



HACETTEPE UNIVERSITY

DEPARTMENT OF
COMPUTER ENGINEERING

BBM453: Computer Networks Laboratory Lab 7: LAN

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Group 14 - Group 9
Source IP : 192.168.0.27

Nov 24,2021

SOLUTIONS

Using repeater HUB

1.In the first part, you have to create a LAN using repeater HUBs as shown in Figure-1

We have created 4 hubs with 2 devices each as shown in the lesson. Each device has IP address according to "192.1*group_no*.*hub_no*0.*device_no*" structure. We have put a packet sniffer to our test device.

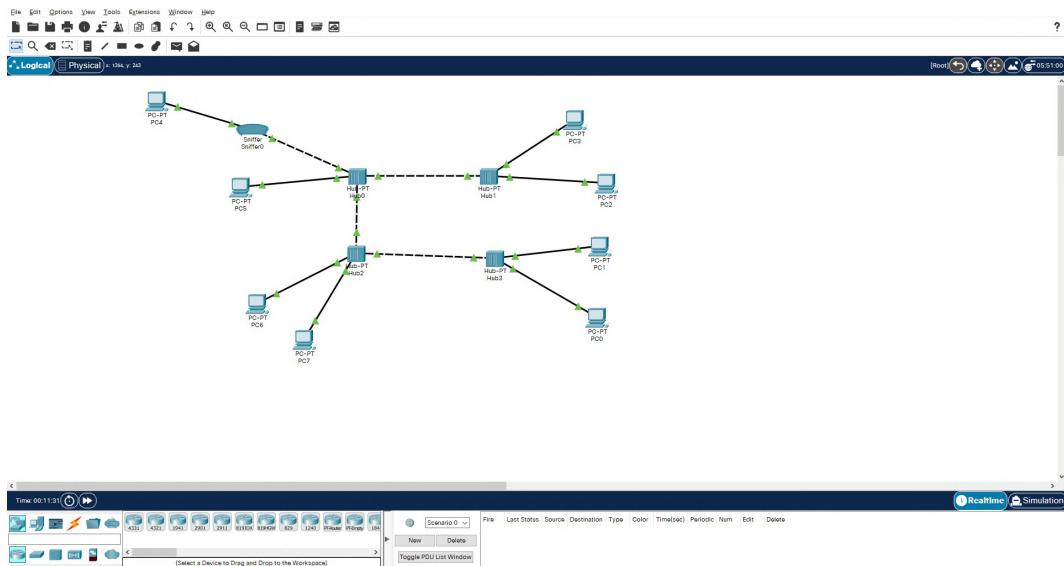


Figure 1: Our end result, see below for steps.

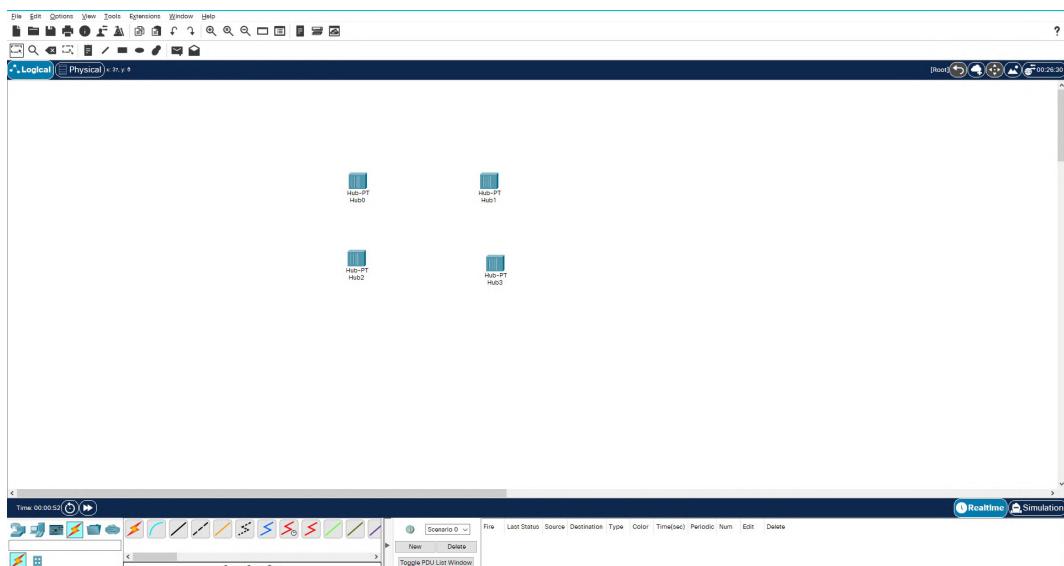


Figure 2: The Hubs are created.

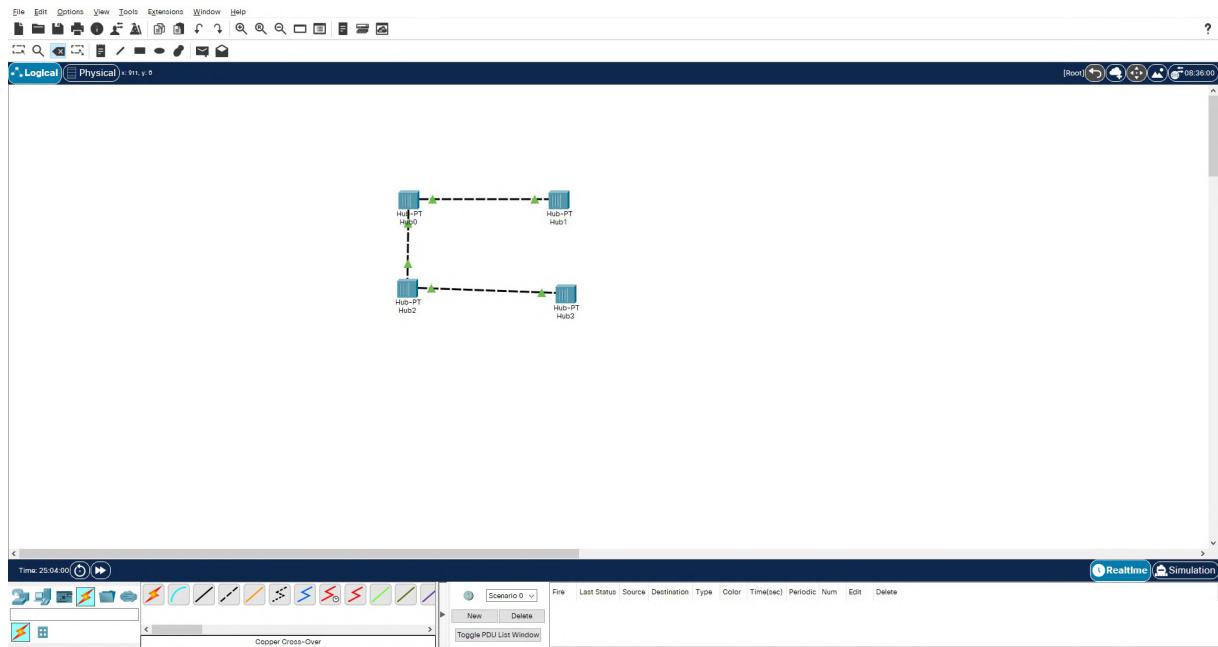


Figure 3: Connected hubs with cross-over cables. Green indicators mean connection is established.

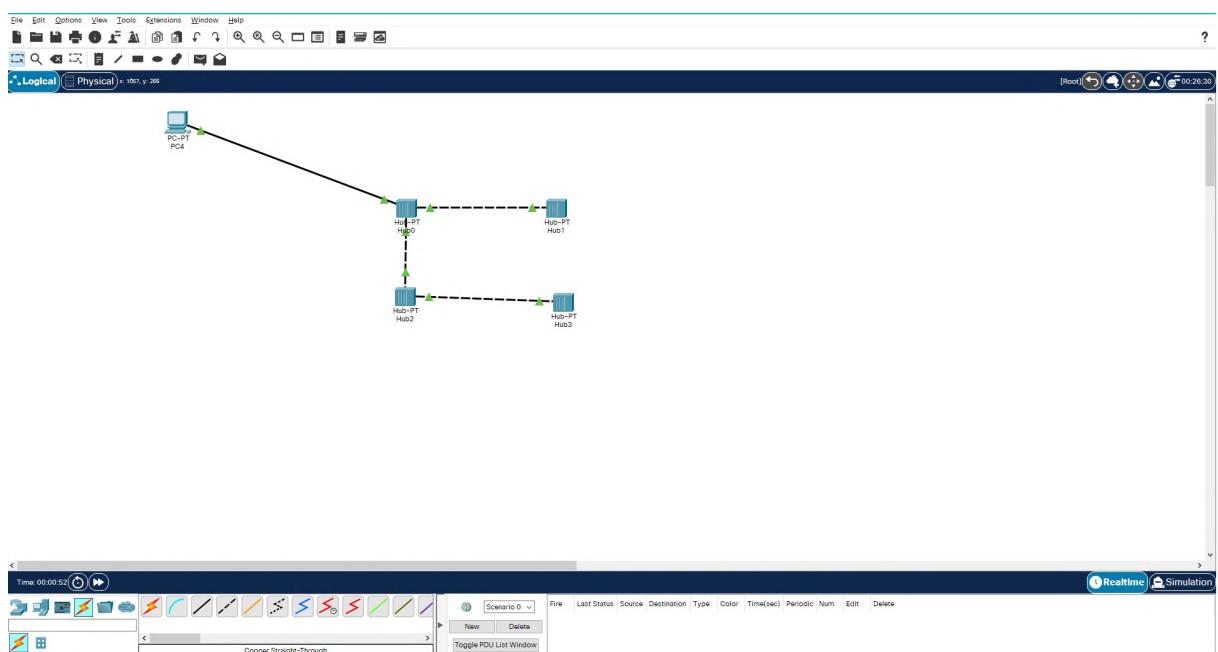


Figure 4: Added our first PC to first hub with straight-through cables. Connection is green.

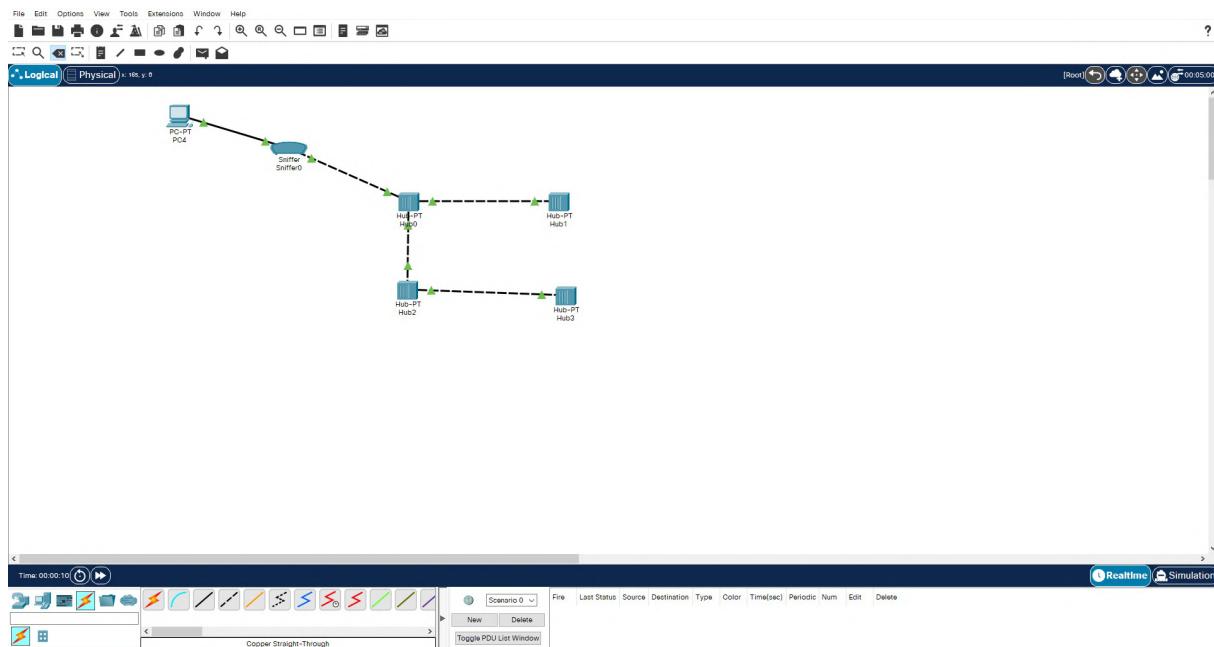


Figure 5: Added a packet sniffer to our PC, since it will be our test subject.

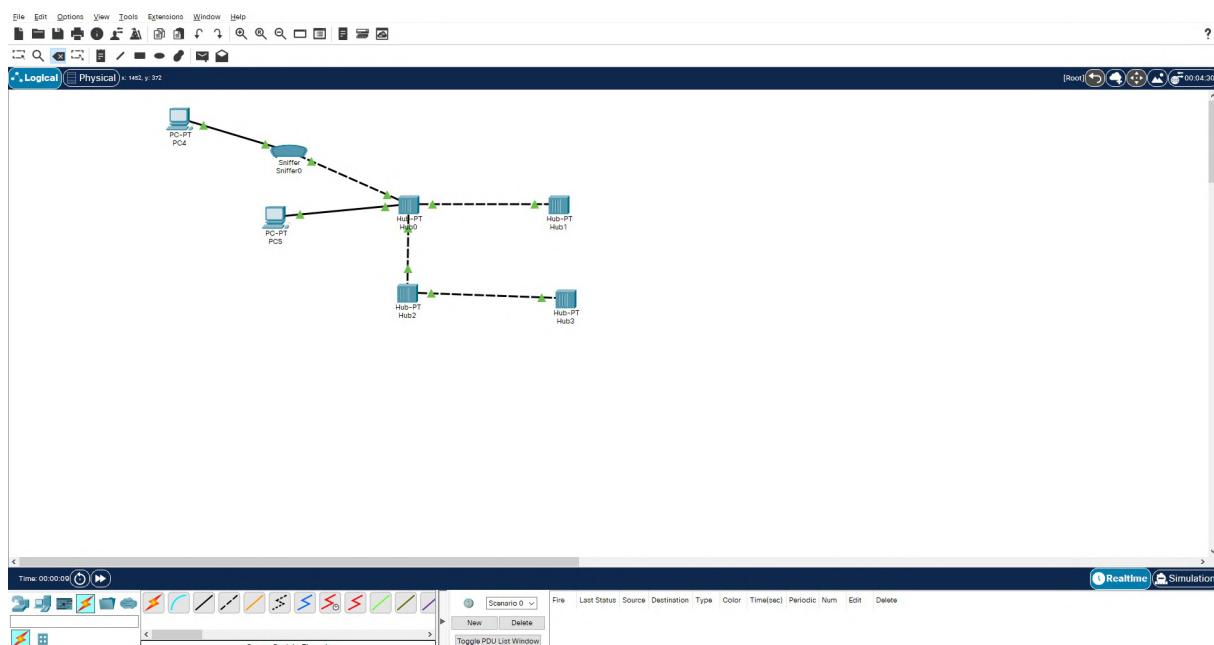


Figure 6: Added second PC to our hub.

