

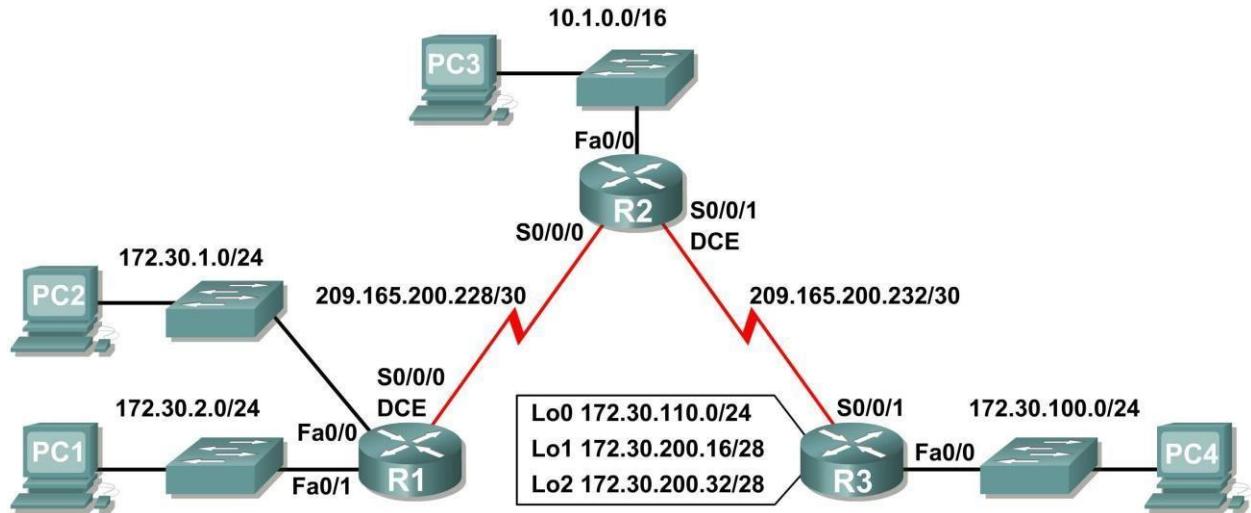
NAME: Varun Magotra

UID:2018130022

CEL 51, DCCN, Monsoon 2020

Lab 7: RIPv2 Router Configuration

Topology Diagram



Addressing Table

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

PC2	NIC	172.30.2.10	255.255.255.0	172.30.1.1
PC3	NIC	10.1.0.10	255.255.0.0	10.1.0.1
PC4	NIC	172.30.100.10	255.255.255.0	172.30.100.1

1 of 49

Learning Objectives

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

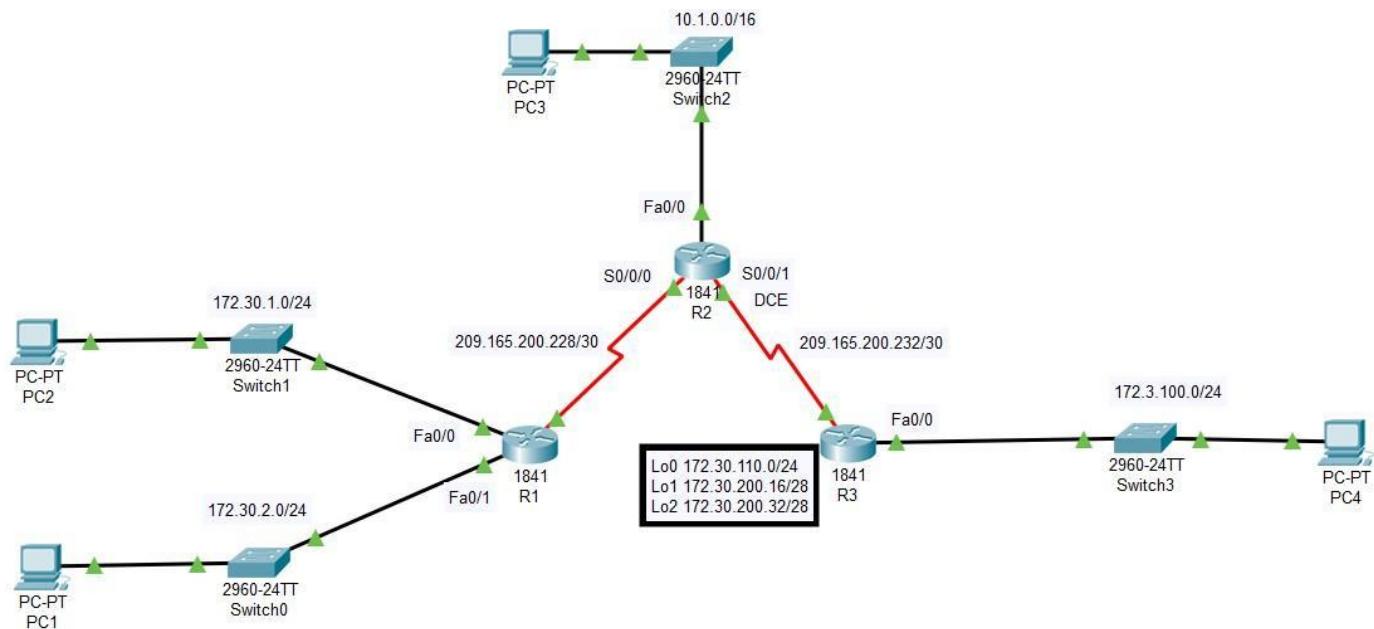
- Cable a network according to the Topology Diagram.
- Load provided scripts onto the routers.
- Examine the current status of the network.
- Configure RIPv2 on all routers.
- Examine the automatic summarization of routes.
- Examine routing updates with `debug ip rip`.
- Disable automatic summarization.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

Scenario

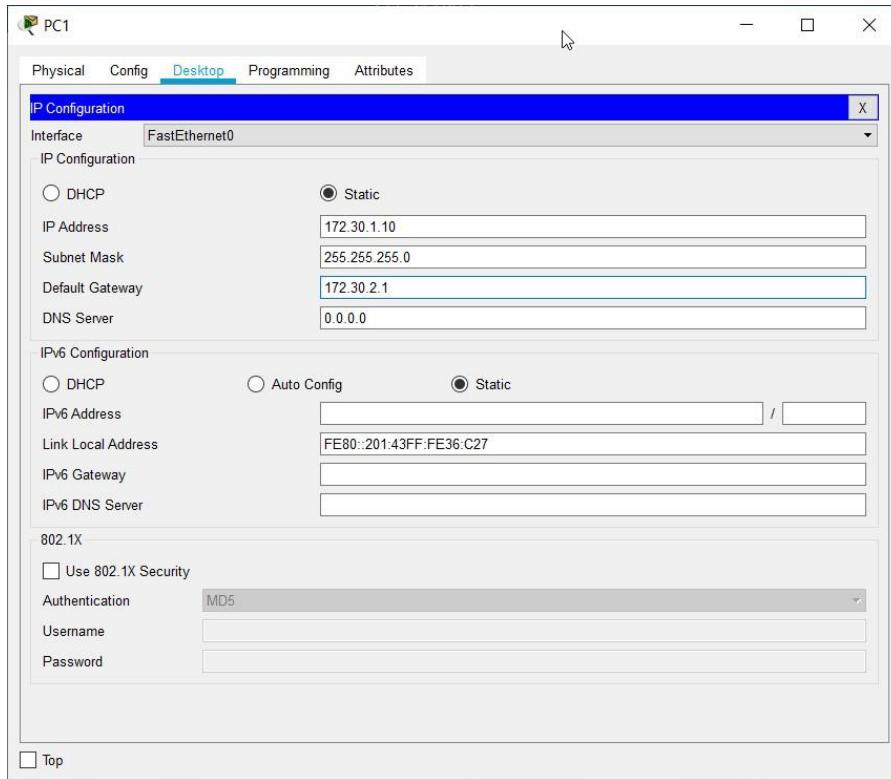
The network shown in the Topology Diagram contains a discontiguous network, 172.30.0.0. This network has been subnetted using VLSM. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network, in this case the two serial networks 209.165.200.228/30 and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

