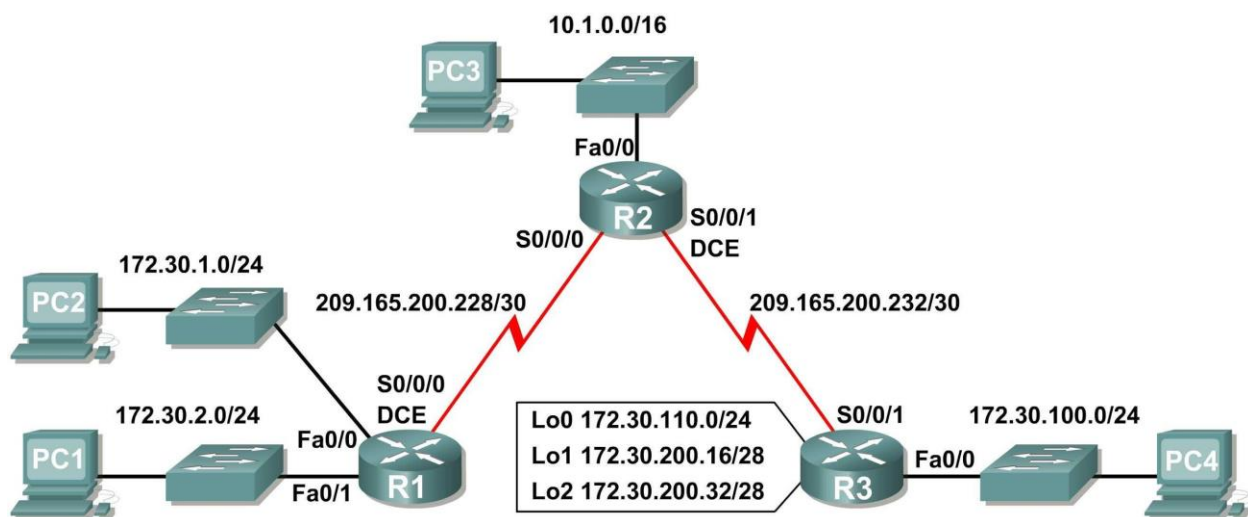


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BATCH A
UID: 2018130002

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

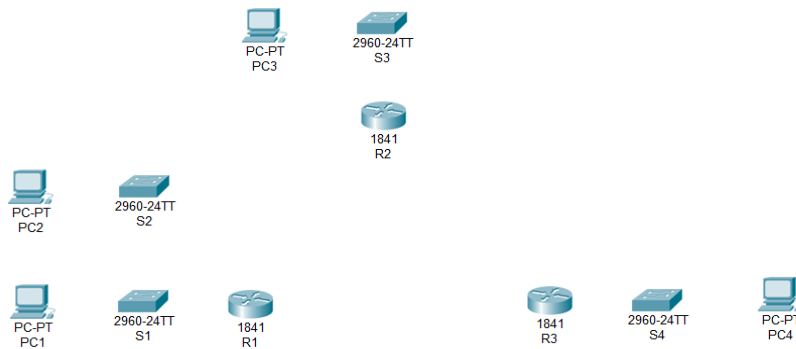
The network shown in the Topology Diagram contains a discontinuous network, 172.30.0.0. This network has been sub netted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and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

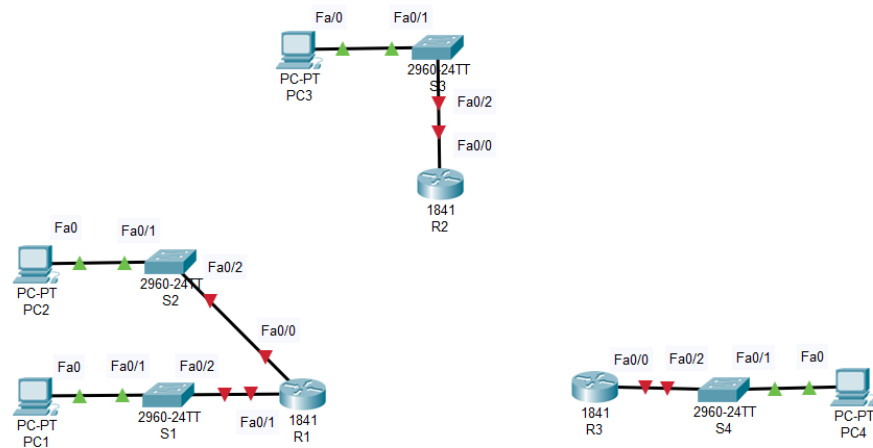
Step 1: Cable a network.

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

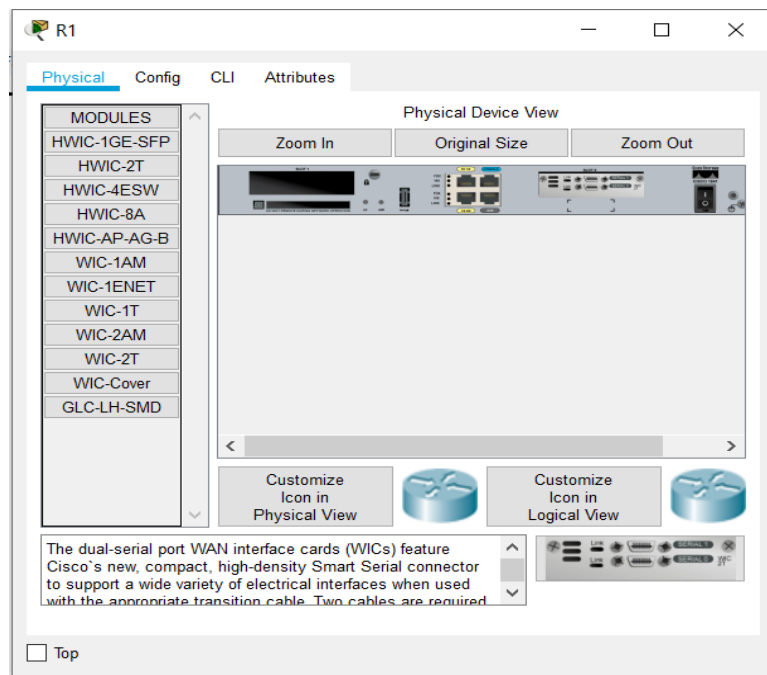
- Arrange 4 PC's, 4 2960 Switches and 3 1841 routers.



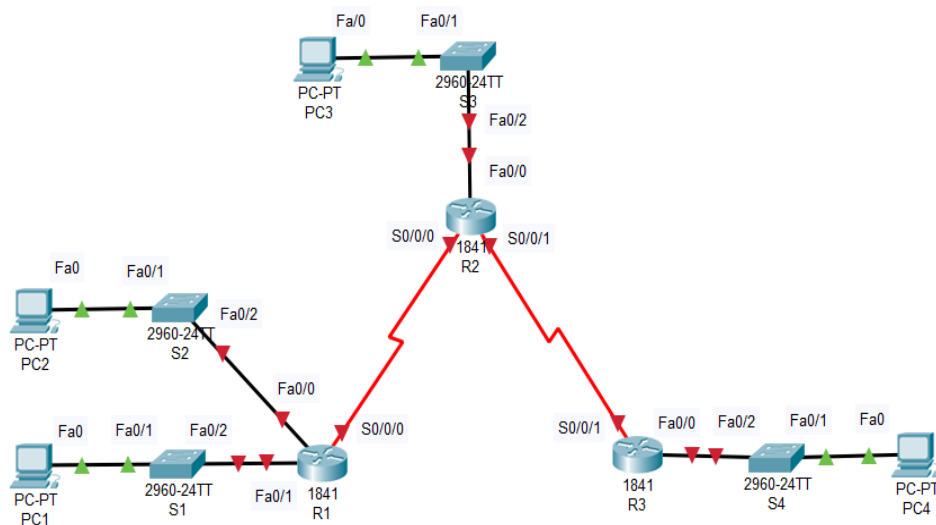
- Connect the switches, pc's and routers using copper straight through cable as shown in the diagram.



- For Serial connection between routers, add WIC-2T cards in each router.



- Connect the routers with serial DCE cable.



- Configuration of PC1:

PC1

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 172.30.2.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::260:3EFF:FECC:1869

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Top

- Configuration of PC2:

PC2

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 172.30.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::20C:CFFF:FE87:BE82

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

Top

- Configuration of PC3:

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::20B:BEFF:FE91:EBC8

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

- Configuration of PC4:

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::2D0:BCFF:FE9E:640B

IPv6 Gateway:

IPv6 DNS Server:

802.1X

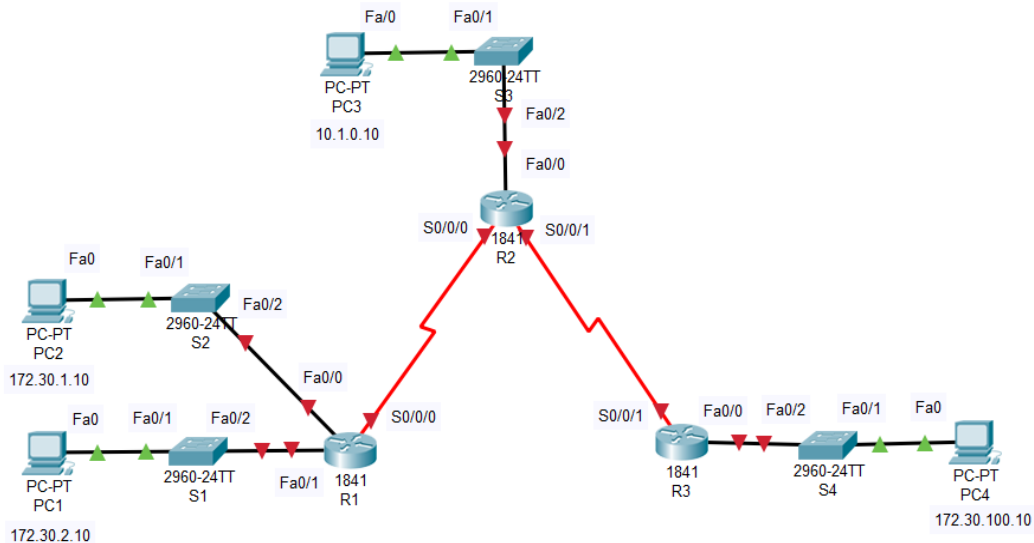
☐ Use 802.1X Security

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.

- Clearing configuration of R1:

```

R1
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

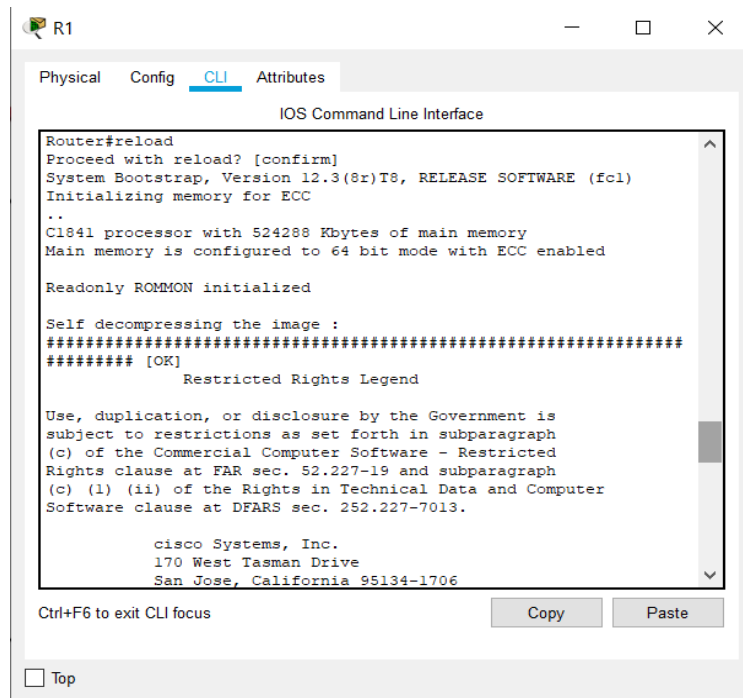
--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>enable
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#
  
```

- Reloading R1:



The screenshot shows the CLI window for router R1. The 'CLI' tab is selected. The text in the terminal area shows the router performing a reload. It starts with 'Router#reload', followed by a confirmation prompt 'Proceed with reload? [confirm]'. Then it shows 'System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)', 'Initializing memory for ECC', and hardware details: 'C1841 processor with 524288 Kbytes of main memory' and 'Main memory is configured to 64 bit mode with ECC enabled'. It then shows 'Readonly ROMMON initialized', 'Self decompressing the image:', a large block of asterisks, '[OK]', and a 'Restricted Rights Legend'. The legend states that use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013. It also lists 'cisco Systems, Inc.', '170 West Tasman Drive', and 'San Jose, California 95134-1706'. At the bottom, there is a 'Ctrl+F6 to exit CLI focus' message, 'Copy' and 'Paste' buttons, and a 'Top' link.

```
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

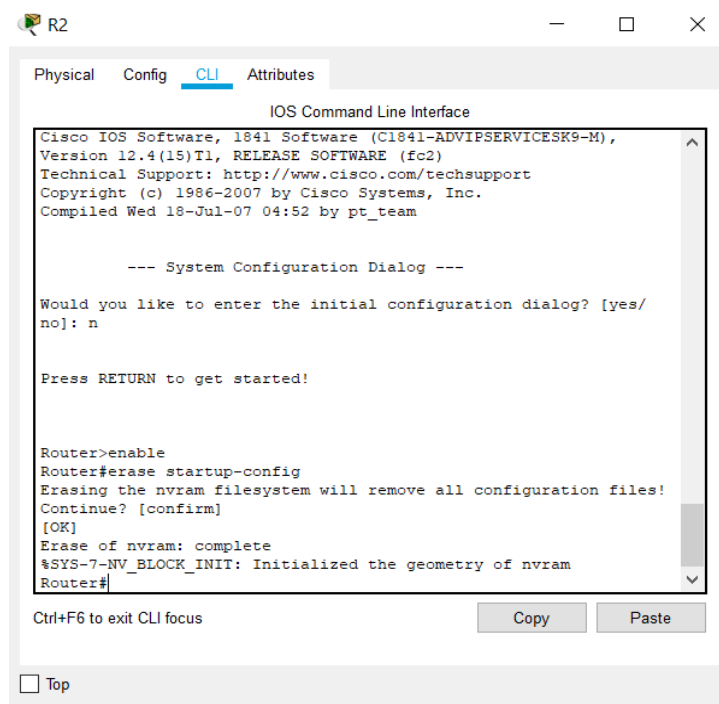
Self decompressing the image :
#####
##### [OK]
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706

Ctrl+F6 to exit CLI focus
```

- Clearing configuration of R2:



The screenshot shows the CLI window for router R2. The 'CLI' tab is selected. The text in the terminal area shows the router's boot sequence. It starts with '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.', and 'Compiled Wed 18-Jul-07 04:52 by pt_team'. Then it shows '--- System Configuration Dialog ---', a prompt 'Would you like to enter the initial configuration dialog? [yes/no]: n', and 'Press RETURN to get started!'. The user enters 'enable', then 'erase startup-config'. The router responds with 'Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]', '[OK]', 'Erase of nvram: complete', and '%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram'. The prompt returns to 'Router#'. At the bottom, there is a 'Ctrl+F6 to exit CLI focus' message, 'Copy' and 'Paste' buttons, and a 'Top' link.

```
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

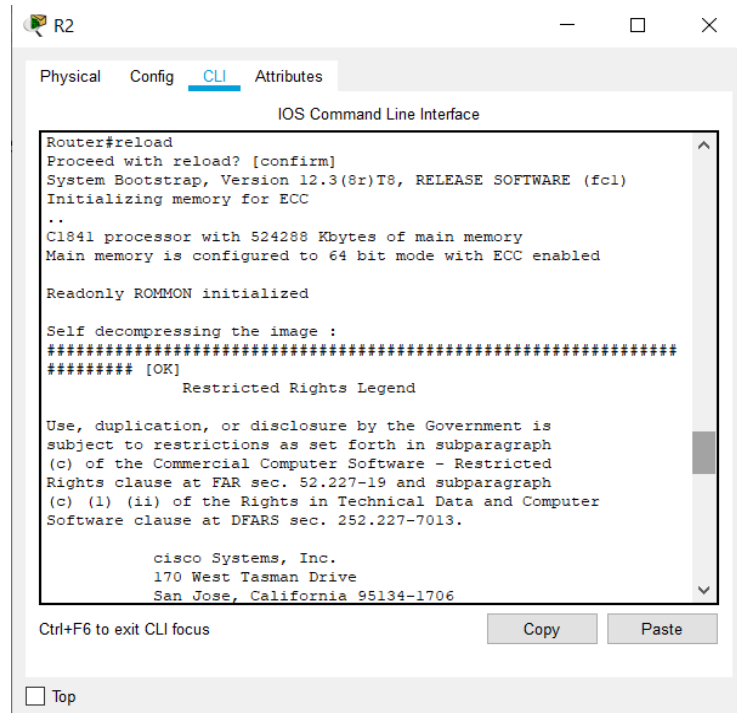
--- System Configuration Dialog ---

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

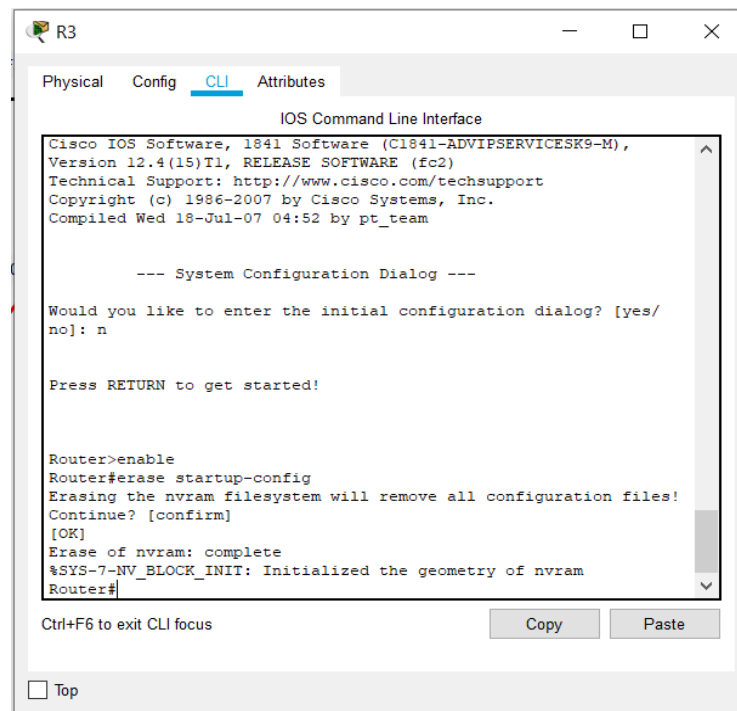
Press RETURN to get started!

Router>enable
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#
```

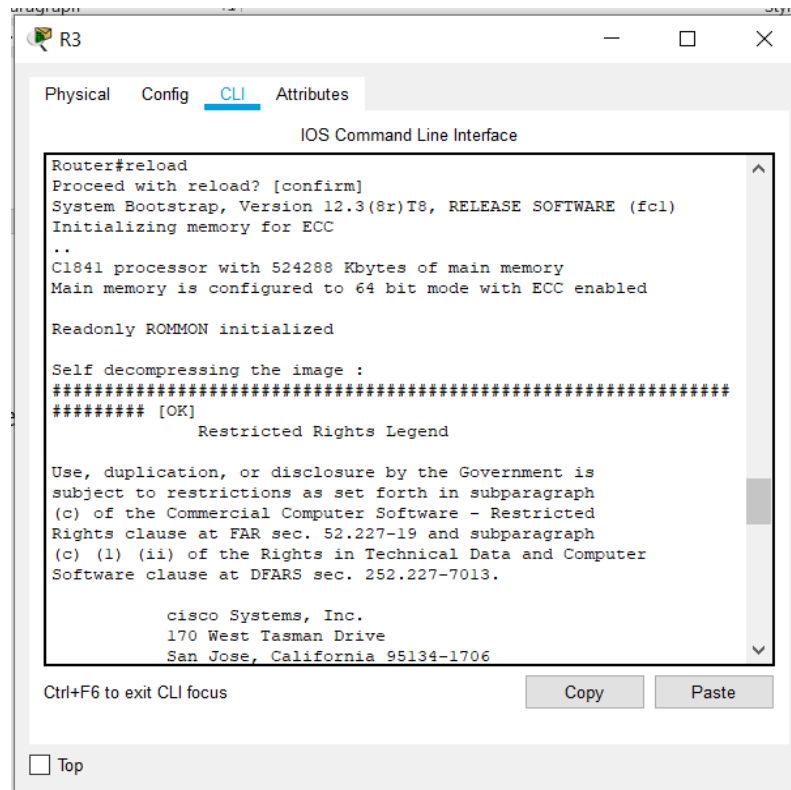
- Reloading R2:



- Clearing configuration of R3:



- Reloading R3:



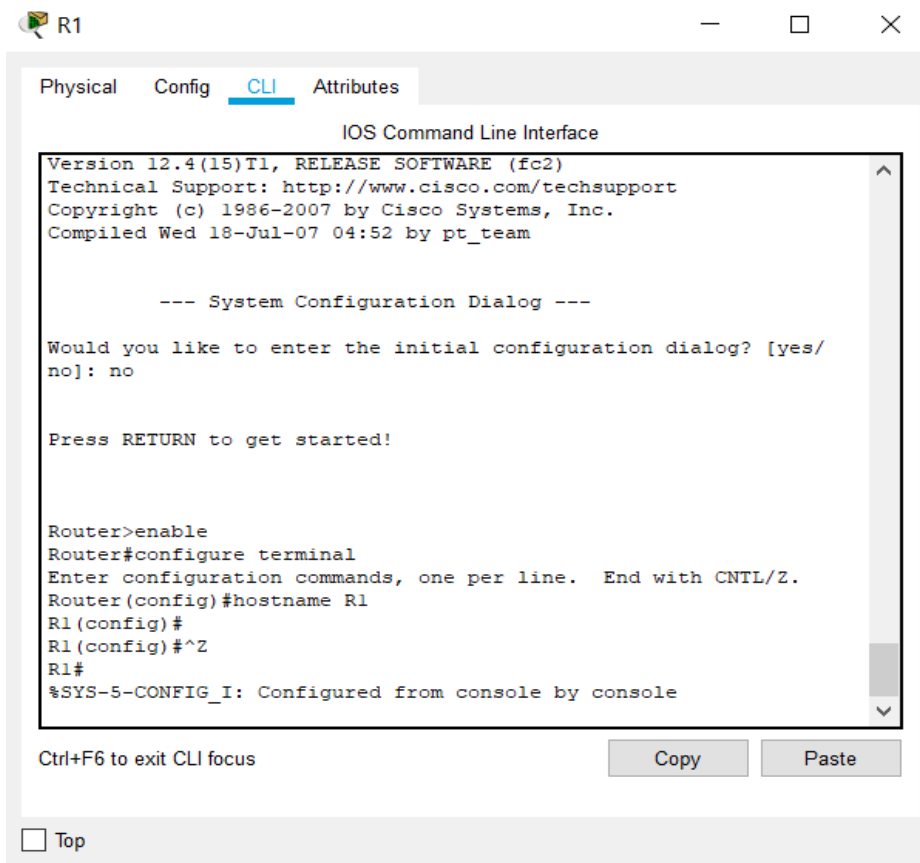
Task 2: Load Routers with the Supplied Scripts.

