CSE 204 – Computer Network

Lab 5

(Assign date: Mar. 1, 2024/ Due date: Mar. 8, 2024)

Student name	*1931200024*
Student ID	*Bùi Hoàng Phúc*

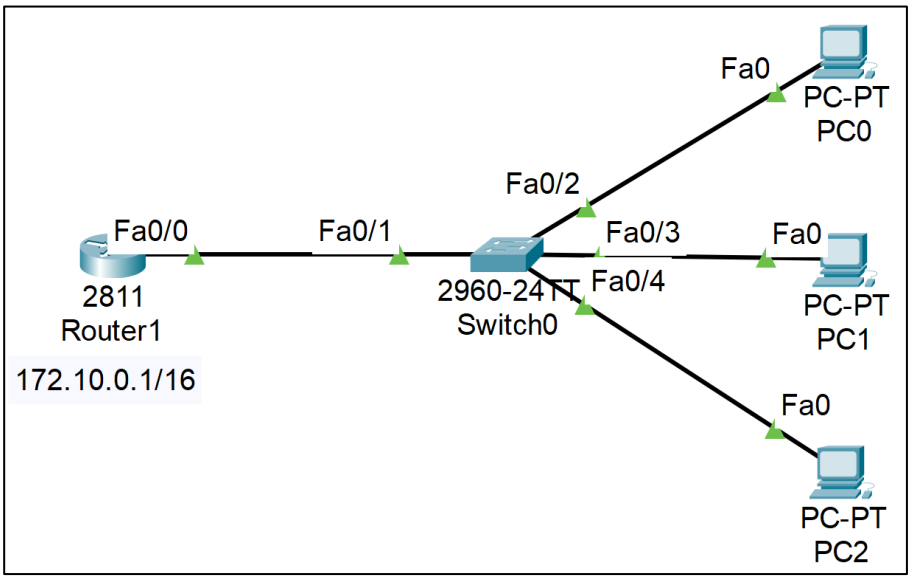
I. Goal

- Students know how to configure DHCP on router.
- Students know how to connect 2 router using Serial Interface
- Students know how to configure static routing
- Students know how to configure dynamic routing (RIPv2)

II. Assignment list

II.1 DHCP Configuration

- Open **Cisco Packet Tracer** and implement the network as shown below:



a) On the Router:

Router>**enable**

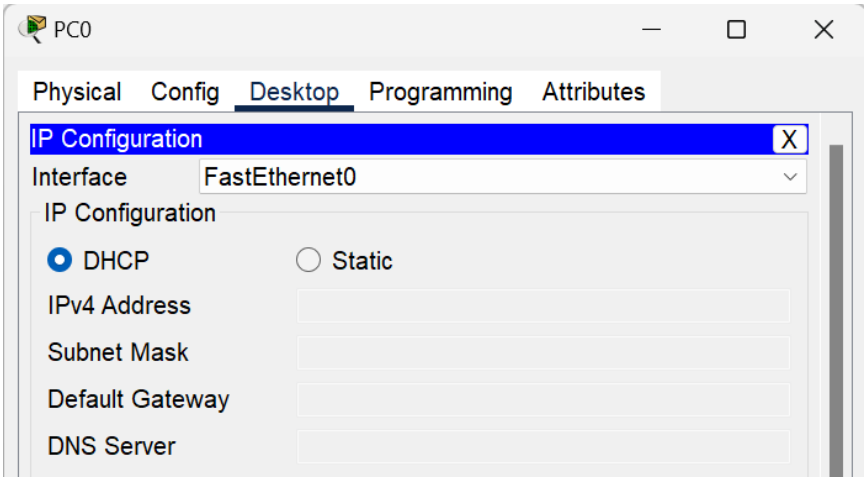
Router#**config terminal**

Router(config)#**ip dhcp pool net172** (name: net172)	*//enter dhcp config mode*
Router(dhcp-config)#**network 172.10.0.0 255.255.0.0**	*//dhcp for network 172.10.0.0/16*
Router(dhcp-config)#**default-router 172.10.0.1** (ip router)	*//default gateway for PCs client*
Router(dhcp-config)#**dns-server 203.15.5.6 – từ từ**	*//dns for PCs client*

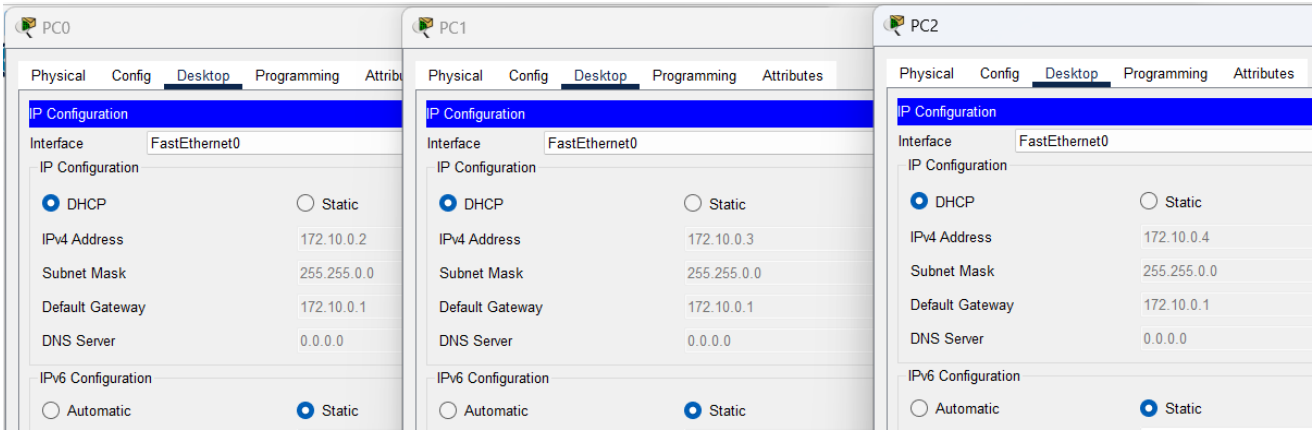
```
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 172.10.0.1      //do not assign 172.10.0.1 to clients
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 172.10.0.1 255.255.0.0     //set ip for interface fa0/0
Router(config-if)#no shutdown
```