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

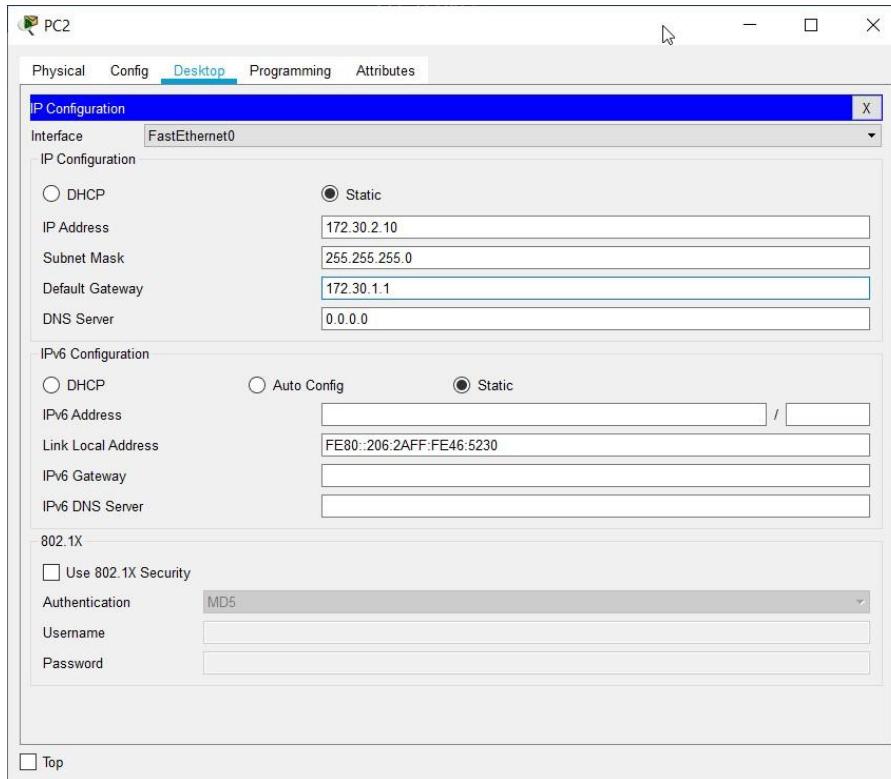
Step 1: Cable a network.



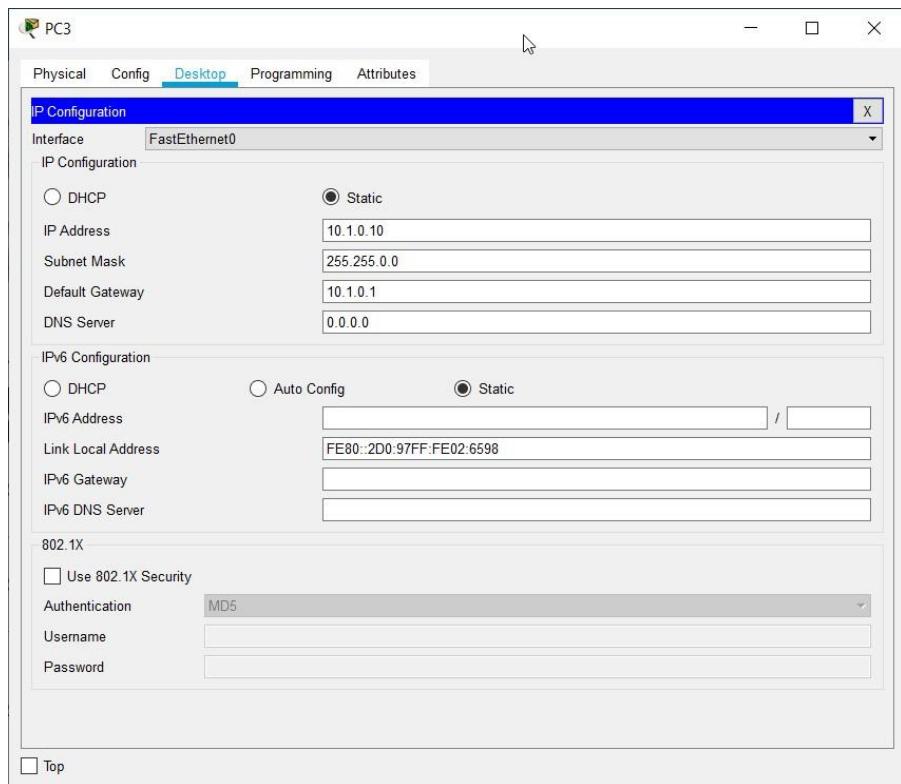
PC1 config



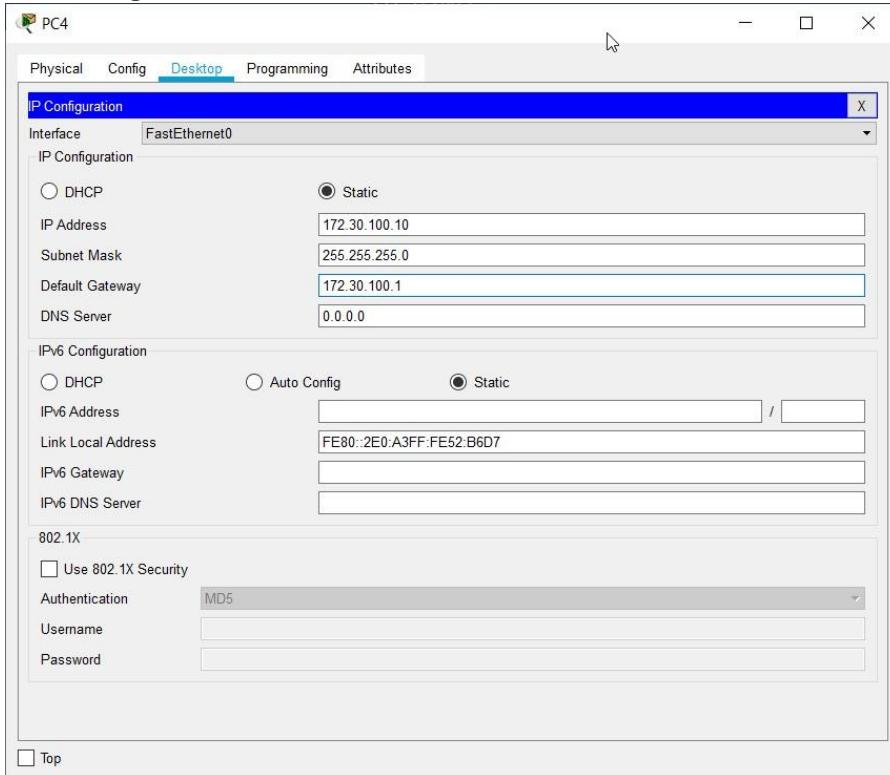
PC2 config



PC3 config



PC4 config



Step 2: Clear the configuration on each router.

