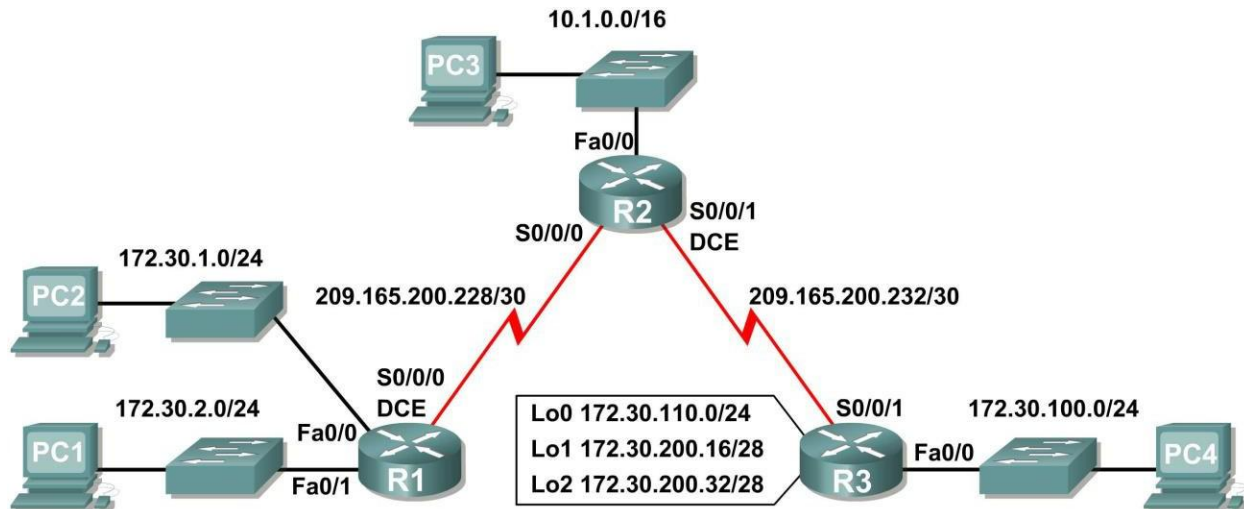


CEL 51, DCCN, Monsoon 2020

Lab 7: RIPv2 Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	172.30.1.1	255.255.255.0	N/A
	Fa0/1	172.30.2.1	255.255.255.0	N/A
	S0/0/0	209.165.200.230	255.255.255.252	N/A
R2	Fa0/0	10.1.0.1	255.255.0.0	N/A
	S0/0/0	209.165.200.229	255.255.255.252	N/A
	S0/0/1	209.165.200.233	255.255.255.252	N/A
R3	Fa0/0	172.30.100.1	255.255.255.0	N/A
	S0/0/1	209.165.200.234	255.255.255.252	N/A
	Lo0	172.30.110.1	255.255.255.0	N/A
	Lo1	172.30.200.17	255.255.255.240	N/A
	Lo2	172.30.200.33	255.255.255.240	N/A
PC1	NIC	172.30.2.10	255.255.255.0	172.30.2.1
PC2	NIC	172.30.1.10	255.255.255.0	172.30.1.1
PC3	NIC	10.1.0.10	255.255.0.0	10.1.0.1
PC4	NIC	172.30.100.10	255.255.255.0	172.30.100.1

Learning Objectives

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

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

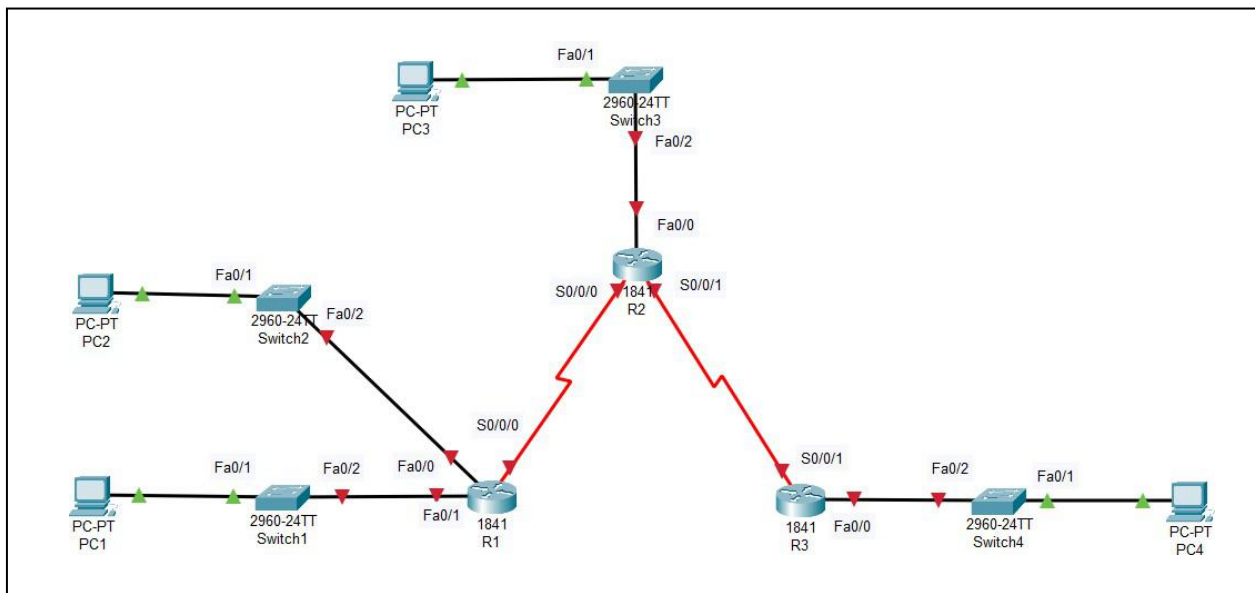
Scenario

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

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

Step 1: Cable a network.

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



PC1

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.30.2.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::203:E4FF:FE74:D551

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

☐ Top

PC2

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.30.1.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::260:47FF:FEE5:62D2

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

☐ Top

PC3

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.1.0.10

Subnet Mask 255.255.0.0

Default Gateway 10.1.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::201:63FF:FEBD:621A

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

☐ Top

PC4

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 172.30.100.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.100.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::201:97FF:FE6D:C31

Default Gateway

DNS Server

802.1X

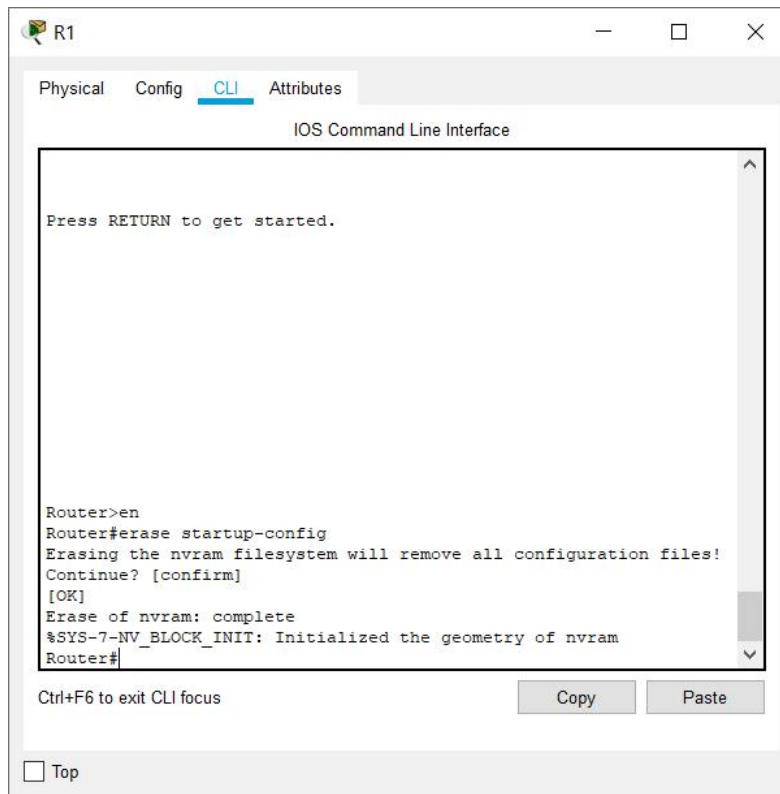
☐ Use 802.1X Security

Authentication MD5

☐ Top

Step 2: Clear the configuration on each router.

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

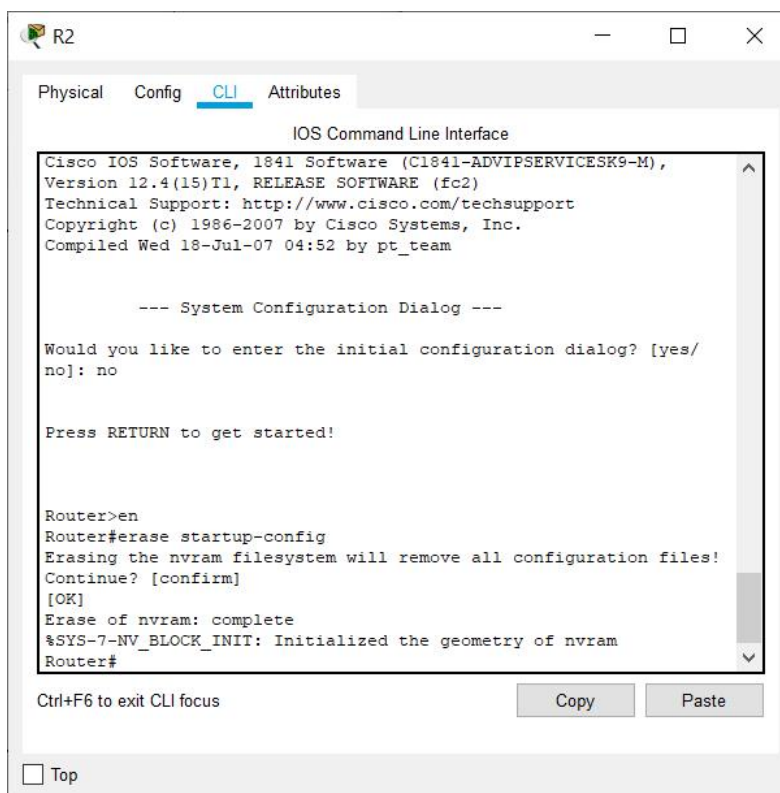


The screenshot shows the CLI window for router R1. The 'CLI' tab is selected. The text in the terminal area is as follows:

```
Press RETURN to get started.

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

Below the terminal area, there is a button labeled 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'. At the bottom left, there is a checkbox labeled 'Top'.



The screenshot shows the CLI window for router R2. The 'CLI' tab is selected. The text in the terminal area is as follows:

```
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),
Version 12.4(15)T1, RELEASE SOFTWARE (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>en
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#
```

Below the terminal area, there is a button labeled 'Ctrl+F6 to exit CLI focus' and two buttons labeled 'Copy' and 'Paste'. At the bottom left, there is a checkbox labeled 'Top'.



R3



Physical

Config

CLI

Attributes

IOS Command Line Interface

```
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M),  
Version 12.4(15)T1, RELEASE SOFTWARE (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>en
```

```
Router#erase startup-config
```

```
Erasing the nvram filesystem will remove all configuration files!
```

```
Continue? [confirm]
```

```
[OK]
```

```
Erase of nvram: complete
```

```
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
```

```
Router#
```

Ctrl+F6 to exit CLI focus

Copy

Paste



Top

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
```




Figure 7.9 – Loading router R1 with the given script

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
```

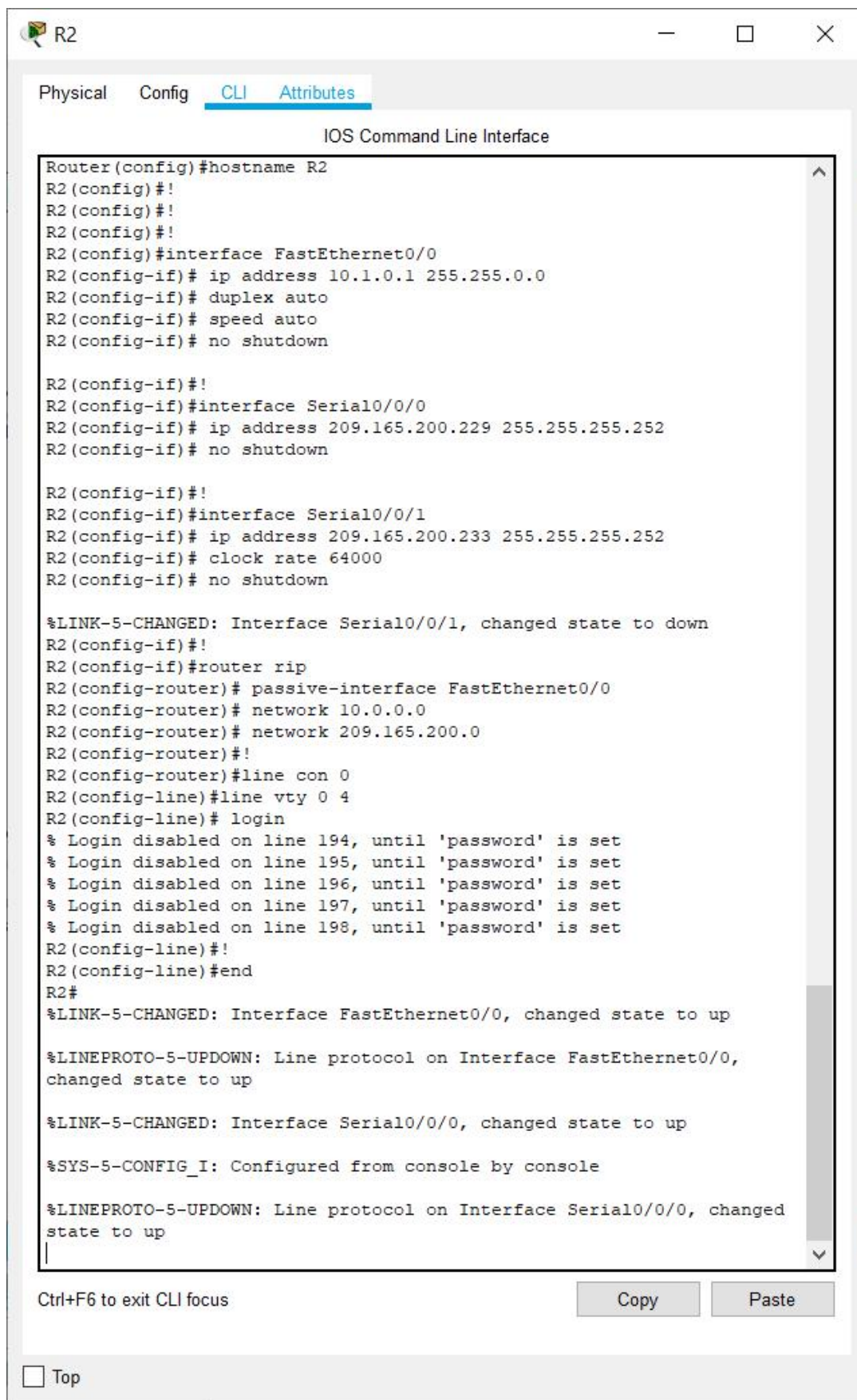


Figure 7.10 – Loading router R2 with the given script

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
```

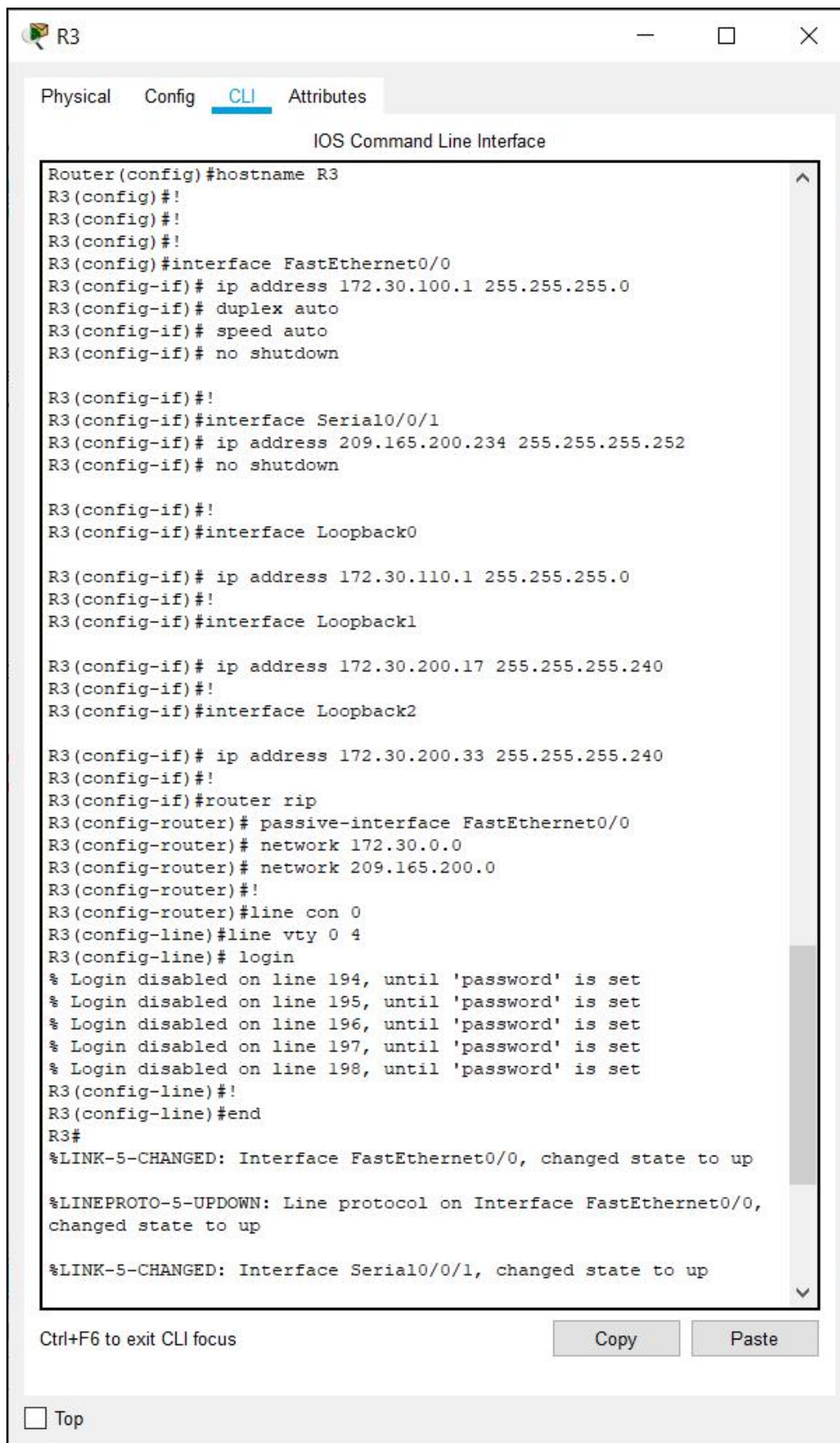
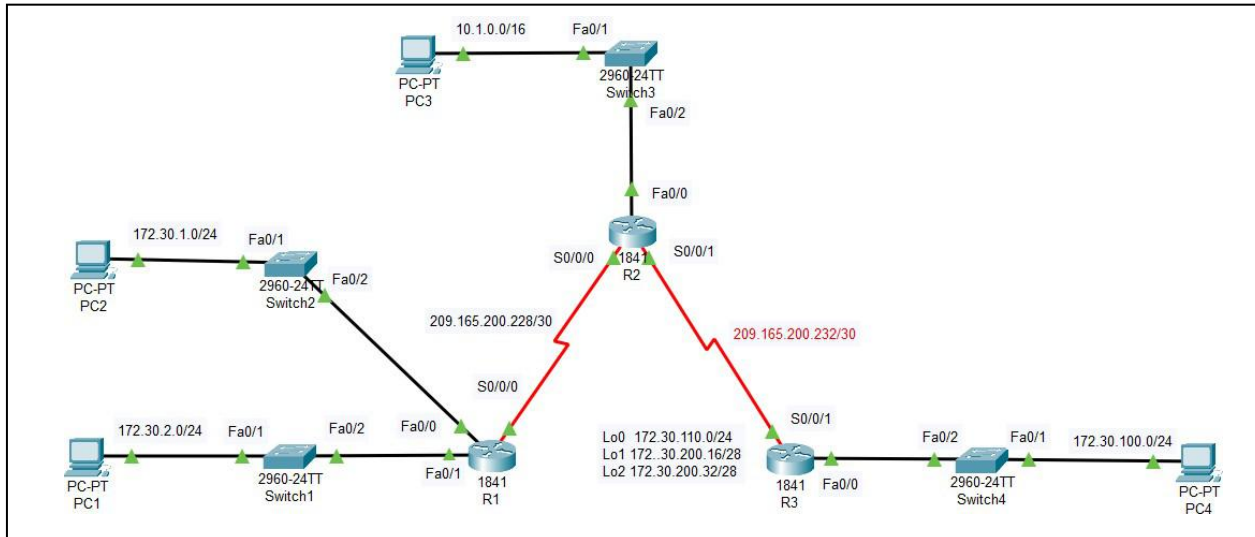


