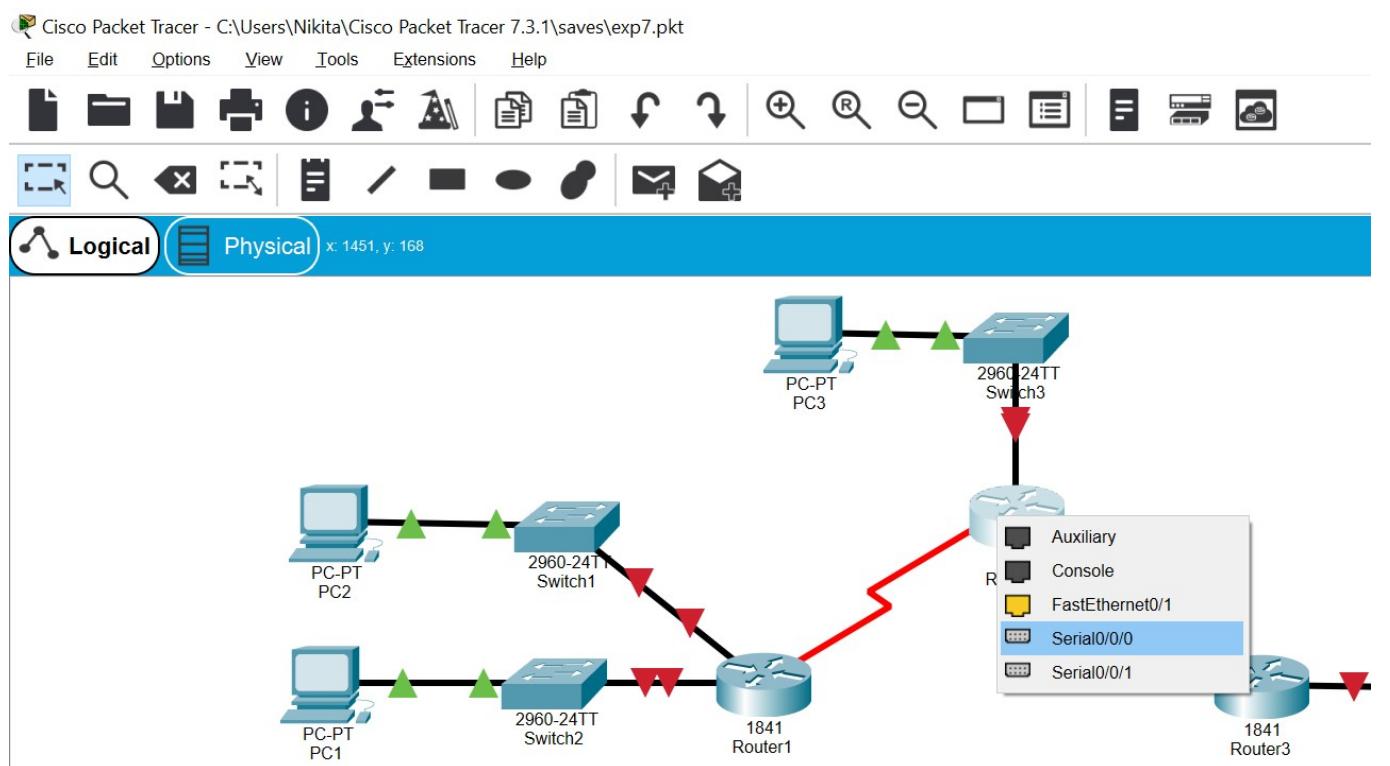
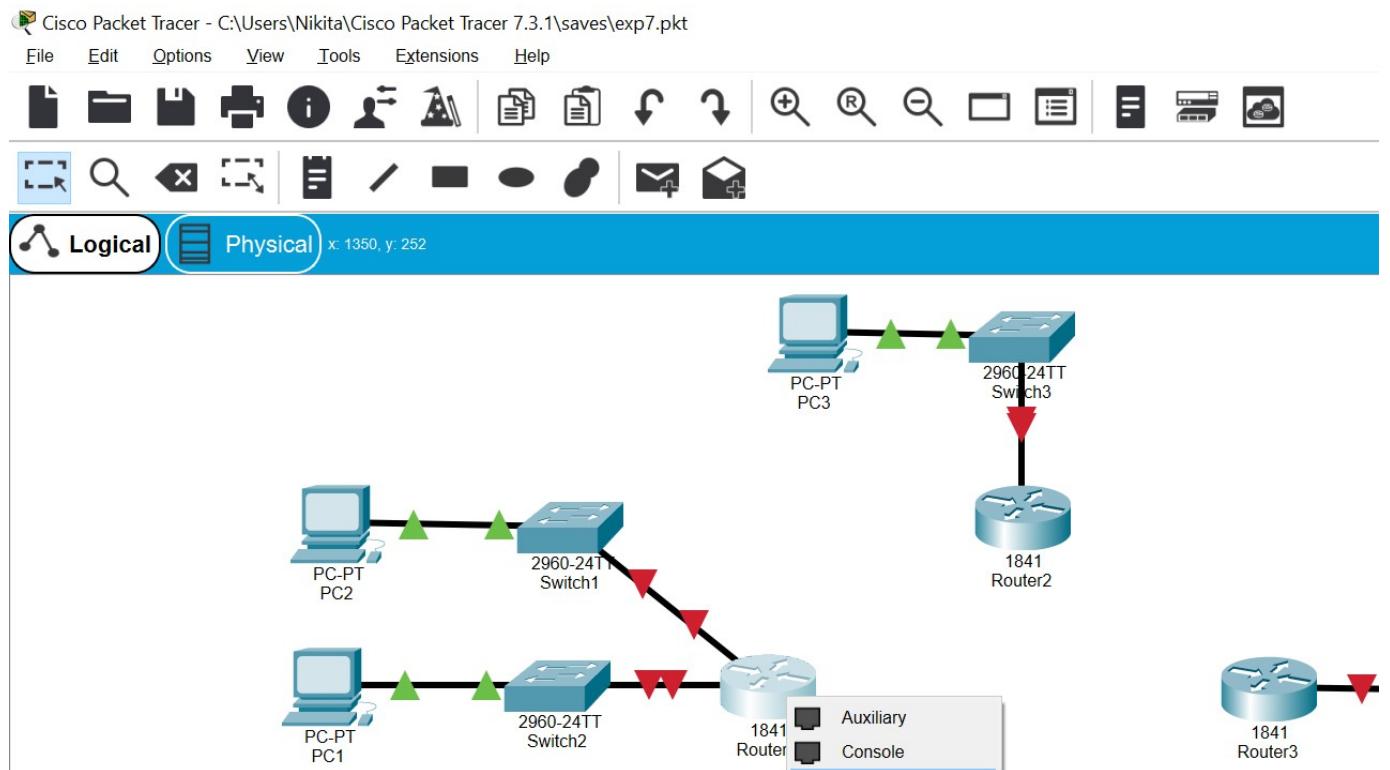


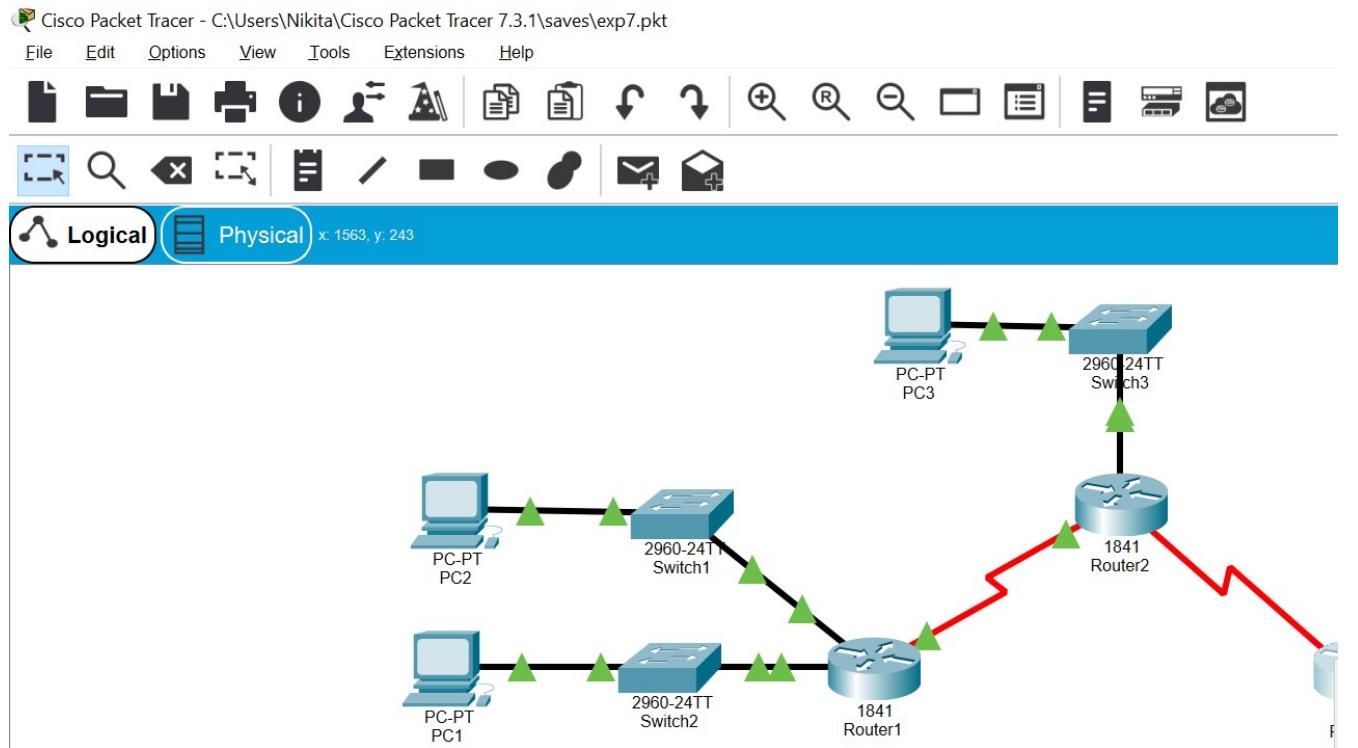
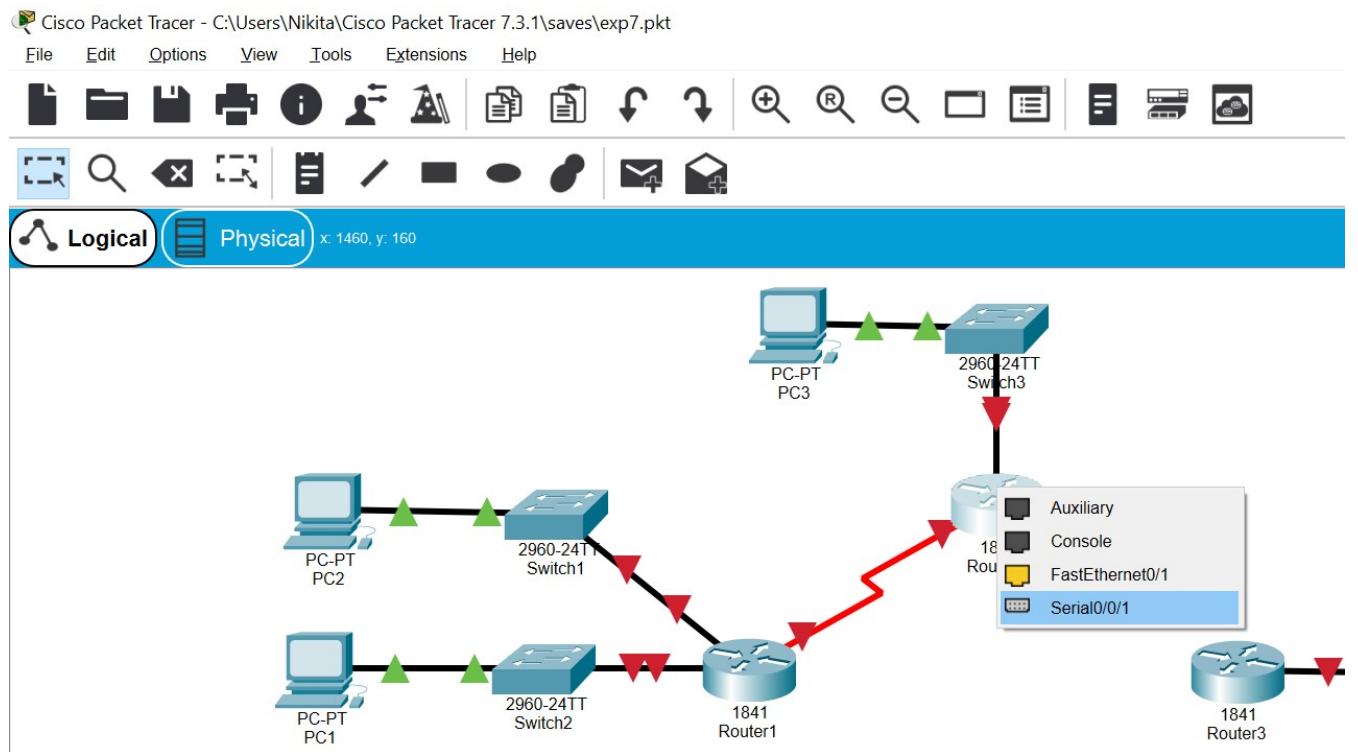






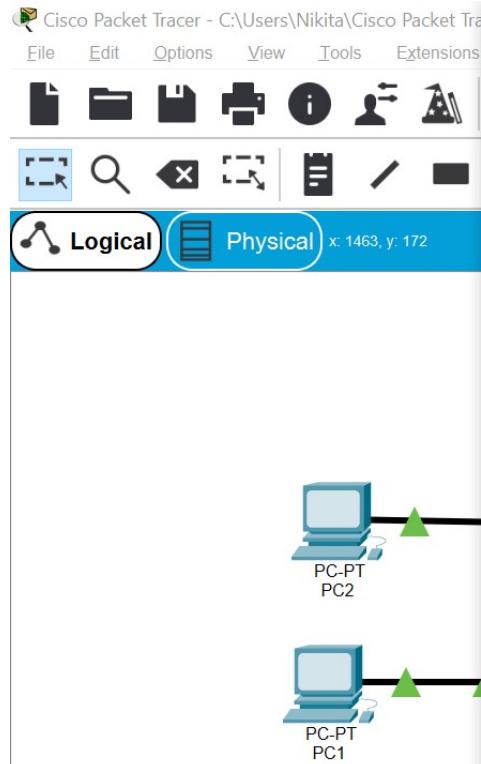






Step 2: Clear the configuration on each router.

