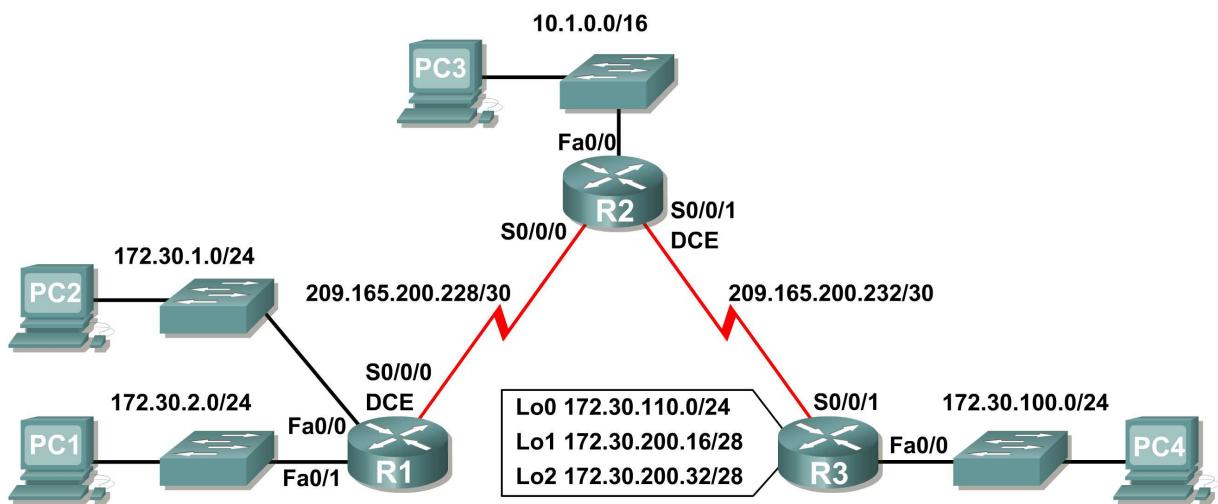


# CEL 51, DCCN, Monsoon 2020

## Lab 7: RIPv2 Router Configuration

### Topology Diagram



### Addressing Table

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

## Learning Objectives

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

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

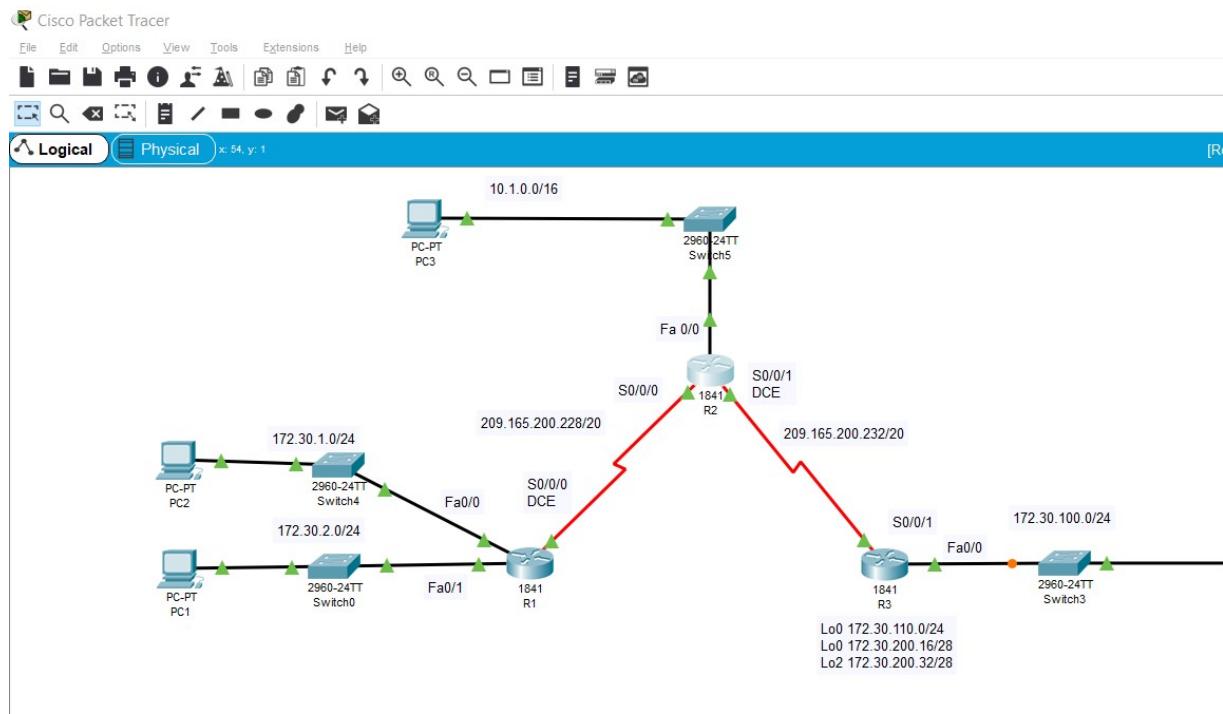
## Scenario

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

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

#### Step 1: Cable a network.

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



PC1

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP  Static

IP Address 172.30.1.10

Subnet Mask 255.255.0.0

Default Gateway 172.30.2.1

DNS Server 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address

Link Local Address FE80::250:FFF:FEC7:C749

IPv6 Gateway

IPv6 DNS Server

802.1X

Use 802.1X Security

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

DHCP  Static

IP Address 172.30.2.10

Subnet Mask 255.255.0.0

Default Gateway 172.30.1.1

DNS Server 0.0.0.0

IPv6 Configuration

DHCP  Auto Config  Static

IPv6 Address

Link Local Address FE80::201:C9FF:FE45:97EA

IPv6 Gateway

IPv6 DNS Server

802.1X

Use 802.1X Security

PC3

Physical Config Desktop Programming Attributes

IP Configuration

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::204:9AFF:FEFC:6231

IPv6 Gateway

IPv6 DNS Server

802.1X

Use 802.1X Security

PC4

Physical Config Desktop Programming Attributes

IP Configuration

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:FFFF:FE72:853E

IPv6 Gateway

IPv6 DNS Server

802.1X

Use 802.1X Security

**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.

R1:

```
Router>en
Router#erase start
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
[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
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
```

R2 :

The screenshot shows the Cisco Network Assistant interface. On the left, there's a network diagram with a central router node labeled "R2". Router R2 is connected to a computer icon labeled "PC-PT" and two port icons labeled "T" and "F". Below the diagram, there are two port labels: "Fa0" and "Fa1".

The main window has tabs: Physical, Config, CLI, and Attributes. The "CLI" tab is selected, displaying the IOS Command Line Interface:

```
Router>en
Router#erase start
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration
[confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
System configuration has been modified. Save? [yes/no]
Proceed with reload? [confirm]
System Bootstrap, Version 12.3(8r)T8, RELEASE SOFTWARE
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
```

R3 :

R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#erase
Router#erase startup-config
Erasing the nvram filesystem will remove all configuration files!
[confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
Router#reload
System configuration has been modified. Save? [yes/no]:no
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
```

### 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
```



Physical    Config    CLI    Attributes

IOS Command Line Interface

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

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

Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

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

Router(config-if)#exit
Router(config)#inter
Router(config)#hostna
Router(config)#hostname R1
R1(config)#interface FastEthernet0/1
R1(config-if)#exit
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)#exit
R1(config)#interface FastEthernet0/1
R1(config-if)#ip address 172.30.2.1 255.255.255.0
R1(config-if)#
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#conf
R1#configure ter
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface FastEthernet0/1
R1(config-if)#duplex auto
```

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R1(config)#interface FastEthernet0/1
R1(config-if)#duplex auto
R1(config-if)#speed auto
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#interface Serial0/0/0
R1(config-if)#ip address 209.165.200.230 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shut
R1(config-if)#no shutdown
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)#exit
R1(config)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#show
R1#show sta
R1#show start
R1#show startup-config
startup-config is not present
R1#show running-config
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
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
!
!
!
!
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
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
```



R1

Physical    Config    **CLI**    Attributes

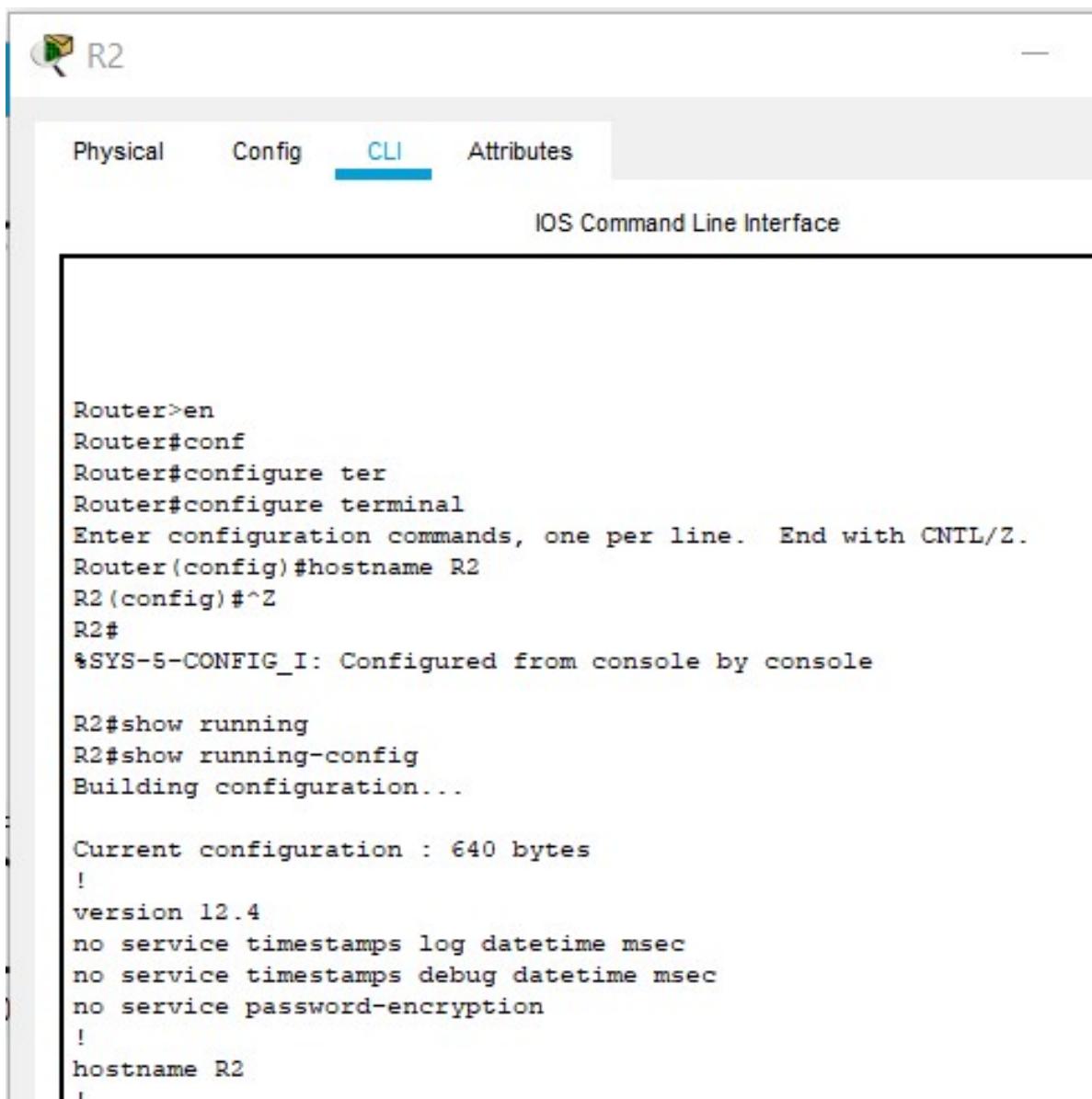
IOS Command Line Interface

```
!line vty 0 4
  login!
```

