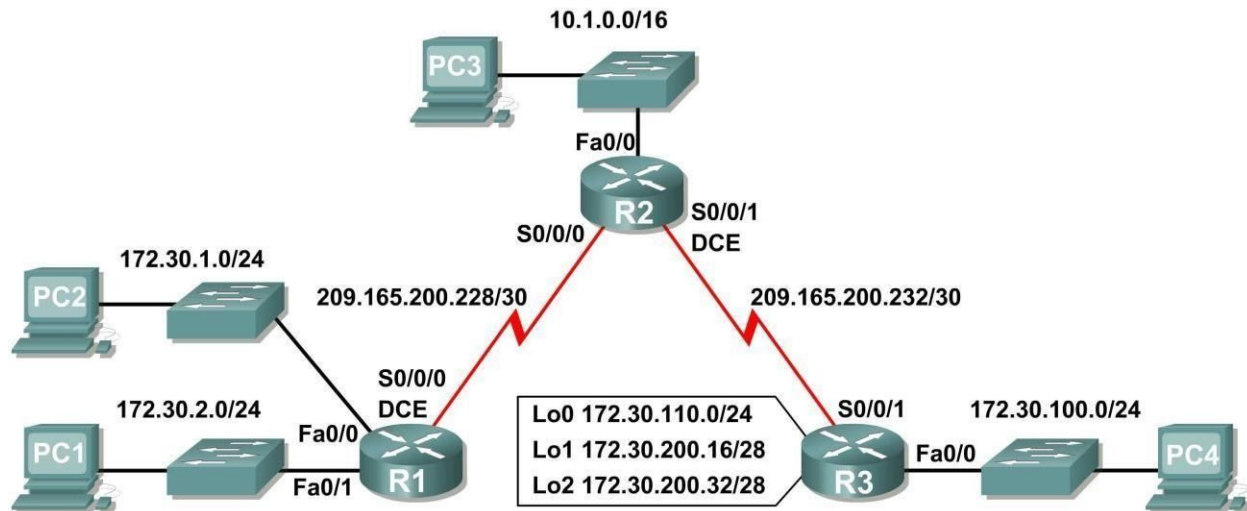


Name: Shivangi Kochrekar
 UID: 2018130020
 CEL 51, DCCN, Monsoon 2020
 Lab 7: RIPv2 Router Configuration

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	172.30.1.10	255.255.255.0	172.30.2.1
PC2	NIC	172.30.2.10	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:

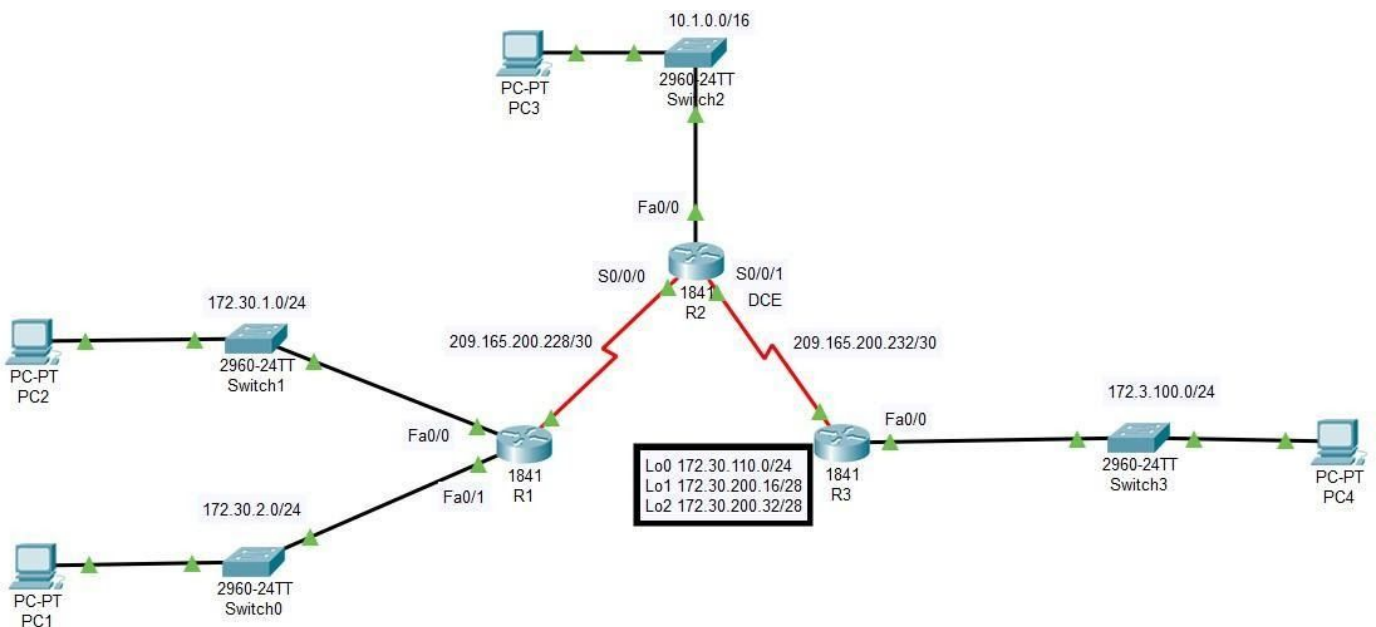
- Cable a network according to the Topology Diagram.
- Load provided scripts onto the routers.
- Examine the current status of the network.
- Configure RIPv2 on all routers.
- Examine the automatic summarization of routes.
- Examine routing updates with `debug ip rip`.
- Disable automatic summarization.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

Scenario

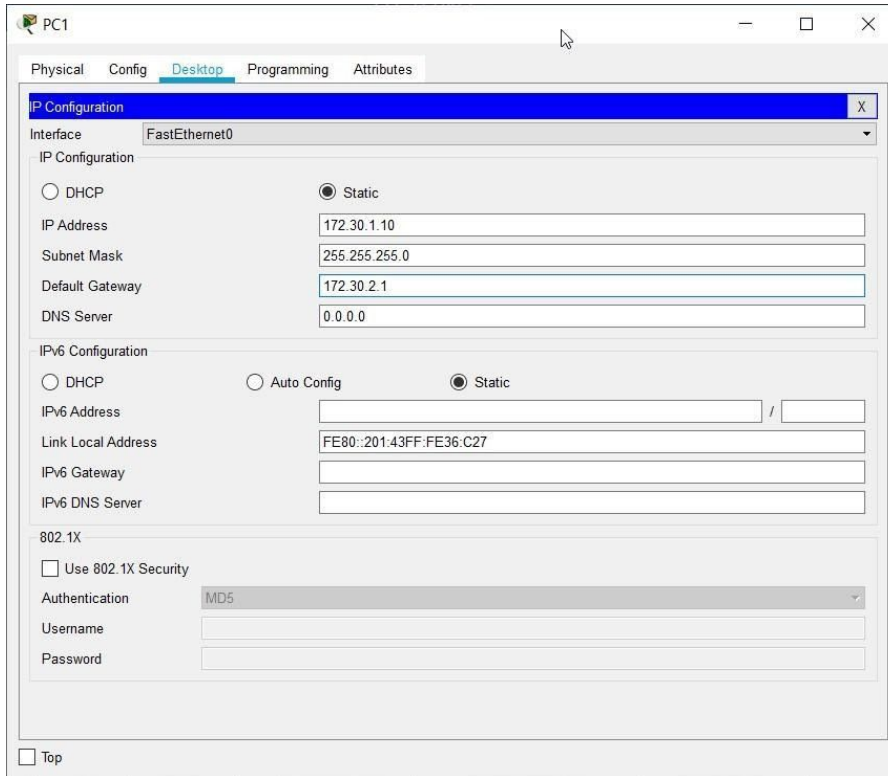
The network shown in the Topology Diagram contains a discontinuous network, 172.30.0.0. This network has been subnetted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and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



PC1 config



PC1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 172.30.1.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::201:43FF:FE36:C27

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

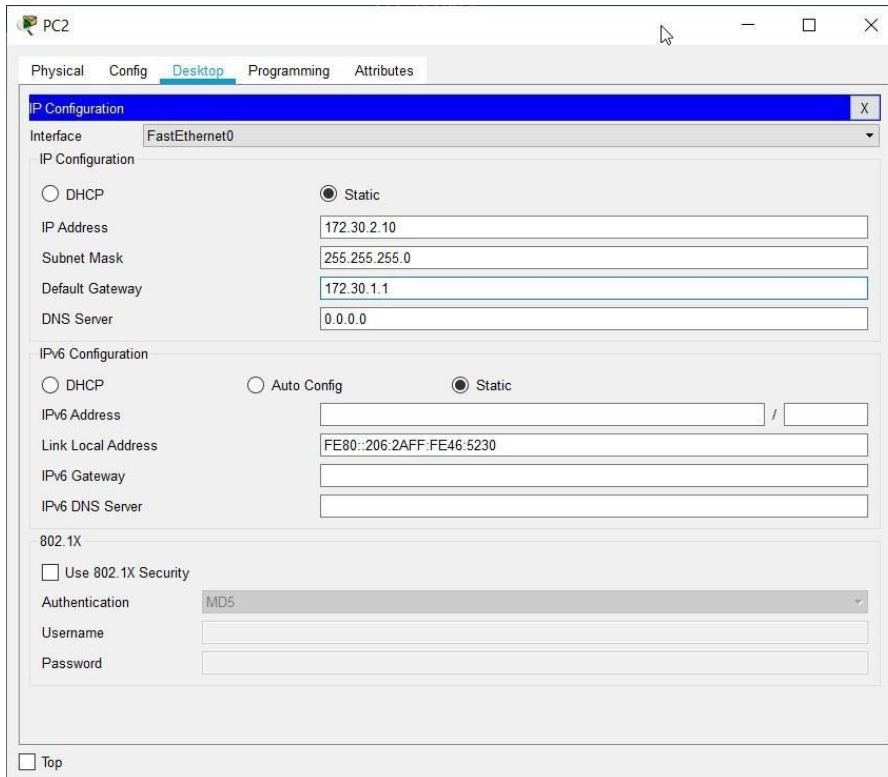
Authentication MD5

Username

Password

☐ Top

PC2 config



PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 172.30.2.10

Subnet Mask 255.255.255.0

Default Gateway 172.30.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::206:2AFF:FE46:5230

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC3 config

PC3

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP 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

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:97FF:FE02:6598

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC4 config

PC4

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP 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

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2E0:A3FF:FE52:B6D7

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

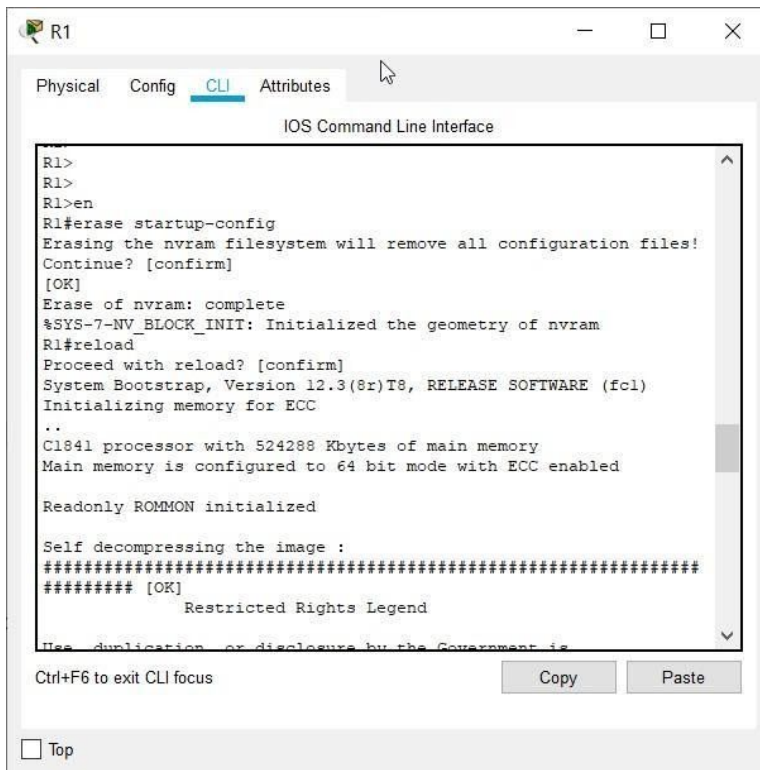
Username

Password

☐ Top

Step 2: Clear the configuration on each router.

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



The screenshot shows the CLI of router R1. The user has entered the command `erase startup-config`, which prompts for confirmation to erase the nvram filesystem. After confirming, the system erases the nvram, initializes the geometry, and then reloads. The reload process shows the system bootstrap version 12.3(8r)T8, initializing memory for ECC, and displaying the ROMMON and self-decompressing image status. The output ends with the Restricted Rights Legend.

