SIT202: Computer Networks and Communication

Leaning Evidence for Active Class Task 6

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Activity 1

Using Website http://httpforever.com/ and tracking DNS protocol for this activity,

1. Examine the IP datagram's header. Can you identify the IP address of your device and the IP address of the destination host?

```
▾ Internet Protocol Version 4, Src: 192.168.8.171, Dst: 192.168.8.72
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  ▸ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 61
    Identification: 0xd1ba (53690)
  ▸ 010. .... = Flags: 0x2, Don't fragment
    ...0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 64
    Protocol: UDP (17)
    Header Checksum: 0xd6b1 [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 192.168.8.171
    Destination Address: 192.168.8.72
```

- Source IP Address is 192.168.8.171 Destination IP Address is 192.168.8.72

2. Can you identify the version of IP addresses?

- The version is IPv4

3. By examine the IP header, can you identify the transport layer protocol used? Does this match with the transport layer protocol listed in in the packet details window?

- The protocol used in the transport layer is UDP and it does match with the protocol listed in the packet details window.

4. What is the size of IP header in Bytes? What is the size of the payload (in Bytes) of this IP datagram? How did you calculate the size of the payload?

• IP header size is 20 bytes. The size of the payload is 41 bytes (61 – 20)

5. Can you check whether this IP datagram is fragmented or not? Explain your answer.

• This IP datagram is not fragmented because the flag value has been set to '010' where the 1 in the second bit means fragmentation is disallowed.

6. Examine other important fields in the IP header.

- Explicit Congestion Notification (ECN) which is a feature present in TCP/IP networks that marks packets that transit parts of the network experiencing high levels of congestion. ECN is set to '00' for this instance indicating that this datagram is not ECN capable.
- Time to Live is '64', which means that the datagram can traverse 64 more hops before being discarded.

7. Now, conduct a similar analysis using a different type of packet (if you have used HTTP before, now you can use DNS) and compare the findings.

Analyzing HTTP protocol now,

```
▾ Internet Protocol Version 6, Src: 2402:4000:1180:3145:3128:133c:22d7:411c, Dst: 2604:a880:4:1d0::1f1:2000
    0110 .... = Version: 6
  ▾ .... 0000 0000 .... .... .... .... .... = Traffic Class: 0x00 (DSCP: CS0, ECN: Not-ECT)
      .... 0000 00.. .... .... .... .... .... = Differentiated Services Codepoint: Default (0)
      .... .... ..00 .... .... .... .... .... = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    .... 0001 0010 1111 1010 0001 = Flow Label: 0x12fa1
    Payload Length: 371
    Next Header: TCP (6)
    Hop Limit: 64
    Source Address: 2402:4000:1180:3145:3128:133c:22d7:411c
    Destination Address: 2604:a880:4:1d0::1f1:2000
```

- Source IP Address is 2402:4000:1180:3145:3128:133c:22d7:411c
  Destination IP Address is 2604:8880:4:1d0::1f1:2000

- The version used in this datagram is IPv6

- The protocol used for the Transport Layer protocol is TCP

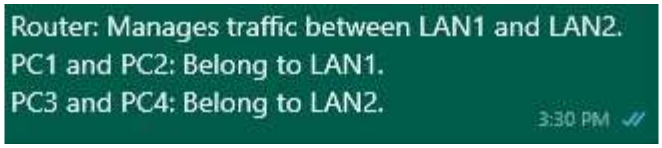
- The IP header size is 40 bytes and the payload size given is 371 bytes

