SIT202: Computer Networks and Communication
Leaning Evidence for Active Class Task 7

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Members in this group activity task:

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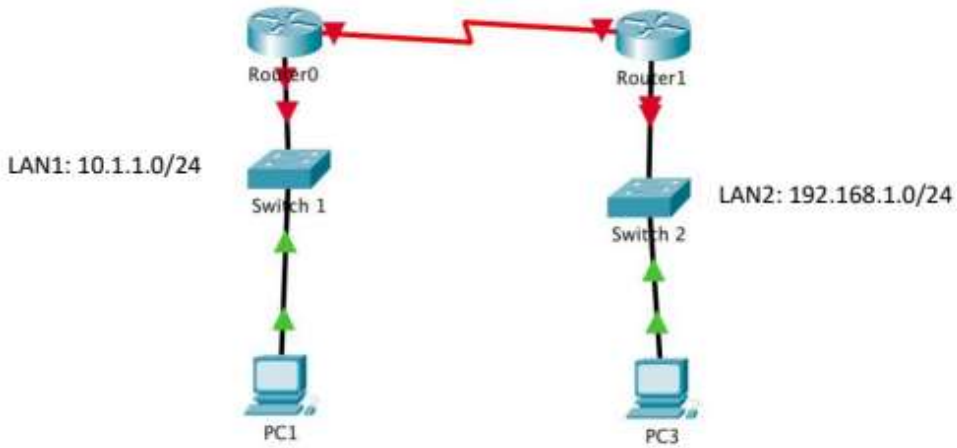
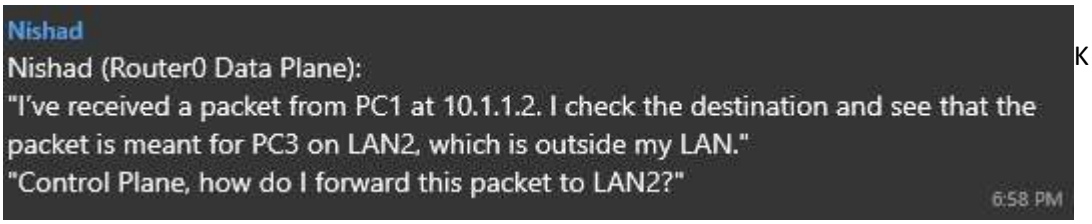
Activity 1

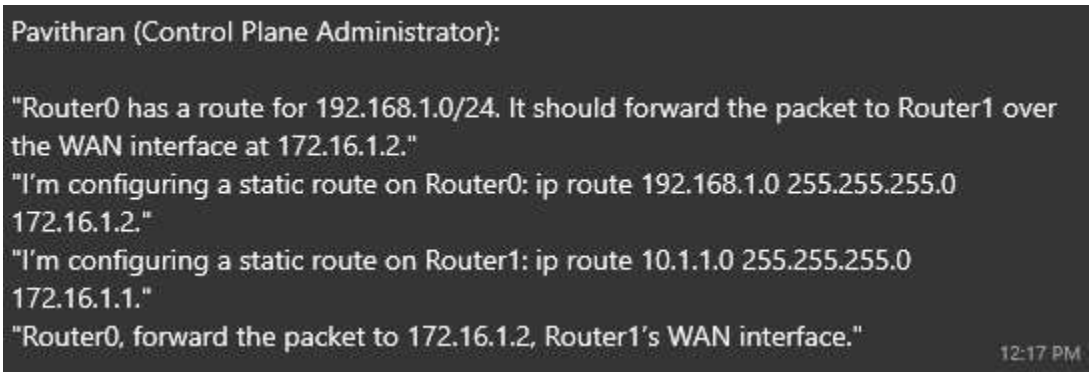
1. Assume your network has two routers and a separate LAN connects to each router as shown in the following figure.

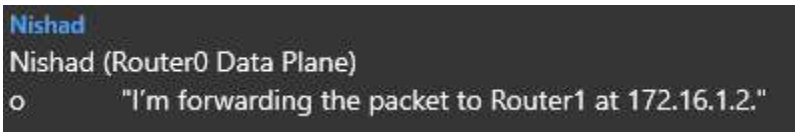


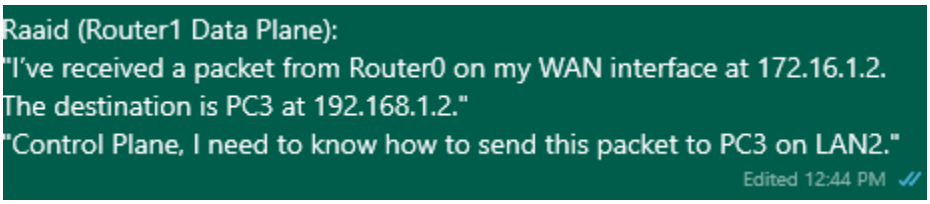
2. Now we are ready to do a role play. Two group members can act as LANs (one member for each LAN). They are responsible for all the PCs connected to their corresponding LAN. Two group members (or one member) are acting as data plane of Router 0 and Router 1. The remaining member is acting as the control plane of both routers.
3. Now assume PC1 wants to send a message to PC3, you need to work together to support the request. Each device needs to list your configurations.