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

Readonly ROMMON initialized

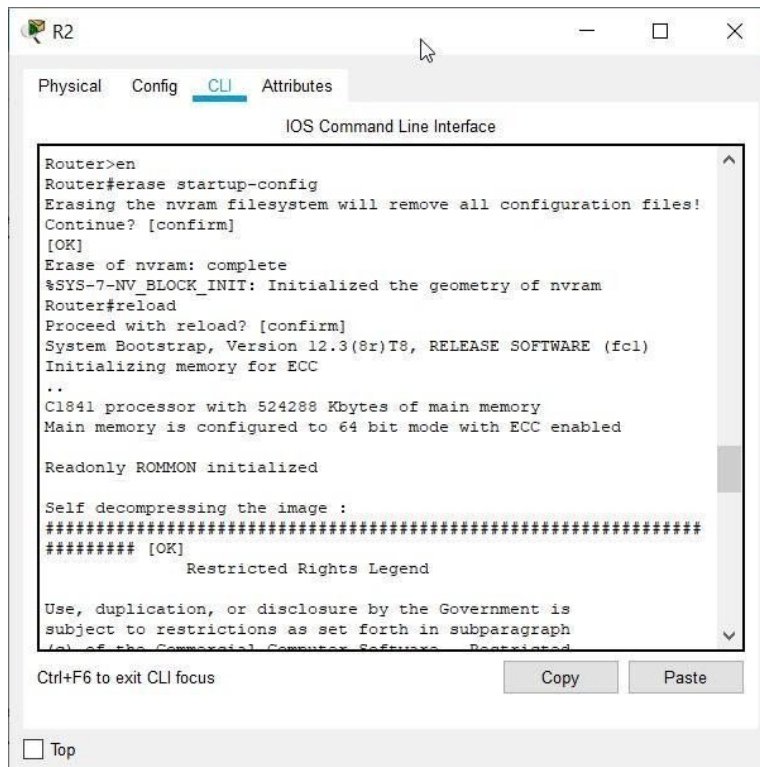
Self decompressing the image :
#####
##### [OK]
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top



The screenshot shows the CLI of router R2. The user has entered the command `erase startup-config`, which prompts for confirmation to erase the nvram filesystem. After confirming, the system erases the nvram, initializes the geometry, and then reloads. The reload process shows the system bootstrap version 12.3(8r)T8, initializing memory for ECC, and displaying the ROMMON and self-decompressing image status. The output ends with the Restricted Rights Legend.

```
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#reload
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Initializing memory for ECC
..
C1841 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

Readonly ROMMON initialized

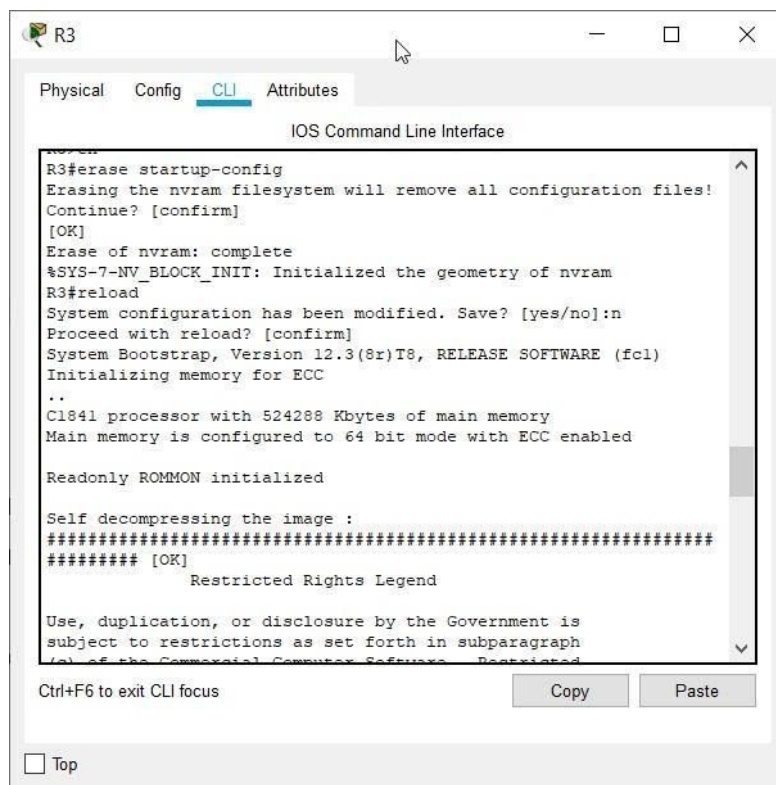
Self decompressing the image :
#####
##### [OK]
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(a) of the Commercial Computer Software - Restricted
```

Ctrl+F6 to exit CLI focus

Copy Paste

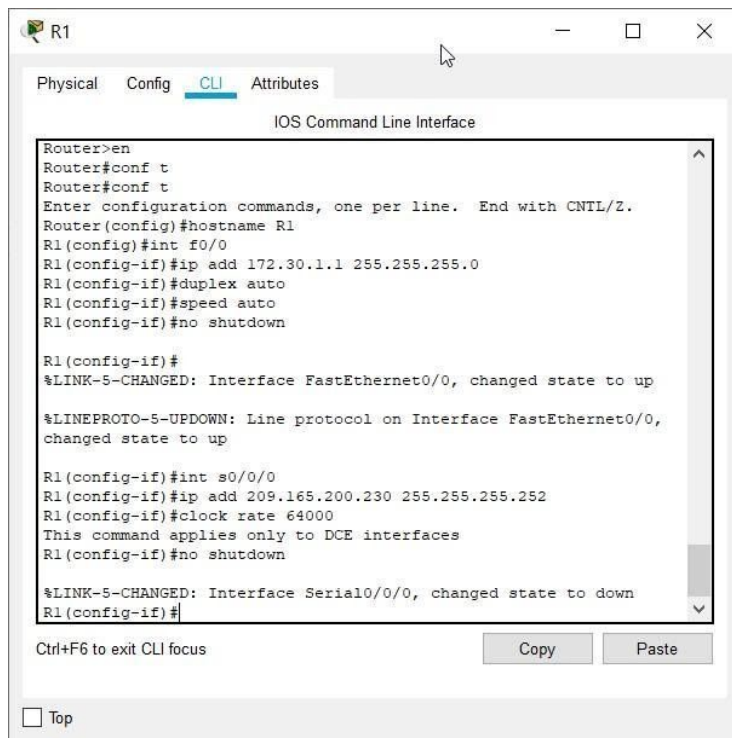
☐ Top



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
```



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

```
Router>en
Router#conf t
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#int f0/0
R1(config-if)#ip add 172.30.1.1 255.255.255.0
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#no shutdown

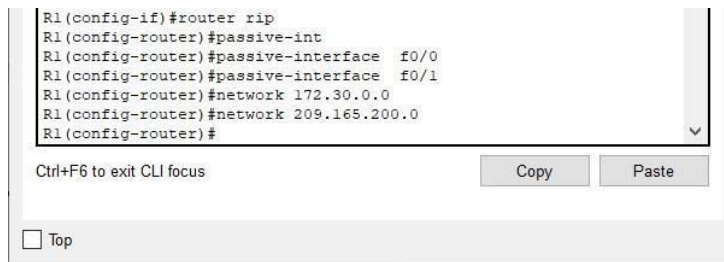
R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

R1(config-if)#int s0/0/0
R1(config-if)#ip add 209.165.200.230 255.255.255.252
R1(config-if)#clock rate 64000
This command applies only to DCE interfaces
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#
```

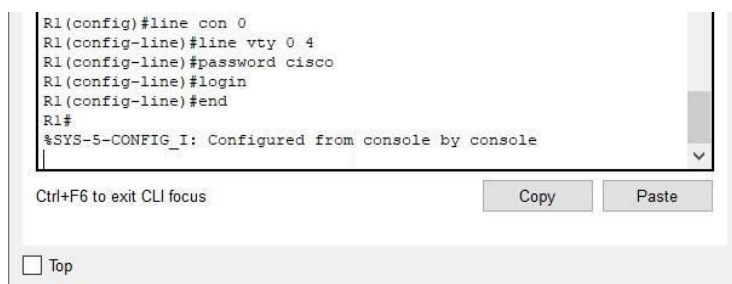
Below the terminal window, there is a 'Ctrl+F6 to exit CLI focus' label, 'Copy' and 'Paste' buttons, and a 'Top' button.



The screenshot shows a terminal window with the following commands and outputs:

```
R1(config-if)#router rip
R1(config-router)#passive-int
R1(config-router)#passive-interface f0/0
R1(config-router)#passive-interface f0/1
R1(config-router)#network 172.30.0.0
R1(config-router)#network 209.165.200.0
R1(config-router)#
```

Below the terminal window, there is a 'Ctrl+F6 to exit CLI focus' label, 'Copy' and 'Paste' buttons, and a 'Top' button.



The screenshot shows a terminal window with the following commands and outputs:

```
R1(config)#line con 0
R1(config-line)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
```

Below the terminal window, there is a 'Ctrl+F6 to exit CLI focus' label, 'Copy' and 'Paste' buttons, and a 'Top' button.

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
```



The screenshot shows a Cisco Packet Tracer window titled "R2" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, showing the "IOS Command Line Interface" for router R2. The configuration commands and their outputs are as follows:

```
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#hostname R2  
R2(config)#  
R2(config)#  
R2(config)#int f0/0  
R2(config-if)#ip add 10.1.0.1 255.255.0.0  
R2(config-if)#duplex auto  
R2(config-if)#speed auto  
R2(config-if)#no shutdown  
  
R2(config-if)#  
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,  
changed state to up  
  
R2(config-if)#int s0/0/0  
R2(config-if)#ip add 209.165.200.229 255.255.255.252  
R2(config-if)#no shutdown  
  
R2(config-if)#  
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up  
  
R2(config-if)#  
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,  
changed state to up  
  
R2(config-if)#int s0/0/1  
R2(config-if)#ip add 209.165.200.233 255.255.255.252  
R2(config-if)#clock rate 64000  
R2(config-if)#no shutdown  
  
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down  
R2(config-if)#  
R2(config-if)#router rip  
R2(config-router)#passive-int  
R2(config-router)#passive-interface f0/0  
R2(config-router)#network 10.0.0.0  
R2(config-router)#network 209.165.200.0  
R2(config-router)#exit  
R2(config)#line con 0  
R2(config-line)#line vty 0 4  
R2(config-line)#password cisco  
R2(config-line)#login  
R2(config-line)#end  
R2#  
%SYS-5-CONFIG_I: Configured from console by console
```

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

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
```

```
Router(config)#
Router(config)#
Router(config)#
Router(config)#hostname R3
R3(config)#int f0/0
R3(config-if)#ip add 172.30.100.1 255.255.255.0
R3(config-if)#duplex auto
R3(config-if)#speed auto
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

R3(config-if)#int s0/0/1
R3(config-if)#ip add 209.165.200.234 255.255.255.252
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

R3(config-if)#int lo0
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1,
changed state to up

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up
ip add 172.30.110.1 255.255.255.0
R3(config-if)#int lo1

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up
ip add 172.30.200.17
% Incomplete command.
R3(config-if)#ip add 172.30.200.17 255.255.255.240
R3(config-if)#ip add 172.30.200.33 255.255.255.240
^
% Invalid input detected at '^' marker.

R3(config-if)#
R3(config-if)#router rip
R3(config-router)#passiv
R3(config-router)#passive-interface f0/0
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

```
R3(config-if)#router rip
R3(config-router)#passiv
R3(config-router)#passive-interface f0/0
R3(config-router)#network 172.30.0.0
R3(config-router)#network 209.165.200.0
R3(config-router)#exit
R3(config)#line con 0
R3(config-line)#line vty 0 4
R3(config-line)#exit
R3(config)#login
R3(config)#password cisco
R3(config)#
% Invalid input detected at '^' marker.
R3(config)#ex
R3#
%SYS-5-CONFIG_I: Configured from console by console
R3#password cisco
R3#
% Invalid input detected at '^' marker.
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#password cisco
R3(config)#
% Invalid input detected at '^' marker.
R3(config)#line vty 0 4
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console
|
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

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

Physical Config CLI Attributes

IOS Command Line Interface

```
R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#show ip interface brief
R2(config)#
% Invalid input detected at '^' marker.
R2(config)#ex
R2#
%SYS-5-CONFIG_I: Configured from console by console
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	NVRAM	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	NVRAM	administratively down	down

```
R2#
R2#
R2#
```

Ctrl+F6 to exit CLI focus

Copy Paste

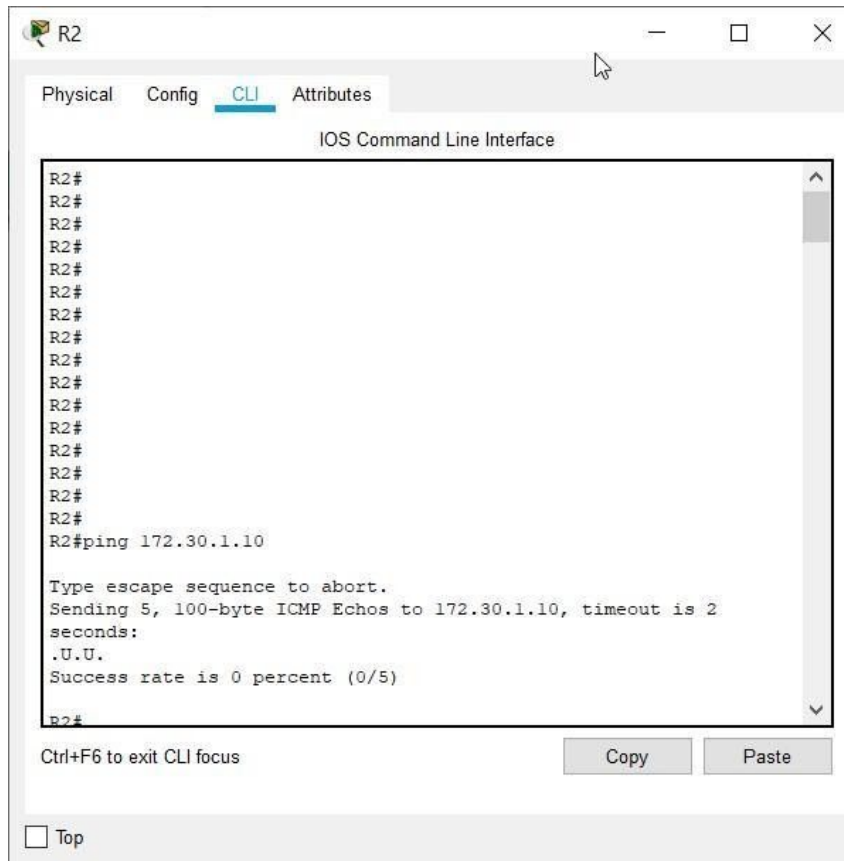
☐ Top

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:

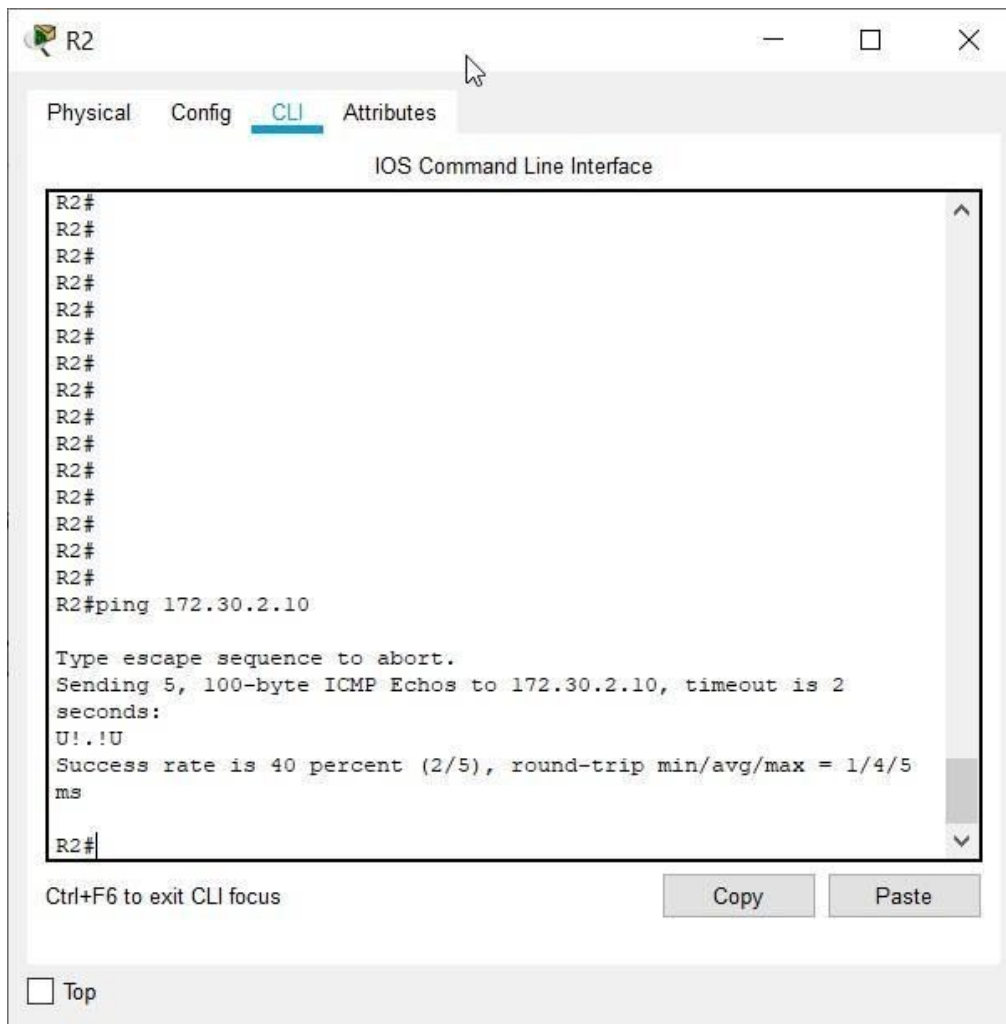
```
R2 (config) #no ip cef
```

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



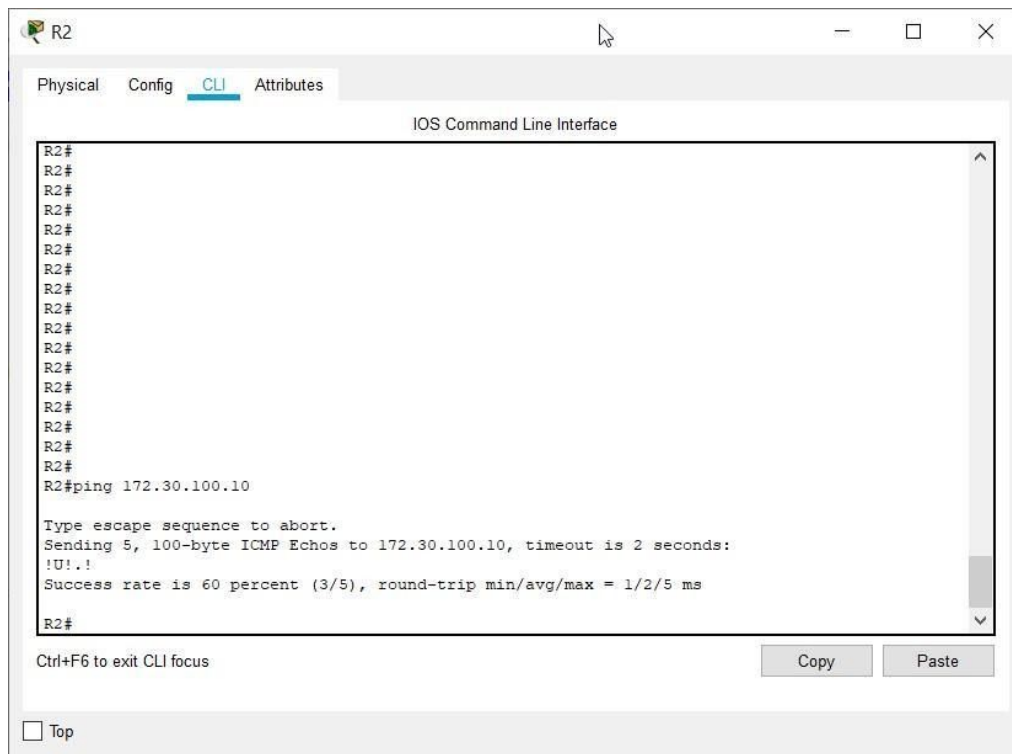
Here we encountered a problem, ping 172.30.1.10 gave 0% success rate, we note that initially 172.30.1.10 doesn't belong to the 172.30.2.10/24 subnet,

So to rectify this, we exchange the IP addresses of PC1 and PC2



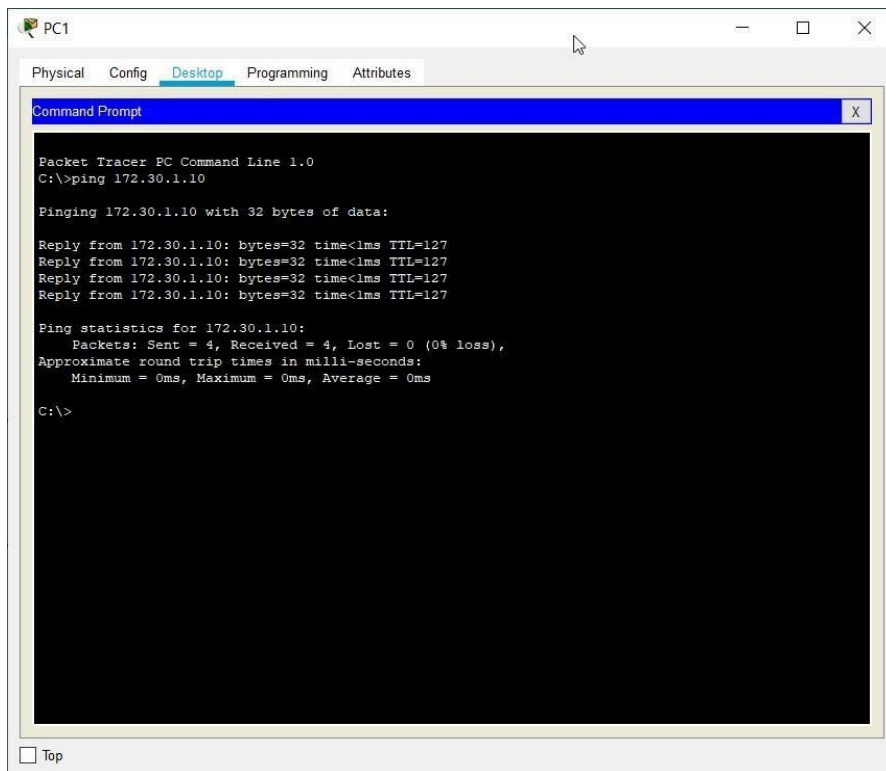
2/5 messages are successful when pingng PC1

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



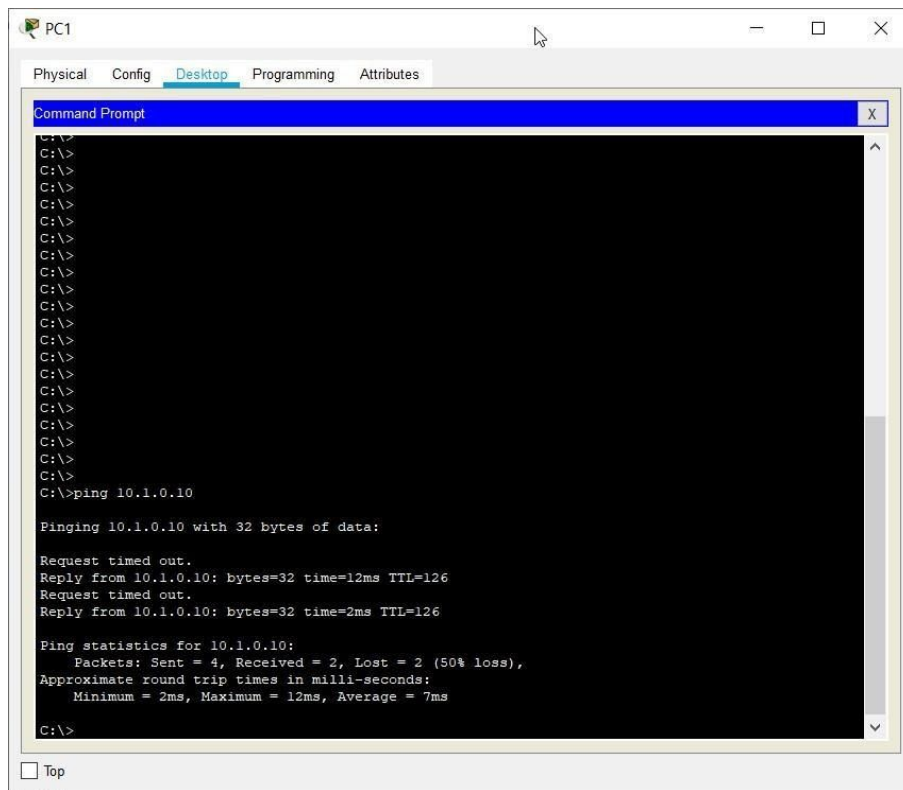
3/5 messages are successful when pingng PC4

Step 3: Check the connectivity between the PCs.



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

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



The screenshot shows a window titled 'PC1' with tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The 'Desktop' tab is active, displaying a 'Command Prompt' window. The command prompt shows a series of 'C:\>' prompts followed by the command 'C:\>ping 10.1.0.10'. The output indicates that two out of four packets were received, resulting in a 50% success rate.

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

Pinging 10.1.0.10 with 32 bytes of data:

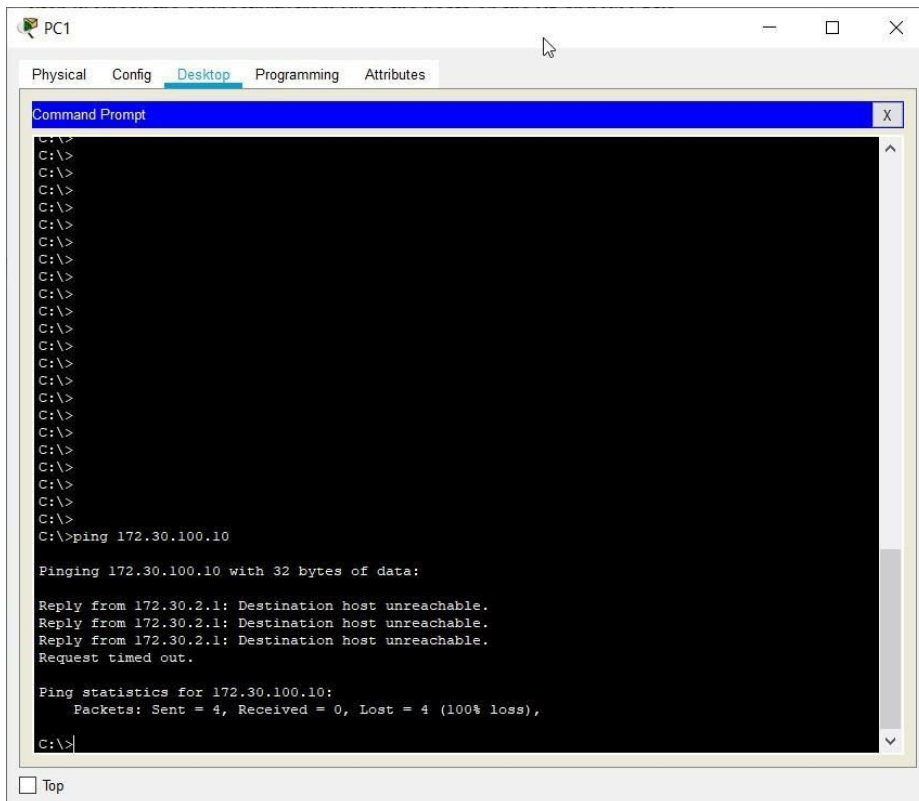
Request timed out.
Reply from 10.1.0.10: bytes=32 time=12ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=2ms TTL=126

Ping statistics for 10.1.0.10:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 12ms, Average = 7ms