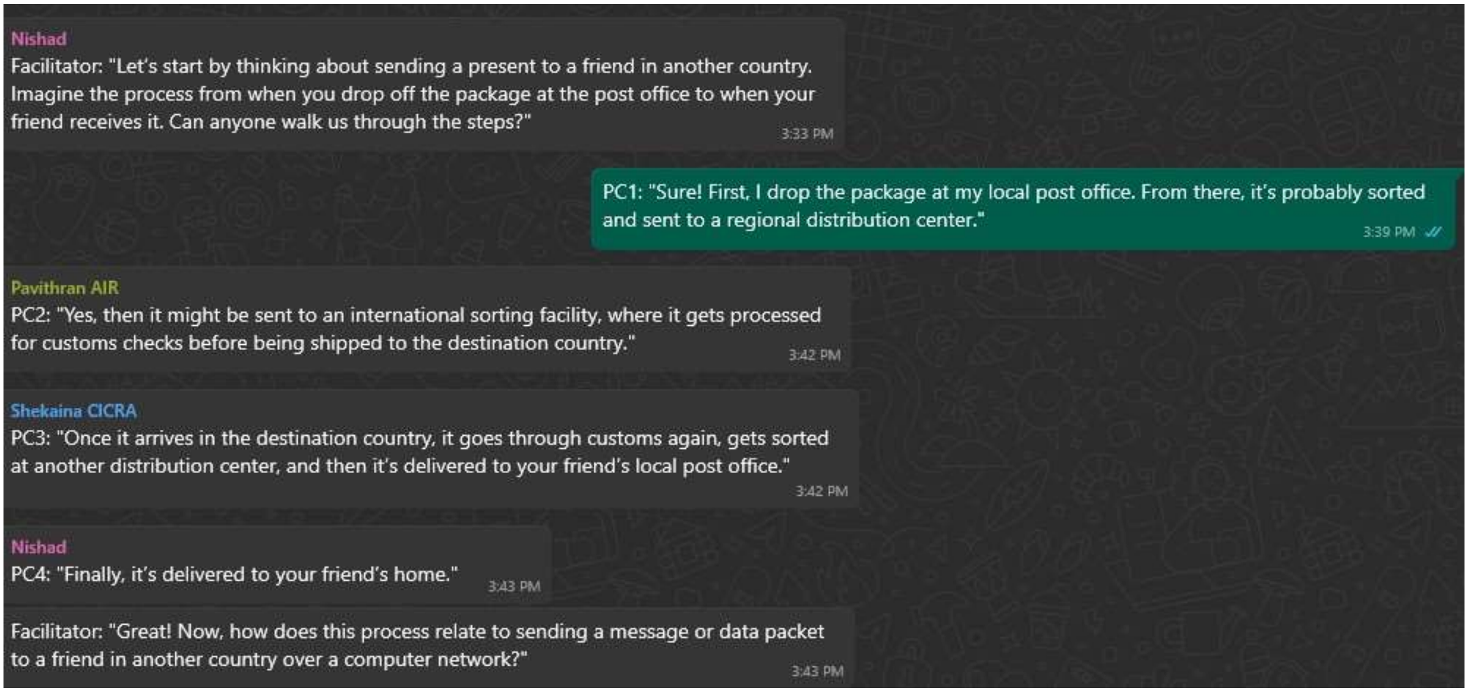
- This datagram is not fragmented since there's no indication of it or the presence of a fragmentation header.

- The hop limit is 64 (similar to Time to Live in IPv4)

Activity 2

1. Assume you are sending a present to a friend in another country. Can you list the various places and steps that your parcel would go in the postal system before it reaches your friend?


Router: Manages traffic between LAN1 and LAN2.
PC1 and PC2: Belong to LAN1.
PC3 and PC4: Belong to LAN2.
3:30 PM


Nishad
Facilitator: "Let's start by thinking about sending a present to a friend in another country. Imagine the process from when you drop off the package at the post office to when your friend receives it. Can anyone walk us through the steps?"
3:33 PM

PC1: "Sure! First, I drop the package at my local post office. From there, it's probably sorted and sent to a regional distribution center."
3:39 PM