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
```

- Assigning hostname as R1:



- Configuring FastEthernet0/0:

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 terminal output shows the following commands and responses:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#
R1(config)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface FastEthernet0/0
R1(config-if)#ip address 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)#
```

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

- Configuring FastEthernet0/1:

The screenshot shows the same 'R1' window, but now the configuration for FastEthernet0/1 is being entered. The terminal output shows the following commands and responses:

```
R1(config-if)#interface FastEthernet0/0
R1(config-if)#ip address 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

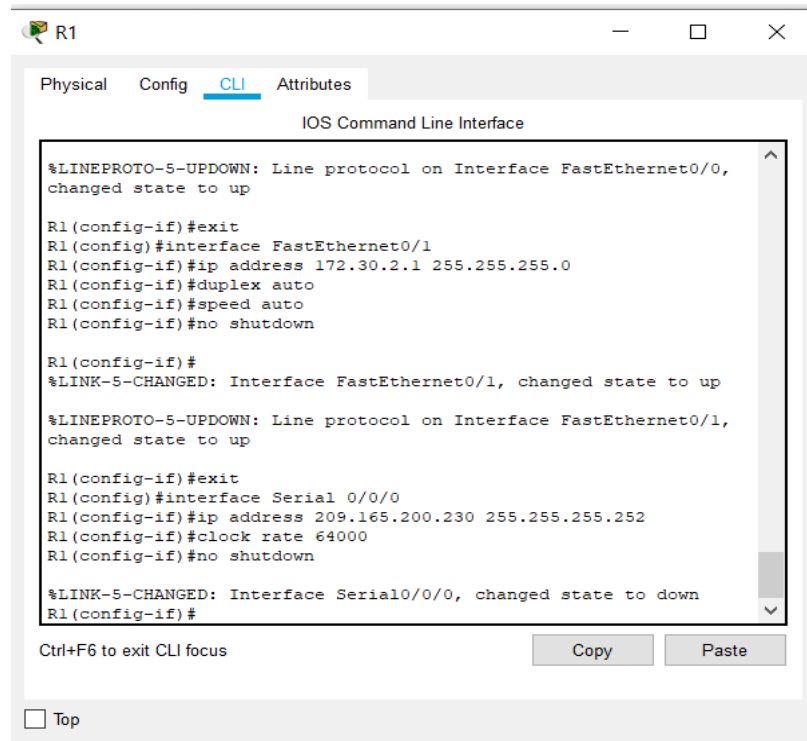
R1(config-if)#exit
R1(config)#interface FastEthernet0/1
R1(config-if)#ip address 172.30.2.1 255.255.255.0
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
```

The window layout, including the 'CLI' tab and 'Copy/Paste' buttons, remains the same as in the previous screenshot.

- Configuring Serial0/0/0:



The screenshot shows the CLI window of router R1. The 'Config' tab is active, and the 'CLI' sub-tab is selected. The window displays the following commands and their outputs:

```
IOS Command Line Interface

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

R1(config-if)#exit
R1(config)#interface FastEthernet0/1
R1(config-if)#ip address 172.30.2.1 255.255.255.0
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

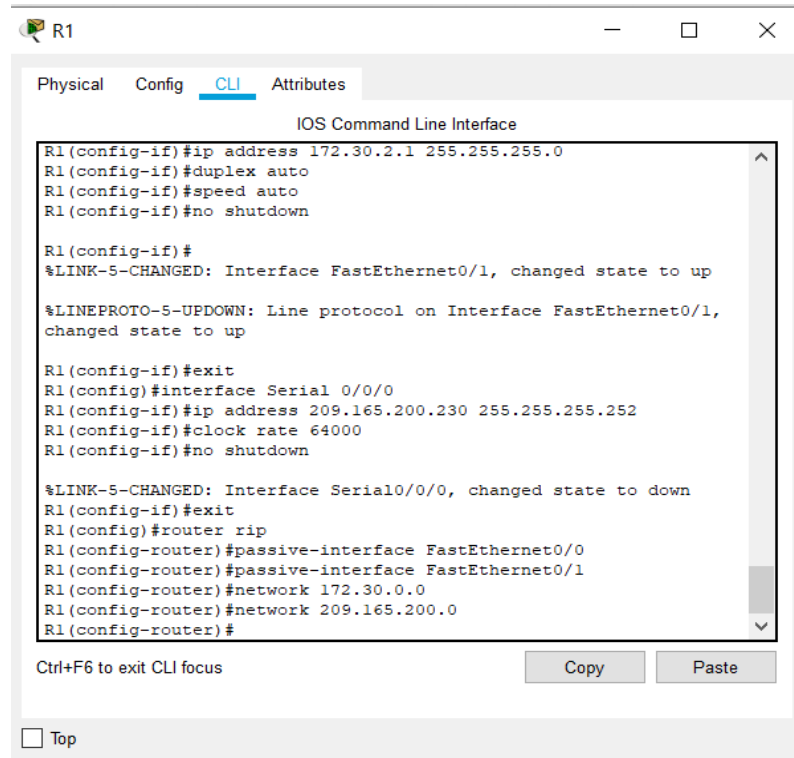
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

R1(config-if)#exit
R1(config)#interface Serial 0/0/0
R1(config-if)#ip address 209.165.200.230 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

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

At the bottom, there is a 'Top' button and a 'Copy' button.

- Configuration of RIP:



The screenshot shows the CLI window of router R1. The 'Config' tab is active, and the 'CLI' sub-tab is selected. The window displays the following commands and their outputs:

```
IOS Command Line Interface

R1(config-if)#ip address 172.30.2.1 255.255.255.0
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

R1(config-if)#exit
R1(config)#interface Serial 0/0/0
R1(config-if)#ip address 209.165.200.230 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#router rip
R1(config-router)#passive-interface FastEthernet0/0
R1(config-router)#passive-interface FastEthernet0/1
R1(config-router)#network 172.30.0.0
R1(config-router)#network 209.165.200.0
R1(config-router)#
```

At the bottom, there is a 'Top' button and a 'Copy' button.

- Running Config:

R1

Physical Config CLI Attributes

IOS Command Line Interface

```
R1#^Z
R1#show running-config
Building configuration...

Current configuration : 857 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
```

R1

Physical Config CLI Attributes

IOS Command Line Interface

```
!
interface FastEthernet0/0
ip address 172.30.1.1 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 172.30.2.1 255.255.255.0
duplex auto
speed auto
!
interface Serial0/0/0
ip address 209.165.200.230 255.255.255.252
clock rate 64000
!
```

R1

Physical Config CLI Attributes

IOS Command Line Interface

```
router rip
passive-interface FastEthernet0/0
passive-interface FastEthernet0/1
network 172.30.0.0
network 209.165.200.0
!
ip classless
!
ip flow-export version 9
!
!
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
--More--
```

Ctrl+F6 to exit CLI focus

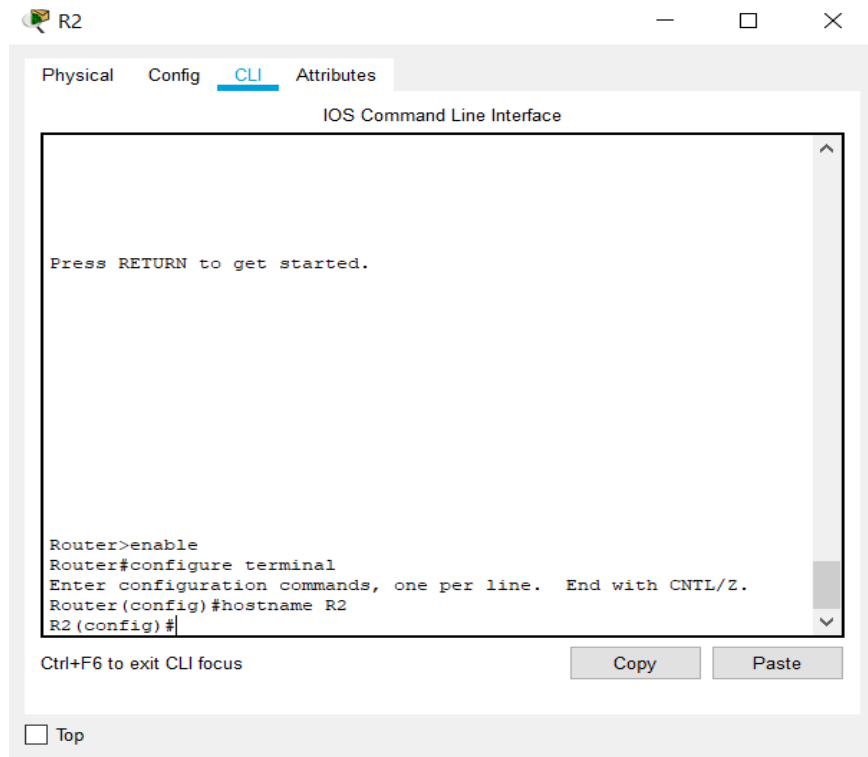
Copy Paste

☐ Top

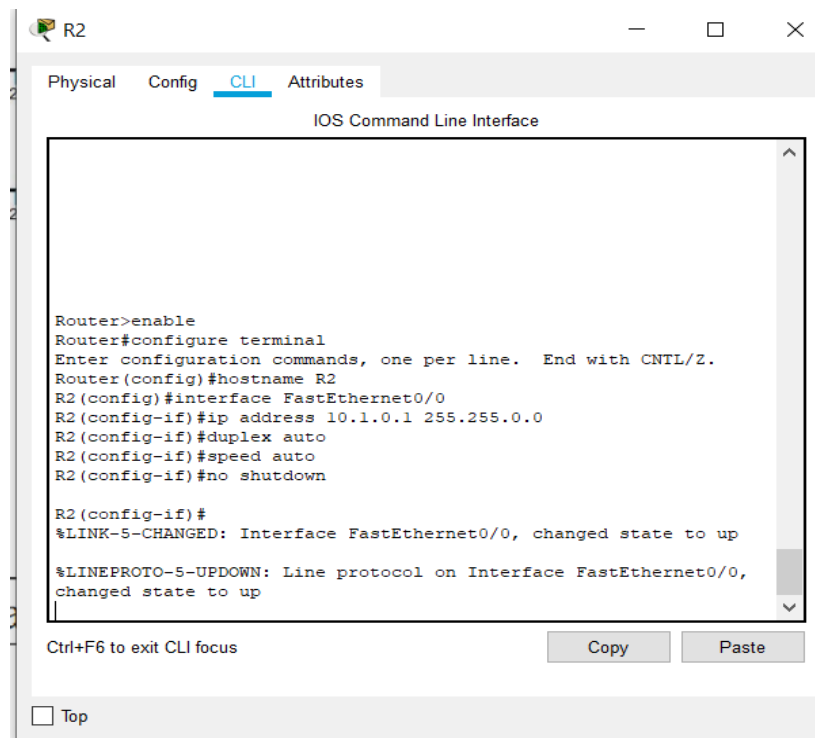
Step 2: Load the following script onto R2.

```
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
```

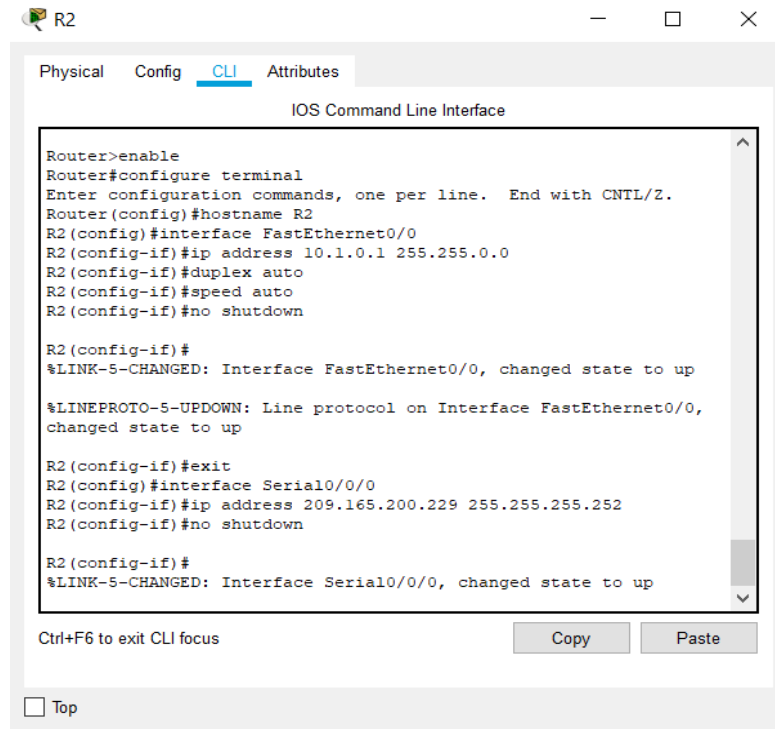
- Assigning hostname as R2:



- Configuring FastEthernet0/0:



- Configuring Serial0/0/0:



The screenshot shows the R2 CLI window with the following commands and output:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#interface FastEthernet0/0
R2(config-if)#ip address 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

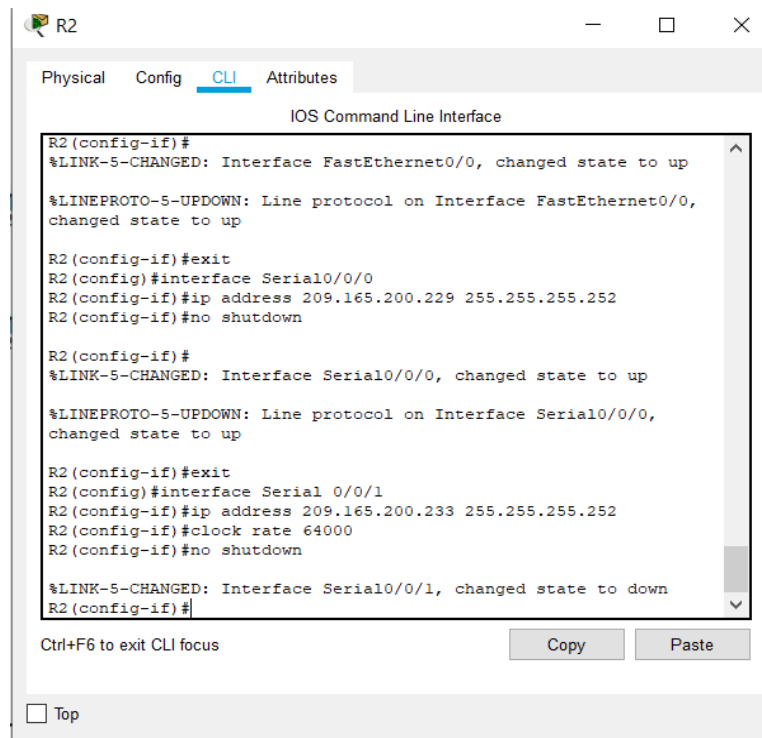
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

R2(config-if)#exit
R2(config)#interface Serial0/0/0
R2(config-if)#ip address 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
```

Buttons at the bottom: Ctrl+F6 to exit CLI focus, Copy, Paste, and a Top button.

- Configuring Serial0/0/1:



The screenshot shows the R2 CLI window with the following commands and output:

```
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)#exit
R2(config)#interface Serial0/0/0
R2(config-if)#ip address 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

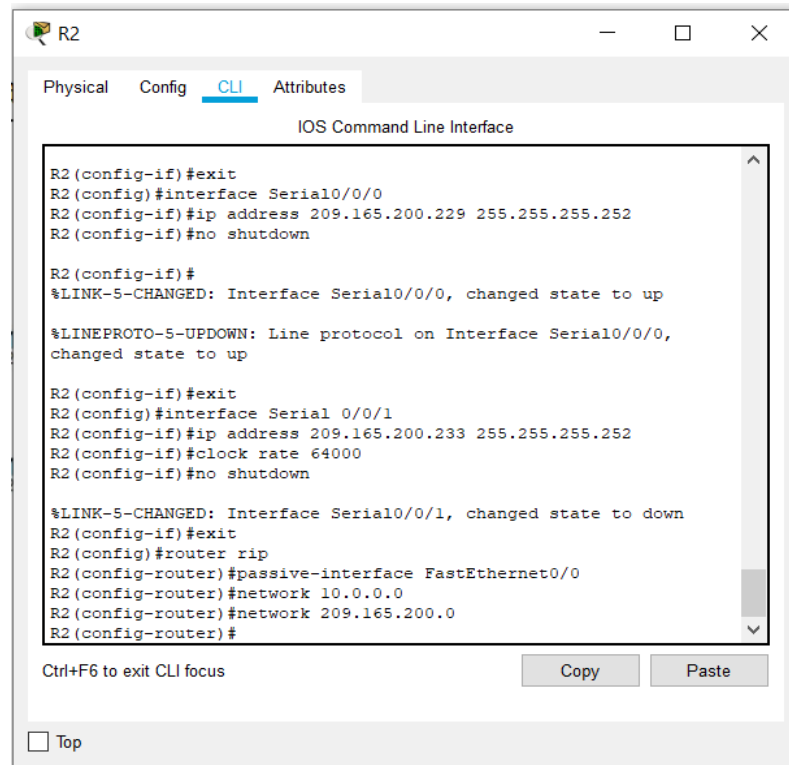
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0,
changed state to up

R2(config-if)#exit
R2(config)#interface Serial 0/0/1
R2(config-if)#ip address 209.165.200.233 255.255.255.252
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown

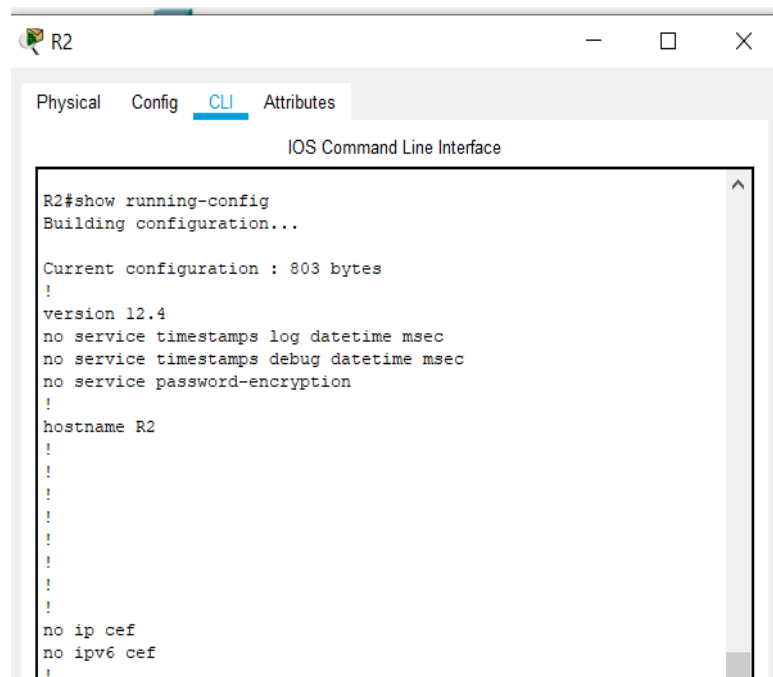
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
R2(config-if)#
```

Buttons at the bottom: Ctrl+F6 to exit CLI focus, Copy, Paste, and a Top button.

- Configuration of RIP:



- Running Config:



R2

Physical Config CLI Attributes

IOS Command Line Interface

```
!  
!  
interface FastEthernet0/0  
  ip address 10.1.0.1 255.255.0.0  
  duplex auto  
  speed auto  
!  
interface FastEthernet0/1  
  no ip address  
  duplex auto  
  speed auto  
  shutdown  
!  
interface Serial0/0/0  
  ip address 209.165.200.229 255.255.255.252  
!  
interface Serial0/0/1  
  ip address 209.165.200.233 255.255.255.252  
  clock rate 64000  
!  
interface Vlan1  
  no ip address  
  shutdown  
!  
--More--
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
!  
router rip  
  passive-interface FastEthernet0/0  
  network 10.0.0.0  
  network 209.165.200.0  
!  
ip classless  
!  
ip flow-export version 9  
!  
!  
!  
!  
!  
!  
line con 0  
!  
line aux 0  
!  
line vty 0 4  
  login  
!  
--More--
```

Ctrl+F6 to exit CLI focus

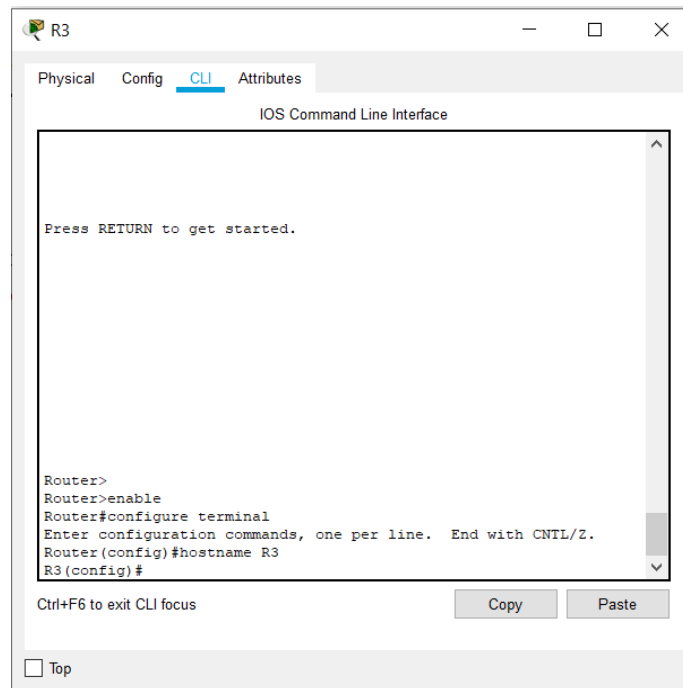
Copy Paste

☐ Top

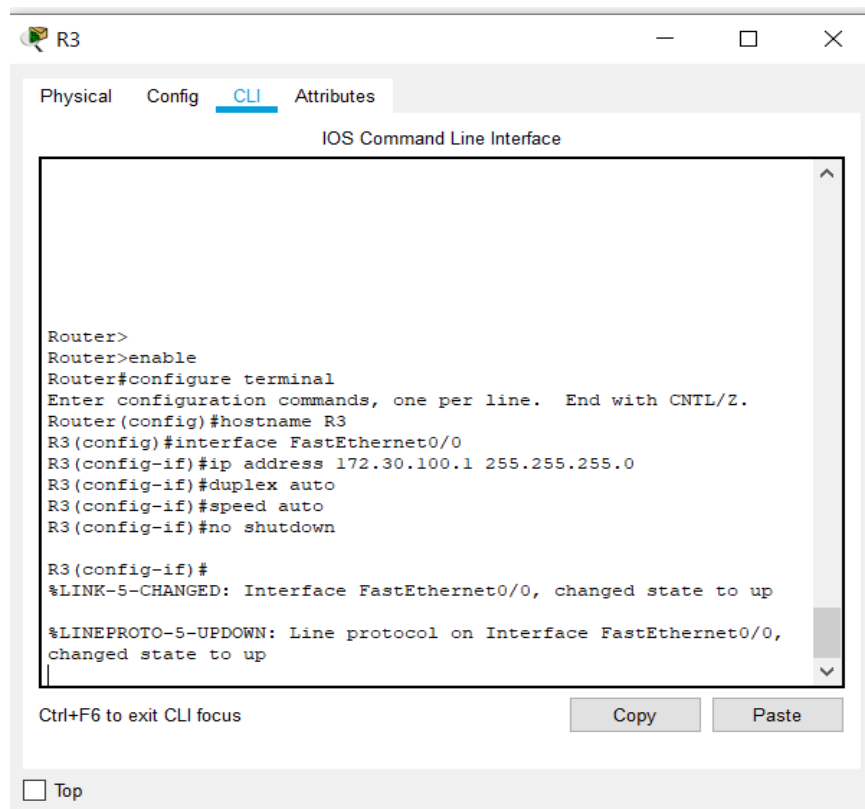
Step 3: Load the following script onto R3.

```
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
```

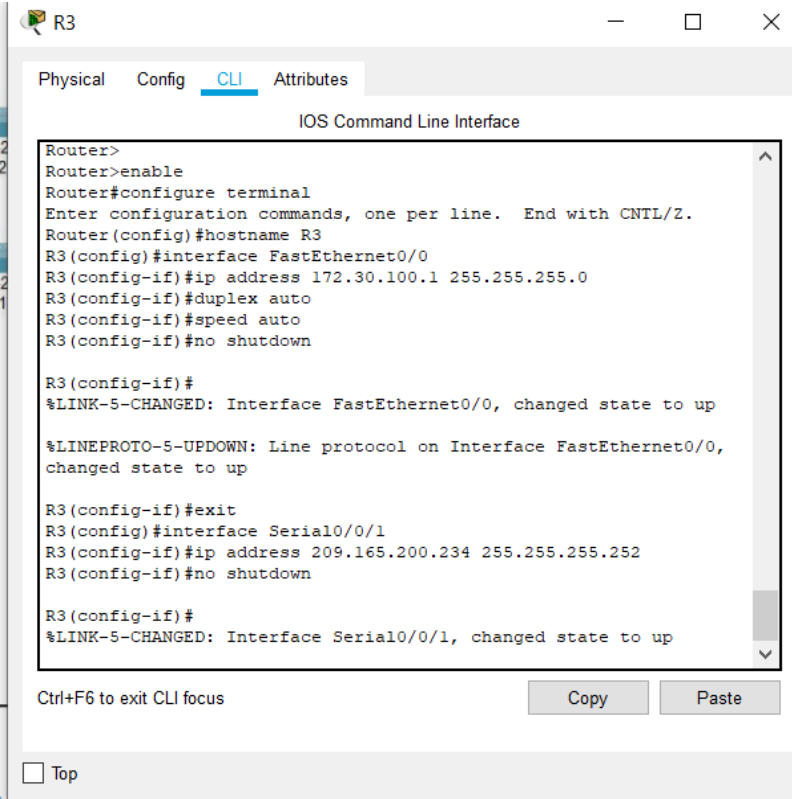
- Assigning hostname as R3:



- Configuration of FastEthernet0/0:



- Configuration of Serial0/0/1:



The screenshot shows a window titled 'R3' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The command history shows the following sequence of commands and their outputs:

```
Router>
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R3
R3(config)#interface FastEthernet0/0
R3(config-if)#ip address 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

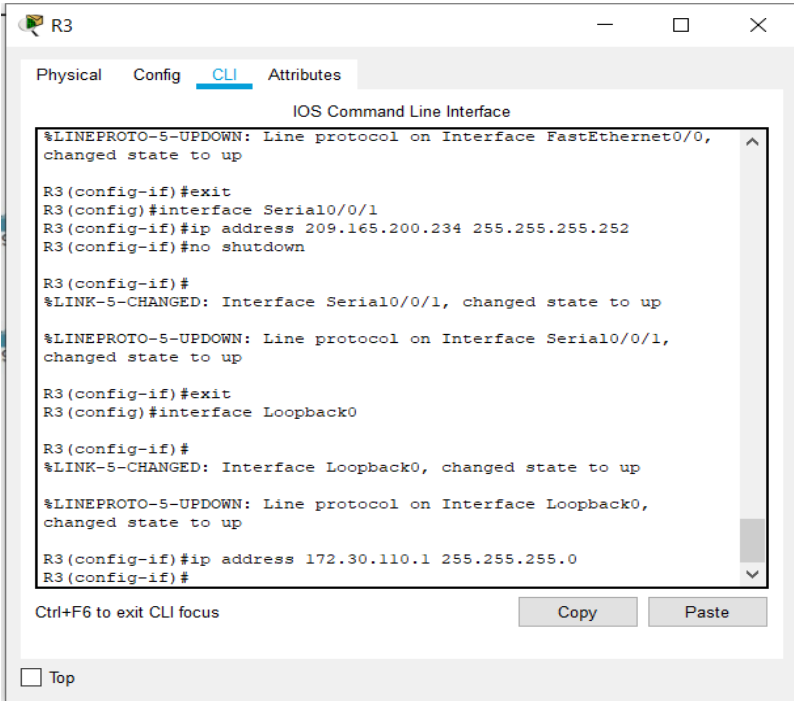
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

R3(config-if)#exit
R3(config)#interface Serial0/0/1
R3(config-if)#ip address 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
```

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

- Configuration of Loopback0:



The screenshot shows the same 'R3' window with the 'CLI' tab active. The command history continues from the previous configuration, showing the setup of Loopback0:

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

R3(config-if)#exit
R3(config)#interface Serial0/0/1
R3(config-if)#ip address 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

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

R3(config-if)#exit
R3(config)#interface Loopback0

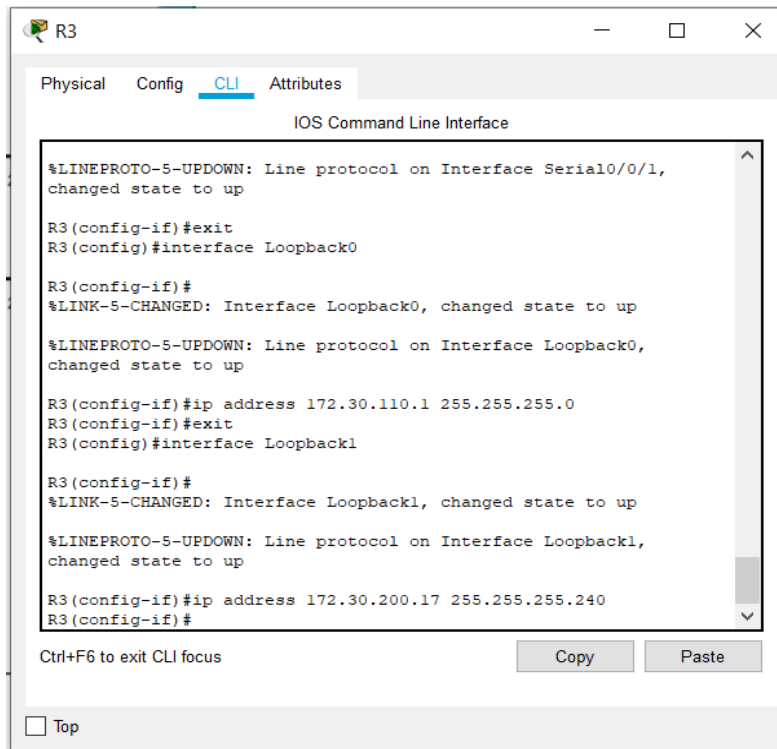
R3(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up

R3(config-if)#ip address 172.30.110.1 255.255.255.0
R3(config-if)#
```

Similar to the first screenshot, the bottom of the CLI window features the 'Ctrl+F6 to exit CLI focus' prompt and 'Copy' and 'Paste' buttons. A 'Top' button is also present at the bottom left.

- Configuration of Loopback1:



The screenshot shows the R3 CLI interface with the 'CLI' tab selected. The command history displays the configuration of Loopback0 and the start of Loopback1 configuration. The prompt is at the 'R3(config-if)#' level for Loopback1.

```
R3
Physical Config CLI Attributes
IOS Command Line Interface

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

R3(config-if)#exit
R3(config)#interface Loopback0

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up

R3(config-if)#ip address 172.30.110.1 255.255.255.0
R3(config-if)#exit
R3(config)#interface Loopback1

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

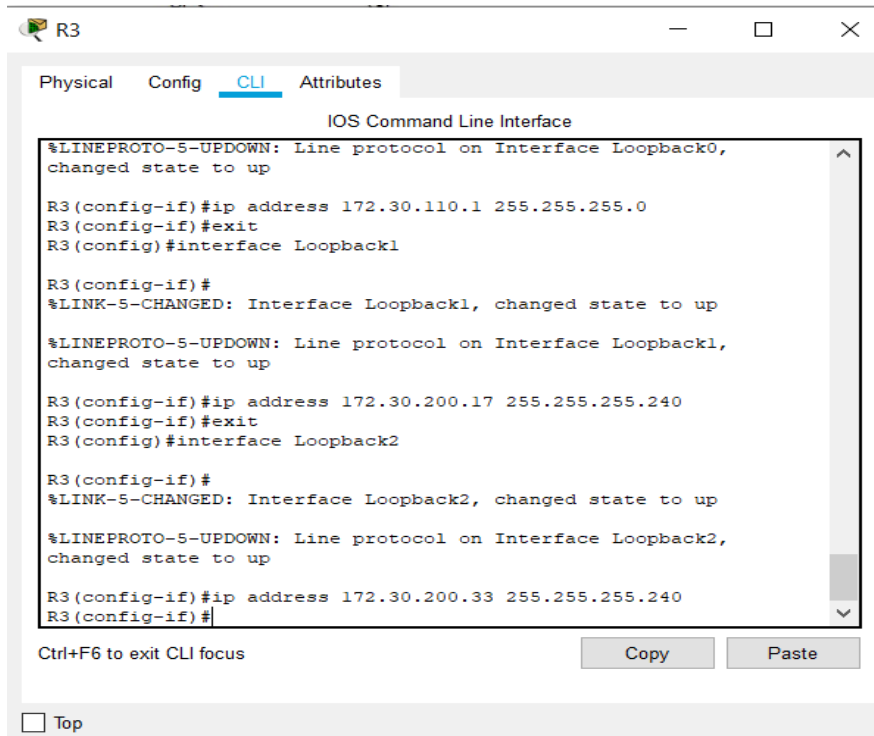
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up

R3(config-if)#ip address 172.30.200.17 255.255.255.240
R3(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

☐ Top

- Configuration of Loopback2:



The screenshot shows the R3 CLI interface with the 'CLI' tab selected. The command history displays the configuration of Loopback0, Loopback1, and the start of Loopback2 configuration. The prompt is at the 'R3(config-if)#' level for Loopback2.

```
R3
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up

R3(config-if)#ip address 172.30.110.1 255.255.255.0
R3(config-if)#exit
R3(config)#interface Loopback1

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up

R3(config-if)#ip address 172.30.200.17 255.255.255.240
R3(config-if)#exit
R3(config)#interface Loopback2

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback2, changed state to up

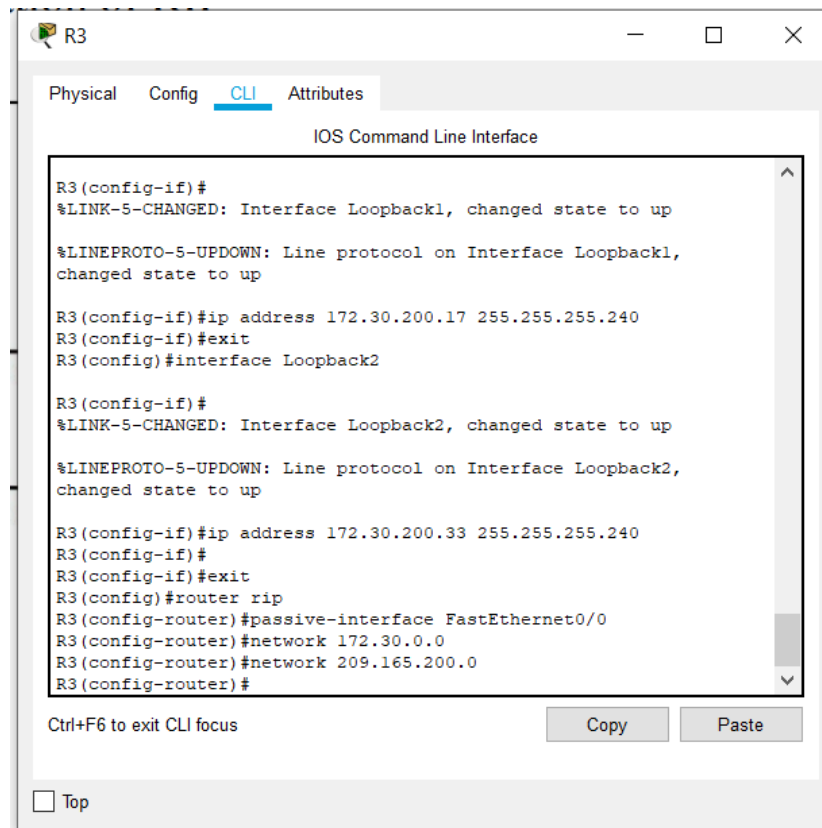
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2,
changed state to up

R3(config-if)#ip address 172.30.200.33 255.255.255.240
R3(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

☐ Top

- Configuration of RIP:



The screenshot shows the R3 CLI window with the following commands and output:

```
R3
Physical Config CLI Attributes
IOS Command Line Interface

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1,
changed state to up

R3(config-if)#ip address 172.30.200.17 255.255.255.240
R3(config-if)#exit
R3(config)#interface Loopback2

R3(config-if)#
%LINK-5-CHANGED: Interface Loopback2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2,
changed state to up

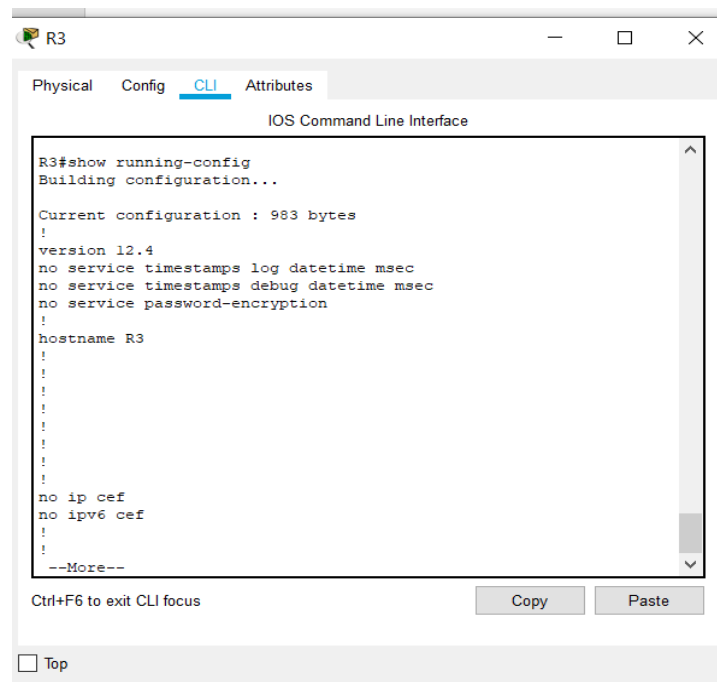
R3(config-if)#ip address 172.30.200.33 255.255.255.240
R3(config-if)#
R3(config-if)#exit
R3(config)#router rip
R3(config-router)#passive-interface FastEthernet0/0
R3(config-router)#network 172.30.0.0
R3(config-router)#network 209.165.200.0
R3(config-router)#
```

Buttons: Copy, Paste

Ctrl+F6 to exit CLI focus

Top

- Running Configuration:



The screenshot shows the R3 CLI window with the following output:

```
R3
Physical Config CLI Attributes
IOS Command Line Interface

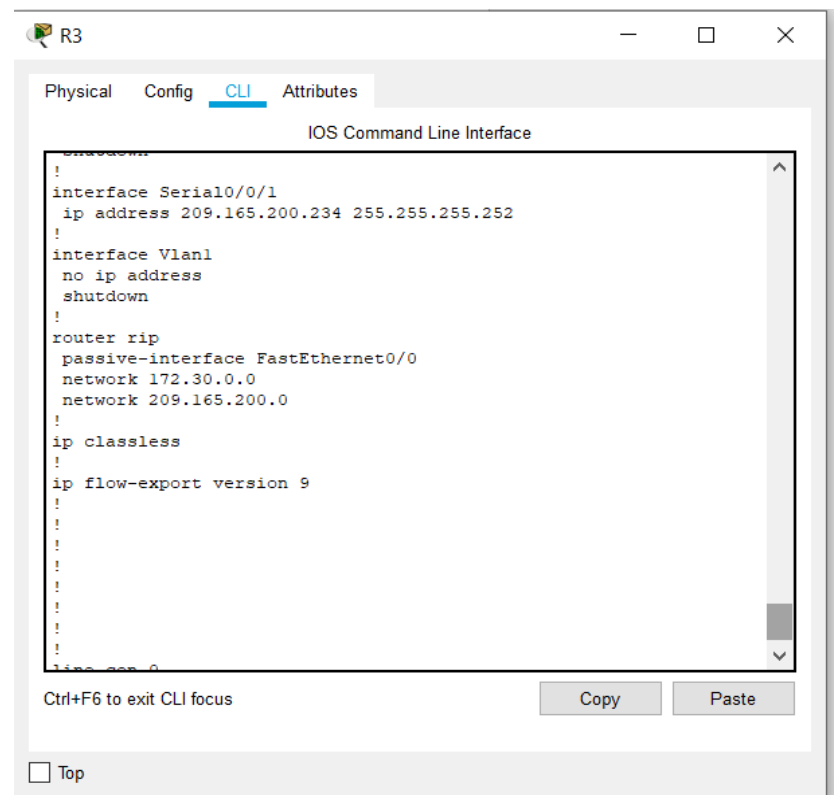
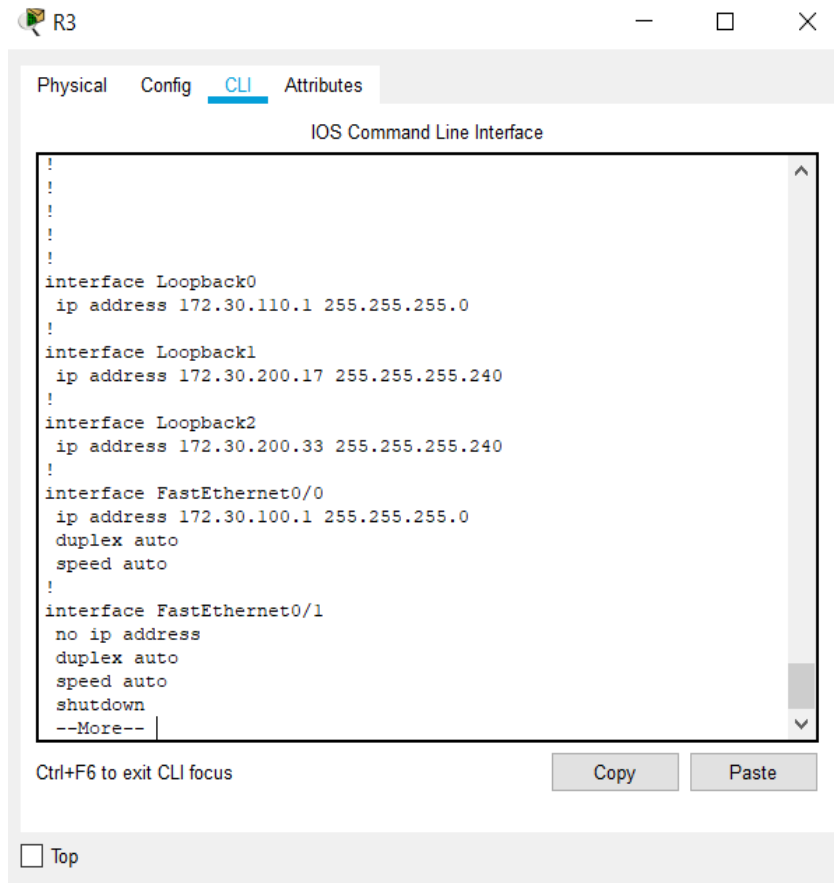
R3#show running-config
Building configuration...

Current configuration : 983 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
!
!
--More--
```

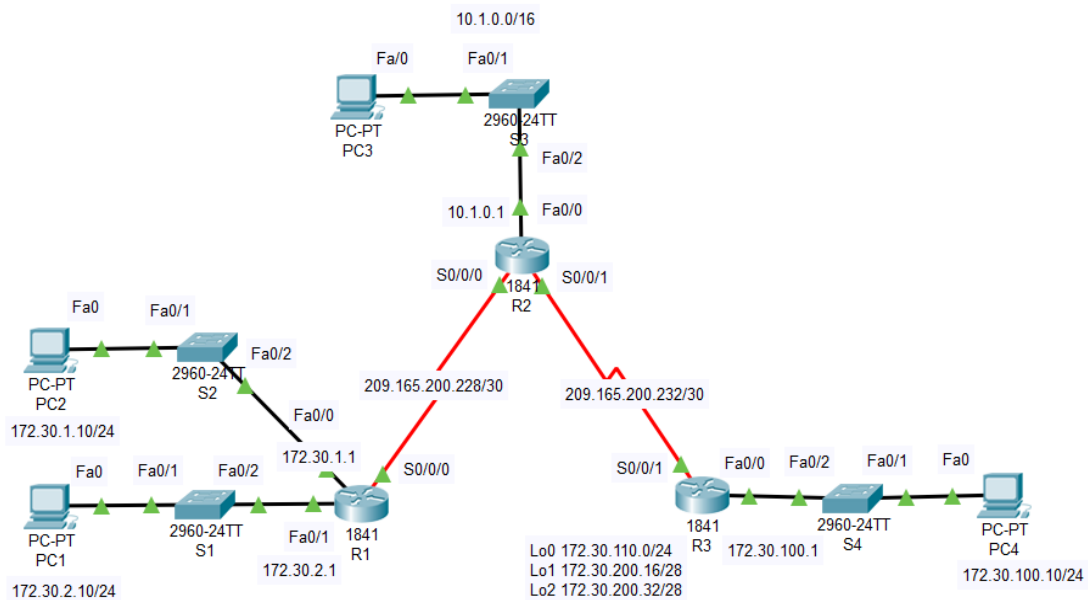
Buttons: Copy, Paste

Ctrl+F6 to exit CLI focus

Top



Final Topology:



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

```
R2>enable
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#

Ctrl+F6 to exit CLI focus

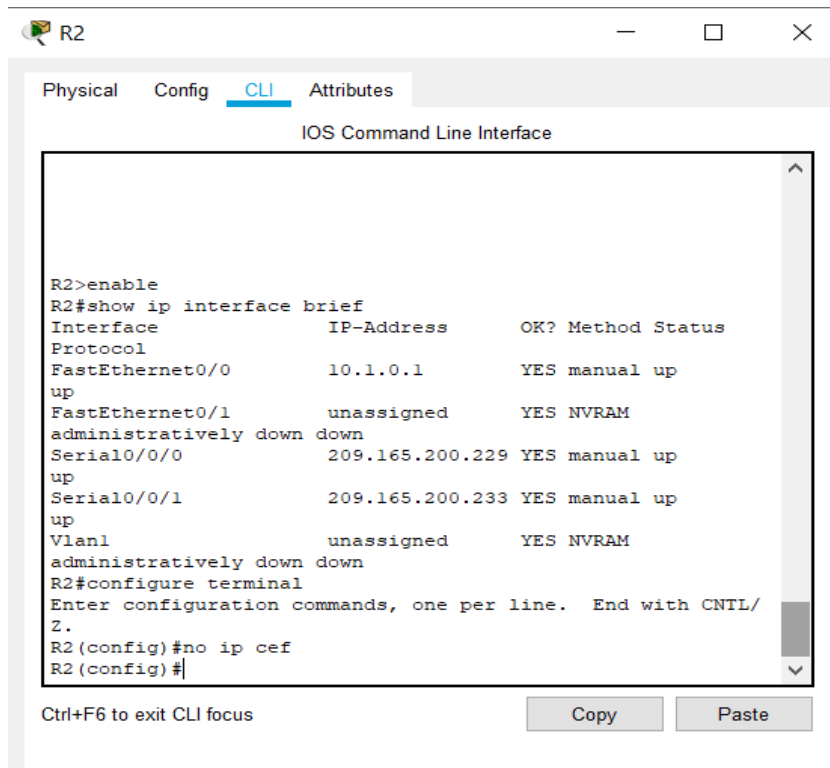
Copy Paste

☐ 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:

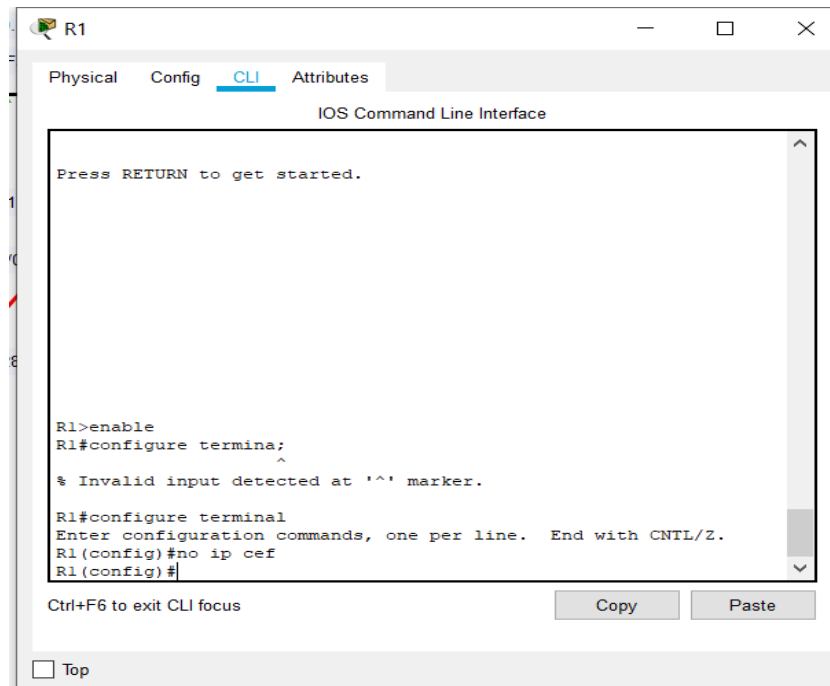
R2(config)#no ip cef



The screenshot shows the R2 CLI window with the 'CLI' tab selected. The 'IOS Command Line Interface' section displays the following output:

```
R2>enable
R2#show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
FastEthernet0/0    10.1.0.1        YES manual up
FastEthernet0/1    unassigned      YES NVRAM  administratively down
Serial0/0/0        209.165.200.229 YES manual up
Serial0/0/1        209.165.200.233 YES manual up
Vlan1              unassigned      YES NVRAM  administratively down
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip cef
R2(config)#
```

At the bottom of the window, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons.