C:\>
```

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

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



The screenshot shows a window titled 'PC1' with tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The 'Desktop' tab is active, displaying a 'Command Prompt' window. The command prompt shows a series of 'C:\>' prompts followed by the command 'C:\>ping 172.30.100.10'. The output indicates that all four packets were lost, resulting in a 100% failure rate.

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

Pinging 172.30.100.10 with 32 bytes of data:

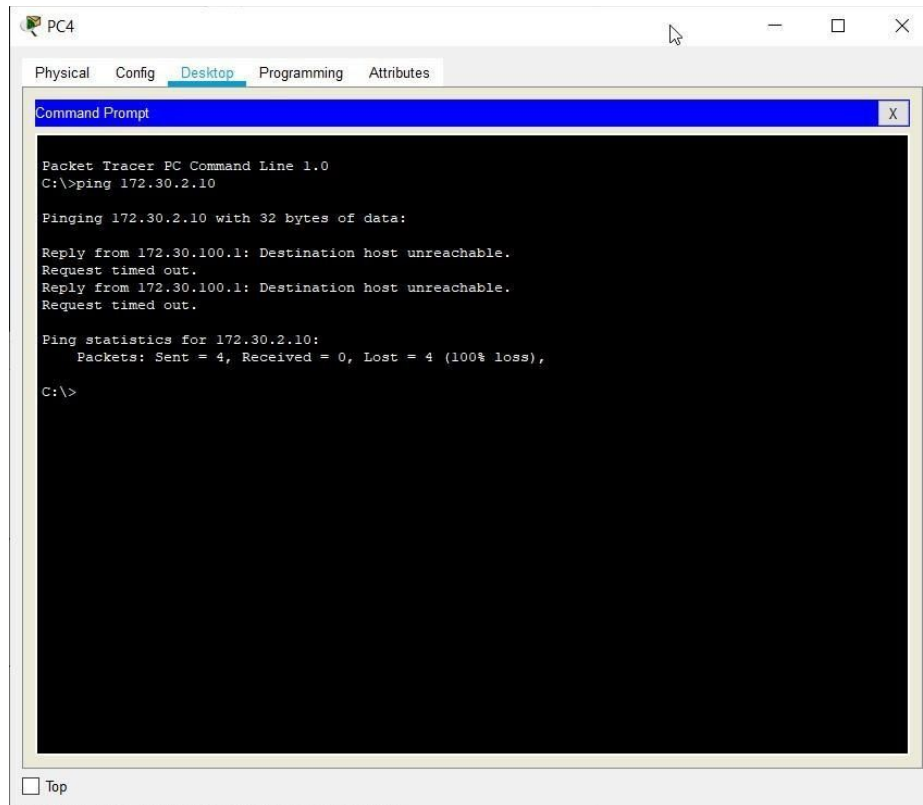
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Request timed out.

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

C:\>
```

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

What is the success rate? 0%



The screenshot shows a Packet Tracer PC4 window with the 'Desktop' tab selected. A Command Prompt window is open, displaying the results of a ping command to 172.30.2.10. The output shows four failed attempts, all with 'Destination host unreachable' and 'Request timed out' messages. The ping statistics indicate 4 packets sent, 0 received, and a 100% loss rate.

```
Packet Tracer PC Command Line 1.0
C:\>ping 172.30.2.10

Pinging 172.30.2.10 with 32 bytes of data:

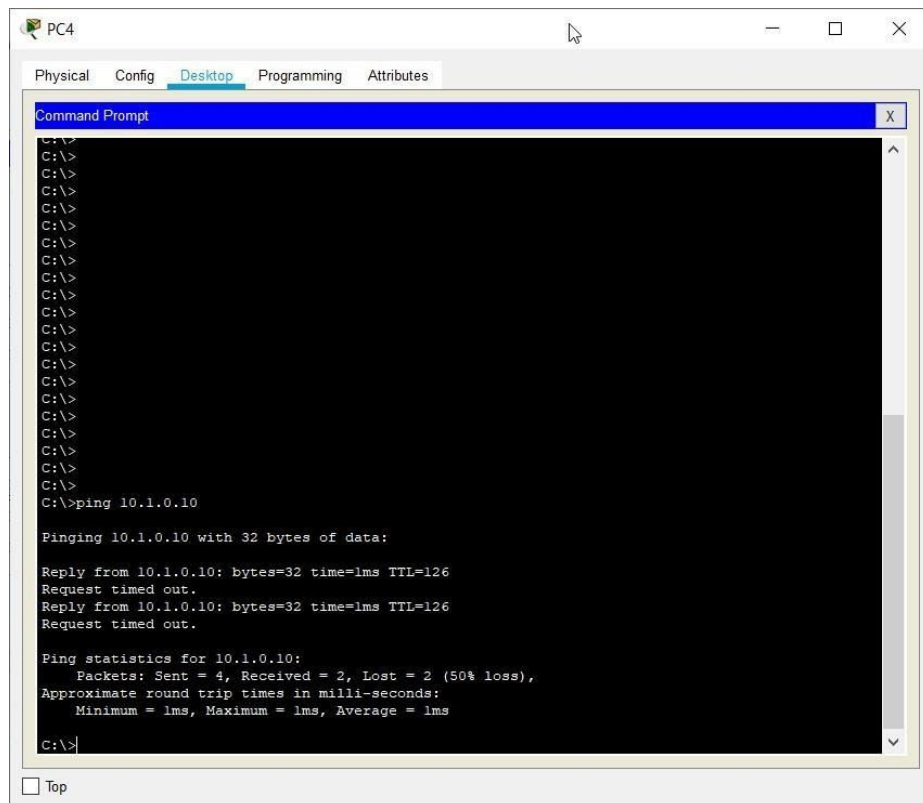
Reply from 172.30.100.1: Destination host unreachable.
Request timed out.
Reply from 172.30.100.1: Destination host unreachable.
Request timed out.

Ping statistics for 172.30.2.10:
    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 Packet Tracer PC4 window with the 'Desktop' tab selected. A Command Prompt window is open, displaying the results of a ping command to 10.1.0.10. The output shows four failed attempts, all with 'Request timed out' messages. The ping statistics indicate 4 packets sent, 2 received, and a 50% loss rate. The received packets show a round trip time of 1ms and a TTL of 126.

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

Pinging 10.1.0.10 with 32 bytes of data:

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

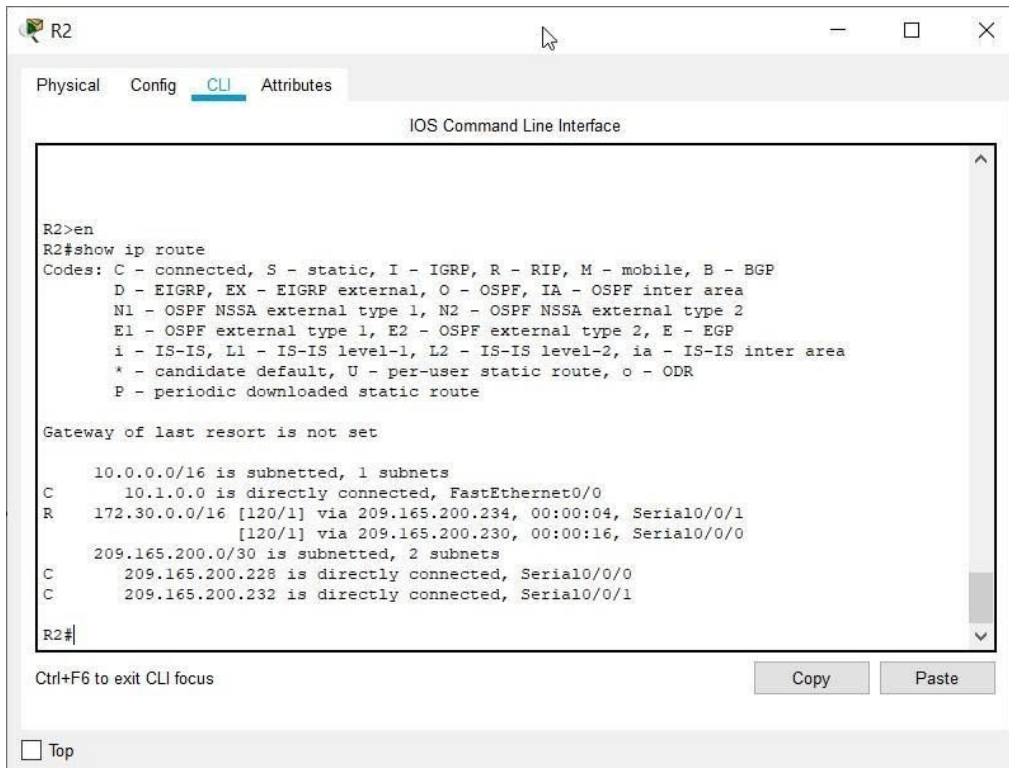
C:\>
```


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 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.

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 command 'R2>en' has been entered, followed by 'R2#show ip route'. The output shows the routing table for R2, including codes for various routing protocols, a gateway of last resort, and specific routes for 10.0.0.0/16, 10.1.0.0, and 172.30.0.0/16. The 172.30.0.0/16 route is shown with two entries, one via 209.165.200.234 and another via 209.165.200.230. The window also includes a 'Ctrl+F6 to exit CLI focus' prompt, 'Copy' and 'Paste' buttons, and a 'Top' button.

```
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

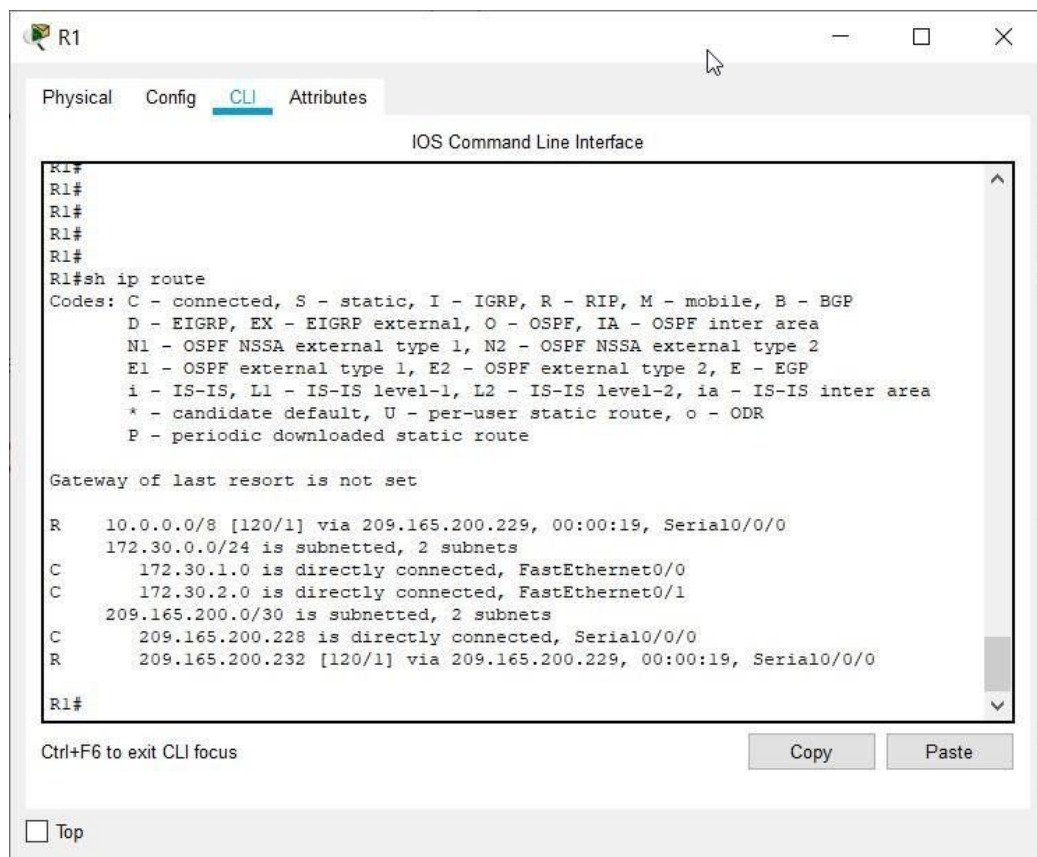
Gateway of last resort is not set

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 209.165.200.234, 00:00:04, Serial0/0/1
           [120/1] via 209.165.200.230, 00:00:16, Serial0/0/0
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.



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#sh ip route' has been entered, and the output is displayed. The output includes a list of codes for route types, a message 'Gateway of last resort is not set', and a list of routes. The routes are: 10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:19, 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, 00:00:19, 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' message and 'Copy' and 'Paste' buttons. At the bottom left, there is a 'Top' button.

```
R1#
R1#
R1#
R1#
R1#sh 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, 00:00:19, 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
     C    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, 00:00:19, Serial0/0/0