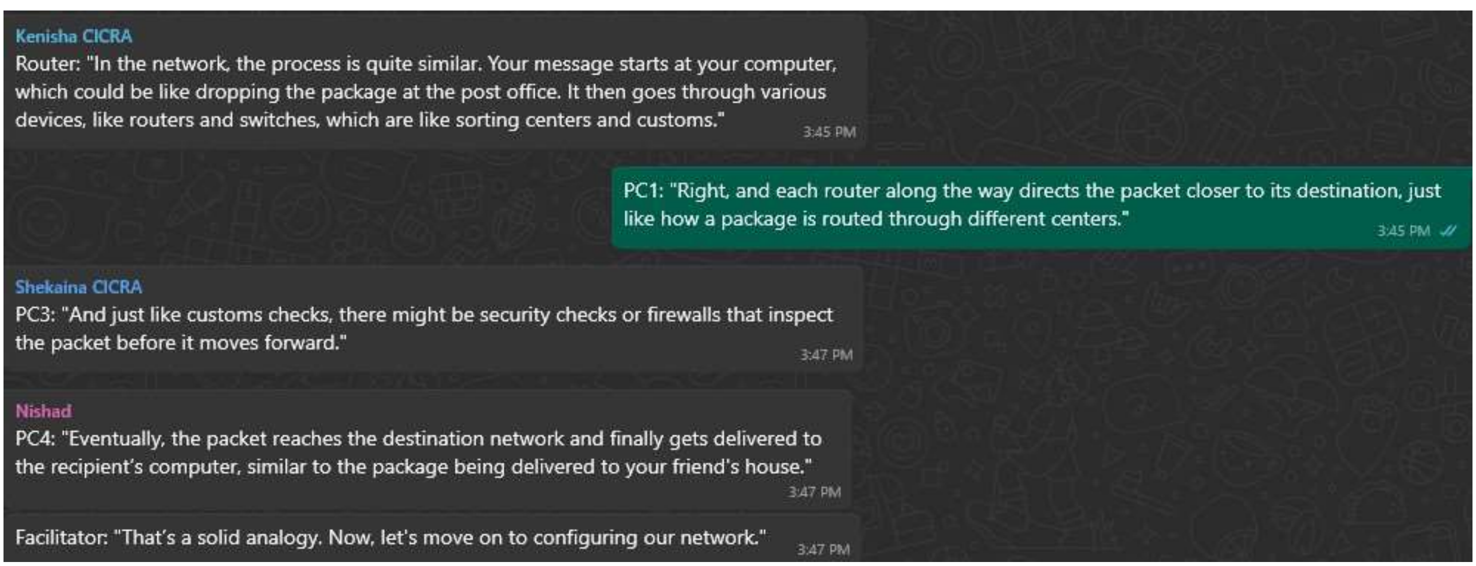
Pavithran AIR
PC2: "Yes, then it might be sent to an international sorting facility, where it gets processed for customs checks before being shipped to the destination country."
3:42 PM

Shekaina CICRA
PC3: "Once it arrives in the destination country, it goes through customs again, gets sorted at another distribution center, and then it's delivered to your friend's local post office."
3:42 PM

Nishad
PC4: "Finally, it's delivered to your friend's home."
3:43 PM

Facilitator: "Great! Now, how does this process relate to sending a message or data packet to a friend in another country over a computer network?"
3:43 PM

2. How this analogous to a situation where you want to send a message to a friend in another country over the computer networks?