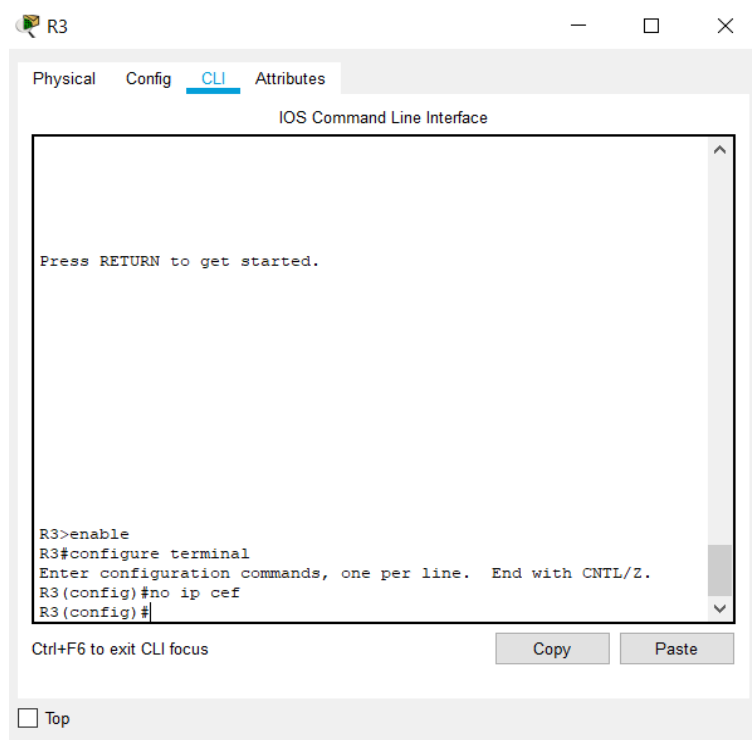
The screenshot shows the R1 CLI window with the 'CLI' tab selected. The 'IOS Command Line Interface' section displays the following output:

```
Press RETURN to get started.

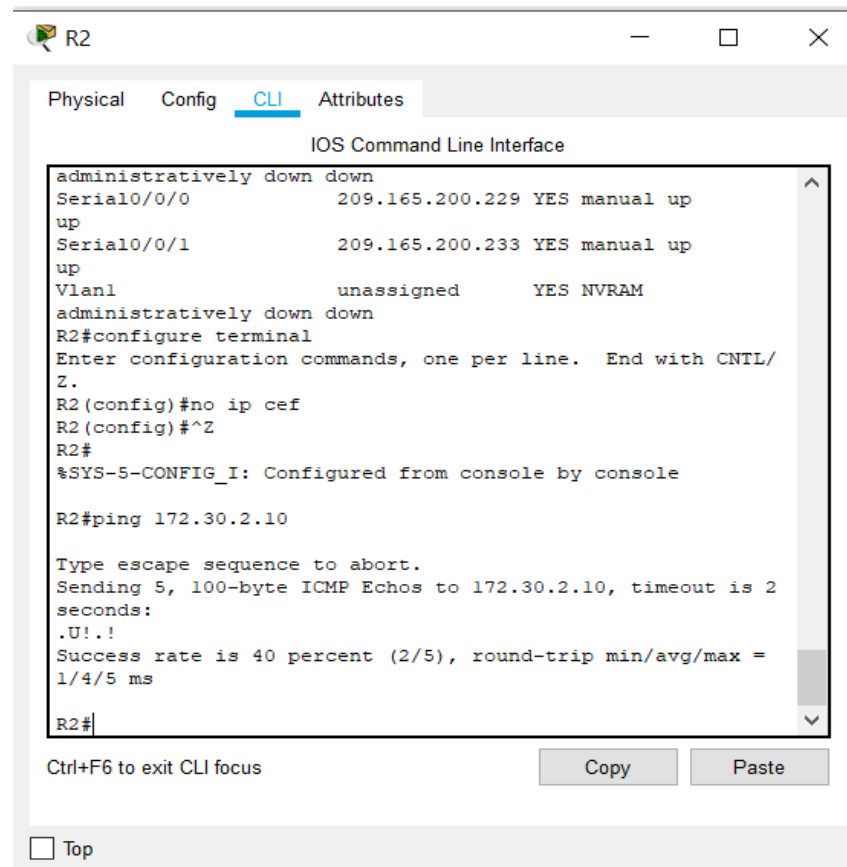
R1>enable
R1#configure termina;
^
% Invalid input detected at '^' marker.

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#no ip cef
R1(config)#
```

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.



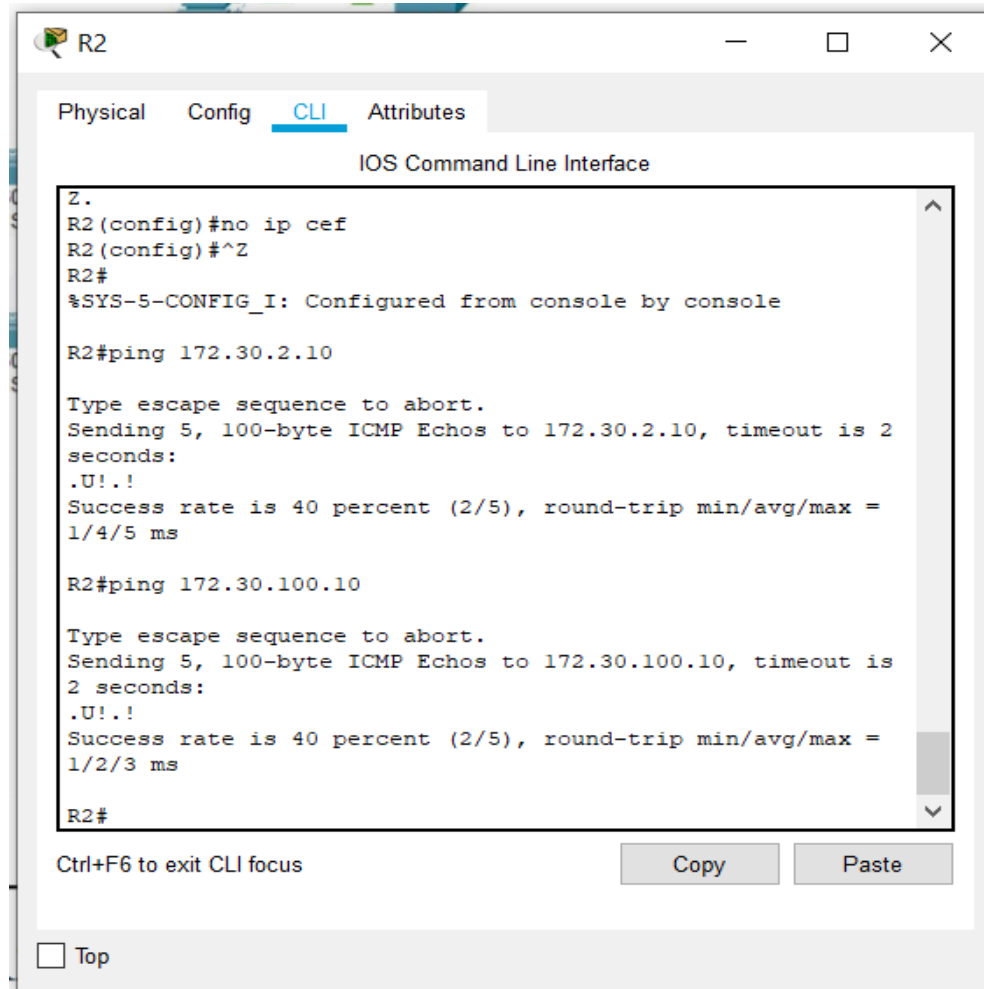
- Ping PC1 from R2:



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

Ans: **2 ICMP messages are successful.**

- Ping PC4 from R2:



The screenshot shows the R2 router's CLI interface. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is active. The user has entered the command 'no ip cef' and then '^Z' to exit configuration mode. The prompt is now 'R2#'. The user has entered the command 'ping 172.30.2.10'. The output shows 'Type escape sequence to abort.', 'Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:', and '.U!..!'. The success rate is 40 percent (2/5), and the round-trip times are 1/4/5 ms. The user has then entered the command 'ping 172.30.100.10'. The output shows 'Type escape sequence to abort.', 'Sending 5, 100-byte ICMP Echos to 172.30.100.10, timeout is 2 seconds:', and '.U!..!'. The success rate is 40 percent (2/5), and the round-trip times are 1/2/3 ms. The prompt is now 'R2#'. There are 'Copy' and 'Paste' buttons at the bottom right, and a 'Top' button at the bottom left.

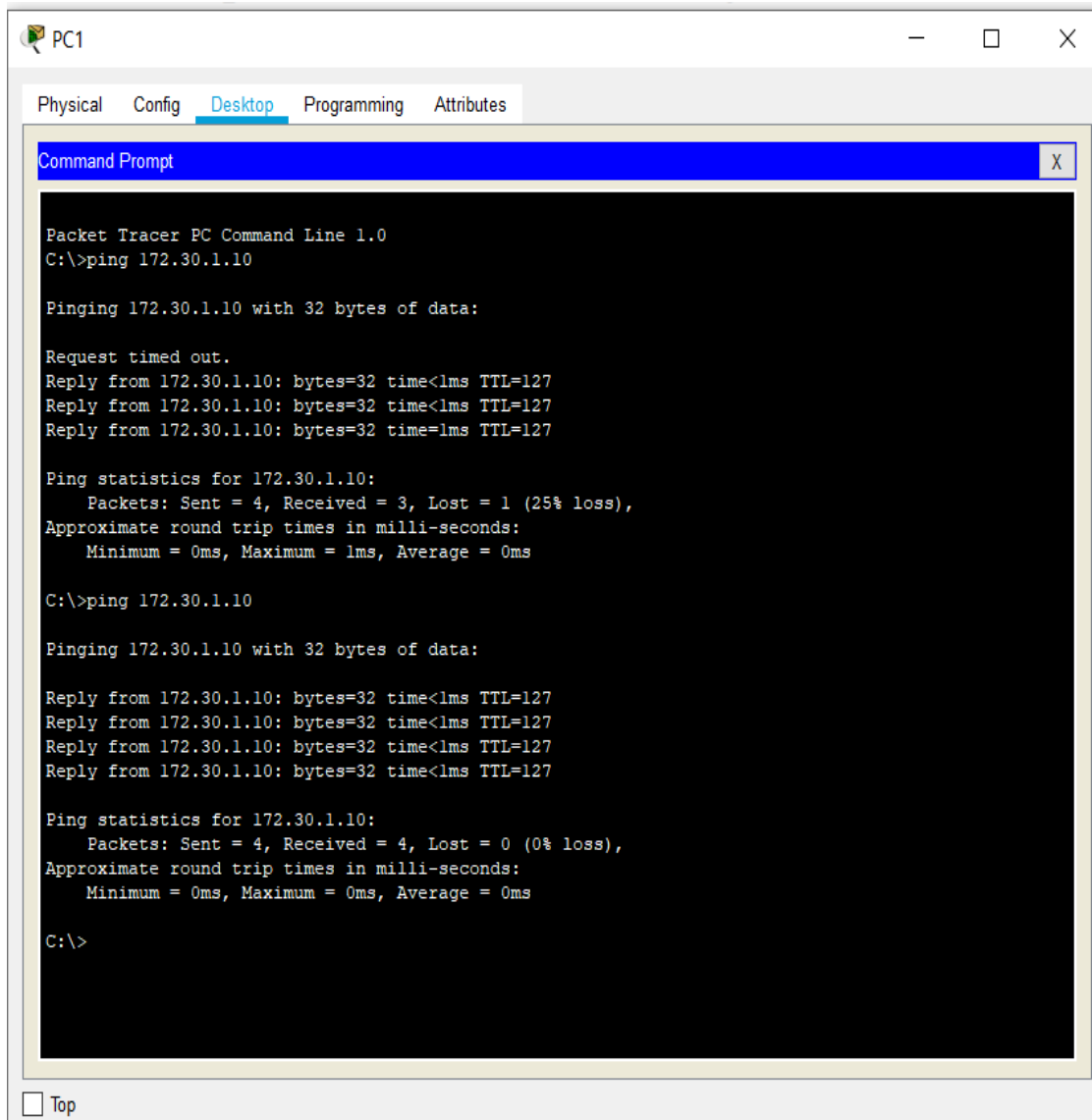
```
Z.  
R2(config)#no ip cef  
R2(config)#^Z  
R2#  
%SYS-5-CONFIG_I: Configured from console by console  
  
R2#ping 172.30.2.10  
  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2  
seconds:  
.U!..!  
Success rate is 40 percent (2/5), round-trip min/avg/max =  
1/4/5 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 40 percent (2/5), round-trip min/avg/max =  
1/2/3 ms  
  
R2#
```

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

Ans: **2 ICMP messages are successful.**

Step 3: Check the connectivity between the PCs.

- Ping PC2 from PC1:



The screenshot shows a Packet Tracer interface for PC1. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window title is 'Command Prompt' with a close button 'X'. The text inside the window shows the execution of the 'ping 172.30.1.10' command twice. The first execution shows a 'Request timed out.' followed by three successful replies. The second execution shows four successful replies. The statistics for both attempts indicate a 0% loss rate.

```
Packet Tracer PC Command Line 1.0
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<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 = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

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:\>
```

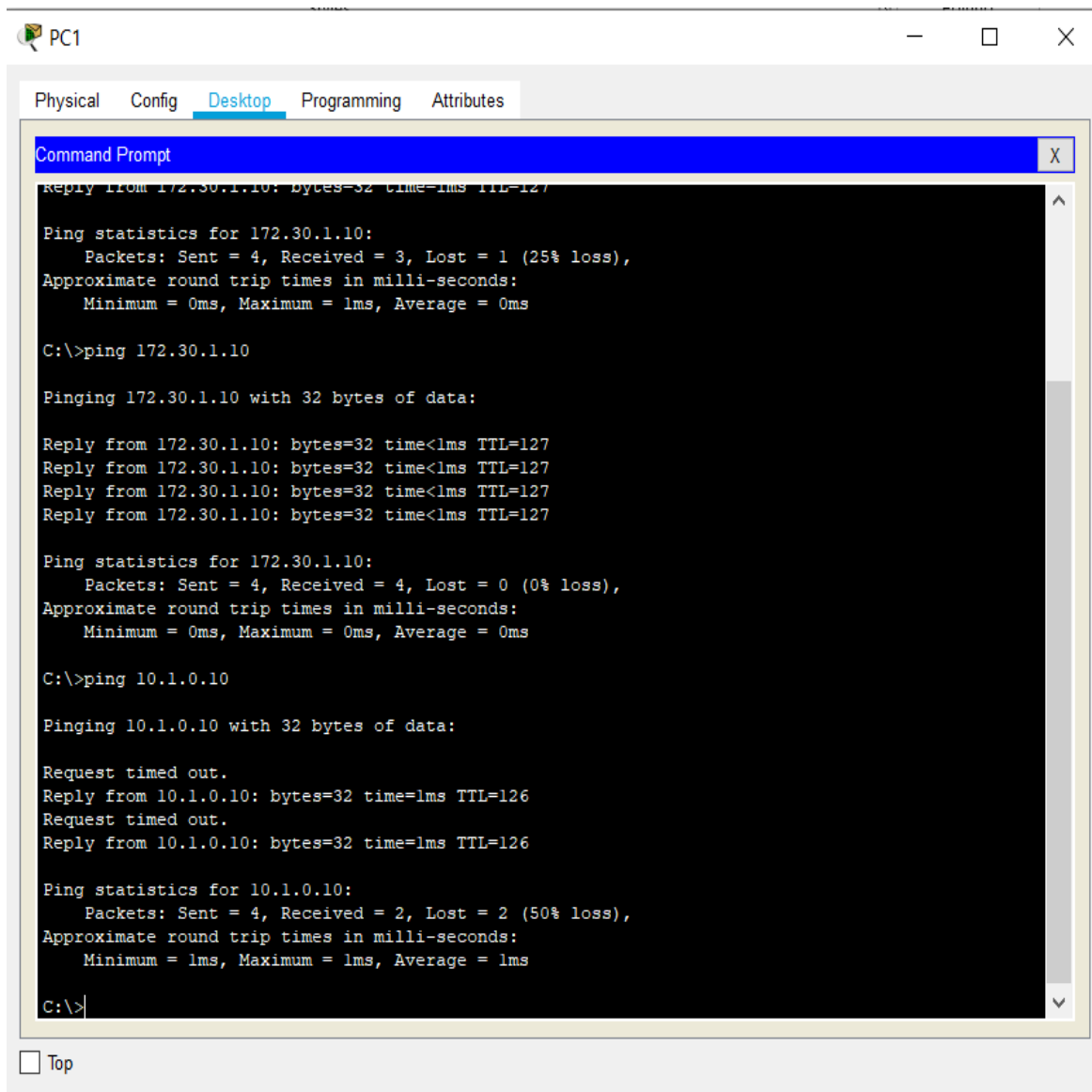
From the PC1, is it possible to ping PC2?

=> **Yes.**

What is the success rate?

=> **100%**

- Ping PC3 from PC1:



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 the results of two ping commands. The first command is "ping 172.30.1.10", which shows a 25% loss rate. The second command is "ping 10.1.0.10", which shows a 50% loss rate.

```
Reply from 172.30.1.10: bytes=32 time=1ms 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 = 1ms, Average = 0ms

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:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

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

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

C:\>
```

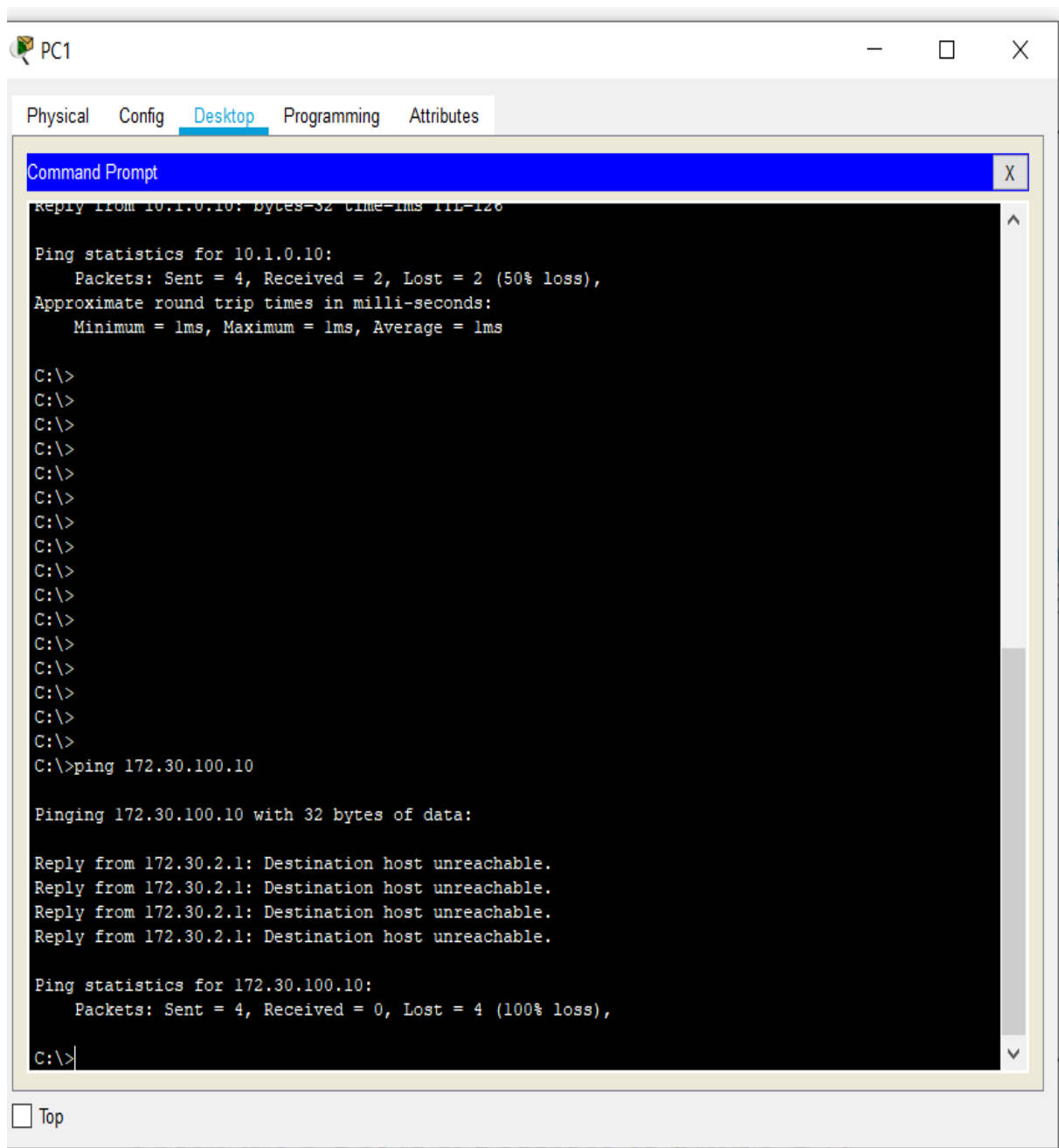
From the PC1, is it possible to ping PC3?

=> **Yes**

What is the success rate?

=> **50%**

- Ping PC4 from PC1:



The screenshot shows a Packet Tracer window for PC1. The 'Desktop' tab is active, displaying a Command Prompt. The prompt shows the results of a ping command to 10.1.0.10, which was successful with 50% loss. Then, a ping command to 172.30.100.10 was executed, resulting in 100% loss because the destination host is unreachable.

```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Reply from 10.1.0.10: bytes=32 time=1ms TTL=128
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:\>
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.
Reply from 172.30.2.1: Destination host unreachable.

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

C:\>
```

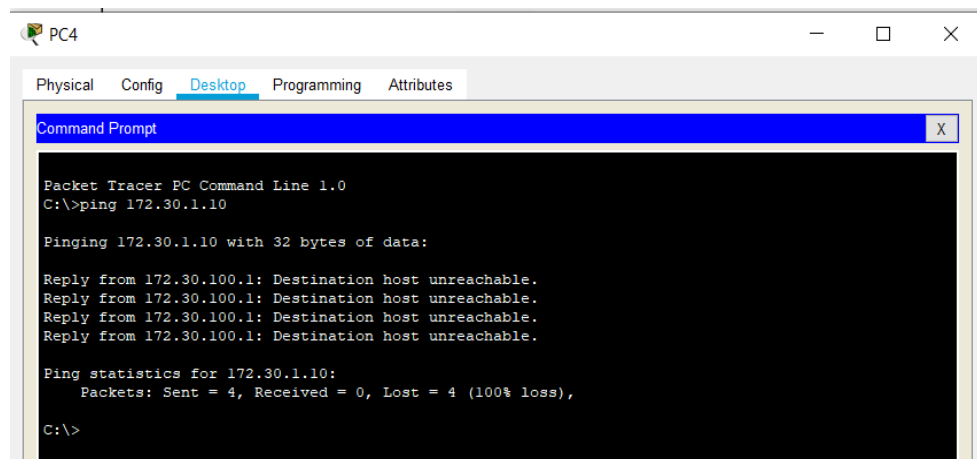
From the PC1, is it possible to ping PC4?

=> **No**

What is the success rate?