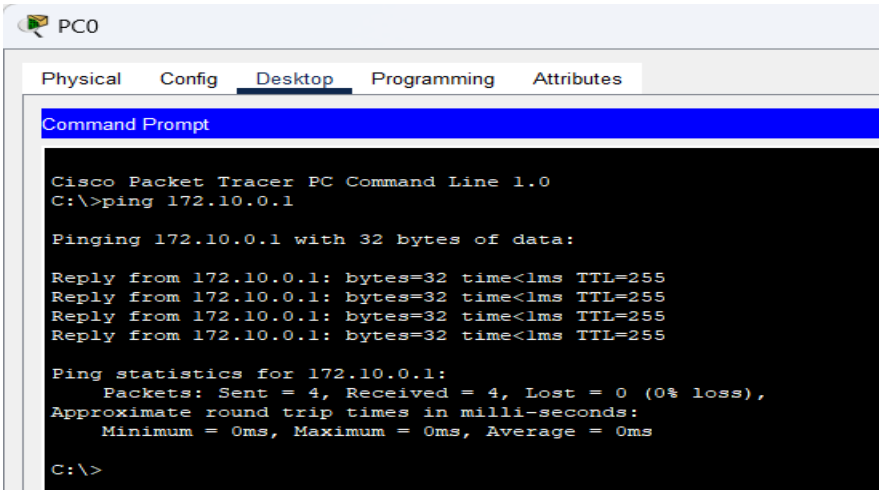
b) On the PCs

On PCs, set DHCP on.