**Step 2: Load the following script onto R2.**

```
hostname R2
!
!
!
interface FastEthernet0/0
  ip address 10.1.0.1 255.255.0.0
  duplex auto
  speed auto
  no shutdown
!
interface Serial0/0/0
  ip address 209.165.200.229 255.255.255.252
  no shutdown
!
```

```
interface Serial0/0/1
  ip address 209.165.200.233 255.255.255.252
  clock rate 64000
  no shutdown
!
router rip
  passive-interface FastEthernet0/0
  network 10.0.0.0
  network 209.165.200.0
!
line con 0
line vty 0 4
  login
!
end
```



The screenshot shows a Cisco Router Configuration interface. At the top, there's a header bar with tabs: Physical, Config, CLI (which is highlighted in blue), and Attributes. Below the header, it says "IOS Command Line Interface". The main area is a terminal window showing the configuration commands entered:

```
Router>en
Router#conf
Router#configure ter
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show running
R2#show running-config
Building configuration...

Current configuration : 640 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
!
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R2(config)#interface FastEthernet0/0
R2(config-if)#no shutdown
R2(config-if)#ip address 10.1.0.1 255.255.0.0
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)#exit
R2(config)#interface Serial0/0/1
R2(config-if)#ip address 209.165.200.233 255.255.255.252
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown
R2(config-if)#exit
R2(config)#router rip
R2(config-router)#passive-interface FastEthernet0/0
R2(config-router)# network 10.0.0.0
R2(config-router)# network 209.165.200.0
R2(config-router)#exit
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show running-config
Building configuration...

Current configuration : 803 bytes
!
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R2(config-router)# network 209.165.200.0
R2(config-router)#exit
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show running-config
Building configuration...

Current configuration : 803 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
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

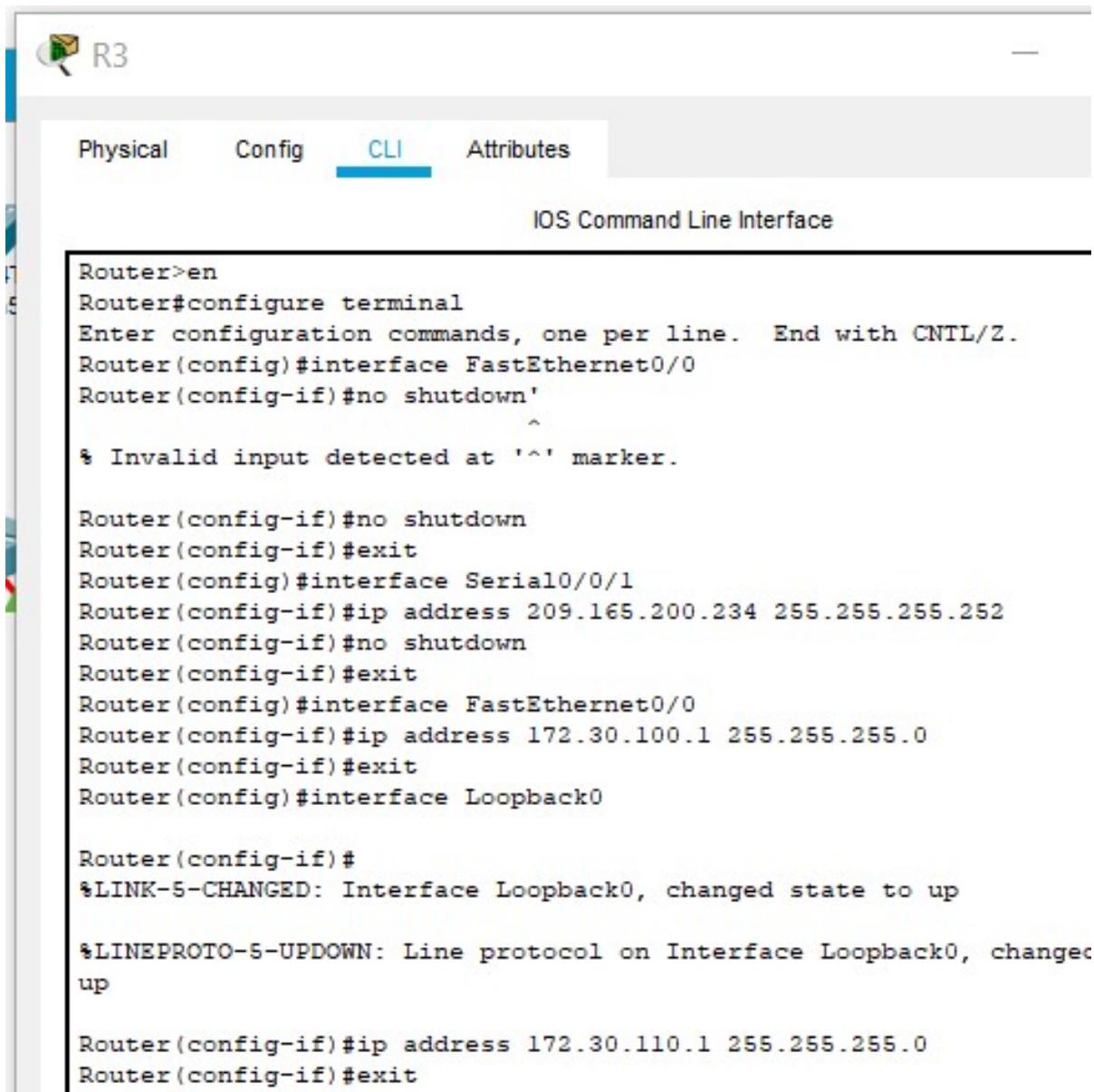
```
interface FastEthernet0/0
  ip address 10.1.0.1 255.255.0.0
  duplex auto
  speed auto
!
interface FastEthernet0/1
  no ip address
  duplex auto
  speed auto
  shutdown
!
interface Serial0/0/0
  ip address 209.165.200.229 255.255.255.252
!
interface Serial0/0/1
  ip address 209.165.200.233 255.255.255.252
  clock rate 64000
!
interface Vlan1
  no ip address
  shutdown
!
router rip
  passive-interface FastEthernet0/0
  network 10.0.0.0
  network 209.165.200.0
!
```

```
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
!
!
!
end
```

**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
```



R3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>en
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown

^
* Invalid input detected at '^' marker.

Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#ip address 209.165.200.234 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 172.30.100.1 255.255.255.0
Router(config-if)#exit
Router(config)#interface Loopback0

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

*LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed
up

Router(config-if)#ip address 172.30.110.1 255.255.255.0
Router(config-if)#exit
```

 R3Physical    Config    **CLI**    Attributes

## IOS Command Line Interface

```
Router(config-if)#exit
Router(config)#interface Loopback1

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

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

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

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

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

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



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Enter configuration commands, one per line. End with Ctrl/Z.
Router(config)#hostname R3
R3(config)#
R3#
%SYS-5-CONFIG_I: Configured from console by console

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
!
```



R3

Physical    Config    **CLI**    Attributes

## IOS Command Line Interface

```
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
```



Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
interface Vlan1
  no ip address
  shutdown
!
router rip
  passive-interface FastEthernet0/0
  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
!
```