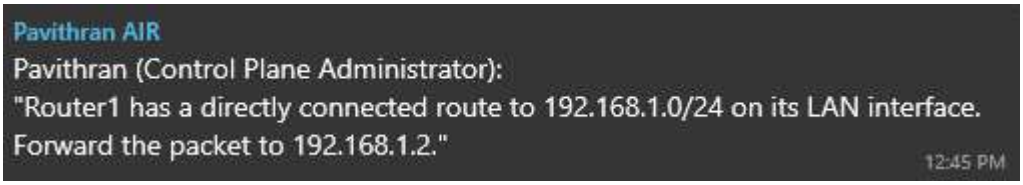
1. Kenisha (LAN1 Administrator - PC1):
"I'm configuring PC1 with the following details: IP address 10.1.1.2, subnet mask 255.255.255.0, and default gateway 10.1.1.1."
"PC1 is ready to send a packet to PC3, with the destination address 192.168.1.2."
"I'm sending a packet to the default gateway (10.1.1.1), addressed to PC3 at 192.168.1.2."
5:34 PM

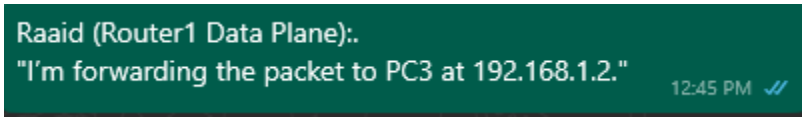












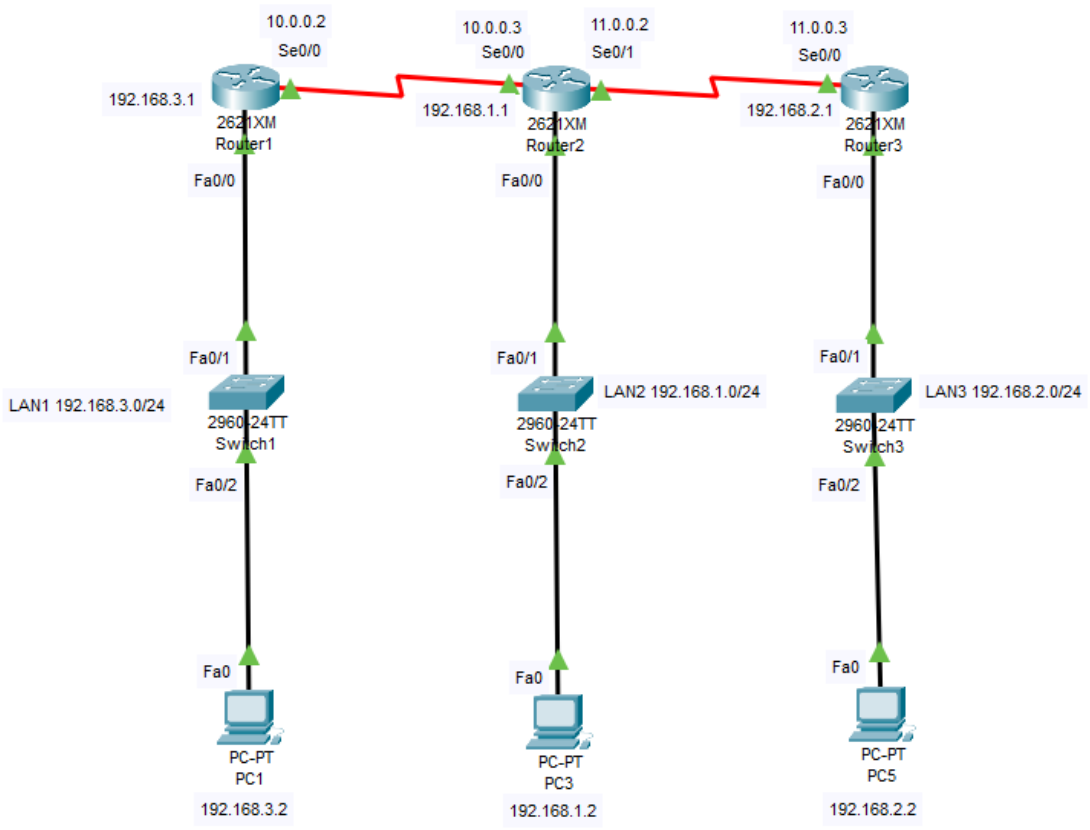
4. Discuss
    a. How many subnets are there?
        - There are three subnets,
            - LAN1 – 10.1.1.0/24 (PC1)
            - LAN2 – 192.168.1.0/24 (PC2)
            - WAN – 176.16.1.0/30 (subnet for routers)

b. The responsibilities of the control plan of the routers. Tips: How router 0 knows about the LAN 2 and router 1
   - Managing the routing table
   - Determining path
   - Static route configuration