=> **0%**

- Ping PC2 from PC4:



```
PC4
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.100.1: Destination host unreachable.
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.

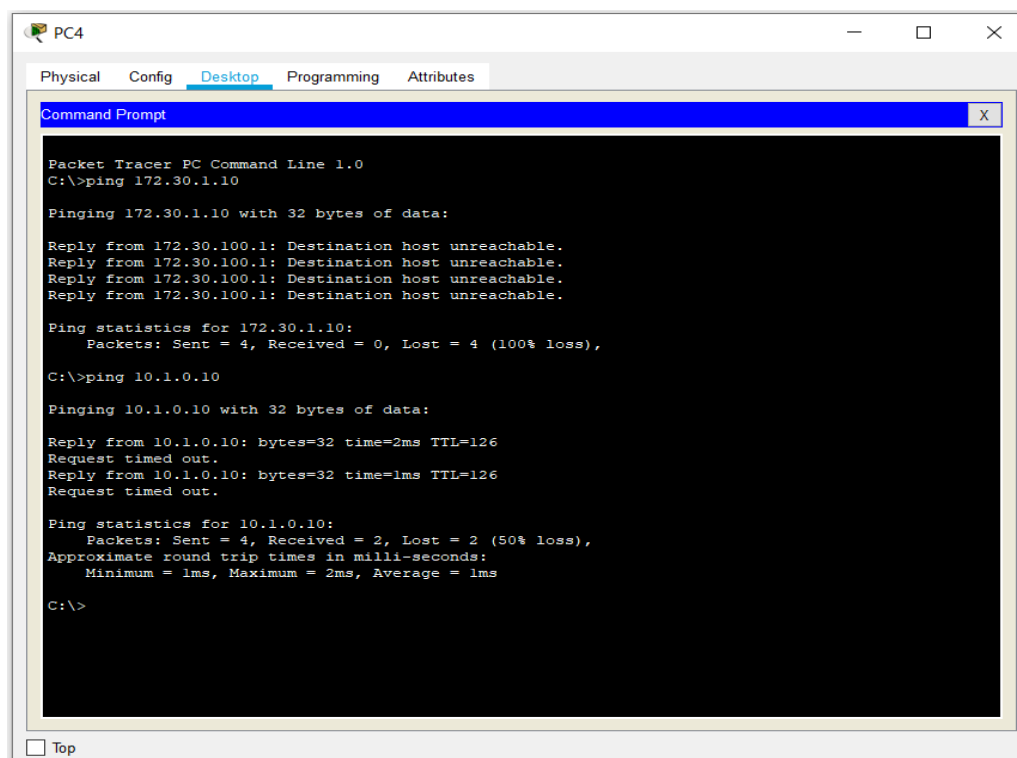
Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

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

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

- Ping PC3 from PC4:



```
PC4
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.100.1: Destination host unreachable.
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 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=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 = 2ms, Average = 1ms

C:\>
```

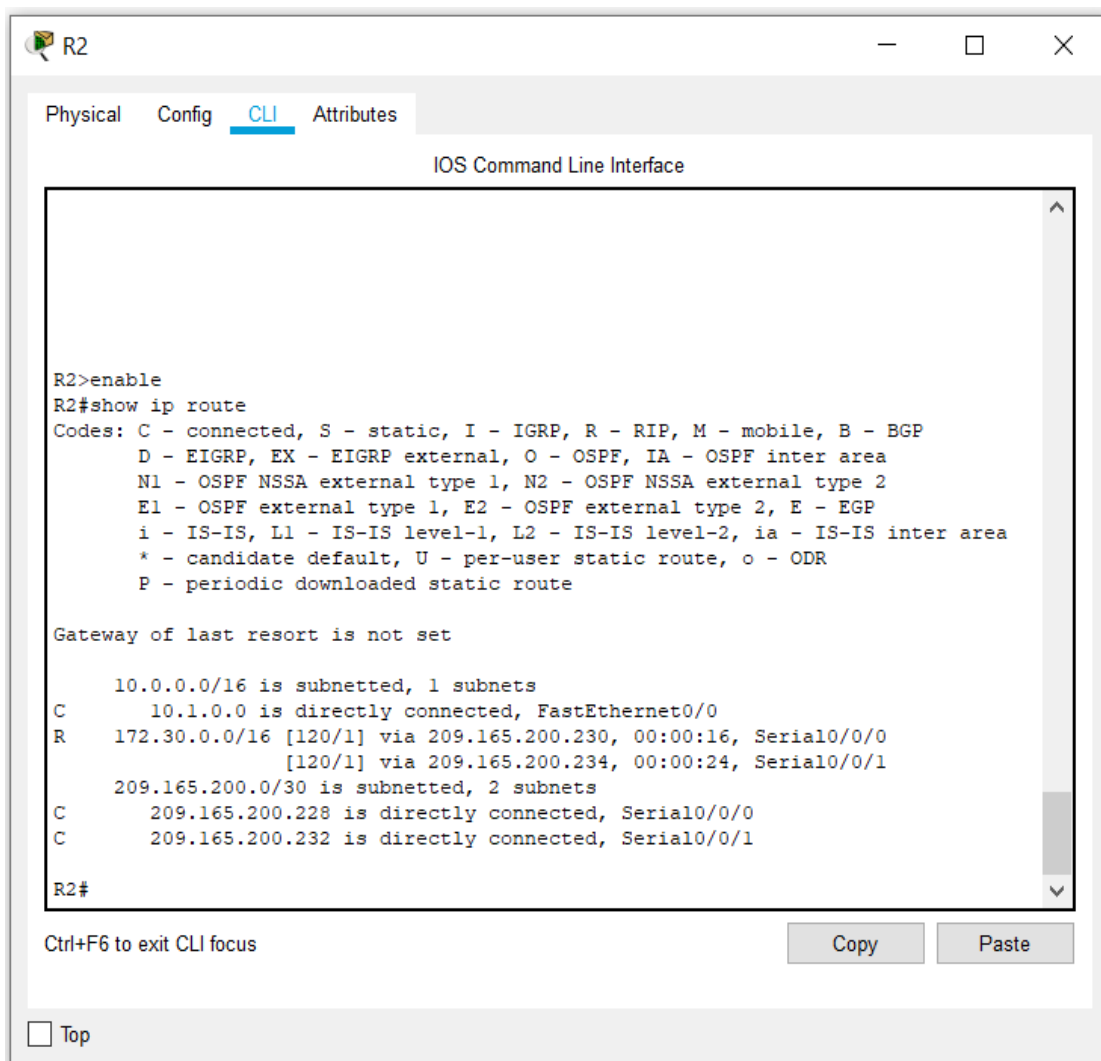
From the PC4, is it possible to ping PC3? => **Yes.**

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 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>enable
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, 00:00:16, Serial0/0/0
      [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

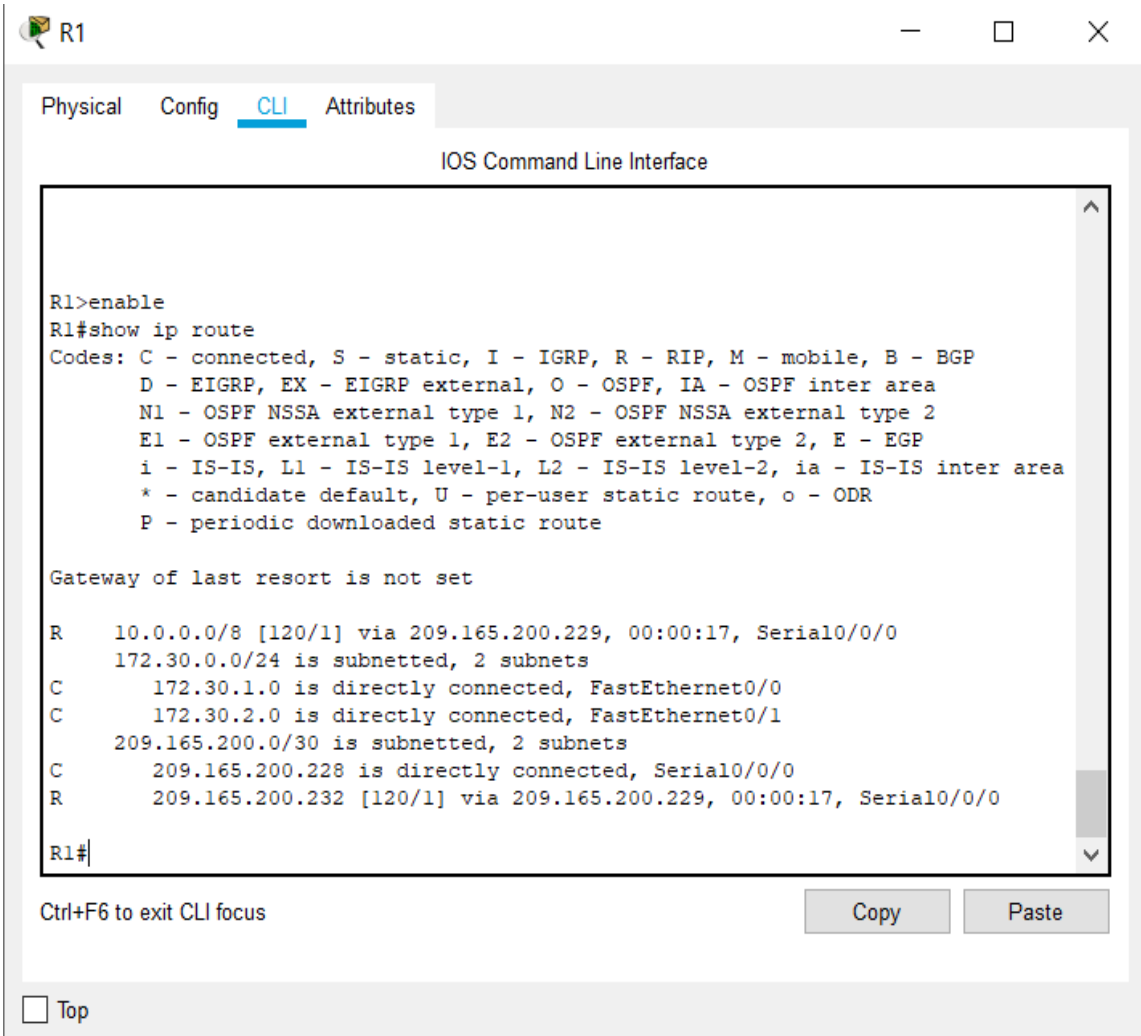
☐ Top

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

Both R1 and R3 are configured with interfaces on a discontinuous network, 172.30.0.0. The 172.30.0.0 subnets are physically and logically divided by at

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

R1#show ip route



```
R1>enable
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, 00:00:17, 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, 00:00:17, Serial0/0/0

R1#
```

Ctrl+F6 to exit CLI focus

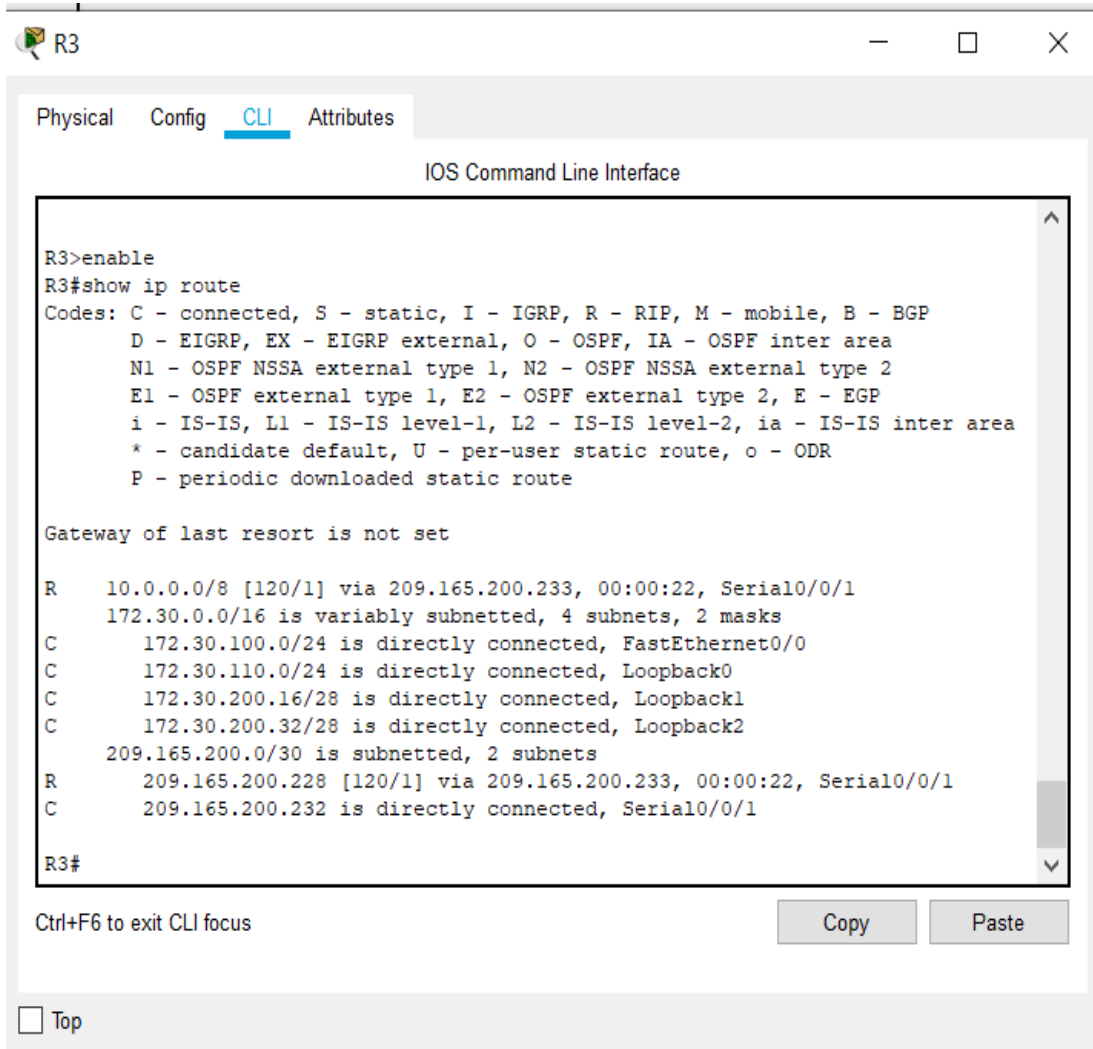
Copy Paste

☐ 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



The screenshot shows a terminal window titled 'R3' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The user has entered the command 'show ip route'. The output shows the routing table for R3, including a legend for route codes (C, S, I, R, M, B, D, EX, N1, N2, E1, E2, E, i, L1, L2, ia, *, U, o, P), a message 'Gateway of last resort is not set', and a list of routes. The routes include 10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:22, Serial0/0/1; 172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks; 172.30.100.0/24 is directly connected, FastEthernet0/0; 172.30.110.0/24 is directly connected, Loopback0; 172.30.200.16/28 is directly connected, Loopback1; 172.30.200.32/28 is directly connected, Loopback2; 209.165.200.0/30 is subnetted, 2 subnets; 209.165.200.228 [120/1] via 209.165.200.233, 00:00:22, Serial0/0/1; and 209.165.200.232 is directly connected, Serial0/0/1. The prompt 'R3#' is visible at the bottom of the CLI window.

```
R3>enable
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, 00:00:22, 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, 00:00:22, Serial0/0/1
C     209.165.200.232 is directly connected, Serial0/0/1

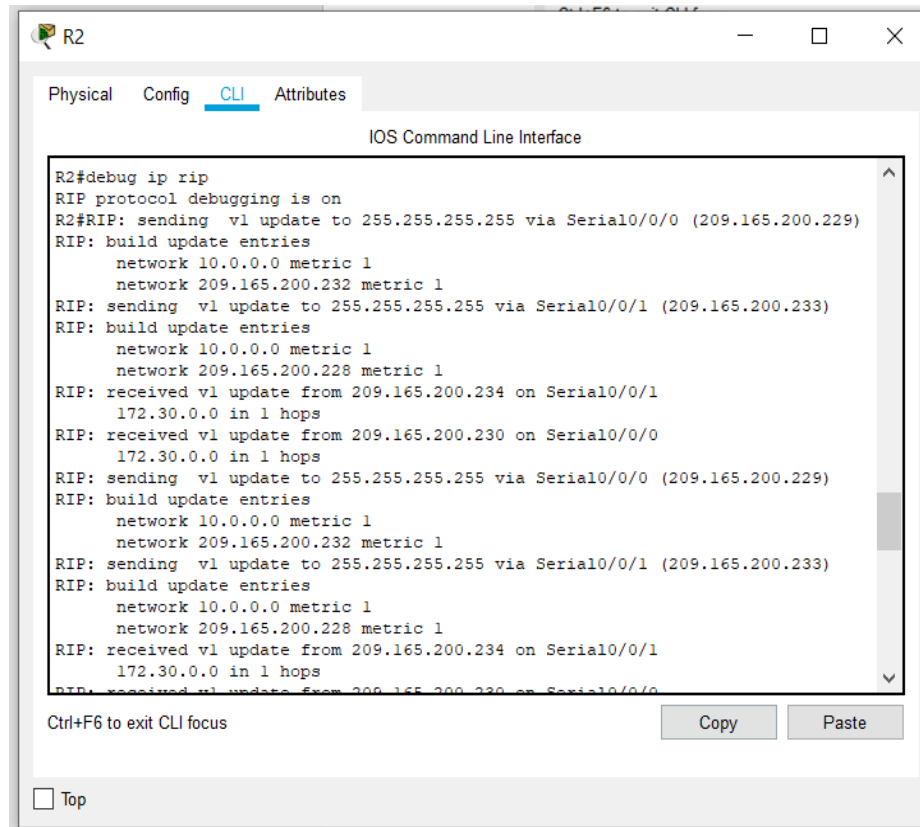
R3#
```

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

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

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

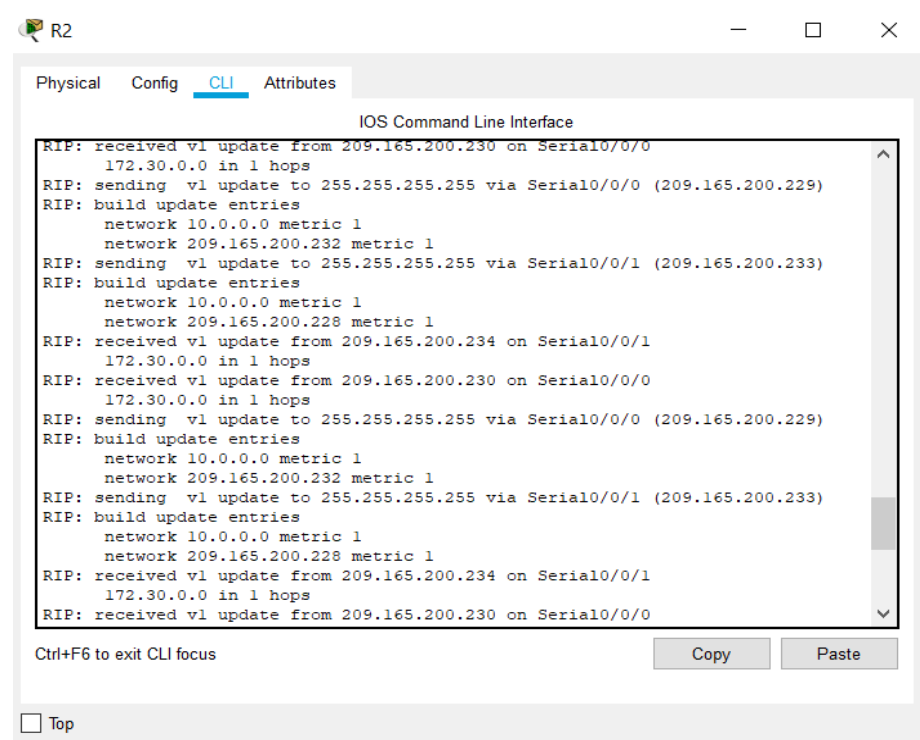
R2#debug ip rip



The screenshot shows a terminal window titled 'R2' with tabs for 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The output of the 'debug ip rip' command is visible, showing the router sending and receiving updates. The text is as follows:

```
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: 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
```

At the bottom of the CLI window, there is a prompt 'Ctrl+F6 to exit CLI focus' and two buttons: 'Copy' and 'Paste'. A 'Top' button is located at the bottom left of the window.



This screenshot shows a continuation of the 'debug ip rip' output from the previous window. The text is as follows:

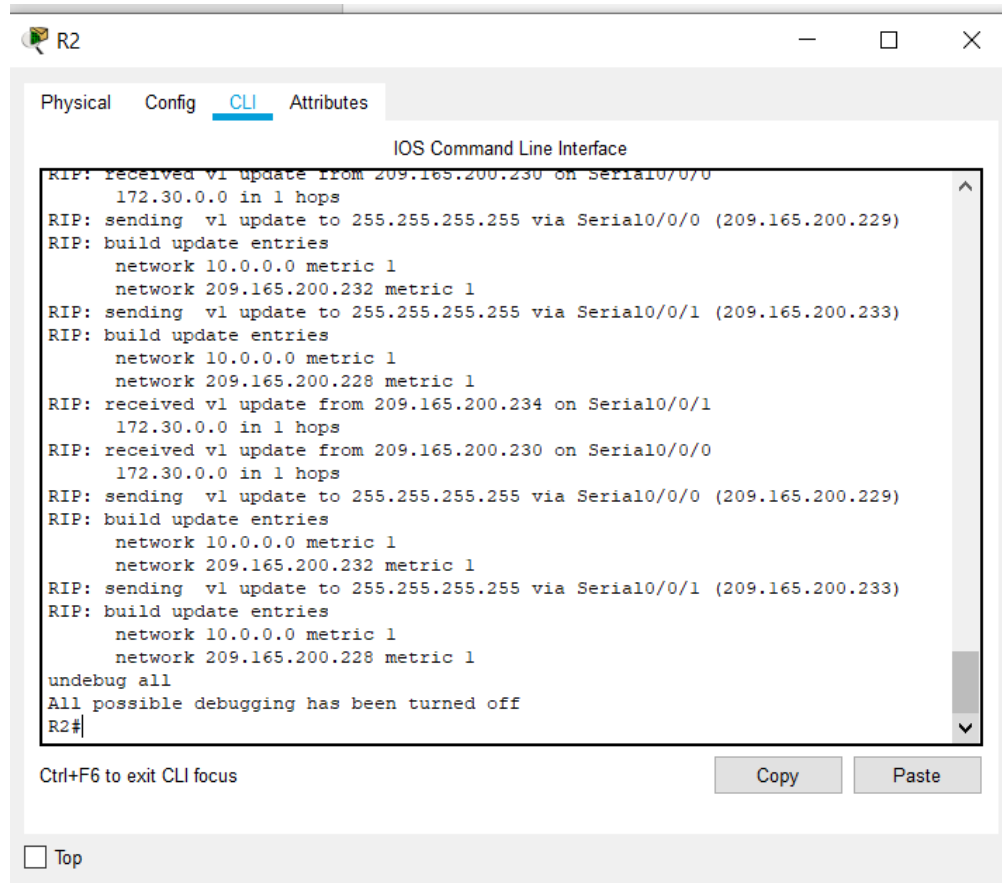
```
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
    172.30.0.0 in 1 hops
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.228 metric 1
RIP: received v1 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
    172.30.0.0 in 1 hops
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.228 metric 1
RIP: received v1 update from 209.165.200.234 on Serial0/0/1
    172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
```

The interface and controls at the bottom of the window are identical to the first screenshot.

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



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 output of the 'undebug all' command is shown, indicating that all debugging has been turned off. The prompt 'R2#' is visible at the bottom of the CLI window.