### 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

Physical Config **CLI** Attributes

IOS Command Line Interface

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

R2>en

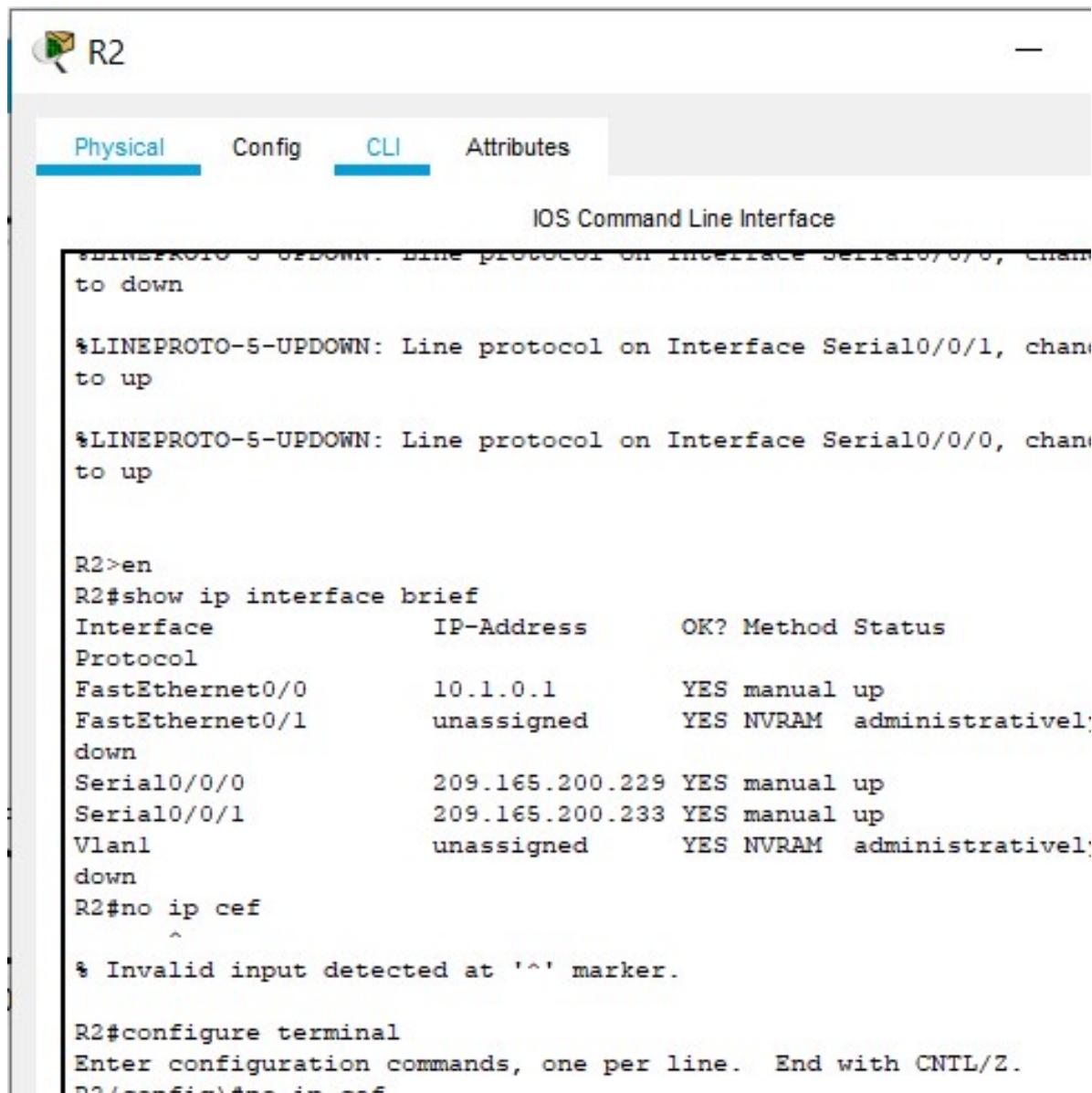
```
R2#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status
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

**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 Cisco Network Assistant interface for router R2. The top navigation bar includes tabs for Physical, Config, CLI, and Attributes, with the CLI tab currently selected. Below the tabs, the title "IOS Command Line Interface" is displayed. The main area contains the terminal session output. The output shows several log messages indicating protocol state changes (e.g., %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed to up) and a configuration command (R2#no ip cef). A warning message "% Invalid input detected at '^' marker." is also present. At the bottom of the terminal window, the prompt "R2#configure terminal" is shown, followed by the instruction "Enter configuration commands, one per line. End with CNTL/Z." The configuration mode prompt "R2(config)" is visible at the bottom left.

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, chan-
to down

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

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

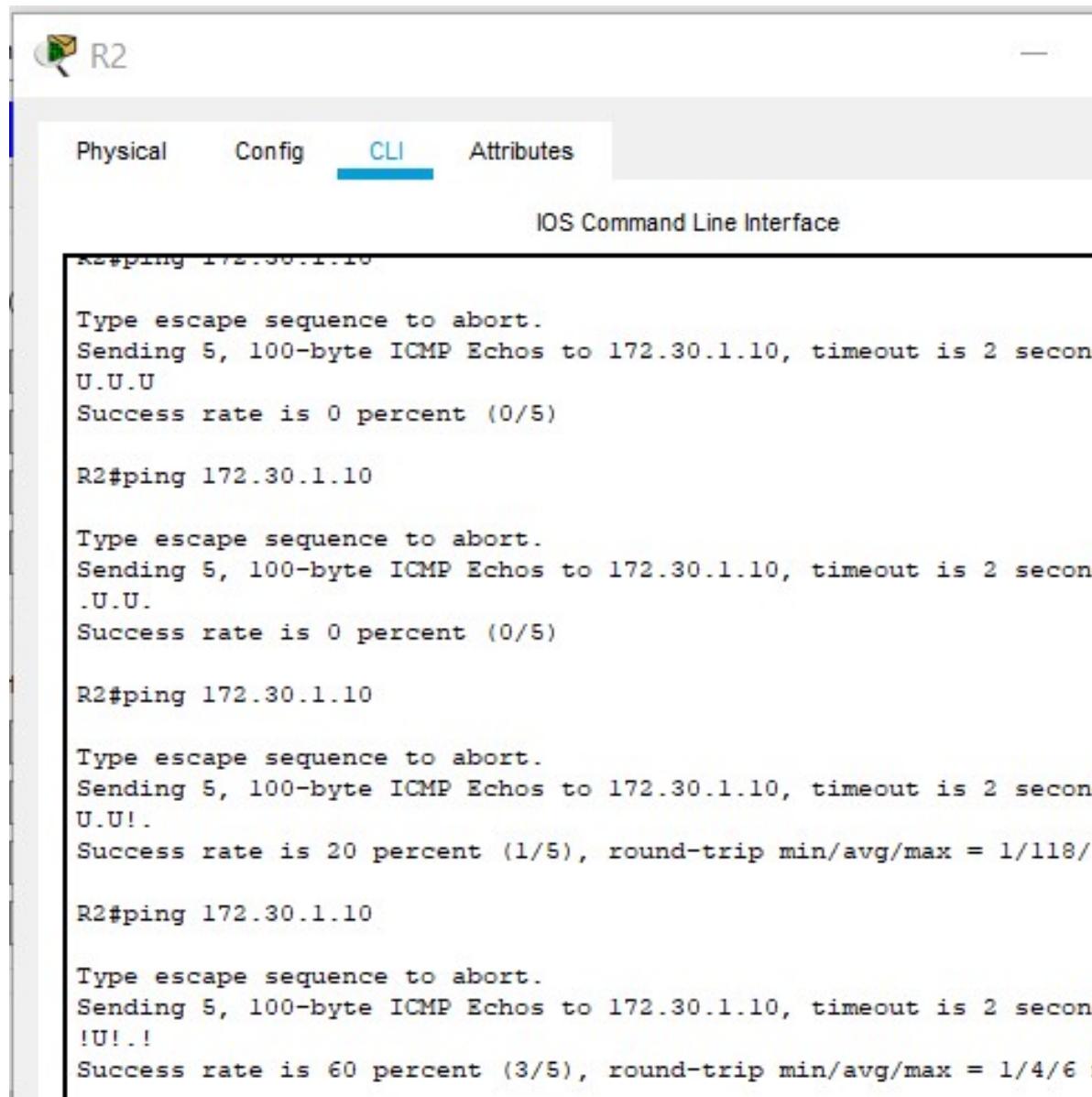
R2>en
R2#show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
FastEthernet0/0    10.1.0.1        YES manual up
FastEthernet0/1    unassigned      YES NVRAM  administrativel;
down
Serial0/0/0        209.165.200.229 YES manual up
Serial0/0/1        209.165.200.233 YES manual up
Vlan1              unassigned      YES NVRAM  administrativel;
down
R2#no ip cef
^
% Invalid input detected at '^' marker.

R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#no ip cef
```

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

On pinging, I initially got 0% success rate as the ip address assigned to PC1 is of the subnet of PC2. On switching the ip addresses of PC1 and PC2 we get 60% success rate.

Yes, 60% success rate



```
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.U
Success rate is 0 percent (0/5)

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#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 20 percent (1/5), round-trip min/avg/max = 1/118/118

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!..
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/4/6
```

PC1

Physical Config Desktop Programming Attributes

IP Configuration

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::250:FFF:FEC7:C749

IPv6 Gateway

IPv6 DNS Server

802.1X

PC2

Physical Config Desktop Programming Attributes

**IP Configuration**

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::201:C9FF:FE45:97EA

IPv6 Gateway

IPv6 DNS Server

802.1X

Use 802.1X Security

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

Yes, 60% success rate



R2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R2#ping 172.30.100.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.100.10, timeout is 2 sec
!U!.!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/3/4

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 sec
U!.!U
Success rate is 40 percent (2/5), round-trip min/avg/max = 1/8/8

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 sec
!U!.!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/4/7

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 secon
.U.U.
-----
```

**Step 3: Check the connectivity between the PCs.**

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

What is the success rate? 100%

PC1

Physical    Config    **Desktop**    Programming    Attributes

Command Prompt

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

Pinging 172.20.1.10 with 32 bytes of data:

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

Ping statistics for 172.20.1.10:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 172.30.1.10

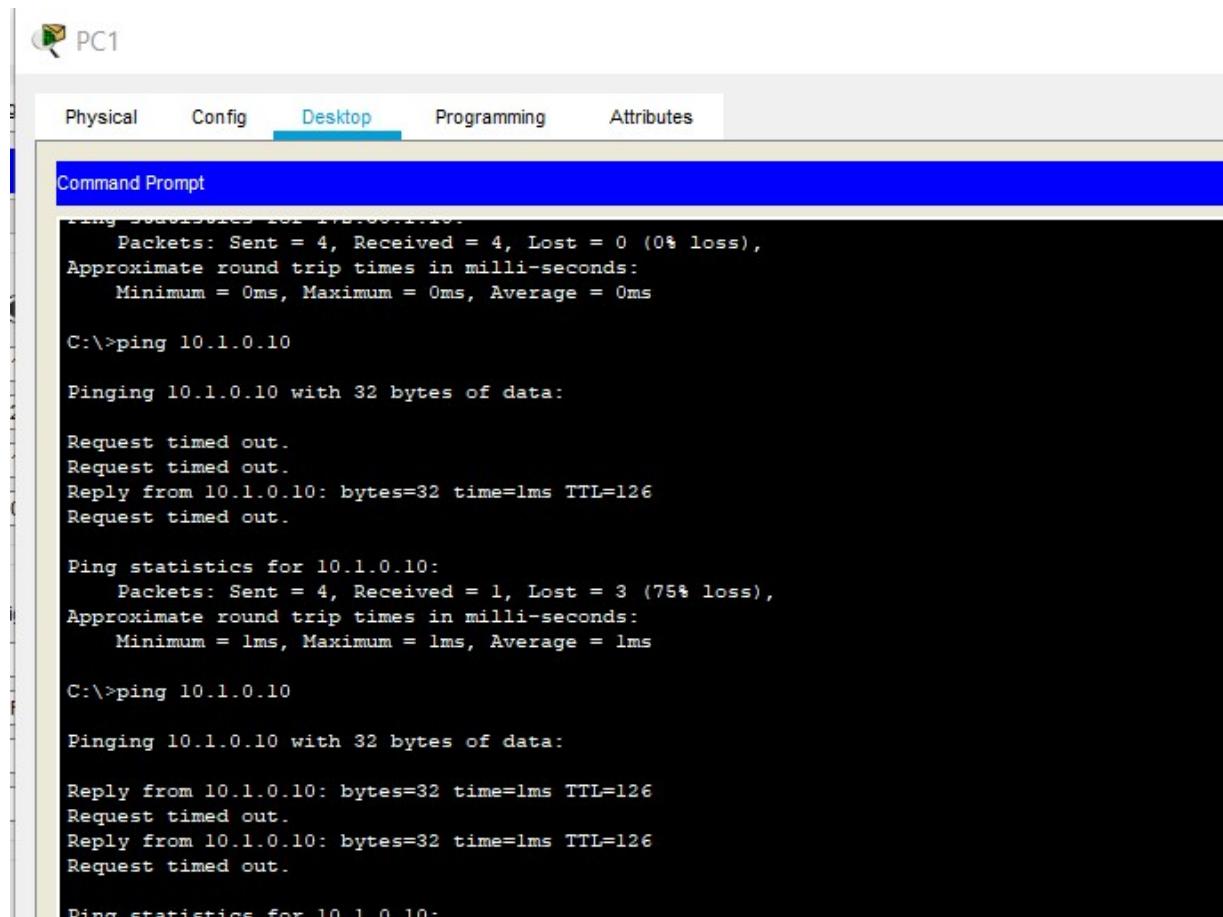
Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: 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
```

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

What is the success rate? 50%



The screenshot shows a network configuration interface for a device named "PC1". The top navigation bar includes tabs for "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". Below the navigation bar is a "Command Prompt" window. The command prompt displays the results of several ping operations to the IP address 10.1.0.10. The output shows varying levels of success and loss:

```
Ping statistics for 10.1.0.10:
    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.
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 = 1, Lost = 3 (75% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

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

Ping statistics for 10.1.0.10:
```

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

What is the success rate? Yes

The screenshot shows a network management interface for a device named "PC1". The top navigation bar includes tabs for Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the navigation bar is a "Command Prompt" window. The command prompt output is as follows:

```
Request timed out.

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

C:\>ping 10.1.0.10

Pinging 10.1.0.10 with 32 bytes of data:

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

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

C:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.2.1: Destination host unreachable.
```