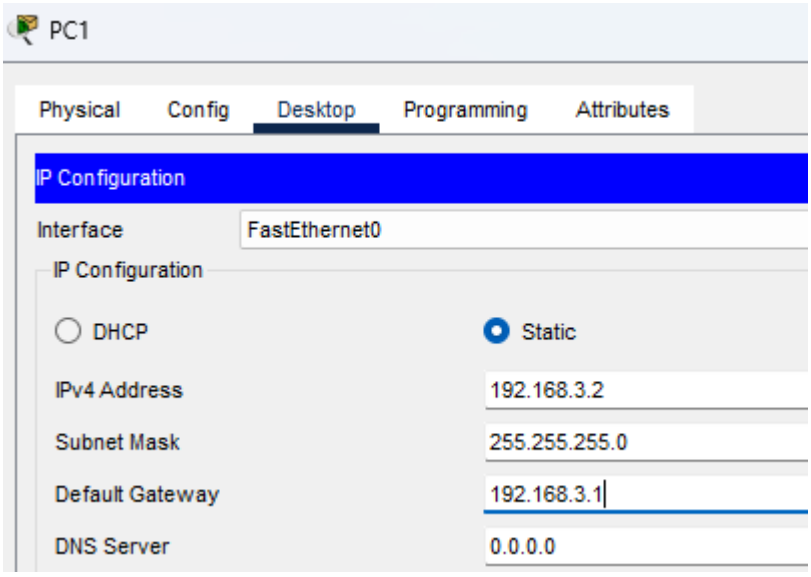
5. You are going to use these discussions for Activity 2 and 3.
   - Completed

Activity 2

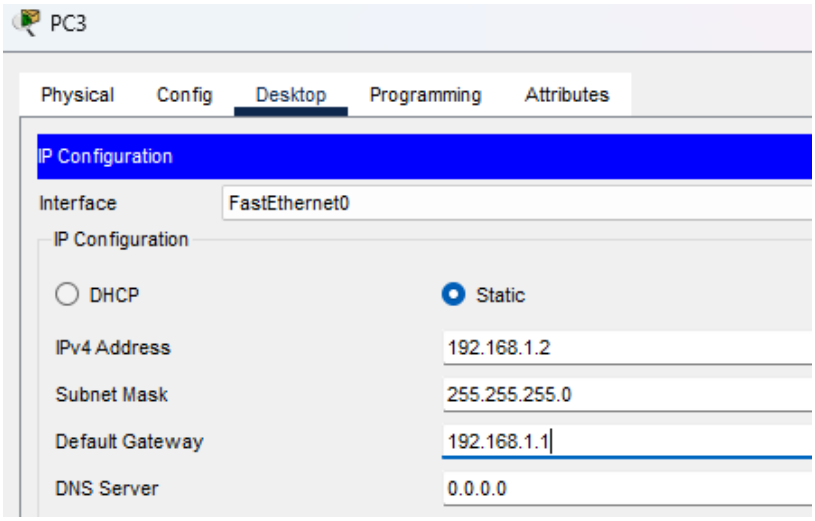
1. Open the packet tracer and implement the following network as a group and make sure to use Activity 1 discussions to configure each device in the network.
   a. You need to make sure PC1, PC3 and PC5 can communicate with each other. Tip: You need to add static routes to each router.
   b. Verify that PC1 can communicate with both PC3 and PC5 using PING command and simulations.



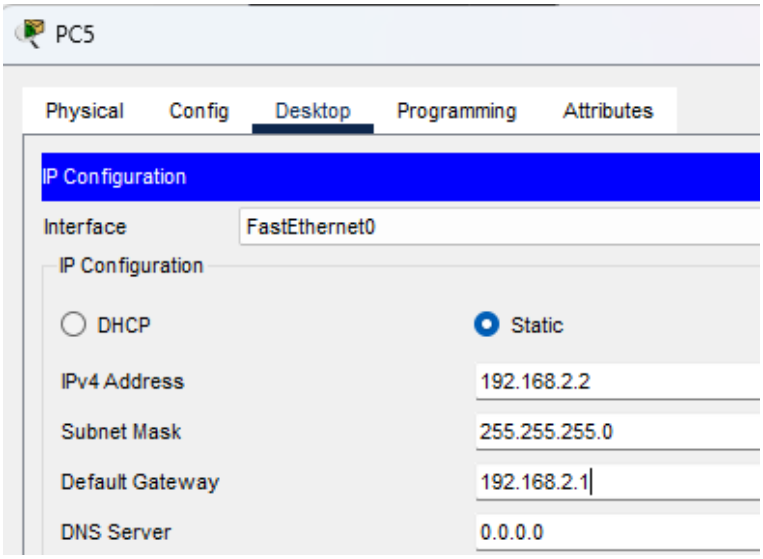
Network Architecture



Configuring IP of PC1



Configuring IP of PC3



Configuring IP of PC5

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
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, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

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

Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.3
Router(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.3
Router(config)#ip route 11.0.0.0 255.0.0.0 10.0.0.3
Router(config)#
```

Configuring Router1 by adding IP address to both ethernet and serial ports and setting up a static connection.

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
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, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
ip address 10.0.0.3 255.0.0.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1, changed state to up

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

Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.3.0 255.255.255.0 10.0.0.2
Router(config)#ip route 192.168.2.0 255.255.255.0 11.0.0.3
Router(config)#
```

Configuring Router2 by adding IP address to both ethernet and serial ports and setting up a static connection.