Figure 7.11 – Loading router R2 with the given script

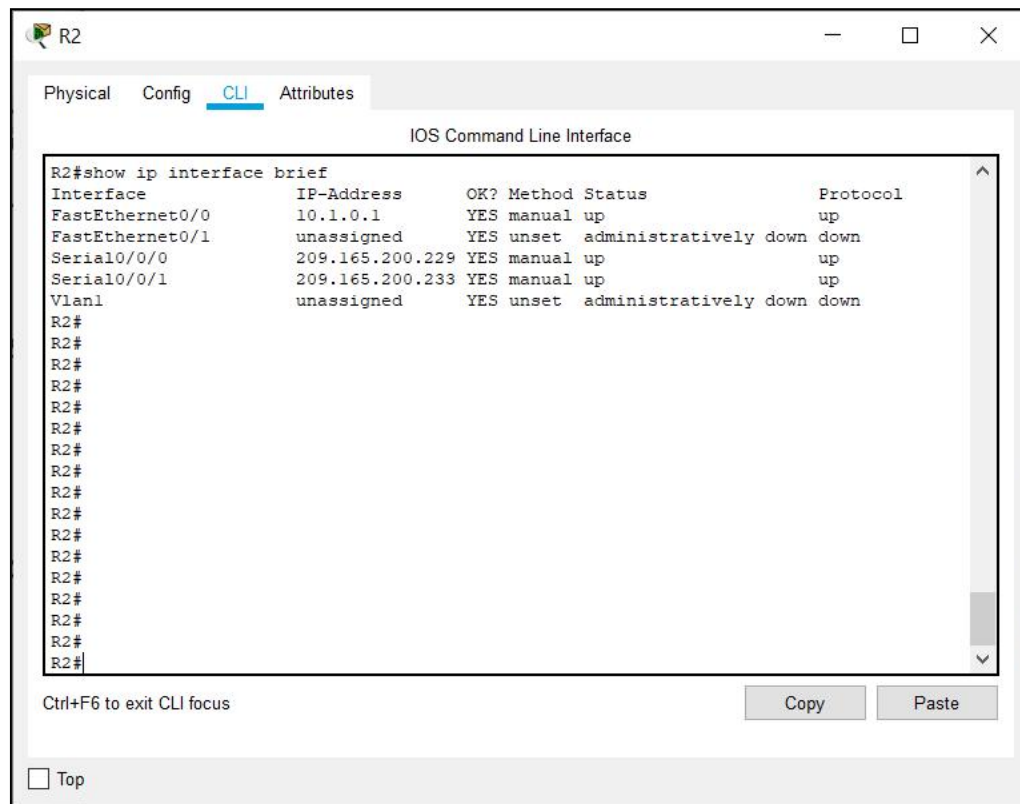
Task 3: Examine the Current Status of the Network.



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.

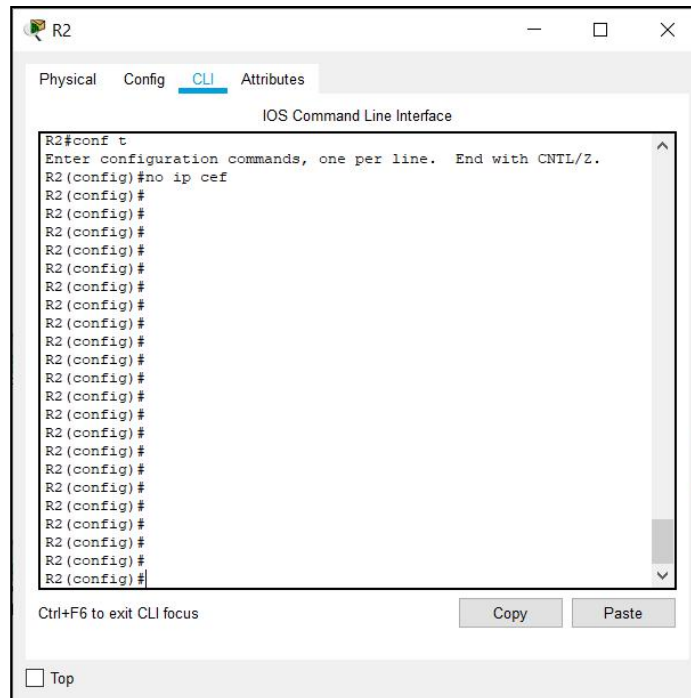
```
R2#show ip interface brief
```



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

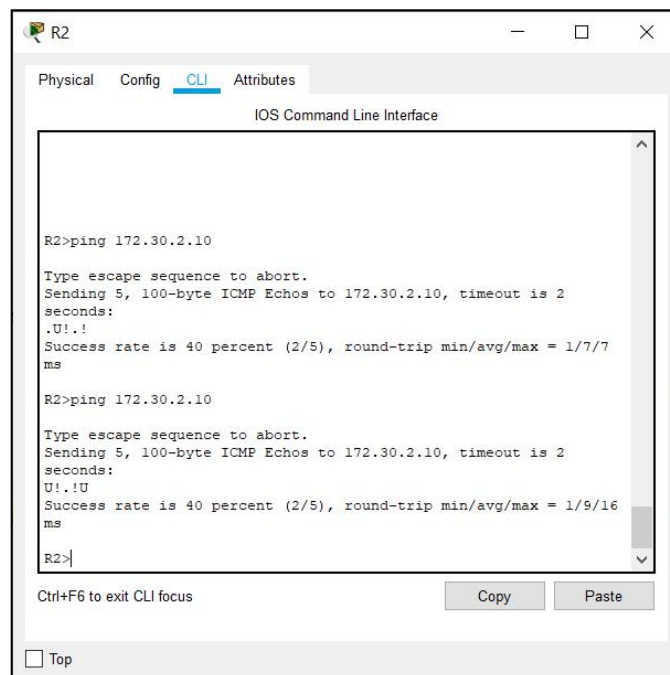
Note: For the 1841 router, you will need to disable IP CEF to obtain the correct output from the **ping** command. Although a discussion of IP CEF is beyond the scope of this course, you may disable IP CEF by using the following command in global configuration mode:

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



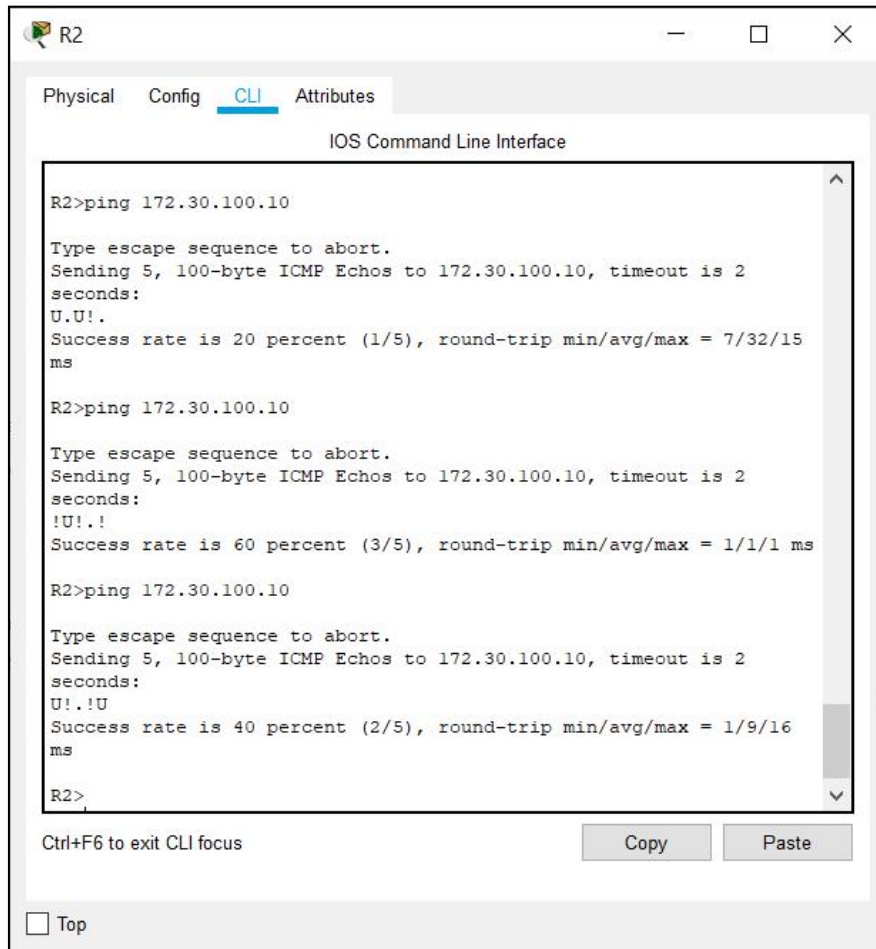
From the R2 router, how many ICMP messages are successful when pinging PC1?

2 out of 5 ICMP messages are successful when pinging PC1.



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

On an average, 2 out of 5 ICMP messages are successful when pinging PC4.



R2

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 20 percent (1/5), round-trip min/avg/max = 7/32/15
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 = 1/1/1 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!..!U
Success rate is 40 percent (2/5), round-trip min/avg/max = 1/9/16
ms

R2>
```

Ctrl+F6 to exit CLI focus

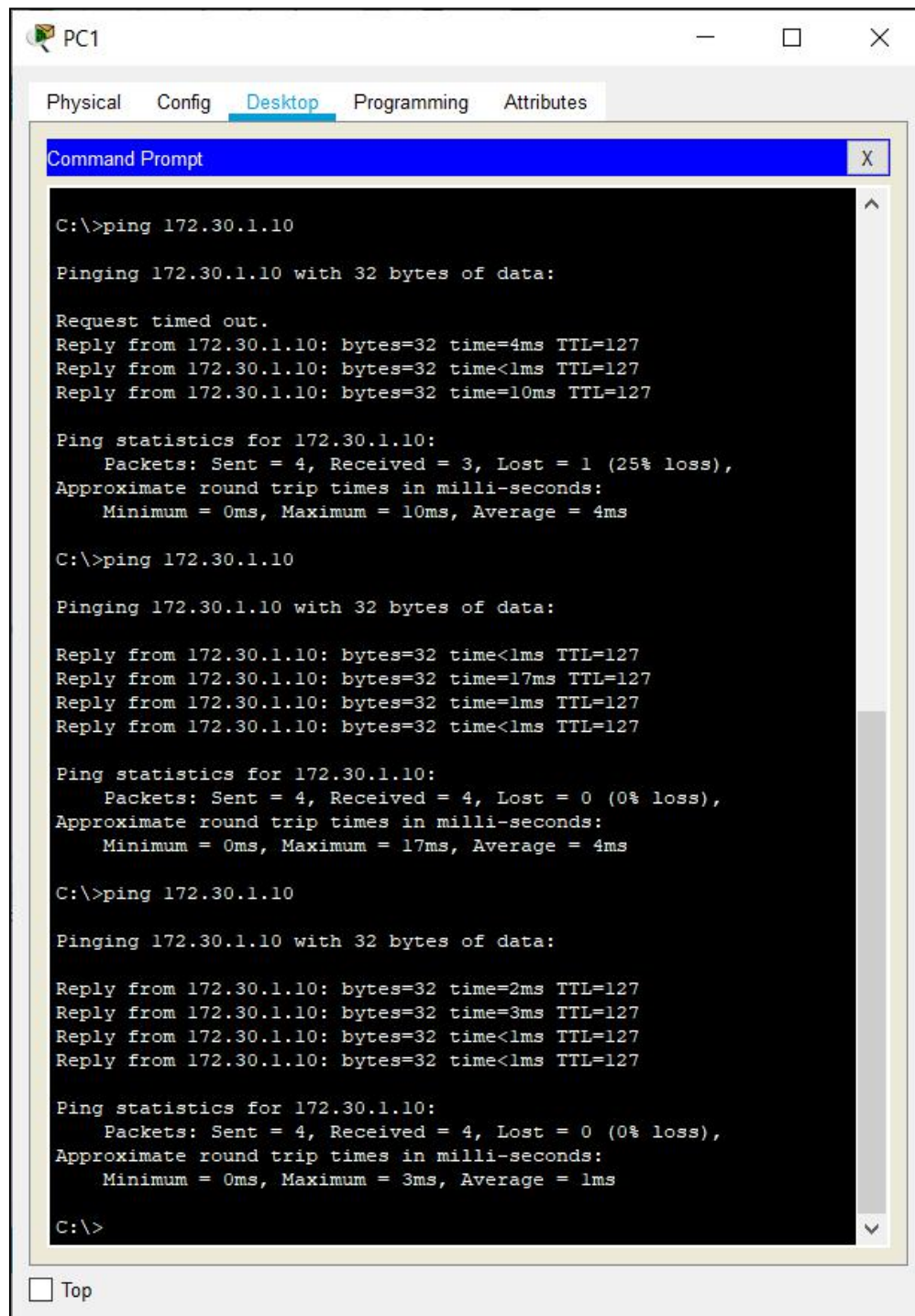
Copy Paste

☐ Top

Step 3: Check the connectivity between the PCs.

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

What is the success rate? **75% once and then 100%**



```
PC1
Physical Config Desktop Programming Attributes
Command Prompt X
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Request timed out.
Reply from 172.30.1.10: bytes=32 time=4ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time=10ms TTL=127

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 4ms

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=17ms TTL=127
Reply from 172.30.1.10: bytes=32 time=1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 17ms, Average = 4ms

C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: bytes=32 time=2ms TTL=127
Reply from 172.30.1.10: bytes=32 time=3ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127

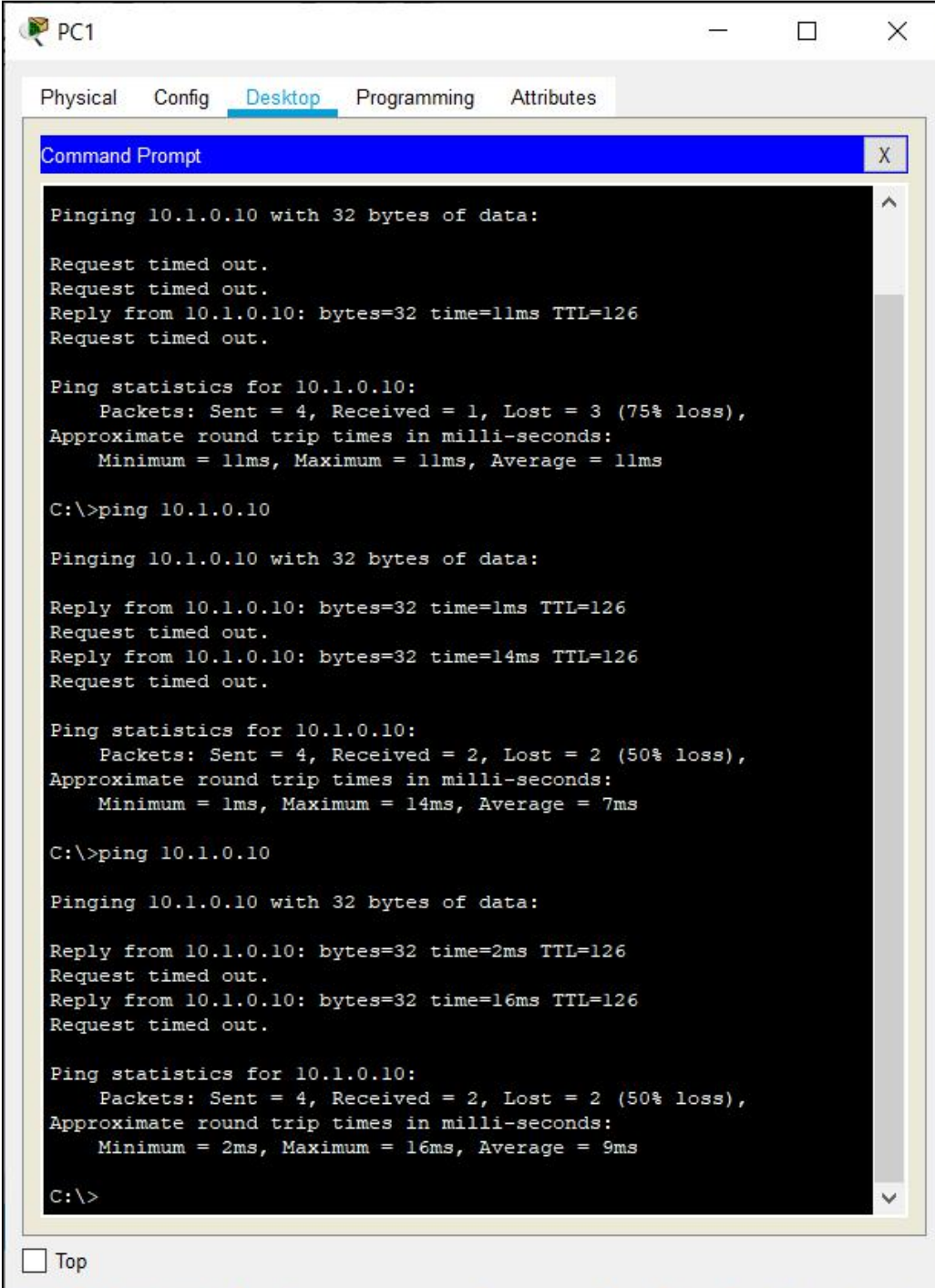
Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>
```

☐ Top

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

What is the success rate? **25% once and then 50%**



The screenshot shows a window titled "PC1" with tabs for "Physical", "Config", "Desktop" (selected), "Programming", and "Attributes". Inside the "Desktop" tab is a "Command Prompt" window. The Command Prompt displays the results of three consecutive ping commands to the IP address 10.1.0.10. Each command sends four 32-byte packets. The first command shows a 75% loss rate (1 received, 3 lost). The second and third commands show a 50% loss rate (2 received, 2 lost). The window also includes a "Top" button at the bottom left.