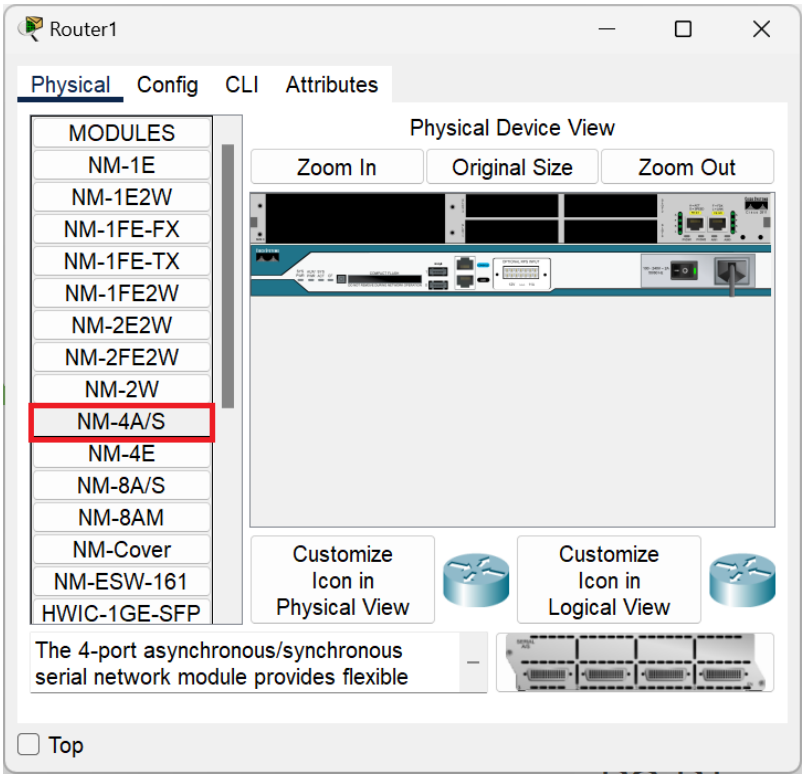
Result: PC ping vs router



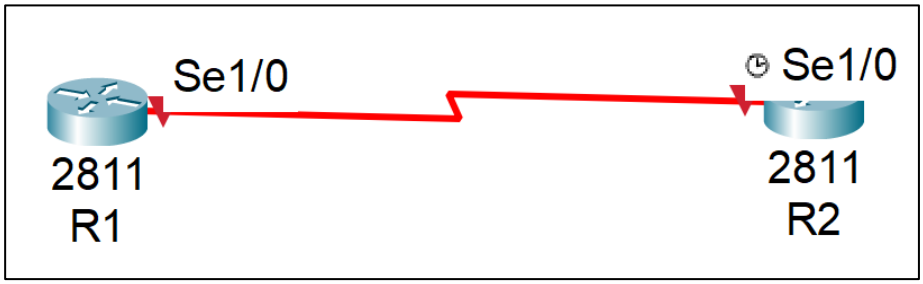


II.2 Connect 2 routers using serial interface

a) Add serial interface module for router



b) Connect 2 routers by serial cable



c) Configure connection between 2 routers

- On Router R1

Router>**enable**

R1#**config terminal**

Router(config)#**hostname R1**

R1(config)#**interface serial1/0**

R1(config-if)#**ip address 10.0.0.1 255.255.255.252**

R1(config-if)#**no shutdown**

- On Router R2

Router>**enable**

R2#**config terminal**

Router(config)#**hostname R2**

R2(config)#**interface serial1/0**

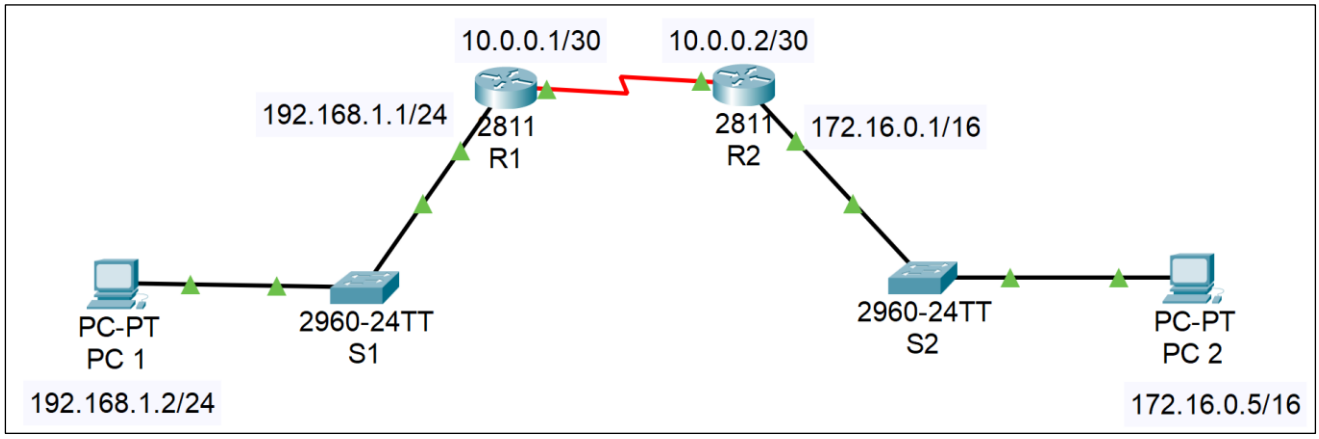
R2(config-if)#**clock rate 128000**

R2(config-if)#**ip address 10.0.0.2 255.255.255.252**

R2(config-if)#**no shutdown**

```
R1#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/6/9 ms

R1#
```

II.3 Static Routing



a) On Router R1

- R1 (config)#**ip route 172.16.0.0 255.255.0.0 10.0.0.2**
- **OR:** R1 (config)#**ip route 172.16.0.0 255.255.0.0 se1/0**

b) On Router R2

- R2 (config)#**ip route 192.168.1.0 255.255.255.0 10.0.0.1**
- **OR:** R2 (config)#**ip route 192.168.1.0 255.255.255.0 se1/0**