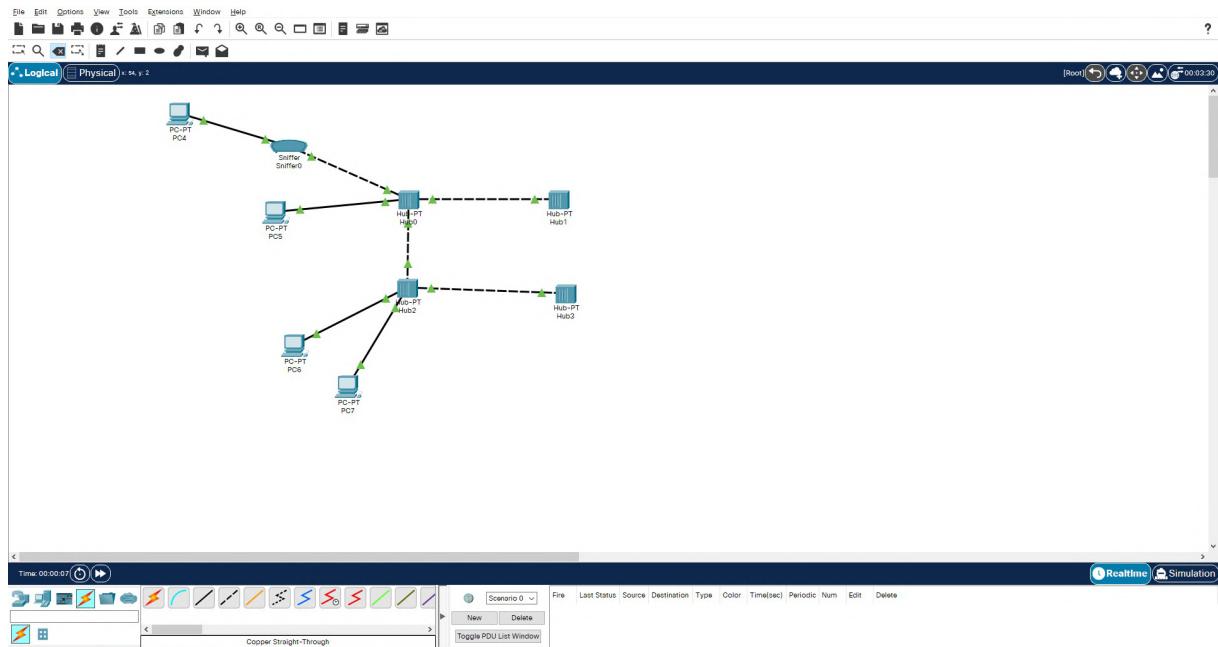


Figure 7: Added 2 PCs with straight-through cables to our second hub.

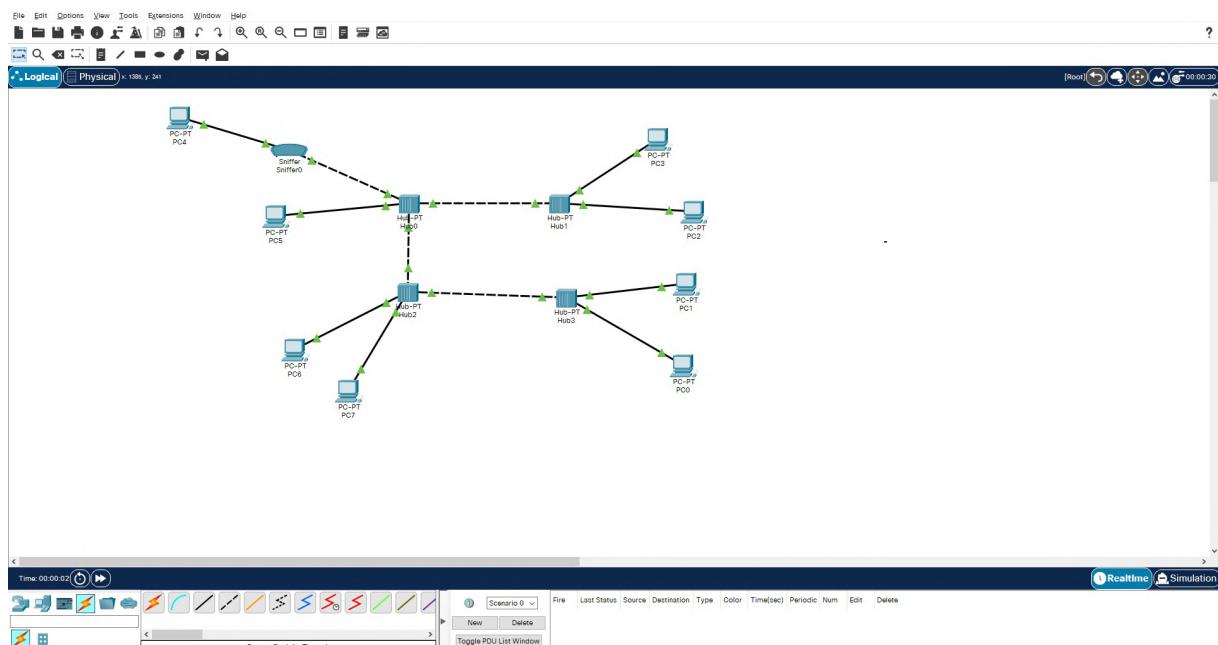
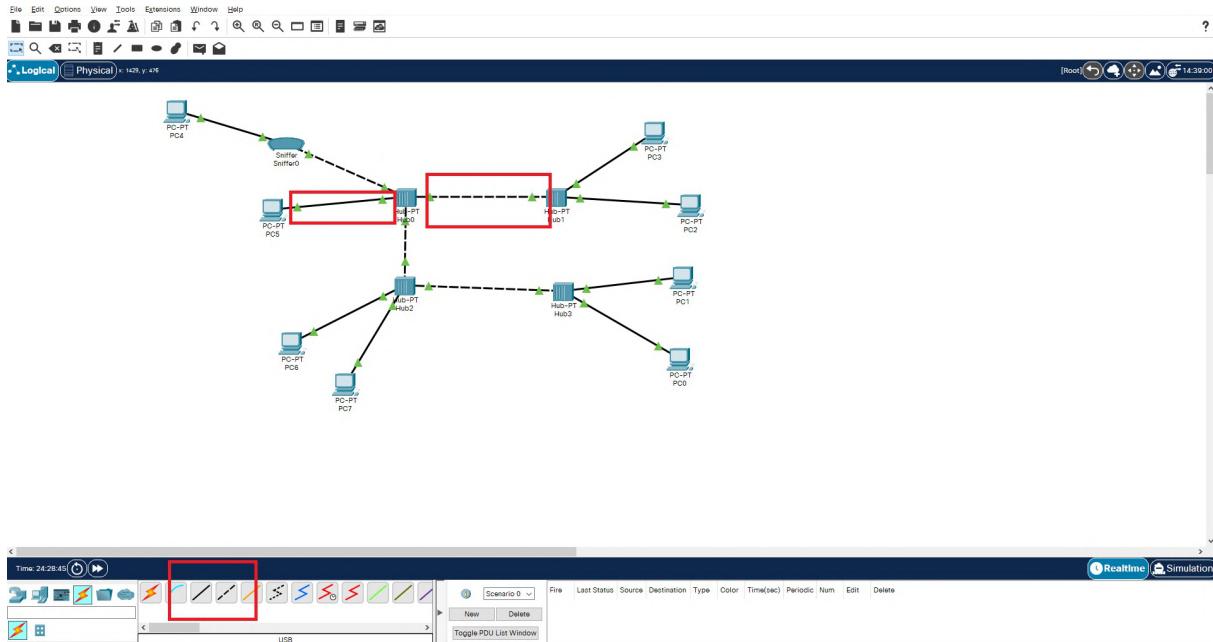


Figure 8: Added rest of the PCs.

2. You should prepare straight-through and cross-over network cables, to be able to connect related devices. Cable preparation tools will be explained by your lab instructor

In our simulator, the cables are ready at the bottom. The dashed ones are cross-over cables and straight ones are straight-through cables.

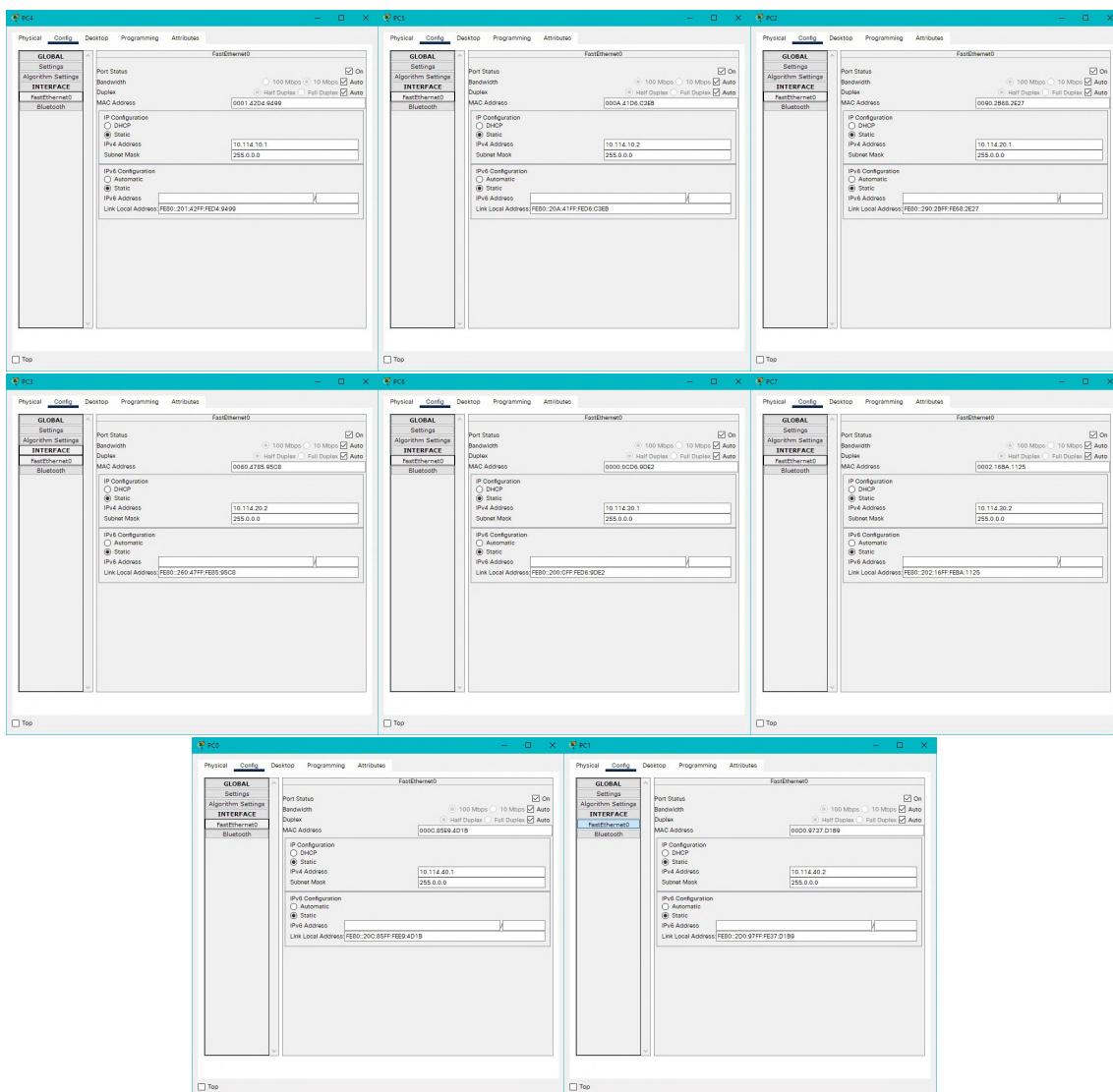


Crossover Wired Cables

3. Assign IP addresses to your computers eth0 adapter as described in the Table-1

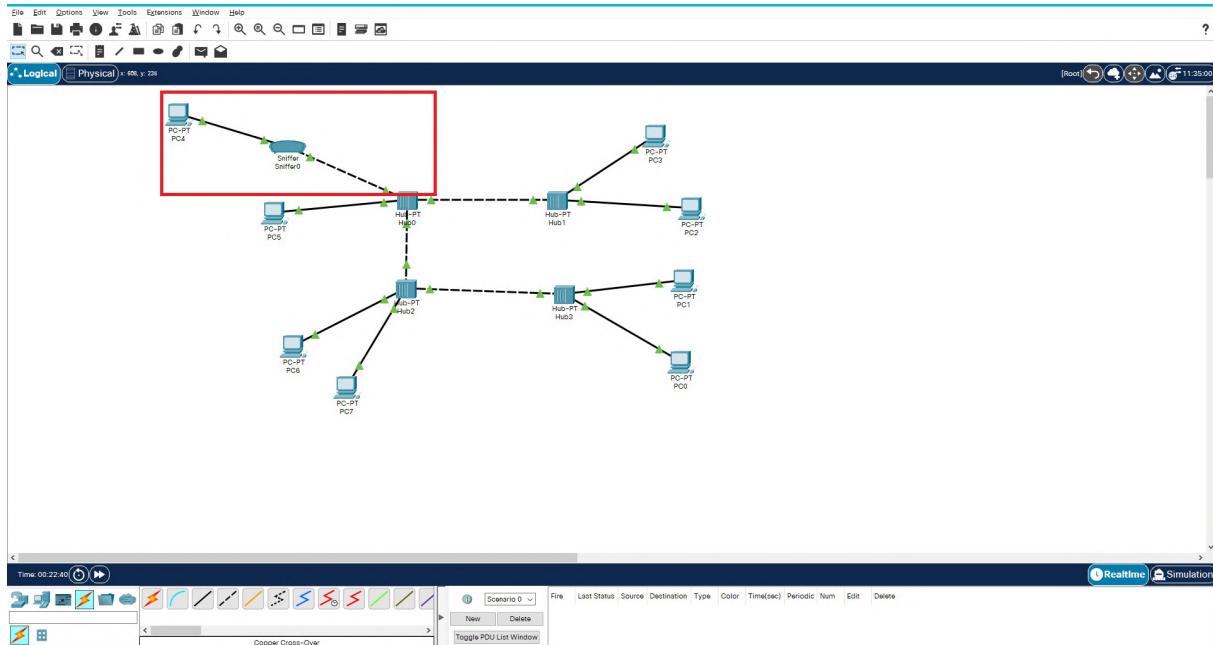
We have assigned the IP addresses according to this instruction "192.1*group_no*.*hub_no*0.*device_no*". See below table and screenshot as proofs.

Group Id	IP Address 1	IP Address 2	Subnet Mask
Group1	10.114.10.1	10.114.10.2	255.0.0.0
Group2	10.114.20.1	10.114.20.2	255.0.0.0
Group3	10.114.30.1	10.114.30.2	255.0.0.0
Group4	10.114.40.1	10.114.40.2	255.0.0.0



4. Make sure that your Ethernet interface of your computer is active, and your cable is plugged to your group's HUB device. Green light on your HUB's port indicates that there is a physical connection established between the hub and the end device

As we can see from screenshot the light is green and connection is established.