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

What is the success rate? 0%

```
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.

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 PC3? Yes

What is the success rate? 50%

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.

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:

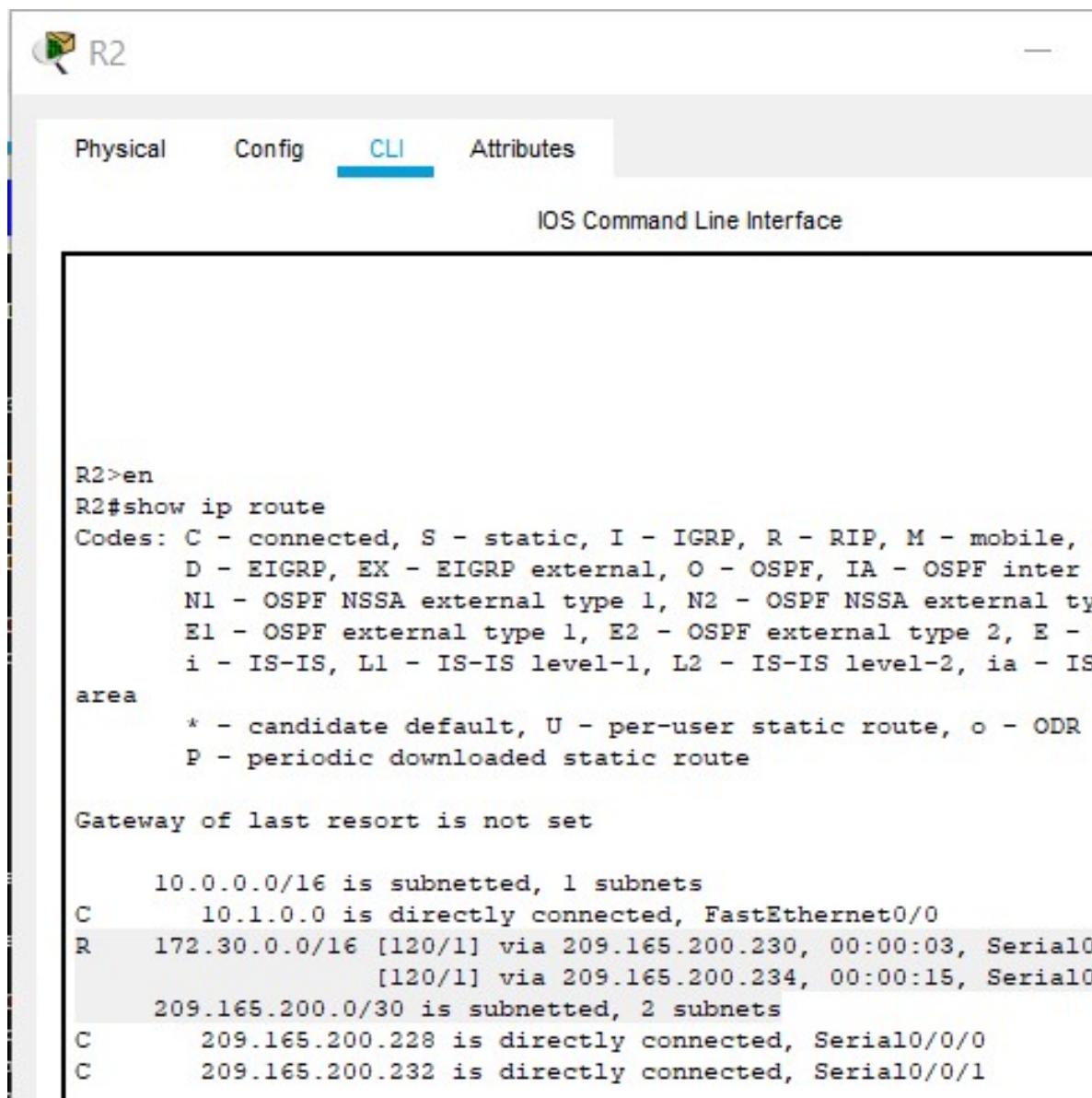
Request timed out.
Reply from 10.1.0.10: bytes=32 time=8ms TTL=126
Request timed out.
Reply from 10.1.0.10: bytes=32 time=1ms TTL=126

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 = 5ms, Average = 3ms
```

#### Step 4: View the routing table on R2.

Both the R1 and R3 are advertising routes to the 172.30.0.0/16 network; therefore, there are two entries for this network in the R2 routing table. The R2 routing table only shows the major classful network address of 172.30.0.0—it does not show any of the subnets for this network that are used on the LANs attached to R1 and R3. Because the routing metric is the same for both entries, the router alternates the routes that are used when forwarding packets that are destined for the 172.30.0.0/16 network.

```
R2#show ip route
```



R2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R2>en
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty
       E1 - OSPF external type 1, E2 - OSPF external type 2, E -
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS
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, 00:00:03, Serial0
                  [120/1] via 209.165.200.234, 00:00:15, Serial0
          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
```

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

Both R1 and R3 are configured with interfaces on a discontiguous network, 172.30.0.0. The 172.30.0.0 subnets are physically and logically divided by at least one other classful or major network—in this case, the two serial networks 209.165.200.228/30 and 209.165.200.232/30. Classful routing protocols like RIPV1 summarize networks at major network boundaries. Both R1 and R3 will be summarizing 172.30.0.0/24 subnets to 172.30.0.0/16. Because the route to 172.30.0.0/16 is directly connected, and

because R1 does not have any specific routes for the 172.30.0.0 subnets on R3, packets destined for the R3 LANs will not be forwarded properly.

```
R1#show ip route
```

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

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

R1>en
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, D
      EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - I
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS
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, 00:00:03, Serial0/0/
      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, 00:00:03, Se
```

**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

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

R3>en
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, E1
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - I
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
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, 00:00:15, 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, 00:00:15, Se
C      209.165.200.232 is directly connected, Serial0/0/1
```

**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 the Cisco Router Configuration Interface. At the top, there's a header with a mail icon and the text "R2". Below it is a navigation bar with four tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Underneath the navigation bar is a sub-header "IOS Command Line Interface". The main area contains the output of the `debug ip rip` command. The output shows R2 receiving a RIP update from 209.165.200.234 via Serial0/0/1, learning the route 172.30.0.0. It then sends its own RIP update to 255.255.255.255 via the same interface. This process repeats several times, indicating bidirectional communication between R2 and either R1 or R3. The output also shows R2 building update entries for the local LAN network 10.0.0.0 and the serial connections.

```
R2#debug ip rip
RIP protocol debugging is on
R2#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 Serial0/0/1
      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
```

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`



R2

Physical    Config    **CLI**    Attributes

## IOS Command Line Interface

```
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

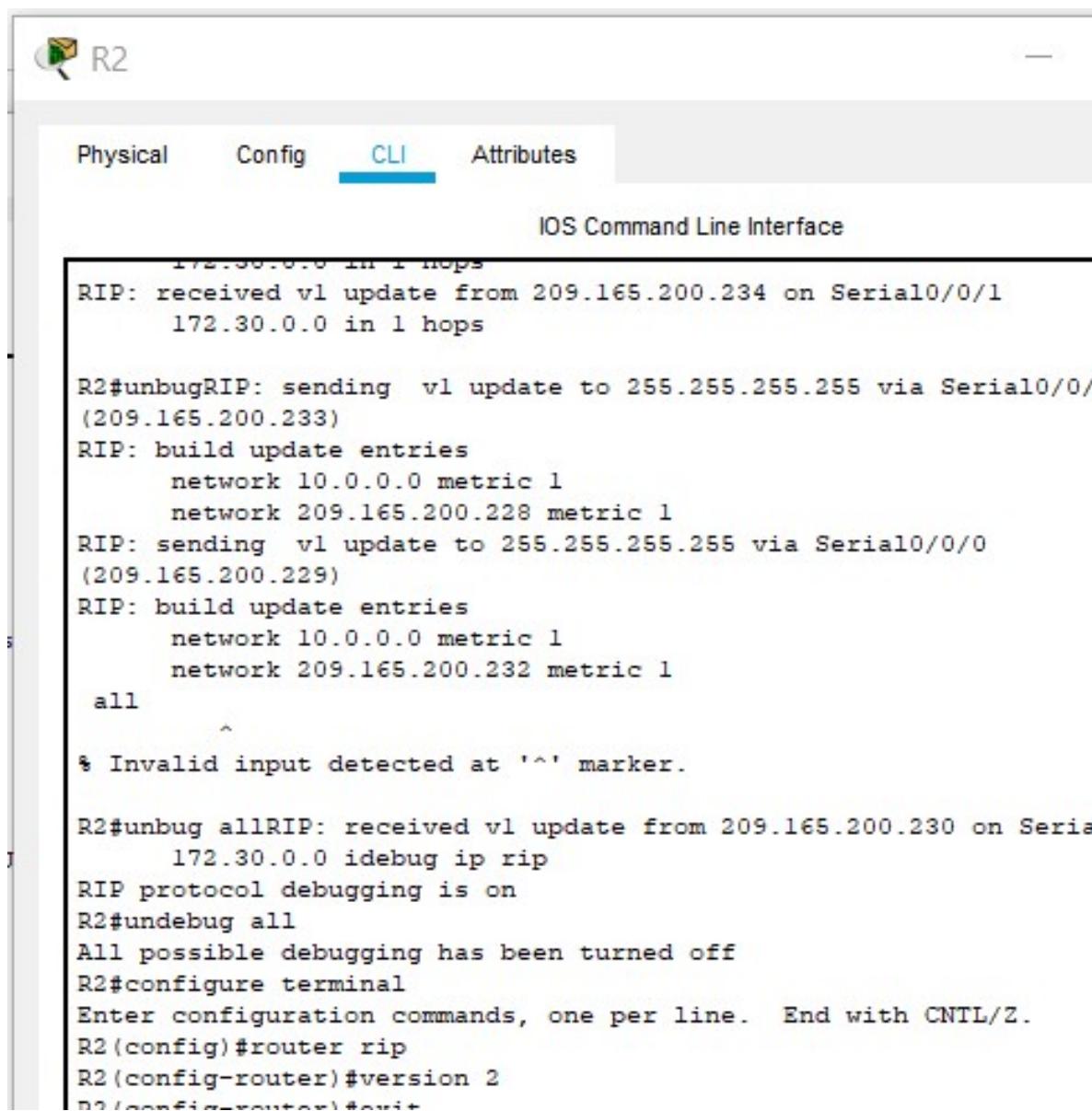
R2#unbugRIP: sending v1 update to 255.255.255.255 via Serial0/0/1
(209.165.200.233)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.228 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0/0
(209.165.200.229)
RIP: build update entries
    network 10.0.0.0 metric 1
    network 209.165.200.232 metric 1
all
^
% Invalid input detected at '^' marker.