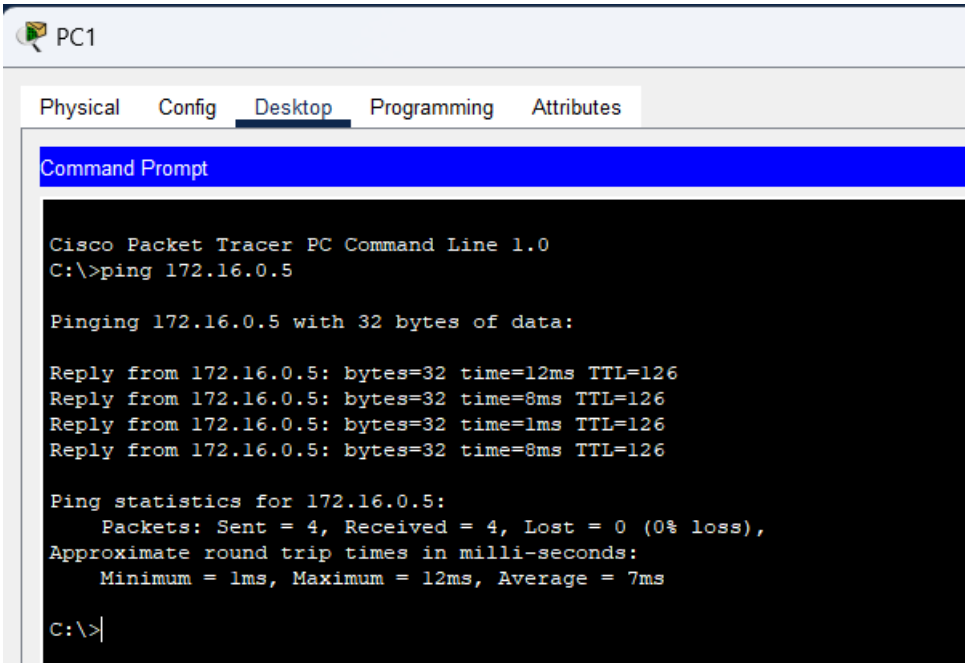
c) Show routing table

- Router#**show ip route**

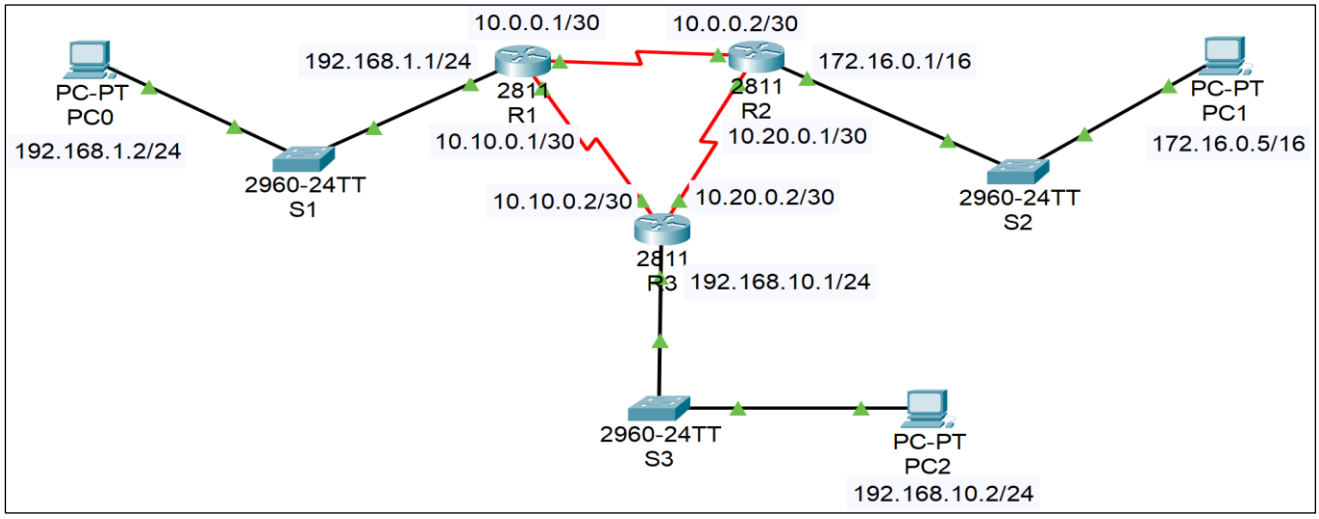
```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       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
C       10.0.0.0/30 is directly connected, Serial1/0
L       10.0.0.1/32 is directly connected, Serial1/0
S    172.16.0.0/16 [1/0] via 10.0.0.2
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, FastEthernet0/0
L       192.168.1.1/32 is directly connected, FastEthernet0/0

R1#
```

```
R2#show ip route
Codes: L - local, C - connected, S - static, 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
C       10.0.0.0/30 is directly connected, Serial1/0
L       10.0.0.2/32 is directly connected, Serial1/0
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.0.0/16 is directly connected, FastEthernet0/0
L       172.16.0.1/32 is directly connected, FastEthernet0/0
S    192.168.1.0/24 [1/0] via 10.0.0.1
```

d) Result (ping between PCs):



II.4 Dynamic Routing – RIPv2



a) On R1

Router(config)#**router rip**

Router(config-router)#**version 2**

Router(config-router)#**network 192.168.1.0**

Router(config-router)#**network 10.0.0.0**

Router(config-router)#**network 10.10.0.0**

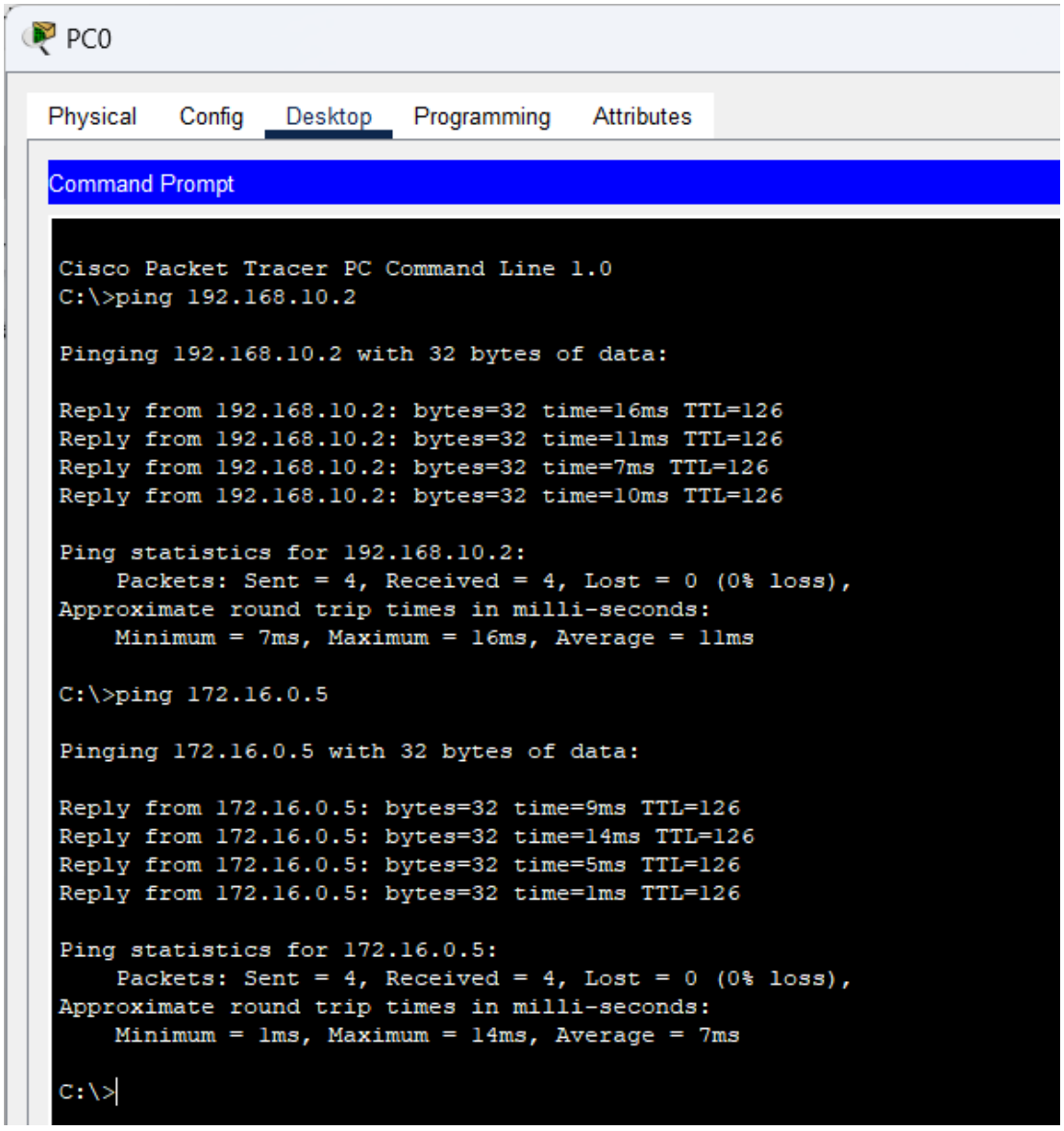
b) On R2

Repeat those steps on R1

c) On R3

Repeat those steps on R1

d) Results:



PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=10ms TTL=126
Reply from 192.168.1.2: bytes=32 time=13ms TTL=126
Reply from 192.168.1.2: bytes=32 time=9ms TTL=126
Reply from 192.168.1.2: bytes=32 time=7ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 13ms, Average = 9ms

C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=1ms TTL=126
Reply from 192.168.10.2: bytes=32 time=15ms TTL=126
Reply from 192.168.10.2: bytes=32 time=4ms TTL=126
Reply from 192.168.10.2: bytes=32 time=18ms TTL=126

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 18ms, Average = 9ms

C:\>
```

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=11ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=5ms TTL=126
Reply from 192.168.1.2: bytes=32 time=5ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 11ms, Average = 5ms

C:\>ping 172.16.0.5

Pinging 172.16.0.5 with 32 bytes of data:

Reply from 172.16.0.5: bytes=32 time=37ms TTL=126
Reply from 172.16.0.5: bytes=32 time=15ms TTL=126
Reply from 172.16.0.5: bytes=32 time=9ms TTL=126
Reply from 172.16.0.5: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 37ms, Average = 15ms

C:\>
```

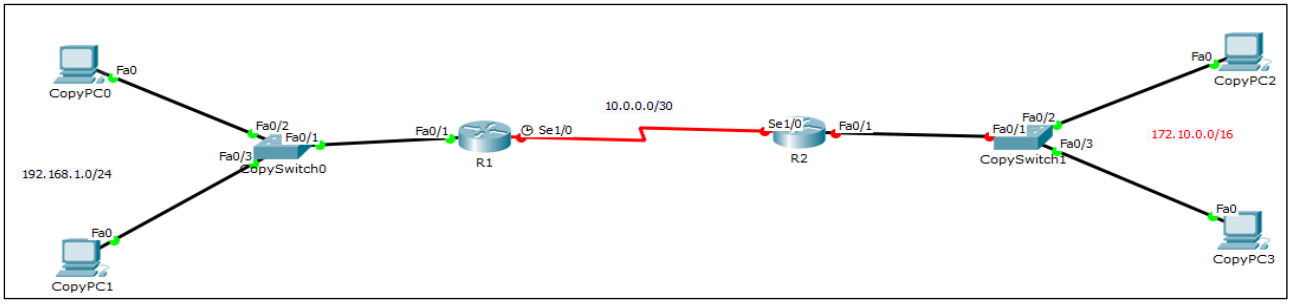
III. Extra Assignments

Requirements:

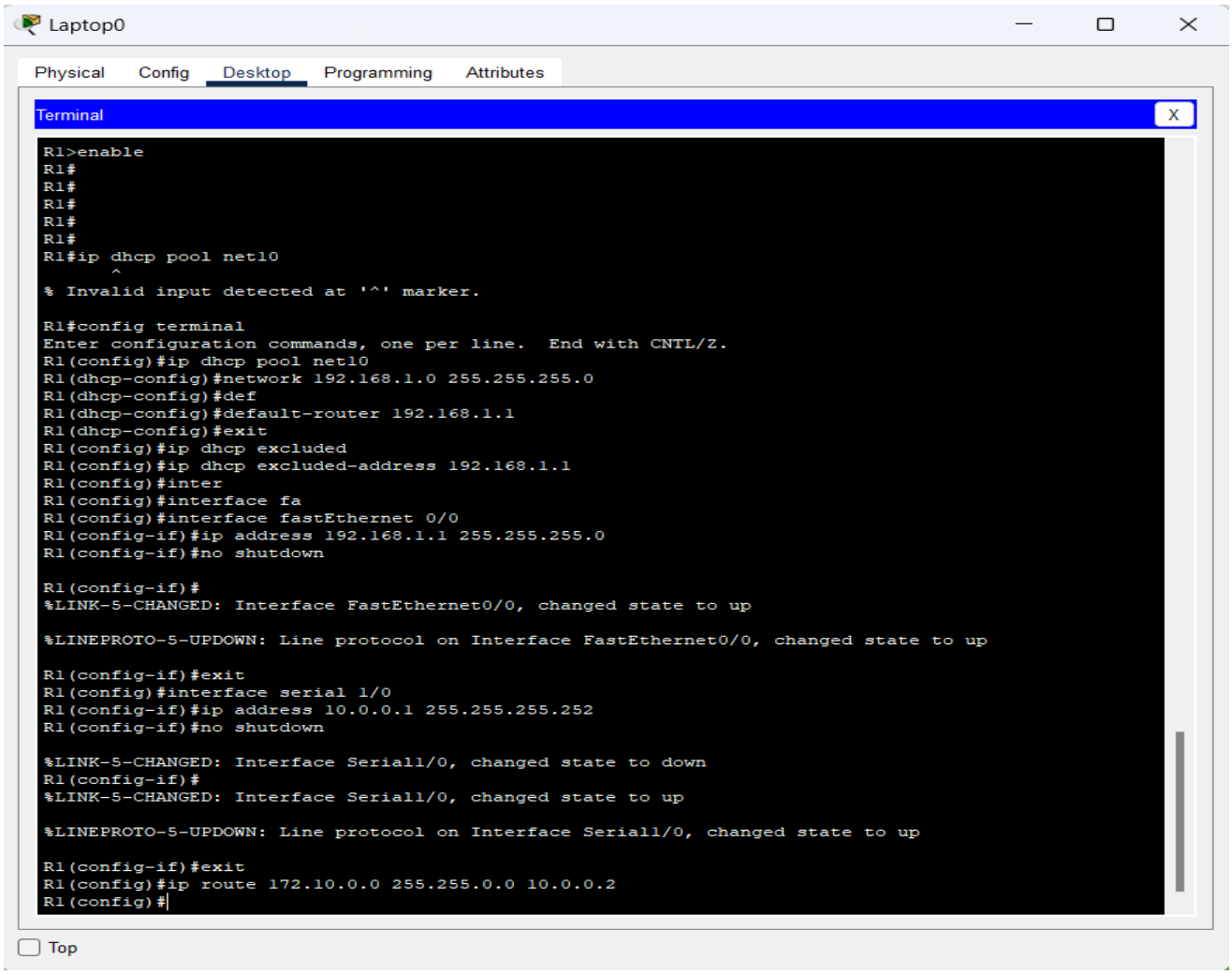
- ***Write all configuration command on each device into a word file*****
- ***Submit a word file and all file .pkt*****
- ***pkt file's name format: lab4_1.pkt;.... *****
- ***Save all files into a folder: name_lab4, then compress in to a ZIP file*****