```
PC1
Physical Config Desktop Programming Attributes
Command Prompt X
Pinging 10.1.0.10 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 10.1.0.10: bytes=32 time=11ms TTL=126
Request timed out.

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 1, Lost = 3 (75% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 11ms, Average = 11ms

C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=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 = 1ms, Maximum = 14ms, Average = 7ms

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=2ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=16ms TTL=126
Request timed out.

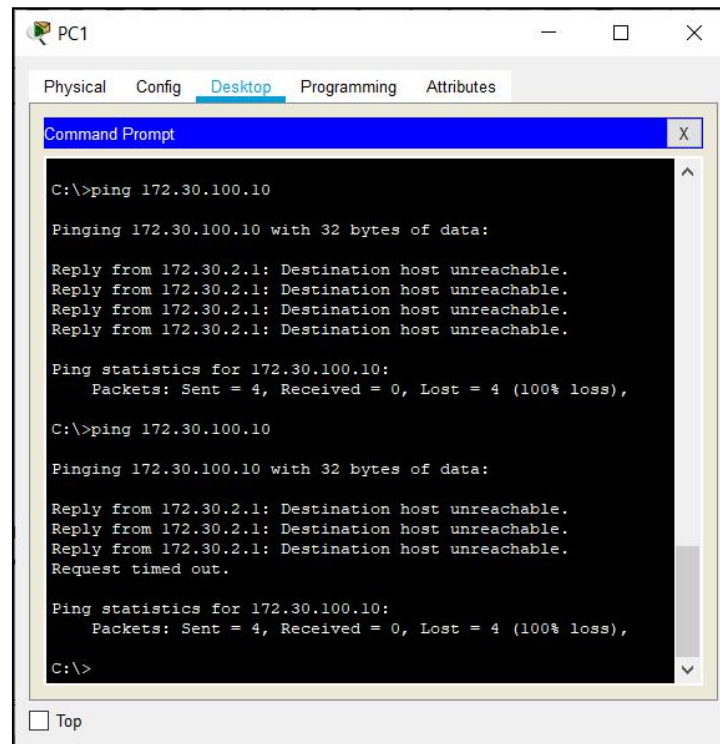
Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 16ms, Average = 9ms

C:\>
```

☐ Top

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

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



The screenshot shows a Windows Command Prompt window titled "PC1" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active. The Command Prompt shows the following output:

```
C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

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

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

C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

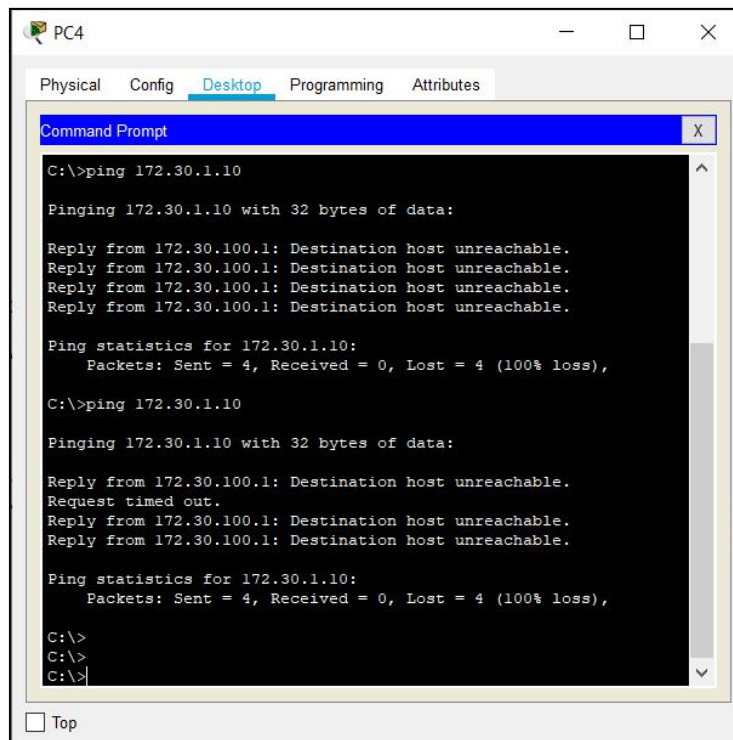
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Request timed out.

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%**



The screenshot shows a Windows Command Prompt window titled "PC4" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active. The Command Prompt shows the following output:

```
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.
Reply from 172.30.100.1: Destination host unreachable.
Reply from 172.30.100.1: Destination host unreachable.
Reply from 172.30.100.1: Destination host unreachable.

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

C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

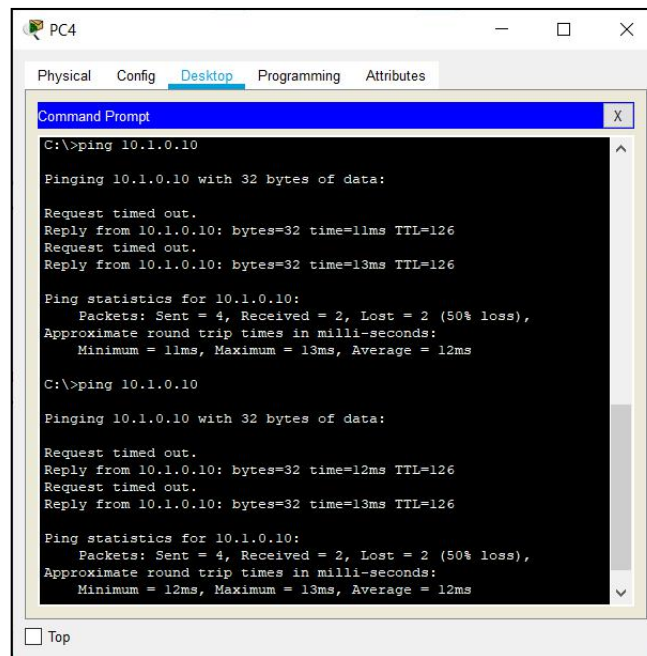
Reply from 172.30.100.1: Destination host unreachable.
Request timed out.
Reply from 172.30.100.1: Destination host unreachable.
Reply from 172.30.100.1: Destination host unreachable.

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

C:\>
C:\>
C:\>
```

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

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



```
PC4
Physical Config Desktop Programming Attributes
Command Prompt
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=11ms 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 = 11ms, Maximum = 13ms, Average = 12ms

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=12ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=13ms TTL=126

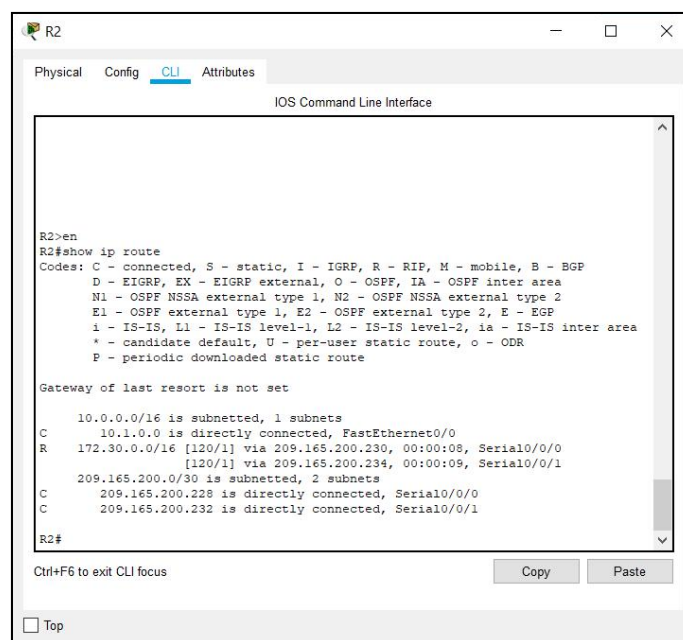
Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 13ms, Average = 12ms

☐ Top
```

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
Physical Config CLI Attributes
IOS Command Line Interface

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

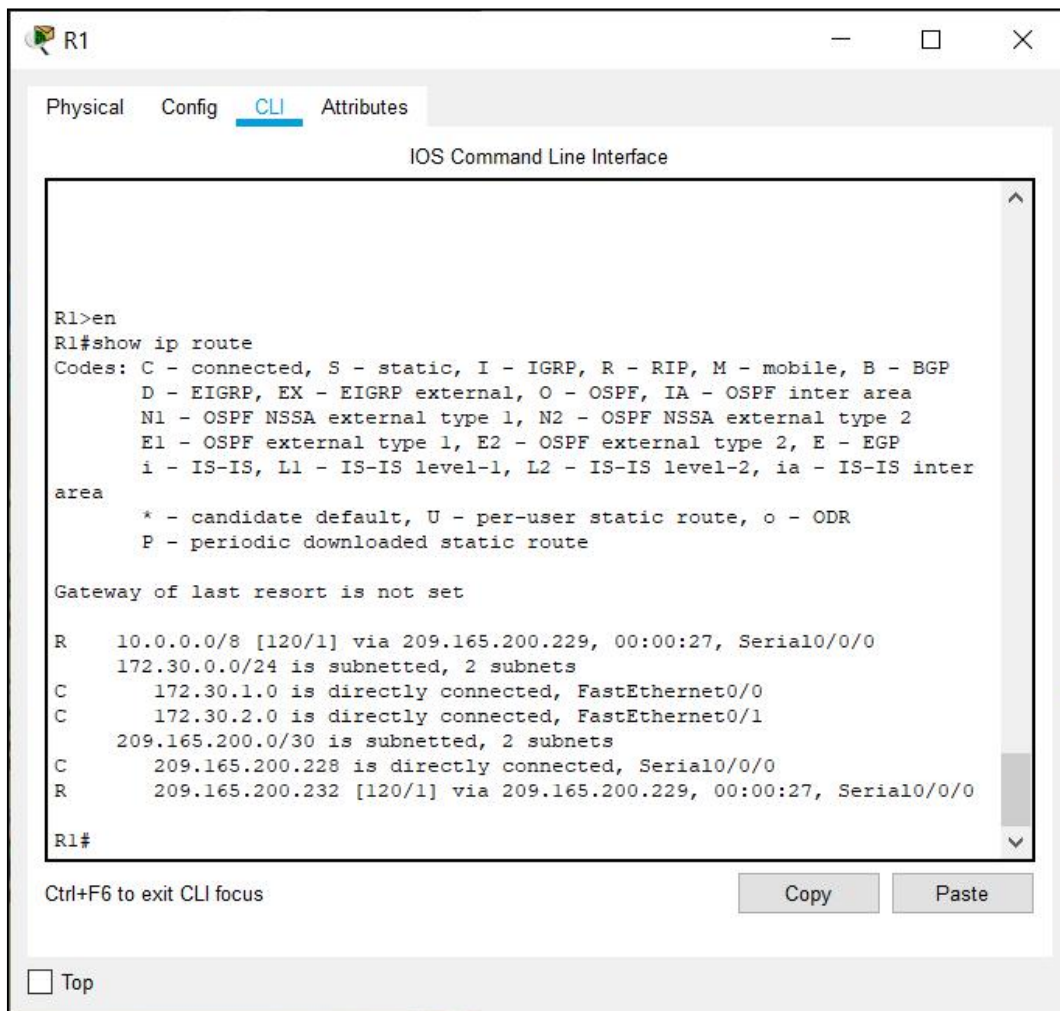
    10.0.0.0/16 is subnetted, 1 subnets
        C      10.1.0.0 is directly connected, FastEthernet0/0
    R      172.30.0.0/16 [120/1] via 209.165.200.230, 00:00:08, Serial0/0/0
                   [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
    209.165.200.0/30 is subnetted, 2 subnets
        C      209.165.200.228 is directly connected, Serial0/0/0
        C      209.165.200.232 is directly connected, Serial0/0/1

R2#
```

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

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

```
R1#show ip route
```



The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The command 'R1#show ip route' has been entered, and the output is displayed. The output includes a legend for route codes (C, S, I, R, M, B, D, EX, O, IA, N1, N2, E1, E2, E, i, L1, L2, ia, *, U, o, P), a note about the gateway of last resort, and a list of routes. The routes shown are: 10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:27, Serial0/0/0; 172.30.0.0/24 is subnetted, 2 subnets; 172.30.1.0 is directly connected, FastEthernet0/0; 172.30.2.0 is directly connected, FastEthernet0/1; 209.165.200.0/30 is subnetted, 2 subnets; 209.165.200.228 is directly connected, Serial0/0/0; and 209.165.200.232 [120/1] via 209.165.200.229, 00:00:27, Serial0/0/0. The prompt 'R1#' is visible at the bottom of the CLI window. Below the CLI window, there is a 'Ctrl+F6 to exit CLI focus' label and 'Copy' and 'Paste' buttons. At the bottom left, there is a 'Top' button.

```
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, 00:00:27, 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, 00:00:27, Serial0/0/0

R1#
```

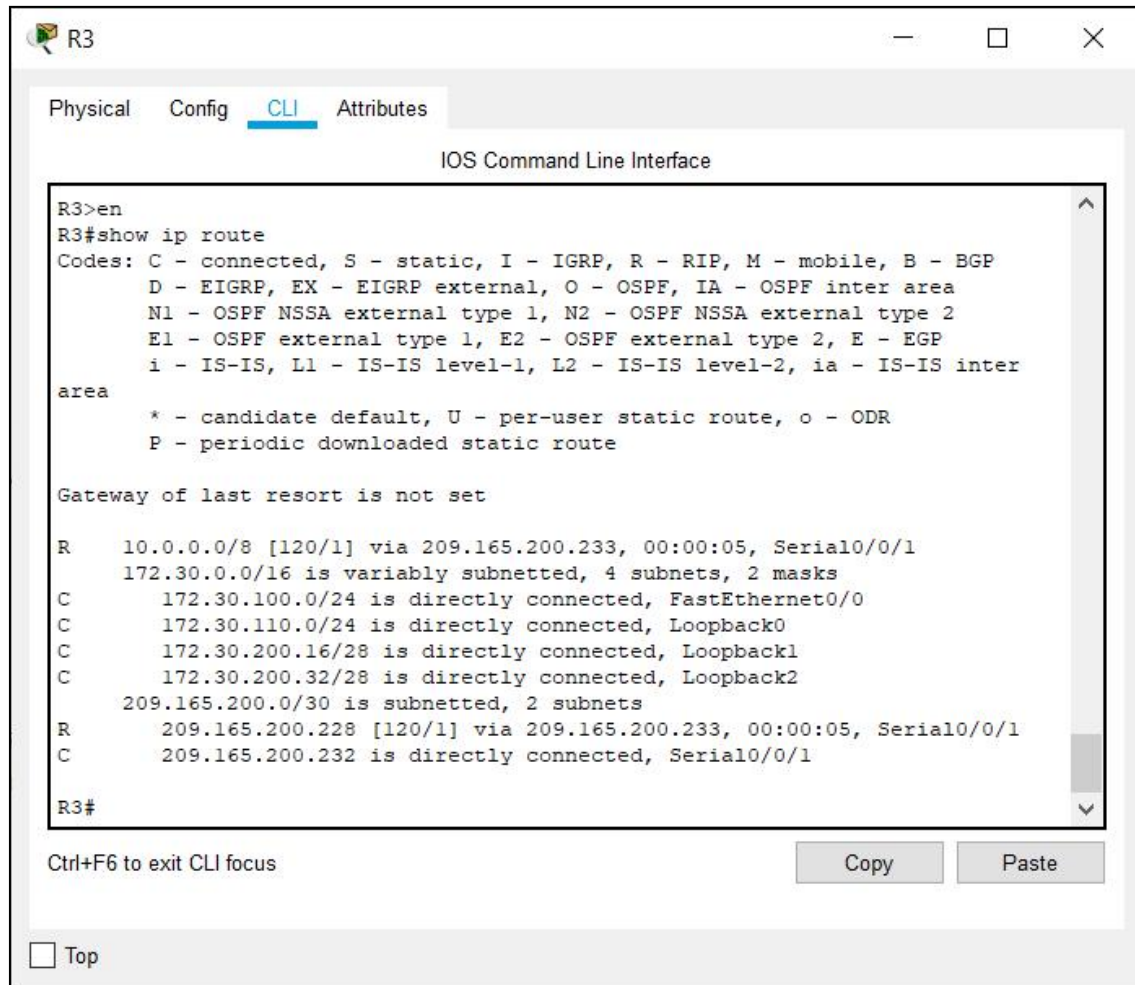
Ctrl+F6 to exit CLI focus Copy Paste

☐ Top

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
```

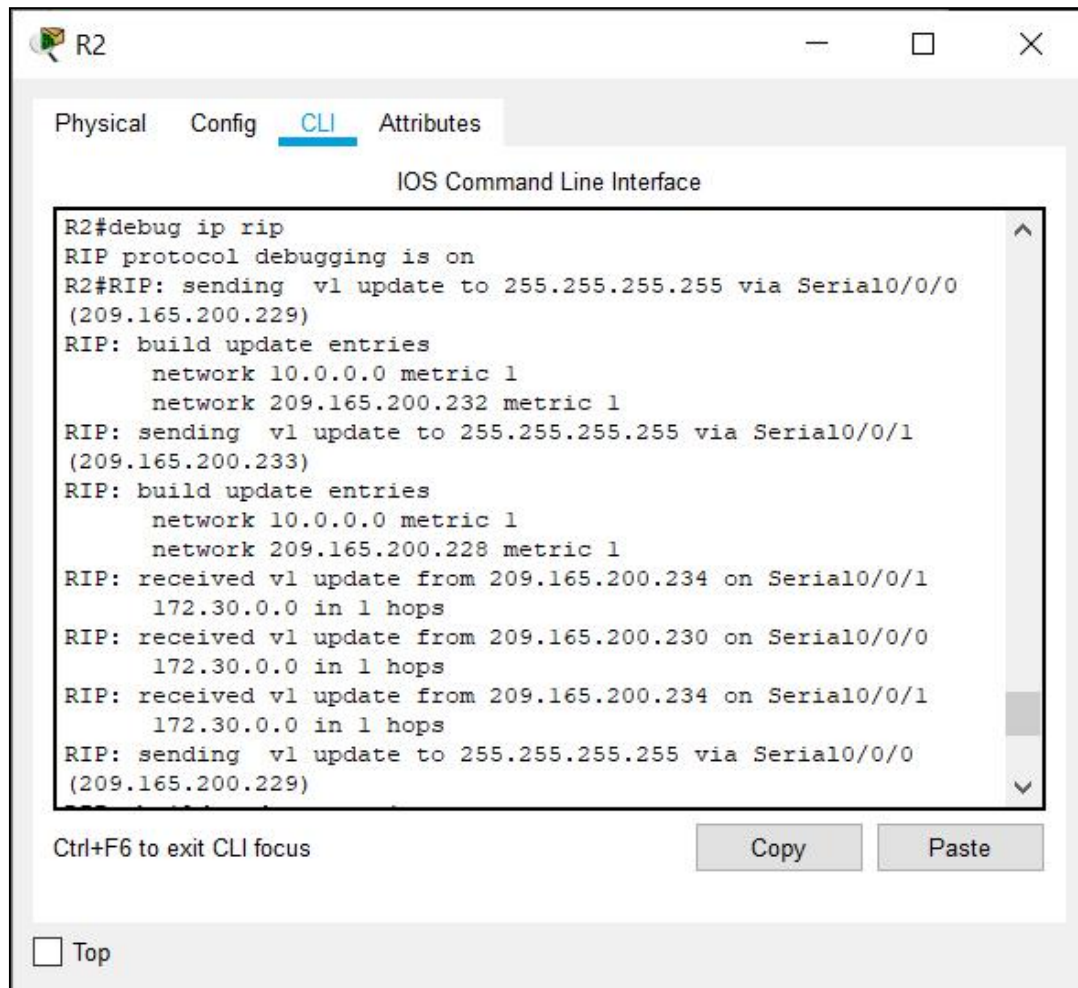


Step 7: Examine the RIPv1 packets that are being received by R2.