```
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
  172.30.0.0 in 1 hops
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
  network 10.0.0.0 metric 1
  network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
  network 10.0.0.0 metric 1
  network 209.165.200.228 metric 1
RIP: received v1 update from 209.165.200.234 on Serial0/0/1
  172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.230 on Serial0/0/0
  172.30.0.0 in 1 hops
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
  network 10.0.0.0 metric 1
  network 209.165.200.232 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
  network 10.0.0.0 metric 1
  network 209.165.200.228 metric 1
undebug all
All possible debugging has been turned off
R2#
```

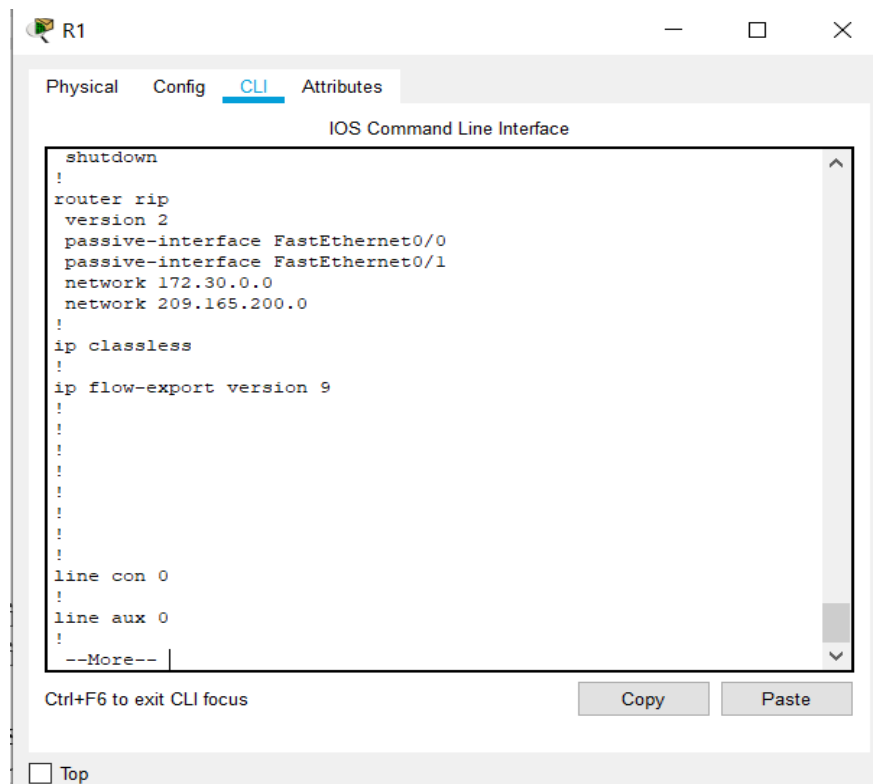
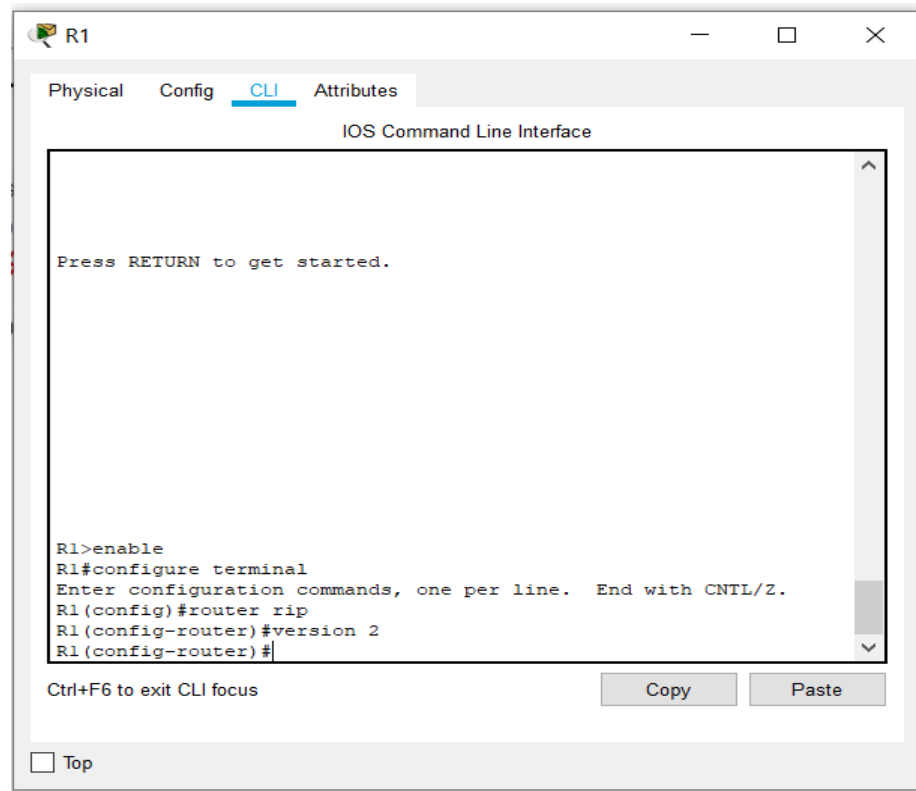
Task 4: Configure RIP Version 2.

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

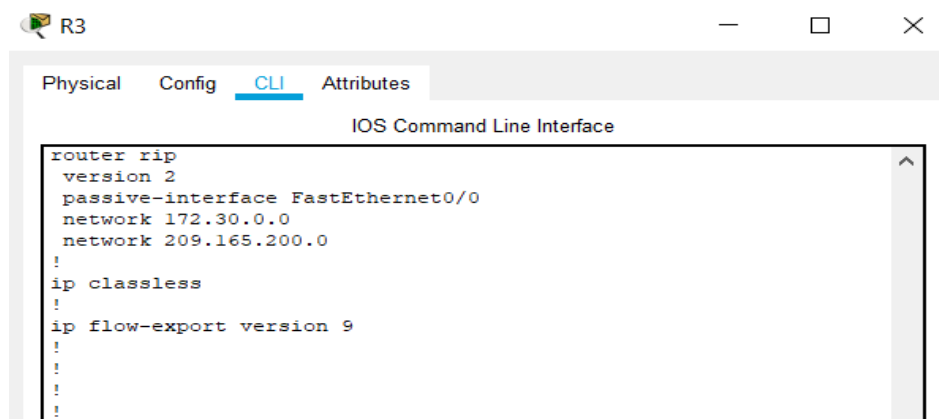
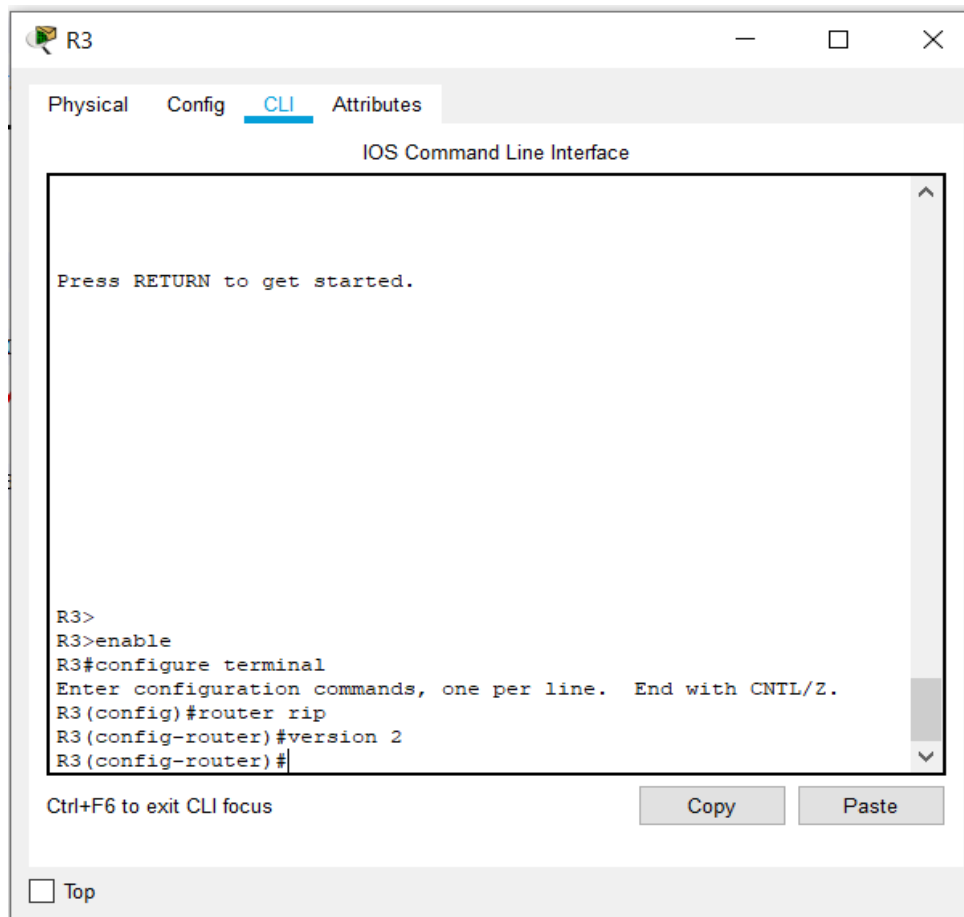
R2(config)#router rip

R2(config-router)#version 2


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



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

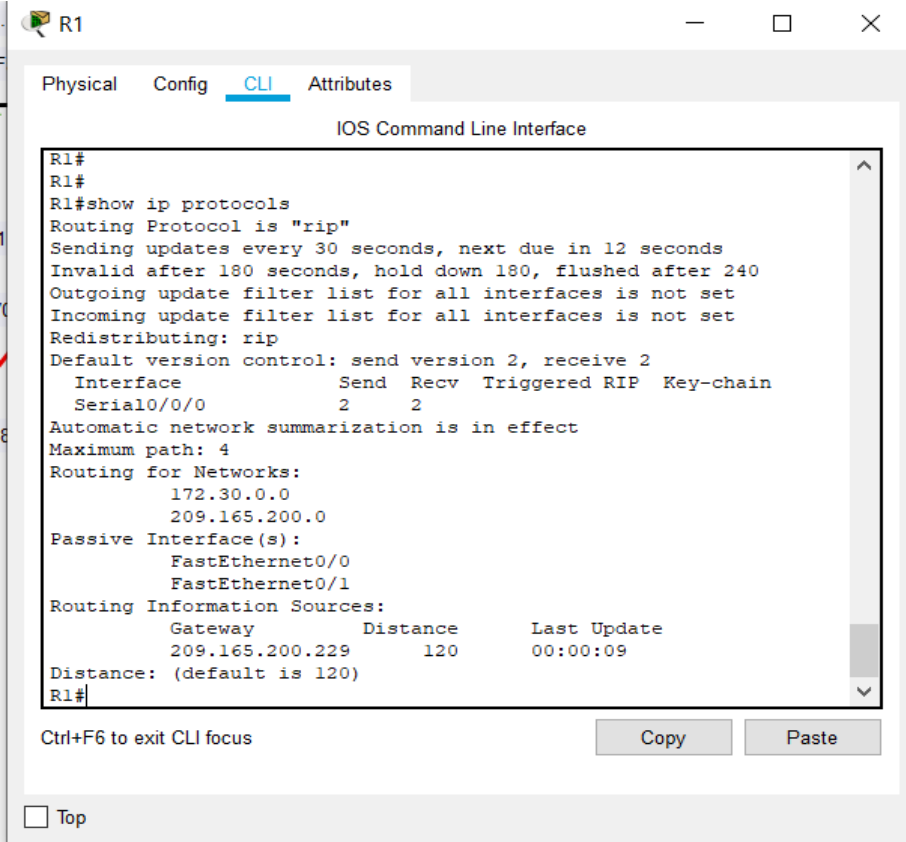


RIPv2 messages include the subnet mask in a field in the routing updates. This allows subnets and their masks to be included in the routing updates. However, by default RIPv2 summarizes networks at major network boundaries, just like RIPv1, except that the subnet mask is included in the update.

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**



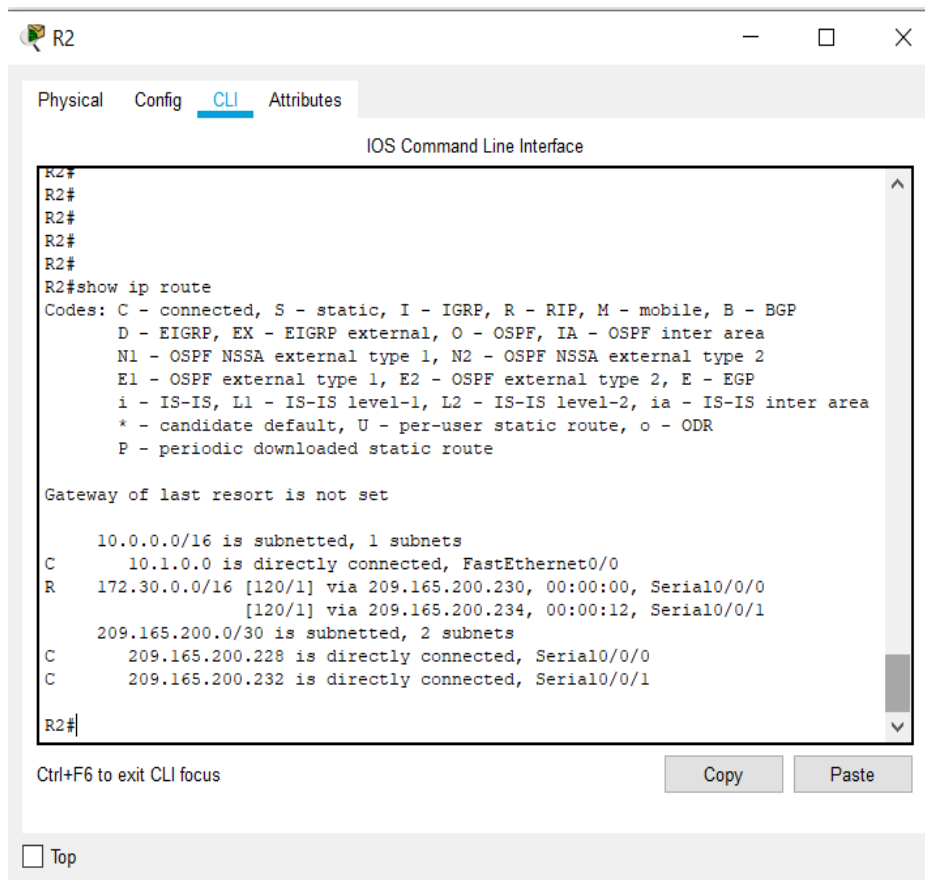
The screenshot shows a Cisco IOS Command Line Interface window for router R1. The window has tabs for Physical, Config, CLI (selected), and Attributes. The CLI tab displays the output of the 'show ip protocols' command. The output shows that RIPv2 is running on the router, with updates sent every 30 seconds. It also shows the default version control settings and the interfaces configured for RIPv2.