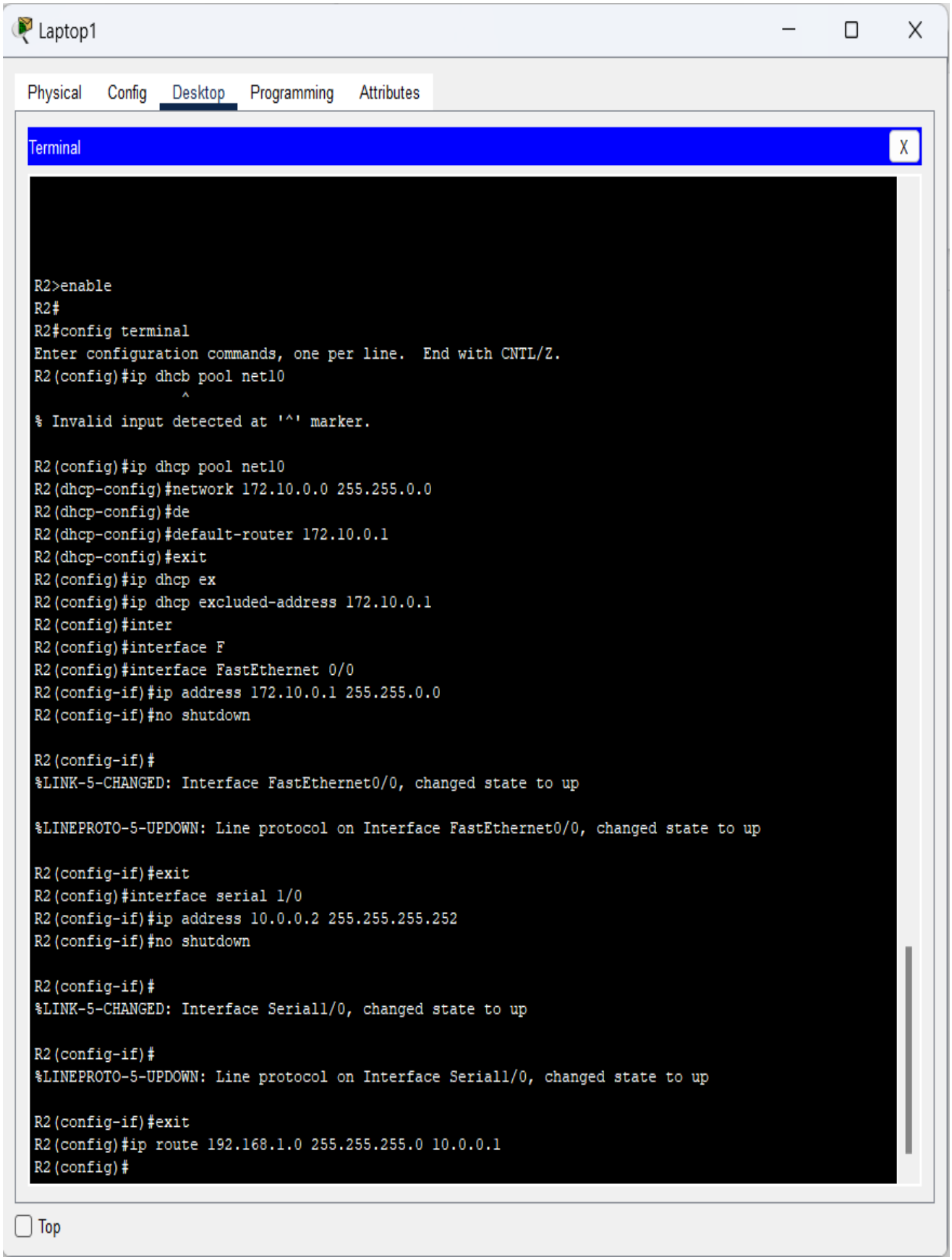
III.1 DHCP & Static Routing

Configure DHCP, Static Route on R1, R2



a. Write all configuration commands for each devices




Laptop1
Physical
Config
Desktop
Programming
Attributes
Terminal
X
R2>enable
R2#
R2#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip dhcb pool net10
                ^
% Invalid input detected at '^' marker.
R2(config)#ip dhcp pool net10
R2(dhcp-config)#network 172.10.0.0 255.255.0.0
R2(dhcp-config)#de
R2(dhcp-config)#default-router 172.10.0.1
R2(dhcp-config)#exit
R2(config)#ip dhcp ex
R2(config)#ip dhcp excluded-address 172.10.0.1
R2(config)#inter
R2(config)#interface F
R2(config)#interface FastEthernet 0/0
R2(config-if)#ip address 172.10.0.1 255.255.0.0
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R2(config-if)#exit
R2(config)#interface serial 1/0
R2(config-if)#ip address 10.0.0.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#
%LINK-5-CHANGED: Interface Serial1/0, changed state to up
R2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R2(config-if)#exit
R2(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.1
R2(config)#
Top