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

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

R2#`debug ip rip`



The screenshot shows a window titled 'R2' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal output shows the following sequence of events:

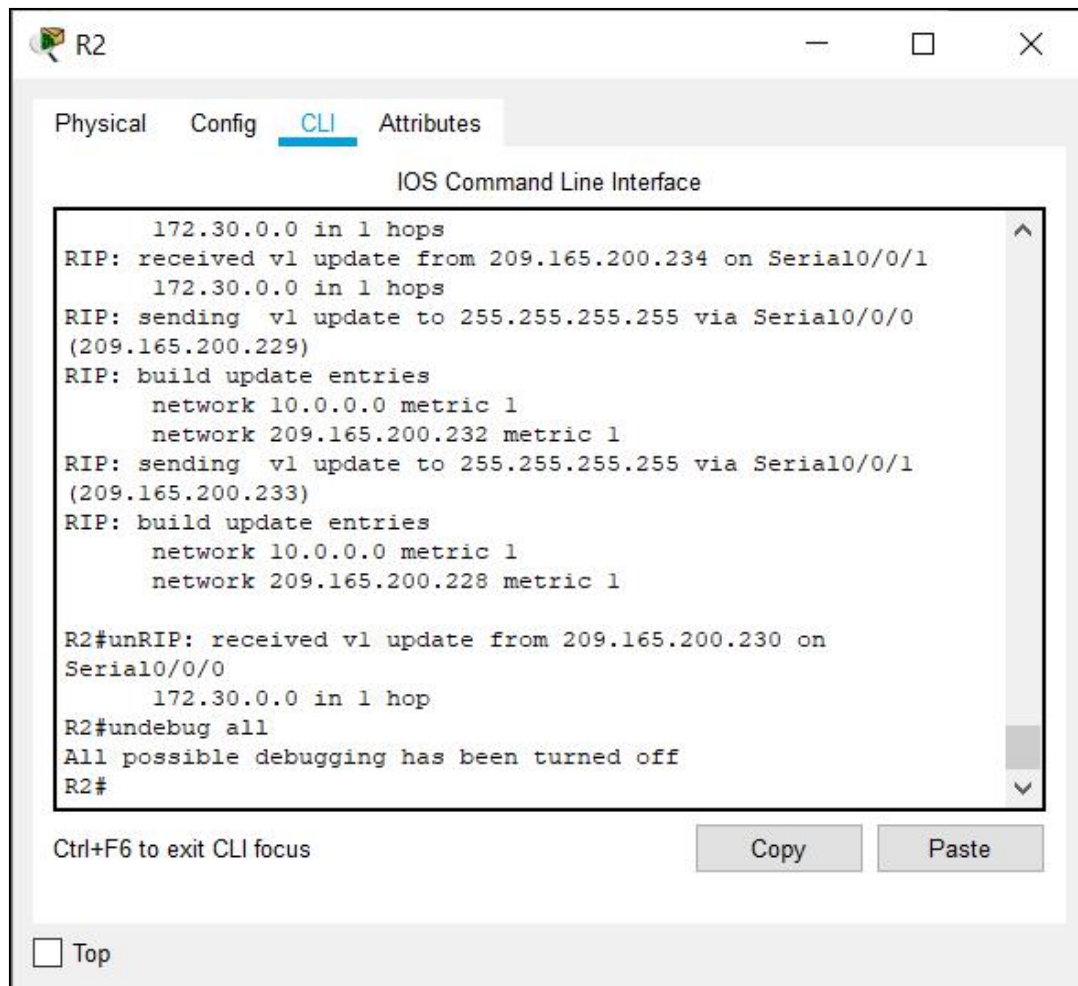
```
R2#debug ip rip
RIP protocol debugging is on
R2#RIP: sending v1 update to 255.255.255.255 via Serial0/0/0
(209.165.200.229)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1
(209.165.200.233)
RIP: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

Below the terminal output, there is a prompt 'Ctrl+F6 to exit CLI focus' and two buttons: 'Copy' and 'Paste'. At the bottom left, there is a checkbox labeled 'Top'.

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.

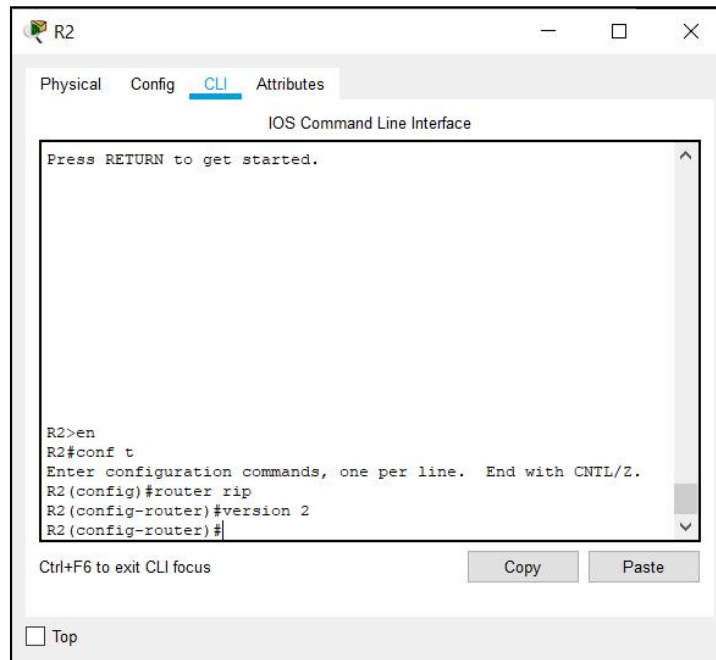
R2#**undebug all**



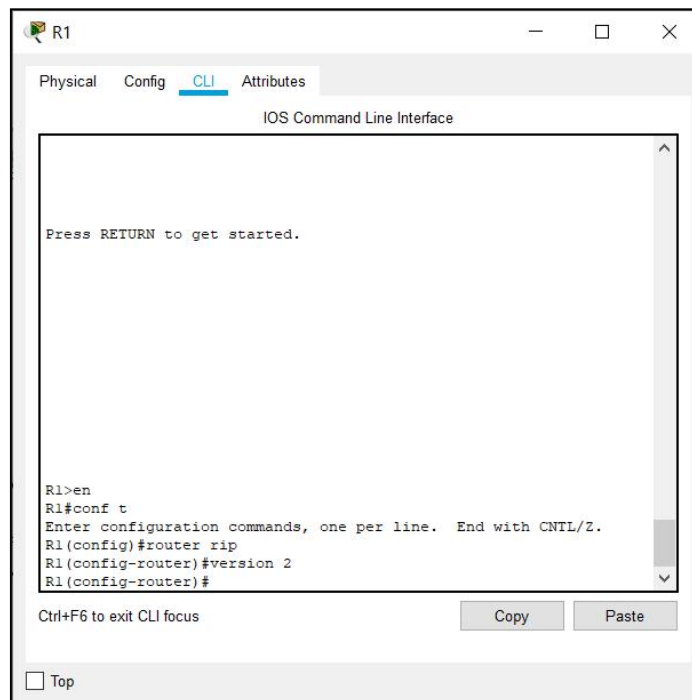
Task 4: Configure RIP Version 2.

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

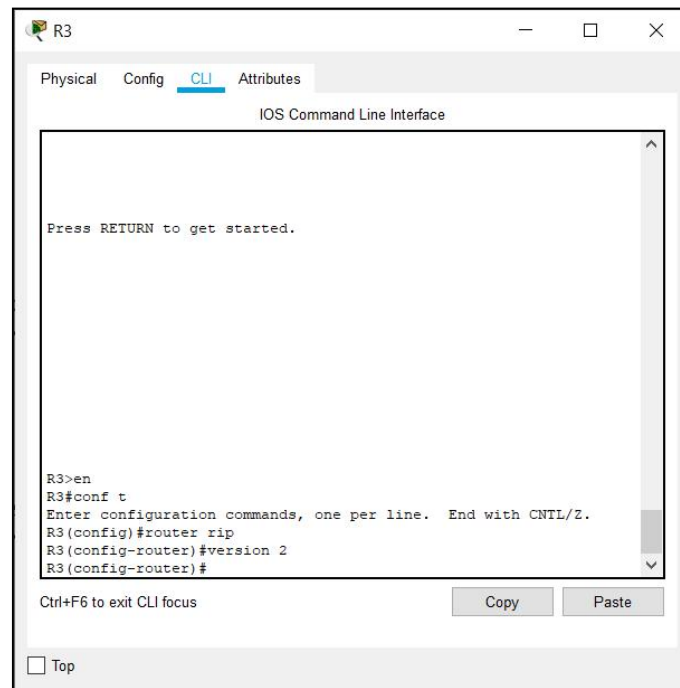
```
R2(config)#router rip  
R2(config-router)#version 2
```



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



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

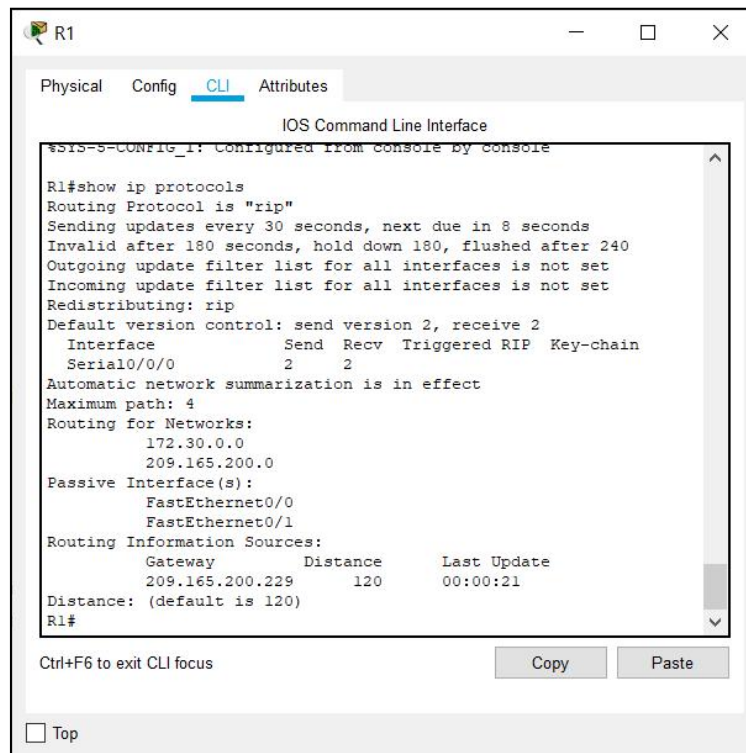


RIPv2 messages include the subnet mask in a field in the routing updates. This allows subnets and their masks to be included in the routing updates. However, by default RIPv2 summarizes networks at major network boundaries, just like RIPv1, except that the subnet mask is included in the update.

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

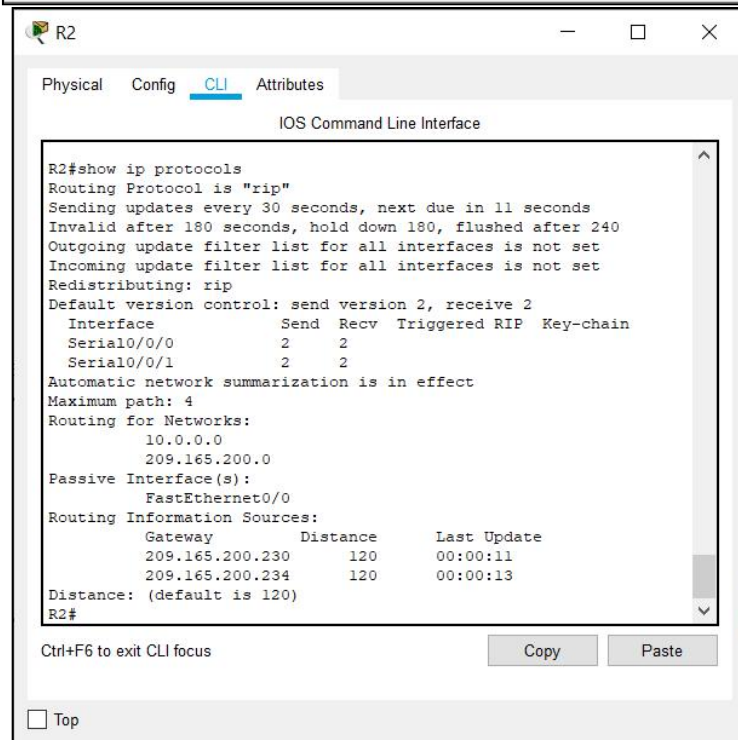
The `debug ip rip`, `show ip protocols`, and `show run` commands can all be used to confirm that RIPv2 is running. The output of the `show ip protocols` command for R1 is shown below.

```
R1# show ip protocols
```



The screenshot shows the CLI of router R1. The output of the `show ip protocols` command is displayed in a scrollable window. The output includes details about the RIPv2 configuration, such as the routing protocol, update intervals, and the interfaces being advertised.

```
R1#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 8 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/0/0         2      2
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
  172.30.0.0
  209.165.200.0
Passive Interface(s):
  FastEthernet0/0
  FastEthernet0/1
Routing Information Sources:
  Gateway         Distance    Last Update
  209.165.200.229  120        00:00:21
Distance: (default is 120)
R1#
```



The screenshot shows the CLI of router R2. The output of the `show ip protocols` command is displayed in a scrollable window. The output includes details about the RIPv2 configuration, such as the routing protocol, update intervals, and the interfaces being advertised.

```
R2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 11 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 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        00:00:11
  209.165.200.234  120        00:00:13
Distance: (default is 120)
R2#
```

R3

Physical

Config

CLI

Attributes

IOS Command Line Interface

R3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 27 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 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 00:00:05
Distance: (default is 120)
R3#

Ctrl+F6 to exit CLI focus

Copy

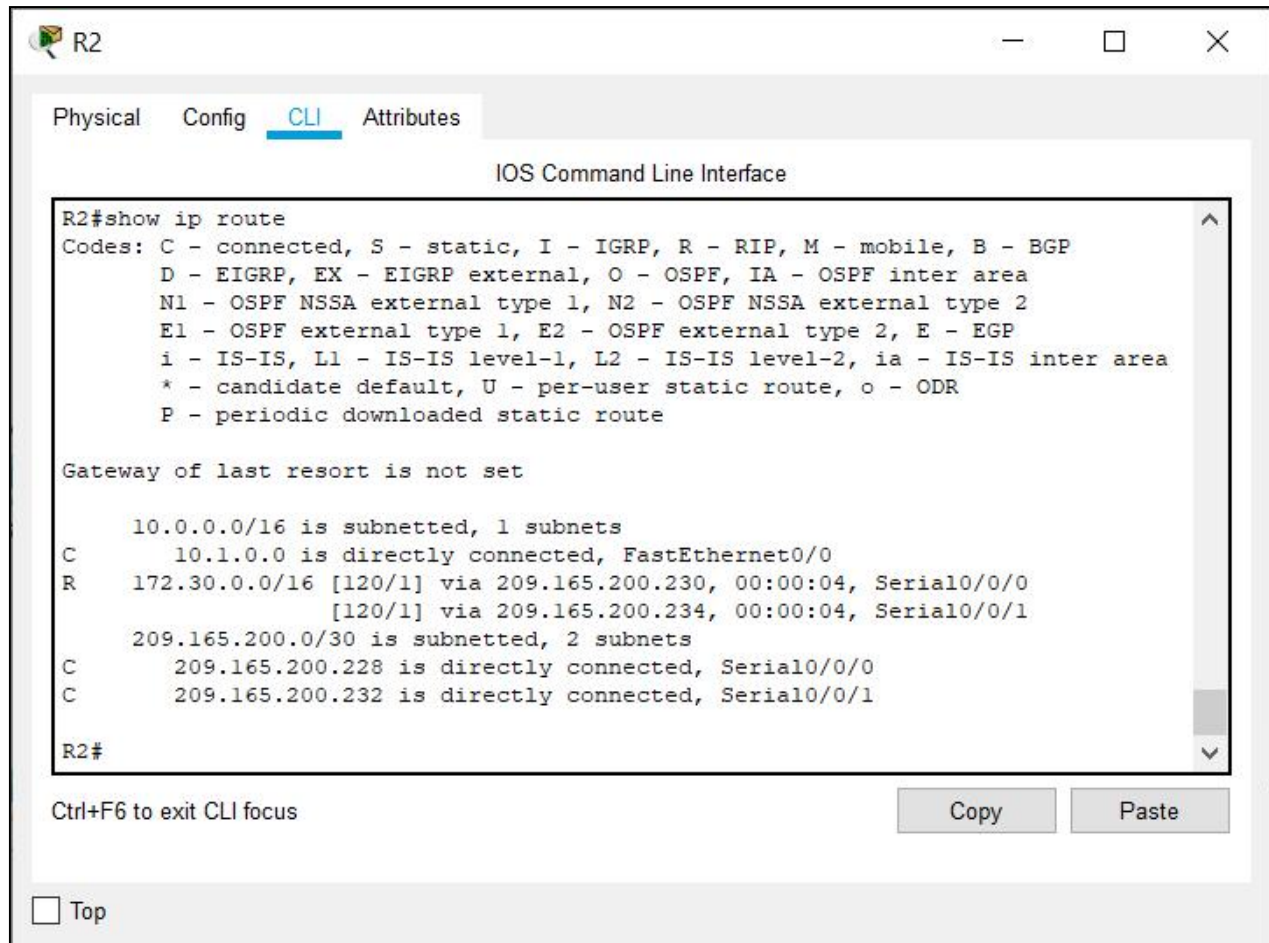
Paste

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Task 5: Examine the Automatic Summarization of Routes.

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