R2#unbug allRIP: received v1 update from 209.165.200.230 on Serial0/0/0
    172.30.0.0 idebug ip rip
RIP protocol debugging is on
R2#undebbug all
All possible debugging has been turned off
```

#### 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
```



```
IOS Command Line Interface  
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#unbugRIP: sending v1 update to 255.255.255.255 via Serial0/0/  
(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  
^  
% Invalid input detected at '^' marker.  
  
R2#unbug allRIP: received v1 update from 209.165.200.230 on Serial0/0/0  
    172.30.0.0 idebug ip rip  
RIP protocol debugging is on  
R2#undebbug all  
All possible debugging has been turned off  
R2#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R2(config)#router rip  
R2(config-router)#version 2  
no /config/running+exit
```

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

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled 'R1'. The window has tabs at the top: 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs, it says 'IOS Command Line Interface'. A large text area in the center contains the following text:

```
Press RETURN to get started.  
  
R1>en  
R1#conf  
R1#configure ter  
R1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R1(config)#router rip  
R1(config-router)#version 2  
R1(config-router)#exit
```

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

The screenshot shows the Cisco Network Assistant interface. At the top, there is a toolbar with icons for Physical, Config, CLI (which is highlighted in blue), and Attributes. Below the toolbar, the title "IOS Command Line Interface" is displayed. In the main window, the text "Press RETURN to get started." is shown at the top. Below this, the command-line session for router R3 is displayed:

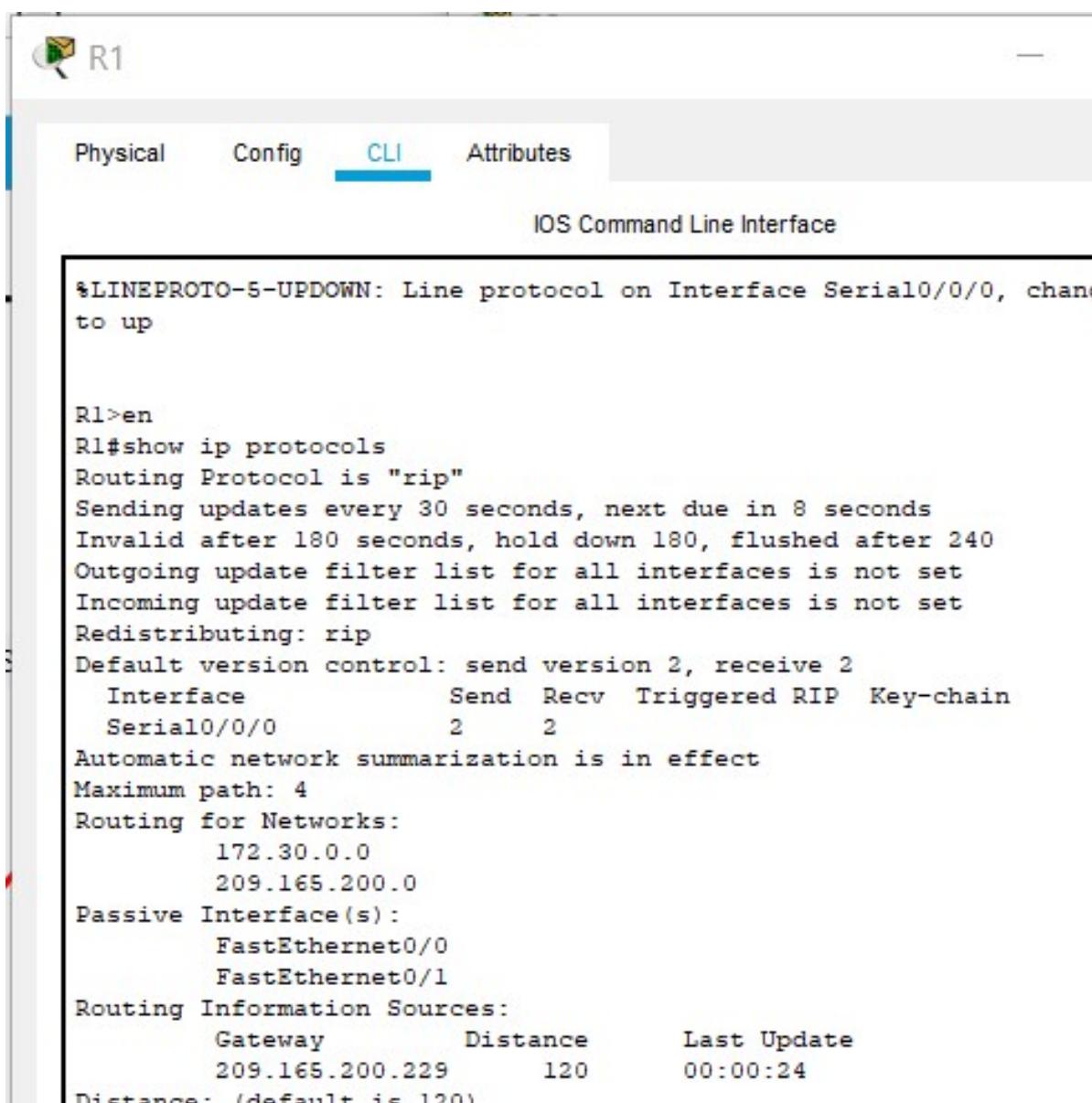
```
R3>en  
R3#confi  
R3#configure termi  
R3#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#router rip  
R3(config-router)#version 2  
R3(config-router)#+exit
```

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
```



```
IOS Command Line Interface

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

R1>en
R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 8 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 2, receive 2
    Interface          Send   Recv   Triggered RIP  Key-chain
      Serial0/0/0        2       2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    172.30.0.0
    209.165.200.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
  Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.229      120          00:00:24
  Distance to default is 120
```

### 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

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on interface Serial0/0/1, chan-
to up

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

R2>en

```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, I
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter-
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty-
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - I
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
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, 00:00:27, Serial0.
                  [120/1] via 209.165.200.234, 00:00:06, Serial0.
          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
```

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

```
R1

Physical Config CLI Attributes

IOS Command Line Interface

Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1

Routing Information Sources:
    Gateway          Distance      Last Update
    209.165.200.229      120        00:00:24

Distance: (default is 120)

R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty
       E1 - OSPF external type 1, E2 - OSPF external type 2, E -
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS
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, 00:00:01, Serial0/0/
     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, 00:00:01, Se
```

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

```
R3#show ip route
```

The screenshot shows a Cisco Network Assistant window titled 'R3'. The top navigation bar has tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs is the text 'IOS Command Line Interface'. The main area displays the output of the 'show ip route' command:

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

R3>en
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, E
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external typ
      E1 - OSPF external type 1, E2 - OSPF external type 2, E - I
      i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
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, 00:00:16, 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, 00:00:16, Se
C          209.165.200.232 is directly connected, Serial0/0/1
```

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

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

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



R3

Physical	Config	CLI	Attributes

IOS Command Line Interface

```
RIP: build update entries
    10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
    172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
    172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
    172.30.200.32/28 via 0.0.0.0, metric 1, tag 0
    209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Loopback1 (172.30.200.17)
RIP: build update entries
    10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
    172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
    172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
    172.30.200.32/28 via 0.0.0.0, metric 1, tag 0
    209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Loopback2 (172.30.200.33)
RIP: build update entries
    10.0.0.0/8 via 0.0.0.0, metric 2, tag 0
    172.30.100.0/24 via 0.0.0.0, metric 1, tag 0
    172.30.110.0/24 via 0.0.0.0, metric 1, tag 0
    172.30.200.16/28 via 0.0.0.0, metric 1, tag 0
    209.165.200.0/24 via 0.0.0.0, metric 1, tag 0
RIP: sending v2 update to 224.0.0.9 via Serial0/0/1 (209.165.200.1)
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
udebug all
All possible debugging has been turned off
```

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

172.30.0.0/16

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

## Task 6: Disable Automatic Summarization.

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

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

The image shows a terminal window titled "IOS Command Line Interface". At the top, there are tabs: "Physical", "Config", "CLI" (which is underlined), and "Attributes". Below the tabs, the text "Press RETURN to get started." is displayed. The main area of the terminal shows the configuration commands entered:

```
R2>en
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)#+Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
```

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

The screenshot shows a Cisco IOS CLI interface. At the top, there's a menu bar with tabs: Physical, Config, **CLI**, and Attributes. Below the menu, it says "IOS Command Line Interface". A large text area in the center contains configuration commands. On the left side of this text area, there's a vertical bar with a small icon at the top.

```
Press RETURN to get started.  
  
R1>en  
R1#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R1(config)#router rip  
R1(config-router)#no auto-summary  
R1(config-router)#^Z  
R1#  
%SYS-5-CONFIG_I: Configured from console by console
```

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

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled 'R3'. The window has tabs at the top: 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs is the text 'IOS Command Line Interface'. The main area displays the following output:

```
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  
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  
undebbug all  
All possible debugging has been turned off  
R3#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
R3(config)#  
R3(config)#router rip  
R3(config-router)#no auto-summary  
R3(config-router)#^Z  
R3#  
%SYS-5-CONFIG_I: Configured from console by console
```

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

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

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

Gateway of last resort is not set

      10.0.0.0/16 is subnetted, 1 subnets
C        10.1.0.0 is directly connected, FastEthernet0/0
      172.30.0.0/16 is variably subnetted, 7 subnets, 3 masks
R        172.30.0.0/16 is possibly down, routing via 209.165.200.21
Serial0/0/1
R        172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/1
R        172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/1
R        172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R        172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R        172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R        172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:08, 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
```

```
R1#show ip route
```

R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R1>en
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, 
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter 
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty 
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - I 
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
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, 00:00:21, Serial0/0,
          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, 00:00:21, Se:
R          172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:21, Se:
R          172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:21, Se:
R          172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:21, Se:
          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, 00:00:21, Se:
```

```
R3#show ip route
```

R3

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

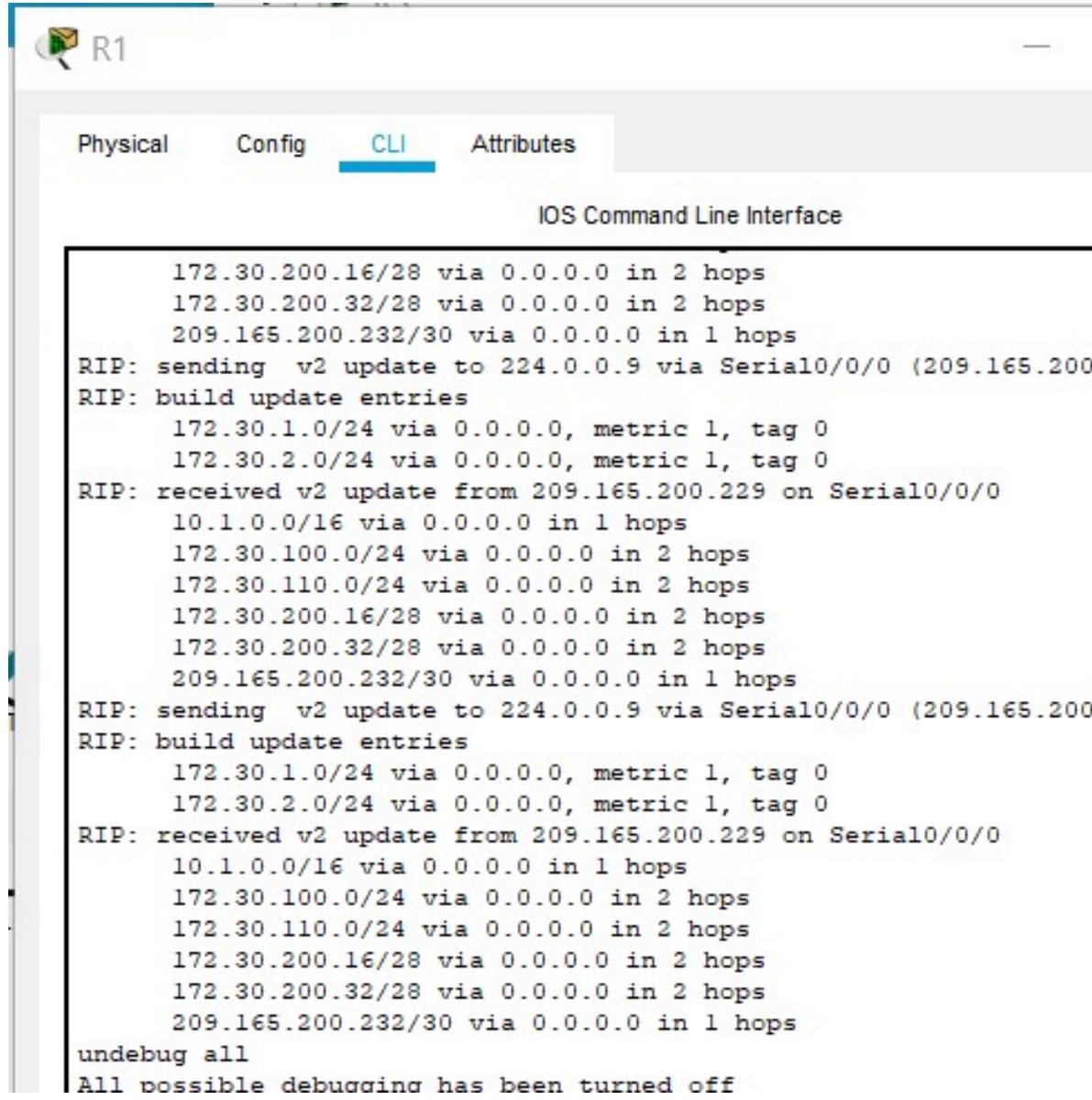
```
*SYS-S-CONFIG_I: Configured from console by console
```

```
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter-
           N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external ty-
               E1 - OSPF external type 1, E2 - OSPF external type 2, E -
               i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS
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, 00:00:26, Serial0/0
      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, 00:00:26, Seri
R          172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:26, Seri
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, 00:00:26, Se
C          209.165.200.232 is directly connected, Serial0/0/1
```