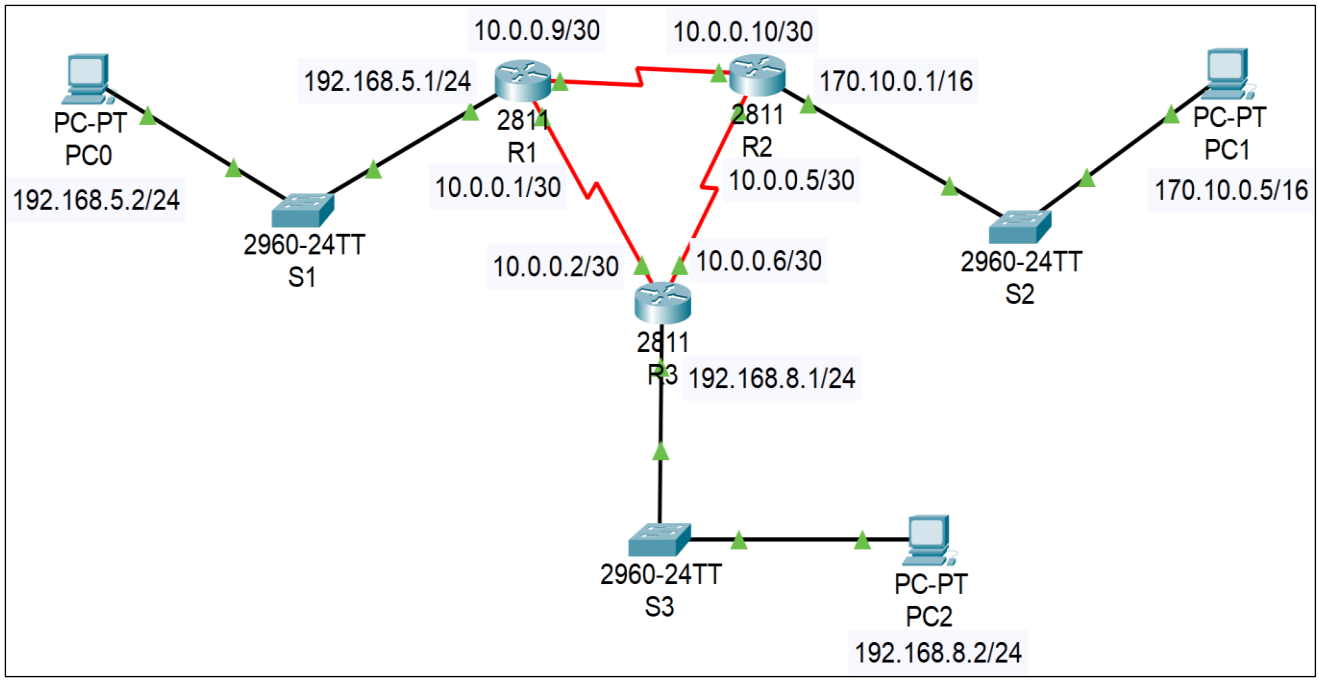
b. What is the routing table on each router?

```
R1#show ip route
Codes: L - local, C - connected, S - static, 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
C       10.0.0.0/30 is directly connected, Serial1/0
L       10.0.0.1/32 is directly connected, Serial1/0
S    172.10.0.0/16 [1/0] via 10.0.0.2
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, FastEthernet0/0
L       192.168.1.1/32 is directly connected, FastEthernet0/0

R1#
```

```
R2#show ip route
Codes: L - local, C - connected, S - static, 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
C       10.0.0.0/30 is directly connected, Serial1/0
L       10.0.0.2/32 is directly connected, Serial1/0
     172.10.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.10.0.0/16 is directly connected, FastEthernet0/0
L       172.10.0.1/32 is directly connected, FastEthernet0/0
S    192.168.1.0/24 [1/0] via 10.0.0.1

R2#
```