```
R2#show ip route
```



The screenshot shows a window titled 'R2' with tabs for 'Physical', 'Config', 'CLI' (selected), and 'Attributes'. The 'CLI' tab displays the 'IOS Command Line Interface' with the following output for the command 'R2#show ip route':

```
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

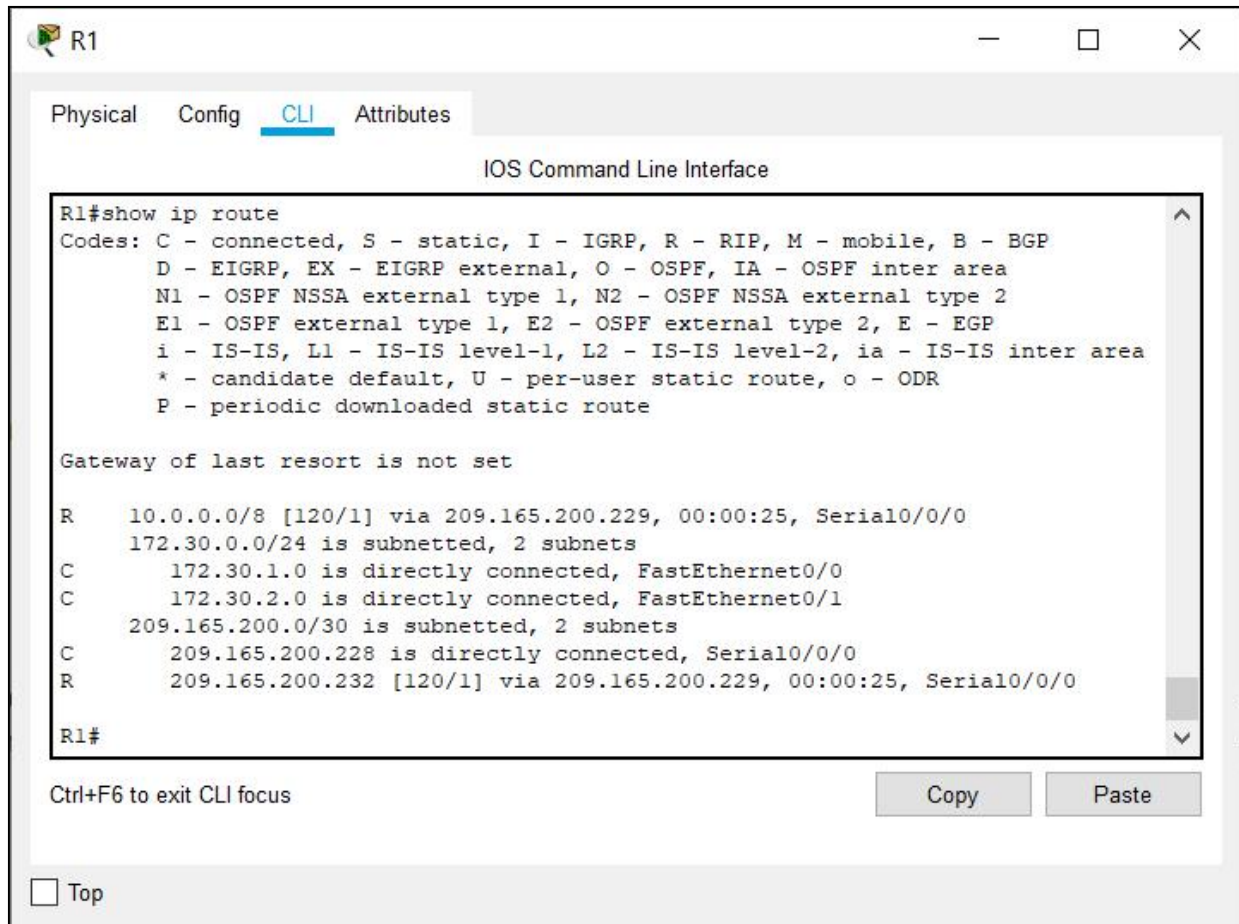
 10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 [120/1] via 209.165.200.230, 00:00:04, Serial0/0/0
      [120/1] via 209.165.200.234, 00:00:04, Serial0/0/1
 209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1

R2#
```

Below the CLI window, there is a prompt 'Ctrl+F6 to exit CLI focus' and two buttons: 'Copy' and 'Paste'. At the bottom left, there is a checkbox labeled 'Top'.

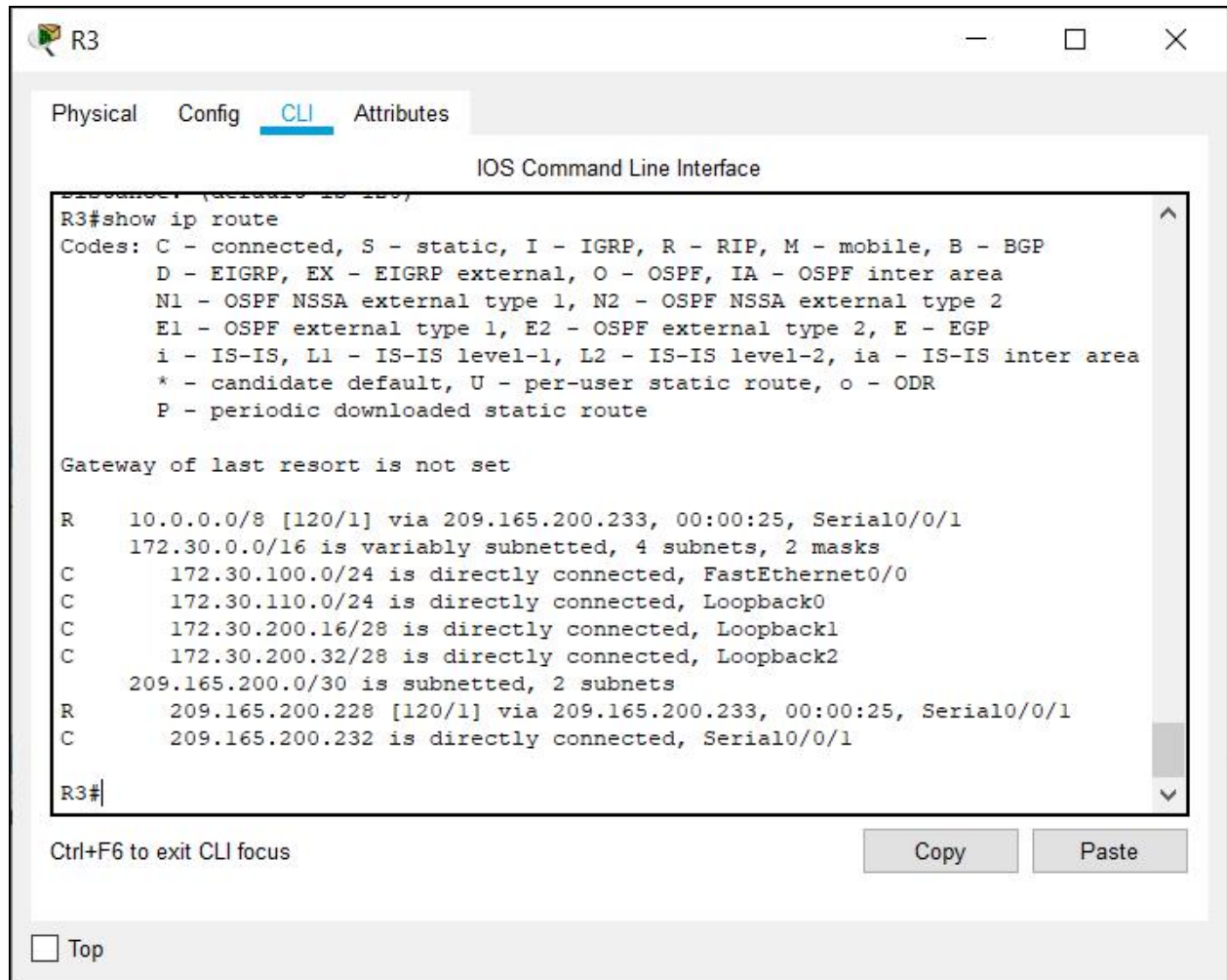
R1 still shows only its own subnets for the 172.30.0.0 network. R1 still does not have any routes for the 172.30.0.0 subnets on R3.

R1#**show ip route**



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**



The screenshot shows a window titled 'R3' with tabs for 'Physical', 'Config', 'CLI' (selected), and 'Attributes'. The 'CLI' tab displays the 'IOS Command Line Interface'. The command 'R3#show ip route' has been entered, and the output is displayed. The output shows the routing table for R3, including the gateway of last resort, the 10.0.0.0/8 network, and several 172.30.0.0/16 subnets. The output is as follows:

```
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, 00:00:25, 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, 00:00:25, Serial0/0/1
C     209.165.200.232 is directly connected, Serial0/0/1

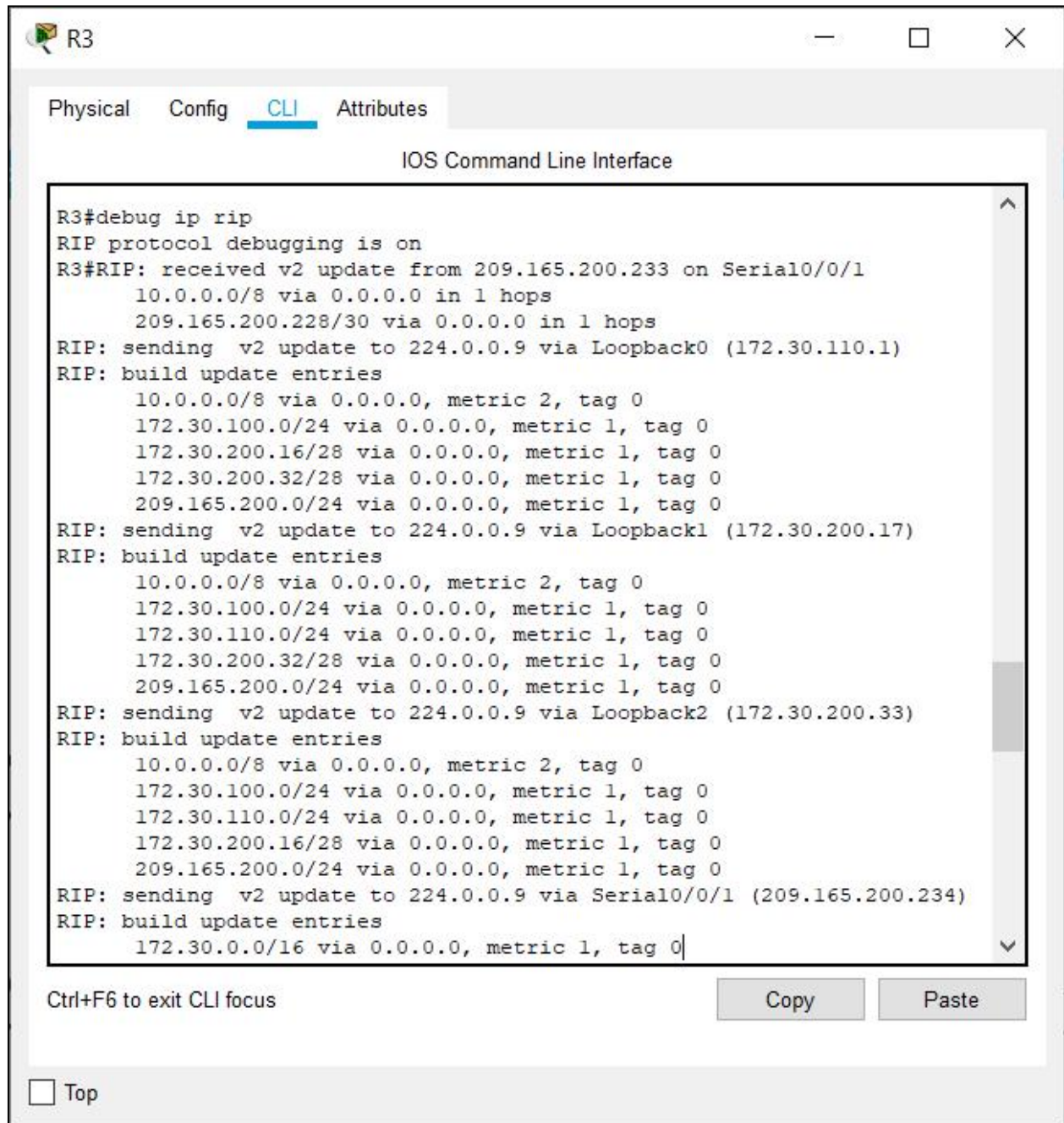
R3#
```

Below the CLI window, there is a 'Ctrl+F6 to exit CLI focus' label and two buttons: 'Copy' and 'Paste'. At the bottom left, there is a 'Top' button.

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

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

- 1) 10.0.0.0/8
- 2) 172.30.100.0/24
- 3) 172.30.110.0/24
- 4) 172.30.200.16/28
- 5) 209.165.200.0/24



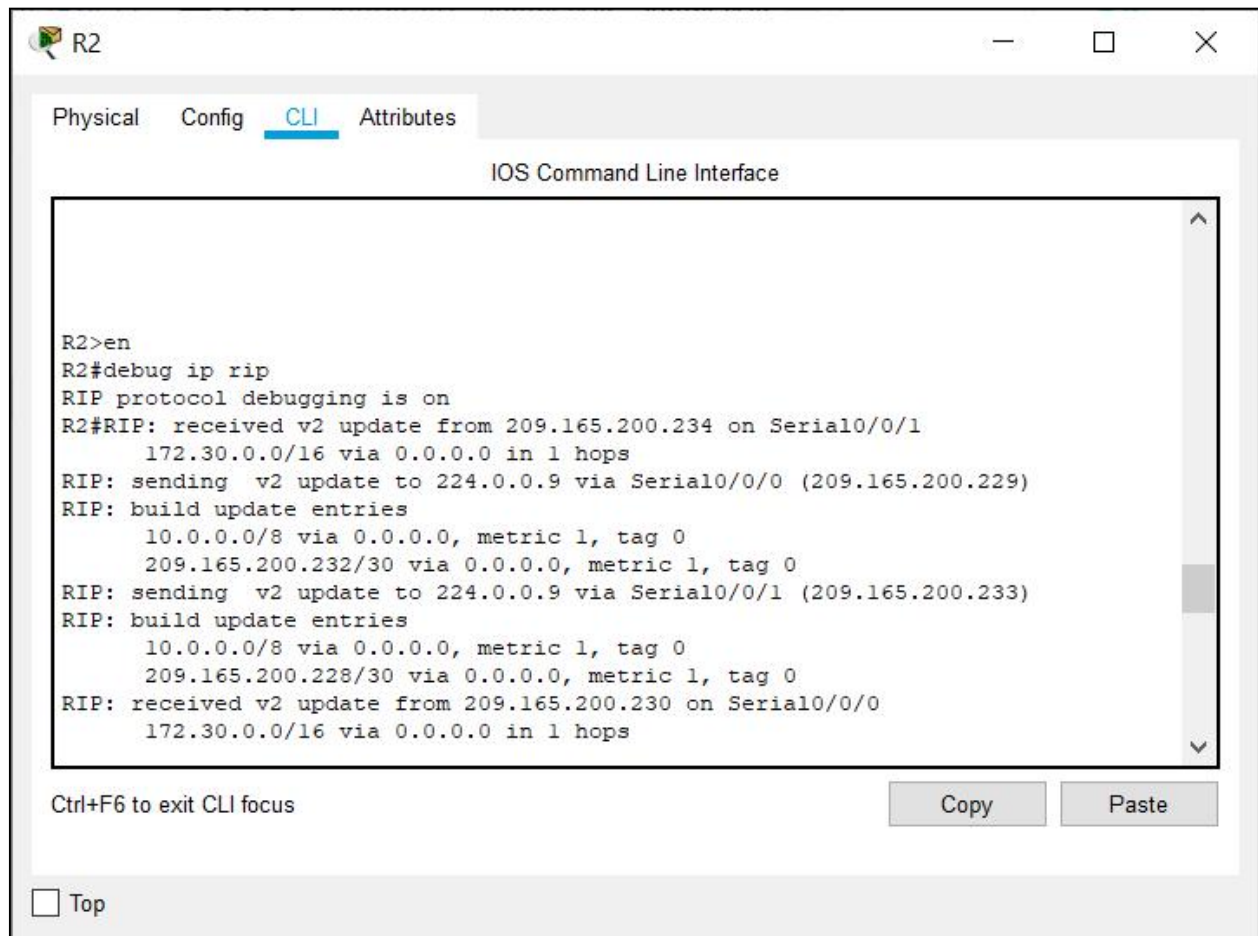
The screenshot shows a Cisco Packet Tracer console window for router R3. The window has tabs for Physical, Config, CLI (selected), and Attributes. The CLI tab displays the IOS Command Line Interface. The output of the `debug ip rip` command is shown, indicating that RIP protocol debugging is on. The output shows several RIP updates being received and sent. The updates sent out from R3 include the following entries:

```
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
```

At the bottom of the console window, there is a status bar with the text "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste".

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

172.30.0.0/16



The screenshot shows a network simulator window titled 'R2'. It has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' selected. The window displays the 'IOS Command Line Interface' with the following text:

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

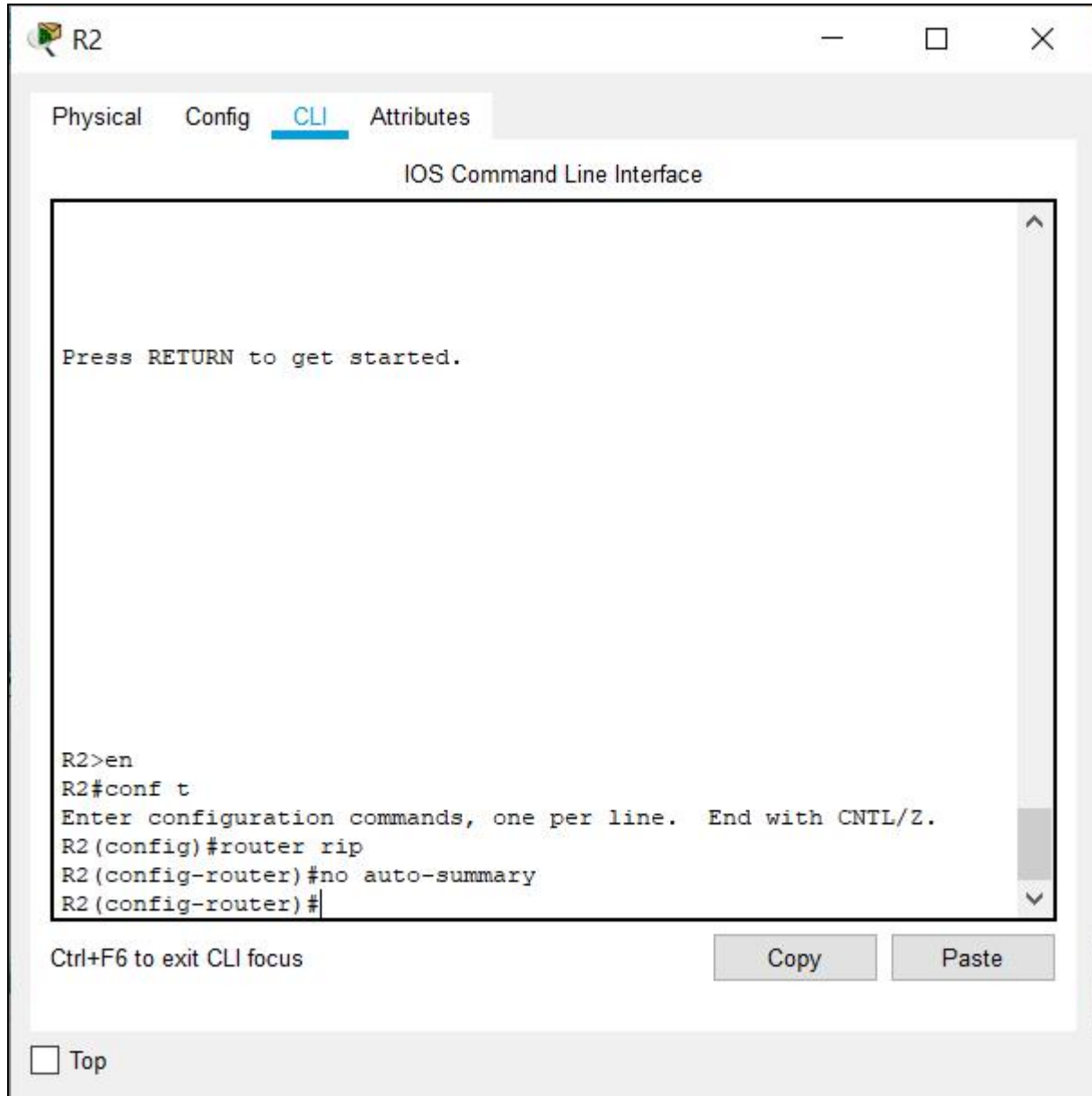
Below the CLI window, there is a status bar with 'Ctrl+F6 to exit CLI focus' on the left, and 'Copy' and 'Paste' buttons on the right. At the bottom left, there is a 'Top' button with a small square icon next to it.

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.

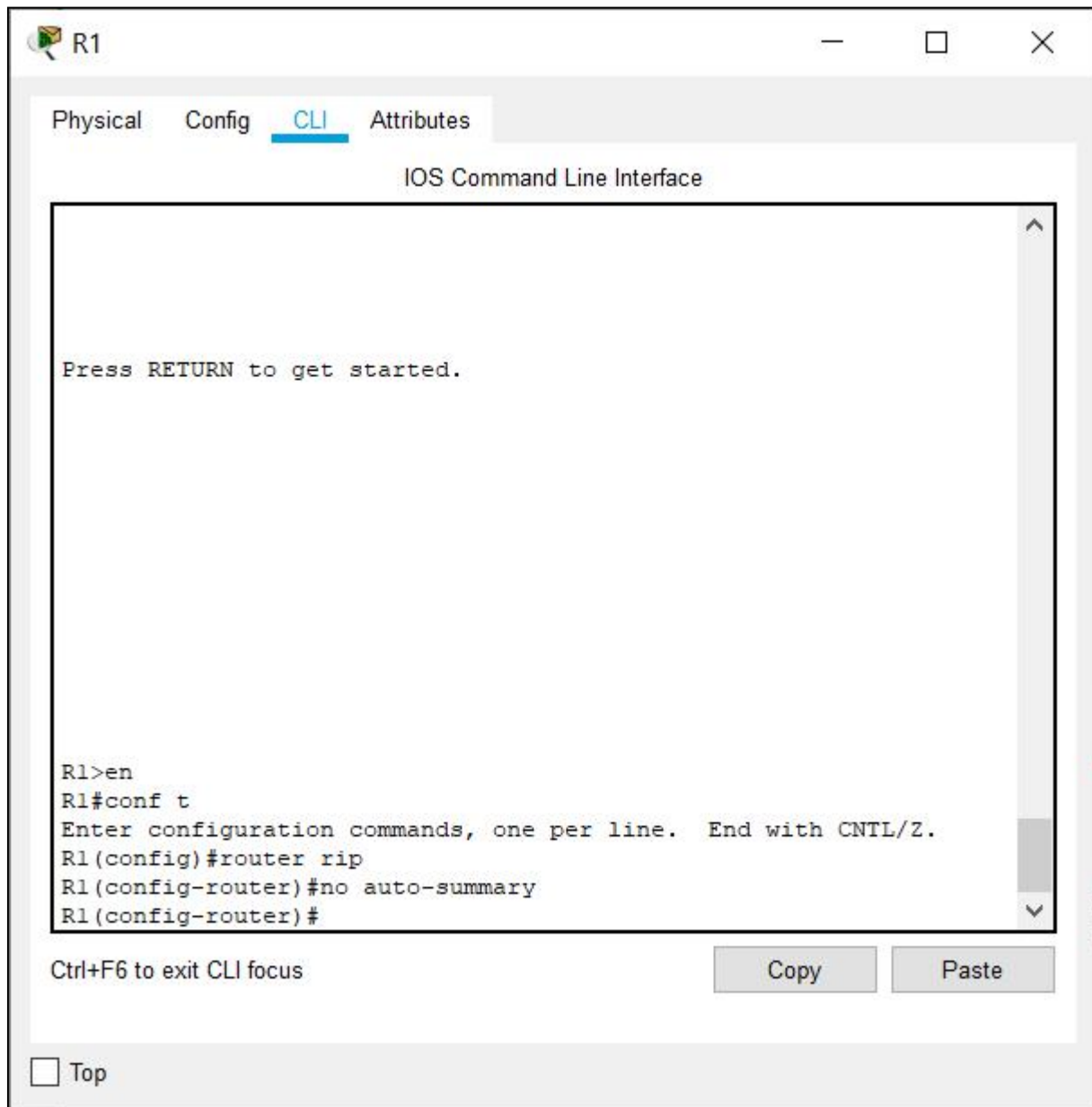
Task 6: Disable Automatic Summarization.

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.

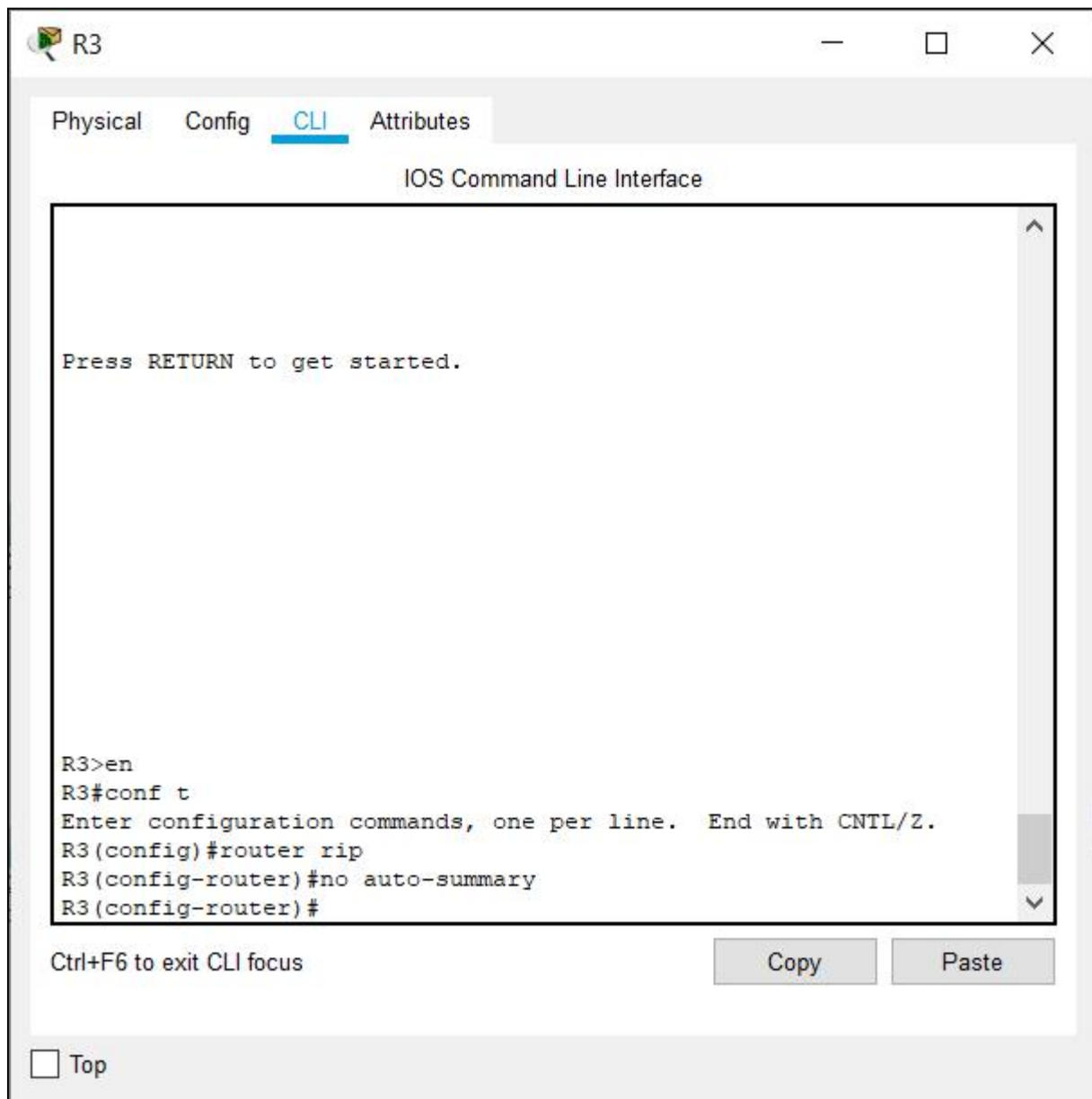
```
R2(config)#router rip
R2(config-router)#no auto-summary
```



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



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

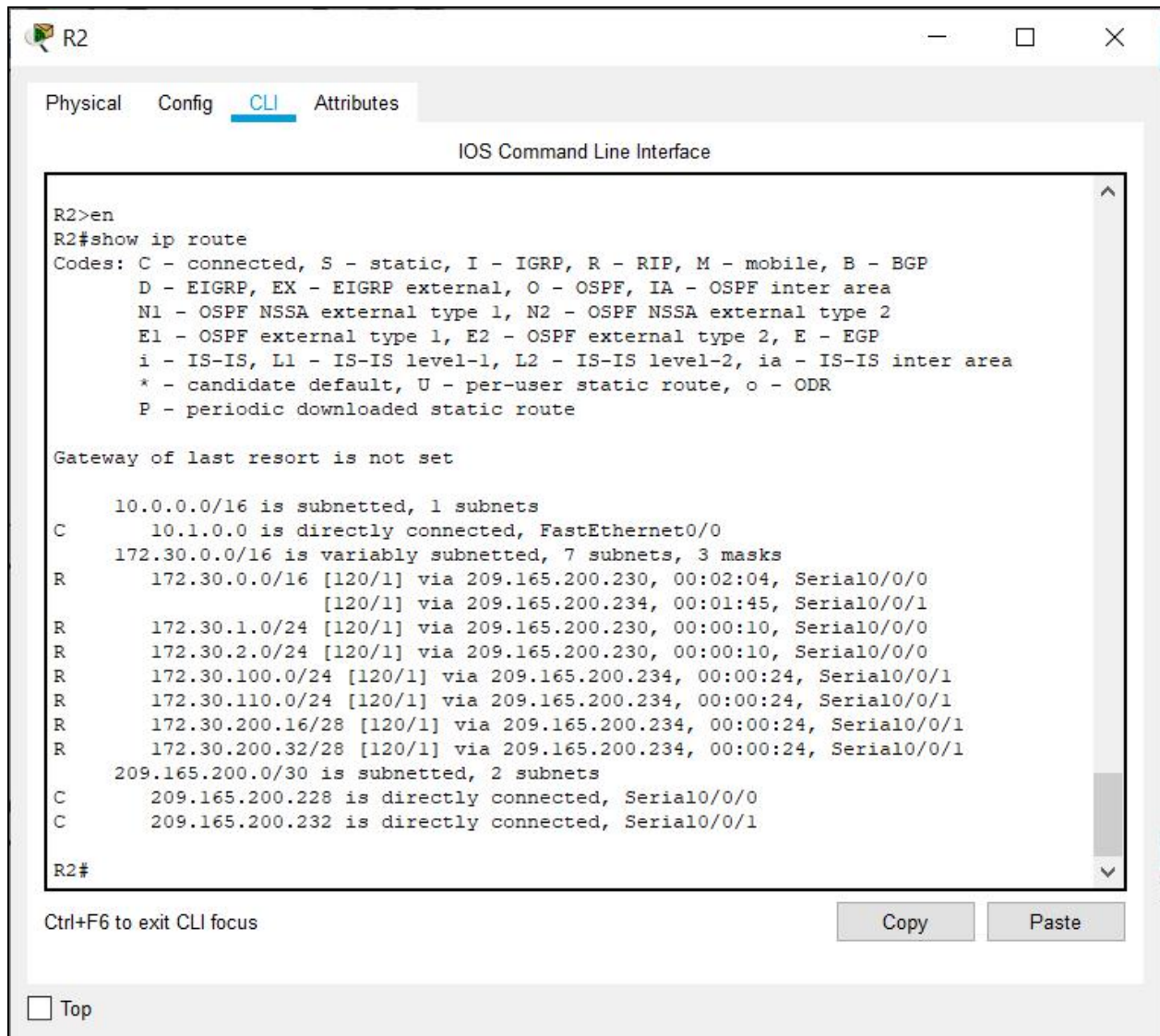


The **show ip route** and **ping** commands can be used to verify that automatic summarization is off.

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
```



The screenshot shows a network device window titled 'R2' with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the 'IOS Command Line Interface'. The command 'show ip route' has been executed, showing the routing table. The output includes a legend for route codes, a message about the gateway of last resort, and a list of routes with their metrics and interfaces.

```
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
 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, 00:02:04, Serial0/0/0
      [120/1] via 209.165.200.234, 00:01:45, Serial0/0/1
R    172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:10, Serial0/0/0
R    172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:10, Serial0/0/0
R    172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:24, Serial0/0/1
R    172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:24, Serial0/0/1
R    172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:24, Serial0/0/1
R    172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:24, 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

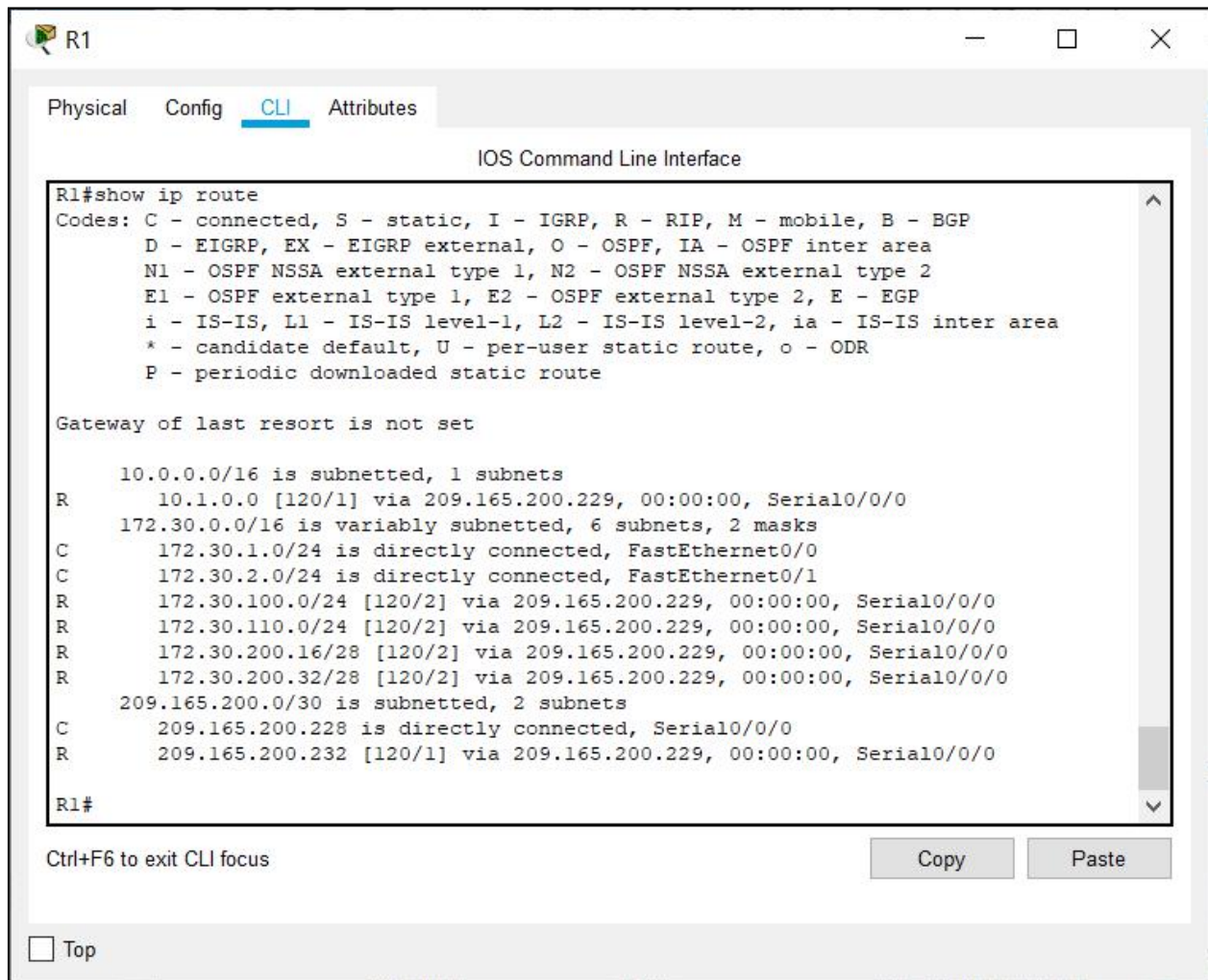
R2#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

R1#show ip route



The screenshot shows a window titled 'R1' with tabs for 'Physical', 'Config', 'CLI' (selected), and 'Attributes'. The 'CLI' tab displays the 'IOS Command Line Interface' with the command 'R1#show ip route' and its output. The output includes a legend for route codes, a message about the gateway of last resort, and a list of routes with their respective metrics and interfaces. At the bottom, there is a 'Ctrl+F6 to exit CLI focus' message, 'Copy' and 'Paste' buttons, and a 'Top' button.