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
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, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/0
Router(config-if)#ip address 11.0.0.3 255.0.0.0
Router(config-if)#ip address 11.0.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

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

Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.1.0 255.255.255.0 11.0.0.2
Router(config)#ip route 192.168.3.0 255.255.255.0 10.0.0.2
Router(config)#ip route 192.168.3.0 255.255.255.0 11.0.0.2
Router(config)#no ip route 192.168.3.0 255.255.255.0 10.0.0.2
Router(config)#ip route 10.0.0.0 255.0.0.0 11.0.0.2
Router(config)#
```

Configuring Router3 by adding IP address to both ethernet and serial ports and setting up a static connection.

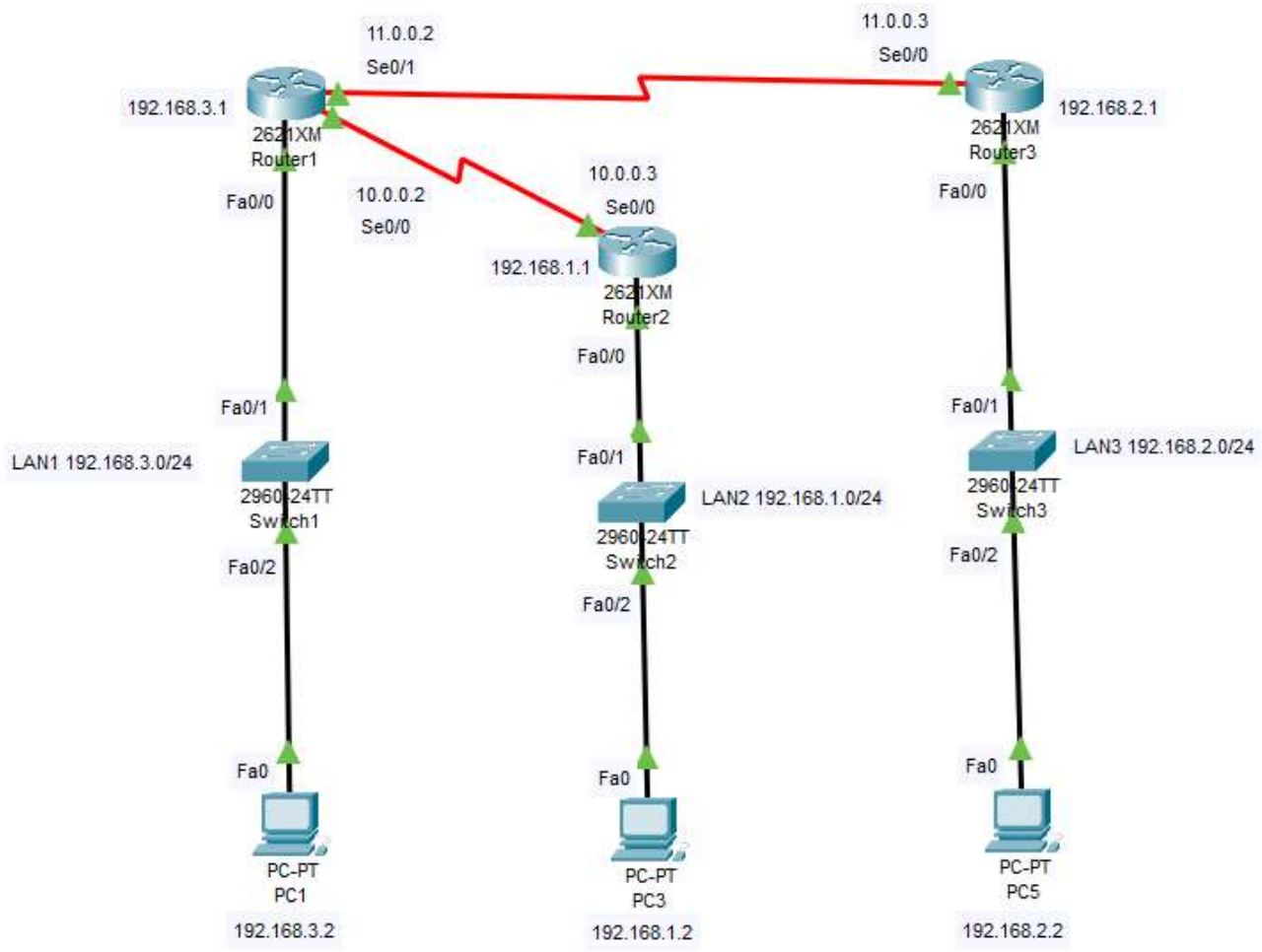
```
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=12ms TTL=126
Reply from 192.168.1.2: bytes=32 time=10ms TTL=126
Reply from 192.168.1.2: bytes=32 time=84ms TTL=126
Reply from 192.168.1.2: bytes=32 time=9ms 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 = 9ms, Maximum = 84ms, Average = 28ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=81ms TTL=125
Reply from 192.168.2.2: bytes=32 time=66ms TTL=125
Reply from 192.168.2.2: bytes=32 time=16ms TTL=125
Reply from 192.168.2.2: bytes=32 time=10ms TTL=125