Kenisha CICRA
Router: "In the network, the process is quite similar. Your message starts at your computer, which could be like dropping the package at the post office. It then goes through various devices, like routers and switches, which are like sorting centers and customs."
3:45 PM

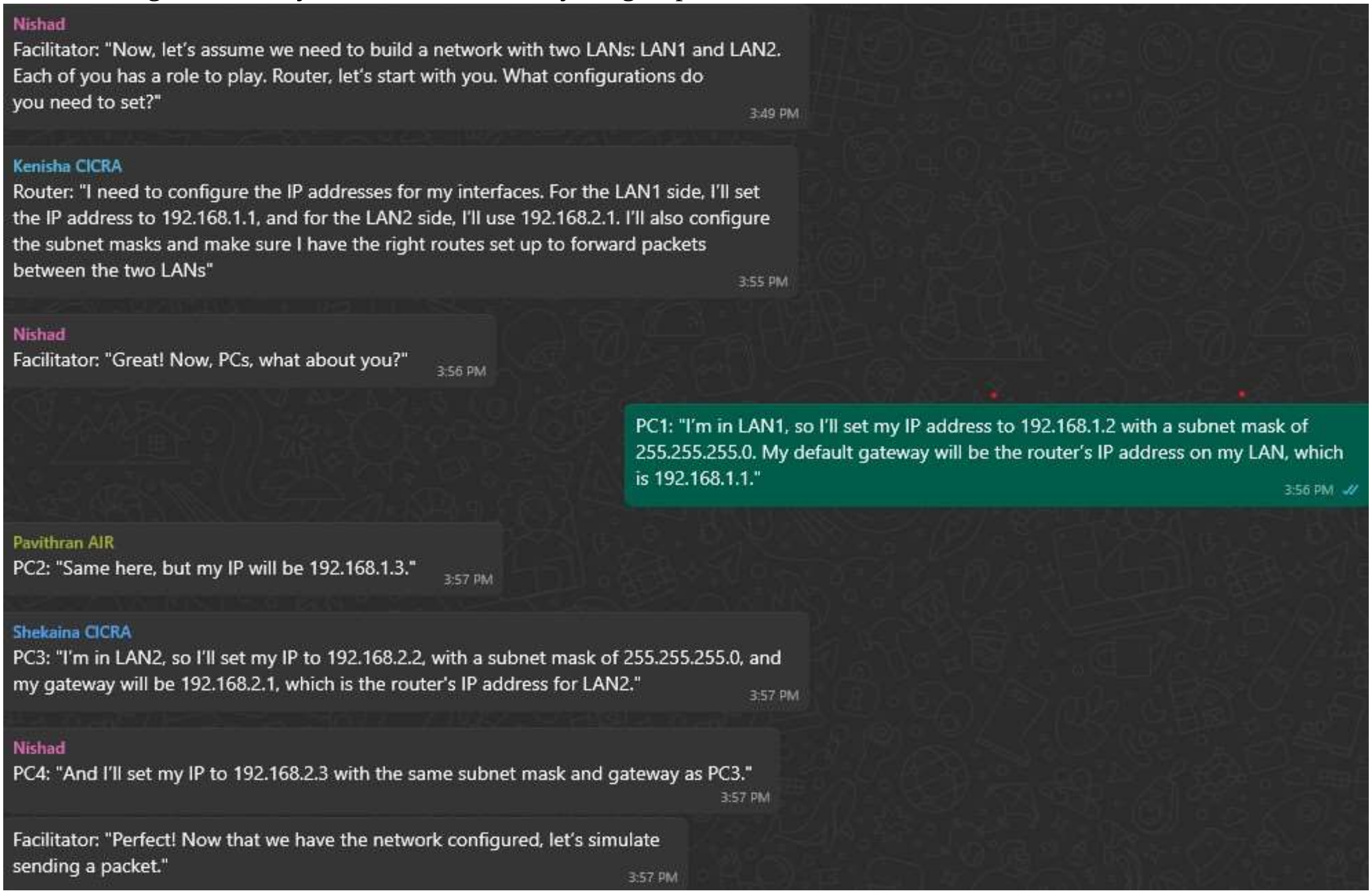
PC1: "Right, and each router along the way directs the packet closer to its destination, just like how a package is routed through different centers."
3:45 PM

Shekaina CICRA
PC3: "And just like customs checks, there might be security checks or firewalls that inspect the packet before it moves forward."
3:47 PM