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

The image displays two separate windows, each titled with the router's name (R1 and R2) and showing the Cisco IOS Command Line Interface (CLI). Both windows have tabs for Physical, Config, CLI (which is selected), and Attributes. The CLI panes show the following sequence of commands and responses:

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

 Readonly ROMMON initialized

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

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

At the bottom of both windows, there are "Copy" and "Paste" buttons, and a "Ctrl+F6 to exit CLI focus" instruction. A "Top" button is also present in the bottom left corner of each window.

```
R3#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
R3#reload
System configuration has been modified. Save? [yes/no]:n
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Initializing memory for ECC
..
C1841 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

 Readonly ROMMON initialized

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

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(a)(1)(B) of the Commercial Computer Software -
```

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
```

R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

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

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

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

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

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

```

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

Top


```

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

```

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

Top


```

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

```

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
```

The screenshot shows a Windows-style application window titled "R2". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the configuration commands for router R2:

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

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

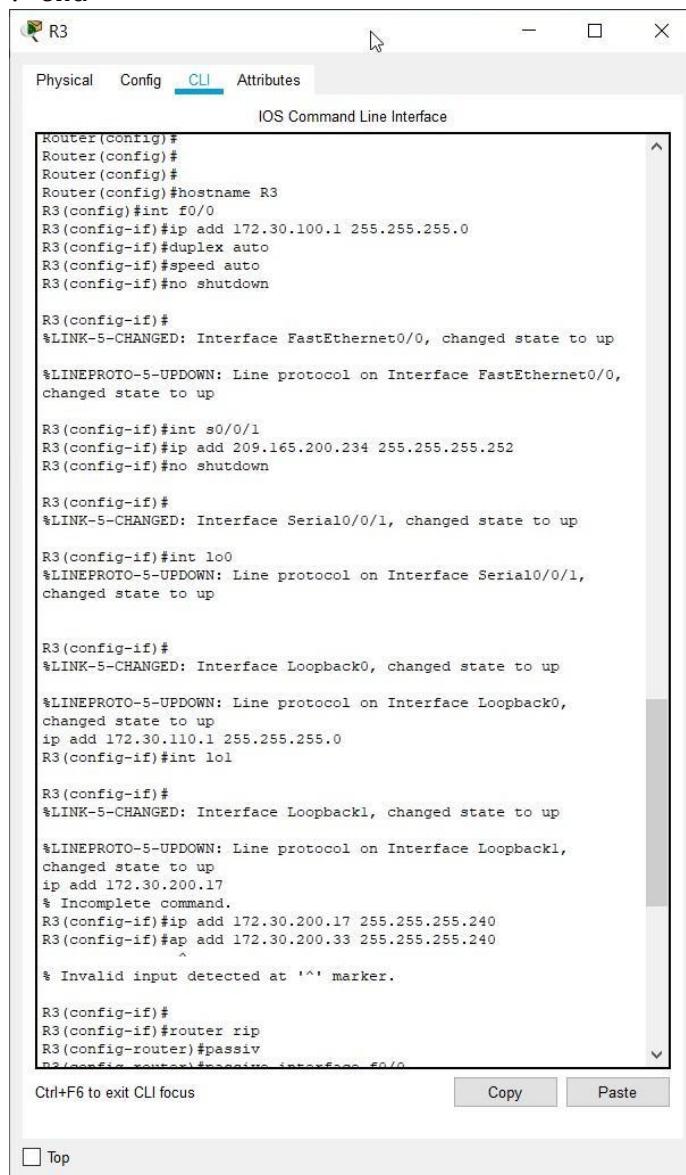
Step 3: Load the following script onto R3.

```
hostname  
R3 !
```

```

! ! interface FastEthernet0/0 ip
address 172.30.100.1 255.255.255.0
duplex auto speed auto no shutdown !
interface Serial0/0/1 ip address
209.165.200.234 255.255.255.252 no
shutdown !
interface Loopback0 ip address
172.30.110.1 255.255.255.0 !
interface Loopback1 ip address
172.30.200.17 255.255.255.240 !
interface Loopback2 ip address
172.30.200.33 255.255.255.240 !
router rip passive-interface
FastEthernet0/0 network
172.30.0.0 network 209.165.200.0
!
line con 0 line
vty 0 4 login
! end

```



The screenshot shows a Cisco IOS Command Line Interface window titled "R3". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the configuration commands entered by the user, along with system messages indicating the state changes of various interfaces.

```

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

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

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

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

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

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

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

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

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

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

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

```

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

```

R3(config-if)#router rip
R3(config-router)#passiv
R3(config-router)#passive-interface f0/0
R3(config-router)#network 172.30.0.0
R3(config-router)#network 209.165.200.0
R3(config-router)#exit
R3(config)#line con 0
R3(config-line)#line vty 0 4
R3(config-line)#exit
R3(config)#login
% Incomplete command.
R3(config)#password cisco
^
% Invalid input detected at '^' marker.

R3(config)#ex
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#password cisco
^
% Invalid input detected at '^' marker.

R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#password cisco
^
% Invalid input detected at '^' marker.

R3(config)#line vty 0 4
R3(config-line)#password cisco
R3(config-line)#login
R3(config-line)#end
R3#
%SYS-5-CONFIG_I: Configured from console by console
|
```

Ctrl+F6 to exit CLI focus

Top

Task

3: Examine the Current Status of the Network.

Step 1: Verify that both serial links are up.

The two serial links can quickly be verified using the `show ip interface brief` command on R2.

```

R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#show ip interface brief
^
% Invalid input detected at '^' marker.