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 81ms, Average = 43ms
```

Pinging both PC3 or PC5 from PC1 Successfully

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	PC3	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC1	PC5	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC3	PC1	ICMP		0.000	N	2	(edit)	(delete)
	Successful	PC3	PC5	ICMP		0.000	N	3	(edit)	(delete)

Simulating Packet transfers between ll three PCs successfully

2. Now, add another serial connection between Router 1 and 3 and remove the direct connection between router 2 and router 3.



Updated Network Architecture

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#interface Serial0/1
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#ip address 11.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1, changed state to up

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

Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.2.0 255.255.255.0 11.0.0.3
Router(config)#no ip route 192.168.2.0 255.255.255.0 10.0.0.3
Router(config)#no ip route 11.0.0.0 255.0.0.0 10.0.0.3
Router(config)#
```

Adding the serial connection between Router1 and Router3 and updating the static routes in Router1

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#no ip route 192.168.2.0 255.255.255.0 11.0.0.3
Router(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.2
Router(config)#ip route 11.0.0.0 255.0.0.0 10.0.0.2
Router(config)#
```

Updating the static routes in Router2

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#no ip route 192.168.3.0 255.255.255.0 11.0.0.2
Router(config)#no ip route 192.168.1.0 255.255.255.0 11.0.0.2
Router(config)#no ip route 10.0.0.0 255.0.0.0 11.0.0.2
Router(config)#ip route 192.168.3.0 255.255.255.0 11.0.0.2
Router(config)#ip route 192.168.1.0 255.255.255.0 11.0.0.2
Router(config)#ip route 10.0.0.0 255.0.0.0 11.0.0.2
Router(config)#
```

Updating the static routes in Router3

```
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=16ms TTL=126
Reply from 192.168.2.2: bytes=32 time=13ms TTL=126
Reply from 192.168.2.2: bytes=32 time=15ms TTL=126
Reply from 192.168.2.2: bytes=32 time=63ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 63ms, Average = 26ms
```

Successfully pinging from PC1 to PC5

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	PC5	ICMP		0.000	N	0	(edit)	
	Successful	PC5	PC1	ICMP		0.000	N	1	(edit)	

Successful packet transfer Simulations between PC1 and PC5

Activity 3

1. Is there any alternative to stop manually configuring the routing table every time the connectivity changes?

- An alternative for static routing is dynamic routing. Dynamic routing enables routers to automatically share and update their routing tables.

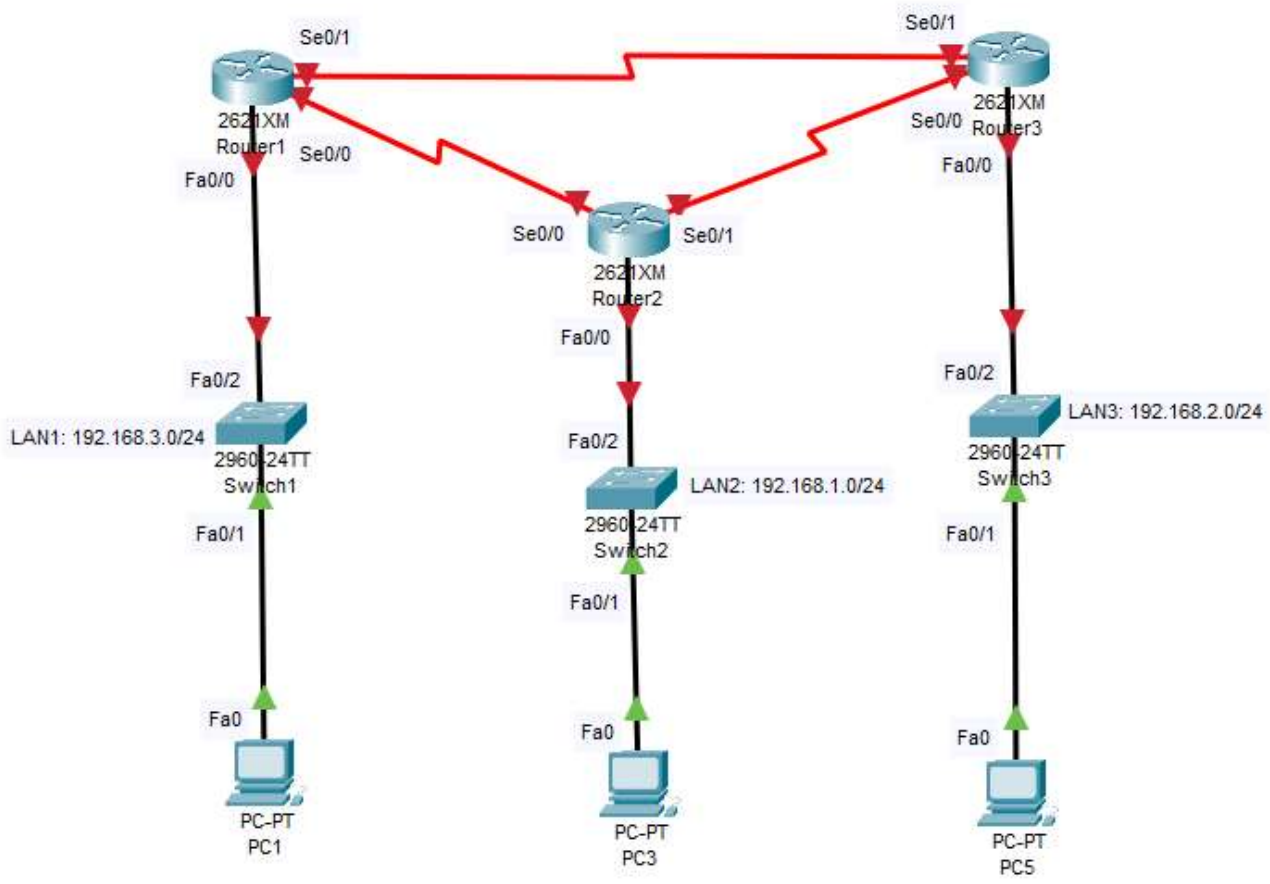
2. What are the latest routing algorithms you can use?