5. Check that you can ping other computers in the local network (using ping <IP address> command)

We have pinged first PC of second hub from the first PC of first of which is the test subject. The ping resulted in confirmation

```
Packet Tracer PC Command Line 1.0
C:\>ping 10.114.20.1

Pinging 10.114.20.1 with 32 bytes of data:
Reply from 10.114.20.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.114.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 9ms, Average = 2ms

C:\>ping 10.114.30.2

Pinging 10.114.30.2 with 32 bytes of data:
Reply from 10.114.30.2: bytes=32 time<10ms TTL=128
Reply from 10.114.30.2: bytes=32 time<1ms TTL=128
Reply from 10.114.30.2: bytes=32 time<1ms TTL=128
Reply from 10.114.30.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.114.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 5ms

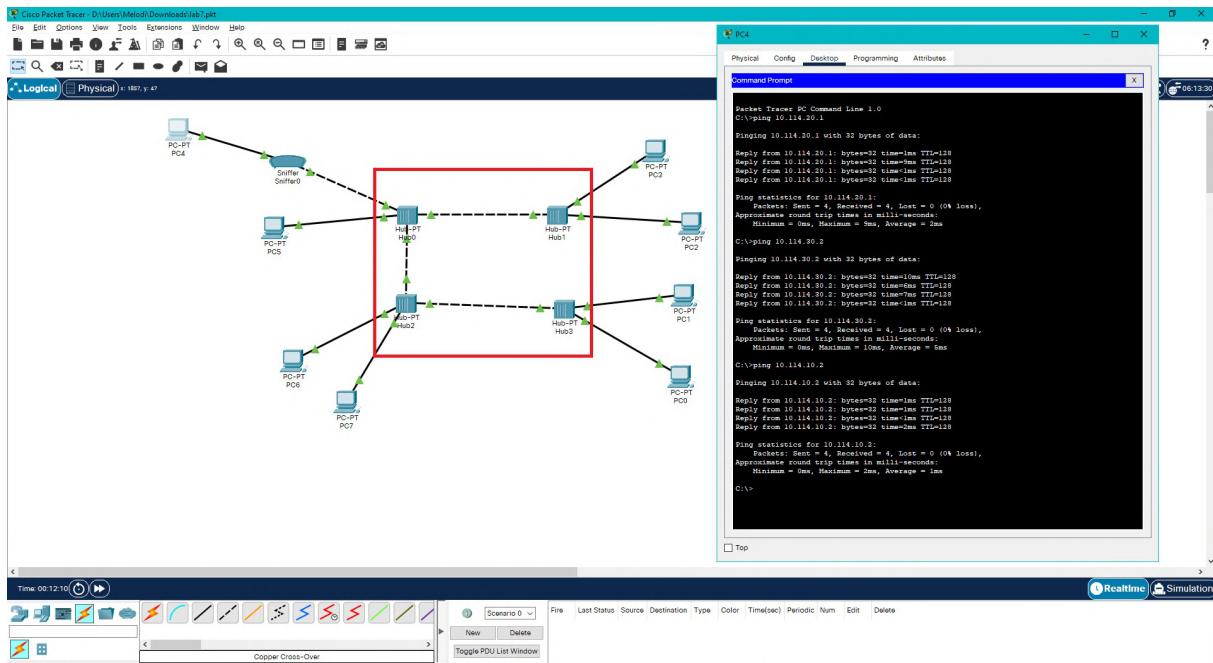
C:\>ping 10.114.10.2

Pinging 10.114.10.2 with 32 bytes of data:
Reply from 10.114.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.114.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 1ms
```

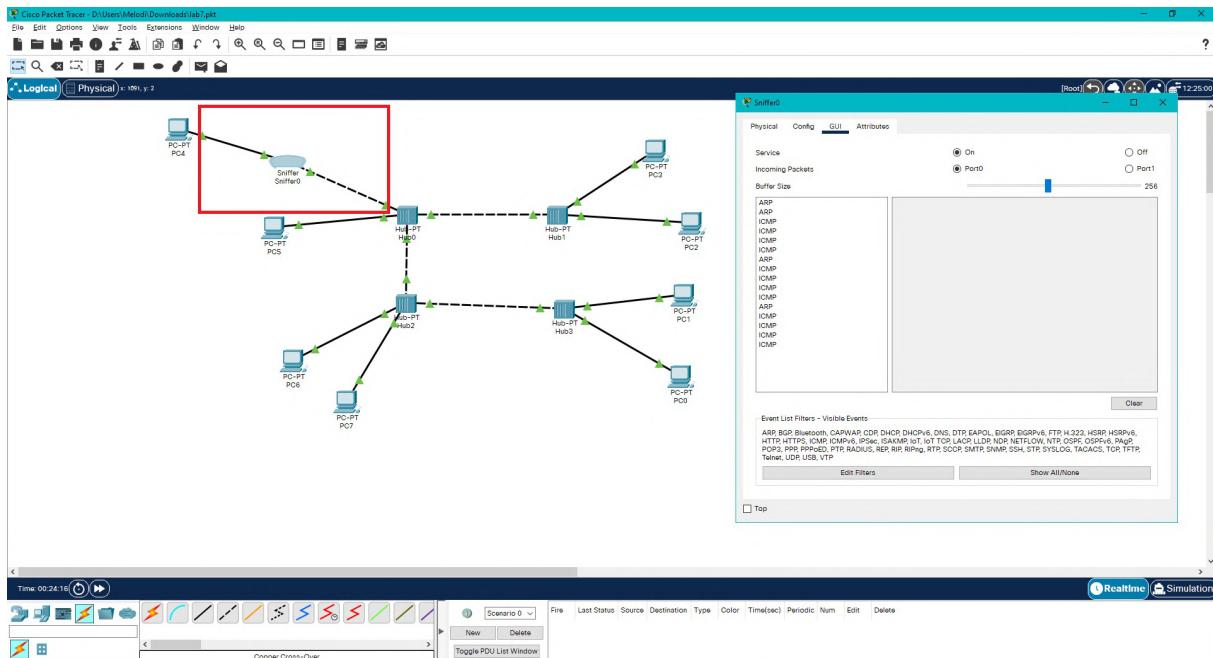
6. Make sure that there is a connection between HUB devices

Yes we tested with pings and also the indicators are green



7. Run Wireshark program and start capturing your active interface (eth0). Before capturing, all computers have to stop pinging (Ctrl+C)

Since we are using a simulator, we are not to run wireshark instead we use sniffer component of packet tracer which is also a sniffer just like wireshark is, and we already added that component and configured such it works.

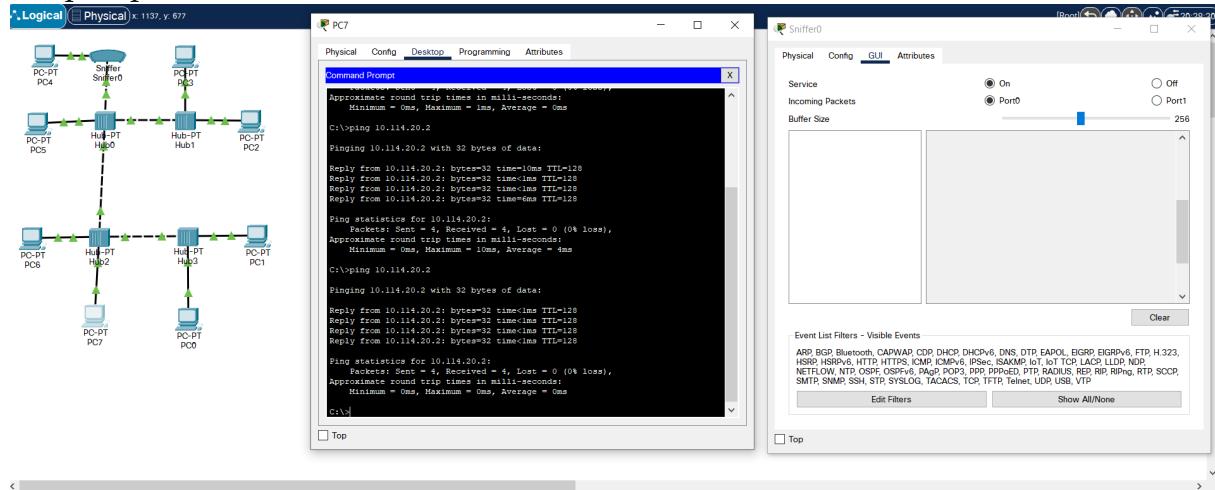


8.Only one computer (decided by lab instructor, lets call A) will start to ping a destination computer (lets say B), and all others will observe the captured packets on Wireshark

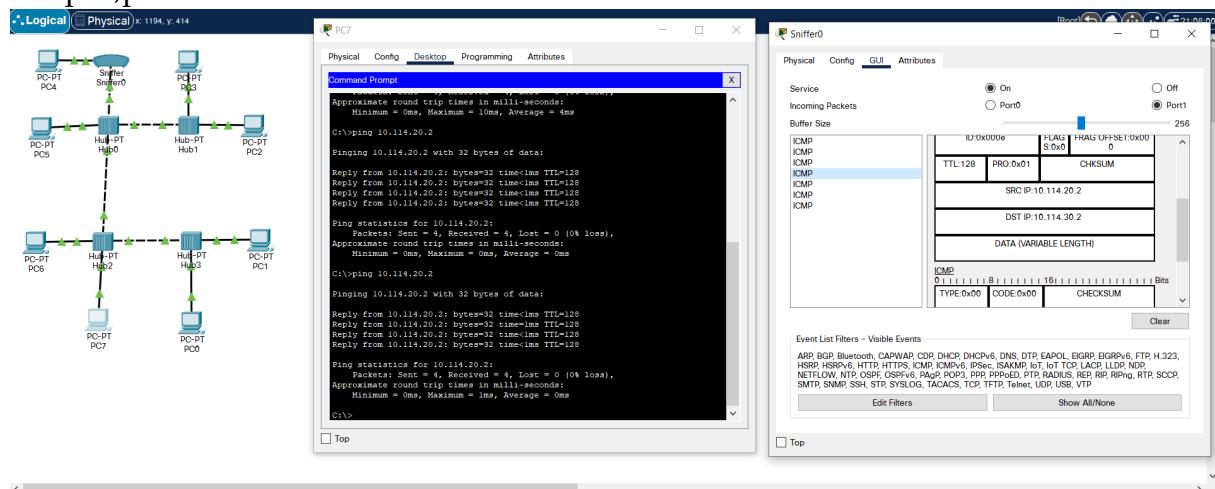
We have run several tests to observe ping system. Our test pc is pc4, has a sniffer and we send pings between different combinations of pcs. After each experiment we restarted the sniffer. See below screenshots and their descriptions for our observations.

If port 0 is selected in packet sniffer, we cannot capture ping from the sniffer except sending ping to devices which is connected to the packet sniffer. In this case also ARP is sent, which can be seen in some screenshots. If port 1 is selected, then we capture every ping action as we can see in screenshots.