R2(config)#ex
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
FastEthernet0/0    10.1.0.1        YES manual up           up
FastEthernet0/1    unassigned       YES NVRAM administratively down down
Serial0/0/0         209.165.200.229 YES manual up           up
Serial0/0/1         209.165.200.233 YES manual up           up
Vlan1              unassigned       YES NVRAM administratively down down
R2#
R2#
R2#
```

Ctrl+F6 to exit CLI focus

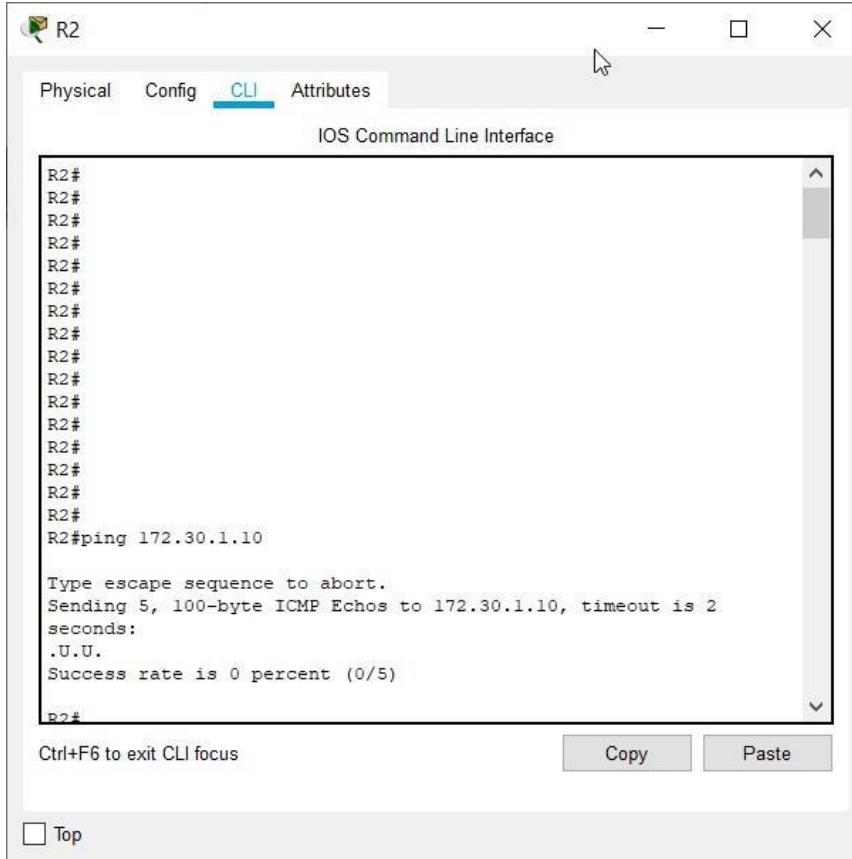
Top

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

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

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

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

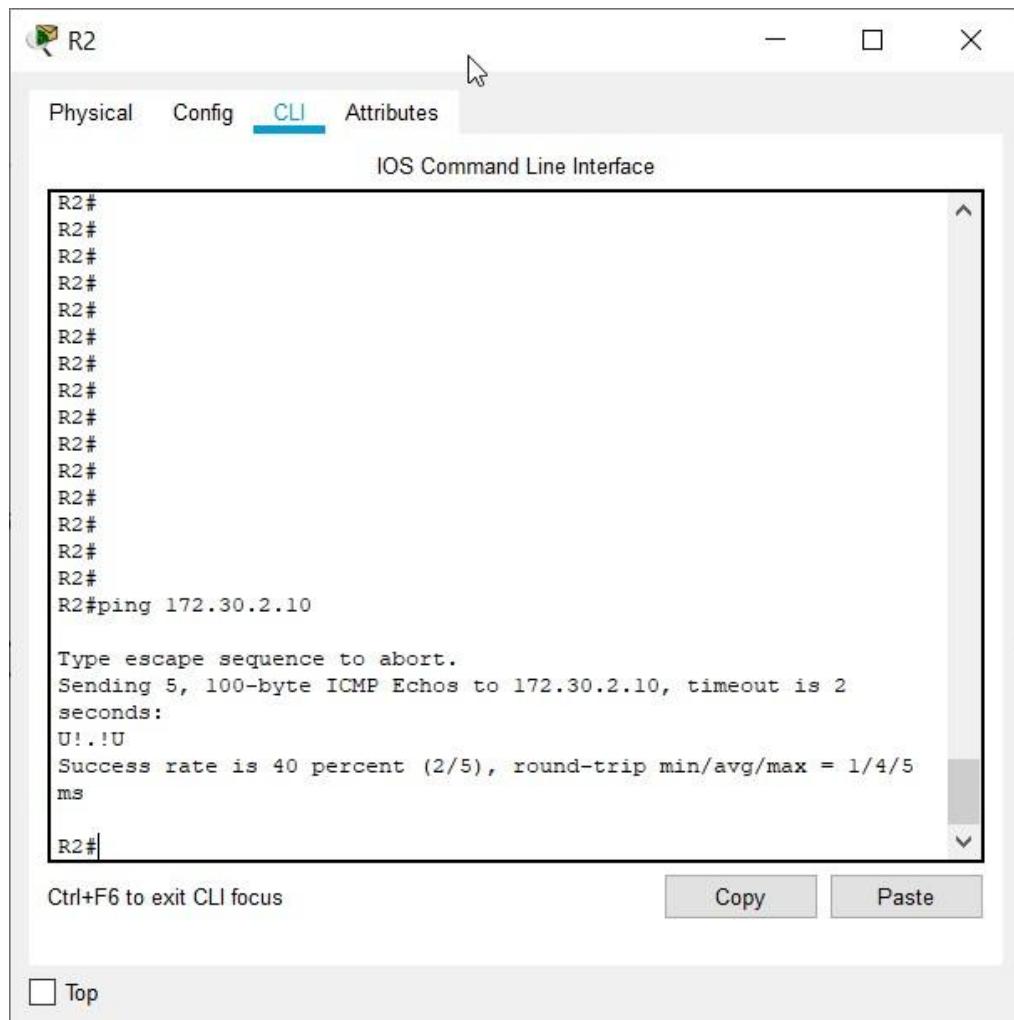


The screenshot shows a CLI window titled "R2". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". The command "ping 172.30.1.10" is entered, followed by its execution details: "Type escape sequence to abort.", "Sending 5, 100-byte ICMP Echos to 172.30.1.10, timeout is 2 seconds:", ".U.U.", and "Success rate is 0 percent (0/5)". At the bottom, there are "Copy" and "Paste" buttons, and a checkbox labeled "Top".

```
R2#
R2#ping 172.30.1.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.1.10, timeout is 2
seconds:
.U.U.
Success rate is 0 percent (0/5)
R2#
```

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

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



R2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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:
U!.!U
Success rate is 40 percent (2/5), round-trip min/avg/max = 1/4/5
ms

R2#
```

Ctrl+F6 to exit CLI focus

Top

2/5 messages are successful when pinging PC1

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

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:
!U!.!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/2/5 ms

R2#

Ctrl+F6 to exit CLI focus

Top

3/5 messages are successful when pinging PC4

Step 3: Check the connectivity between the PCs.

PC1

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 172.30.1.10: 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:\>
```

Top

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

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

```
C:\>
C:\>ping 10.1.0.10
Pinging 10.1.0.10 with 32 bytes of data:
Request timed out.
Reply from 10.1.0.10: bytes=32 time=12ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=2ms TTL=126

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

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

What is the success rate? 50%

```
C:\>
C:\>ping 172.30.100.10
Pinging 172.30.100.10 with 32 bytes of data:
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Reply from 172.30.2.1: Destination host unreachable.
Request timed out.

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

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

What is the success rate? 0%

PC4

Physical Config Desktop Programming Attributes

Command Prompt X

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

Pinging 172.30.2.10 with 32 bytes of data:

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

Ping statistics for 172.30.2.10:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

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

What is the success rate? 0%

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

Gateway of last resort is not set

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

R2#
```