- Software-Defined Networking (SDN) – separates the control plane from the data plane, allowing network administrators to centrally manage routing decisions using software

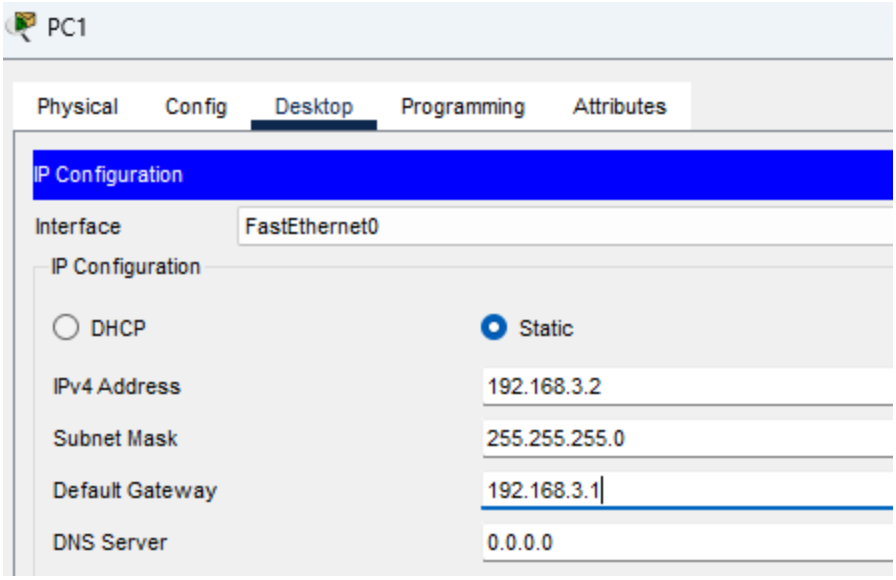
3. Is there any routing algorithm available in Cisco Packet Traces?

- Open Shortest Path First (OSPF)
- Routing Information Protocol (RIP)
- Border Gateway Protocol (BGP)

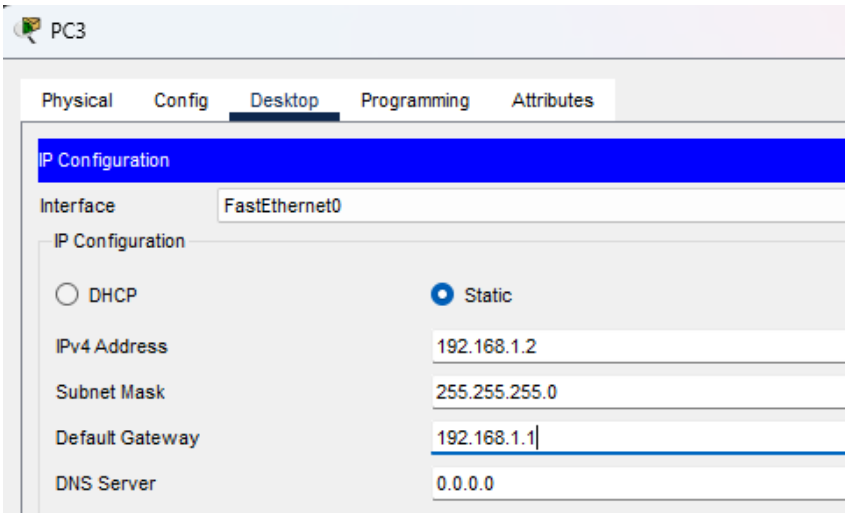
4. Implement the same network as shown in the following figure. However, this time make sure to use the routing algorithm available in the routers.