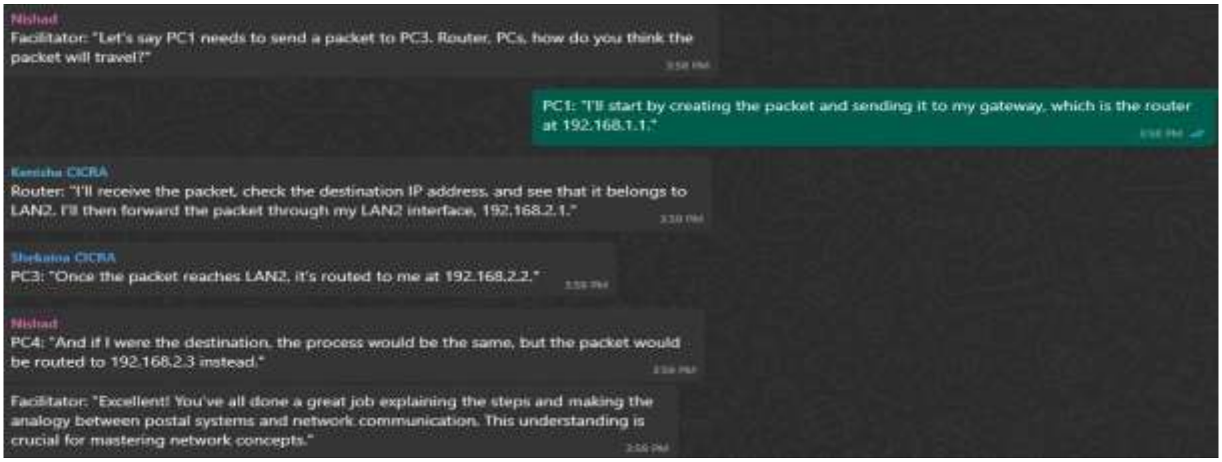
Nishad
PC4: "Eventually, the packet reaches the destination network and finally gets delivered to the recipient's computer, similar to the package being delivered to your friend's house."
3:47 PM

Facilitator: "That's a solid analogy. Now, let's move on to configuring our network."
3:47 PM

3. Assume we need to build the following network with two LANs (LAN1 and LAN2). Each group member has a role to play. One group member can be the router and four other group members could be PCs (PC1 and PC2 belong to LAN1 and PC3 and PC4 belong to LAN2). Each device needs to set their own network configuration. The Router needs to set its interfaces/port and PCs need to set its IP address and gateways to be able to make a communication between two LANs. Discuss the configurations of your own device with your group members.



4. Assume PC1 needs to send a packet to PC3, discuss the steps that the packet needs to go through to reach to PC3.



Activity 3

1. Implement the above-mentioned network in Cisco Packet Tracer. You need to determine the IP addresses of all PCs depending on the LAN that they belong to (you have done this in Activity 2)
2. Once all the devices are configured and connected properly, verify the connectivity using command prompt "ping" in one of the PCs (ex: if PC3's IP address is 192.168.1.5 then from PC1's command prompt we can type "ping 192.168.1.5" to verify the connection) 3. Use the simulation mode to verify the steps that you have discussed in Activity 2 Step 4.