R1#
```

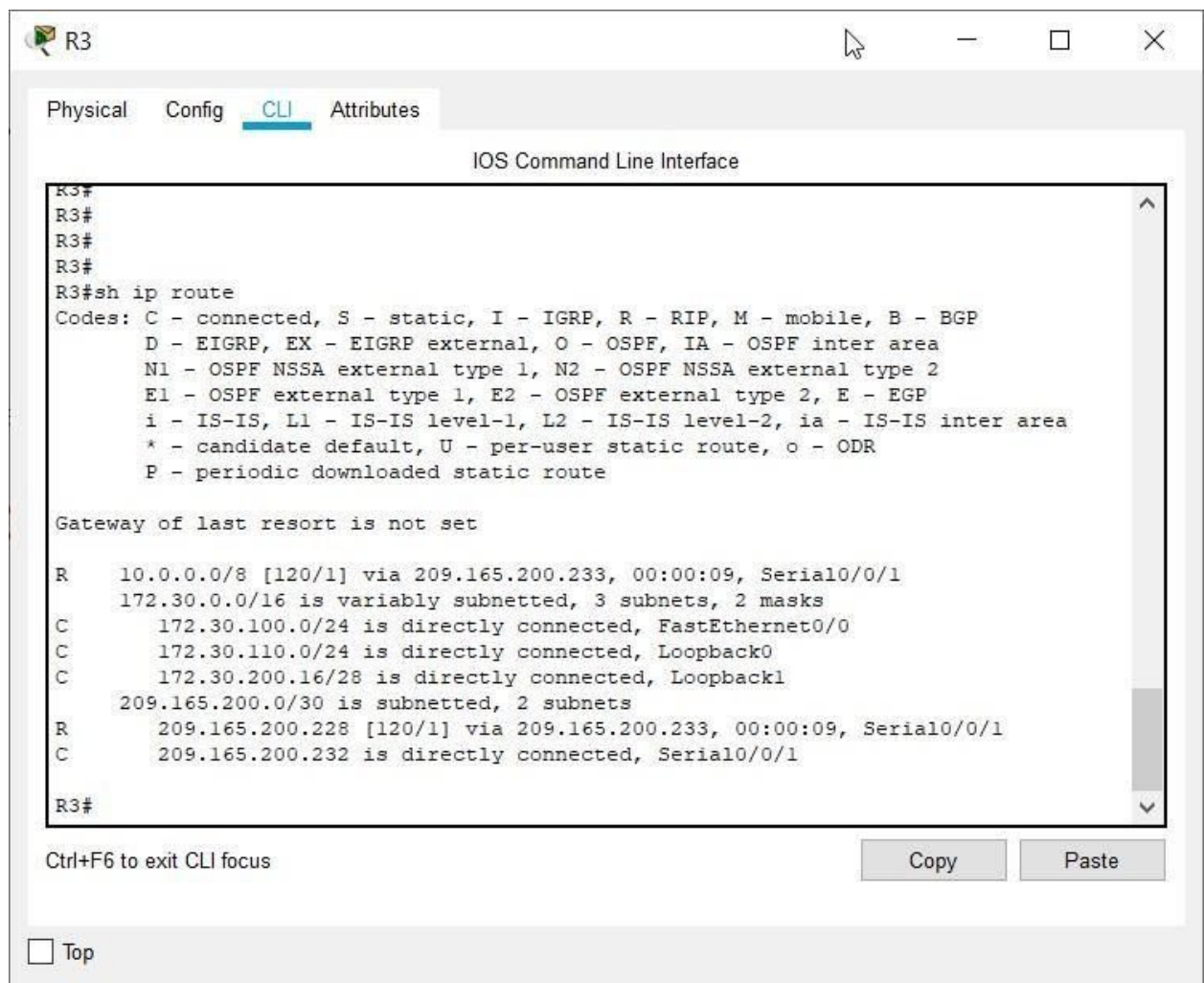
Ctrl+F6 to exit CLI focus

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.

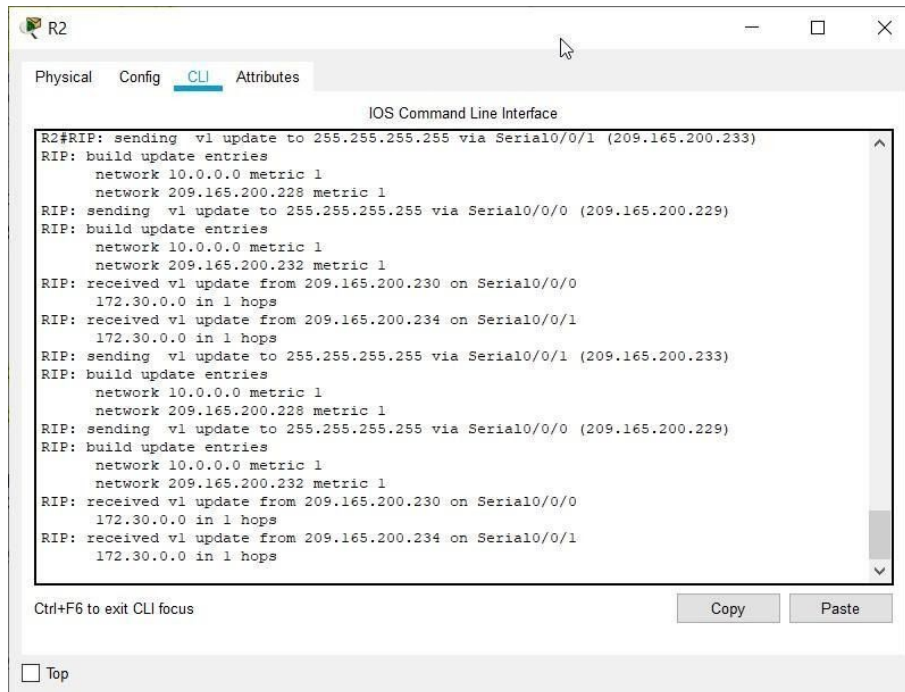


Step 7: Examine the RIPv1 packets that are being received by R2.

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

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

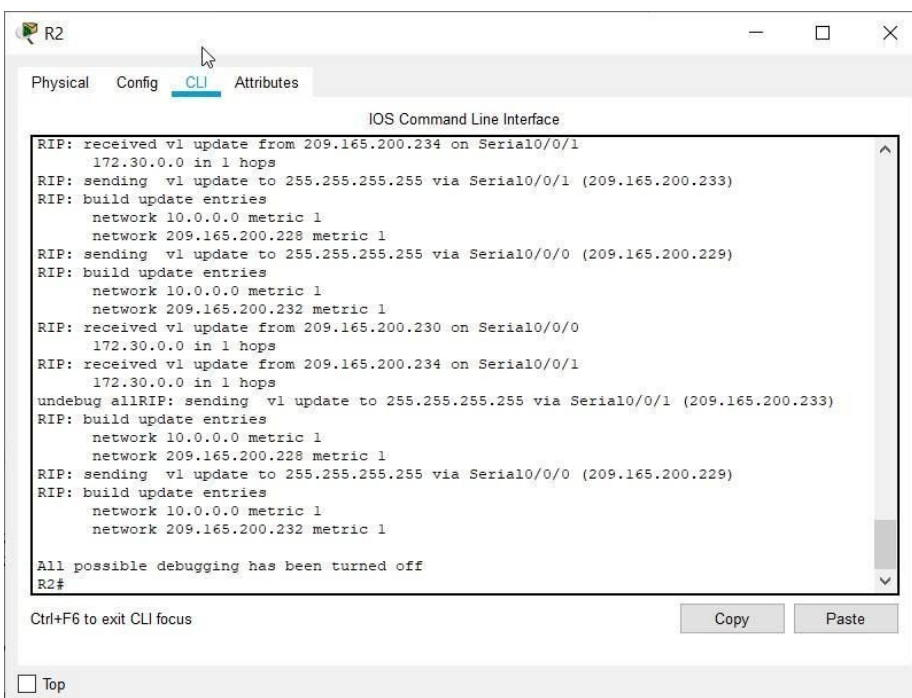
R2#**debug ip rip**



R2 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**

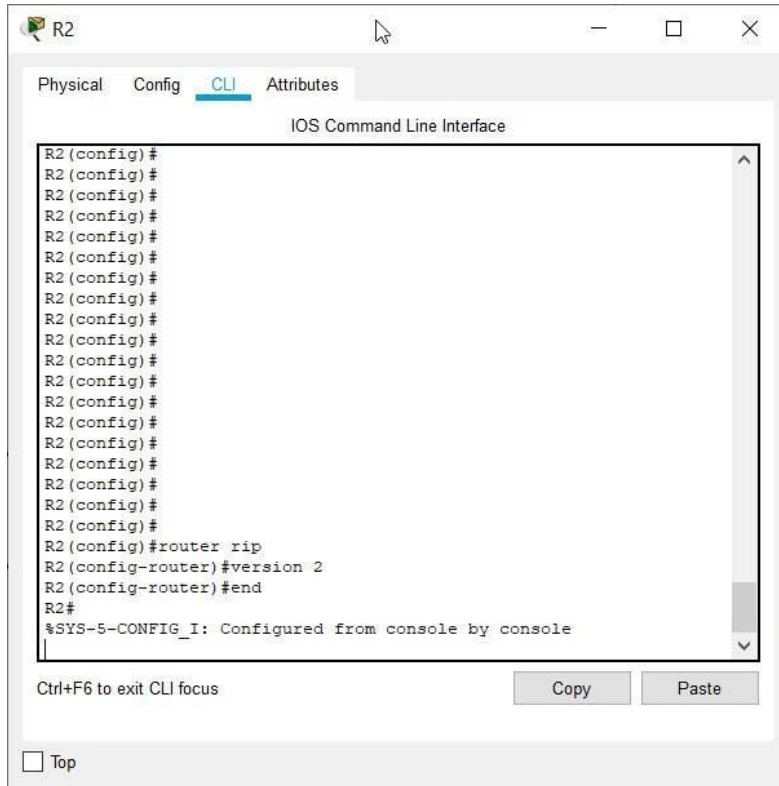


Task 4: Configure RIP Version 2.

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
```

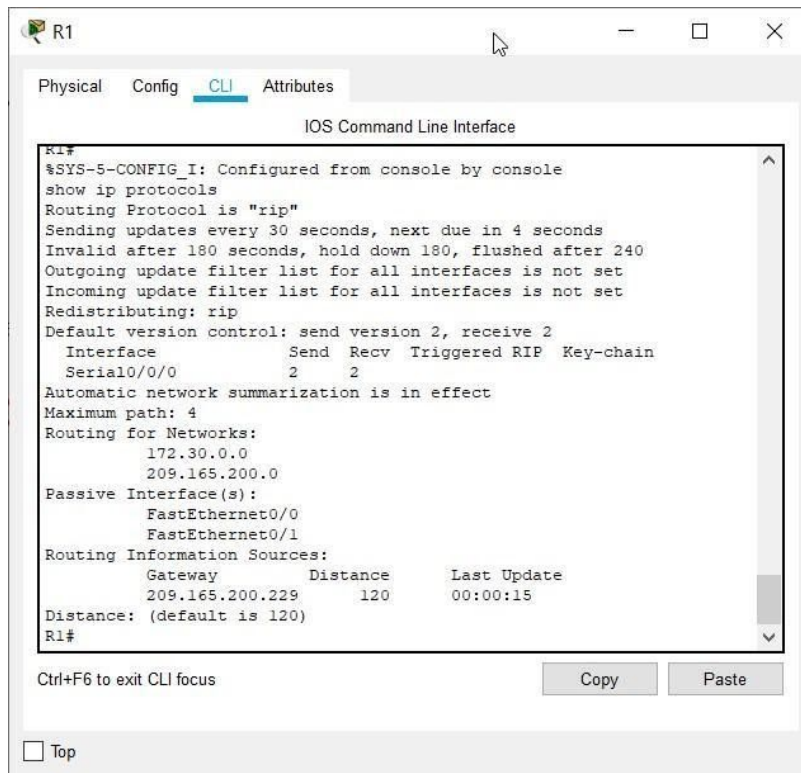
```
R1 (config-router) #version 2
```


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 a 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 'show ip protocols' command is as follows:

```
R1#
%SYS-5-CONFIG_I: Configured from console by console
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 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        00:00:15
  Distance: (default is 120)
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: 'Copy' and 'Paste'. Below the window, there is a checkbox labeled 'Top'.

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
R2#sh ip proto
R2#sh ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 22 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
  Serial0/0/1         2    2
  Serial0/0/0         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
  209.165.200.234  120          00:00:13
  209.165.200.230  120          00:00:15
Distance: (default is 120)
R2#
```

Ctrl+F6 to exit CLI focus

Copy Paste

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R3

Physical Config CLI Attributes

IOS Command Line Interface

```
R3#sh ip pr
R3#sh ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 19 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
  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          00:00:02
Distance: (default is 120)
R3#
```

Ctrl+F6 to exit CLI focus

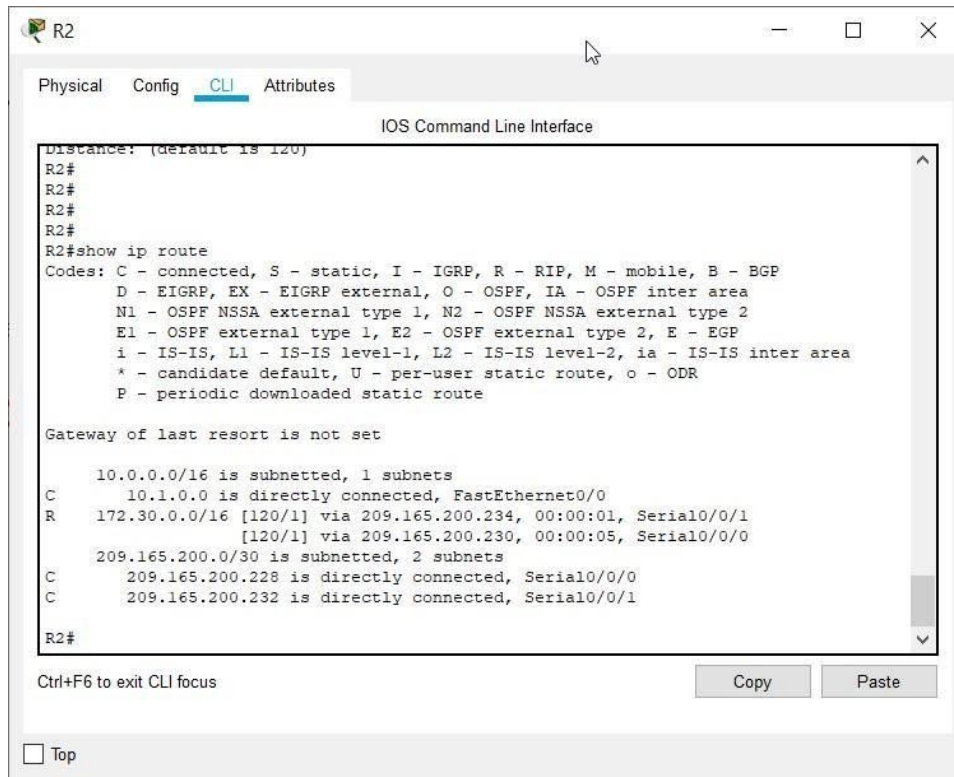
Copy Paste

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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', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The command 'show ip route' has been entered, and the output is displayed. The output shows the routing table for R2, including the major network 172.30.0.0/16 and its subnets. The output is as follows:

```
Distance: (default is 120)
R2#
R2#
R2#
R2#
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

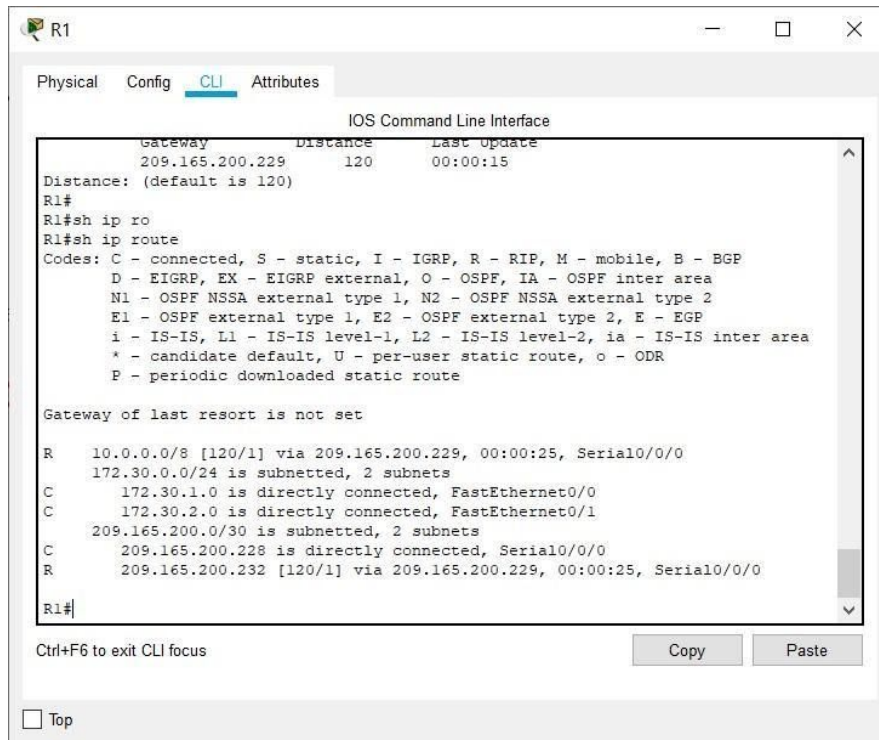
Gateway of last resort is not set

 10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:01, Serial0/0/1
      [120/1] via 209.165.200.230, 00:00:05, Serial0/0/0
 209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
```

At the bottom of the window, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons. A 'Top' button is also visible at the bottom left.

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

R1#show ip route



The screenshot shows the CLI of router R1. The output of the 'show ip route' command is displayed, showing the routing table. The table has columns for Gateway, Distance, and Last Update. The output shows several routes, including 10.0.0.0/8, 172.30.0.0/24, and 209.165.200.0/30. The routes are listed with their respective gateways and distances. The output also includes a legend for route codes and a message about the gateway of last resort.

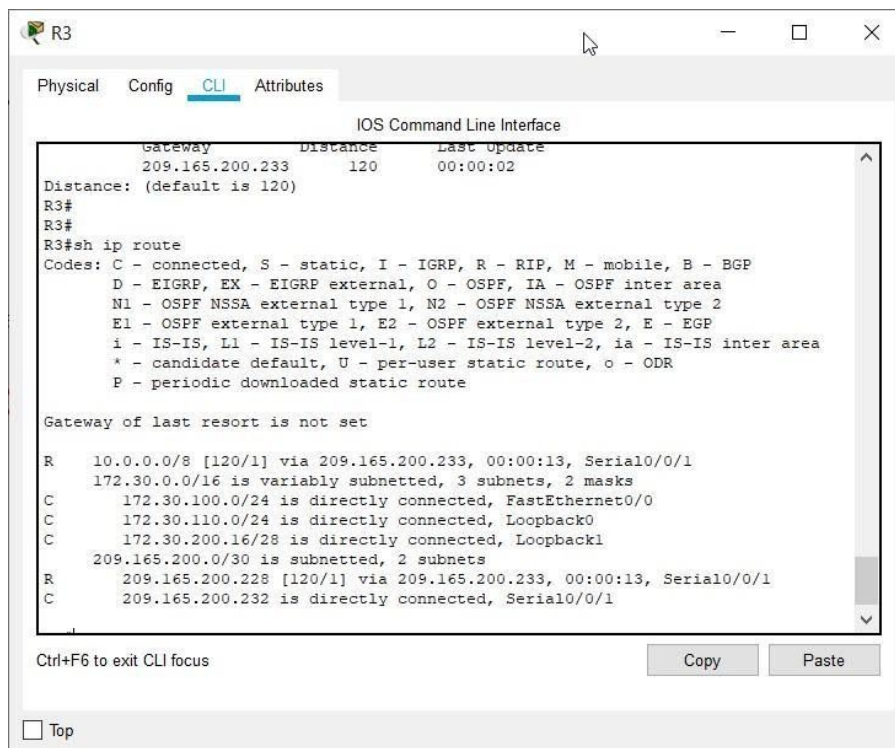
```
IOS Command Line Interface
Gateway      Distance    Last Update
209.165.200.229  120        00:00:15
Distance: (default is 120)
R1#
R1#sh ip ro
R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter 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, 00:00:25, 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, 00:00:25, Serial0/0/0
R1#
```

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

R3#show ip route



The screenshot shows the CLI of router R3. The output of the 'show ip route' command is displayed, showing the routing table. The table has columns for Gateway, Distance, and Last Update. The output shows several routes, including 10.0.0.0/8, 172.30.0.0/16, and 209.165.200.0/30. The routes are listed with their respective gateways and distances. The output also includes a legend for route codes and a message about the gateway of last resort.

```
IOS Command Line Interface
Gateway      Distance    Last Update
209.165.200.233  120        00:00:02
Distance: (default is 120)
R3#
R3#sh 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, 00:00:13, Serial0/0/1
   172.30.0.0/16 is variably subnetted, 3 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
   209.165.200.0/30 is subnetted, 2 subnets
R    209.165.200.228 [120/1] via 209.165.200.233, 00:00:13, Serial0/0/1
C    209.165.200.232 is directly connected, Serial0/0/1
R3#
```

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

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

```

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 Serial0/0/1 (209.165.200.234)
RIP: build update entries
172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: 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

```

10.0.0.0/8

172.30.100.0/24 172.30.110.0/24

172.30.200.16/28

209.165.200.0/24

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

```

RIP protocol debugging is on
R2#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: 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: received v2 update from 209.165.200.230 on Serial0/0/0
172.30.0.0/16 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
172.30.0.0/16 via 0.0.0.0 in 1 hops

```

10.0.0.0/8

209.165.200.228/30

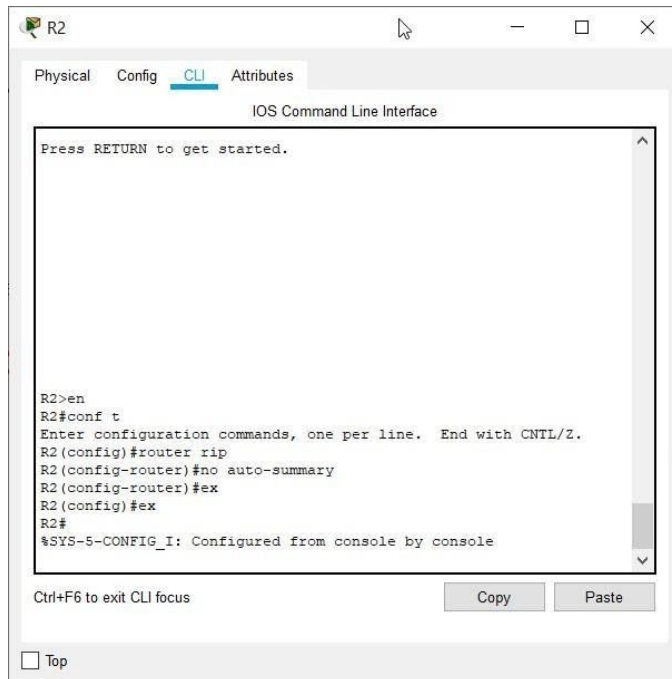
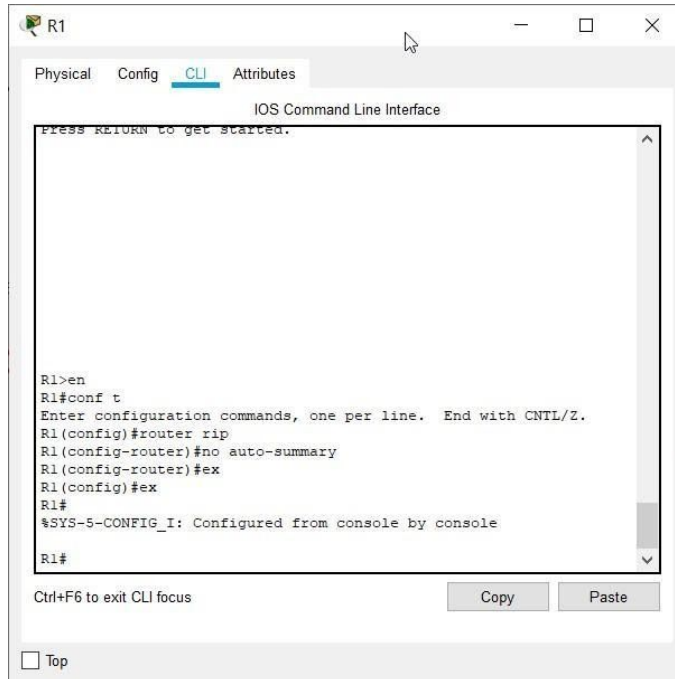
172.30.0.0/16

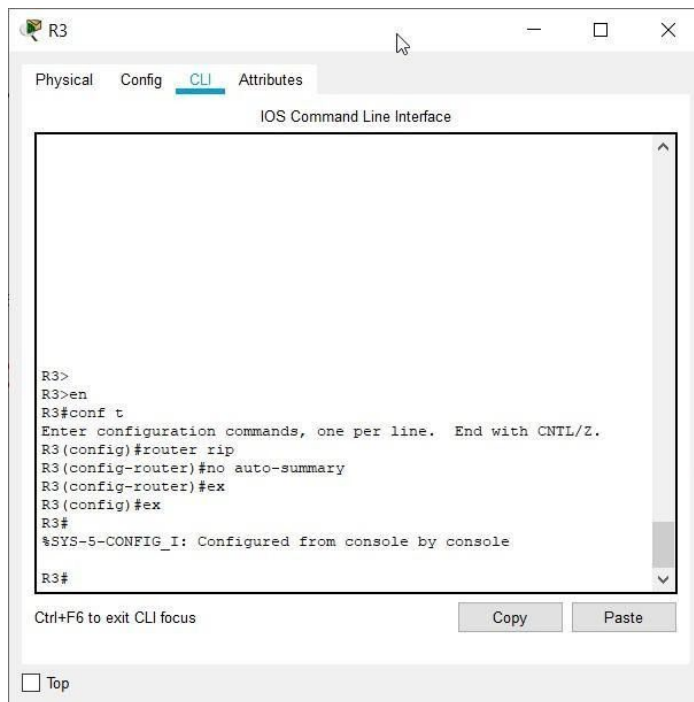
R3 is not sending any of the 172.30.0.0 subnets—only the summarized route of 172.30.0.0/16, including the subnet mask. This is why R2 and R1 are not seeing the 172.30.0.0 subnets on R3.

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**



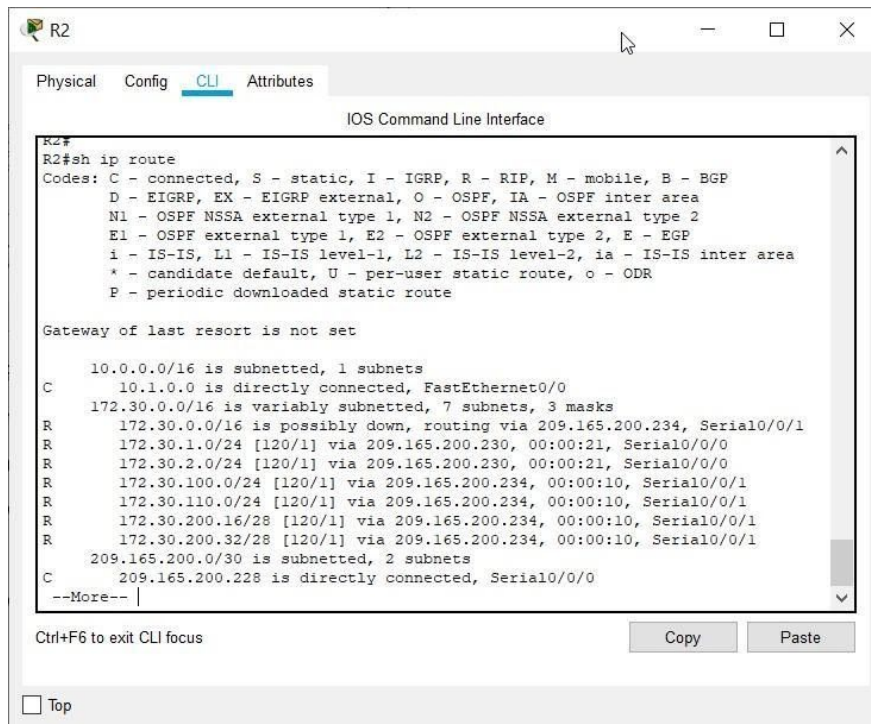


The **show ip route** and **ping** commands can be used to verify that automatic summarization is off.

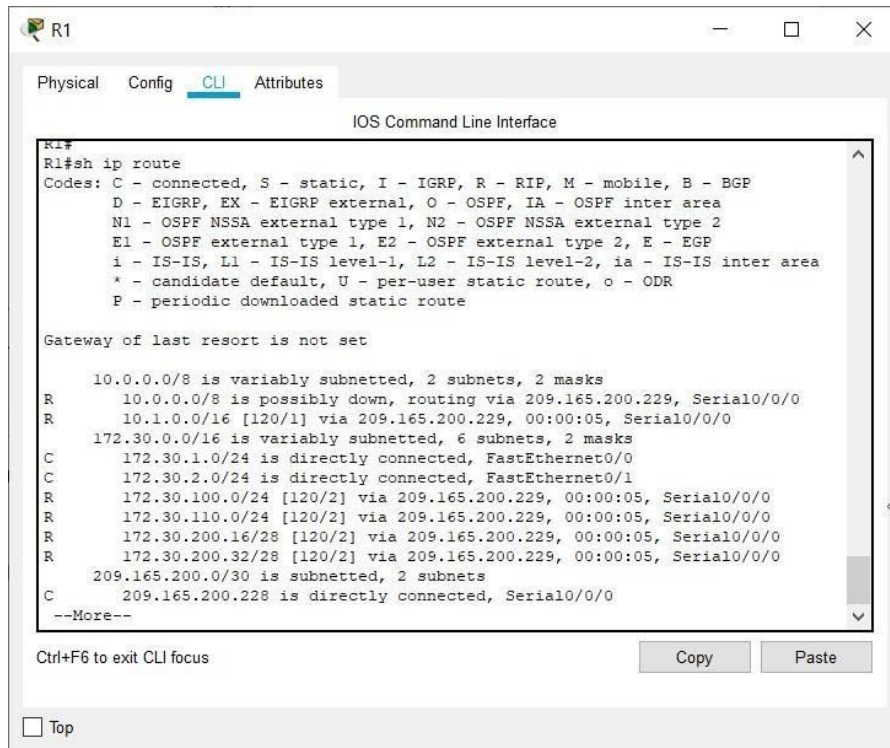
Task 7: Examine the Routing Tables.

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

R2#**show ip route**



R1#show ip route



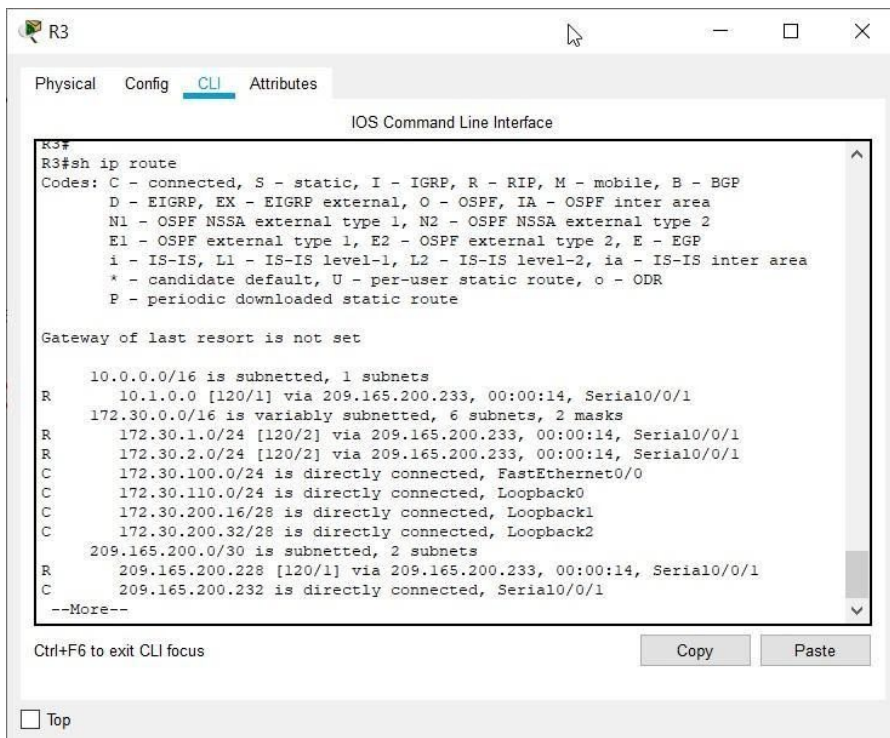
The screenshot shows the R1 CLI window with the 'show ip route' command executed. The output lists various routes, including connected, static, and OSPF routes. The window has tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, showing the command and its output. The output includes a legend for route codes, a message about the gateway of last resort, and a list of routes with their respective metrics and interfaces. The routes are: 10.0.0.0/8 (connected), 10.1.0.0/16 (connected), 172.30.0.0/16 (connected), 172.30.1.0/24 (connected), 172.30.2.0/24 (connected), 172.30.100.0/24 (connected), 172.30.110.0/24 (connected), 172.30.200.16/28 (connected), 172.30.200.32/28 (connected), 209.165.200.0/30 (connected), and 209.165.200.228 (connected).

```
R1#
R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

 10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
R   10.0.0.0/8 is possibly down, routing via 209.165.200.229, Serial0/0/0
R   10.1.0.0/16 [120/1] via 209.165.200.229, 00:00:05, 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, 00:00:05, Serial0/0/0
R   172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0
R   172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0
R   172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0
 209.165.200.0/30 is subnetted, 2 subnets
C   209.165.200.228 is directly connected, Serial0/0/0
--More--
```

R3#show ip route



The screenshot shows the R3 CLI window with the 'show ip route' command executed. The output lists various routes, including connected, static, and OSPF routes. The window has tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, showing the command 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. The routes are: 10.0.0.0/16 (connected), 10.1.0.0/16 (connected), 172.30.0.0/16 (connected), 172.30.1.0/24 (connected), 172.30.2.0/24 (connected), 172.30.100.0/24 (connected), 172.30.110.0/24 (connected), 172.30.200.16/28 (connected), 172.30.200.32/28 (connected), 209.165.200.0/30 (connected), and 209.165.200.228 (connected).

```
R3#
R3#sh 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, 00:00:14, 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, 00:00:14, Serial0/0/1
R   172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:14, 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, 00:00:14, Serial0/0/1
C   209.165.200.232 is directly connected, Serial0/0/1
--More--
```

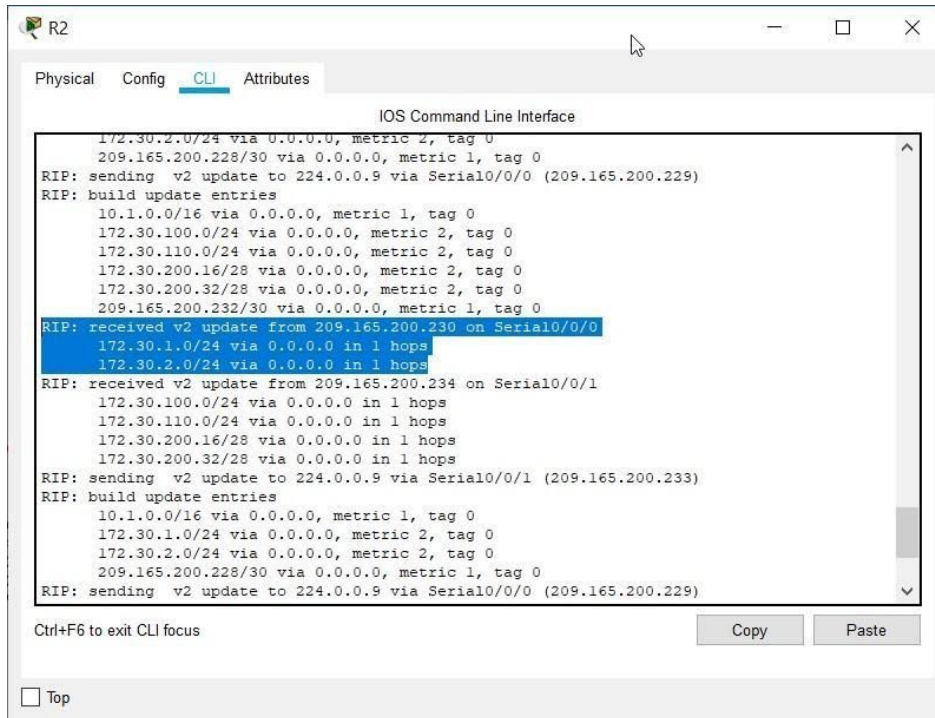
Use the output of the `debug ip rip` command to answer the following questions:

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

172.30.1.0/24

172.30.2.0/24

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



The screenshot shows the CLI of router R2. The 'CLI' tab is selected. The output shows the following sequence of events:

```
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: 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: received v2 update from 209.165.200.230 on Serial0/0/0
172.30.1.0/24 via 0.0.0.0 in 1 hops
172.30.2.0/24 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
172.30.100.0/24 via 0.0.0.0 in 1 hops
172.30.110.0/24 via 0.0.0.0 in 1 hops
172.30.200.16/28 via 0.0.0.0 in 1 hops
172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: 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: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
```

172.30.1.0/24

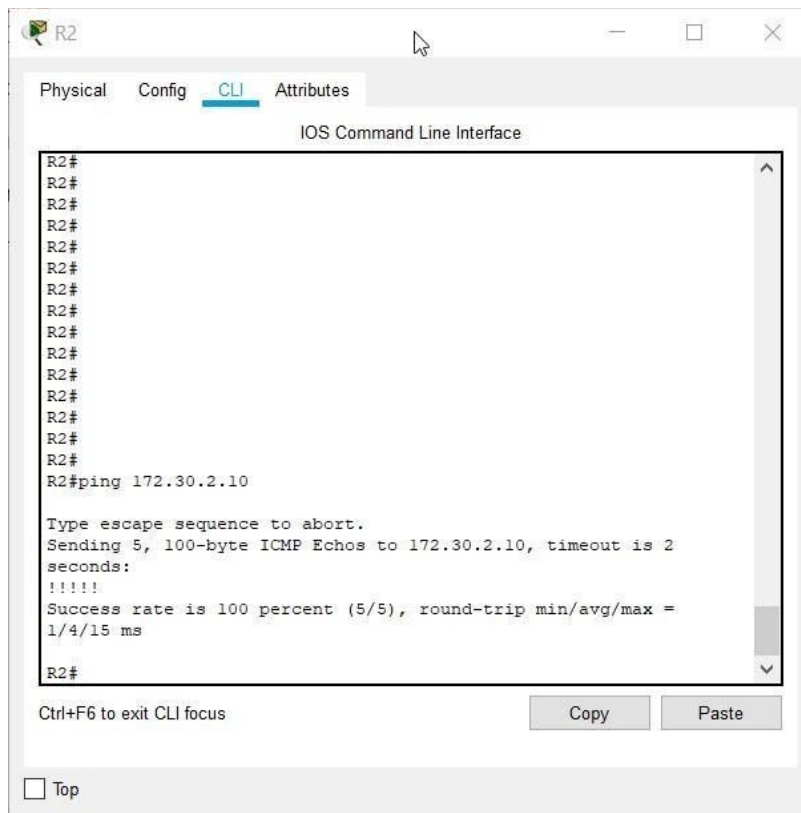
172.30.2.0/24

Are the subnet masks now included in the routing updates? **yes Task**

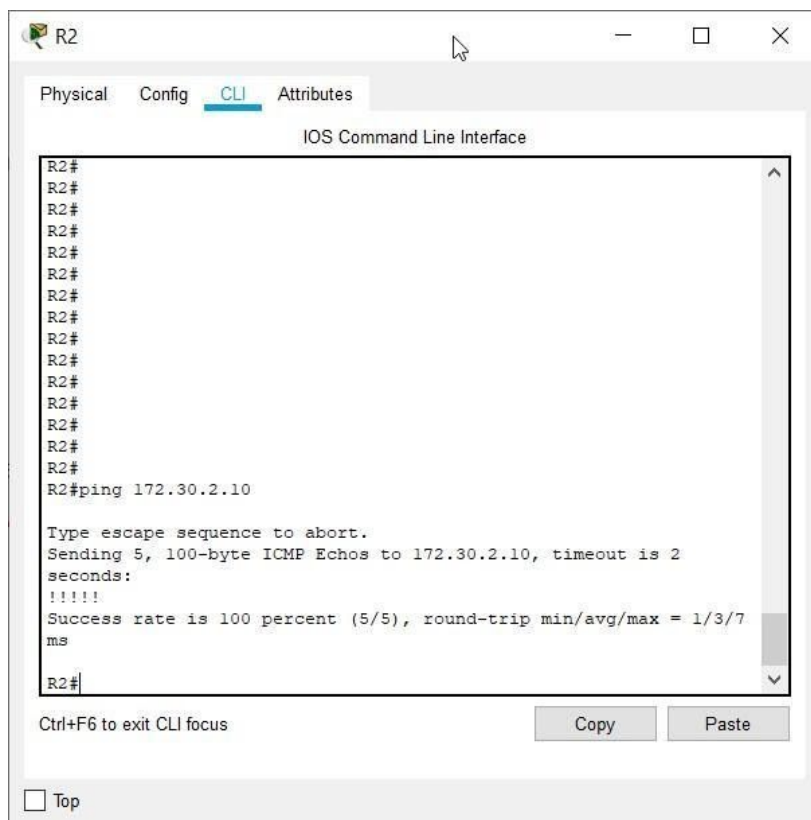
8: Verify Network Connectivity.

Step 1: Check connectivity between R2 router and PCs.

From R2, how many ICMP messages are successful when pinging PC1? **5/5 messages**



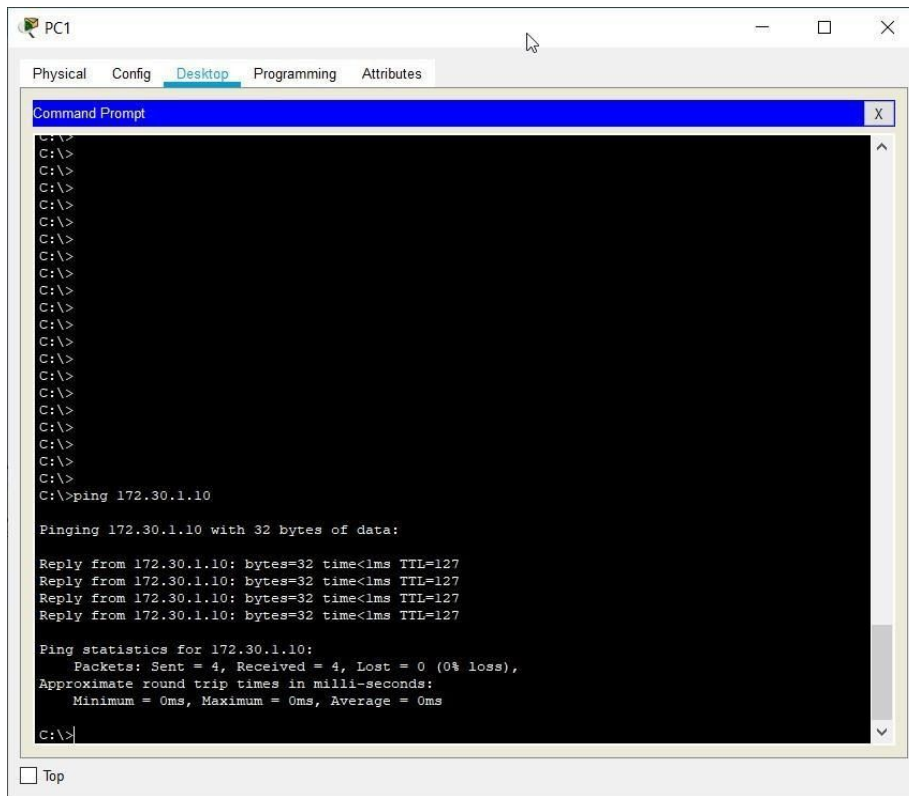
From R2, how many ICMP messages are successful when pinging PC4? **5/5 messages**



Step 2: Check the connectivity between the PCs.

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

What is the success rate? **4/4**



The screenshot shows a virtual desktop environment for PC1. The desktop has tabs for Physical, Config, Desktop (selected), Programming, and Attributes. A Command Prompt window is open, displaying the following text:

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

Pinging 172.30.1.10 with 32 bytes of data:

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

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

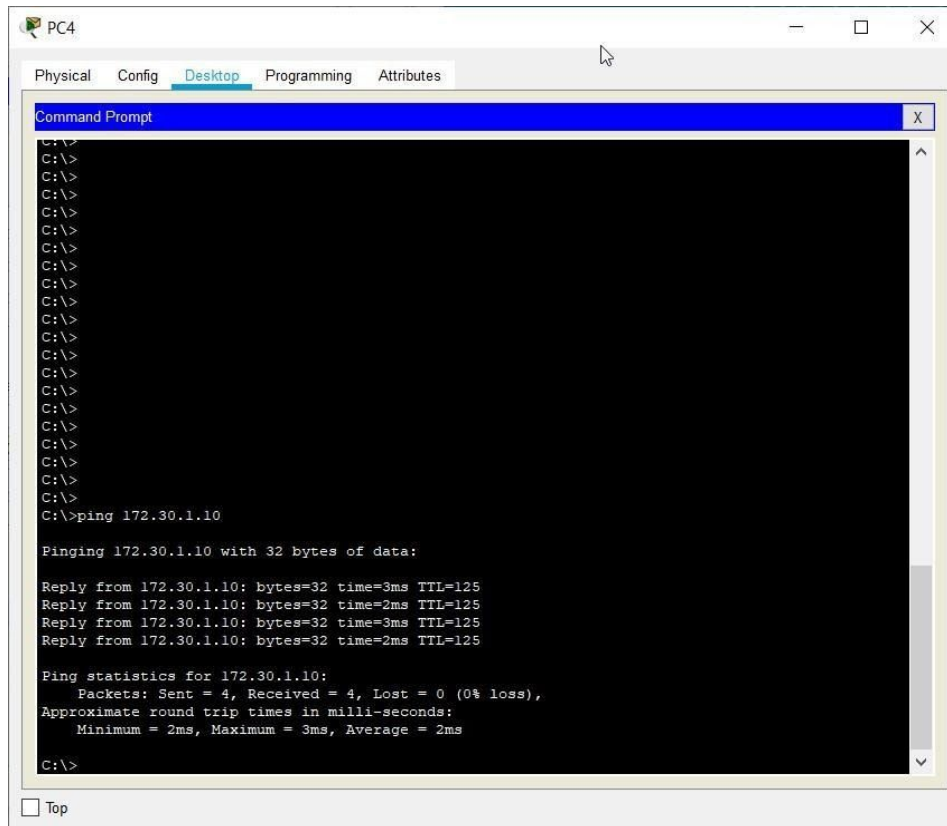
C:\>
```

At the bottom left of the window, there is a checkbox labeled "Top" which is currently unchecked.

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

What is the success rate? **4/4**

What is the success rate? 4/4



The screenshot shows a window titled "PC4" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The command prompt shows a series of "C:\>" prompts, followed by the command "C:\>ping 172.30.1.10". The output of the ping command is as follows:

```
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=3ms TTL=125
Reply from 172.30.1.10: bytes=32 time=2ms TTL=125
Reply from 172.30.1.10: bytes=32 time=3ms TTL=125
Reply from 172.30.1.10: bytes=32 time=2ms TTL=125

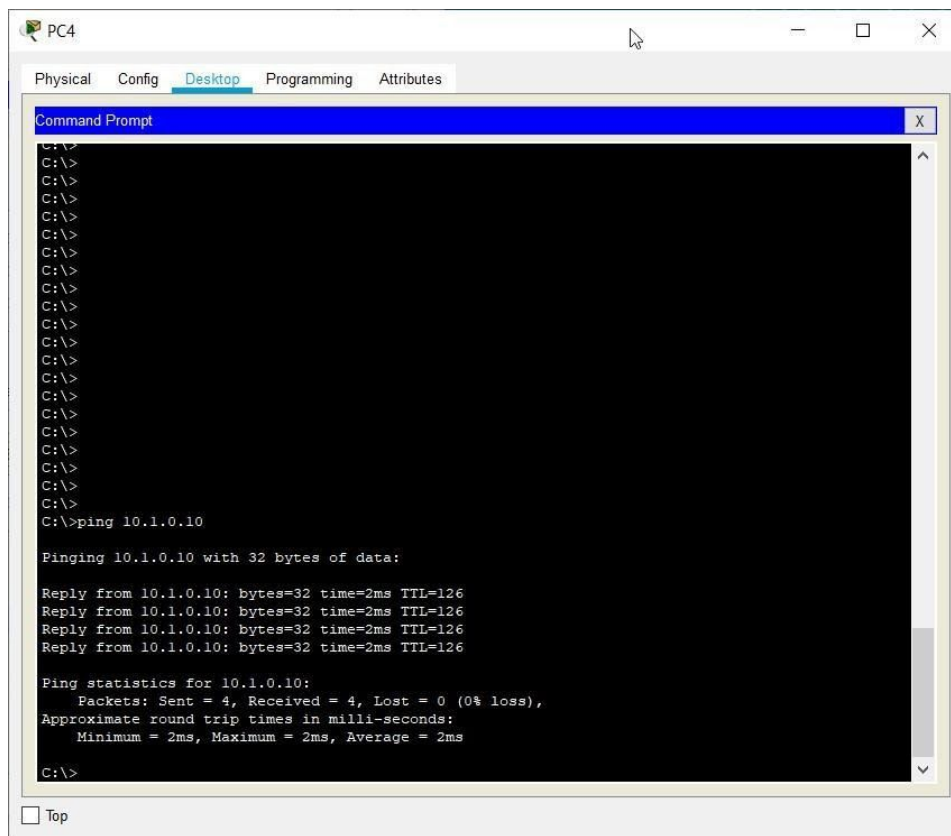
Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

C:\>
```

At the bottom of the window, there is a "Top" button with a small square icon to its left.

From PC4, is it possible to ping PC3? yes

What is the success rate? 4/4



Task 9: Documentation

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

Router – R1

· show running-config

R1#sh running-config

Building configuration...

Current configuration : 883 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 ! 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
password
cisco login
!
!
! end

```

· show ip route

```

R1#sh 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, 00:00:18, 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, 00:00:18, Serial0/0/0
R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0

```



```

R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0
R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:18, 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, 00:00:18, Serial0/0/0

```

· show ip interface brief

```

R1#sh 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 NVRAM  administratively down down  Vlan1
                        unassigned  YES unset  administratively down down

```

· show ip protocols

```

R1#sh ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 24 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.30.0.0
209.165.200.0
Passive Interface(s):
FastEthernet0/0
FastEthernet0/1
Routing Information Sources:
Gateway Distance Last Update
209.165.200.229 120 00:00:03
Distance: (default is 120)

```

Router – R2

· show running-config

```

R2#sh running-config
Building configuration...

Current configuration : 867 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 clock
rate 2000000 !
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
password cisco
login
!
!
!
end

```

· show ip route

R2#sh 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, 00:00:10, 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, 00:00:19, Serial0/0/1
R 172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
R 172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
R 172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:19, 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

· show ip interface brief

R2#sh ip int brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	10.1.0.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	NVRAM	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

· show ip protocols

R2#sh ip protocols

Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 18 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/0 2 2
Serial0/0/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
10.0.0.0
209.165.200.0
Passive
Interface(s):
FastEthernet0/0
Routing Information Sources:

```
Gateway Distance Last Update
209.165.200.230 120 00:00:09
209.165.200.234 120 00:00:13
Distance: (default is 120)
```

Router – R3

```
· show running-config
R3#sh running-config
Building configuration...

Current configuration : 1027 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
password cisco
login
!
!
!
en
d

```

· show ip route

R3#sh 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, 00:00:04, 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, 00:00:04, Serial0/0/1
R 172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:04, 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, 00:00:04, Serial0/0/1
C 209.165.200.232 is directly connected, Serial0/0/1

· show ip interface brief

R3#sh ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	172.30.100.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	NVRAM	administratively down	down
Serial0/0/0	unassigned	YES	NVRAM	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

· show ip protocols

R3#sh ip protocols

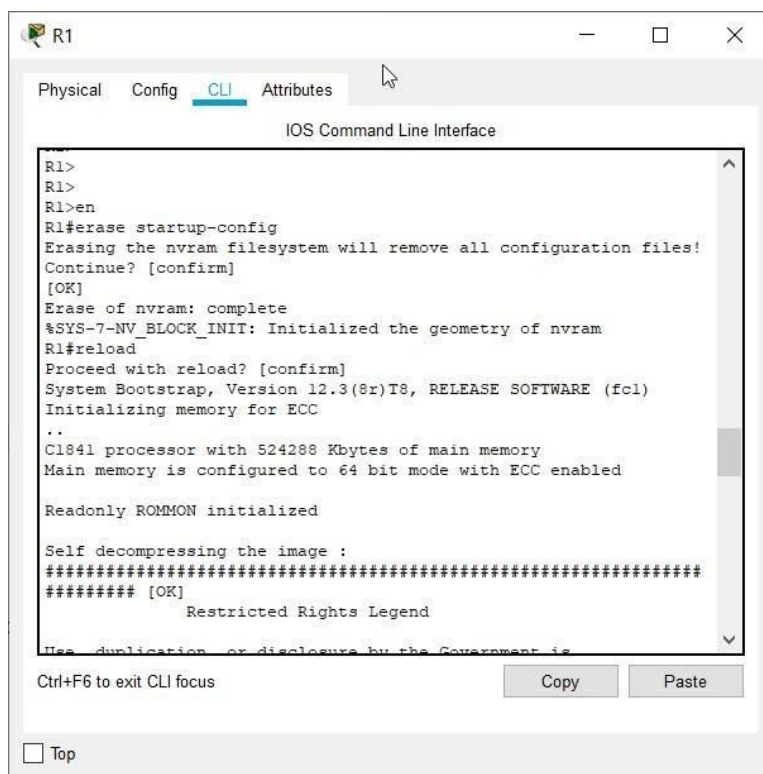
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 13 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: 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):

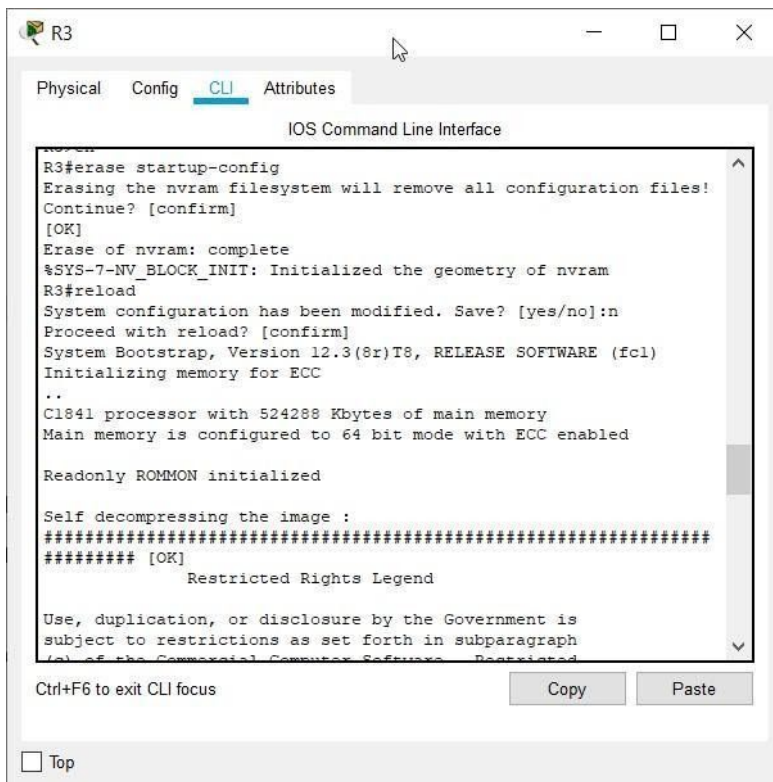
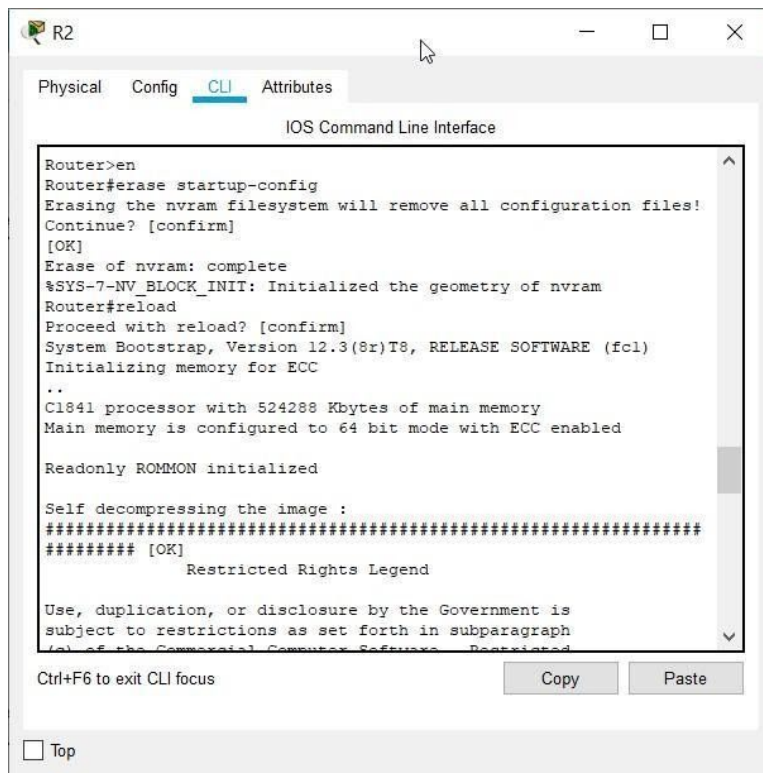
```
FastEthernet0/0
Routing Information Sources:
Gateway Distance Last Update
209.165.200.233          120
00:00:19 Distance: (default
is 120)
```

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.

Since there is no PC host which are connected to other networks, we disconnect cabling and reload the routers after erasing the configurations





Hence, we have Erased all configurations and disconnected and stored the cables.