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.



Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

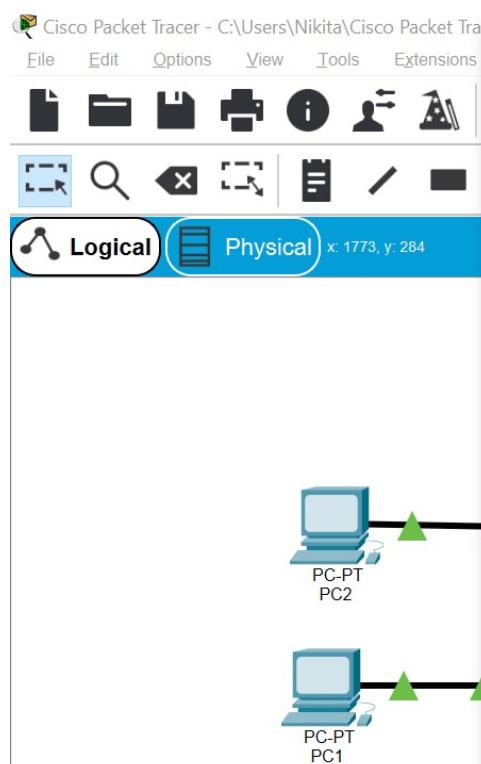
```
Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.  
Processor board ID FTX0947Z18E  
M860 processor: part number 0, mask 49  
2 FastEthernet/IEEE 802.3 interface(s)  
2 Low-speed serial(sync/async) network interface(s)  
191K bytes of NVRAM.  
63488K bytes of ATA CompactFlash (Read/Write)  
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1, 1 (fc2)  
Technical Support: http://www.cisco.com/techsupport  
Copyright (c) 1986-2007 by Cisco Systems, Inc.  
Compiled Wed 18-Jul-07 04:52 by pt_team

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>erase startup-config
^
% Invalid input detected at '^' marker.
```



Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

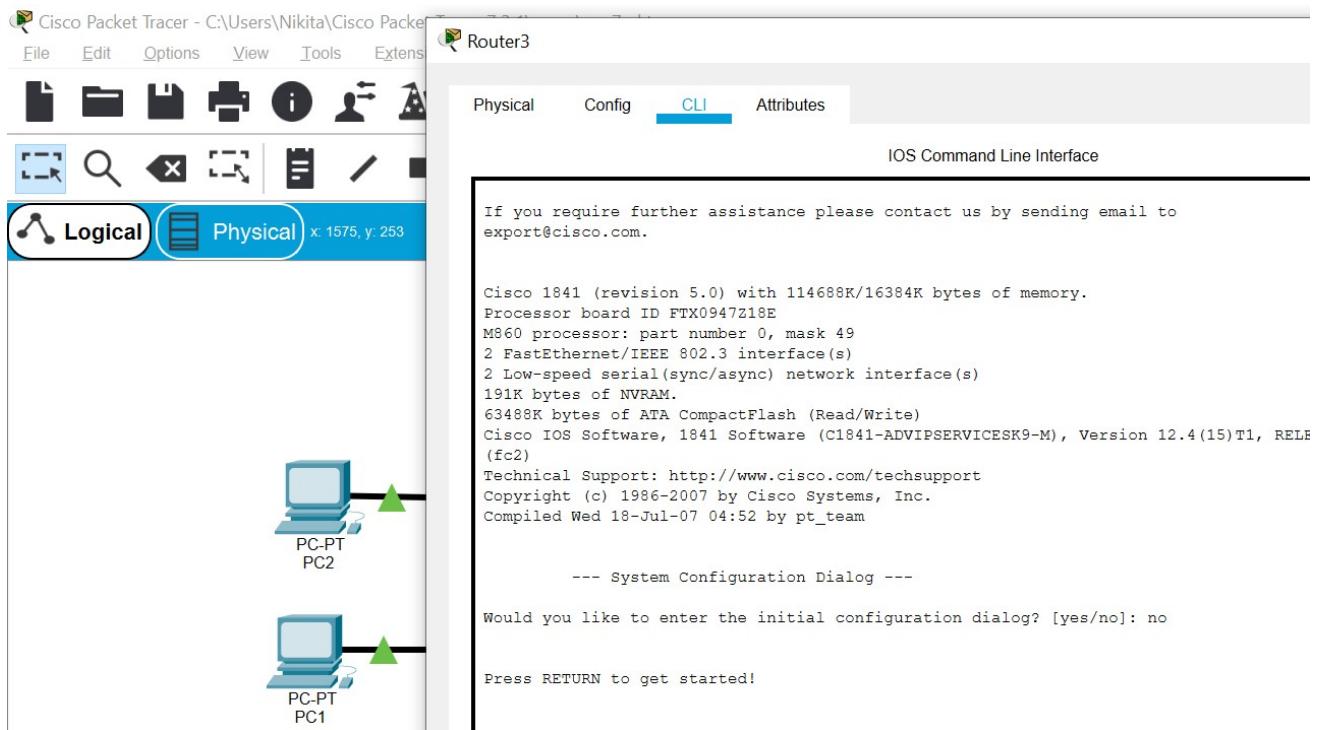
```
If you require further assistance please contact us by sending email to  
export@cisco.com.

Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.  
Processor board ID FTX0947Z18E  
M860 processor: part number 0, mask 49  
2 FastEthernet/IEEE 802.3 interface(s)  
2 Low-speed serial(sync/async) network interface(s)  
191K bytes of NVRAM.  
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Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1, 1 (fc2)  
Technical Support: http://www.cisco.com/techsupport  
Copyright (c) 1986-2007 by Cisco Systems, Inc.  
Compiled Wed 18-Jul-07 04:52 by pt_team

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!
```



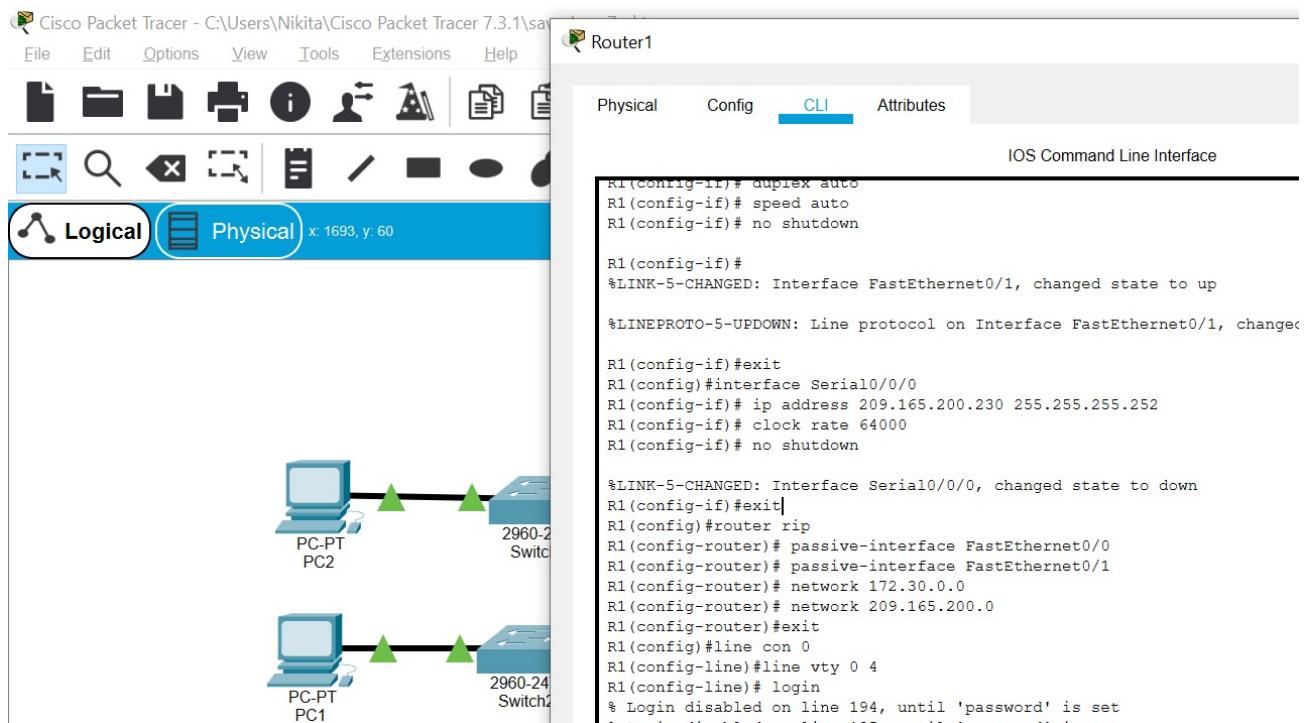
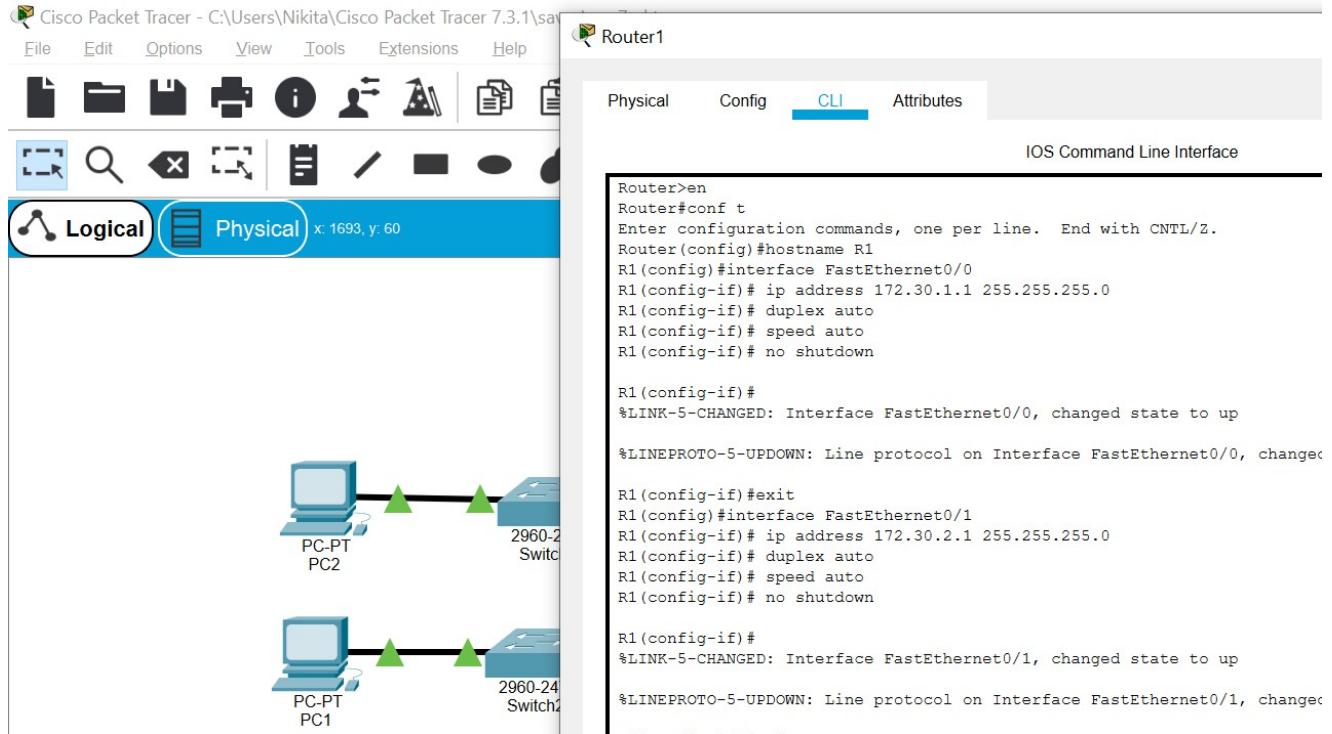
Task 2: Load Routers with the Supplied Scripts.