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



R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
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
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
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
undebbug all
All possible debugging has been turned off
```

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

1. 172.30.1.0/24
2. 172.30.2.0/24

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

1. 172.30.1.0/24
2. 172.30.2.0/24

Are the subnet masks now included in the routing updates?

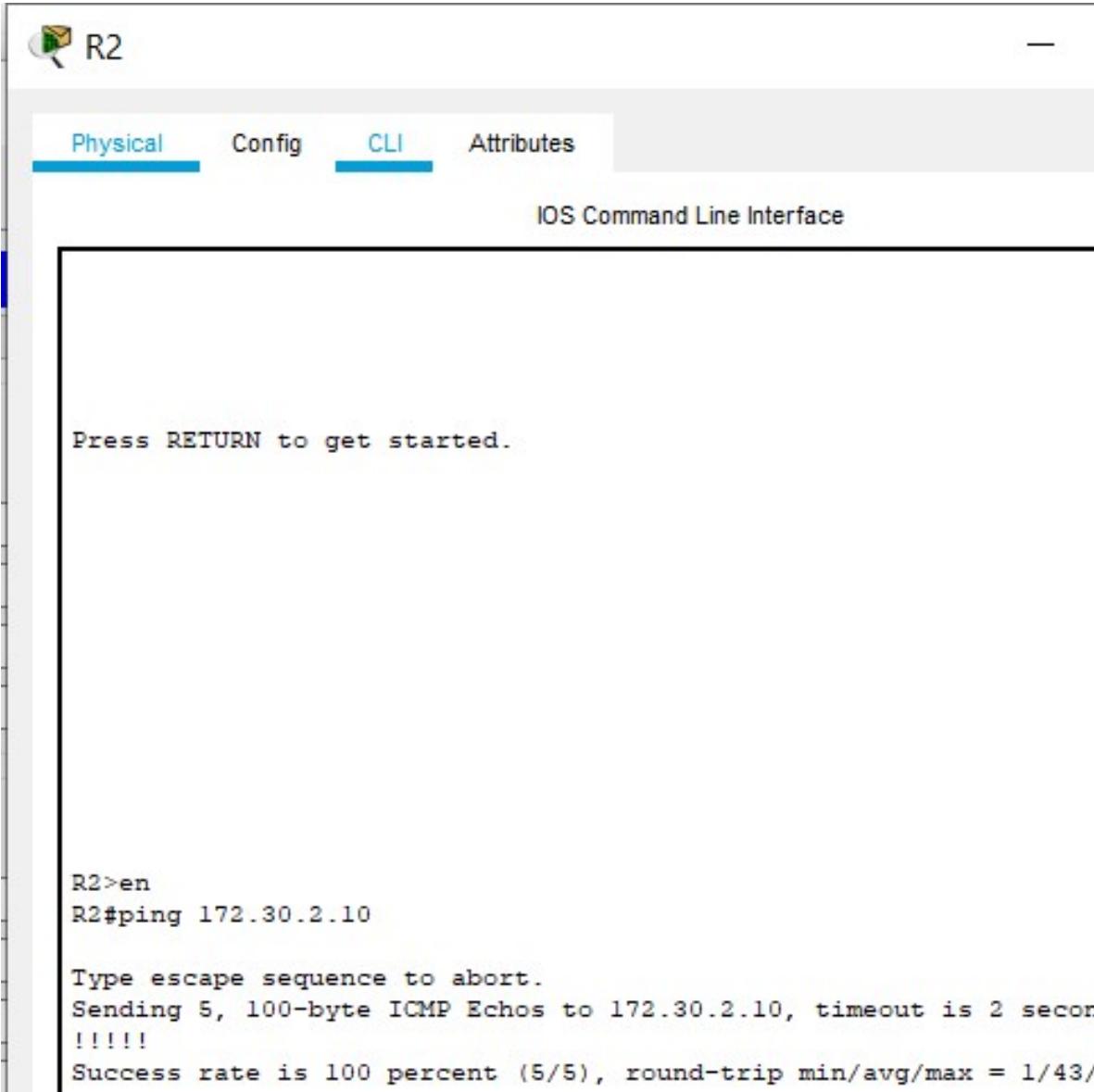
Yes

## 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?

100% success



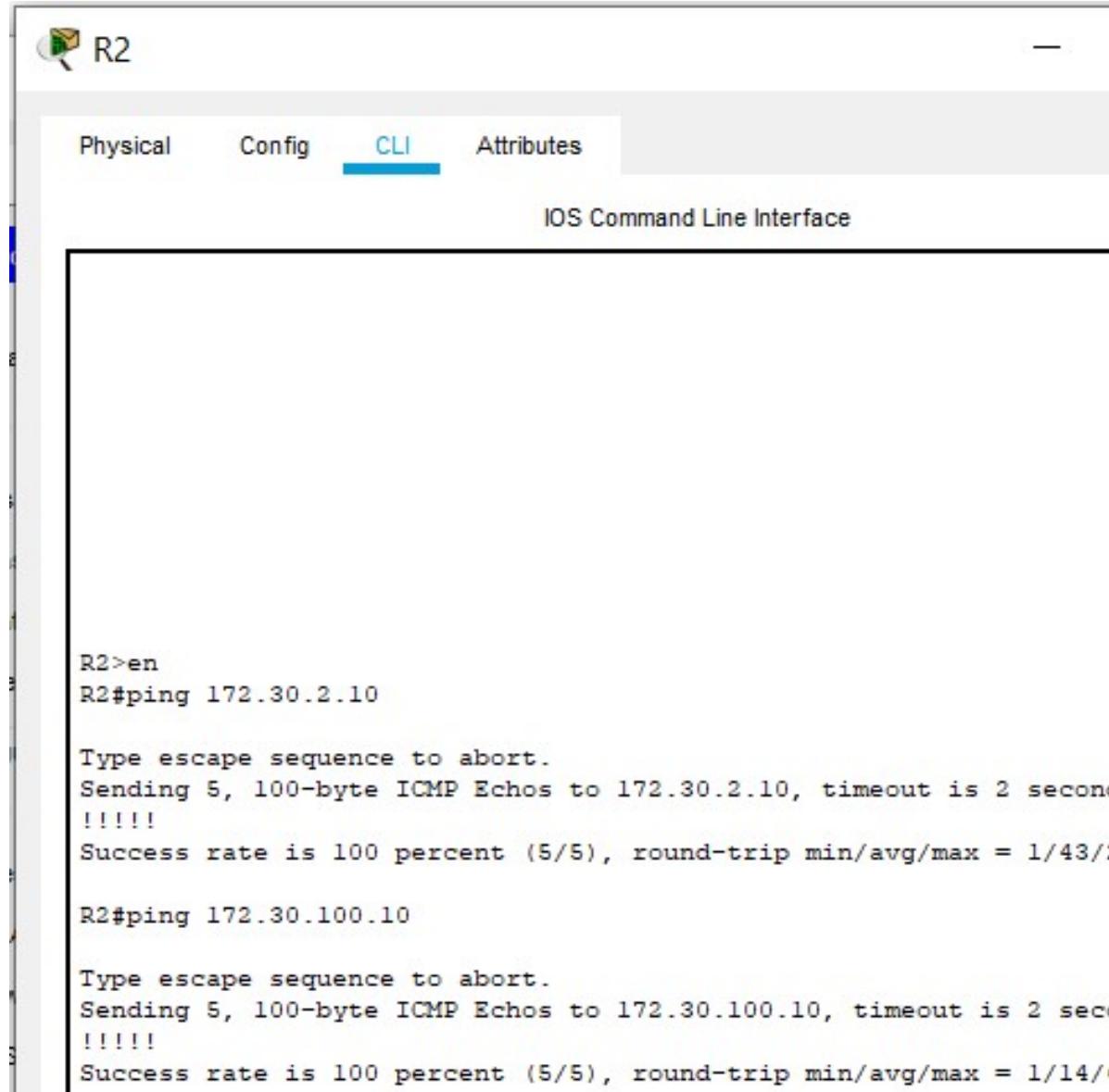
The screenshot shows a network management interface with the following details:

- Router Identification:** R2
- Navigation Tabs:** Physical, Config, **CLI**, Attributes
- Sub-Header:** IOS Command Line Interface
- Welcome Message:** Press RETURN to get started.
- CLI Session Log:**

```
R2>en
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 secon
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/43/
```

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