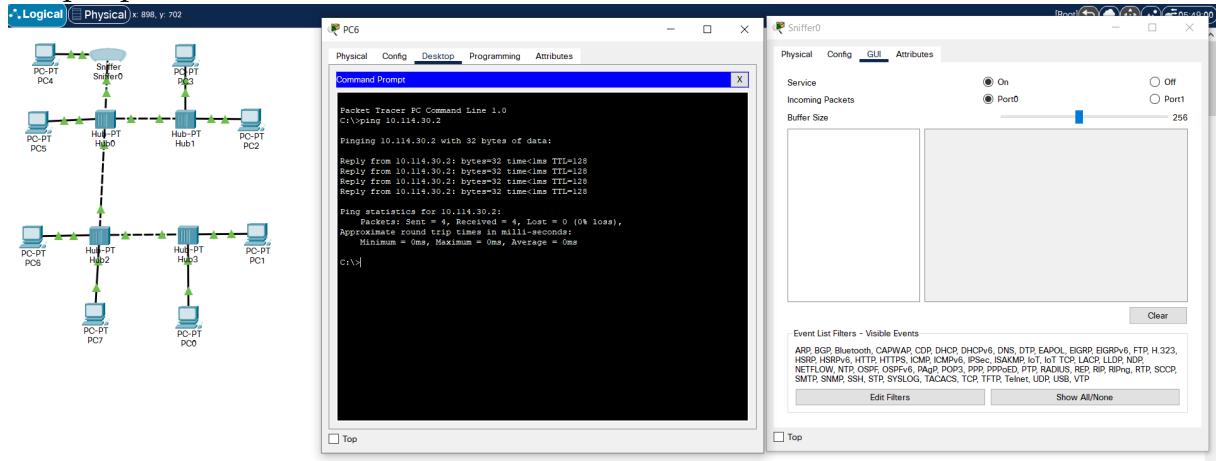
pc7 to pc3, port 0



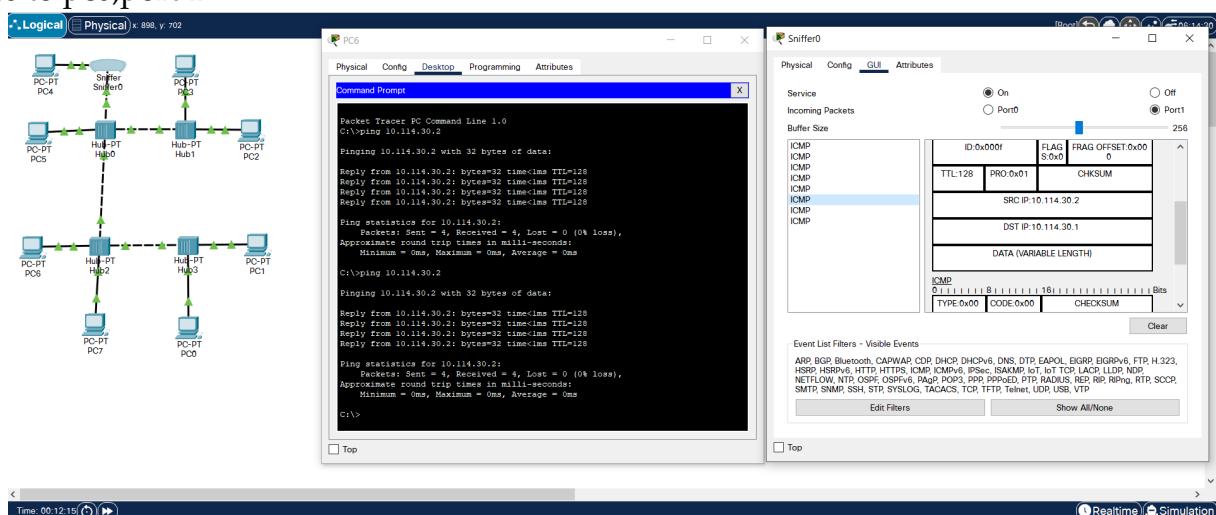
pc7 to pc3, port 1



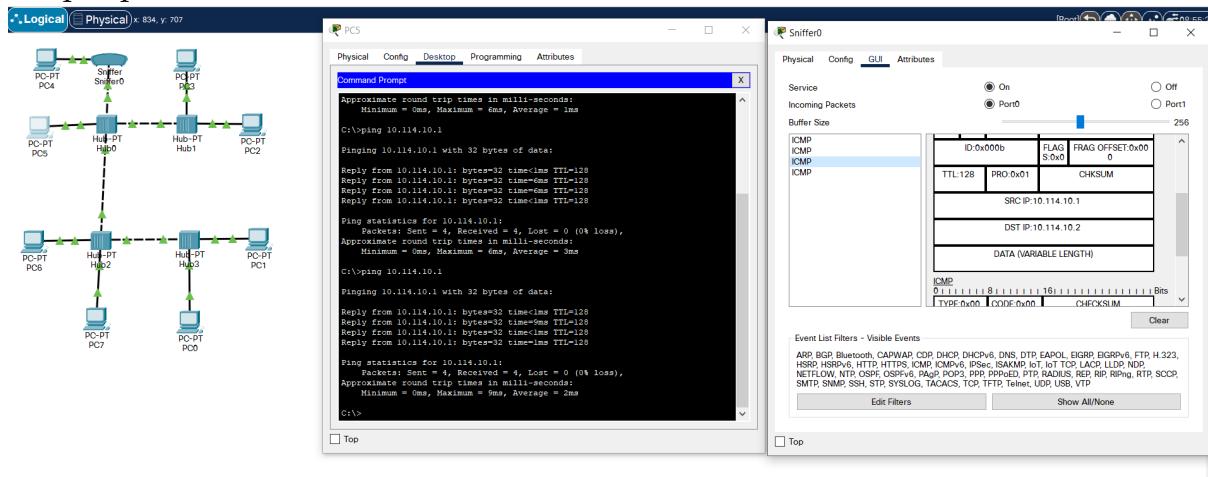
pc6 to pc0, port 0



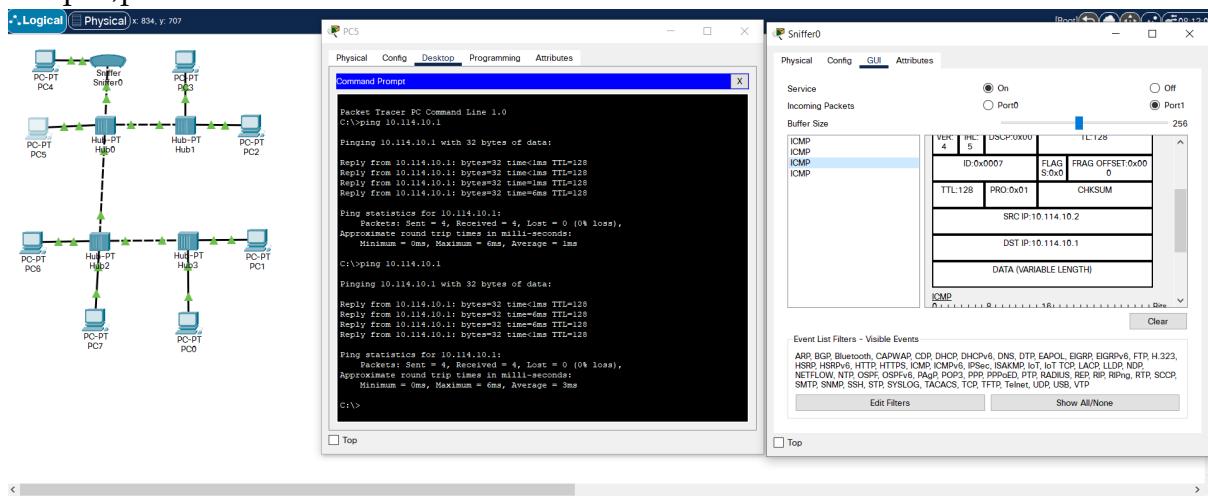
pc6 to pc0, port 1



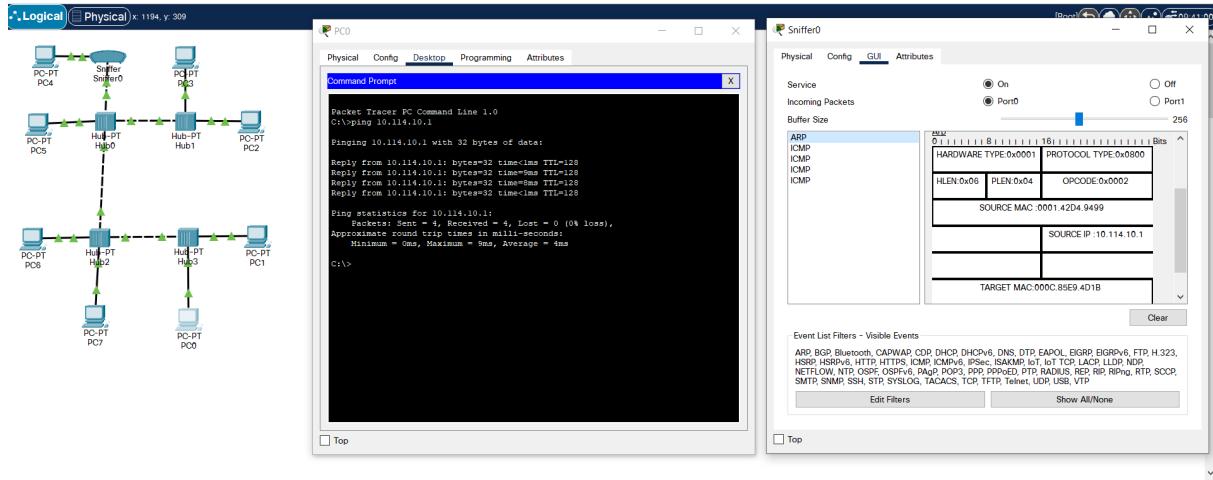
pc5 to pc4, port 0



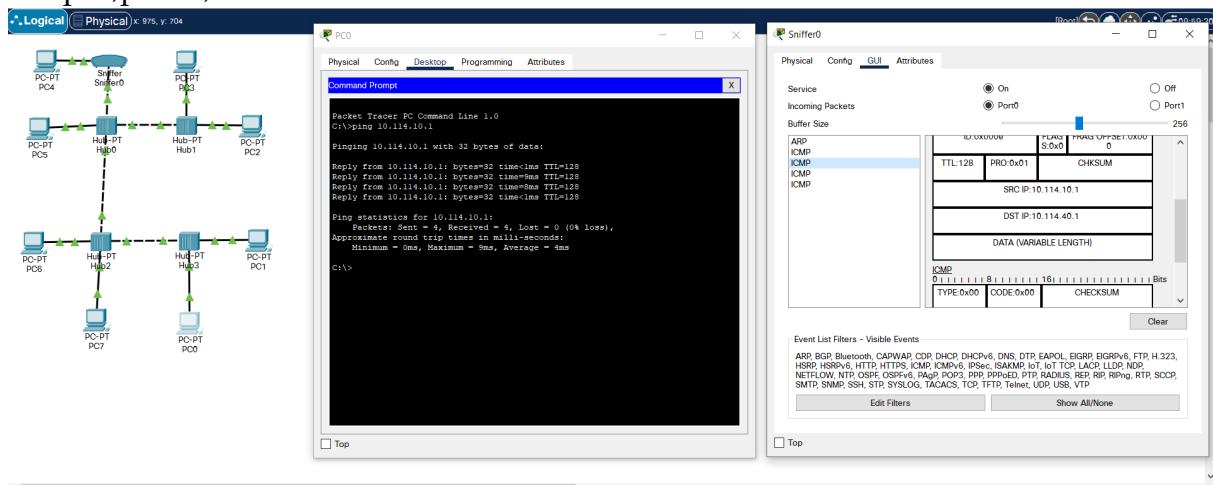
pc5 to pc4, port 1



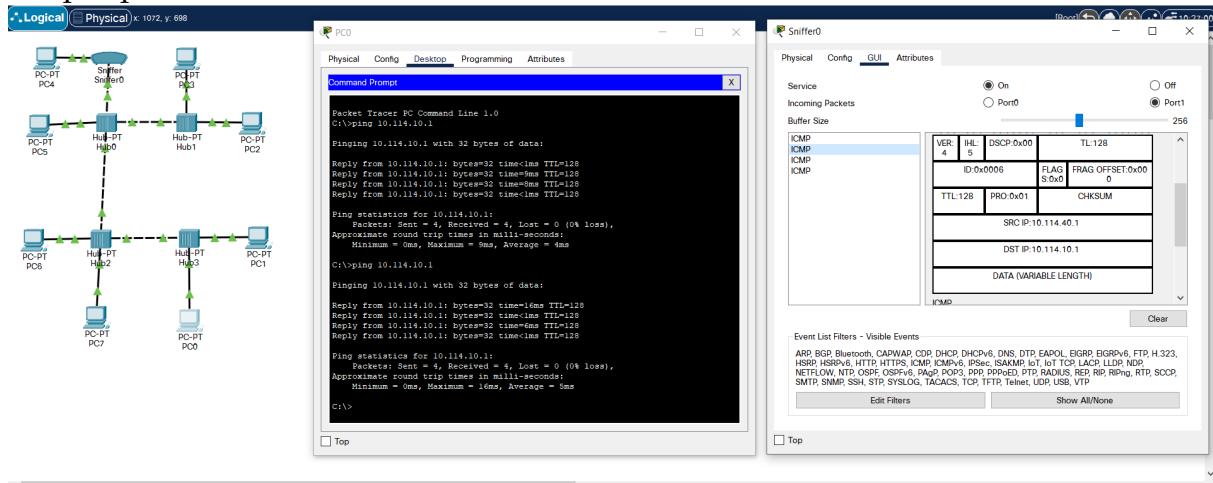
pc0 to pc4, port 0, ARP



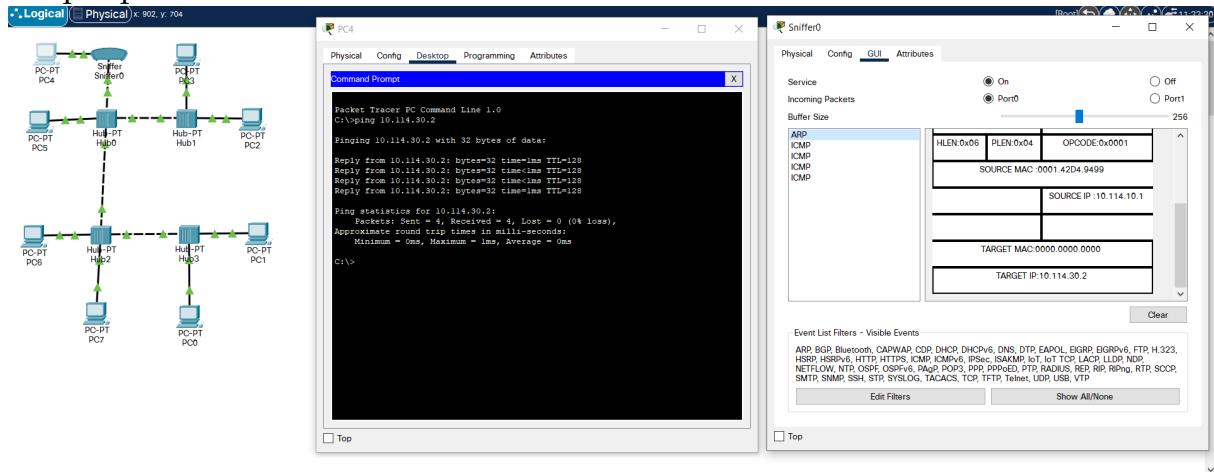
pc0 to pc4, port 0, ICMP



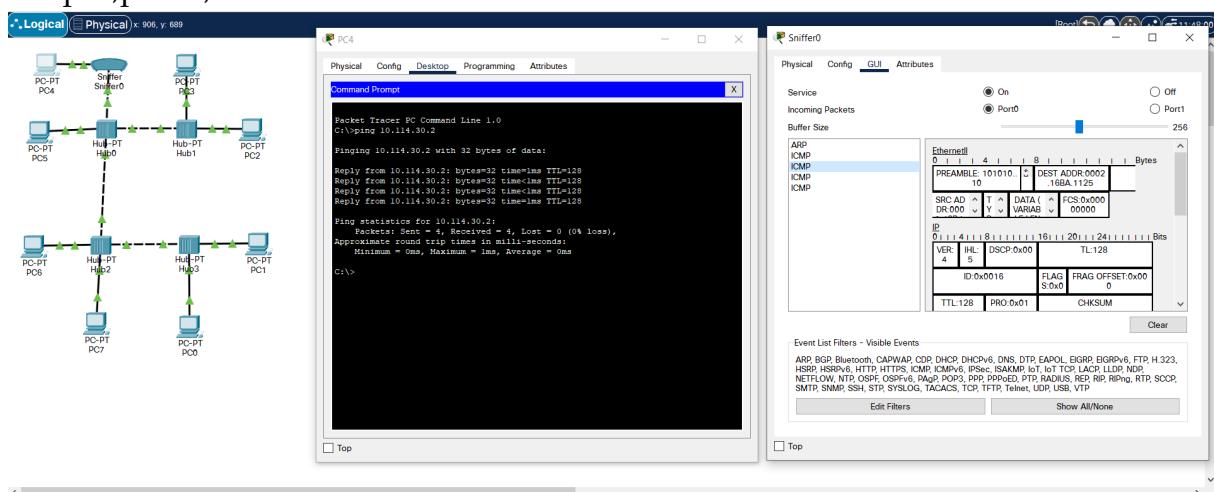
pc0 to pc4, port 1



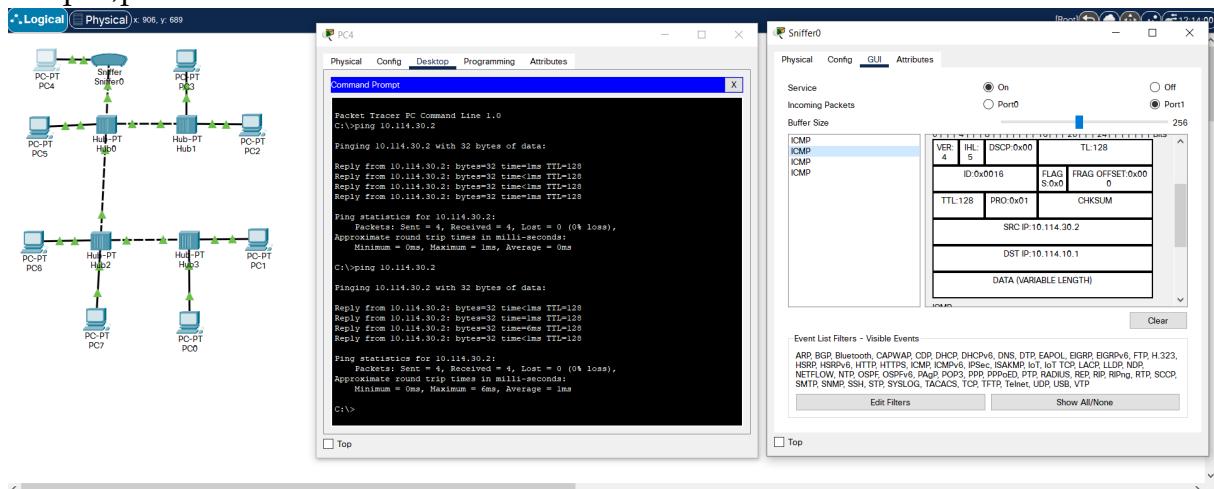
pc4 to pc7, port 0, ARP



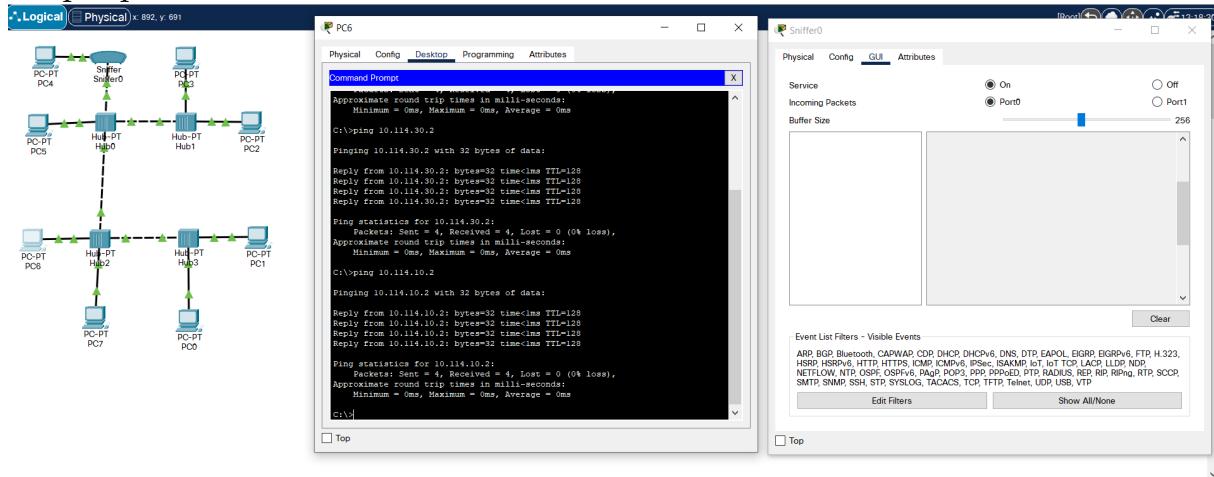
pc4 to pc7, port 0, ICMP



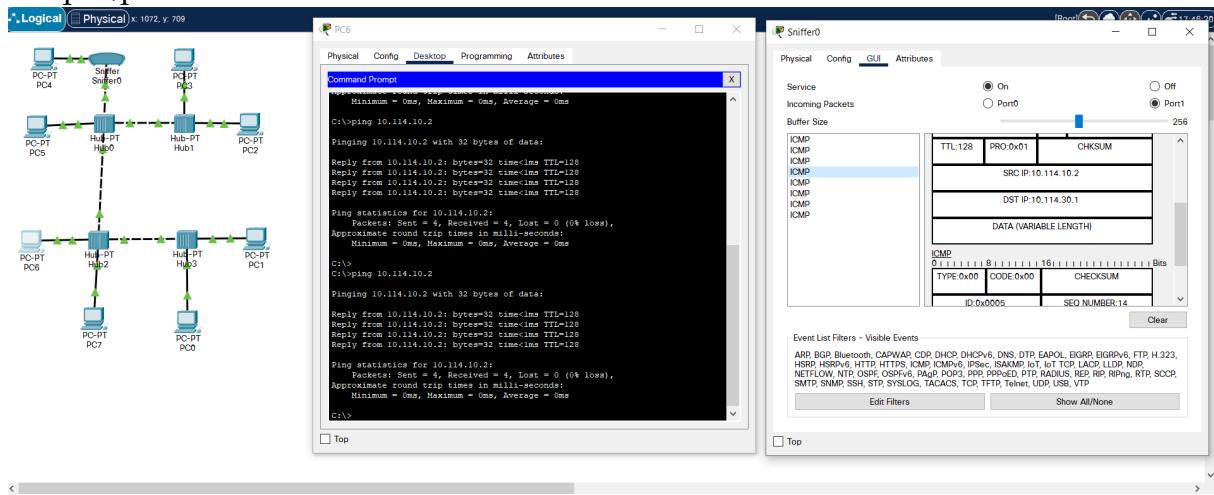
pc4 to pc7, port 1



pc6 to pc5, port 0



pc6 to pc5, port 1



9. After observing ping packets, computer A will start an FTP connection to the FTP server on B. In the meantime all other computers will observe the connection and login process. (Lab instructor will determine the computer B and configure FTP user settings)

Skipped since Teacher instructed so.