```
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, 00:00:00, 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, 00:00:00, Serial0/0/0
R       172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:00, Serial0/0/0
R       172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:00, Serial0/0/0
R       172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:00, 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, 00:00:00, Serial0/0/0


R1#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

R3#show ip route

 R3

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 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, 00:00:23, 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, 00:00:23, Serial0/0/1
R       172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:23, 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, 00:00:23, Serial0/0/1
C       209.165.200.232 is directly connected, Serial0/0/1

R3#
```

Ctrl+F6 to exit CLI focus

Copy Paste

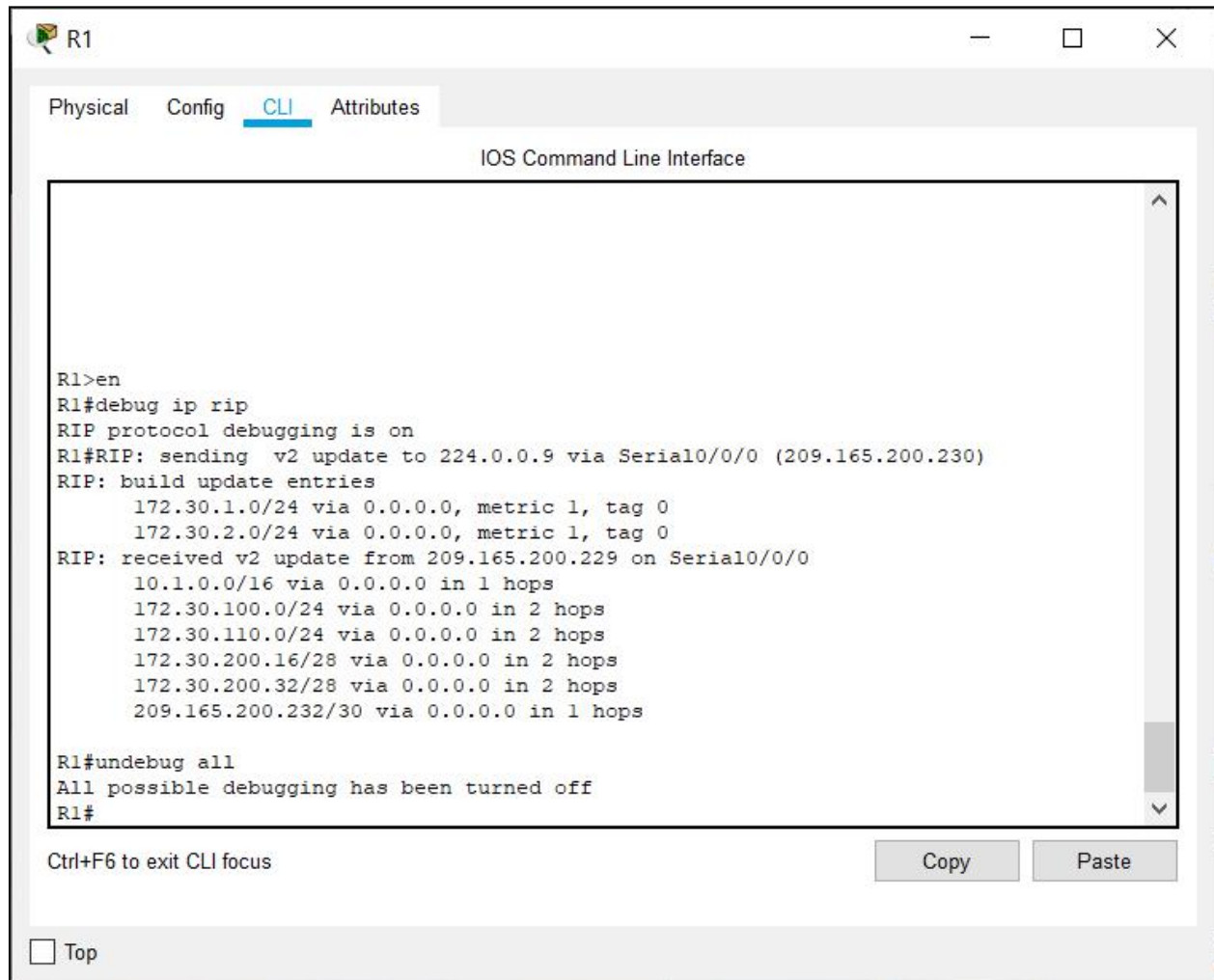
☐ Top

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

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

172.30.1.0/24

172.30.2.0/24



The screenshot shows a network simulator window titled "R1" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the "IOS Command Line Interface". The output of the commands entered is as follows:

```
R1>en
R1#debug ip rip
RIP protocol debugging is on
R1#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

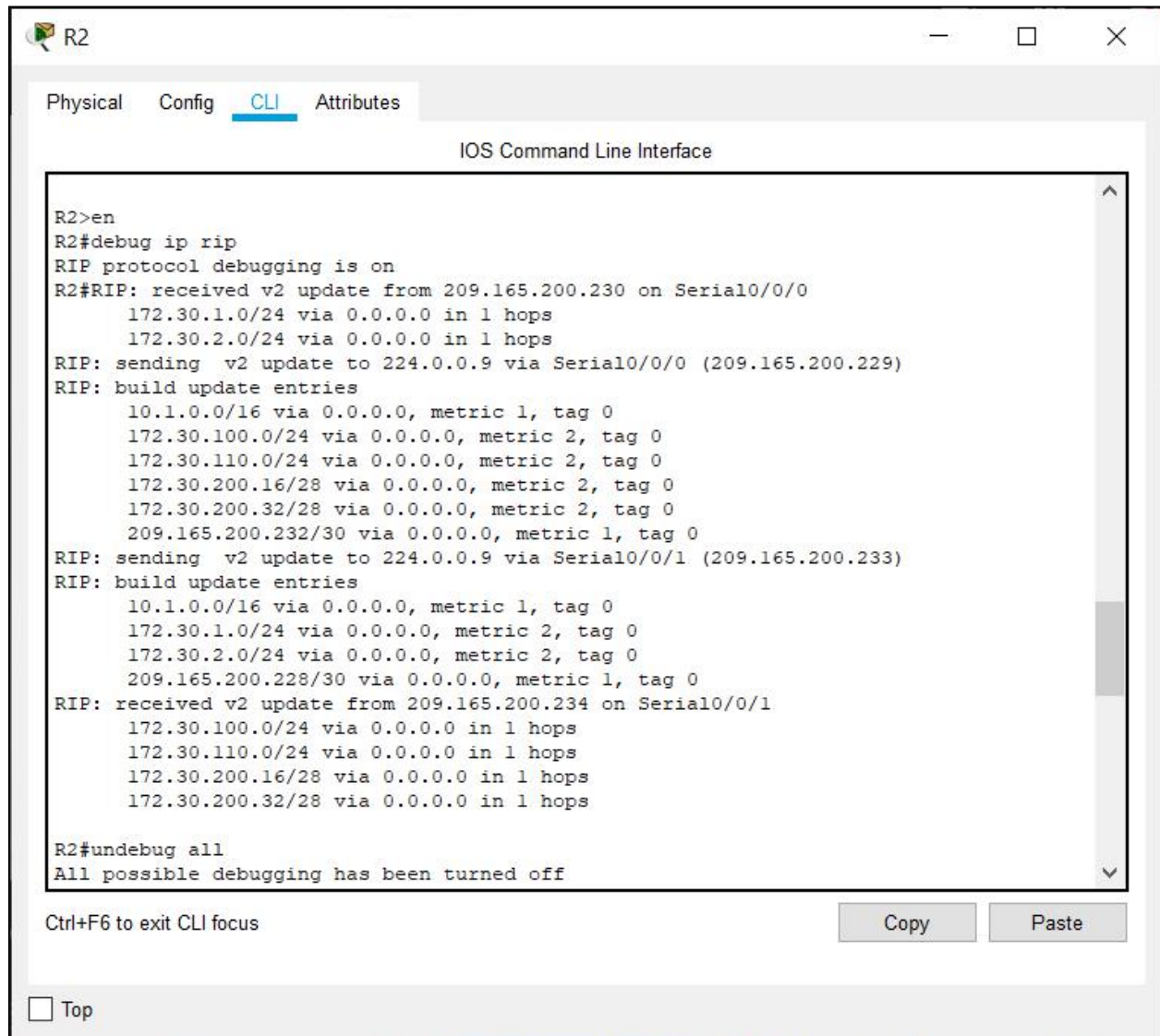
R1#undebug all
All possible debugging has been turned off
R1#
```

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

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

172.30.1.0/24

172.30.2.0/24



The screenshot shows the CLI of router R2. The tabs at the top are Physical, Config, CLI (selected), and Attributes. The title bar says 'R2'. The main window is titled 'IOS Command Line Interface'. The output shows the following sequence of commands and debug messages:

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

R2#undebg all
All possible debugging has been turned off
```

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

Are the subnet masks now included in the routing updates?

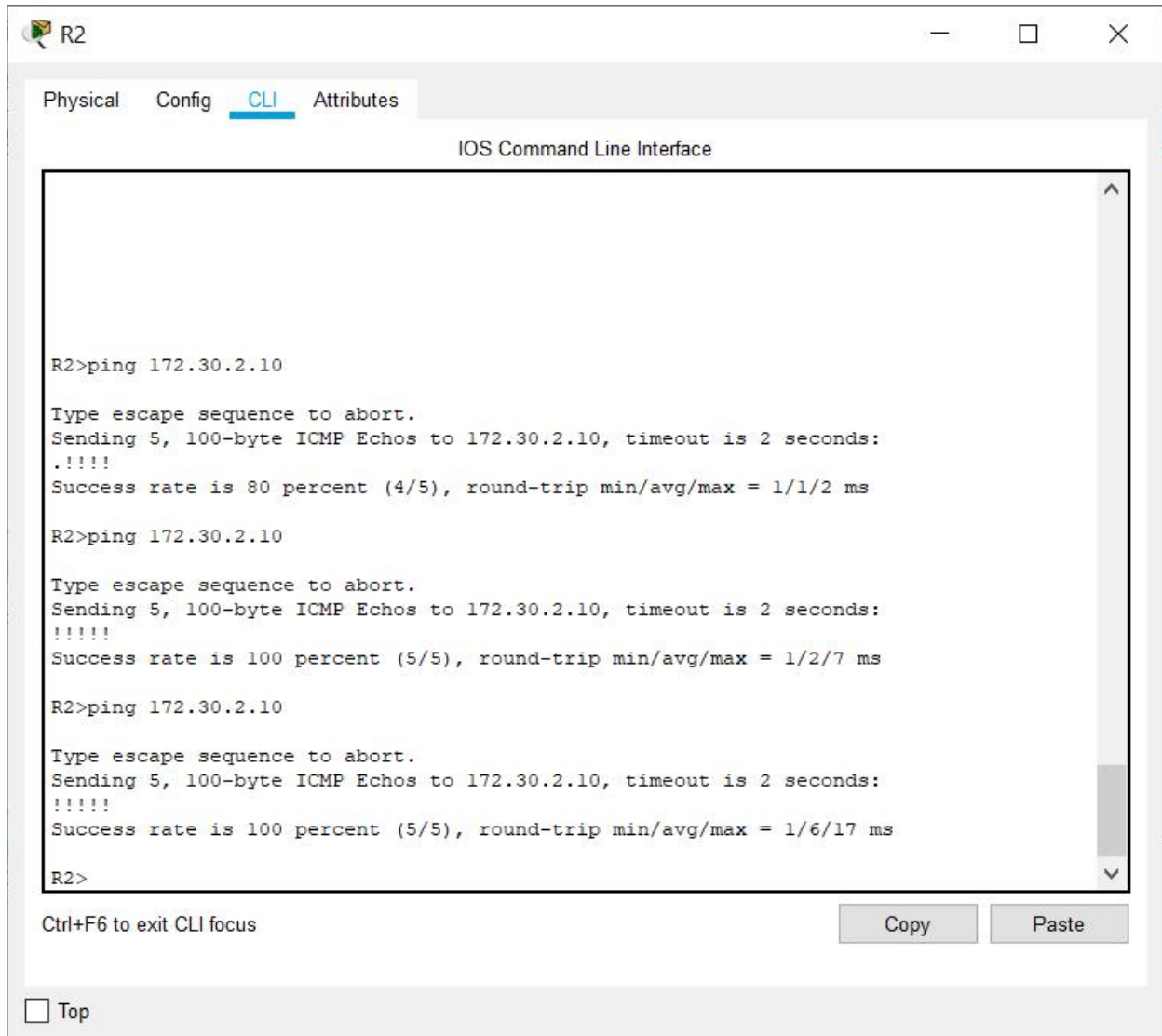
Yes

Task 8: Verify Network Connectivity.

Step 1: Check connectivity between R2 router and PCs.

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

4 out of 5 messages are sent the first time followed by 5 out of 5 messages each time.



R2

Physical Config CLI Attributes

IOS Command Line Interface

```
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 80 percent (4/5), round-trip min/avg/max = 1/1/2 ms

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 = 1/2/7 ms

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 = 1/6/17 ms

R2>
```

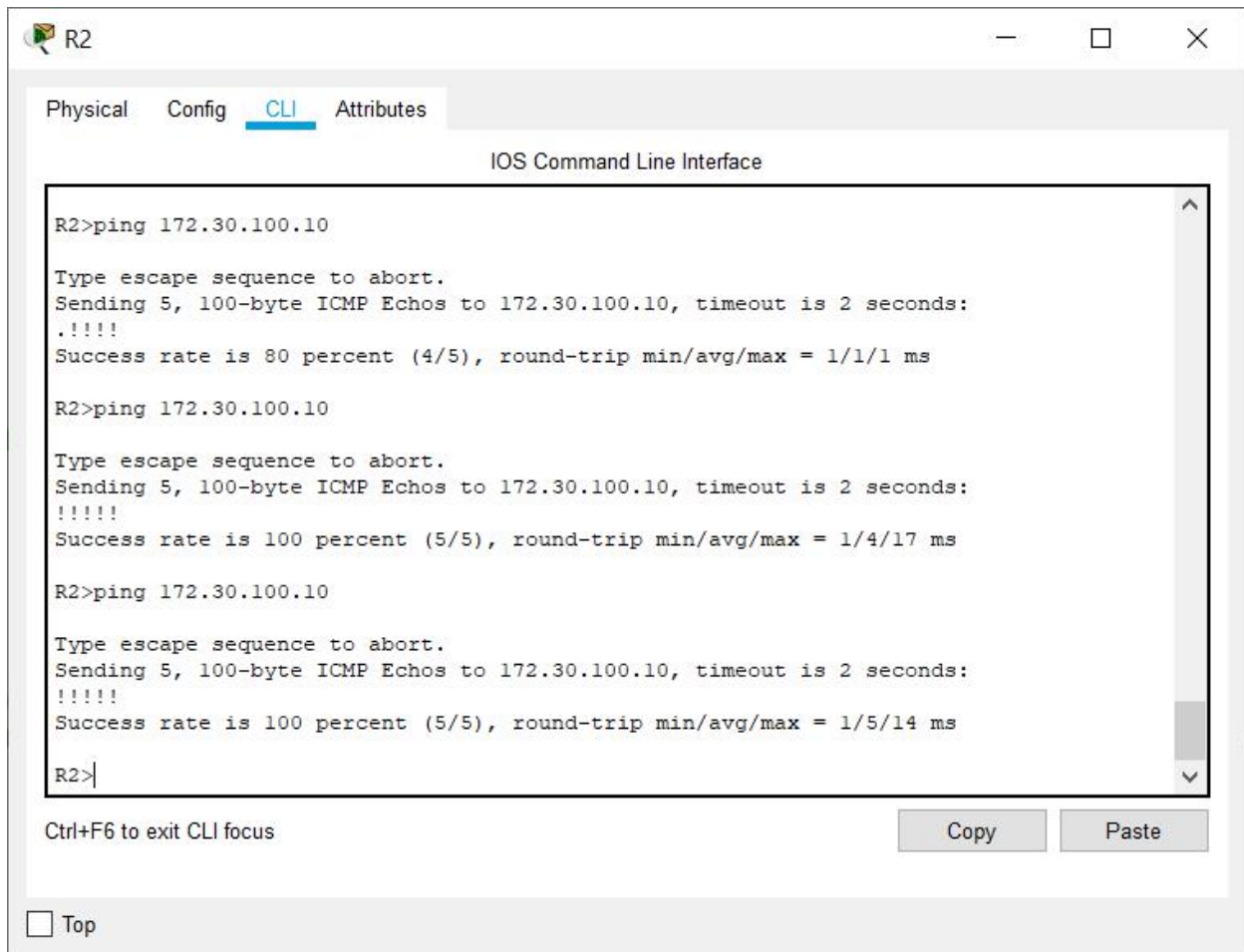
Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

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

4 out of 5 messages are sent the first time followed by 5 out of 5 messages each time.