4. Make sure to take screenshots that you can use for task submissions.

Above and Beyond Tasks

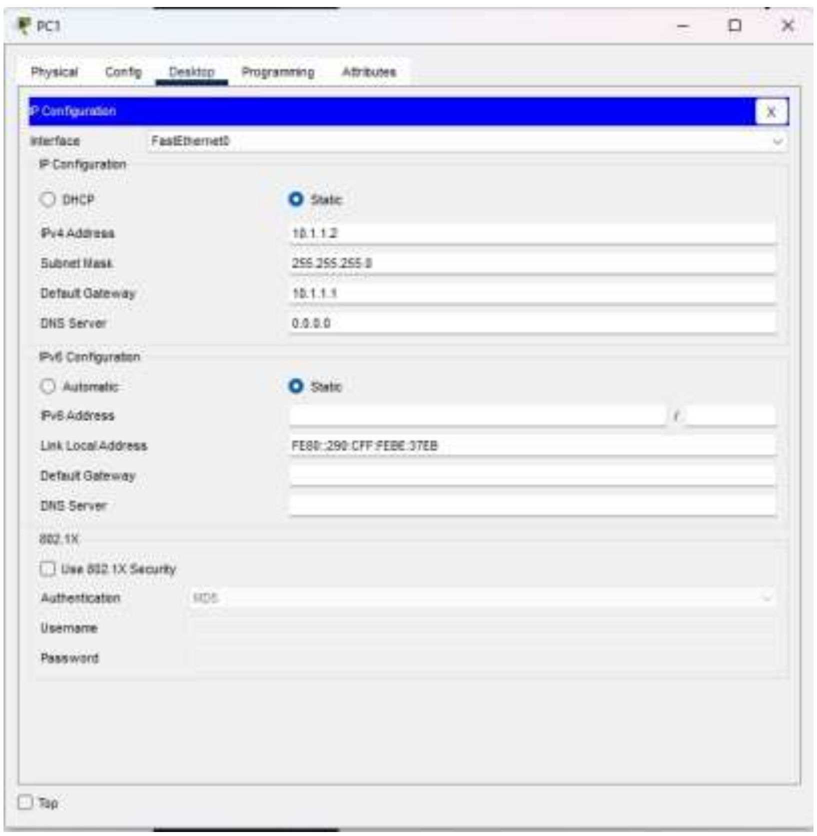
Connecting more devices to the network you built in Activity 3.

1. PC1 in the above diagram now wants to send a message to another PC (PC5) with the IP address of 198.168.2.4.
2. Discuss how PC5 is connected to the current network.
3. Add PC5 and other devices (if necessary) to the network you built in Activity 2 and verify the connectivity using "Ping" in one of the PCs.

Both Activity 3 and Above and Beyond Tasks were done together.

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 10.1.1.1 255.0.0.0
Router(config-if)#ip address 10.1.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
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 GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
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 GigabitEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
```

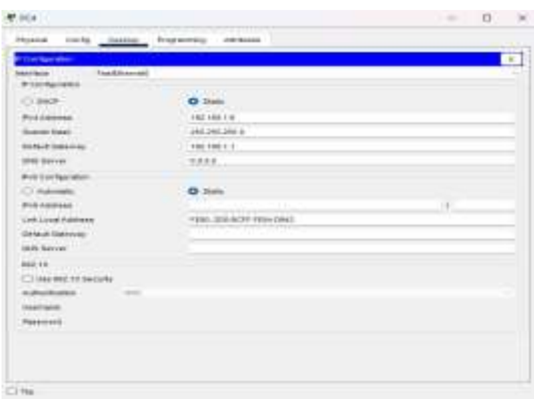
Configuration of IP addresses in Router



IP configuration of PC1

IP configuration of PC2

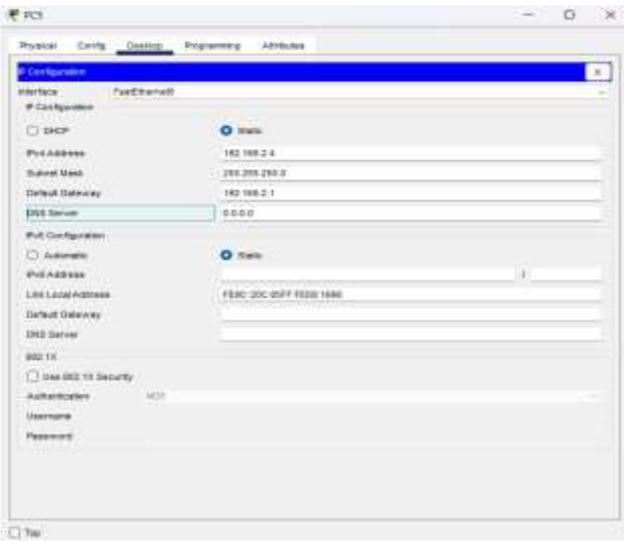
IP configuration of PC3



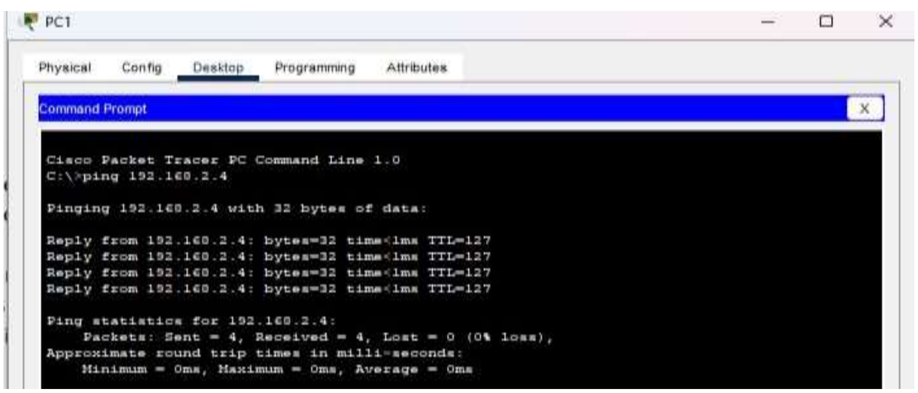
IP configuration of PC4