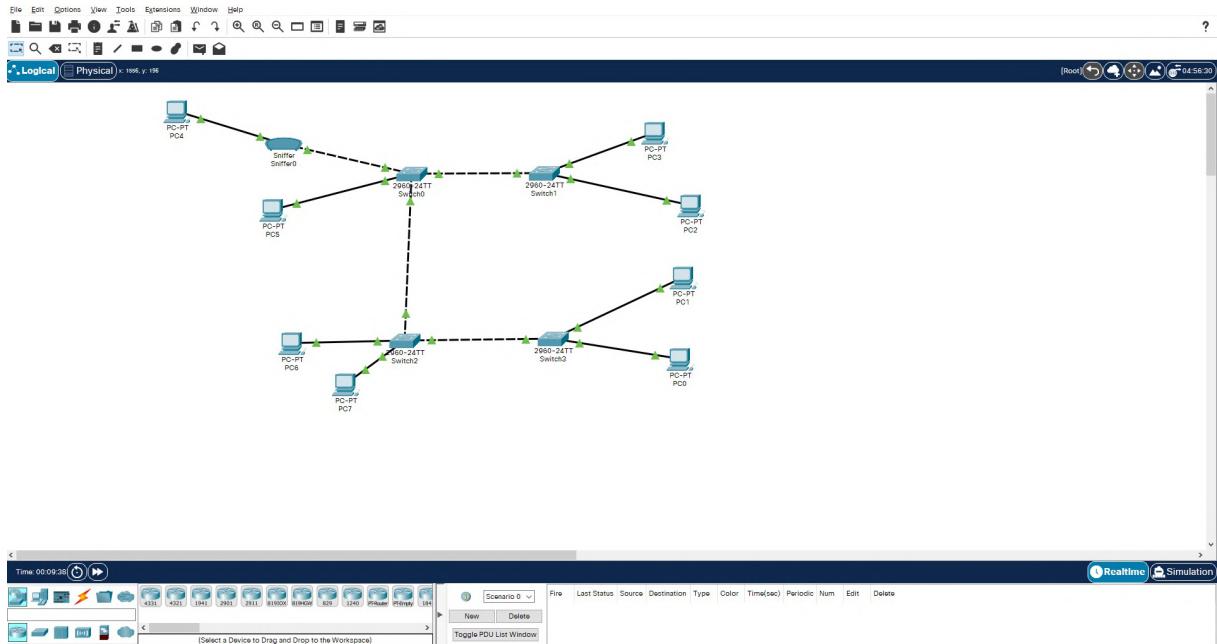
10. You should mention all steps you have done (with printscreens) and discuss about your observations.

We have added as much as screenshots as we can.

Using Switch

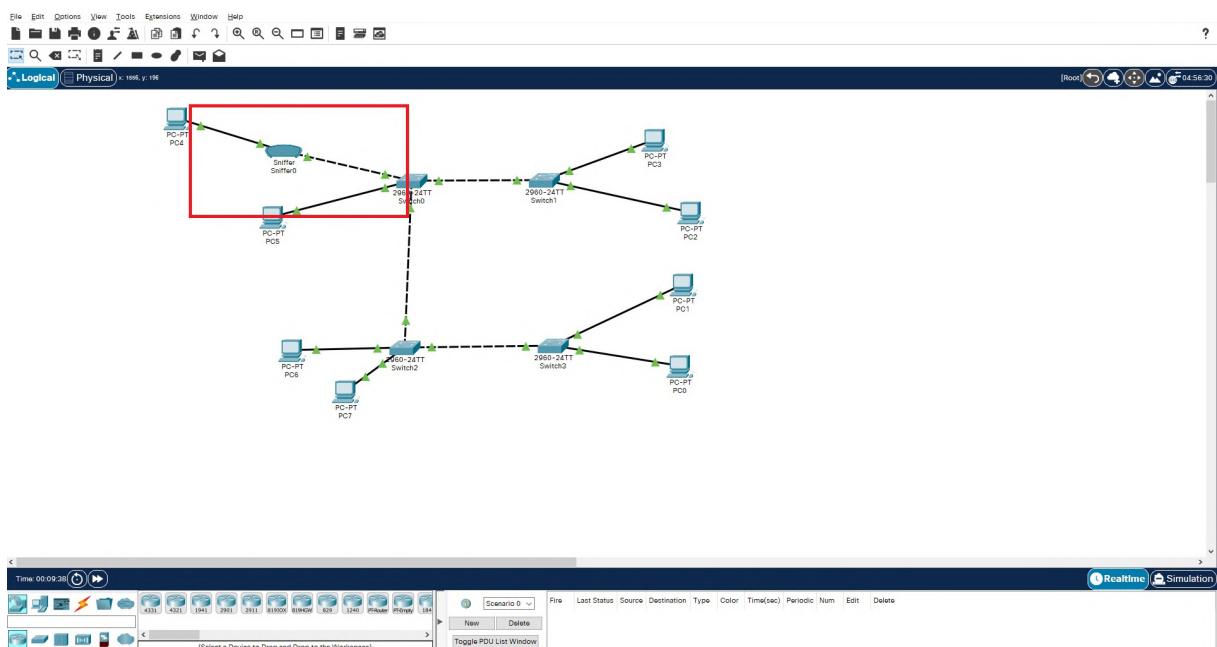
11. Change the HUB devices with Switches and create same topology described in Figure-1

We changed as screenshot below.



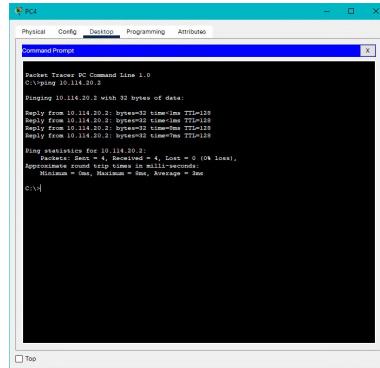
12. Make sure that your Ethernet interface of your computer is active, and your cable is plugged to your group's Switch device. Green light on your Switch's port indicates that there is a physical connection established between the hub and the end device

Light is green as screenshot below



13. Check that you can ping other computers in the local network (using ping <IP address> command)

We pinged pc3 from our test computer pc4, and ping resulted in confirmation.

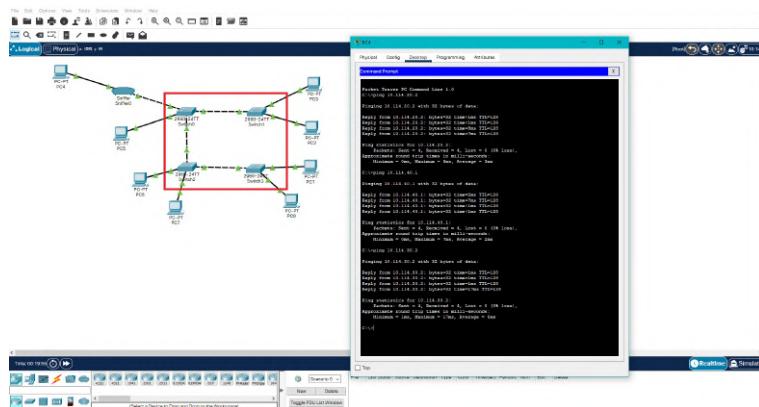


```
PC4
Physical Config Desktop Programming Attributes
Packet Tracer PC Command Line 1.0
C:\pinging 10.114.20.2 with 32 bytes of data:
Reply from 10.114.20.2: bytes=32 time=1ms TTL=128

Ping statistics for 10.114.20.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms Maximum = 1ms, Average = 1ms
C:\[1]
```

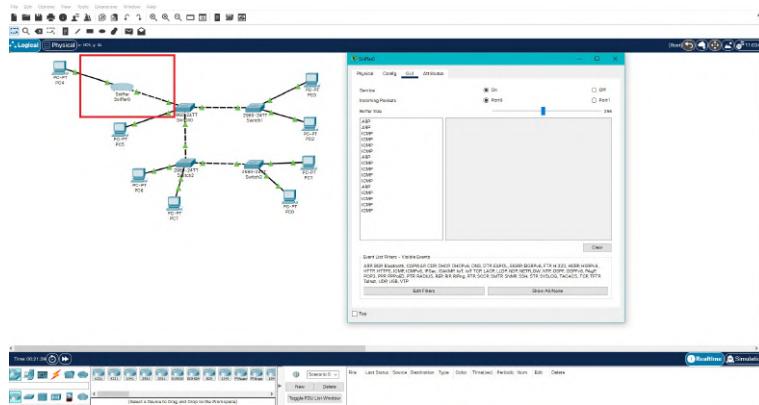
14. Make sure that there is a connection between Switch devices

We can ping computers from all switches and the connection lights are green.



15. Run Wireshark program and start capturing your active interface (eth0). Before capturing, all computers have to stop pinging (Ctrl+C)

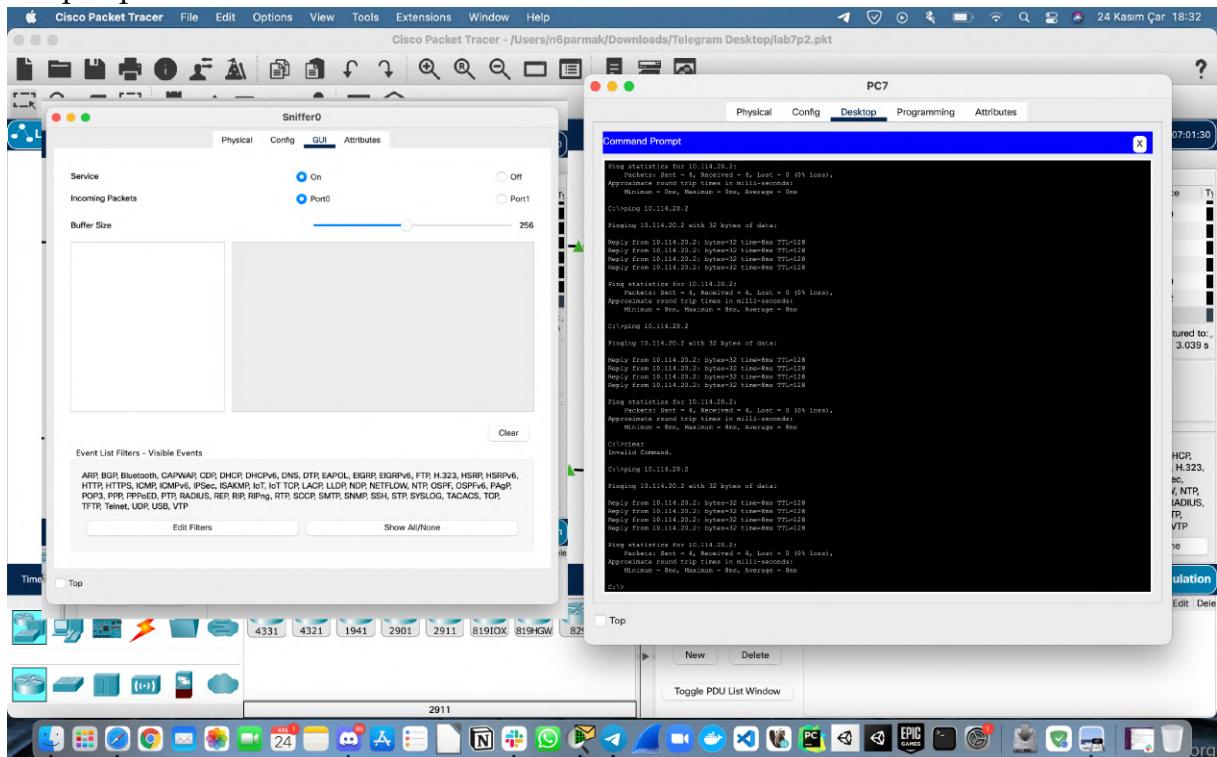
Since we are using a simulator, we are not to run wireshark instead we use sniffer component of packet tracer which is also a sniffer just like wireshark is, and we already added that component and configured such that it works.



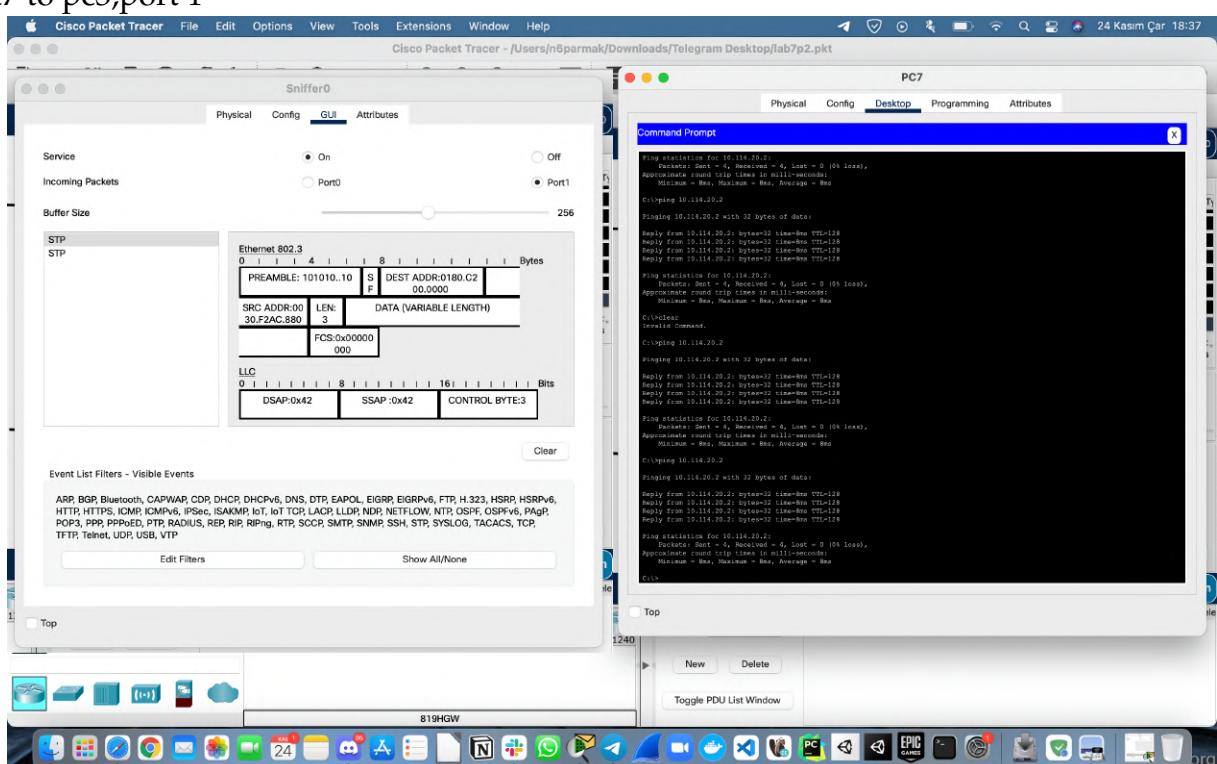
16. Only one computer (decided by lab instructor, lets call A) will start to ping a destination computer (lets say B), and all others will observe the captured packets on Wireshark

We have done several ping tests. Main difference we observed is there is STP calls in switcher system and there is no sniffing ICMP call when sending to other pcs.