```
R1#
R1#
R1#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
  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        00:00:09
Distance: (default is 120)
R1#
```

Task 5: Examine the Automatic Summarization of Routes.

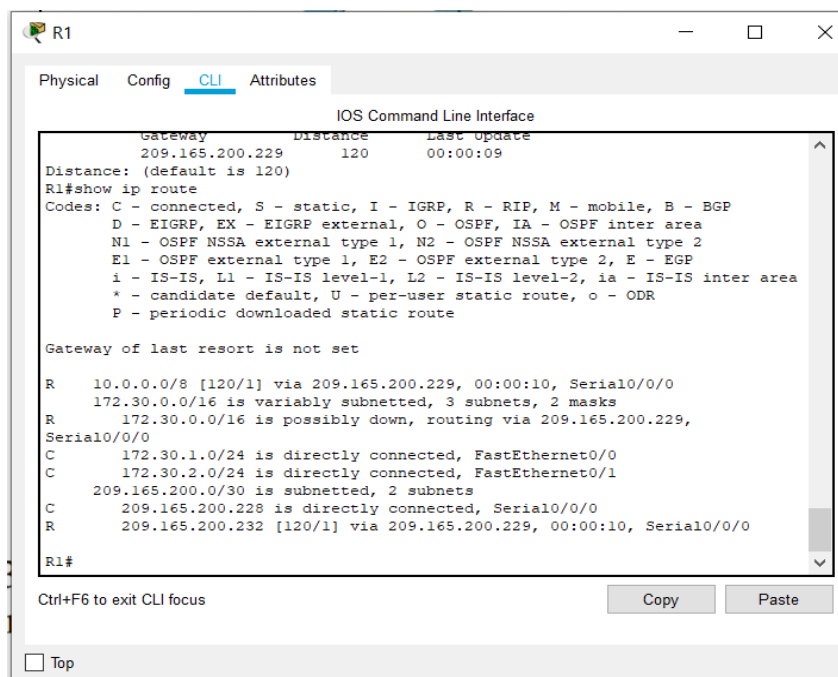
The LANs connected to R1 and R3 are still composed of discontinuous networks. R2 still shows two equal cost paths to the 172.30.0.0/16 network in the routing table. R2 still shows only the major classful network address of 172.30.0.0 and does not show any of the subnets for this network.

R2#**show ip route**



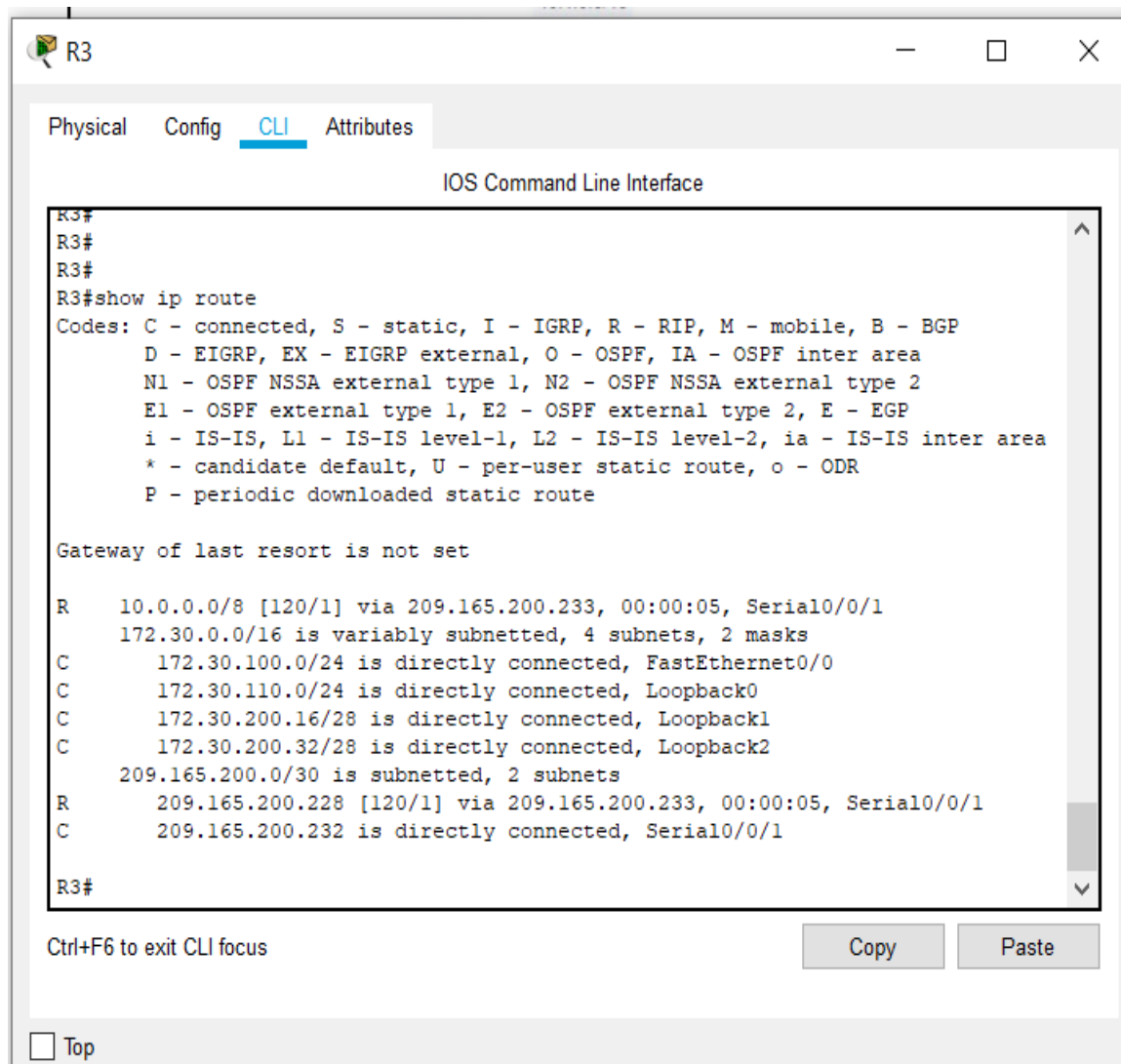
R1 still shows only its own subnets for the 172.30.0.0 network. R1 still does not have any routes for the 172.30.0.0 subnets on R3.

R1#show ip route



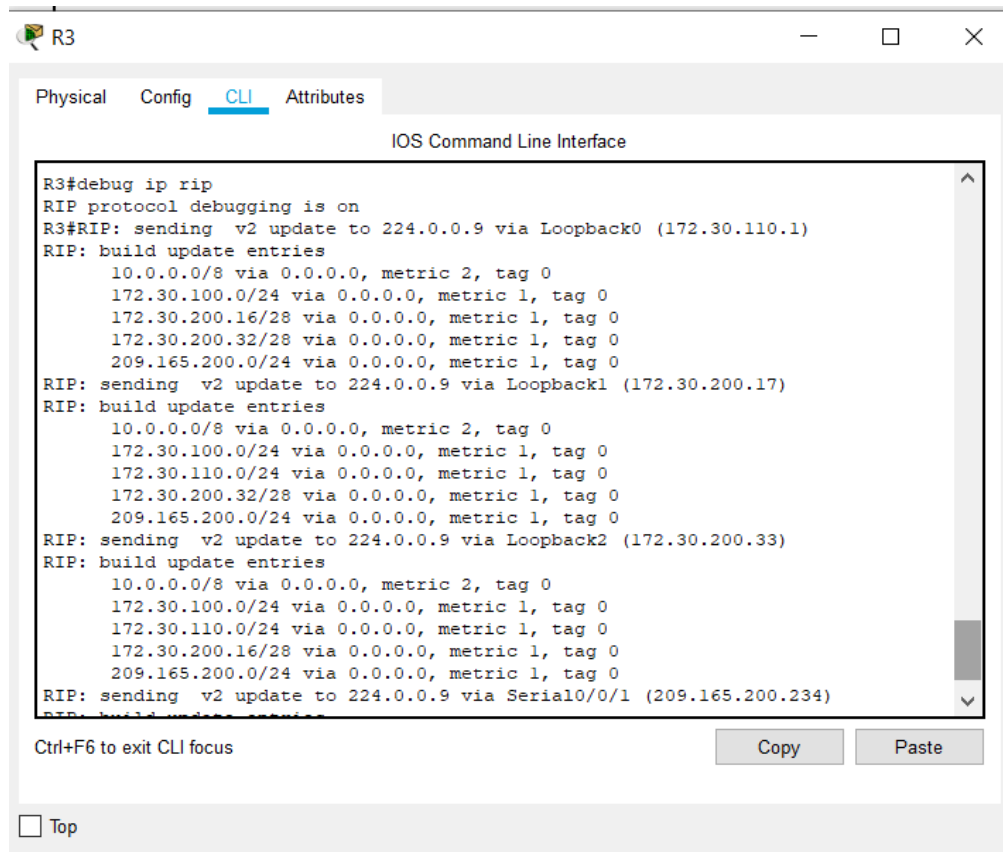
R3 still only shows its own subnets for the 172.30.0.0 network. R3 still does not have any routes for the 172.30.0.0 subnets on R1.

R3#show ip route



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

- For R3:



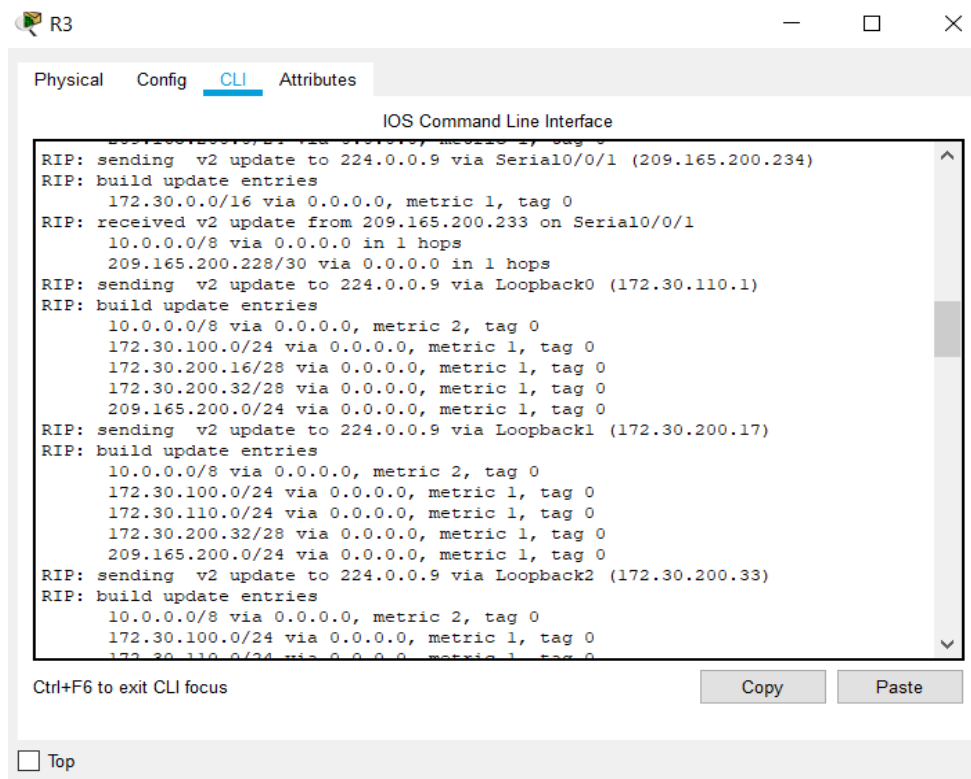
The screenshot shows the R3 CLI window with the 'CLI' tab selected. The output of the 'debug ip rip' command is displayed in a scrollable text area. The output shows the router sending v2 updates to three loopback interfaces (Loopback0, Loopback1, and Loopback2) and building update entries for each. The update entries include the 10.0.0.0/8 network with a metric of 2, and three other networks (172.30.100.0/24, 172.30.200.16/28, and 172.30.200.32/28) with a metric of 1. The output also shows the router sending v2 updates to the Serial0/0/1 interface (209.165.200.234).

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

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top



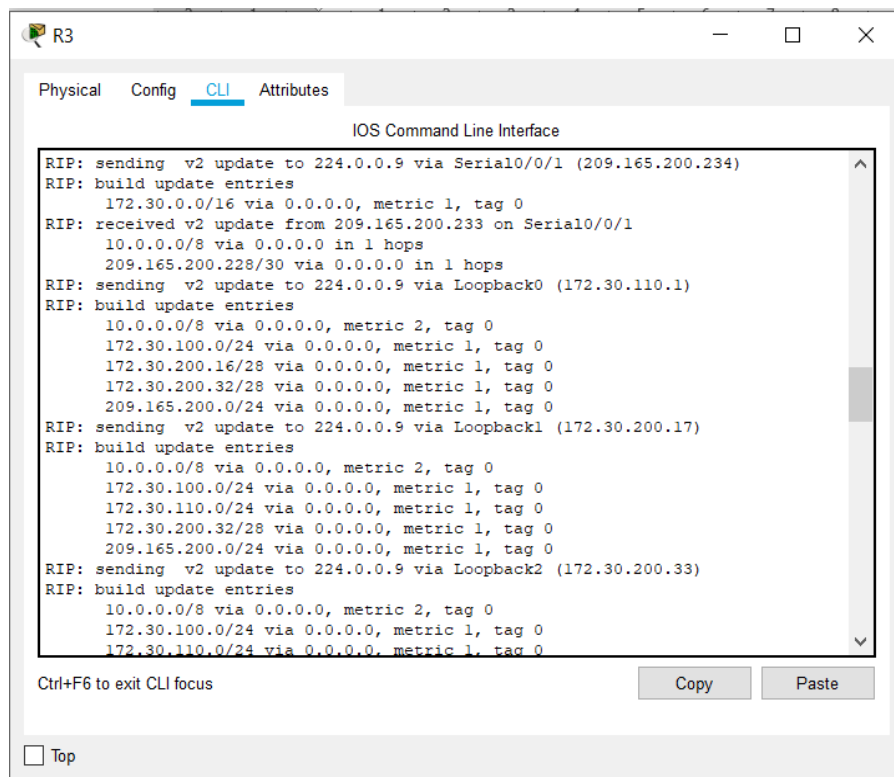
The screenshot shows the R3 CLI window with the 'CLI' tab selected. The output of the 'debug ip rip' command is displayed in a scrollable text area. The output shows the router receiving a v2 update from the Serial0/0/1 interface (209.165.200.234) and building update entries for each. The update entries include the 10.0.0.0/8 network with a metric of 1, and three other networks (172.30.100.0/24, 172.30.200.16/28, and 172.30.200.32/28) with a metric of 1. The output also shows the router sending v2 updates to three loopback interfaces (Loopback0, Loopback1, and Loopback2) and building update entries for each. The update entries include the 10.0.0.0/8 network with a metric of 2, and three other networks (172.30.100.0/24, 172.30.200.16/28, and 172.30.200.32/28) with a metric of 1.

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

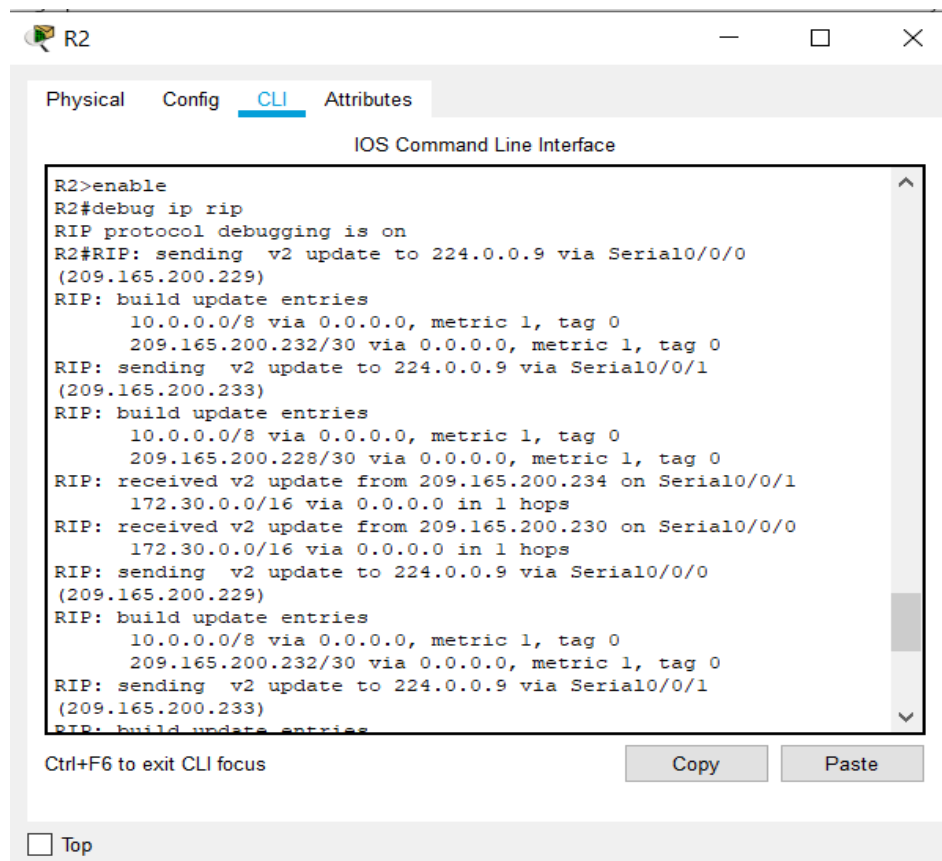
Ctrl+F6 to exit CLI focus

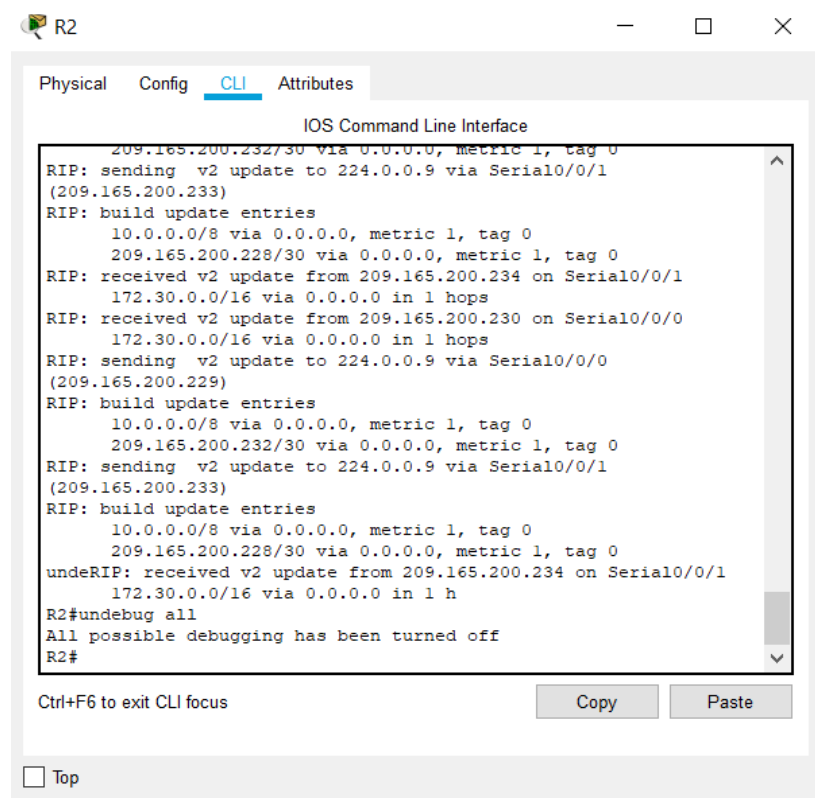
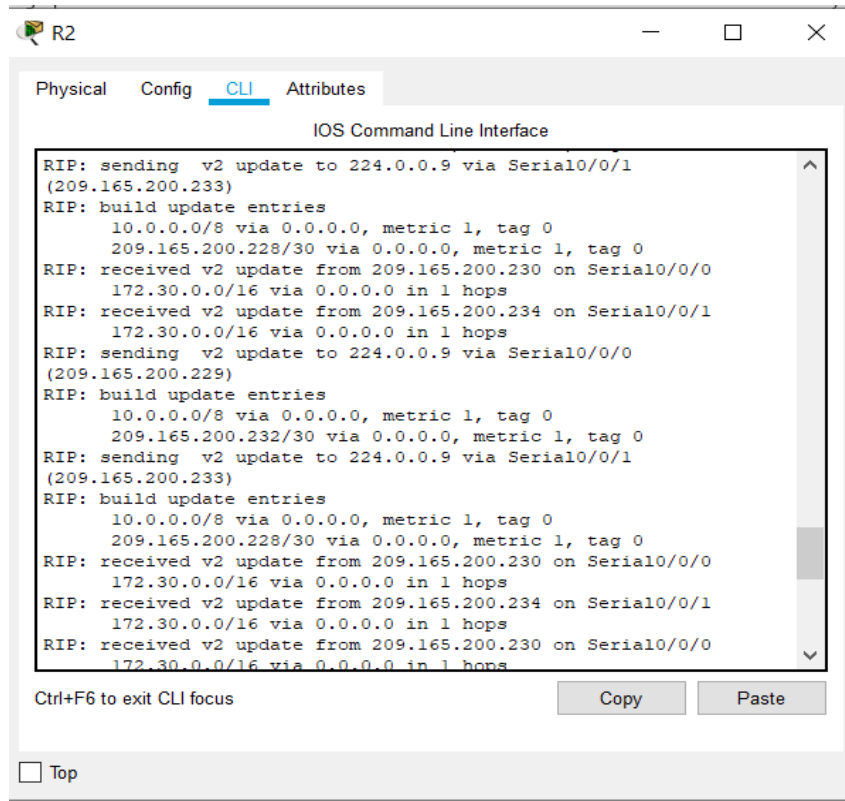
Copy Paste

☐ Top

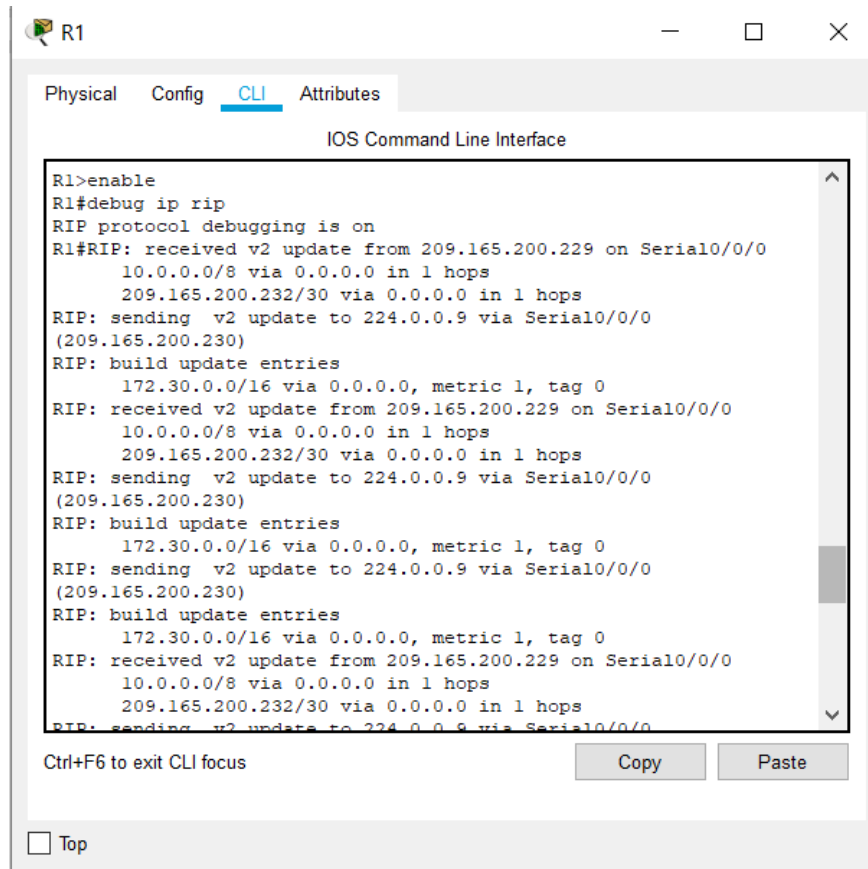


- For R2:





- For R1:



R1

Physical Config CLI Attributes

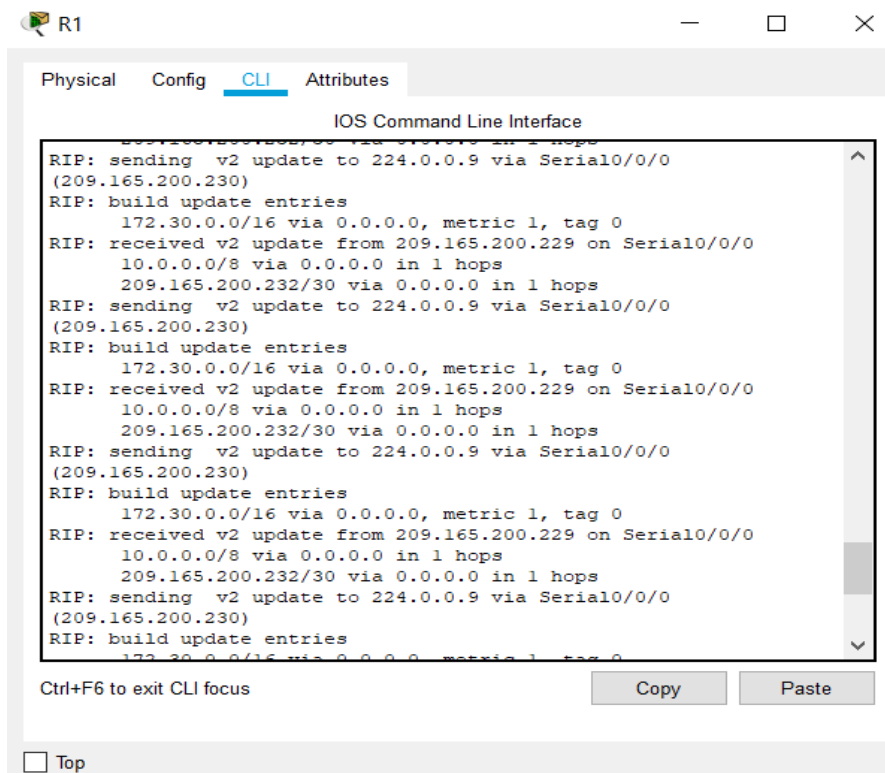
IOS Command Line Interface

```
R1>enable
R1#debug ip rip
RIP protocol debugging is on
R1#RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top



R1

Physical Config CLI Attributes

IOS Command Line Interface

```
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.229 on Serial0/0/0
    10.0.0.0/8 via 0.0.0.0 in 1 hops
    209.165.200.232/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.230)
RIP: build update entries
    172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
```

Ctrl+F6 to exit CLI focus

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☐ Top

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. 172.30.200.16/24
5. 209.165.200.0/24

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

Ans: **172.30.0.0/16**

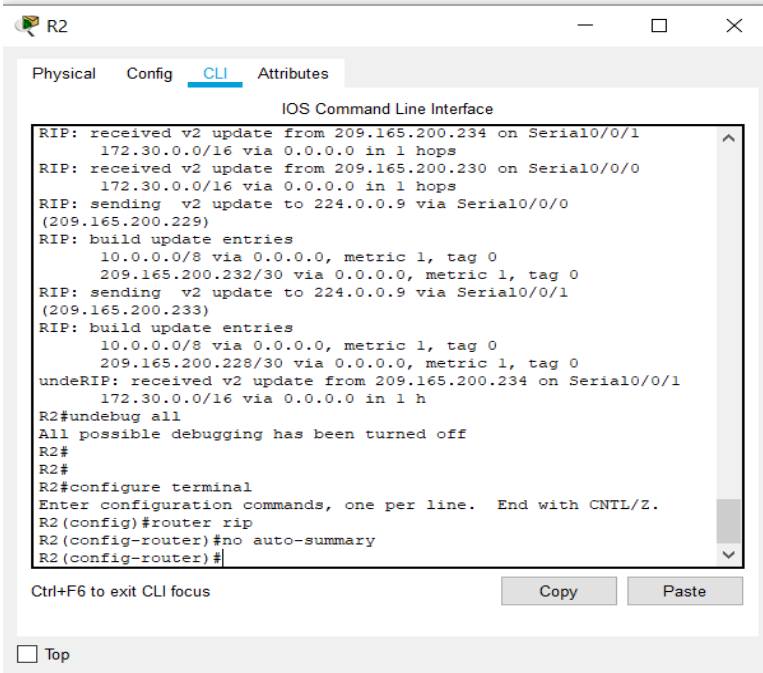
R3 is not sending any of the 172.30.0.0 subnets—only the summarized route of 172.30.0.0/16, including the subnet mask. This is why R2 and R1 are not seeing the 172.30.0.0 subnets on R3.

Task 6: Disable Automatic Summarization.

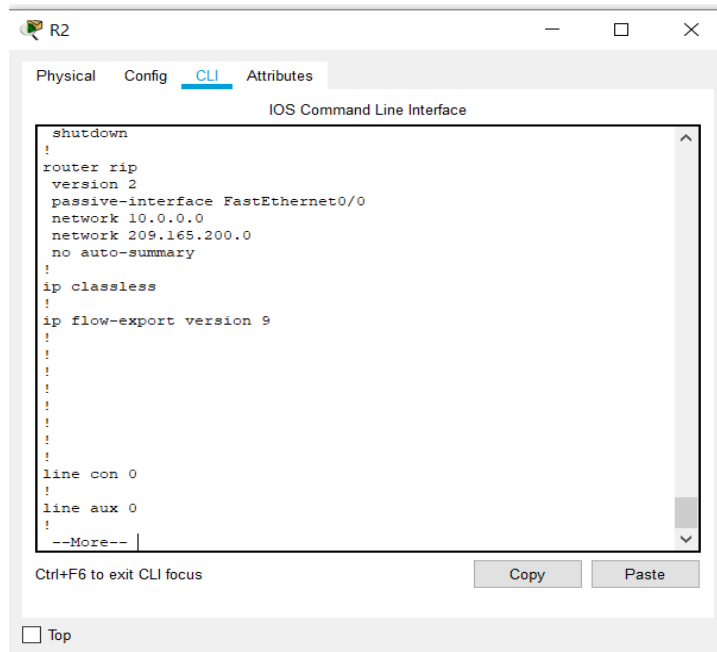
The **no auto-summary** command is used to turn off automatic summarization in RIPv2. Disable auto summarization on all routers. The routers will no longer summarize routes at major network boundaries.

R2(config)#**router rip**

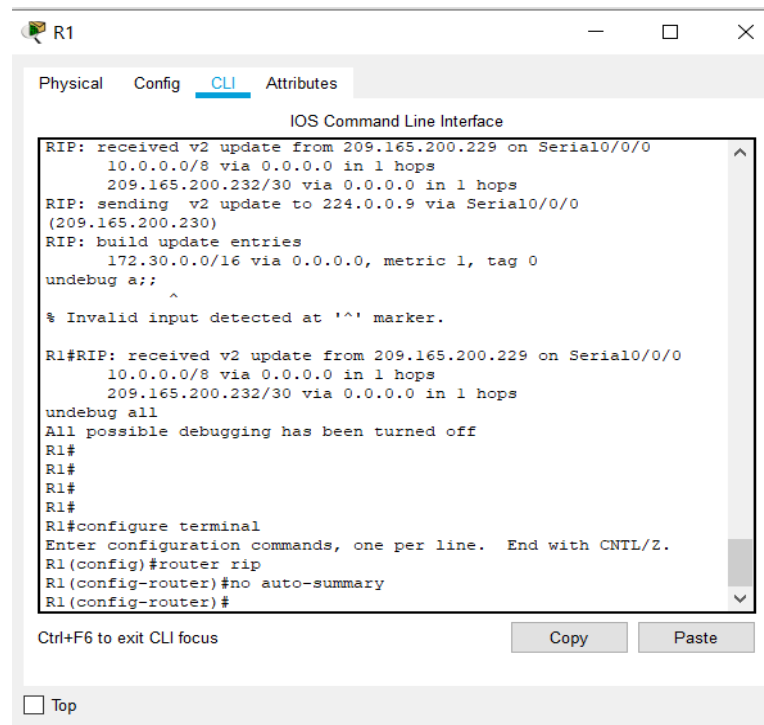
R2(config-router)#**no auto-summary**



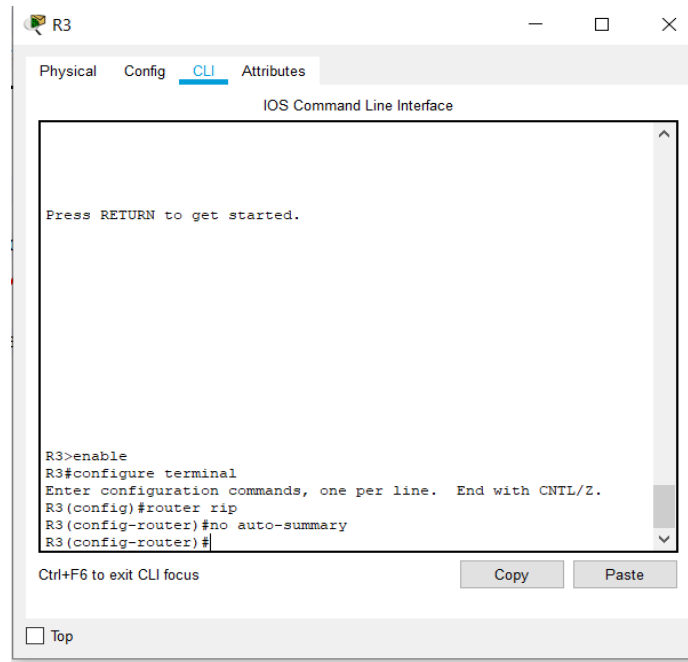
```
R2
Physical Config CLI Attributes
IOS Command Line Interface
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
  172.30.0.0/16 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.230 on Serial0/0/0
  172.30.0.0/16 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0
(209.165.200.229)
RIP: build update entries
  10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
  209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1
(209.165.200.233)
RIP: build update entries
  10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
  209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
undeRIP: received v2 update from 209.165.200.234 on Serial0/0/1
  172.30.0.0/16 via 0.0.0.0 in 1 h
R2#undebug all
All possible debugging has been turned off
R2#
R2#
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#router rip
R2(config-router)#no auto-summary
R2(config-router)#
```



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



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

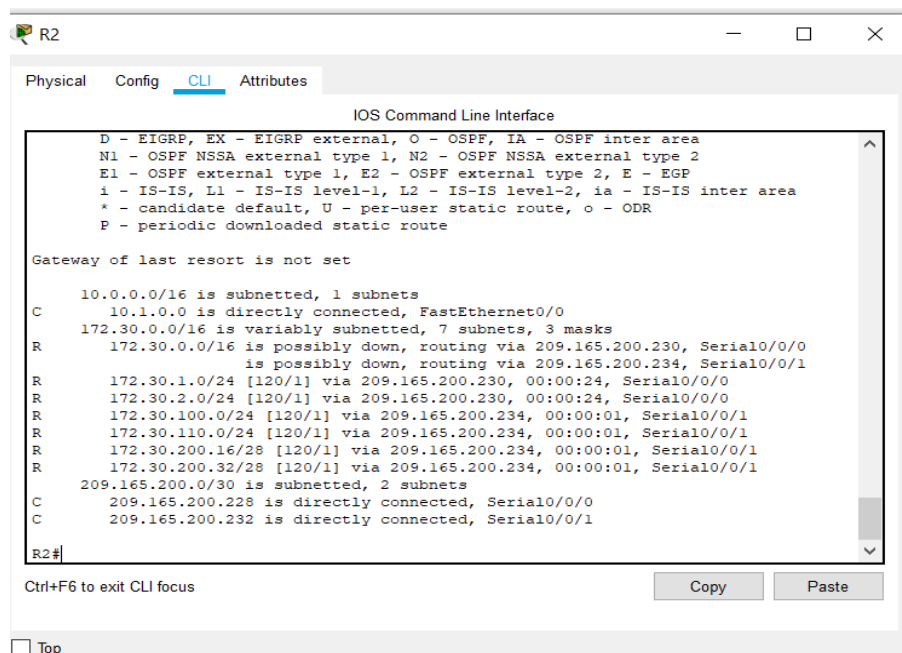


The **show ip route** and **ping** commands can be used to verify that automatic summarization is off.