```
R2>en
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 = 1/43/43

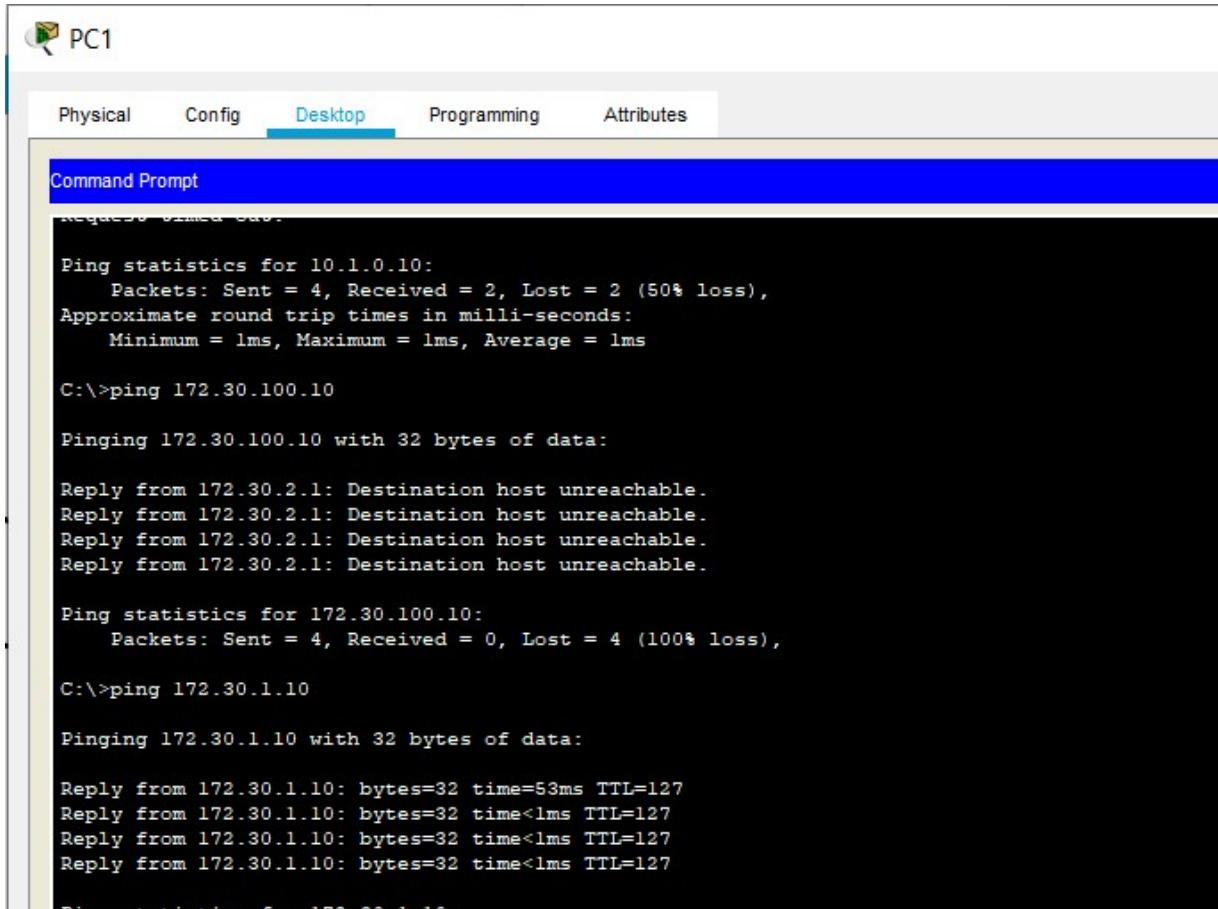
R2#ping 172.30.100.10

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 = 1/14/14
```

## Step 2: Check the connectivity between the PCs.

From PC1, is it possible to ping PC2? Yes

What is the success rate? 100%



PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
Request timed out.

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:\>ping 172.30.100.10

Pinging 172.30.100.10 with 32 bytes of data:

Reply from 172.30.2.1: Destination host unreachable.

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

C:\>ping 172.30.1.10

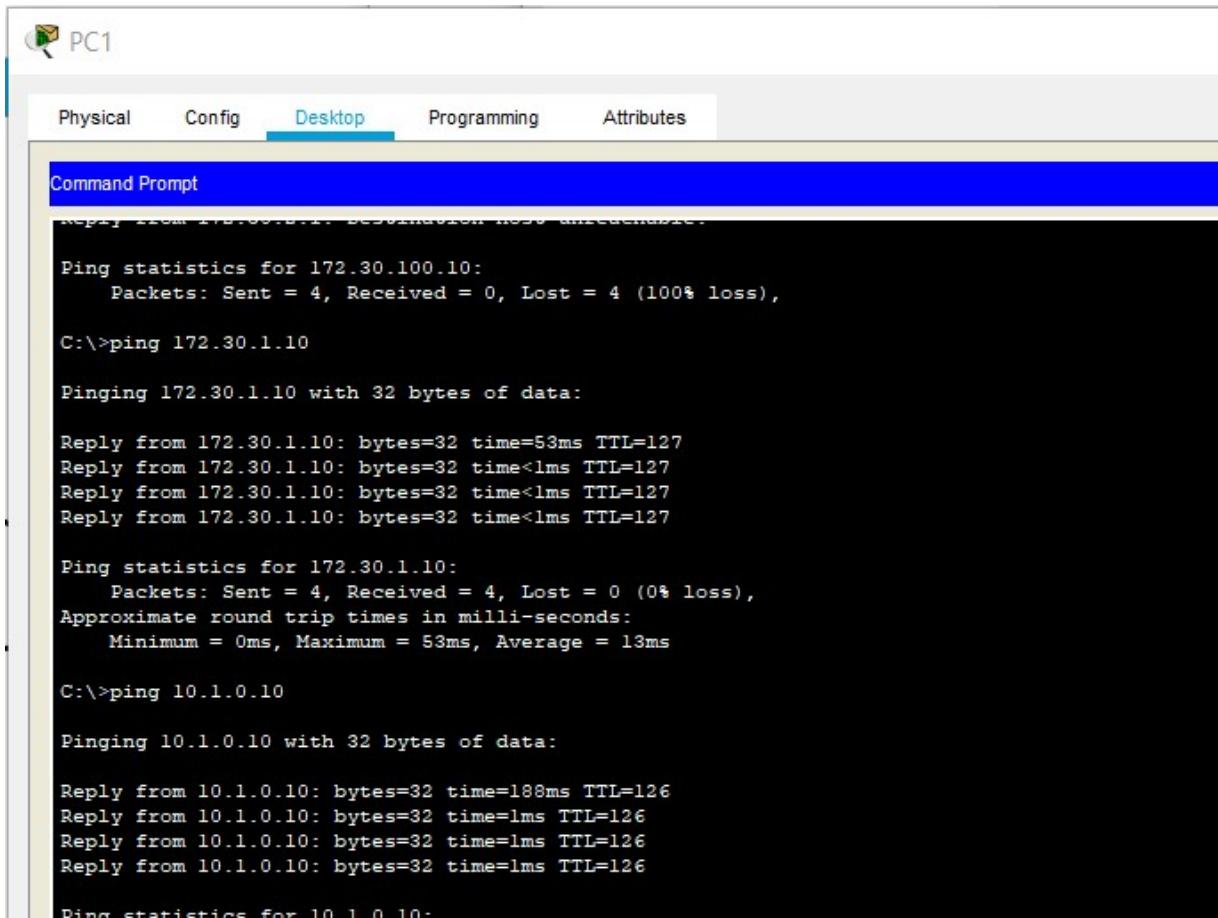
Pinging 172.30.1.10 with 32 bytes of data:

Reply from 172.30.1.10: bytes=32 time=53ms 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:
```

From PC1, is it possible to ping PC3? Yes

What is the success rate? 100%

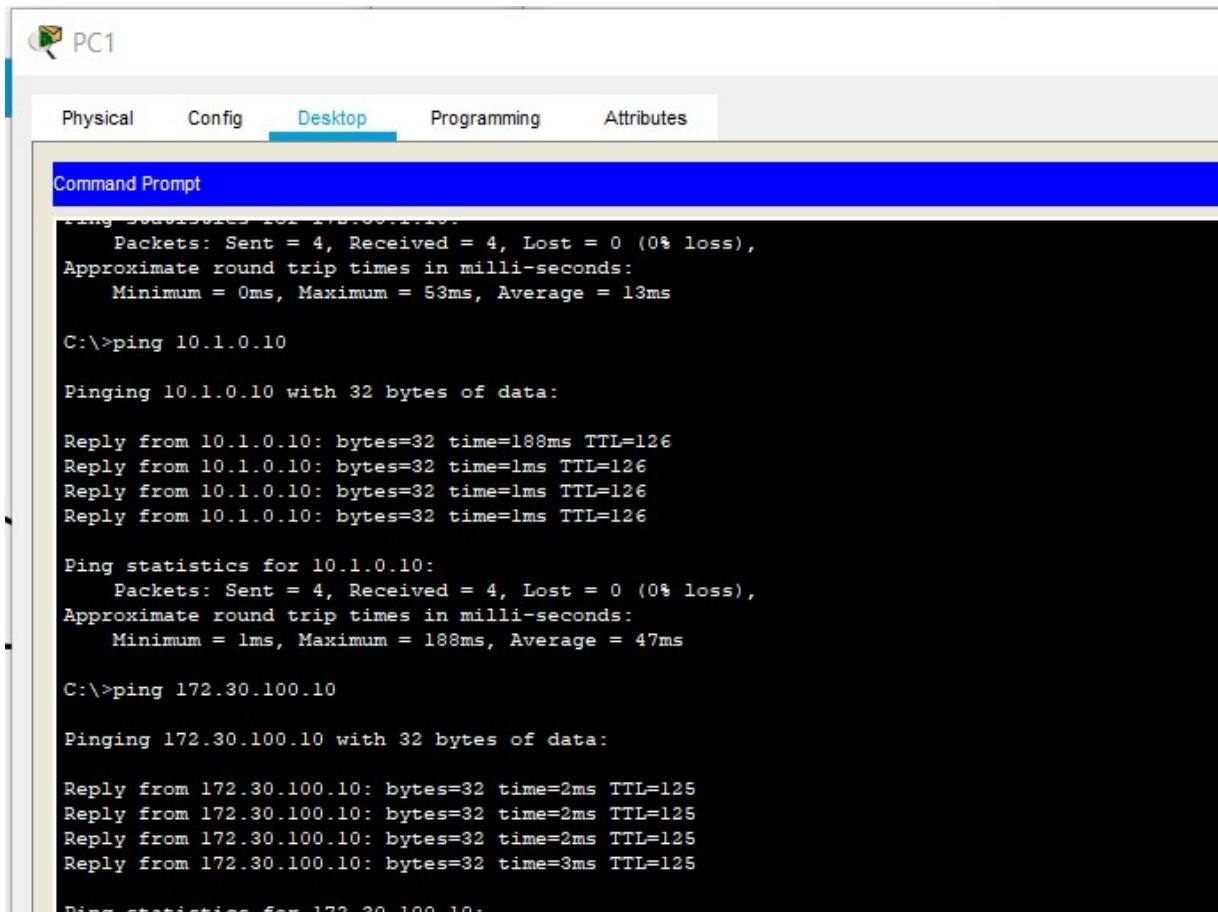


The screenshot shows a network management interface for a device named 'PC1'. The top navigation bar includes tabs for Physical, Config, Desktop (which is selected), Programming, and Attributes. Below the navigation bar is a blue header bar labeled 'Command Prompt'. The main content area displays the output of several ping commands:

```
Reply from 172.30.0.1: 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=53ms 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 = 53ms, Average = 13ms  
  
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=188ms 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:
```