Ctrl+F6 to exit CLI focus

Top

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

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

The screenshot shows the Cisco Network Assistant interface with a window titled 'R1'. The tab bar at the top has 'Physical', 'Config', 'CLI' (which is selected and highlighted in blue), and 'Attributes'. The main area is titled 'IOS Command Line Interface'. The command entered is 'sh ip route'. The output shows the following:

```
R1#  
R1#  
R1#  
R1#  
R1#  
R1#sh ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is not set  
  
R    10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:19, Serial0/0/0  
      172.30.0.0/24 is subnetted, 2 subnets  
C      172.30.1.0 is directly connected, FastEthernet0/0  
C      172.30.2.0 is directly connected, FastEthernet0/1  
      209.165.200.0/30 is subnetted, 2 subnets  
C      209.165.200.228 is directly connected, Serial0/0/0  
R      209.165.200.232 [120/1] via 209.165.200.229, 00:00:19, Serial0/0/0  
  
R1#
```

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

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

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:09, Serial0/0/1
      172.30.0.0/16 is variably subnetted, 3 subnets, 2 masks
C      172.30.100.0/24 is directly connected, FastEthernet0/0
C      172.30.110.0/24 is directly connected, Loopback0
C      172.30.200.16/28 is directly connected, Loopback1
      209.165.200.0/30 is subnetted, 2 subnets
R      209.165.200.228 [120/1] via 209.165.200.233, 00:00:09, Serial0/0/1
C      209.165.200.232 is directly connected, Serial0/0/1

R3#
Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

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

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

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

```
R2#debug ip rip
```

```
R2#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: 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: received v1 update from 209.165.200.230 on Serial0/0/0
  172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.234 on Serial0/0/0
  172.30.0.0 in 1 hops
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: 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: received v1 update from 209.165.200.230 on Serial0/0/0
  172.30.0.0 in 1 hops
RIP: received v1 update from 209.165.200.234 on Serial0/0/1
  172.30.0.0 in 1 hops
```

R2 is sending only the routes for the 10.0.0.0 LAN and the two serial connections to R1 and R3. R1 and R3 are not receiving any information about the 172.30.0.0 subnet routes.

When you are finished, turn off the debugging.

```
R2#undebbug all
```

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

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

```
R3(config)#router rip
```

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

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

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

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

```
R1# show ip protocols
```

The screenshot shows a window titled "R1" with the "CLI" tab selected. The window title bar includes icons for minimize, maximize, and close. Below the title bar are tabs for "Physical", "Config", and "CLI". The main area is labeled "IOS Command Line Interface". The output of the `show ip protocols` command is displayed:

```
R1#
%SYS-5-CONFIG_I: Configured from console by console
show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 4 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface      Send   Recv   Triggered RIP  Key-chain
    Serial0/0/0        2       2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
  Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.229      120          00:00:15
  Distance: (default is 120)
R1#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A checkbox labeled "Top" is located at the bottom left.

R2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R2#sh ip proto
R2#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 22 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv Triggered RIP  Key-chain
      Serial0/0/1       2       2
      Serial0/0/0       2       2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
      209.165.200.234    120        00:00:13
      209.165.200.230    120        00:00:15
  Distance: (default is 120)
R2#
```

Ctrl+F6 to exit CLI focus

Top

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R3#sh ip pr
R3#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 19 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv Triggered RIP  Key-chain
      Loopback0         2       2
      Loopback1         2       2
      Serial0/0/1       2       2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway          Distance      Last Update
      209.165.200.233    120        00:00:02
  Distance: (default is 120)
R3#
```

Ctrl+F6 to exit CLI focus

Top

Task 5: Examine the Automatic Summarization of Routes.

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

```
R2#show ip route
```

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

Gateway of last resort is not set

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

R2#
Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

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

```
R1#show ip route
```

The screenshot shows the Cisco IOS Command Line Interface (CLI) window for router R1. The title bar says "R1". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the output of the "show ip route" command. The output shows a single static route to 10.0.0.0/8 via 209.165.200.229, and direct connections to 172.30.0.0/24 and 209.165.200.0/30. A legend for route codes is provided, followed by a note that the gateway of last resort is not set.

```
Gateway      Distance   Last Update
209.165.200.229       120      00:00:15
Distance: (default is 120)
R1#
R1#sh ip ro
R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 209.165.200.229, 00:00:25, Serial0/0/0
    172.30.0.0/24 is subnetted, 2 subnets
C      172.30.1.0 is directly connected, FastEthernet0/0
C      172.30.2.0 is directly connected, FastEthernet0/1
    209.165.200.0/30 is subnetted, 2 subnets
C      209.165.200.228 is directly connected, Serial0/0/0
R    209.165.200.232 [120/1] via 209.165.200.229, 00:00:25, Serial0/0/0
R1#
```

Ctrl+F6 to exit CLI focus

Top

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

```
R3#show ip route
```

The screenshot shows the Cisco IOS Command Line Interface (CLI) window for router R3. The title bar says "R3". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the output of the "show ip route" command. The output shows a static route to 10.0.0.0/8 via 209.165.200.233, and direct connections to 172.30.0.0/16, 172.30.100.0/24, 172.30.110.0/24, and 172.30.200.0/28. A legend for route codes is provided, followed by a note that the gateway of last resort is not set.

```
Gateway      Distance   Last Update
209.165.200.233       120      00:00:02
Distance: (default is 120)
R3#
R3#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

R    10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:13, Serial0/0/1
    172.30.0.0/16 is variably subnetted, 3 subnets, 2 masks
C      172.30.100.0/24 is directly connected, FastEthernet0/0
C      172.30.110.0/24 is directly connected, Loopback0
C      172.30.200.16/28 is directly connected, Loopback1
    209.165.200.0/30 is subnetted, 2 subnets
R    209.165.200.228 [120/1] via 209.165.200.233, 00:00:13, Serial0/0/1
C      209.165.200.232 is directly connected, Serial0/0/1
R3#
```

Ctrl+F6 to exit CLI focus

Top

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

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

RIP protocol debugging is on

```

R3#RIP: received v2 update from 209.165.200.233 on Serial0/0/1
10.0.0.0/8 via 0.0.0.0 in 1 hops
209.165.200.228/30 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Loopback0 (172.30.110.1)
RIP: build update entries
10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
172.30.200.32/28 via 0.0.0.0, metric 1, tag 0
209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Loopback1 (172.30.200.17)
RIP: build update entries
10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
172.30.200.32/28 via 0.0.0.0, metric 1, tag 0
209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.234)
RIP: build update entries
172.30.0.0/16 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Loopback2 (172.30.200.33)
RIP: build update entries
10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
209.165.200.0/24 via 0.0.0.0, metric 1, tag 0

```

10.0.0.0/8

172.30.100.0/24 172.30.110.0/24

172.30.200.16/28

209.165.200.0/24

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