III.2 Dynamic Routing

- Configure DHCP and Dynamic Routing on R1, R2, R3



c. Write all configuration commands for each devices

```
Router>enable
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#ip dhcp pool net10
R1(dhcp-config)#network 192.168.5.0 255.255.255.0
R1(dhcp-config)#def
R1(dhcp-config)#default-router 192.168.5.1
R1(dhcp-config)#exit
R1(config)#ip dhcp exclu
R1(config)#ip dhcp excluded-address 192.168.5.1
R1(config)#inter
R1(config)#interface F
R1(config)#interface FastEthernet 0/0
R1(config-if)#ip address 192.168.5.1 255.255.255.0
R1(config-if)#no shutdown

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

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

R1(config-if)#exit
R1(config)#inter
R1(config)#interface serial 1/0
R1(config-if)#ip address 10.0.0.9 255.255.255.252
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial1/0, changed state to down
R1(config-if)#exit
R1(config)#interface serial 1/1
R1(config-if)#ip address 10.0.0.1 255.255.255.252
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial1/1, changed state to down
R1(config-if)#
%LINK-5-CHANGED: Interface Serial1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
```

```
R1>
R1>enable
R1#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 192.168.5.0
R1(config-router)#network 10.0.0.0
R1(config-router)#
```

```
Router>enable
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#
R2(config)#ip dhcp pool net10
R2(dhcp-config)#network 170.10.0.0 255.255.0.0
R2(dhcp-config)#de
R2(dhcp-config)#default-router 170.10.0.1
R2(dhcp-config)#exit
R2(config)#ip dhcp ex
R2(config)#ip dhcp excluded-address 170.10.0.1
R2(config)#inter
R2(config)#interface F
R2(config)#interface FastEthernet 0/0
R2(config-if)#ip address 170.10.0.1 255.255.0.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

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

R2(config-if)#exit
R2(config)#interface serial 1/0
R2(config-if)#ip address 10.0.010 255.255.255.252
                         ^
% Invalid input detected at '^' marker.

R2(config-if)#ip address 10.0.0.10 255.255.255.252
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface Serial1/0, changed state to up

R2(config-if)#e
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
exit
             ^
% Invalid input detected at '^' marker.

R2(config-if)#exit
R2(config)#interface serial 1/2
R2(config-if)#ip address 10.0.0.5 255.255.255.252
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial1/2, changed state to down
R2(config-if)#
```

```
R2>enable
R2#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#network 170.10.0.0
R2(config-router)#netwrok 10.0.0.0
                     ^
% Invalid input detected at '^' marker.

R2(config-router)#network 10.0.0.0
R2(config-router)#
```

```
R3>
R3>
R3>
R3>enable
R3#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip dhcp pool net10
R3(dhcp-config)#network 192.168.8.0 255.255.255.0
R3(dhcp-config)#de
R3(dhcp-config)#default-router 192.168.8.1
R3(dhcp-config)#exit
R3(config)#ip dhcp ex
R3(config)#ip dhcp excluded-address 192.168.8.1
R3(config)#in
R3(config)#interface fa
R3(config)#interface fastEthernet 0/0
R3(config-if)#ip address 192.168.8.1
% Incomplete command.
R3(config-if)#no shutdown
R3(config-if)#
```

```
R3>enable
R3#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ip dhcp pool net10
R3(dhcp-config)#network 192.168.8.0 255.255.255.0
R3(dhcp-config)#de
R3(dhcp-config)#default-router 192.168.8.1
R3(dhcp-config)#exit
R3(config)#ip dhcp ex
R3(config)#ip dhcp excluded-address 192.168.8.1
R3(config)#in
R3(config)#interface fa
R3(config)#interface fastEthernet 0/0
R3(config-if)#ip address 192.168.8.1
% Incomplete command.
R3(config-if)#no shutdown
R3(config-if)#
```

```
R3(config)#router rip
R3(config-router)#version 2
R3(config-router)#network 192.168.8.0
R3(config-router)#network 10.0.0.0
```

d. What is the routing table on each router?

```
R1>enable
R1#show ip route
Codes: L - local, C - connected, S - static, 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, 5 subnets, 2 masks
C       10.0.0.0/30 is directly connected, Serial1/1
L       10.0.0.1/32 is directly connected, Serial1/1
R       10.0.0.4/30 [120/1] via 10.0.0.10, 00:00:15, Serial1/0
                    [120/1] via 10.0.0.2, 00:00:04, Serial1/1
C       10.0.0.8/30 is directly connected, Serial1/0
L       10.0.0.9/32 is directly connected, Serial1/0
R    170.10.0.0/16 [120/1] via 10.0.0.10, 00:00:15, Serial1/0
     192.168.5.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.5.0/24 is directly connected, FastEthernet0/0
L       192.168.5.1/32 is directly connected, FastEthernet0/0
R    192.168.8.0/24 [120/1] via 10.0.0.2, 00:00:04, Serial1/1
 --More--
```

```
R2#show ip route
Codes: L - local, C - connected, S - static, 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, 5 subnets, 2 masks
R       10.0.0.0/30 [120/1] via 10.0.0.9, 00:00:06, Serial1/0
                    [120/1] via 10.0.0.6, 00:00:03, Serial1/2
C       10.0.0.4/30 is directly connected, Serial1/2
L       10.0.0.5/32 is directly connected, Serial1/2
C       10.0.0.8/30 is directly connected, Serial1/0
L       10.0.0.10/32 is directly connected, Serial1/0
     170.10.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       170.10.0.0/16 is directly connected, FastEthernet0/0
L       170.10.0.1/32 is directly connected, FastEthernet0/0
R    192.168.5.0/24 [120/1] via 10.0.0.9, 00:00:06, Serial1/0
R    192.168.8.0/24 [120/1] via 10.0.0.6, 00:00:03, Serial1/2

R2#
```

```
R3#show ip route
Codes: L - local, C - connected, S - static, 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, 5 subnets, 2 masks
C       10.0.0.0/30 is directly connected, Serial1/1
L       10.0.0.2/32 is directly connected, Serial1/1
C       10.0.0.4/30 is directly connected, Serial1/2
L       10.0.0.6/32 is directly connected, Serial1/2
R       10.0.0.8/30 [120/1] via 10.0.0.5, 00:00:16, Serial1/2
                    [120/1] via 10.0.0.1, 00:00:05, Serial1/1
R    170.10.0.0/16 [120/1] via 10.0.0.5, 00:00:16, Serial1/2
R    192.168.5.0/24 [120/1] via 10.0.0.1, 00:00:05, Serial1/1
     192.168.8.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.8.0/24 is directly connected, FastEthernet0/0
L       192.168.8.1/32 is directly connected, FastEthernet0/0

R3#
```