```
C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=127
Reply from 192.168.1.5: bytes=32 time<1ms TTL=127
Reply from 192.168.1.5: bytes=32 time<1ms TTL=127
Reply from 192.168.1.5: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Ping from PC1(IP address: 10.1.1.2) to PC3 (IP address: 192.168.1.5)



IP configuration of PC5



Ping from PC1(IP address: 10.1.1.2) to PC5 (IP address: 192.168.2.4)

Network architecture

Router1 (2911) was connected to three switches (switch-PT) using copper straight through cables (gig ethernet) and each switch was connected to 2 PCs (excluding switch 3 which was connected to only 1 PC which was PC5) using copper straight through cables (fast ethernet).

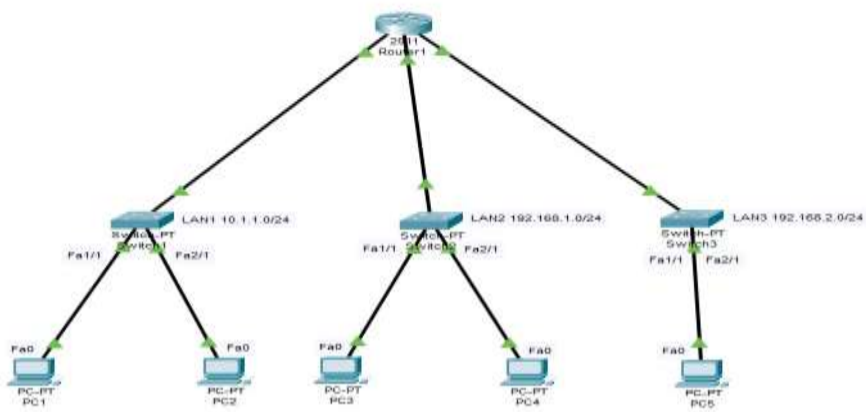
There are in total 3 LAN connections.

LAN1 – 10.1.1.0/24

LAN2 – 192.168.1.0/24

LAN3 – 192.168.2.0/24

PC5 (192.168.2.4/24) is connected under LAN3.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	PC5	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC5	PC3	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC2	PC5	ICMP		0.000	N	2	(edit)	(delete)

These are the successful attempts in verifying connectivity with PC5.