```

RIP protocol debugging is on
R2#RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.233)
RIP: build update entries
10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
209.165.200.228/30 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
10.0.0.0/8 via 0.0.0.0, metric 1, tag 0
209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
RIP: received v2 update from 209.165.200.230 on Serial0/0/0 172.30.0.0/16
via 0.0.0.0 in 1 hops
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
172.30.0.0/16 via 0.0.0.0 in 1 hops

```

10.0.0.0/8

209.165.200.228/30

172.30.0.0/16

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

Task 6: Disable Automatic Summarization.

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

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

R1

Physical Config **CLI** Attributes

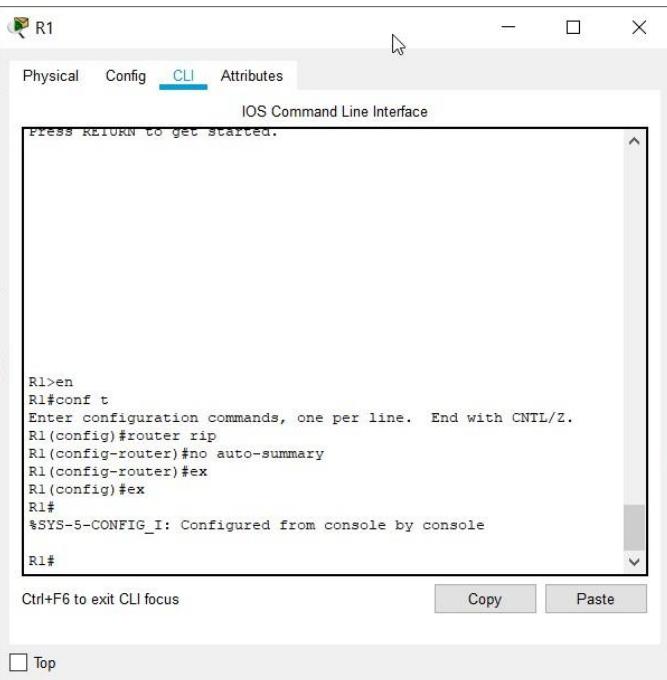
IOS Command Line Interface

Press RETURN to get started.

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

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

Top



R2

Physical Config **CLI** Attributes

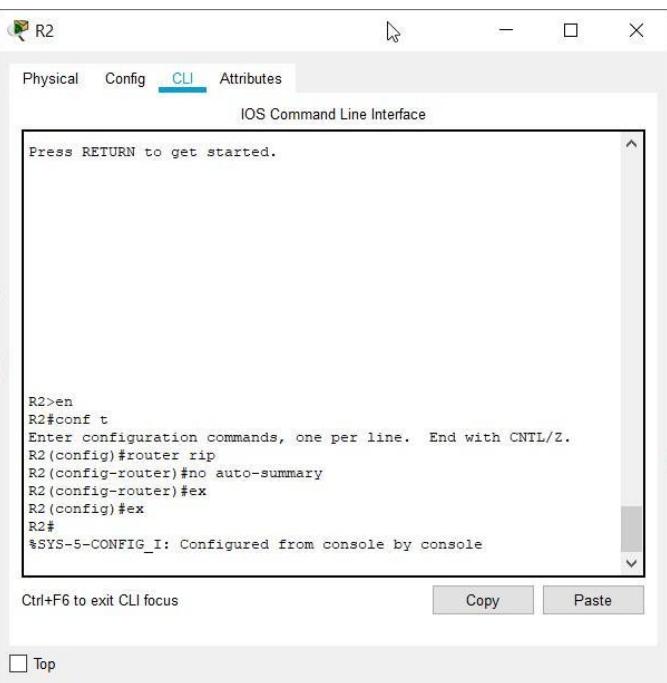
IOS Command Line Interface

Press RETURN to get started.

```
R2>en  
R2#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#router rip  
R2(config-router)#no auto-summary  
R2(config-router)#ex  
R2(config)#ex  
R2#  
%SYS-5-CONFIG_I: Configured from console by console
```

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

Top



```

R3>
R3>en
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router rip
R3(config-router)#no auto-summary
R3(config-router)#ex
R3(config)#ex
R3#
*SIS-5-CONFIG_I: Configured from console by console
R3#

```

Ctrl+F6 to exit CLI focus Copy Paste

Top

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**

```

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

Gateway of last resort is not set

      10.0.0.0/16 is subnetted, 1 subnets
C        10.1.0.0 is directly connected, FastEthernet0/0
      172.30.0.0/16 is variably subnetted, 7 subnets, 3 masks
R          172.30.0.0/24 [120/1] via 209.165.200.234, Serial0/0/1
R          172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:21, Serial0/0/0
R          172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:21, Serial0/0/0
R          172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R          172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R          172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
R          172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:10, Serial0/0/1
          209.165.200.0/30 is subnetted, 2 subnets
C            209.165.200.228 is directly connected, Serial0/0/0
--More-- |


```

Ctrl+F6 to exit CLI focus Copy Paste

Top

```
R1#show ip route
```

```
R1#  
R1#sh ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is not set  
  
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks  
R     10.0.0.0/8 is possibly down, routing via 209.165.200.229, Serial0/0/0  
R     10.1.0.0/16 [120/1] via 209.165.200.229, 00:00:05, Serial0/0/0  
     172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks  
C     172.30.1.0/24 is directly connected, FastEthernet0/0  
C     172.30.2.0/24 is directly connected, FastEthernet0/1  
R     172.30.100.0/24 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0  
R     172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0  
R     172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0  
R     172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:05, Serial0/0/0  
C     209.165.200.0/30 is subnetted, 2 subnets  
C       209.165.200.228 is directly connected, Serial0/0/0  
--More--
```

```
R3#show ip route
```

```
R3#  
R3#sh ip route  
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
      * - candidate default, U - per-user static route, o - ODR  
      P - periodic downloaded static route  
  
Gateway of last resort is not set  
  
10.0.0.0/16 is subnetted, 1 subnets  
R     10.1.0.0 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1  
     172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks  
R     172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1  
R     172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1  
C     172.30.100.0/24 is directly connected, FastEthernet0/0  
C     172.30.110.0/24 is directly connected, Loopback0  
C     172.30.200.16/28 is directly connected, Loopback1  
C     172.30.200.32/28 is directly connected, Loopback2  
C     209.165.200.0/30 is subnetted, 2 subnets  
R       209.165.200.228 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1  
C       209.165.200.232 is directly connected, Serial0/0/1  
--More--
```

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

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

172.30.1.0/24

172.30.2.0/24

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

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

Ctrl+F6 to exit CLI focus

Top

172.30.1.0/24

172.30.2.0/24

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

8: Verify Network Connectivity.

Step 1: Check connectivity between R2 router and PCs.

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

The screenshot shows a Windows-style application window titled "R2". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Below the tabs, the title "IOS Command Line Interface" is displayed. The main pane contains the following text:

```
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 =
1/4/15 ms

R2#
```

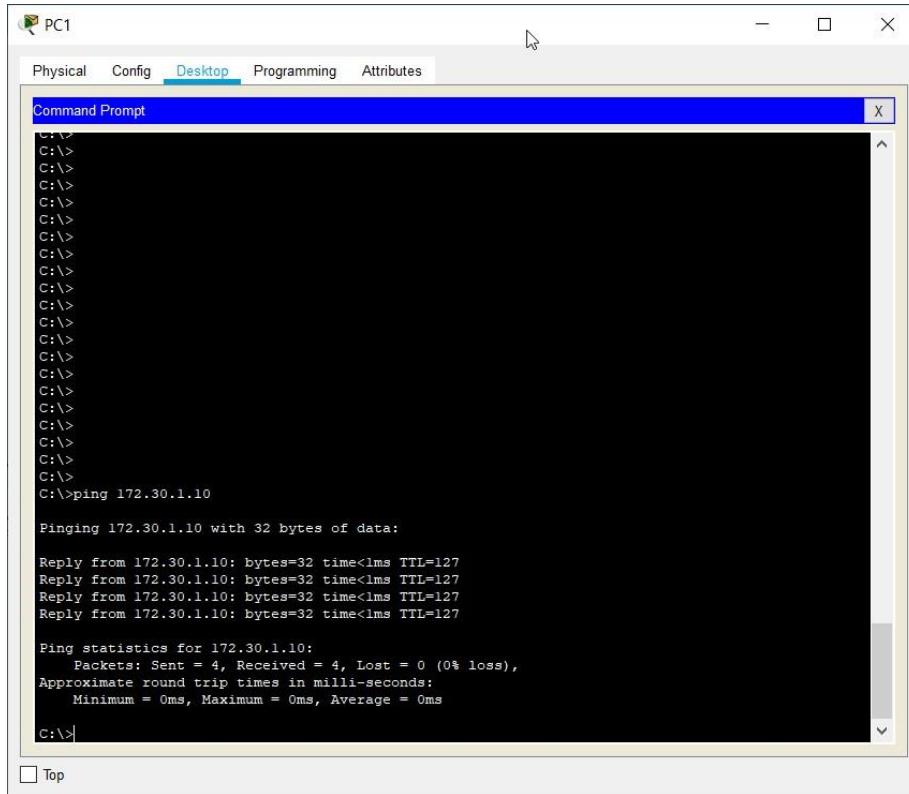
At the bottom left, there is a note: "Ctrl+F6 to exit CLI focus". On the bottom right, there are two buttons: "Copy" and "Paste". A small "Top" button is located at the bottom left corner.

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

Step 2: Check the connectivity between the PCs.

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

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



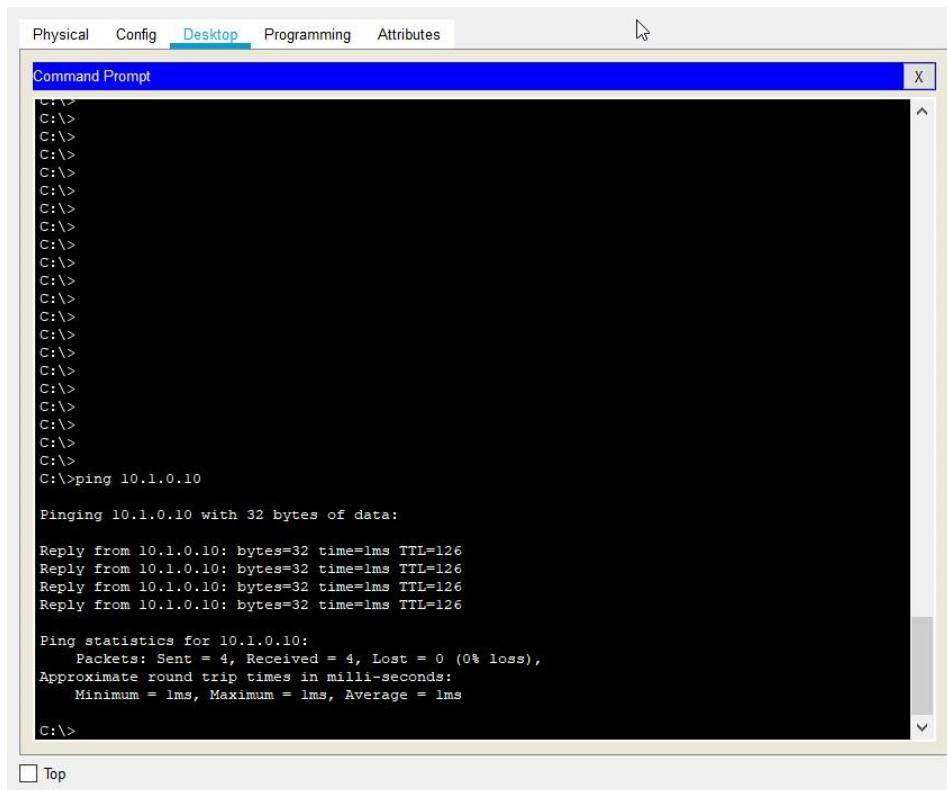
The screenshot shows a Windows Command Prompt window titled "PC1". The tab bar at the top has "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". The command prompt window itself has a title bar "Command Prompt" and a close button "X". The text area contains the following command and its output:

```
C:\>
C:\>ping 172.30.1.10
Pinging 172.30.1.10 with 32 bytes of data:
Reply from 172.30.1.10: bytes=32 time<1ms TTL=127

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

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



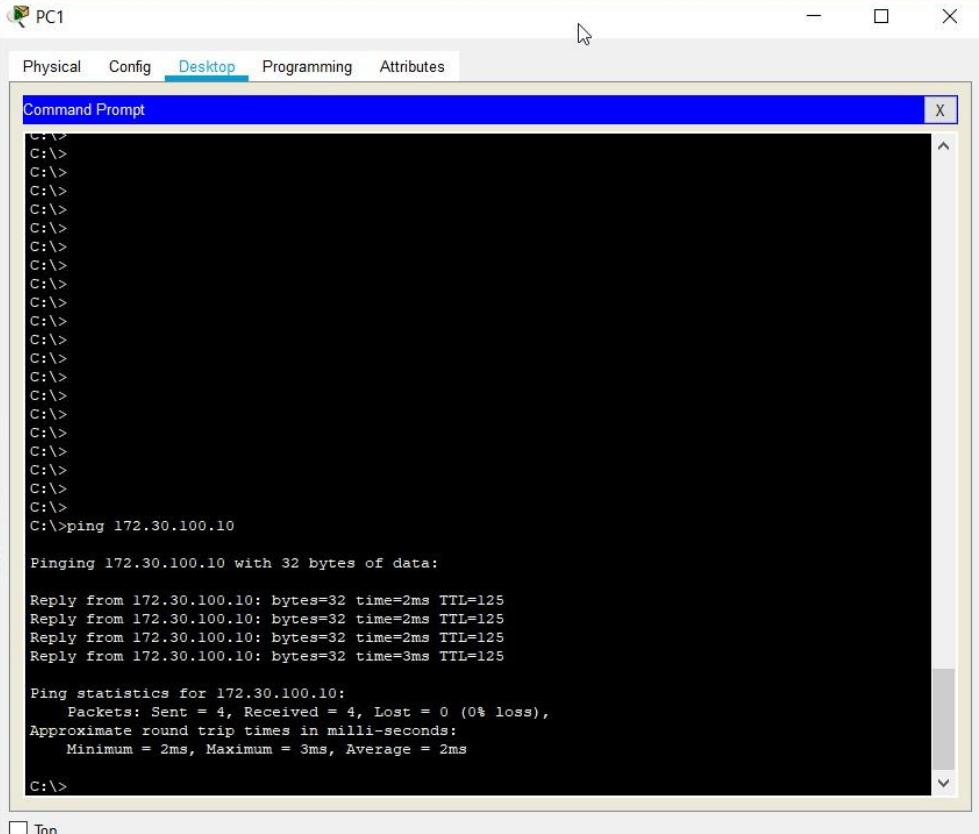
The screenshot shows a Windows Command Prompt window titled "PC1". The tab bar at the top has "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". The command prompt window itself has a title bar "Command Prompt" and a close button "X". The text area contains the following command and its output:

```
C:\>
C:\>ping 10.1.0.10
Pinging 10.1.0.10 with 32 bytes of data:
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126

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 PC1, is it possible to ping PC4? **yes**

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



The screenshot shows a Windows Command Prompt window titled "PC1". The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area of the window displays the following command and its output:

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

Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.100.10: bytes=32 time=2ms TTL=125
Reply from 172.30.100.10: bytes=32 time=2ms TTL=125
Reply from 172.30.100.10: bytes=32 time=2ms TTL=125
Reply from 172.30.100.10: bytes=32 time=3ms TTL=125

Ping statistics for 172.30.100.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

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

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

PC4

Physical Config Desktop Programming Attributes

Command Prompt

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

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

C:\>
```