Step 1: Load the following script onto R1.

```

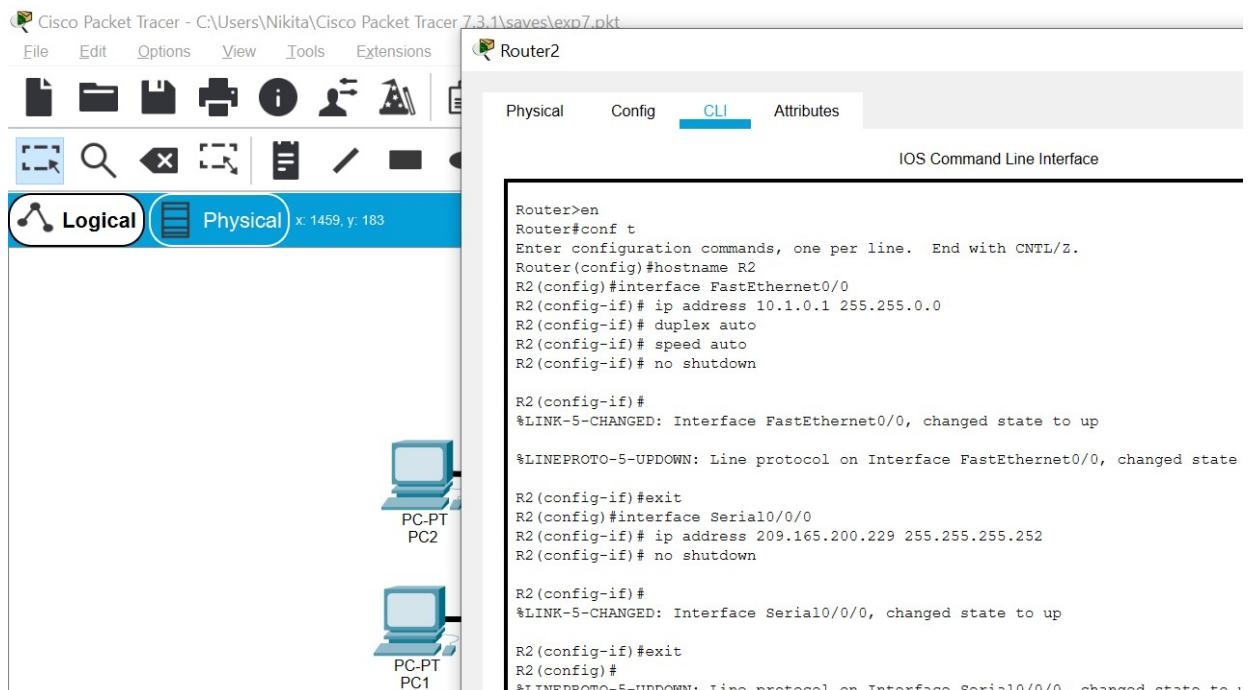
!
hostname R1
!
!
!
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/1
 ip address 172.30.2.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface Serial0/0/0
 ip address 209.165.200.230 255.255.255.252
 clock rate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

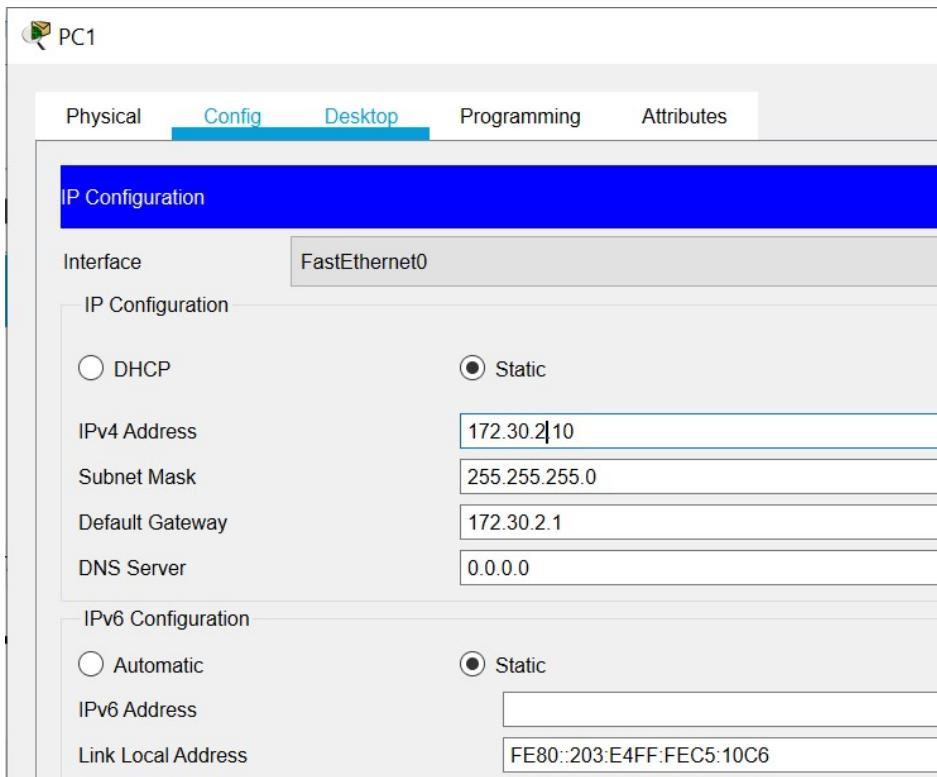
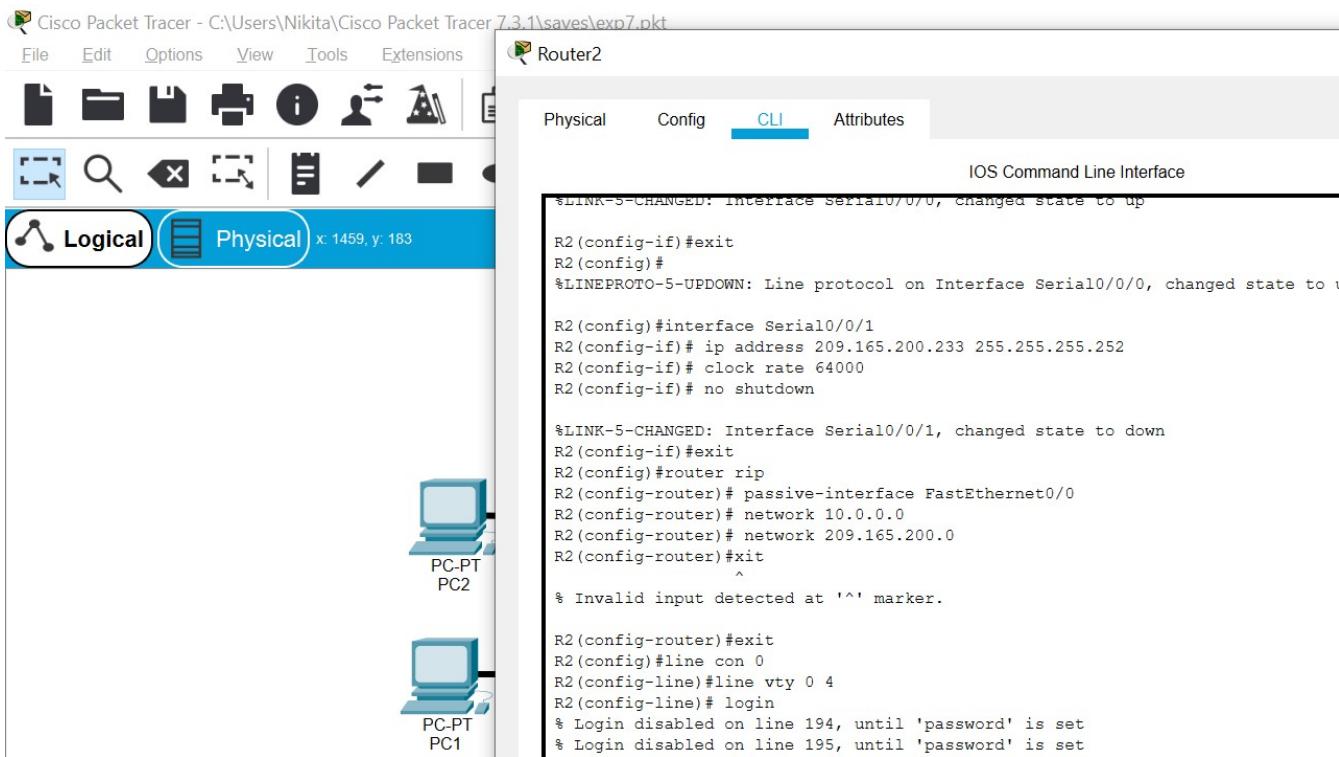
```
line con 0
line vty 0 4
    login
!
End
```



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 **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:CFF:FE49:7A02

Default Gateway

PC3

Physical Config Desktop **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

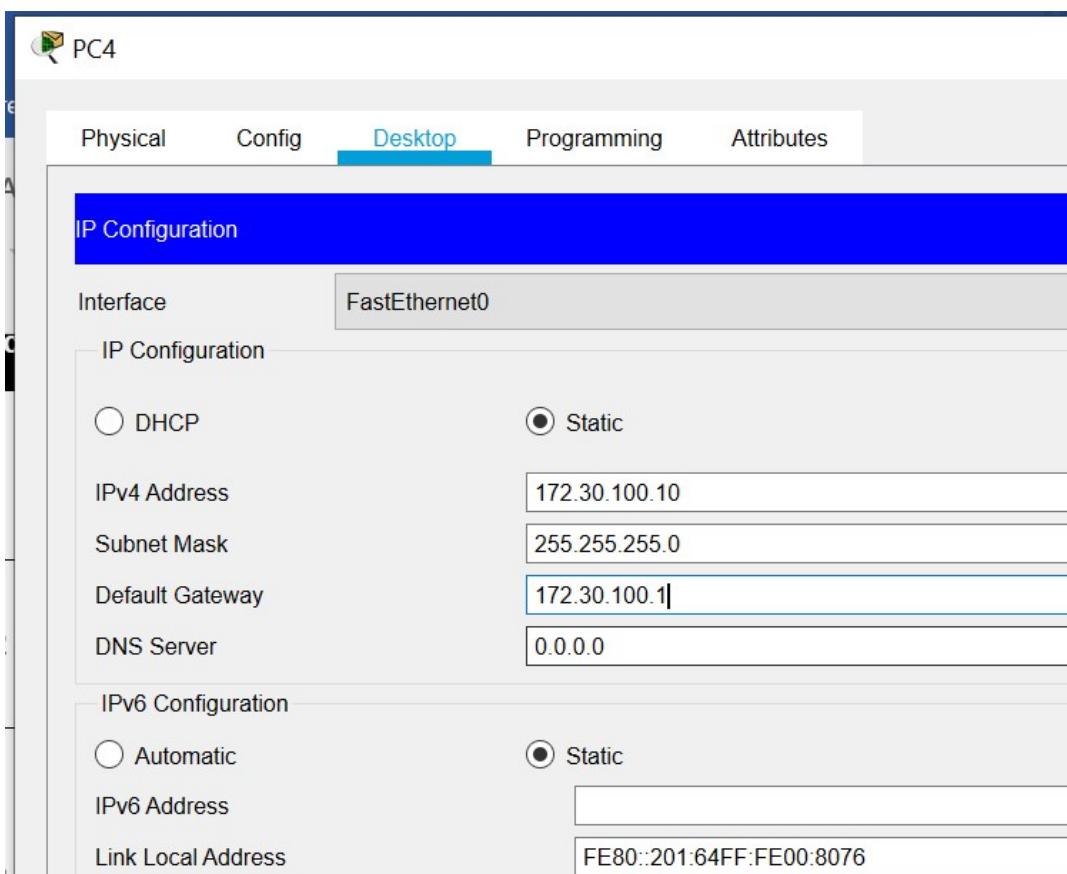
IPv6 Configuration

Automatic Static

IPv6 Address

Link Local Address FE80::2E0:B0FF:FE49:350C

Default Gateway



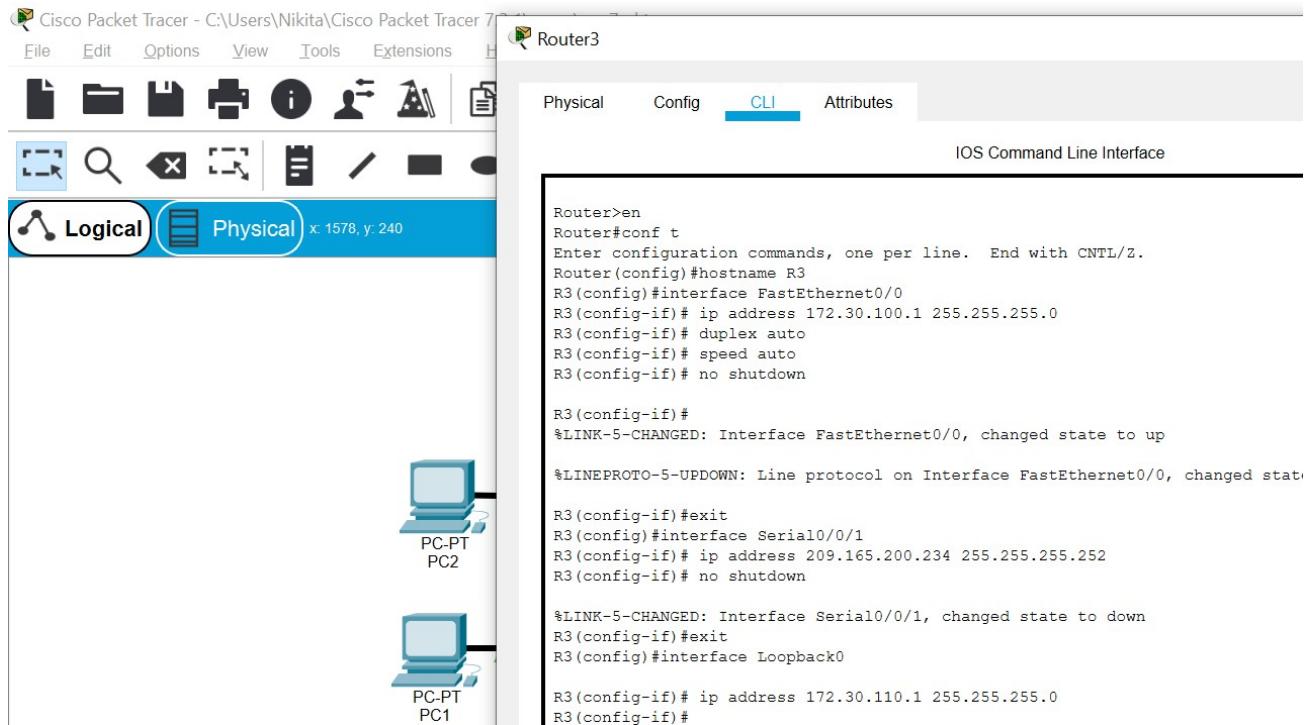
Step 3: Load the following script onto R3.