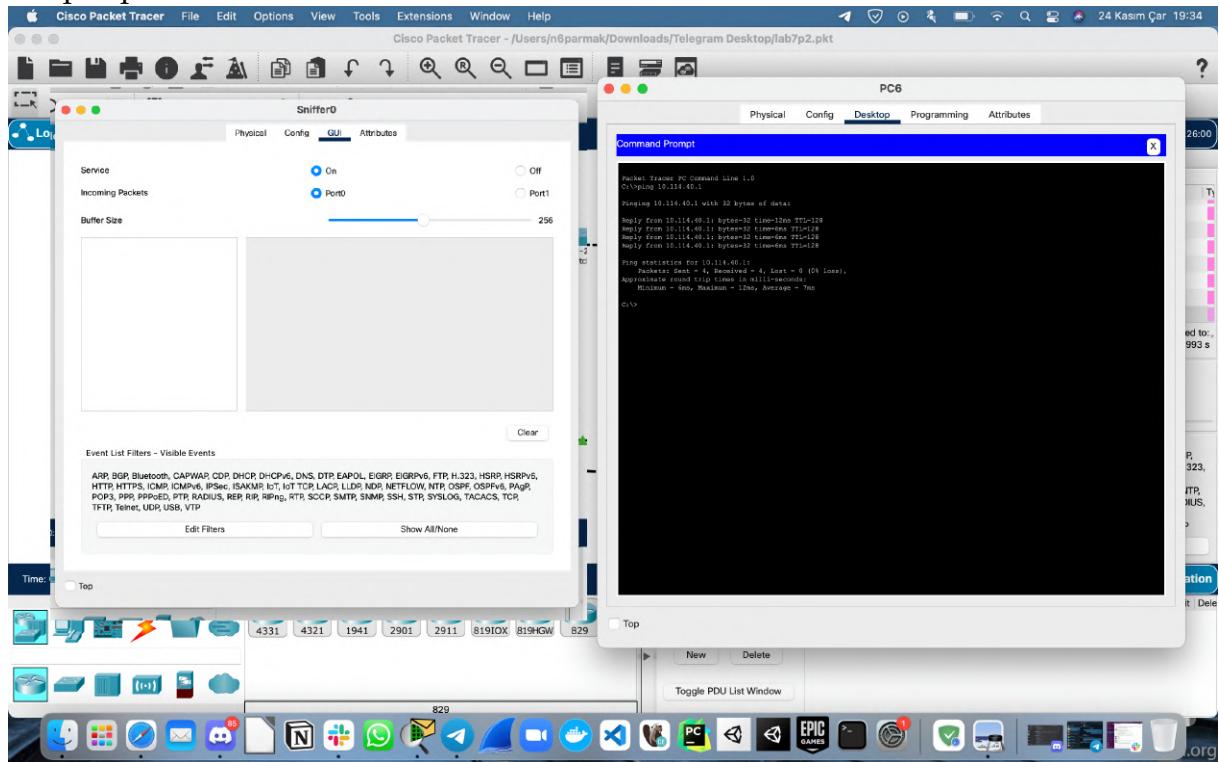
pc7 to pc3, port 0



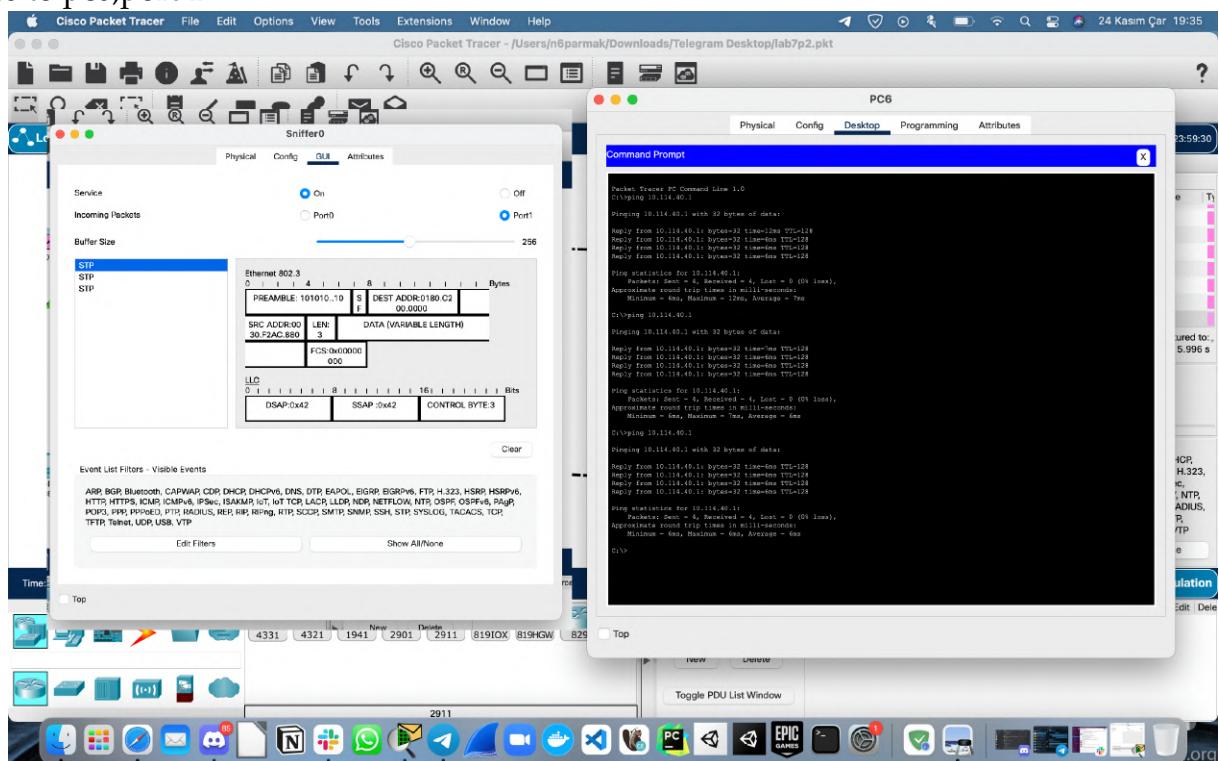
pc7 to pc3, port 1



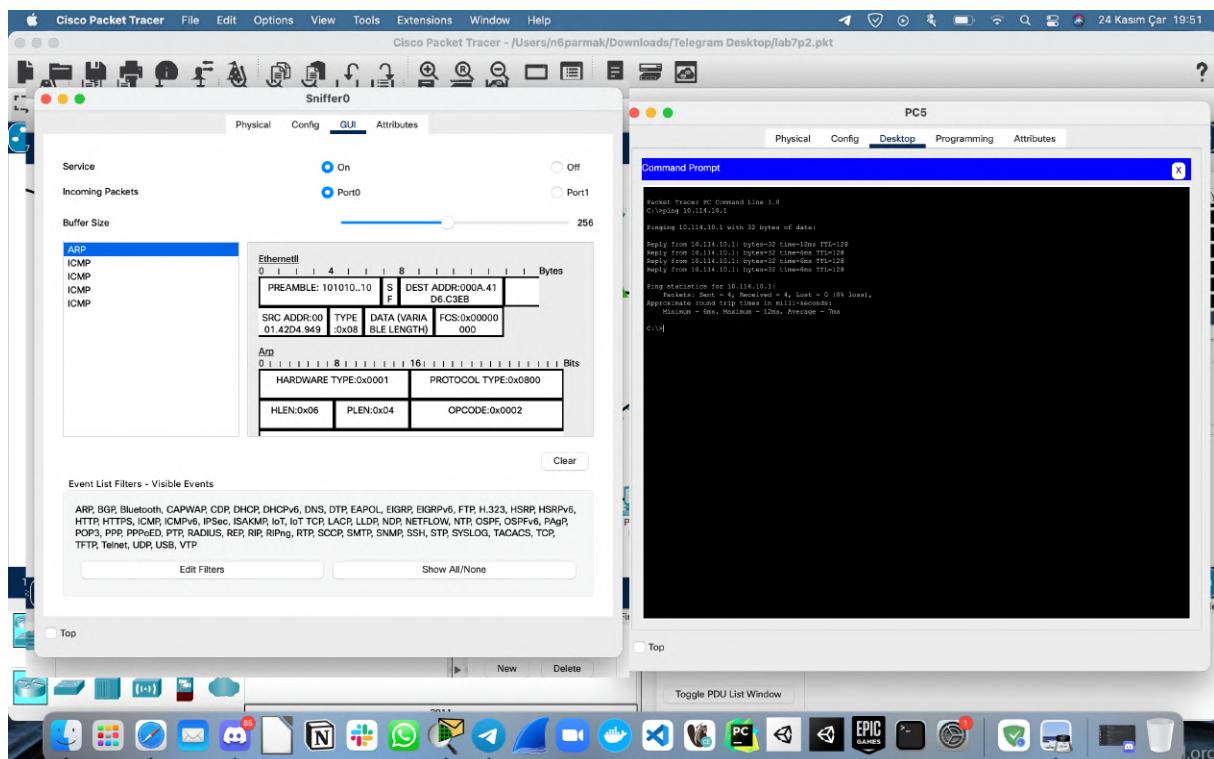
pc6 to pc0, port 0



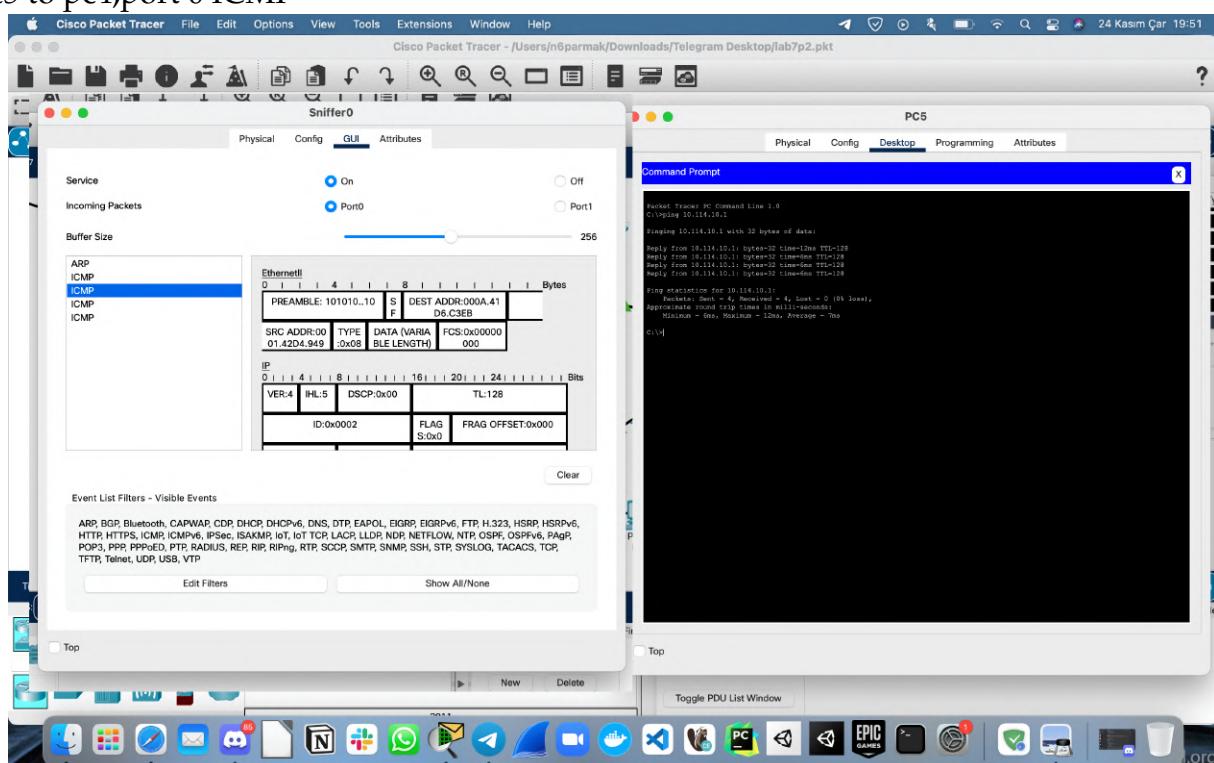
pc6 to pc0, port 1



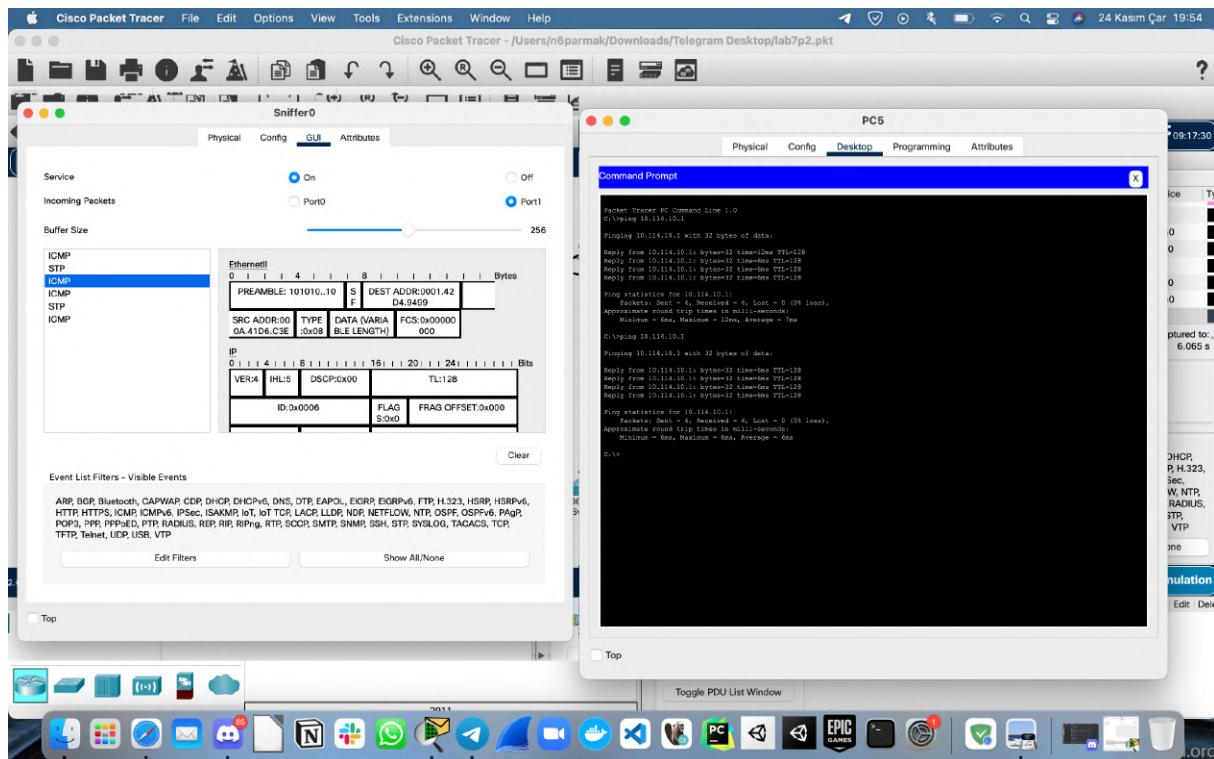
pc5 to pc4, port 0 ARP



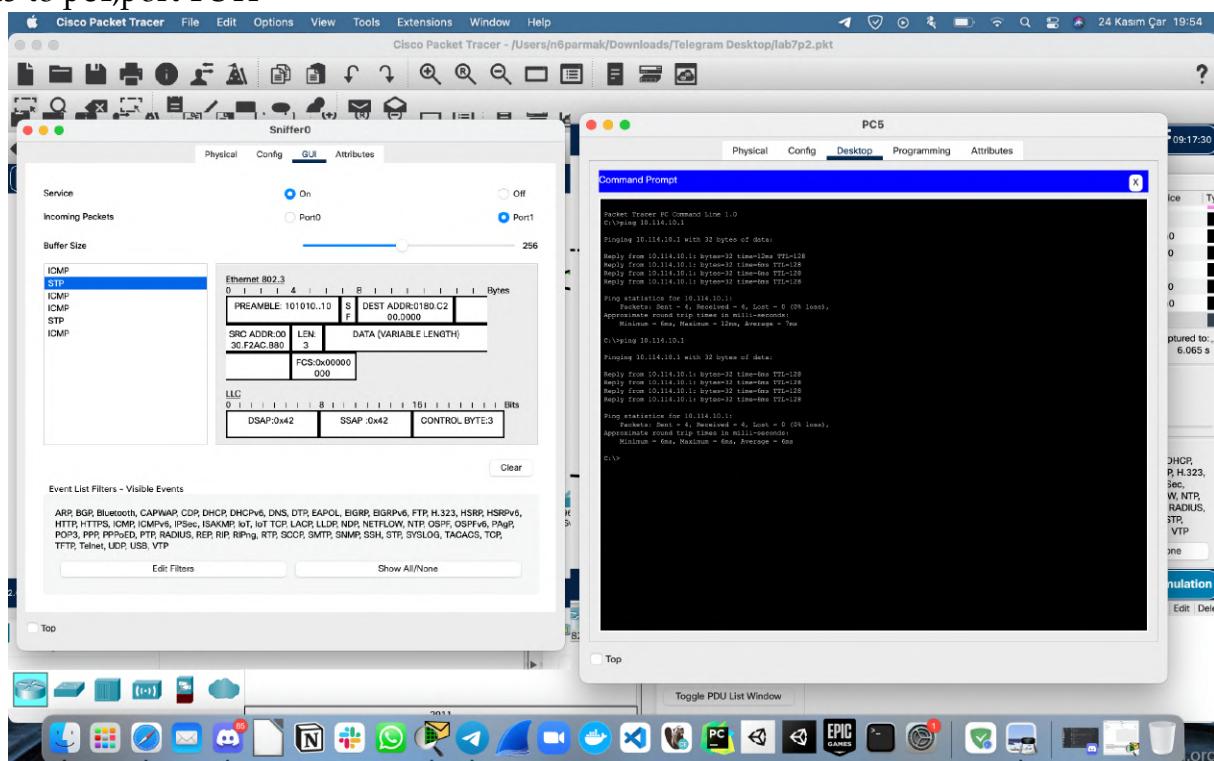
pc5 to pc4, port 0 ICMP



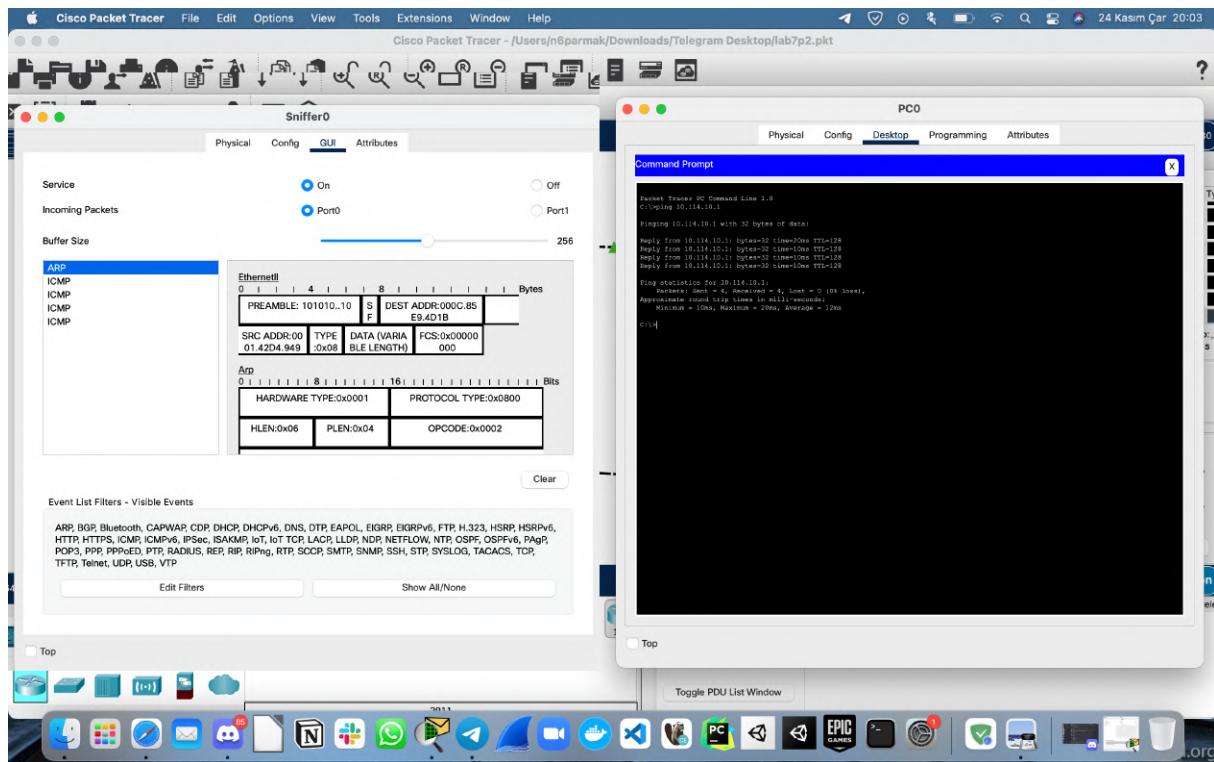
pc5 to pc4, port 1 ICMP



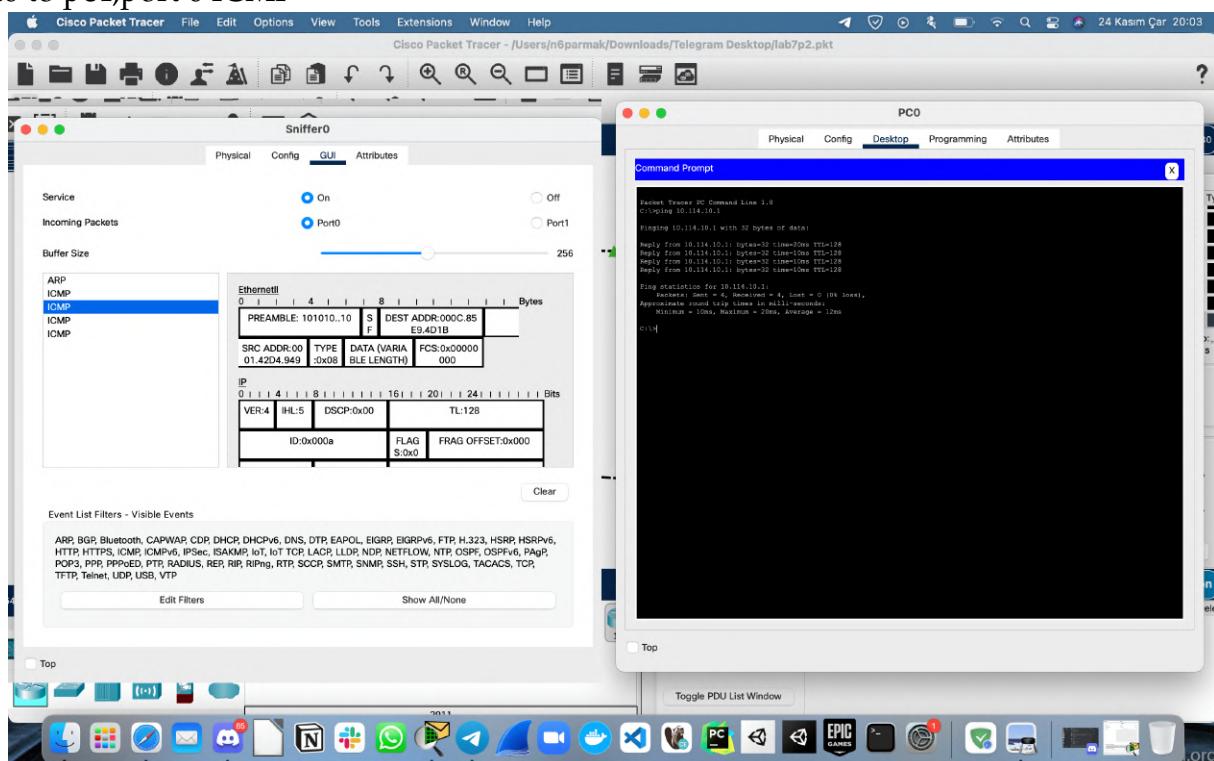
pc5 to pc4, port 1 STP



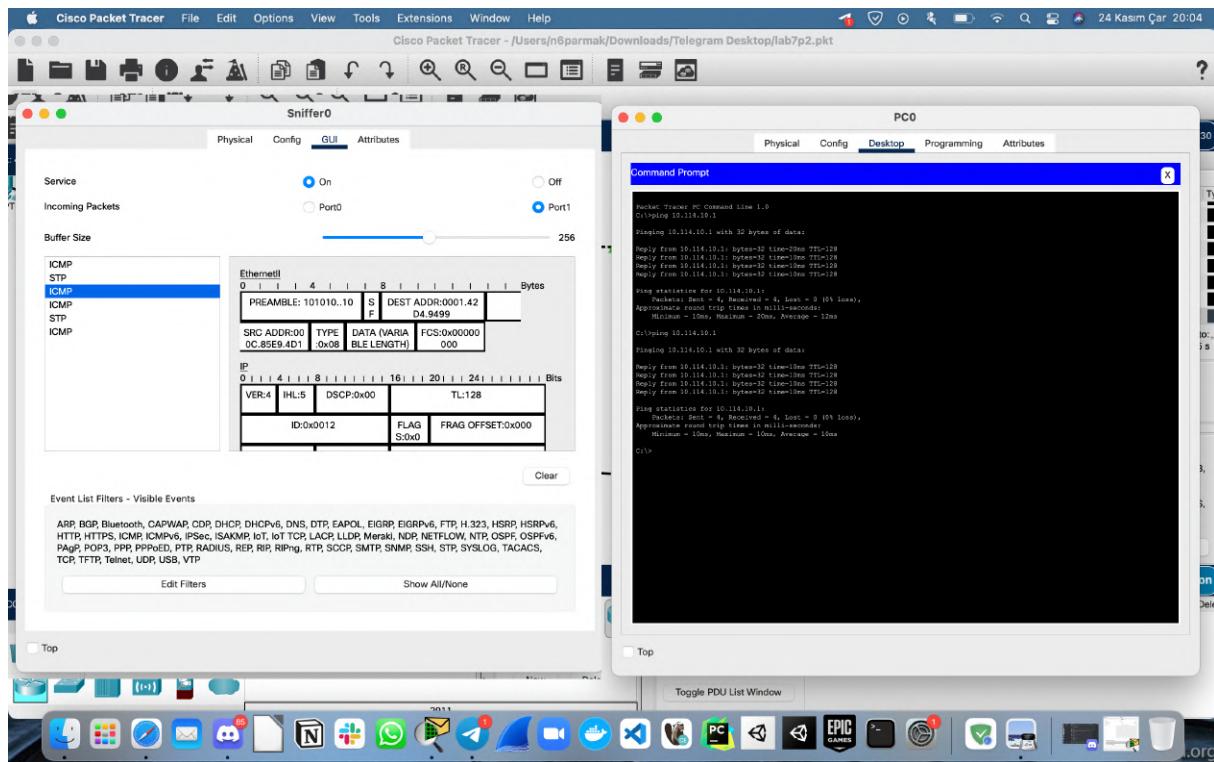
pc0 to pc4, port 0 ARP



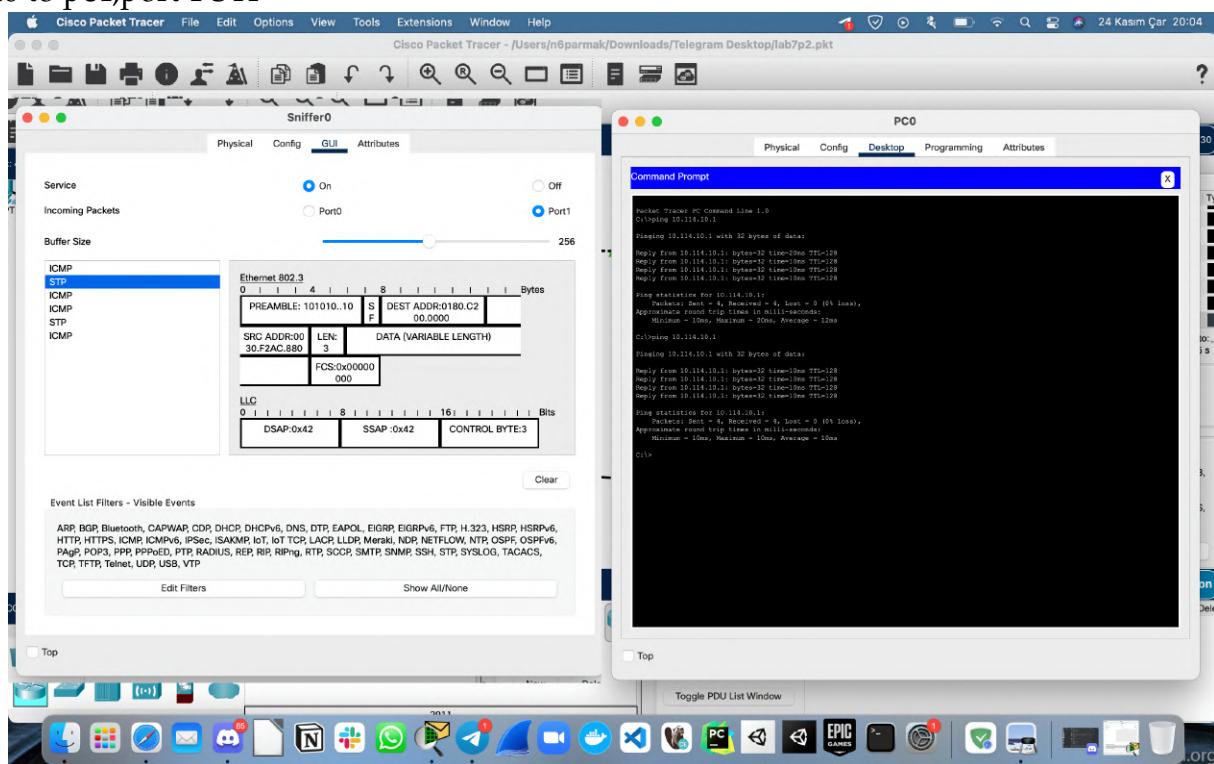
pc0 to pc4, port 0 ICMP



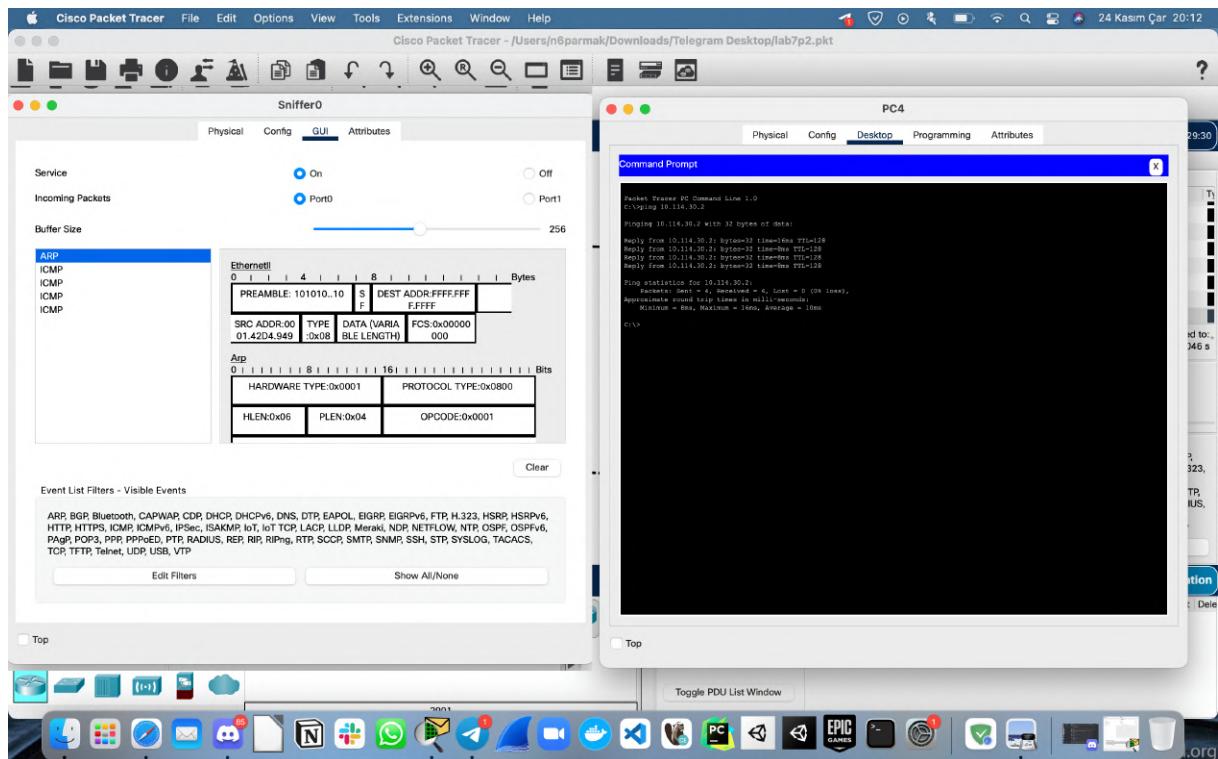
pc0 to pc4, port 1 ICMP



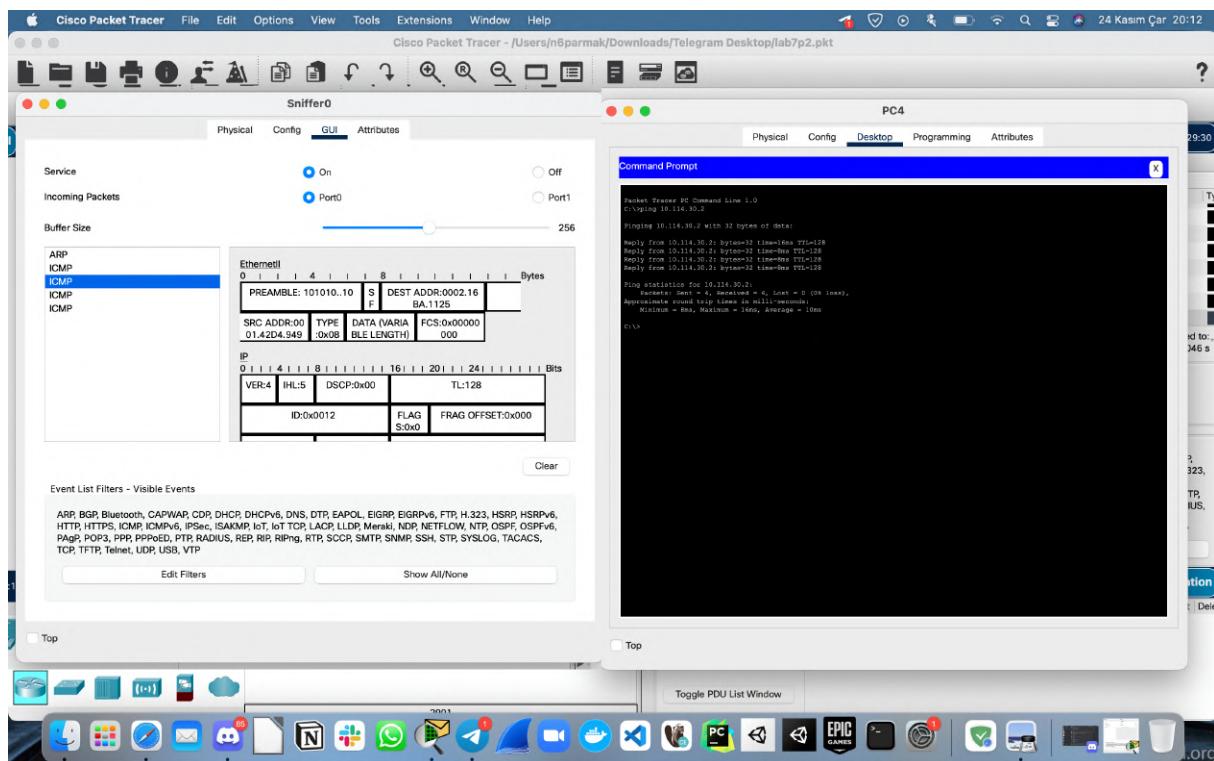
pc0 to pc4, port 1 STP



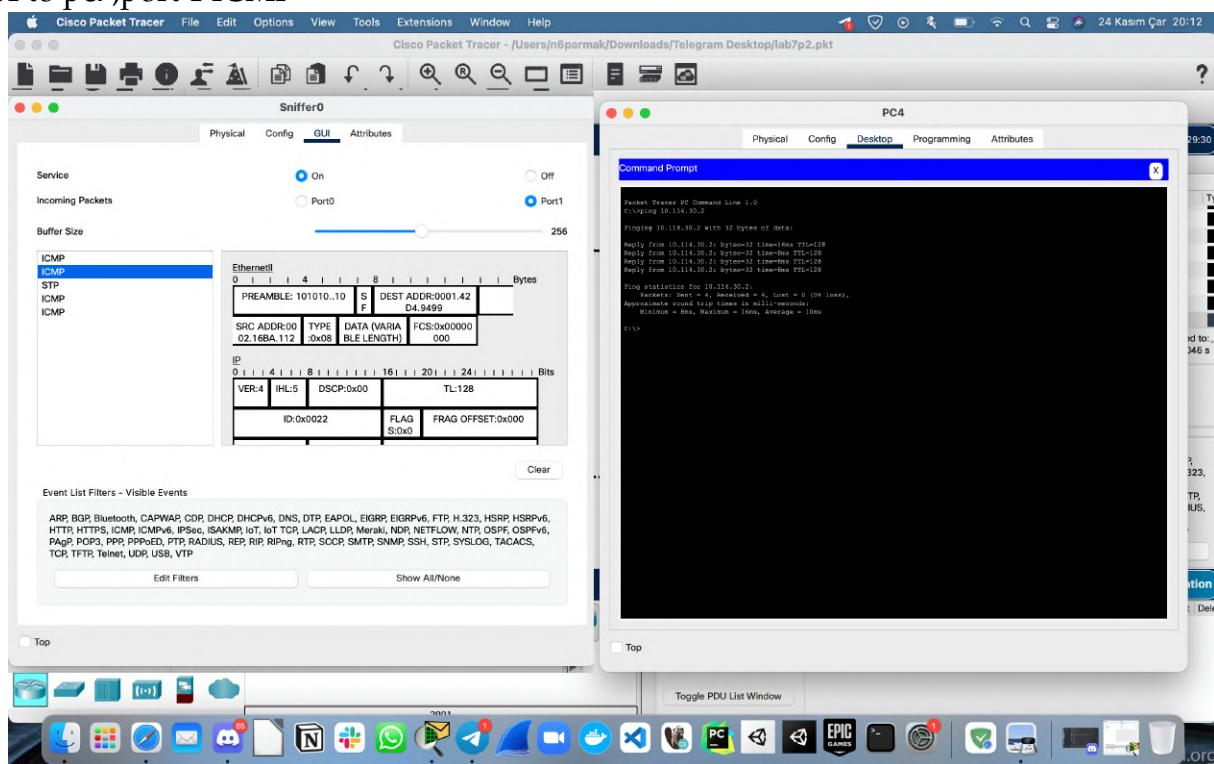