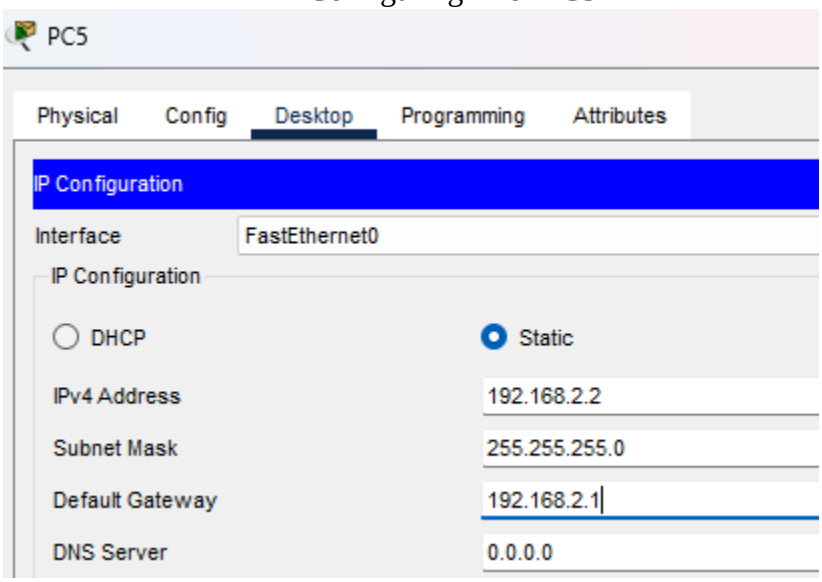
Network Architecture



Configuring IP of PC1



Configuring IP of PC3



Configuring IP of PC5

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.3.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Configuring Router1 Ethernet connection with PC1

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#clock rate 64000
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface Serial0/1
Router(config-if)#clock rate 64000
Router(config-if)#ip address 12.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1, changed state to up

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

Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 192.168.3.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 12.0.0.0
Router(config-router)#
```

Configuring serial connection and Routing Information Protocol networks in Router1

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Configuring Router2 Ethernet connection with PC3

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial0/0
Router(config-if)#clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#ip address 10.0.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial0/1
Router(config-if)#clock rate 64000
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state to up
ip address 11.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1, changed state to up

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

Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 192.168.1.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 11.0.0.0
Router(config-router)#
```

Configuring serial connection and Routing Information Protocol networks in Router2

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

Configuring Router3 Ethernet connection with PC5

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial0/0
Router(config-if)#clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#ip address 11.0.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0, changed state to up

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

Router(config-if)#exit
Router(config)#interface Serial0/1
Router(config-if)#clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#ip address 12.0.0.3 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1, changed state to up

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

Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 192.168.2.0
Router(config-router)#network 11.0.0.0
Router(config-router)#network 12.0.0.0
Router(config-router)#
```

Configuring serial connection and Routing Information Protocol networks in Router3

5. Verify the network connections using PING (in each PC).

```
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=73ms TTL=126
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=2ms TTL=126
Reply from 192.168.1.2: bytes=32 time=13ms 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 = 2ms, Maximum = 73ms, Average = 22ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=16ms TTL=126
Reply from 192.168.2.2: bytes=32 time=72ms TTL=126
Reply from 192.168.2.2: bytes=32 time=17ms TTL=126
Reply from 192.168.2.2: bytes=32 time=19ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 16ms, Maximum = 72ms, Average = 31ms
```

Successfully Pinging PC3 and PC5 from PC1

```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=20ms TTL=126
Reply from 192.168.3.2: bytes=32 time=9ms TTL=126
Reply from 192.168.3.2: bytes=32 time=9ms TTL=126
Reply from 192.168.3.2: bytes=32 time=8ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 20ms, Average = 11ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=80ms TTL=126
Reply from 192.168.2.2: bytes=32 time=19ms TTL=126
Reply from 192.168.2.2: bytes=32 time=13ms TTL=126
Reply from 192.168.2.2: bytes=32 time=27ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 80ms, Average = 34ms
```

Successfully Pinging PC1 and PC5 from PC3

```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=15ms TTL=126
Reply from 192.168.3.2: bytes=32 time=78ms TTL=126
Reply from 192.168.3.2: bytes=32 time=13ms TTL=126
Reply from 192.168.3.2: bytes=32 time=14ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 78ms, Average = 30ms