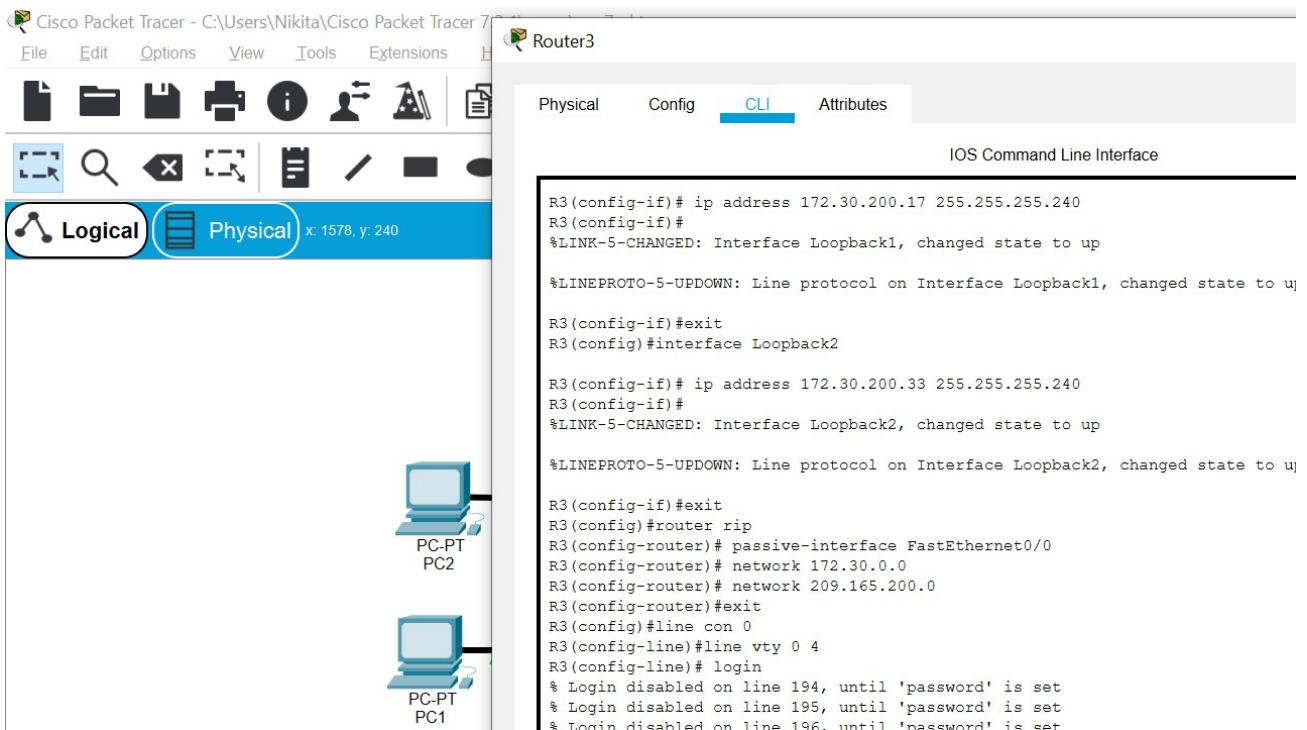
```
hostname R3
!
!
!
interface FastEthernet0/0
  ip address 172.30.100.1 255.255.255.0
  duplex auto
  speed auto
  no shutdown
!
interface Serial0/0/1
  ip address 209.165.200.234 255.255.255.252
  no shutdown
!
interface Loopback0
  ip address 172.30.110.1 255.255.255.0
!
interface Loopback1
  ip 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

```



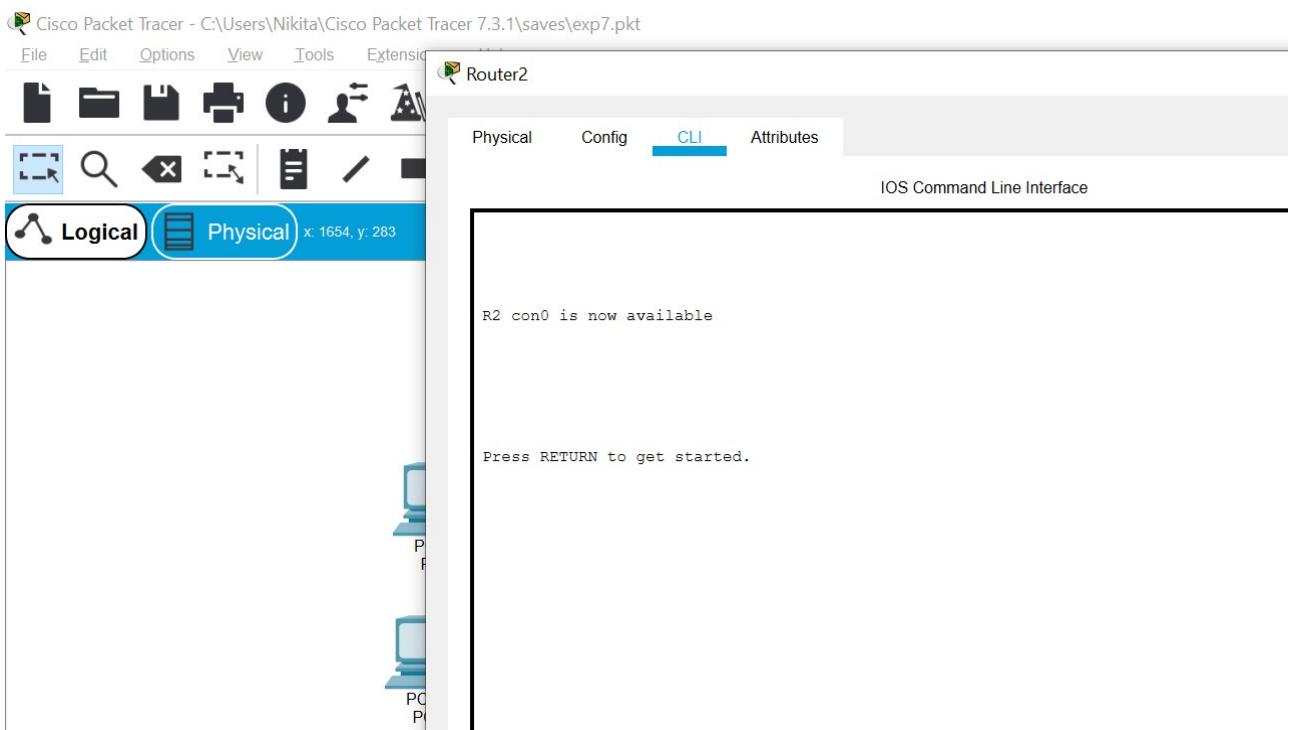


Task 3: Examine the Current Status of the Network.

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.

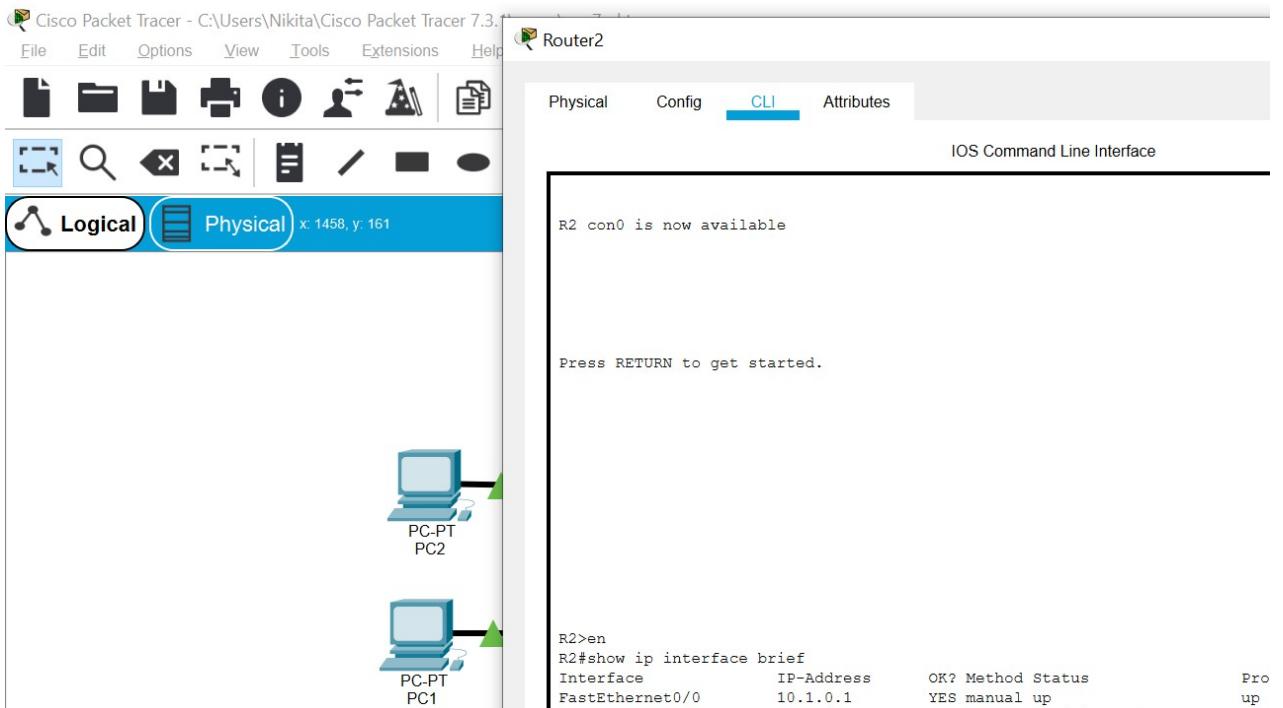
```
R2#show ip interface brief
```

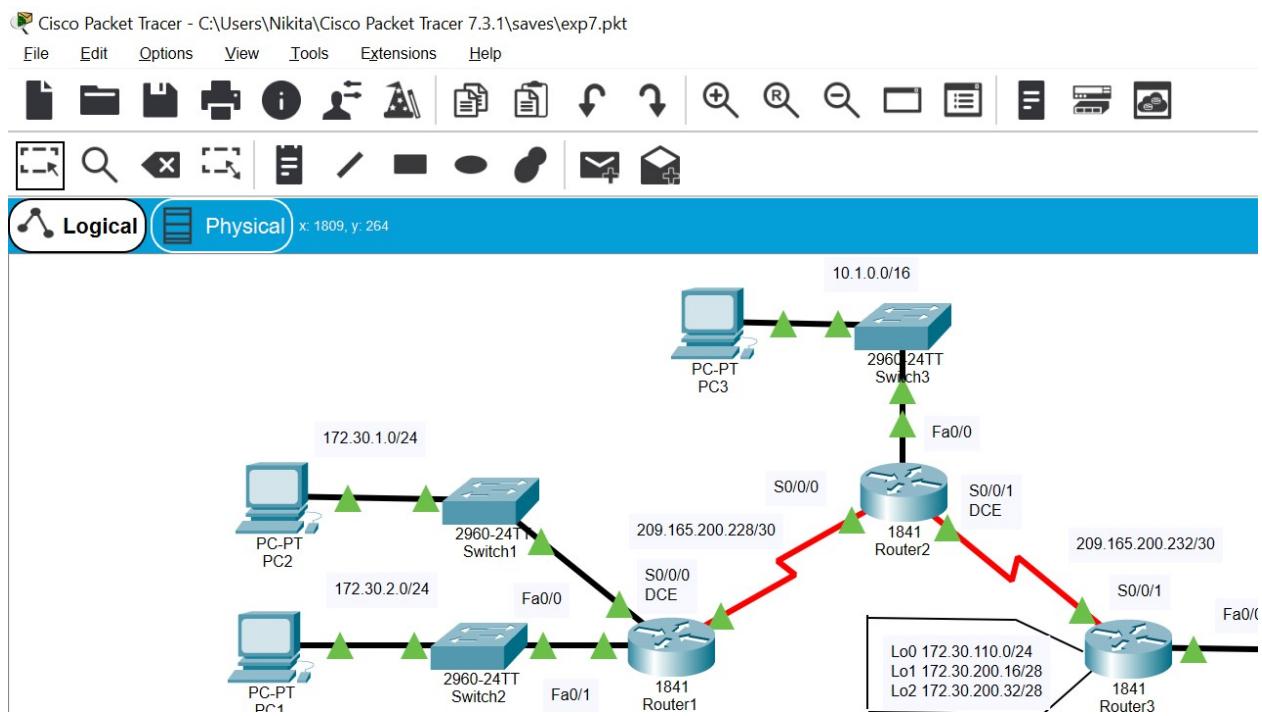


Step 2: Check the connectivity from R2 to the hosts on the R1 and R3 LANs.

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?

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

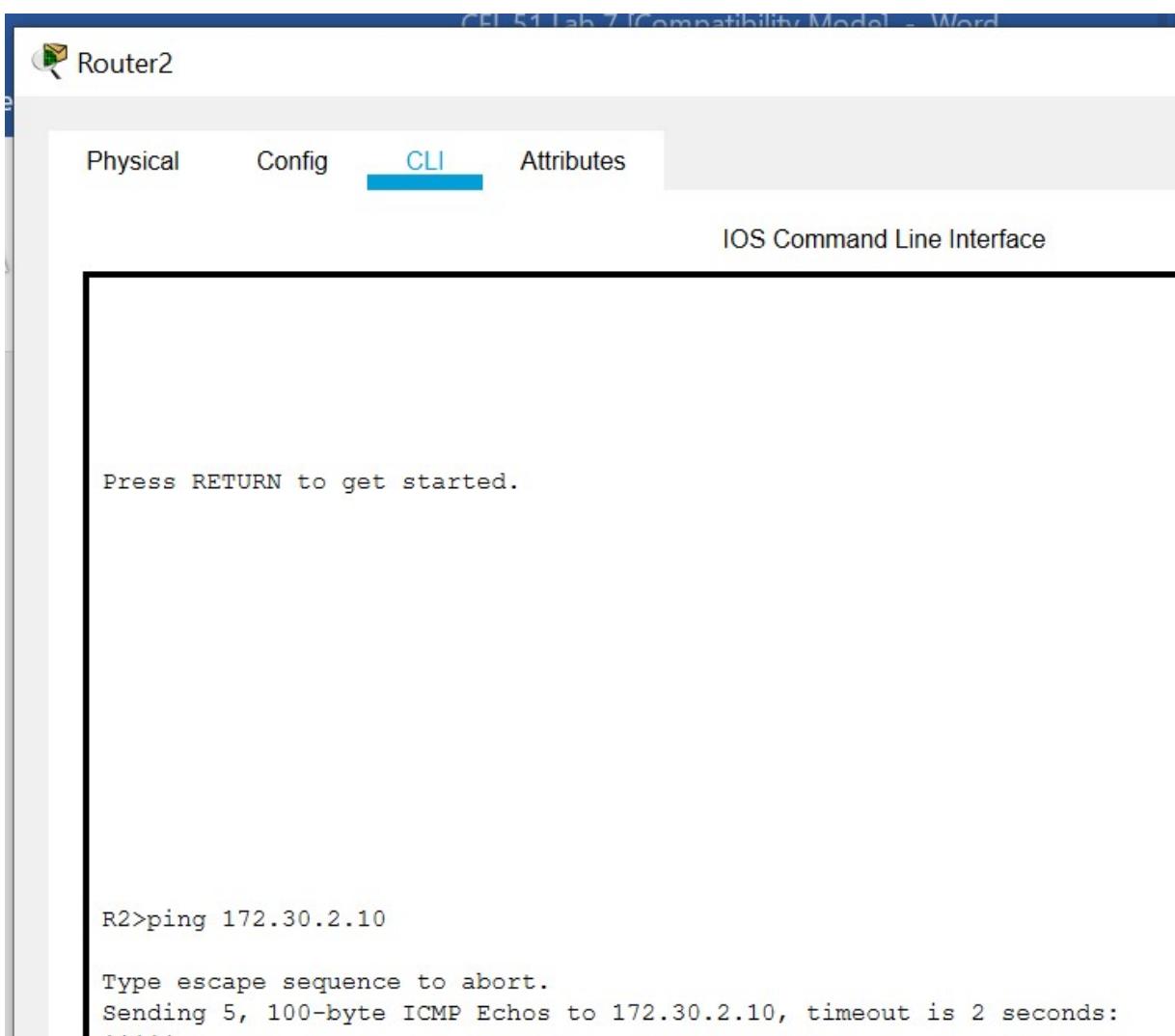
```
R2 con0 is now available

Press RETURN to get started.
```

5/5 (100%) success rate

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

5/5(100%) success rate_____

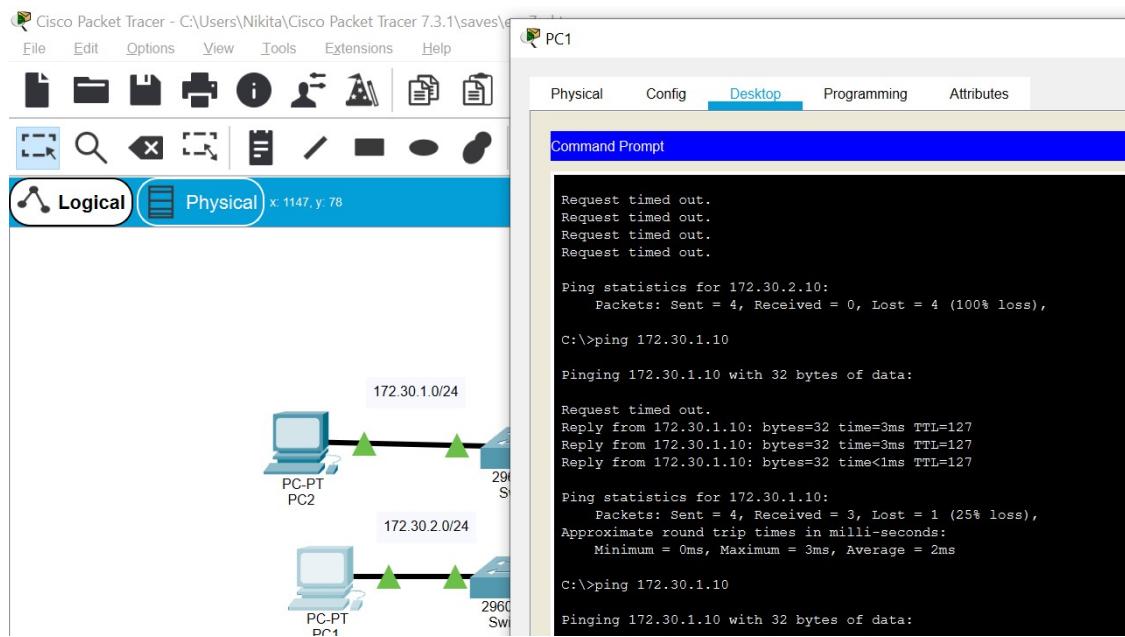


The screenshot shows the Cisco IOS Command Line Interface (CLI) for Router2. The title bar reads "CEI 51 Lab 7 / Compatibility Model - Word". The window title is "Router2". Below the title bar are tabs: Physical, Config, **CLI**, and Attributes. The main area is labeled "IOS Command Line Interface". A large black rectangular box highlights the command output. Inside this box, the text "Press RETURN to get started." is displayed. Below this, the command "R2>ping 172.30.2.10" is entered. The response shows the ping process starting: "Type escape sequence to abort.", "Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:", followed by four dots indicating progress.

Step 3: Check the connectivity between the PCs.

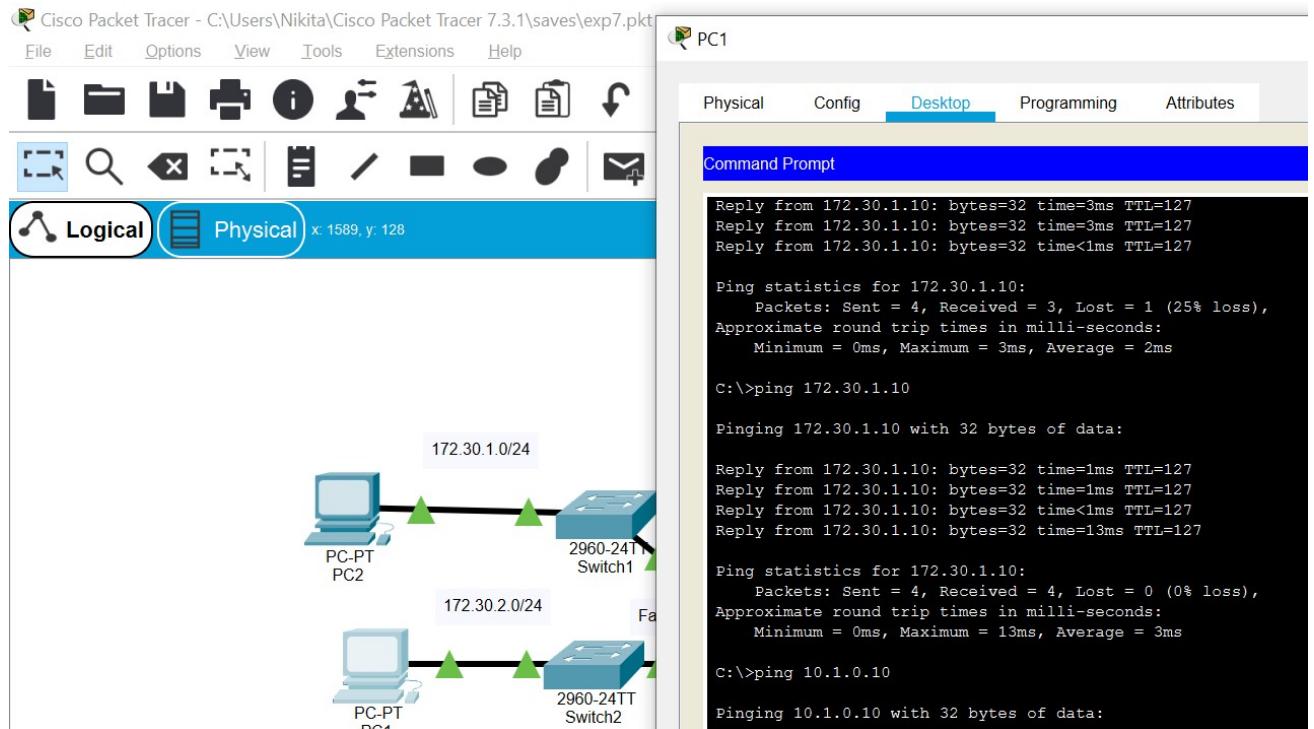
From the PC1, is it possible to ping PC2? Yes_____

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 PC3? No

What is the success rate? 0%

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
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

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

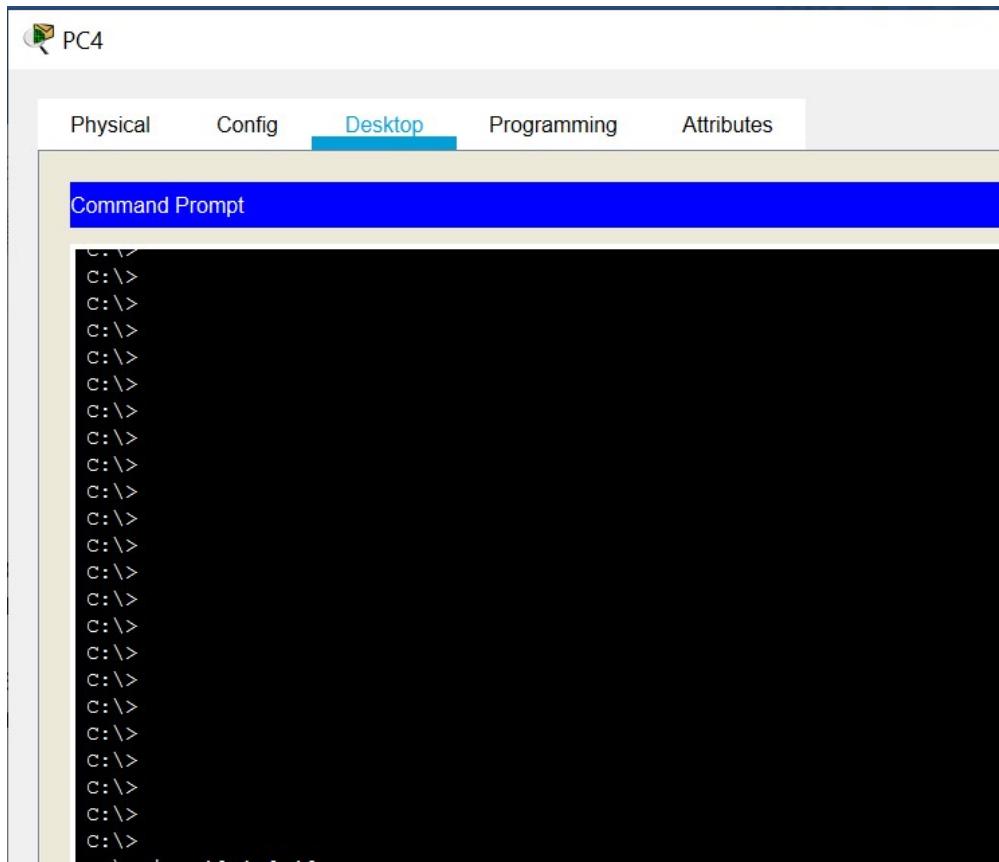
Pinging 172.20.1.10 with 32 bytes of data:

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
```