From PC1, is it possible to ping PC4? Yes

What is the success rate? 100%



The screenshot shows a network configuration interface for a device named "PC1". The interface has tabs for "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". In the "Desktop" tab, there is a "Command Prompt" window displaying the following output:

```
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 = 53ms, Average = 13ms

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=188ms 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 = 188ms, Average = 47ms

C:\>ping 172.30.100.10

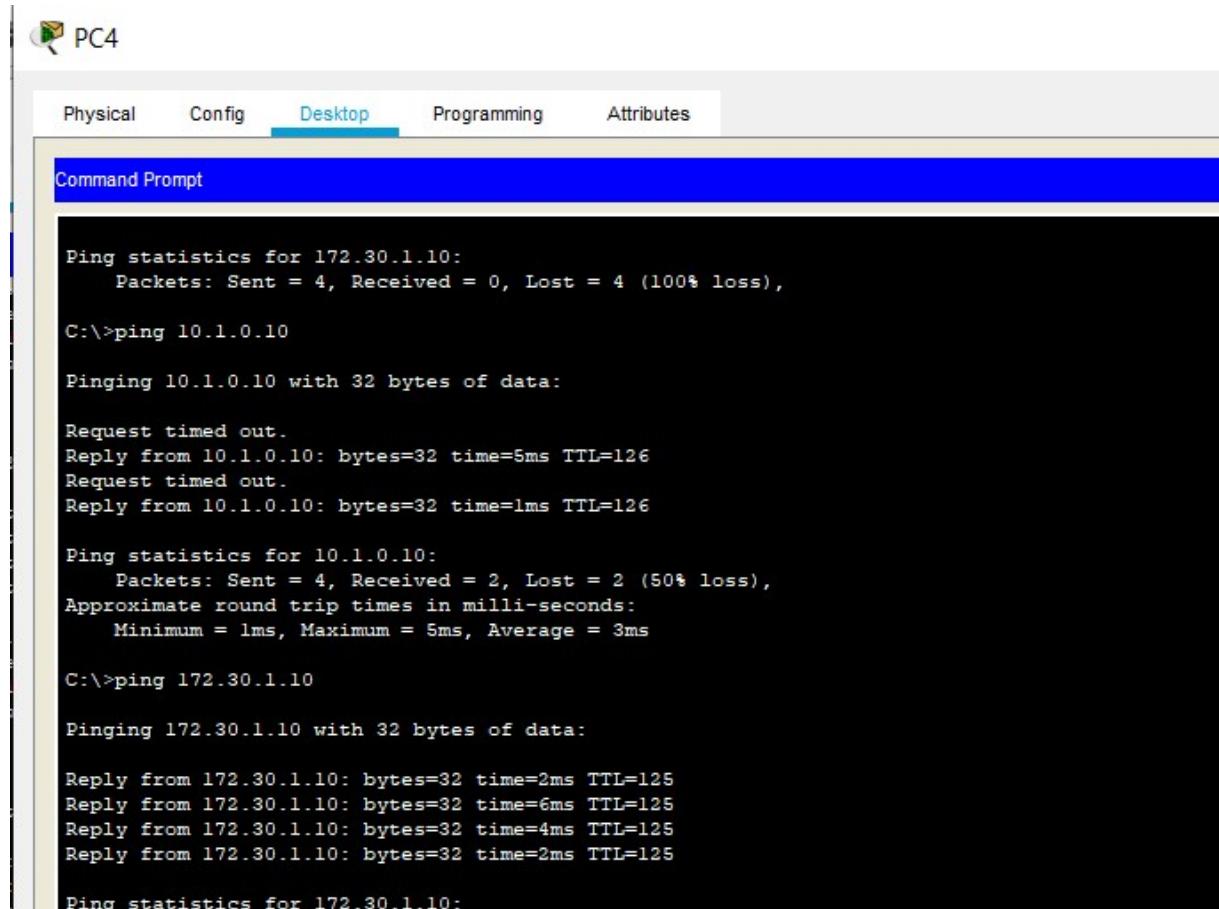
Pinging 172.30.100.10 with 32 bytes of data:

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:
```

From PC4, is it possible to ping PC2? Yes

What is the success rate? 100%

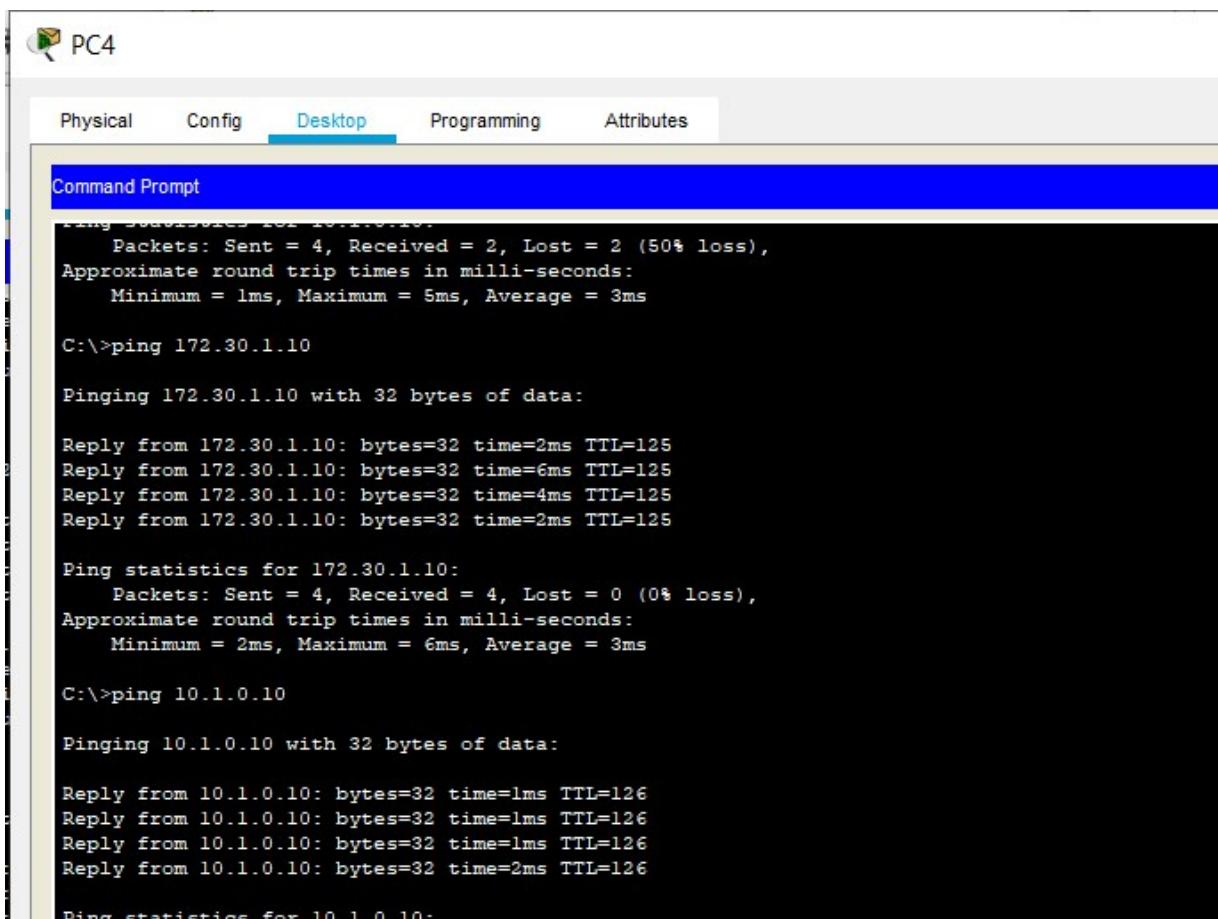


The screenshot shows a software interface for managing network devices. At the top, there's a menu bar with tabs: Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is currently selected, indicated by a blue underline. Below the menu is a toolbar with icons for different functions. The main area is titled 'Command Prompt' and contains the following text output:

```
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:  
  
Request timed out.  
Reply from 10.1.0.10: bytes=32 time=5ms 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 = 5ms, Average = 3ms  
  
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=6ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=4ms TTL=125  
Reply from 172.30.1.10: bytes=32 time=2ms TTL=125  
  
Ping statistics for 172.30.1.10:
```

From PC4, is it possible to ping PC3? Yes

What is the success rate? 100%



The screenshot shows a software interface titled "PC4" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is selected, displaying a Command Prompt window. The command prompt shows ping results for three destinations:

```
ping statistics for 172.30.1.10:
  Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
  Minimum = 1ms, Maximum = 5ms, Average = 3ms

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=6ms TTL=125
Reply from 172.30.1.10: bytes=32 time=4ms 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 = 6ms, Average = 3ms

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=2ms TTL=126

Ping statistics for 10.1.0.10:
```

### Task 9: Documentation

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

- **show running-config**

1. 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
```

```
2. 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
```

### 3. R3

4. R3#show running-config
5. Building configuration...
- 6.
7. Current configuration : 1011 bytes
8. !
9. version 12.4
10. no service timestamps log datetime msec
11. no service timestamps debug datetime msec
12. no service password-encryption
13. !
14. hostname R3
15. !
16. !
17. !
18. !
19. !
20. !
21. !
22. !
23. no ip cef
24. no ipv6 cef
25. !
26. !
27. !

28. !  
29. !  
30. !  
31. !  
32. !  
33. !  
34. !  
35. !  
36. !  
37. spanning-tree mode pvst  
38. !  
39. !  
40. !  
41. !  
42. !  
43. !  
44. interface Loopback0  
45. ip address 172.30.110.1 255.255.255.0  
46. !  
47. interface Loopback1  
48. ip address 172.30.200.17 255.255.255.240  
49. !  
50. interface Loopback2  
51. ip address 172.30.200.33 255.255.255.240  
52. !  
53. interface FastEthernet0/0  
54. ip address 172.30.100.1 255.255.255.0  
55. duplex auto  
56. speed auto  
57. !  
58. interface FastEthernet0/1  
59. no ip address  
60. duplex auto  
61. speed auto  
62. shutdown  
63. !  
64. interface Serial0/0/0  
65. no ip address  
66. clock rate 2000000  
67. shutdown  
68. !  
69. interface Serial0/0/1  
70. ip address 209.165.200.234 255.255.255.252  
71. !  
72. interface Vlan1  
73. no ip address  
74. shutdown  
75. !  
76. router rip

```
77. version 2
78. passive-interface FastEthernet0/0
79. network 172.30.0.0
80. network 209.165.200.0
81. no auto-summary
82. !
83. ip classless
84. !
85. ip flow-export version 9
86. !
87. !
88. !
89. !
90. !
91. !
92. !
93. !
94. line con 0
95. !
96. line aux 0
97. !
98. line vty 0 4
99. login
100.      !
101.      !
102.      !
103.      end
```

- **show ip route**

```
1. 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, 00:00:06, 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, 00:00:06, Serial0/0/0
R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:06, Serial0/0/0
R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:06, Serial0/0/0
```

```
R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:06, 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, 00:00:06, Serial0/0/0
```

## 2. R2

### 3. R3

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, 00:00:06, 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, 00:00:06, Serial0/0/0
R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:06, Serial0/0/0
R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:06, Serial0/0/0
R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:06, 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, 00:00:06, Serial0/0/0
```

- **show ip interface brief**

### 1. R1

R1#show ip interface brief

Interface Protocol	IP-Address	OK?	Method	Status	
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

## 2. R2

R2#show ip interface brief

Interface Protocol	IP-Address	OK?	Method	Status	
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

## 3. R3

R3#show ip interface brief

Interface Protocol	IP-Address	OK?	Method	Status	
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

- **show ip protocols**

### 1. R1

R1#show 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
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	00:00:07

Distance: (default is 120)

## 2. R2

R2#show 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
Serial0/0/1	2	2	
Serial0/0/0	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	00:00:12
209.165.200.234	120	00:00:26

Distance: (default is 120)

## 3. R3

R3#show ip protocols  
Routing Protocol is "rip"  
Sending updates every 30 seconds, next due in 12 seconds  
Invalid after 180 seconds, hold down 180, flushed after 240  
Outgoing update filter list for all interfaces is not set  
Incoming update filter list for all interfaces is not set  
Redistributing: rip

Default version control: send version 2, receive 2  

Interface	Send	Recv	Triggered RIP Key-chain
Loopback0	2	2	
Loopback1	2	2	
Loopback2	2	2	
Serial0/0/1	2	2	

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

172.30.0.0  
209.165.200.0

Passive Interface(s):

FastEthernet0/0

Routing Information Sources:

Gateway	Distance	Last Update
209.165.200.233	120	00:00:07
Distance: (default is 120)		

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

### **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.

 R1

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
R1#erasetest
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
System configuration has been modified. Save? [yes/no]:y
Building configuration...
[OK]
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 :
#####
##### 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
```



R2

Physical Config CLI Attributes

## IOS Command Line Interface

```
R2#erase start
R2#erase startup-config
Erasing the nvram filesystem will remove all configuration files! (
[confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
R2#reload
System configuration has been modified. Save? [yes/no]:yes
Building configuration...
[OK]
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
```



R3

Physical    Config    **CLI**    Attributes

## IOS Command Line Interface

```
R3#erase startup
R3#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Co
[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]:
* Please answer 'yes' or 'no'.
System configuration has been modified. Save? [yes/no]:yes
Building configuration...
[OK]
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
```