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=82ms TTL=126
Reply from 192.168.1.2: bytes=32 time=17ms TTL=126
Reply from 192.168.1.2: bytes=32 time=13ms TTL=126
Reply from 192.168.1.2: bytes=32 time=14ms 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 = 13ms, Maximum = 82ms, Average = 31ms
```

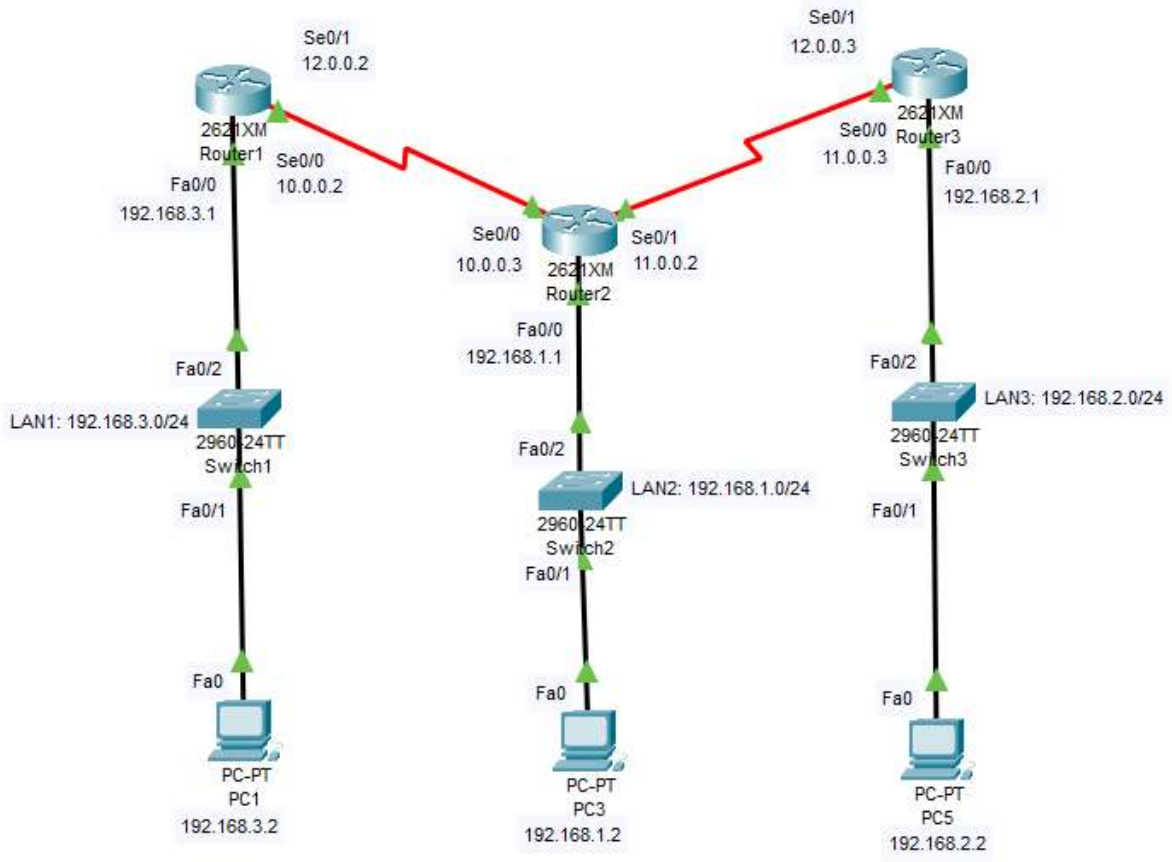
Successfully pinging PC1 and PC3 from PC5

6. Use the simulation tool to send a packet from PC1 to PC5. Have you seen any differences compared to the route you have seen in Activity 2? Explain what happened.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	PC5	ICMP		0.000	N	0	(edit)	(delete)

Instead of using Static Routing, Dynamic Routing was implemented. The protocol followed specifically was Routing Information Protocol.

7. Now remove the connection between router 1 and 3 and use the simulation tool to send a packet from PC1 to PC5 without changing any configuration.



Updated Networking system

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Successful	PC1	PC5	ICMP		0.000	N	0	(edit)		(delete)
	Successful	PC1	PC5	ICMP		0.000	N	1	(edit)		(delete)

Successful packet transfer from PC1 to PC5

8. Explain what you observed.
    - Within a network that is connected, the Routing Information Protocol (RIP) sets up routers to determine the best route for sending data packets from a sender to a recipient. In this instance, since Router 1 and Router 3's serial connection was severed. The route from Router 1 to Router 2 to Router 3 is the next best one with the fewest hops that can be made.

Above and Beyond Tasks

1. **Routing Information Protocol (RIP)**
   - **Type**: Distance Vector
   - **Algorithm**: Uses the Bellman-Ford algorithm.
   - **Metric**: Hop count, with a maximum limit of 15 hops.
   - **Updates**: Periodic updates every 30 seconds.
   - **Convergence Time**: Slow convergence due to periodic updates and limited metric (hop count).
   - **Scalability**: Suitable for small networks due to the hop count limit.

     Advantages:
     - Simple to configure and easy to implement.
     - Low CPU/memory overhead due to minimal processing.

     Disadvantages:
     - Poor scalability (limited to 15 hops).
     - Slow convergence and prone to routing loops.

2. **Open Shortest Path First (OSPF)**
   - **Type**: Link State
   - **Algorithm**: Uses Dijkstra's Shortest Path First (SPF) algorithm.
   - **Metric**: Cost (based on bandwidth), making it more efficient for varying link speeds.
   - **Updates**: Event-driven updates (only when changes occur), reducing bandwidth usage.
   - **Convergence Time**: Fast convergence, as changes are rapidly propagated.
   - **Scalability**: Highly scalable, suitable for both small and large networks. Supports hierarchical design with areas.

     Advantages:
     - Fast convergence and better for large, complex networks.
     - Supports multi-area network structures for efficient routing.

     Disadvantages:
     - More complex to configure and manage compared to RIP.
     - Higher CPU and memory overhead due to its algorithm and state tracking.

3. **Border Gateway Protocol (BGP)**
   - **Type**: Path Vector
   - **Algorithm**: Uses path attributes to determine the best route.
   - **Metric**: Uses multiple attributes like AS path, next-hop, and policy-based metrics.
   - **Updates**: Event-driven updates (only when network topology changes).
   - **Convergence Time**: Slower convergence compared to OSPF due to its complexity.
   - **Scalability**: Highly scalable, used for inter-domain (between ISPs) and large networks like the Internet.

     Advantages:
     - Essential for Internet backbone routing and inter-domain communication.
     - Highly customizable via route policies.

     Disadvantages:
     - Very complex to configure and maintain.
     - Slow convergence due to complex decision processes and large networks.