pc4 to pc7, port 0 ARP



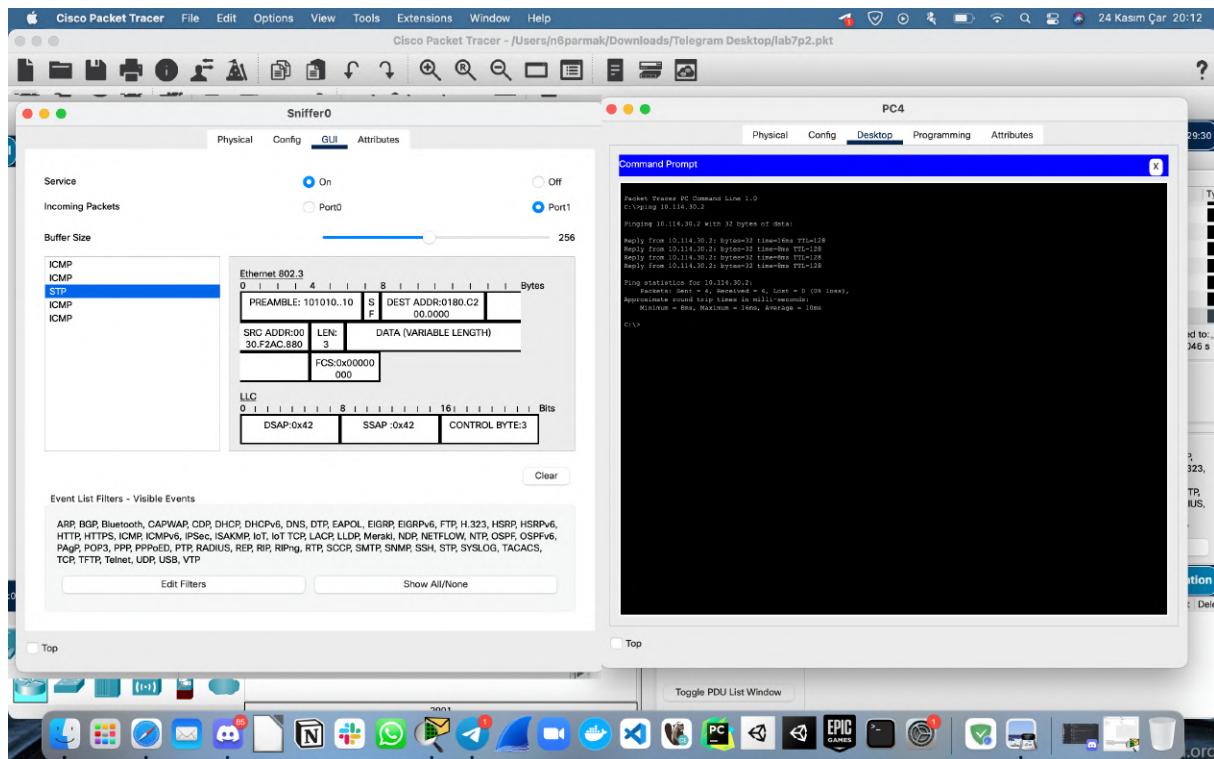
pc4 to pc7, port 0 ICMP



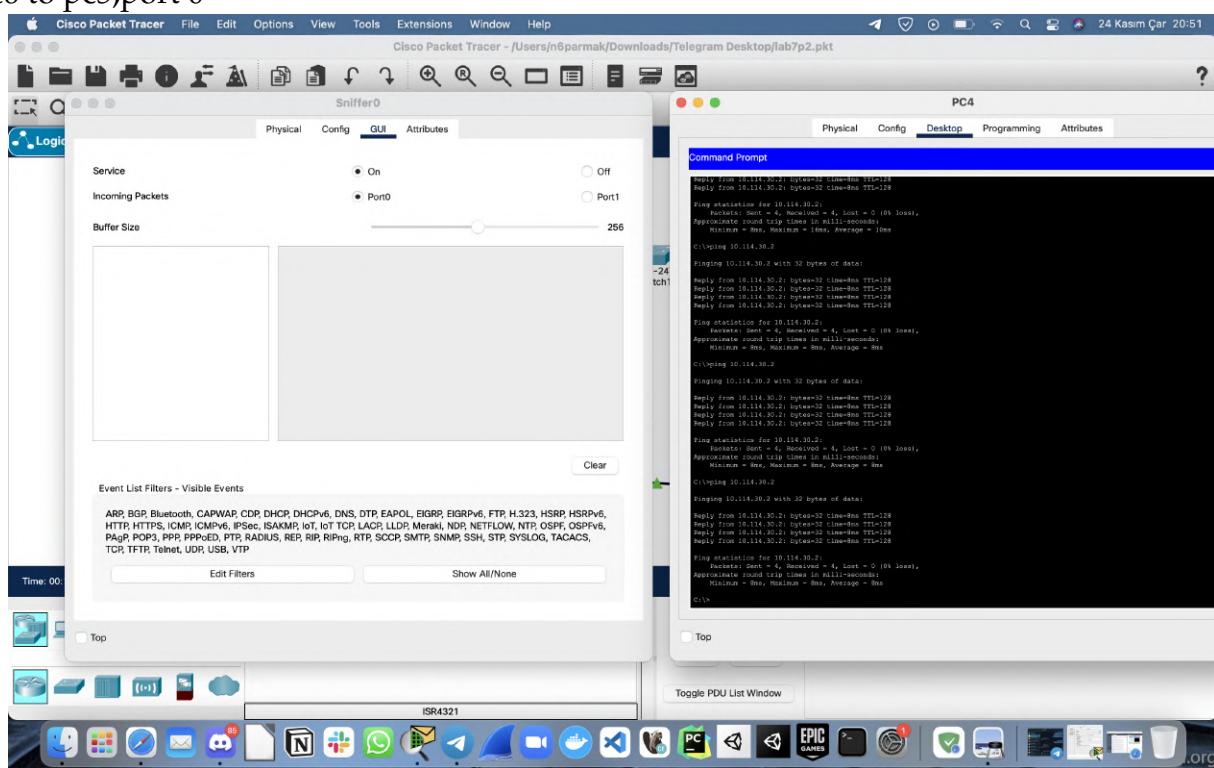
pc4 to pc7, port 1 ICMP



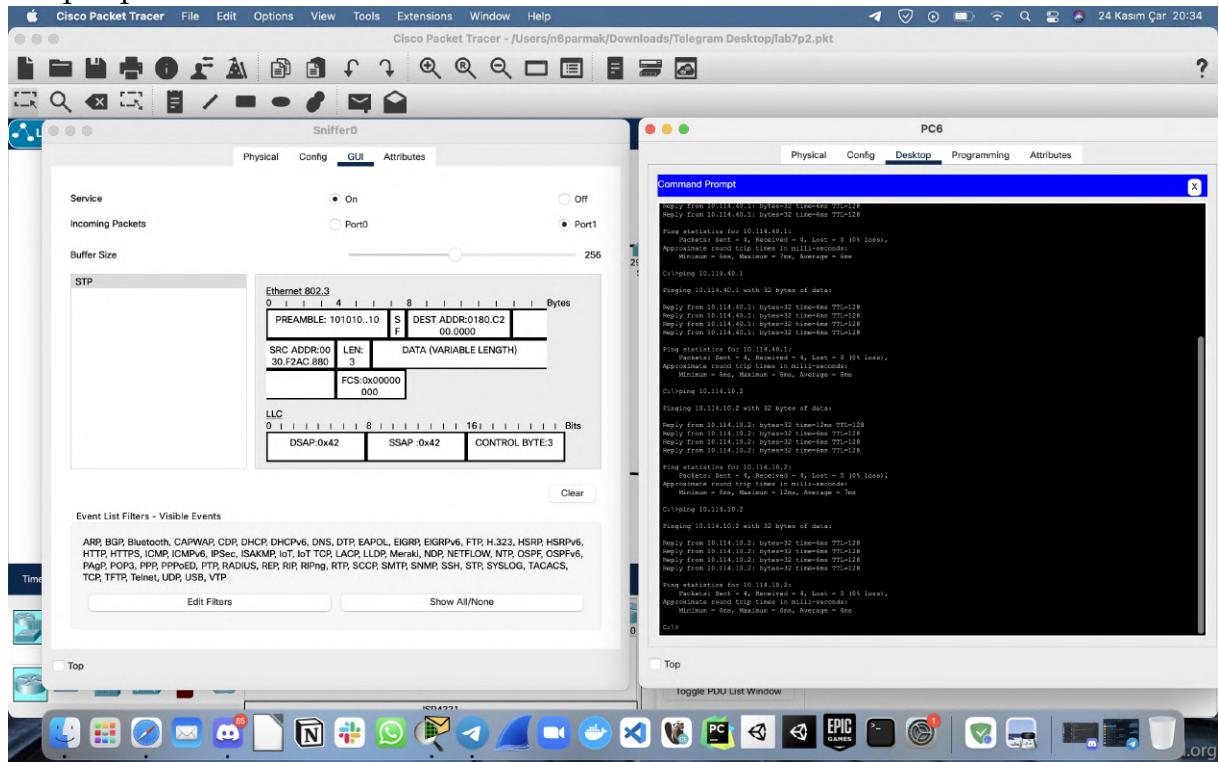
pc4 to pc7, port 1 STP



pc6 to pc5, port 0



pc6 to pc5, port 1



17. After observing ping packets, computer A will start an FTP connection to the FTP server on B. In the meantime all other computers will observe the connection and login process. (Lab instructor will determine the computer B and configure FTP user settings)

Skipped since Teacher instructed so.

18. You should mention all steps you have done (with printscreens) and discuss about your observations

We have added as much as screenshots as we can.

19. Discuss the differences between HUB and Switch as you see in the experiments. Reach a conclusion about their working logic

We have seen that main difference is we are unable to sniff packets in switch structure, since there is no incoming message other than the pinged address. Also we have realized the number of ports (ethernet inputs) are more in the switch system.

20. Describe the protocol other than ICMP that you saw in this scenario which was mentioned in introduction part. And explain why you observe it and associate with the frame sending process in Local Area Network

ARP protocol is seen in the experiment. The reason of the usage of ARP protocol is determining the device which is pinged with IP address in the LAN in this scenario. This is because of translating network-layer addresses and link-layer. The true device send back a message that the IP address is true, to sender.

REFERENCES

LaTex Tutorials
Assignment Paper