R2

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:
!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 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 = 1/4/17 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 = 1/5/14 ms

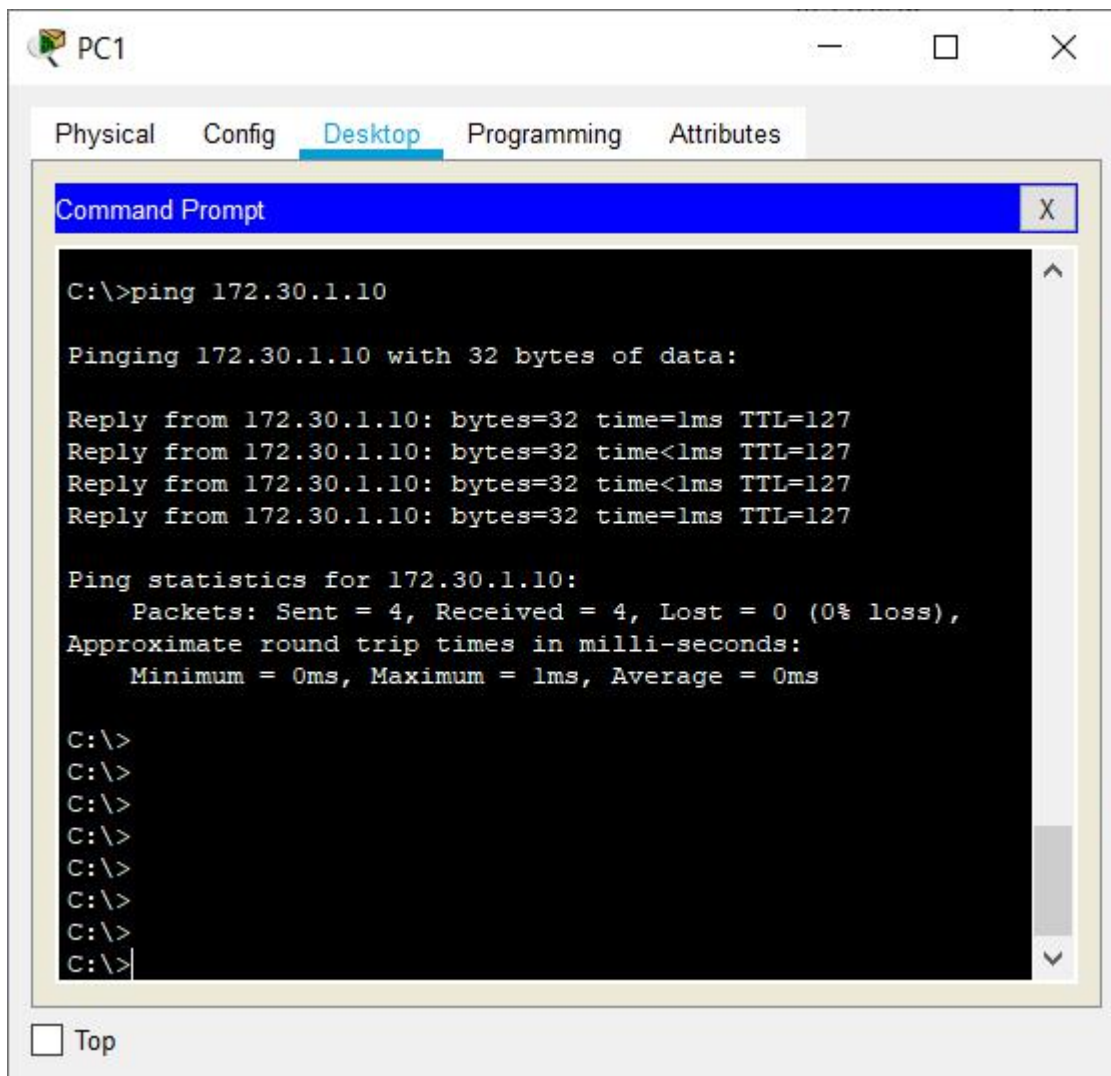
R2>
```

Ctrl+F6 to exit CLI focus

Copy Paste

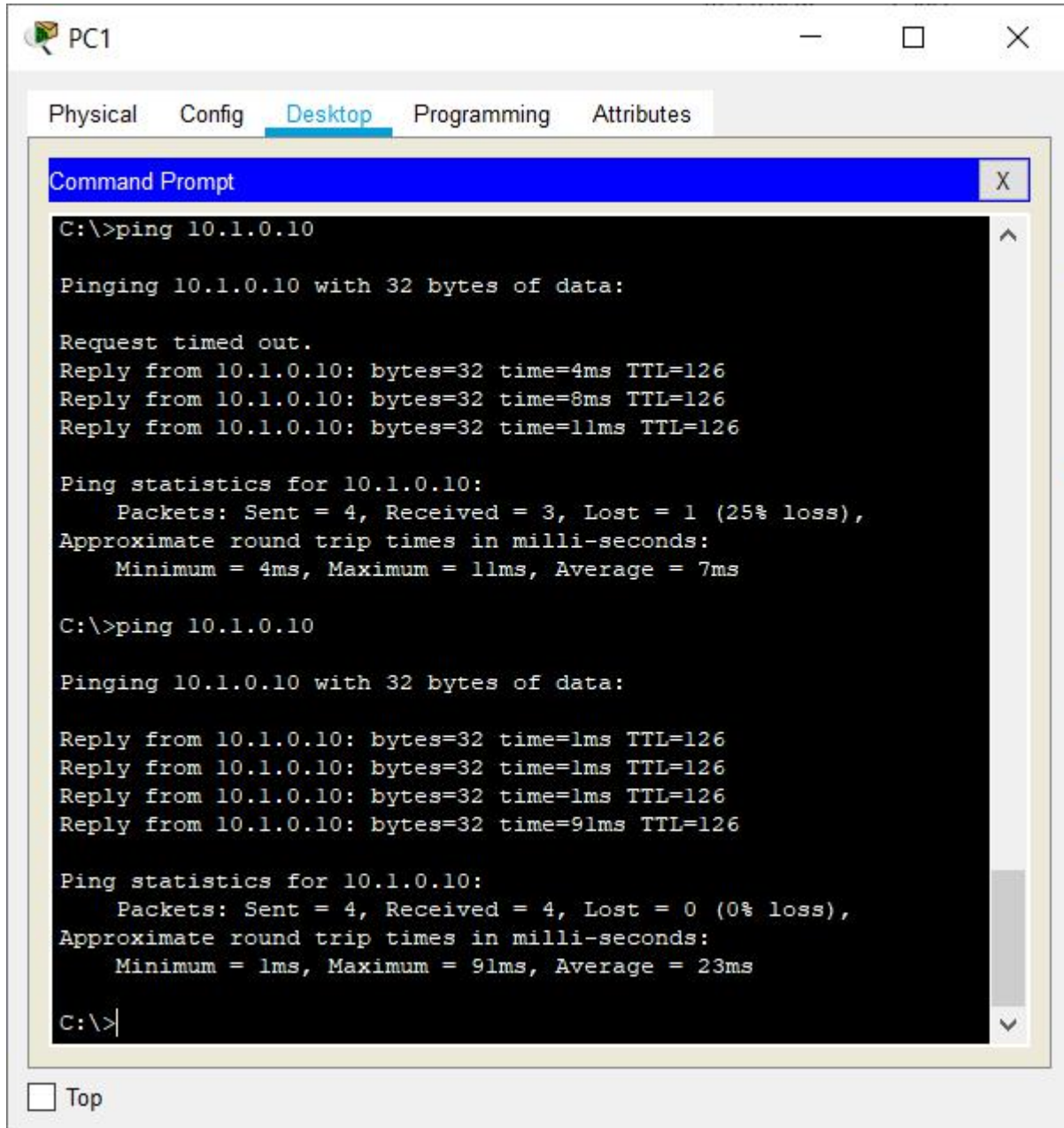
☐ Top

What is the success rate? 100%



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

What is the success rate? **75% the first time, followed by 100%**



PC1

Physical Config **Desktop** Programming Attributes

Command Prompt

```
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=4ms TTL=126
Reply from 10.1.0.10: bytes=32 time=8ms TTL=126
Reply from 10.1.0.10: bytes=32 time=11ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 11ms, Average = 7ms

C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

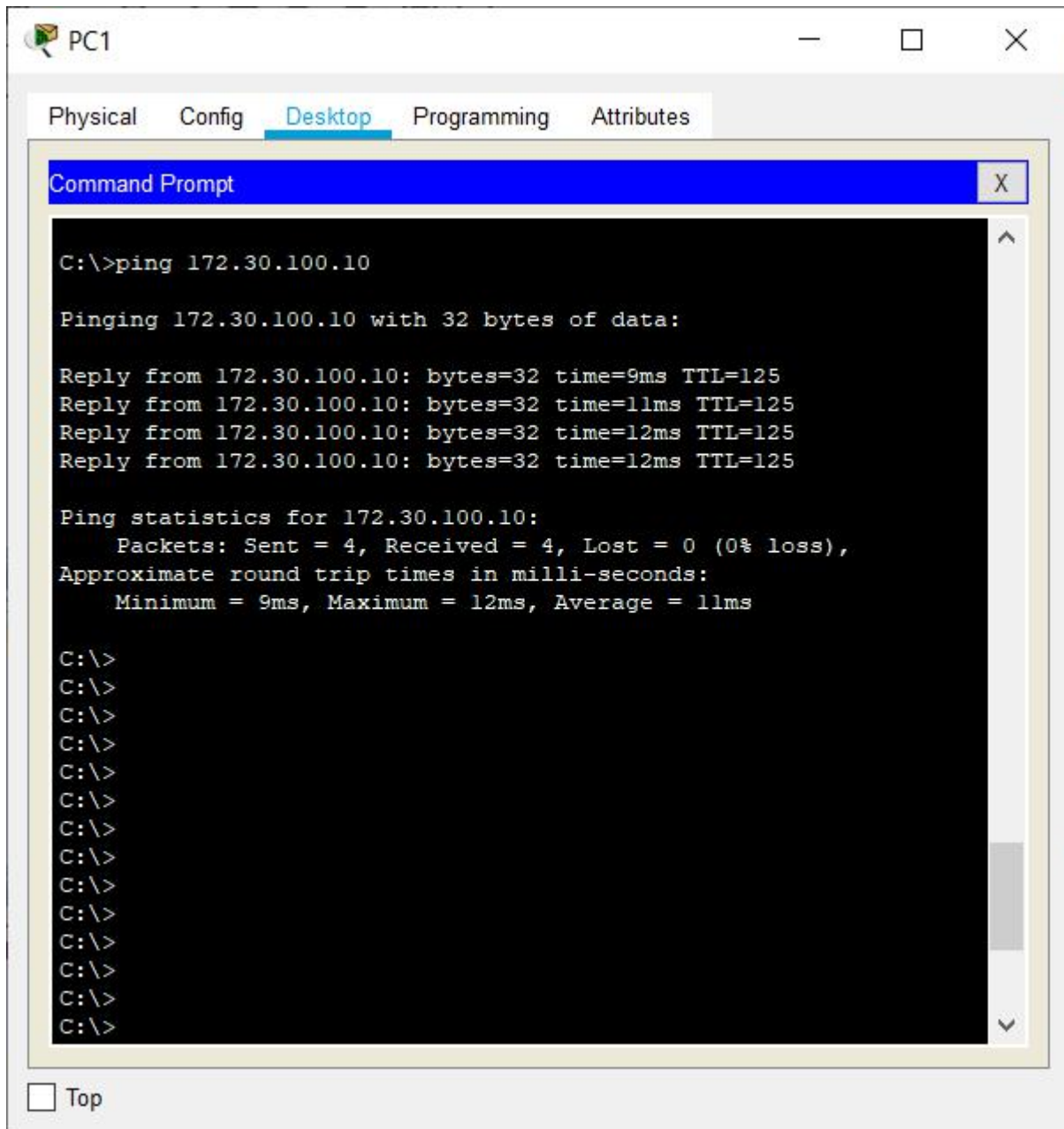
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126
Reply from 10.1.0.10: bytes=32 time=91ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 91ms, Average = 23ms

C:\>
```

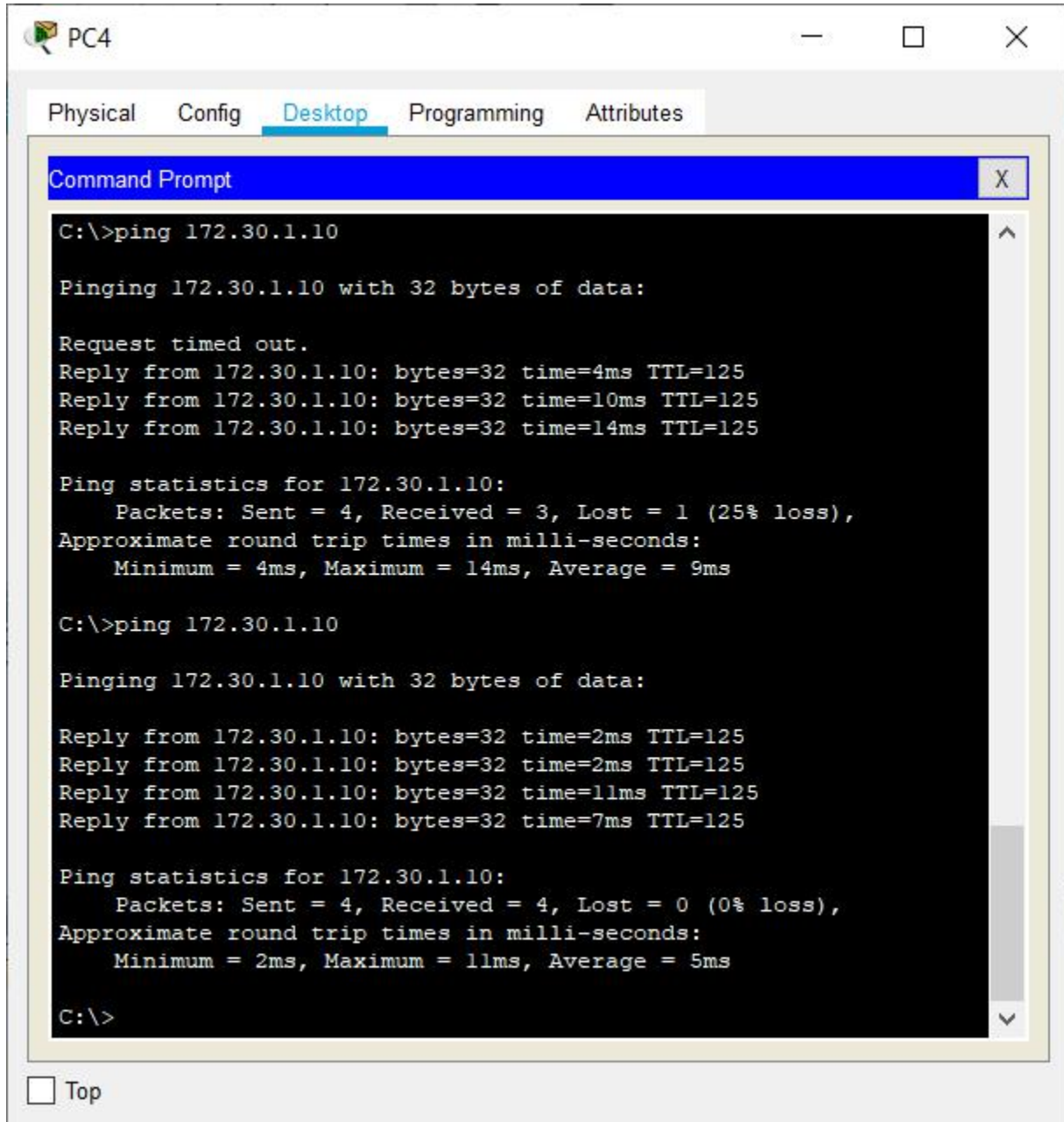
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What is the success rate? 100%



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

What is the success rate? **75% the first time, followed by 100%**



The screenshot shows a window titled "PC4" with a tabbed interface. The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows two ping commands to 172.30.1.10. The first command results in a 25% loss (1 out of 4 packets), and the second command results in a 0% loss (4 out of 4 packets).

```
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Request timed out.
Reply from 172.30.1.10: bytes=32 time=4ms TTL=125
Reply from 172.30.1.10: bytes=32 time=10ms TTL=125
Reply from 172.30.1.10: bytes=32 time=14ms TTL=125

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, 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=2ms TTL=125
Reply from 172.30.1.10: bytes=32 time=2ms TTL=125
Reply from 172.30.1.10: bytes=32 time=11ms TTL=125
Reply from 172.30.1.10: bytes=32 time=7ms TTL=125

Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 11ms, Average = 5ms

C:\>
```

☐ Top

What is the success rate? 100%

Task 9: Documentation

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

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

All these outputs have been captured in txt files (named Router_R_command.txt where R can be R1, R2 and R3 and the commands are as above) and saved in the same folder as the document.

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

1) `show running-config`,

For R1

R1#show running-config

Building configuration...

Current configuration : 885 bytes

!

version 12.4

no service timestamps log datetime msec

no service timestamps debug datetime msec

no service password-encryption

!

hostname R1

!

!

!

!

!

!

!

!

no ip cef

no ipv6 cef

!

!

!

!

!

!

!

!

!

!

```
!  
!  
spanning-tree mode pvst  
!  
!  
!  
!  
!  
!  
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  
!  
ip flow-export version 9  
!  
!  
!  
!
```

```
!  
!  
!  
!  
line con 0  
!  
line aux 0  
!  
line vty 0 4  
login  
!  
!  
!  
end
```

For R2

R2#show running-config

Building configuration...

Current configuration : 831 bytes

```
!  
version 12.4  
no service timestamps log datetime msec  
no service timestamps debug datetime msec  
no service password-encryption  
!  
hostname R2  
!  
!  
!  
!  
!  
!  
!  
!  
no ip cef  
no ipv6 cef  
!  
!  
!  
!  
!  
!  
!
```



```
!  
!  
!  
!  
spanning-tree mode pvst  
!  
!  
!  
!  
!  
!  
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  
!  
!  
!  
!
```

```
!  
!  
!  
!  
line con 0  
!  
line aux 0  
!  
line vty 0 4  
login  
!  
!  
!  
end
```

For R3

R3#show running-config

Building configuration...

Current configuration : 1011 bytes

```
!  
version 12.4  
no service timestamps log datetime msec  
no service timestamps debug datetime msec  
no service password-encryption  
!  
hostname R3  
!  
!  
!  
!  
!  
!  
!  
!  
no ip cef  
no ipv6 cef  
!  
!  
!  
!  
!  
!  
!  
!  
!
```

```
!  
!  
!  
spanning-tree mode pvst  
!  
!  
!  
!  
!  
!  
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  
!  
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  
network 209.165.200.0
```

```

no auto-summary
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
!
!
end

```

2) show ip route

For 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, 00:00:20, 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, 00:00:20, Serial0/0/0
R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:20, Serial0/0/0
R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:20, Serial0/0/0

```

R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:20, 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, 00:00:20, Serial0/0/0

For R2

R2#show ip route

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

Gateway of last resort is not set

10.0.0.0/16 is subnetted, 1 subnets
C 10.1.0.0 is directly connected, FastEthernet0/0
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R 172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R 172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R 172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R 172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R 172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:10, 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

For 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, 00:00:28, 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, 00:00:28, Serial0/0/1
R    172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:28, 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, 00:00:28, Serial0/0/1
C    209.165.200.232 is directly connected, Serial0/0/1

```

3) show ip interface brief

For 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

For R2

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

For R3

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

4) show ip protocols,

For R1

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	00:00:10	
-----------------	-----	----------	--

Distance: (default is 120)

For R2

R2#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 25 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	00:00:19
209.165.200.234	120	00:00:25

Distance: (default is 120)

For R3

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	00:00:03

Distance: (default is 120)

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.

Task 10 is a good practice in real life where the devices are reused by engineers for different setups. In our case, it is not needed as we are in a simulation.