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

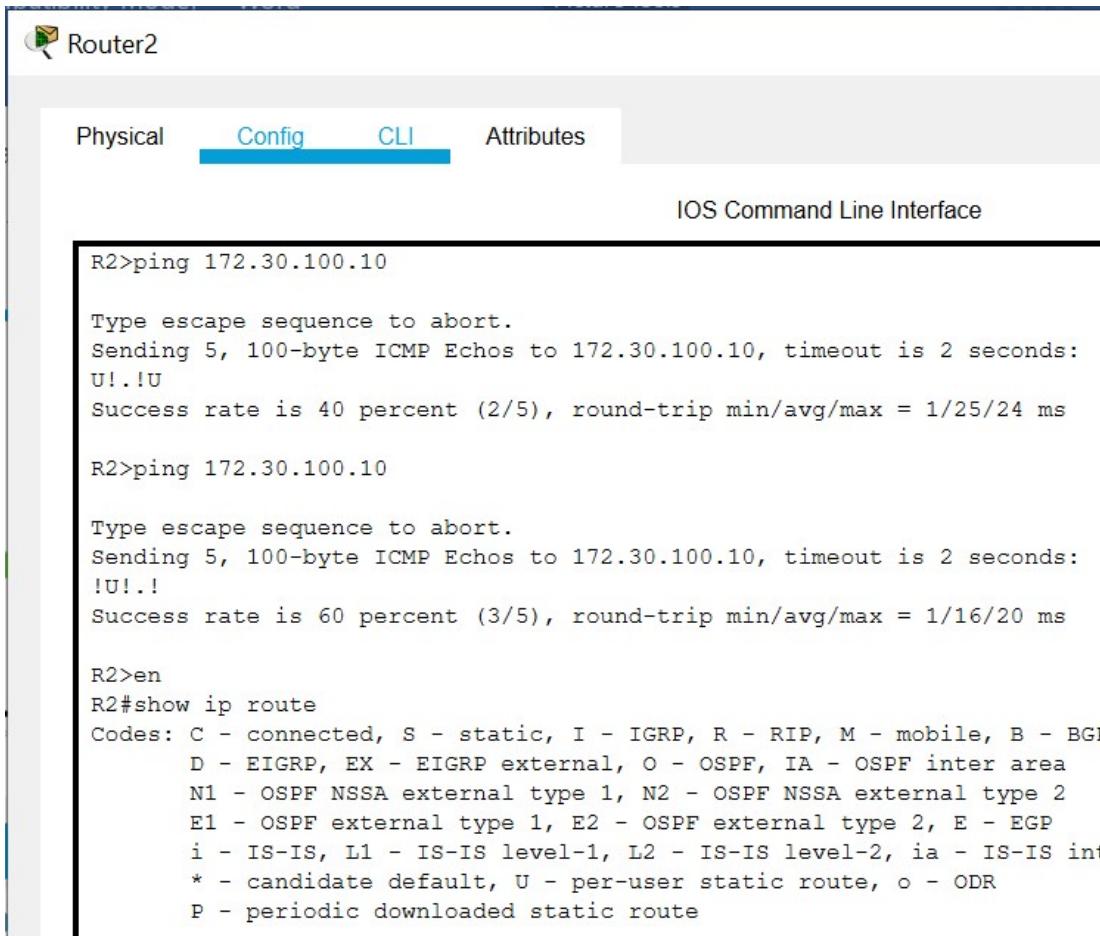
What is the success rate? 50%



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
```



Router2

Physical **Config** **CLI** Attributes

IOS Command Line Interface

```
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!.!U
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:
!U!..
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 int
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route
```

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
```



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
```



Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

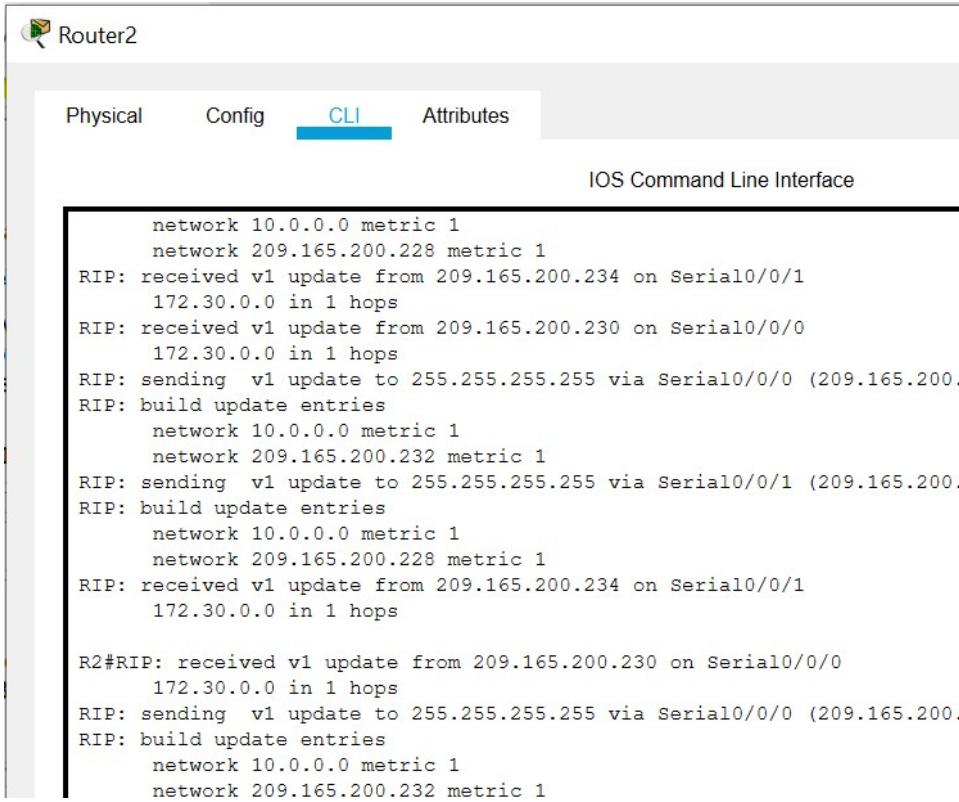
```
R3>en
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS int
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set
```

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.



Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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.
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.
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.
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 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#undebbug 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.
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.
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
```

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 int
      * - 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
```

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

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%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
```

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.

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1# show ip protocols
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, Serial0/0/1

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
  . . .
```

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
```

Router2

Physical	Config	CLI	Attributes
IOS Command Line Interface			
<pre>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 int * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route</pre>			

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.

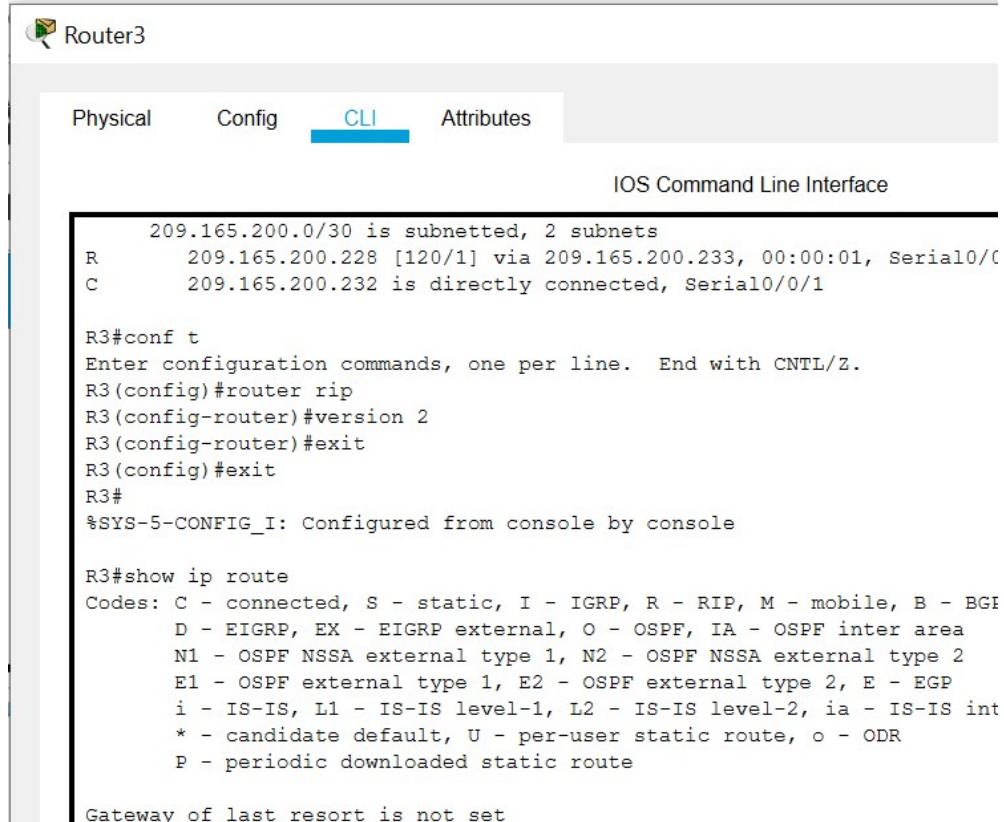
```
R1#show ip route
```

Router1

Physical	Config	CLI	Attributes
IOS Command Line Interface			
<pre>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 int * - candidate default, U - per-user static route, o - ODR P - periodic downloaded static route</pre>			

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

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
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 int
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set
```

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



IOS Command Line Interface

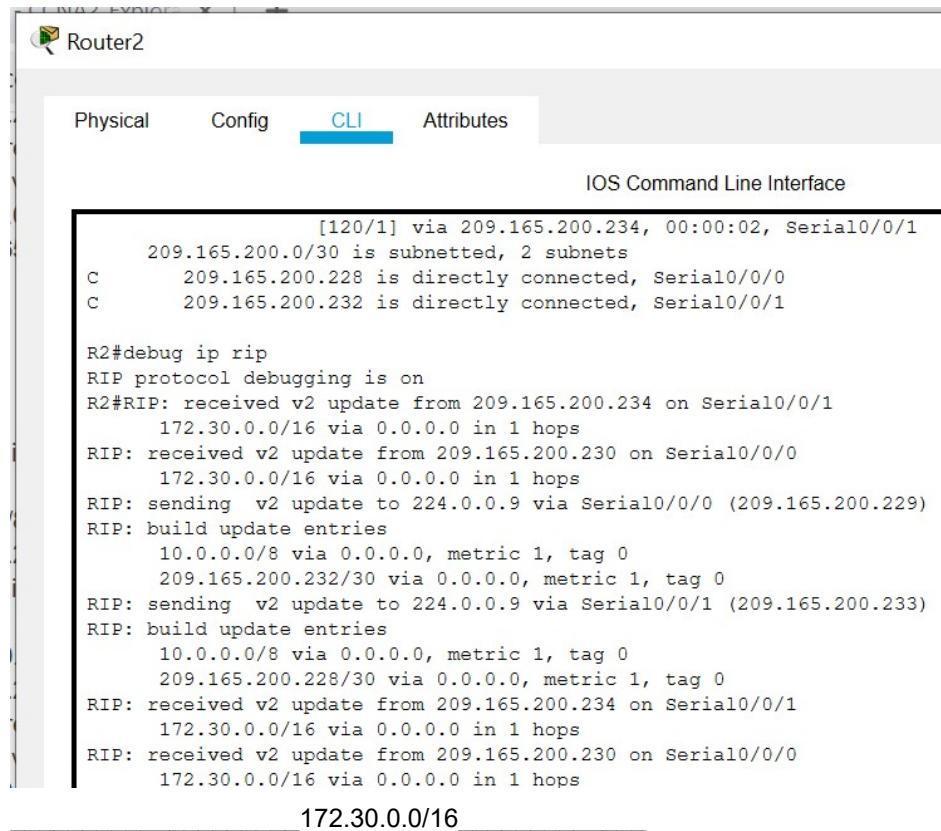
```
209.165.200.0/30 is subnetted, 2 subnets
R    209.165.200.228 [120/1] via 209.165.200.233, 00:00:23, Serial0/0
C    209.165.200.232 is directly connected, Serial0/0/1

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)
```

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 terminal window titled "Router2" with the "CLI" tab selected. The window displays the "IOS Command Line Interface". Inside, there is a block of text representing the output of the "R2#debug ip rip" command. The output shows various RIP events such as receiving and sending v2 updates, and building update entries. One specific line highlights the route "172.30.0.0/16 via 0.0.0.0 in 1 hops".

```
[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
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 209.165.200.234 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)
```

```
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.
```

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

 Router3

Physical Config CLI Attributes

IOS Command Line Interface

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
RTP: received v2 update from 209.165.200.233 on Serial0/0/1
```

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

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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)#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 int
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C      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, Serial0/0/1
```

```
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 int
      * - 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, Serial
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
```

```
R3#show ip route
```

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

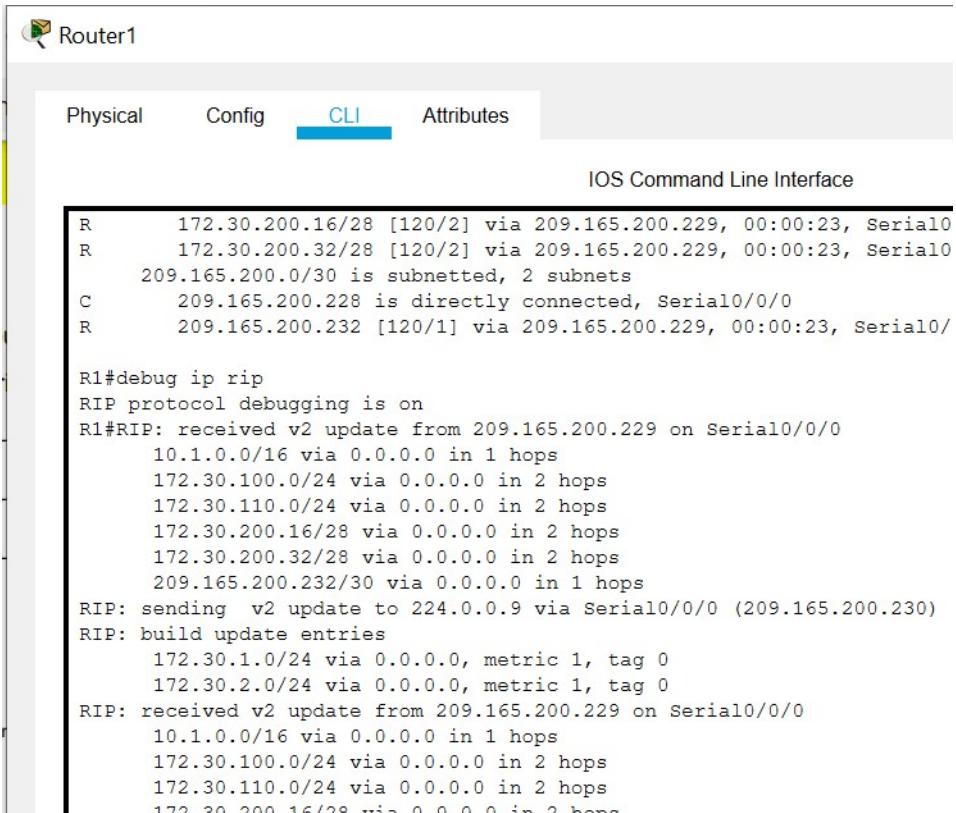
```
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#no auto-summary
R3(config-router)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

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 int
      * - 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, Serial
R        10.1.0.0/16 [120/1] via 209.165.200.233, 00:00:16, Serial0/0/1
```

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



Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R    172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:23, Serial0
R    172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:23, Serial0
  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, Serial0/0/1

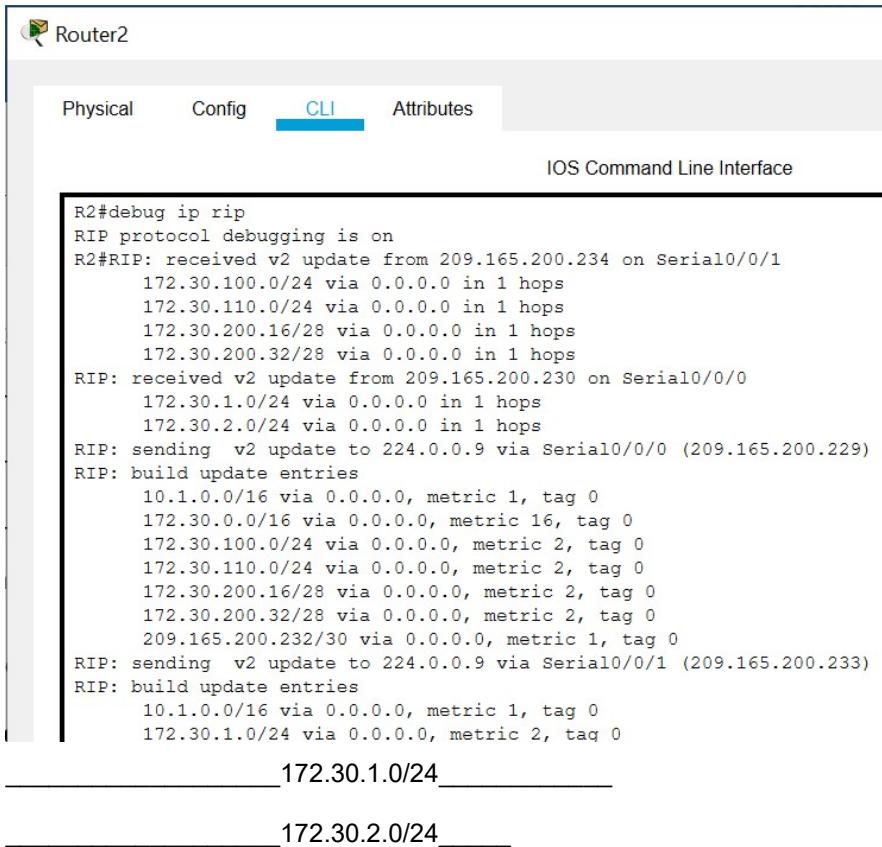
R1#debug ip rip
RIP protocol debugging is on
R1#RIP: received v2 update from 209.165.200.229 on Serial0/0/0
  10.1.0.0/16 via 0.0.0.0 in 1 hops
  172.30.100.0/24 via 0.0.0.0 in 2 hops
  172.30.110.0/24 via 0.0.0.0 in 2 hops
  172.30.200.16/28 via 0.0.0.0 in 2 hops
  172.30.200.32/28 via 0.0.0.0 in 2 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
```

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 image shows a screenshot of a network configuration interface for Router2. The top navigation bar includes tabs for Physical, Config, **CLI**, and Attributes. The **CLI** tab is selected, and the main area displays the "IOS Command Line Interface". The output of the command `R2#debug ip rip` is shown, detailing RIP protocol activity. It lists received v2 updates from R1 (209.165.200.234) and R2's own v2 updates to R1 (224.0.0.9). The output also shows RIP building update entries for various networks with their metrics and tags.

```
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
```

_____172.30.1.0/24_____

_____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?

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R2 con0 is now available

Press RETURN to get started.
```

100%

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

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Press RETURN to get started.

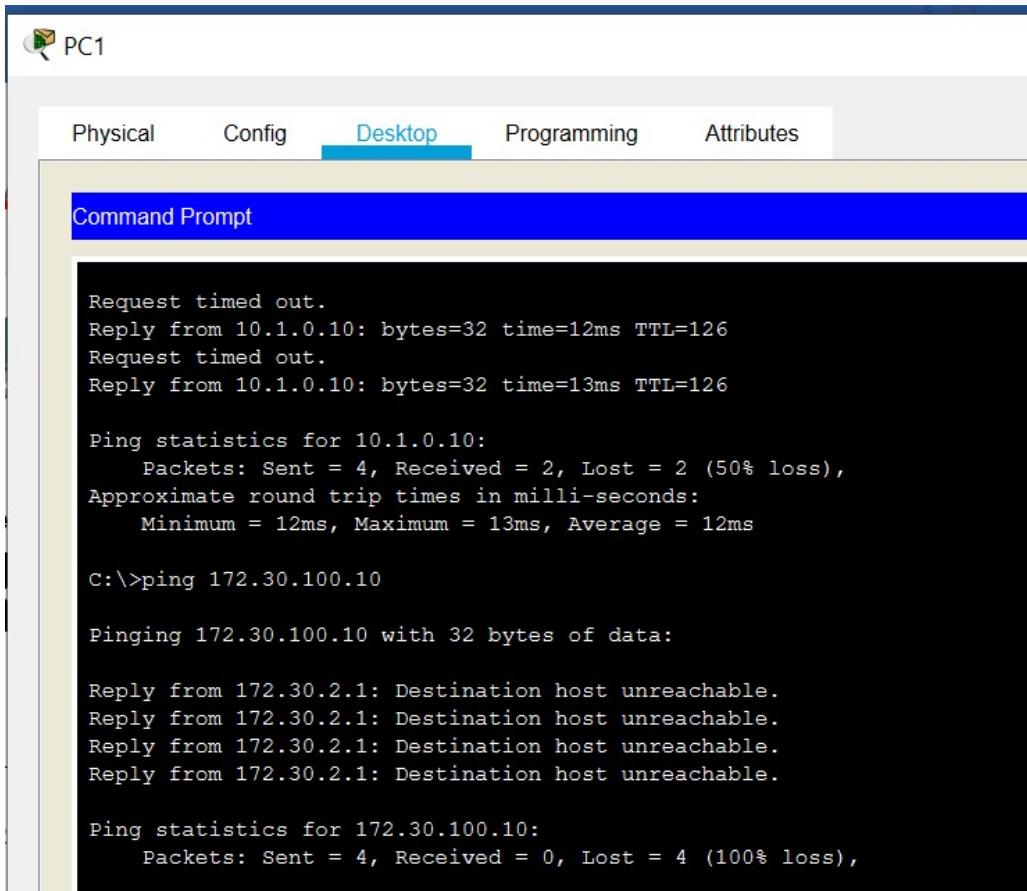
R2>ping 172.30.2.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:
!!!!!
```

100%

Step 2: Check the connectivity between the PCs.

From PC1, is it possible to ping PC2? Yes

What is the success rate? 100%



PC1

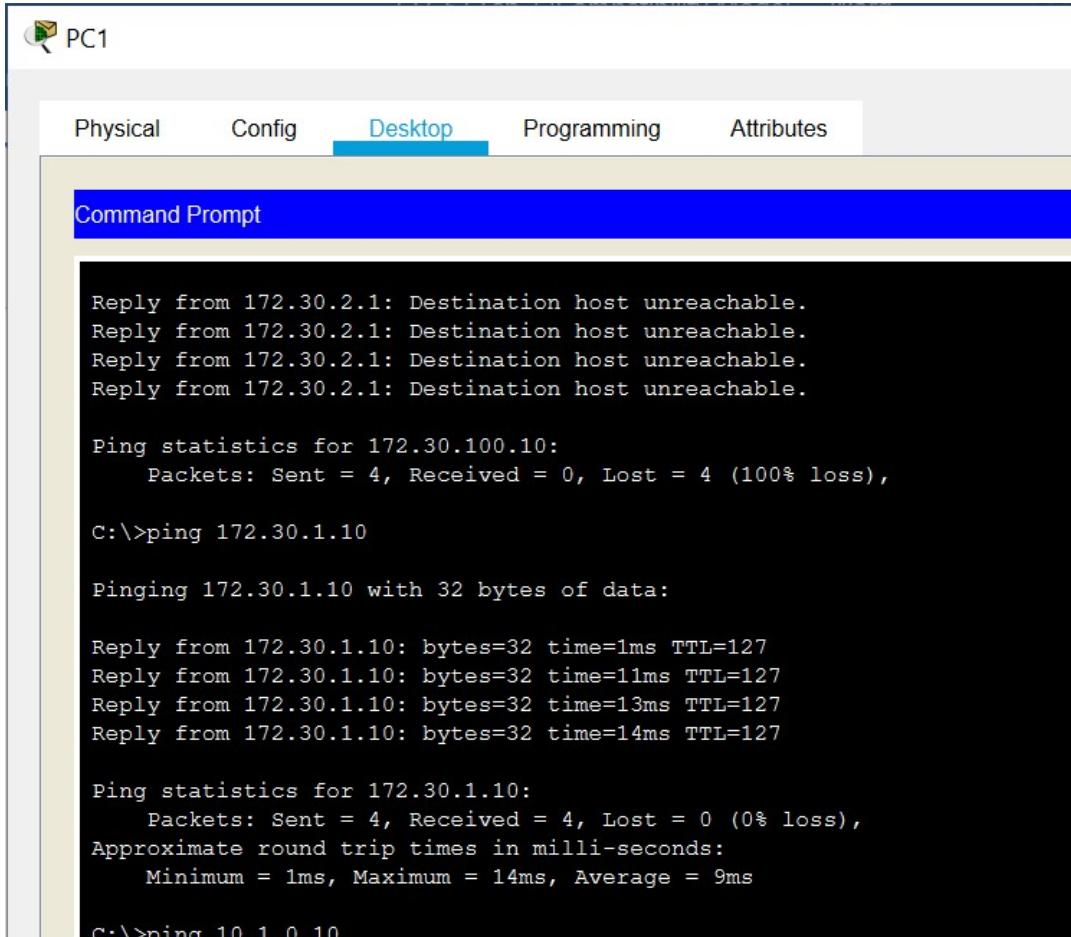
Physical Config Desktop Programming Attributes

Command Prompt

```
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),
```

From PC1, is it possible to ping PC3? yes

What is the success rate? 100%



PC1

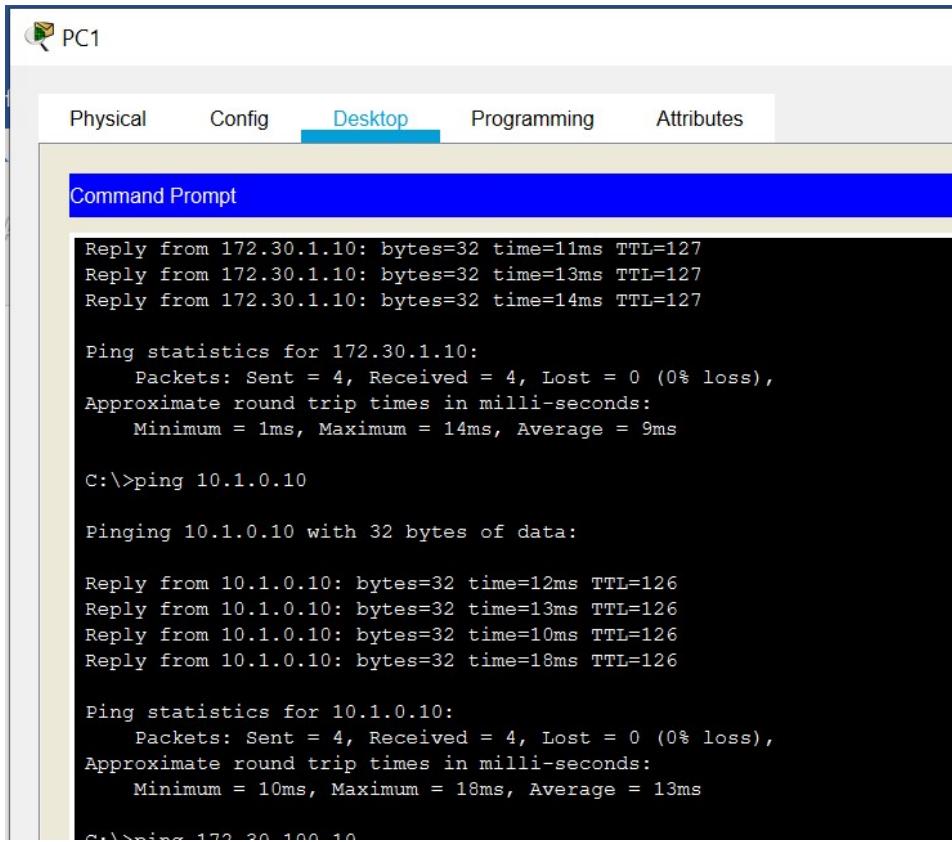
Physical Config Desktop Programming Attributes

Command Prompt

```
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
```

From PC1, is it possible to ping PC4? yes

What is the success rate? 100%



The screenshot shows a software interface for managing network devices. The title bar says "PC1". Below it is a navigation bar with tabs: Physical, Config, Desktop (which is selected and highlighted in blue), Programming, and Attributes. The main area is titled "Command Prompt". Inside the command prompt window, the following text is displayed:

```
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:

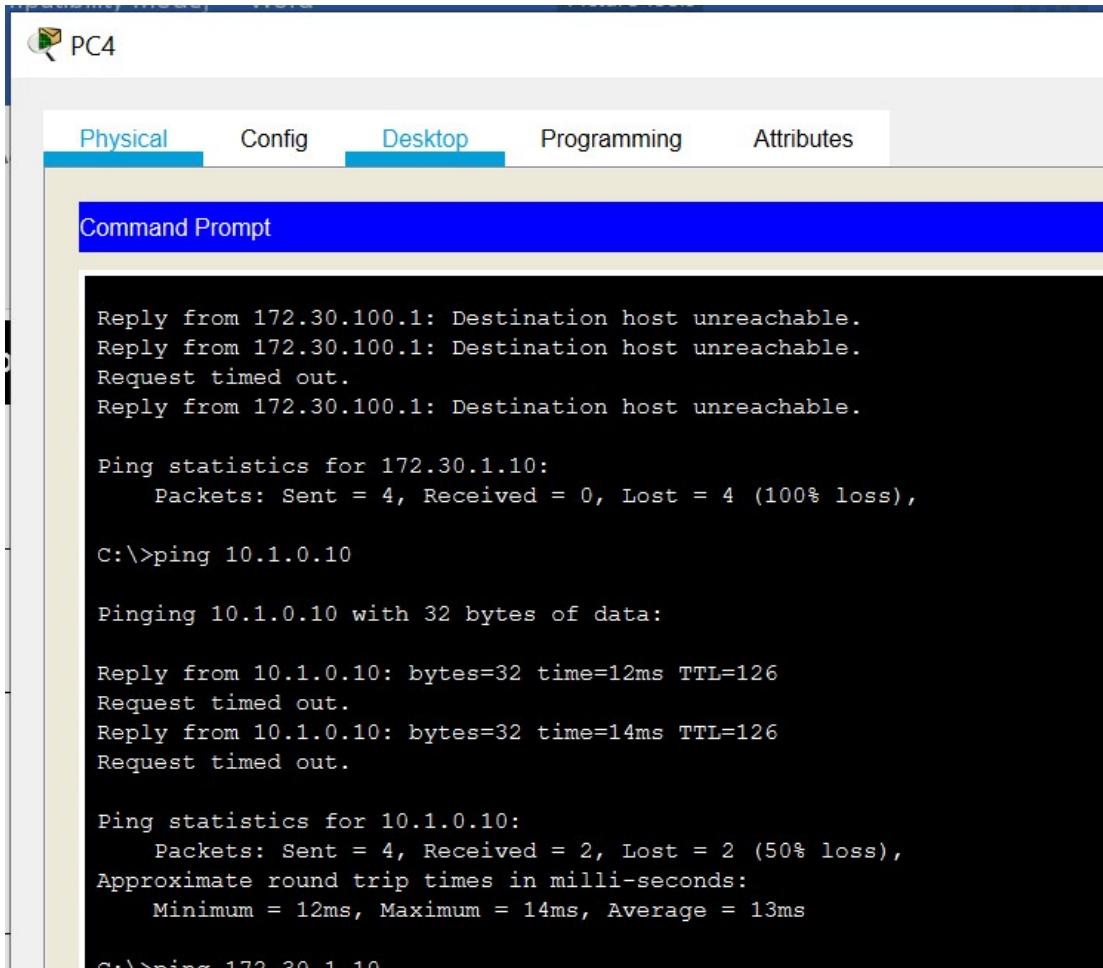
Reply from 10.1.0.10: bytes=32 time=12ms TTL=126
Reply from 10.1.0.10: bytes=32 time=13ms TTL=126
Reply from 10.1.0.10: bytes=32 time=10ms TTL=126
Reply from 10.1.0.10: bytes=32 time=18ms TTL=126

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:\>ping 172.30.1.10
```

From PC4, is it possible to ping PC2? yes

What is the success rate? 100%

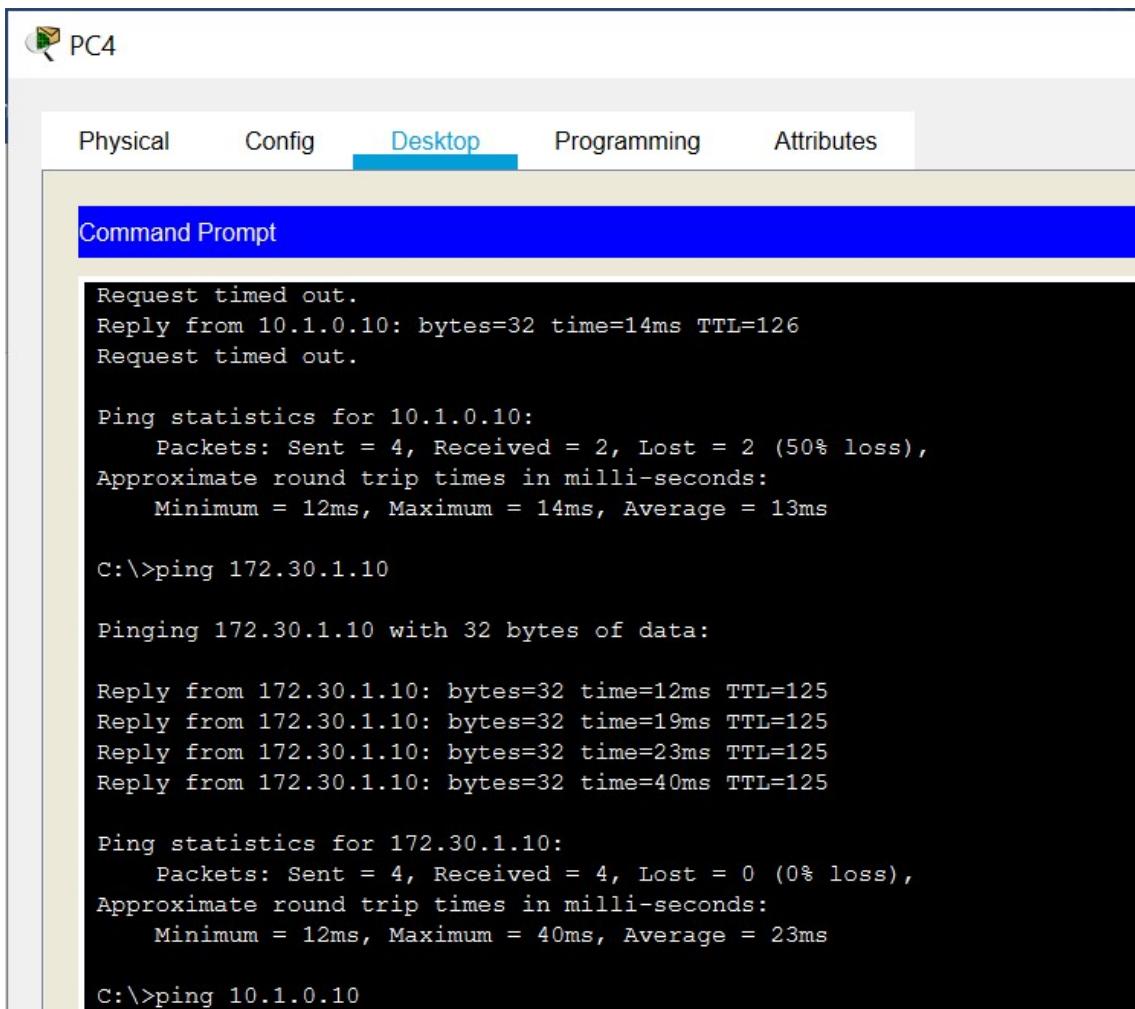


The screenshot shows a software interface titled "PC4". At the top, there is a navigation bar with tabs: "Physical", "Config", "Desktop" (which is highlighted in blue), "Programming", and "Attributes". Below the navigation bar is a blue header bar labeled "Command Prompt". The main area is a black terminal window displaying the following command-line session:

```
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
```

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 has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area of the window displays the following command 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
```

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
```

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 - BG
      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 in
      * - 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/
R          172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:15, Serial0/
R          172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:15, Serial0
R          172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:15, Serial0
      209.165.200.0/30 is subnetted, 2 subnets
```



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

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



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
```

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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 int
      * - 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, 6 subnets, 2 masks
R        172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:15, Serial0/0/C
R        172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:15, Serial0/0/C
R        172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/C
R        172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/C
R        172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/C
R        172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/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
```

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
FastEthernet0/0    10.1.0.1        YES manual up
FastEthernet0/1    unassigned       YES unset administratively down
Serial0/0/0         209.165.200.229 YES manual up
Serial0/0/1         209.165.200.233 YES manual up
Vlan1              unassigned       YES unset administratively 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
```



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
!
```



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 int
      * - 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
```

Router3

Physical Config **CLI** Attributes

IOS Command Line Interface

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

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.
```

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1 con0 is now available
Press RETURN to get started.
```



Physical Config **CLI** Attributes

IOS Command Line Interface

```
R3 con0 is now available
```

```
Press RETURN to get started.
```