Top

From PC4, is it possible to ping PC3? **yes**

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

PC4

Physical Config Desktop Programming Attributes

Command Prompt

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

Pinging 10.1.0.10 with 32 bytes of data:

Reply from 10.1.0.10: bytes=32 time=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 = 2ms, Maximum = 2ms, Average = 2ms

C:\>
```

Top

Task 9: Documentation

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

Router – R1

- **show ip route**

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

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
R 10.1.0.0 [120/1] via 209.165.200.229, 00:00:18, Serial0/0/0
  172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
    C 172.30.1.0/24 is directly connected, FastEthernet0/0
    C 172.30.2.0/24 is directly connected, FastEthernet0/1
    R 172.30.100.0/24 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0
    R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0
    R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0
    R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:18, Serial0/0/0
  209.165.200.0/30 is subnetted, 2 subnets
    C 209.165.200.228 is directly connected, Serial0/0/0
    R 209.165.200.232 [120/1] via 209.165.200.229, 00:00:18, Serial0/0/0
```

- **show ip interface brief**

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

- **show ip protocols**

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

Router – R2

- show running-config

R2#sh running-config Building configuration...

```

!
ip flow-export version 9 !
!
!
!
!
!
!
line con 0 !
line aux 0 !
line vty 0 4
password cisco login
!
!
!
```

end

• show ip route

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

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
C 10.1.0.0 is directly connected, FastEthernet0/0
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:10, Serial0/0/0
R 172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:10, Serial0/0/0
R 172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
R 172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
R 172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
R 172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:19, Serial0/0/1
209.165.200.0/30 is subnetted, 2 subnets
C 209.165.200.228 is directly connected, Serial0/0/0 C
209.165.200.232 is directly connected, Serial0/0/1
```

• show ip interface brief

R2#sh ip int brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	10.1.0.1	YES	manual	up	
FastEthernet0/1	unassigned	YES	NVRAM	administratively down	down
Serial0/0/0	209.165.200.229	YES	manual	up	
Serial0/0/1	209.165.200.233	YES	manual	up	
Vlan1	unassigned	YES	unset	administratively down	down

- **show ip protocols**

```
R2#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 18 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
  Interface Send Recv Triggered RIP Key-chain
    Serial0/0/0 2 2
    Serial0/0/1 2 2
  Automatic network summarization is not in effect
  Maximum path: 4 Routing
  for Networks:
    10.0.0.0
    209.165.200.0 Passive
  Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway Distance Last Update
    209.165.200.230 120 00:00:09
    209.165.200.234 120 00:00:13
  Distance: (default is 120)
```

Router – R3

```

!
!
line con 0 !
line aux 0 !
line vty 0 4
password cisco login
!
!
end

```

• **show ip route**

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

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
R 10.1.0.0 [120/1] via 209.165.200.233, 00:00:04, Serial0/0/1
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:04, Serial0/0/1
R 172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:04, Serial0/0/1
C 172.30.100.0/24 is directly connected, FastEthernet0/0
C 172.30.110.0/24 is directly connected, Loopback0
C 172.30.200.16/28 is directly connected, Loopback1
C 172.30.200.32/28 is directly connected, Loopback2
209.165.200.0/30 is subnetted, 2 subnets
R 209.165.200.228 [120/1] via 209.165.200.233, 00:00:04, Serial0/0/1
C 209.165.200.232 is directly connected, Serial0/0/1
```

• **show ip interface brief**

```
R3#sh ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	172.30.100.1	YES	manual	up	
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	
Loopback0	172.30.110.1	YES	manual	up	
Loopback1	172.30.200.17	YES	manual	up	
Loopback2	172.30.200.33	YES	manual	up	
Vlan1	unassigned	YES	unset	administratively down	down

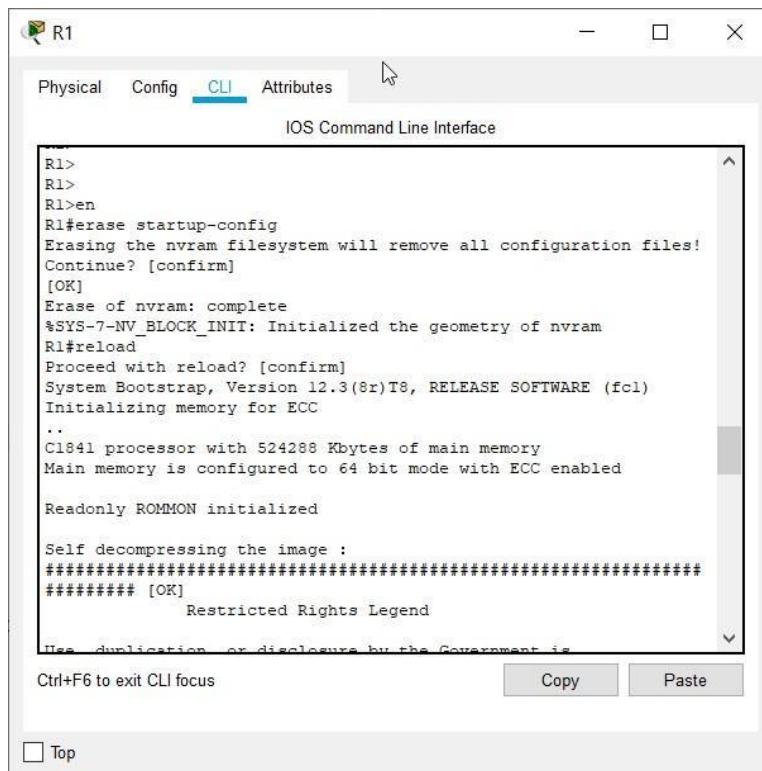
- **show ip protocols**

```
R3#sh ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 13 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
  Interface Send Recv Triggered RIP Key-chain
    Loopback0 2 2
    Loopback1 2 2
    Loopback2 2 2
    Serial0/0/1 2 2
  Automatic network summarization is not in effect
  Maximum path: 4 Routing
  for Networks:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway Distance Last Update
    209.165.200.233 120 00:00:19
Distance: (default is 120)
```

Task 10: Clean Up

Erase the configurations and reload the routers. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

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



R2

Physical Config **CLI** Attributes

IOS Command Line Interface

```

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

 Readonly ROMMON initialized

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

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

```

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

Top

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```

R3>en
R3#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
R3#reload
System configuration has been modified. Save? [yes/no]:n
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
Initializing memory for ECC
...
C1841 processor with 524288 Kbytes of main memory
Main memory is configured to 64 bit mode with ECC enabled

 Readonly ROMMON initialized

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

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

```

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

Top

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