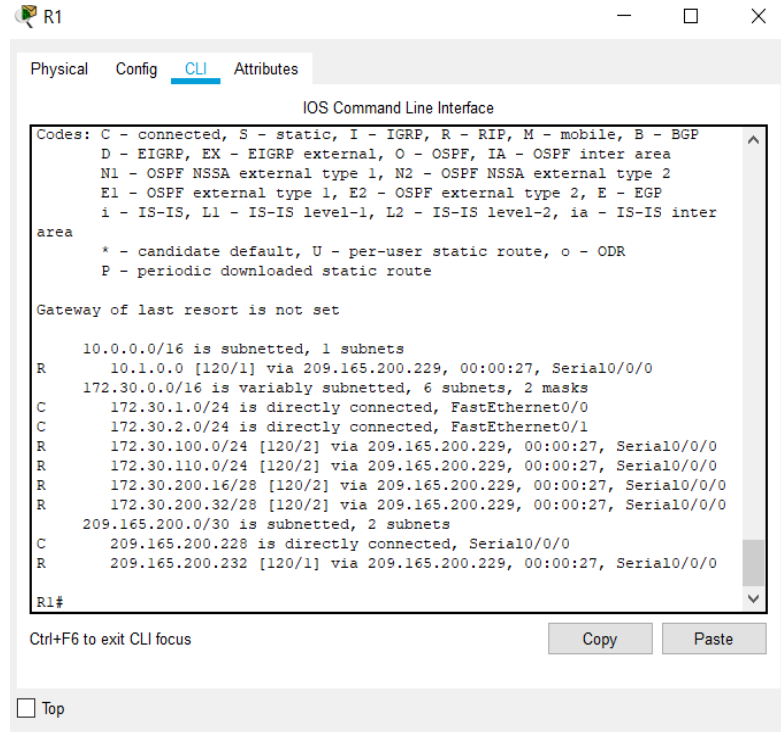
Task 7: Examine the Routing Tables.

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

R2#show ip route



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 output includes a legend for route codes (C, S, I, R, M, B, D, N1, E1, i, *, P), a statement about the gateway of last resort, and a list of routes with their respective metrics and interfaces.

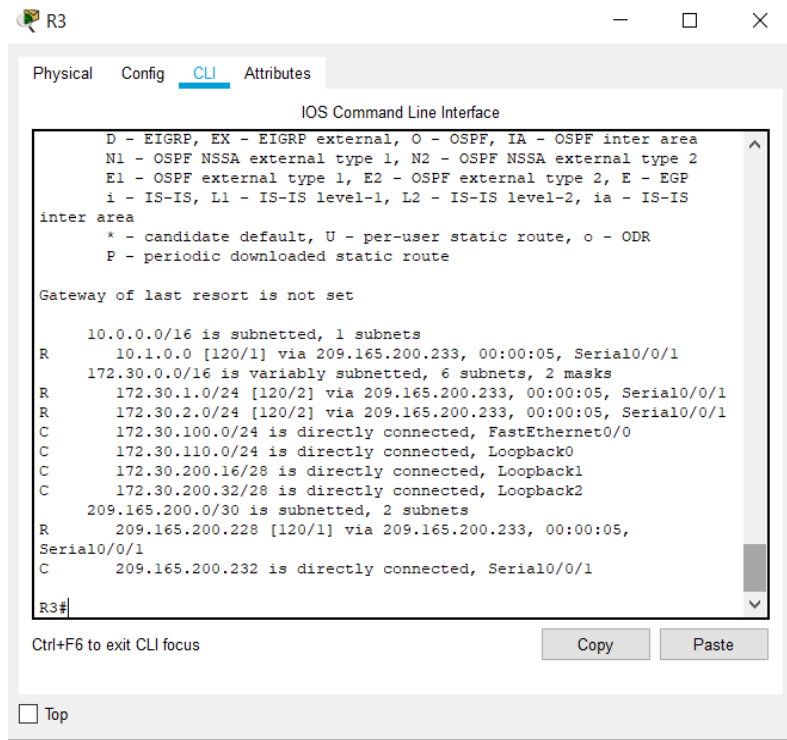
```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, 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, 00:00:27, 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, 00:00:27, Serial0/0/0
R    172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:27, Serial0/0/0
R    172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:27, Serial0/0/0
R    172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:27, 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, 00:00:27, Serial0/0/0

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 output includes a legend for route codes (D, N1, E1, i, *, P), a statement about the gateway of last resort, and a list of routes with their respective metrics and interfaces.

```
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

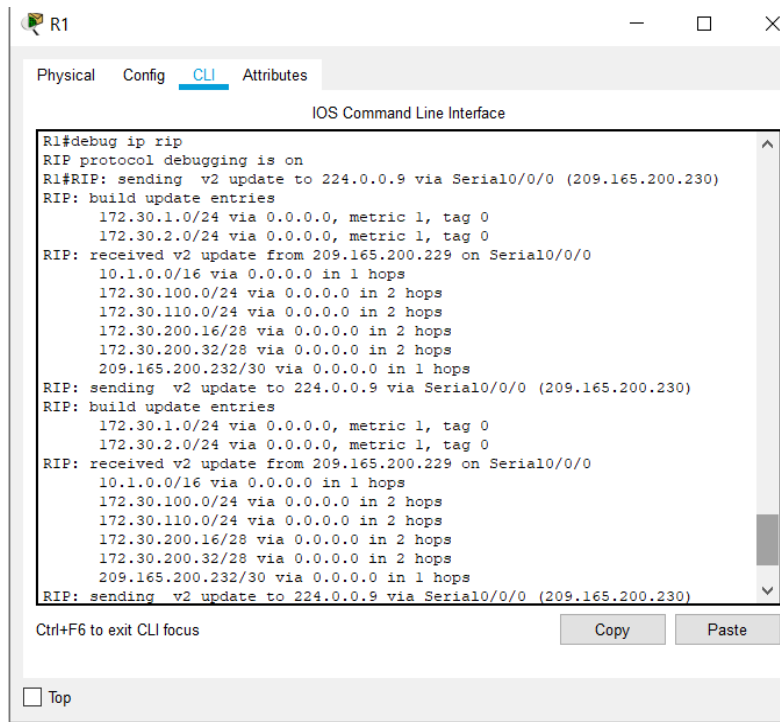
Gateway of last resort is not set

10.0.0.0/16 is subnetted, 1 subnets
R    10.1.0.0 [120/1] via 209.165.200.233, 00:00:05, 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, 00:00:05, Serial0/0/1
R    172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:05, 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, 00:00:05,
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:

- For R1:



```
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
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
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.230)
```

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

Ans:

1. **172.30.1.0/24**
2. **172.30.2.0/24**

- On R2:

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
R2>enable
R2#debug ip rip
RIP protocol debugging is on
R2#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
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
```

Ctrl+F6 to exit CLI focus

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☐ Top

R2

Physical Config CLI Attributes

IOS Command Line Interface

```
172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.230 on Serial0/0/0
  172.30.1.0/24 via 0.0.0.0 in 1 hops
  172.30.2.0/24 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
  10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
  172.30.100.0/24 via 0.0.0.0, metric 2, tag 0
  172.30.110.0/24 via 0.0.0.0, metric 2, tag 0
  172.30.200.16/28 via 0.0.0.0, metric 2, tag 0
  172.30.200.32/28 via 0.0.0.0, metric 2, tag 0
  209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
  10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
  172.30.1.0/24 via 0.0.0.0, metric 2, tag 0
  172.30.2.0/24 via 0.0.0.0, metric 2, tag 0
  209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
  172.30.100.0/24 via 0.0.0.0 in 1 hops
  172.30.110.0/24 via 0.0.0.0 in 1 hops
  172.30.200.16/28 via 0.0.0.0 in 1 hops
  172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.230 on Serial0/0/0
  172.30.1.0/24 via 0.0.0.0 in 1 hops
```

Ctrl+F6 to exit CLI focus

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☐ Top

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

Ans:

1. 172.30.1.0/24

2. 172.30.2.0/24

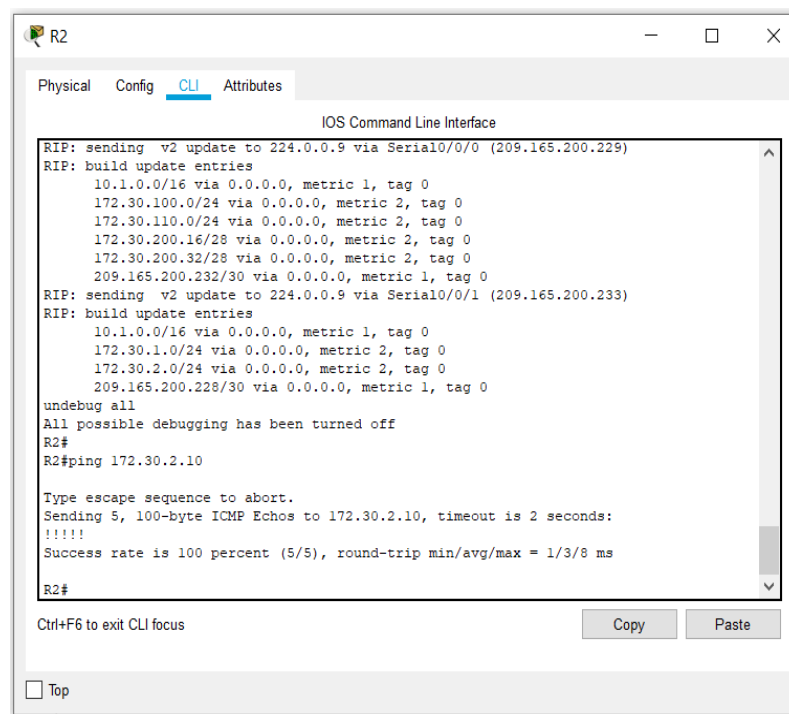
Are the subnet masks now included in the routing updates?

Ans: **Yes.**

Task 8: Verify Network Connectivity.

Step 1: Check connectivity between R2 router and PCs.

- Ping PC1 from R2.



```
R2
Physical Config CLI Attributes
IOS Command Line Interface
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
undebg all
All possible debugging has been turned off
R2#
R2#ping 172.30.2.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.2.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/8 ms
R2#
```

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

Ans: **5 ICMP messages are successful.**

- Ping PC4 from R2

```
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 = 1/3/14 ms

R2#
```

Ctrl+F6 to exit CLI focus

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☐ Top

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

Ans: **5 ICMP messages are successful.**

Step 2: Check the connectivity between the PCs.

- Ping PC2 from PC1:

```
PC1

Physical Config Desktop Programming Attributes

Command Prompt

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.
Reply from 172.30.2.1: Destination host unreachable.

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

C:\>ping 172.30.1.10

Pinging 172.30.1.10 with 32 bytes of data:

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

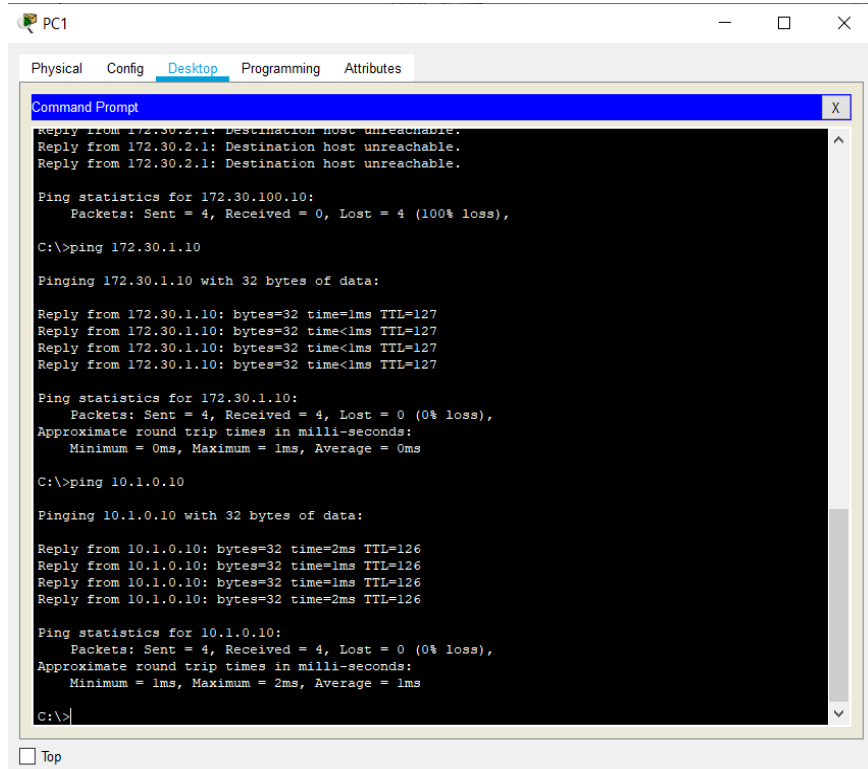
Ping statistics for 172.30.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

From PC1, is it possible to ping PC2? => Yes

What is the success rate? 100%

- Ping PC3 from PC1:



The screenshot shows a Windows 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 the results of a ping command from PC1 to 172.30.1.10. The output indicates that the destination host is reachable, with a success rate of 100% (4 packets sent, 4 received, 0 lost). The approximate round trip times in milliseconds are: Minimum = 0ms, Maximum = 1ms, Average = 0ms.

```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
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 172.30.1.10

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 = 1ms, Average = 0ms

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
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=2ms 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 = 2ms, Average = 1ms

C:\>
```

From PC1, is it possible to ping PC3? => Yes

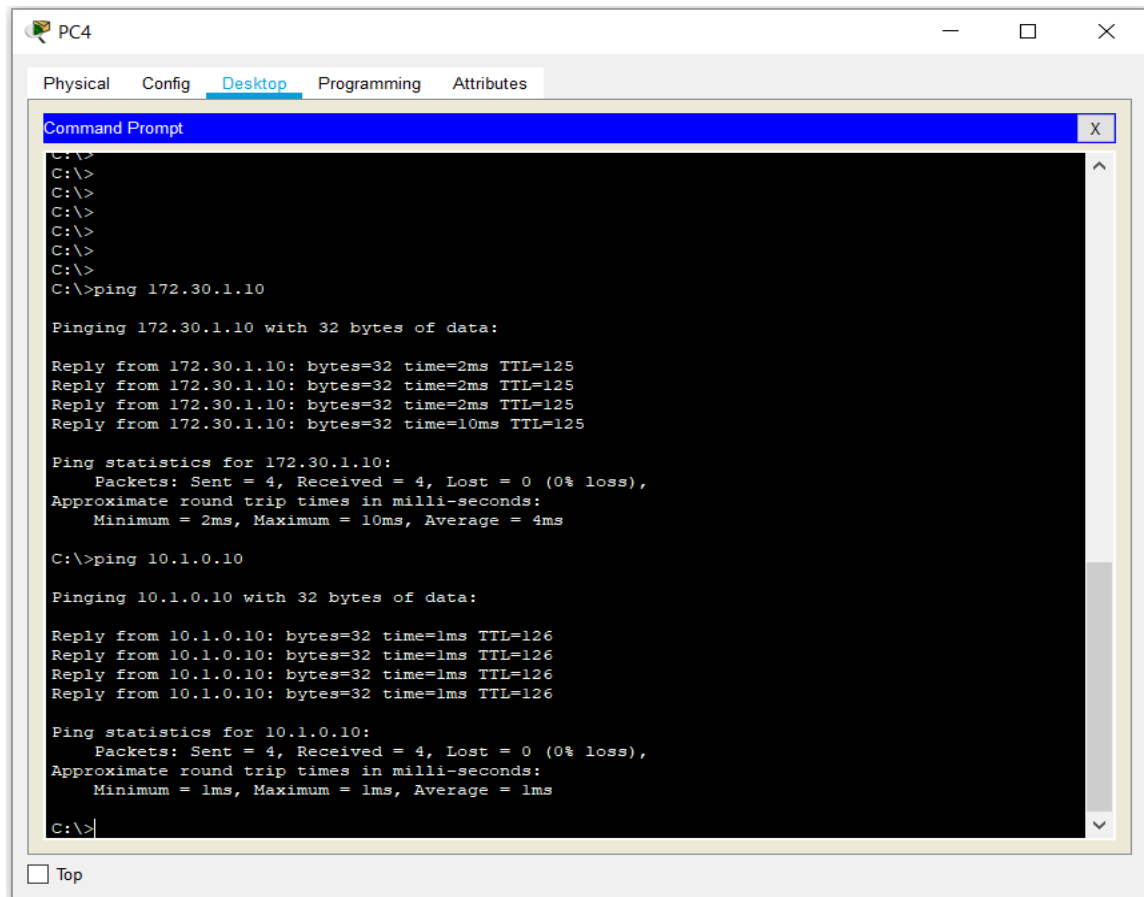
What is the success rate? => 100%

- Ping PC4 from PC1:

From PC4, is it possible to ping PC2? => Yes

What is the success rate? => 100%

- Ping PC3 from PC4:



The screenshot shows a Windows desktop environment for PC4. A Command Prompt window is open, displaying the results of two ping commands. The first command is 'ping 172.30.1.10', which shows four successful replies with 0% loss and round trip times ranging from 2ms to 10ms. The second command is 'ping 10.1.0.10', which also shows four successful replies with 0% loss and a consistent round trip time of 1ms. The desktop background is black, and the Command Prompt window has a blue title bar and a scroll bar on the right.

```
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=2ms TTL=125
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=10ms 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 = 10ms, Average = 4ms

C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

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

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

C:\>|
```

From PC4, is it possible to ping PC3? =>Yes

What is the success rate? 100%

Task 9: Documentation

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

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

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

Txt file:

Show Running-config

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
```

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
```

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
```


Show ip route:

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, 00:00:30, 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, 00:00:30, Serial0/0/0

R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:30, Serial0/0/0

R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:30, Serial0/0/0

R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:30, 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, 00:00:30, Serial0/0/0

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, 00:00:10, 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, 00:00:18, Serial0/0/1

R 172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:18, Serial0/0/1

R 172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:18, Serial0/0/1

R 172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:18, 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#

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, 00:00:12, 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, 00:00:12, Serial0/0/1

R 172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:12, 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, 00:00:12, Serial0/0/1

C 209.165.200.232 is directly connected, Serial0/0/1

R3#

Show ip interface brief:

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	NVRAM	administratively down	down
Vlan1	unassigned	YES	NVRAM	administratively down	down

R1#

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	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#

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	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	NVRAM	administratively	down down

R3#

Show ip protocols:

R1:

R1#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 10 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)

R1#

R2:

R2#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 14 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	00:00:27
209.165.200.234	120	00:00:10

Distance: (default is 120)

R2#

R3:

R3#show ip protocols

Routing Protocol is "rip"

Sending updates every 30 seconds, next due in 10 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:

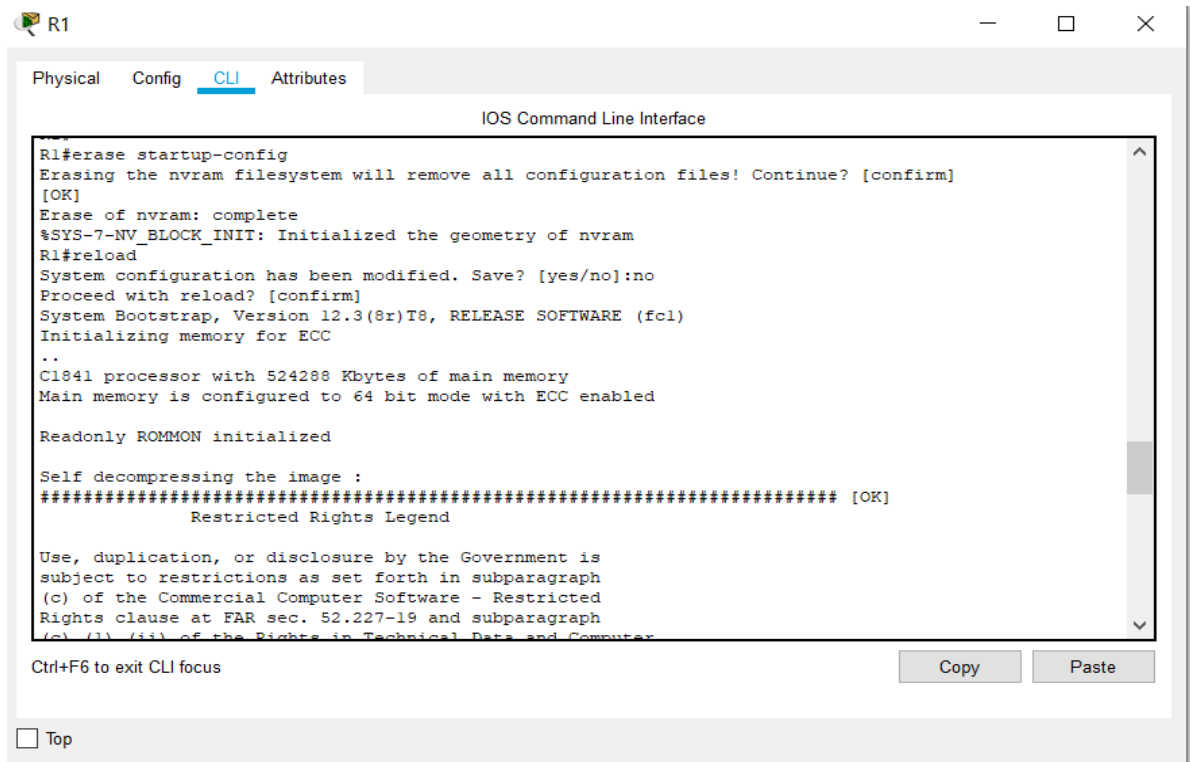
Gateway	Distance	Last Update
209.165.200.233	120	00:00:21

Distance: (default is 120)

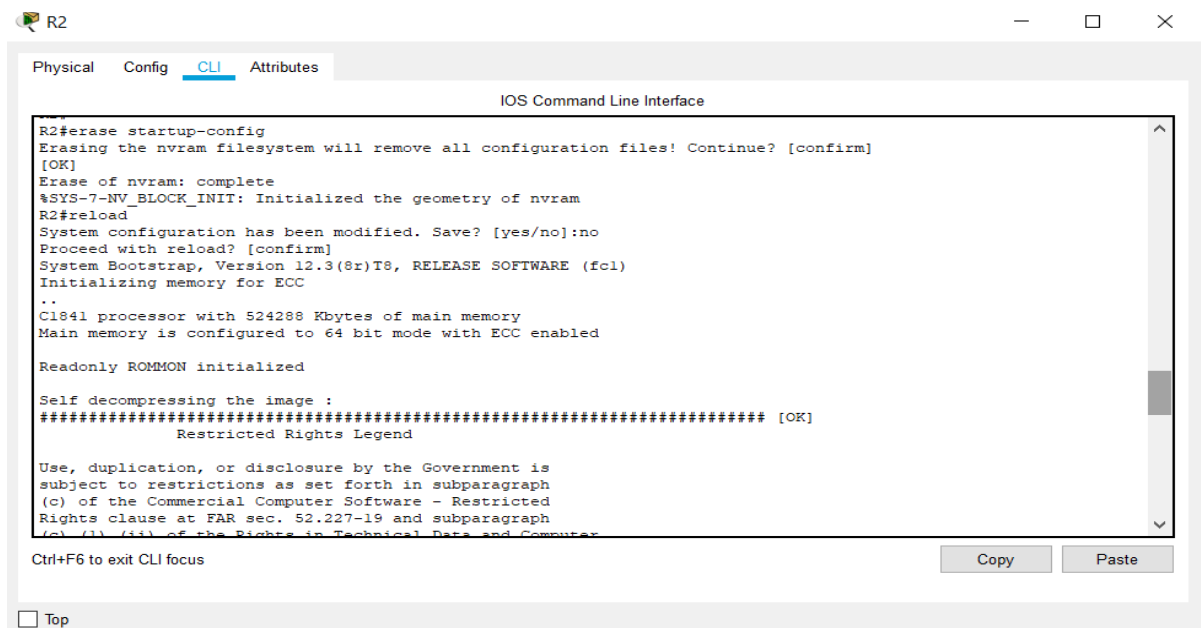
Task 10: Clean Up

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.

- Erase configuration for R1 and reload:



- Erase configuration for R2 and reload:



- Erase configuration for R3 and reload:

