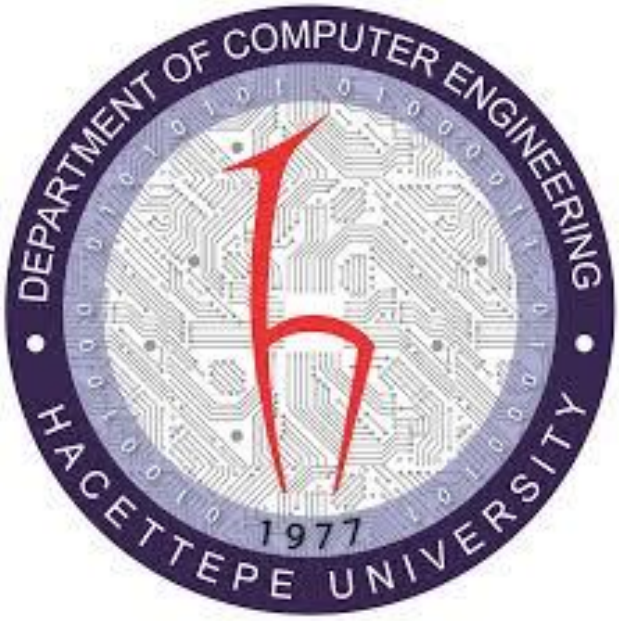
HACETTEPE UNIVERSITY

COMPUTER ENGINEERING DEPARTMENT

COMPUTER NETWORKS LABORATORY



EXPERIMENT

Local Area Networks (LANs) and Ethernet

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AIM OF EXPERIMENT:

In this lab experiment, we created a LAN using HUBs and Switches. We learnt preparation of straight-through and crossover network cables, to connect related devices. We saw the differences of HUB and Switch in Local Area Network using Cisco packet tracer.

DEFINITIONS:

Straight-through cables: are often called an Ethernet cable.

Crossover cables: it crosses over the wire from pin 1 at one end to pin 3 at the other connector.

Differences: When you connect two devices of different types together, you use a straight through cable. When you connect two devices of the same type together, you use a crossover cable.

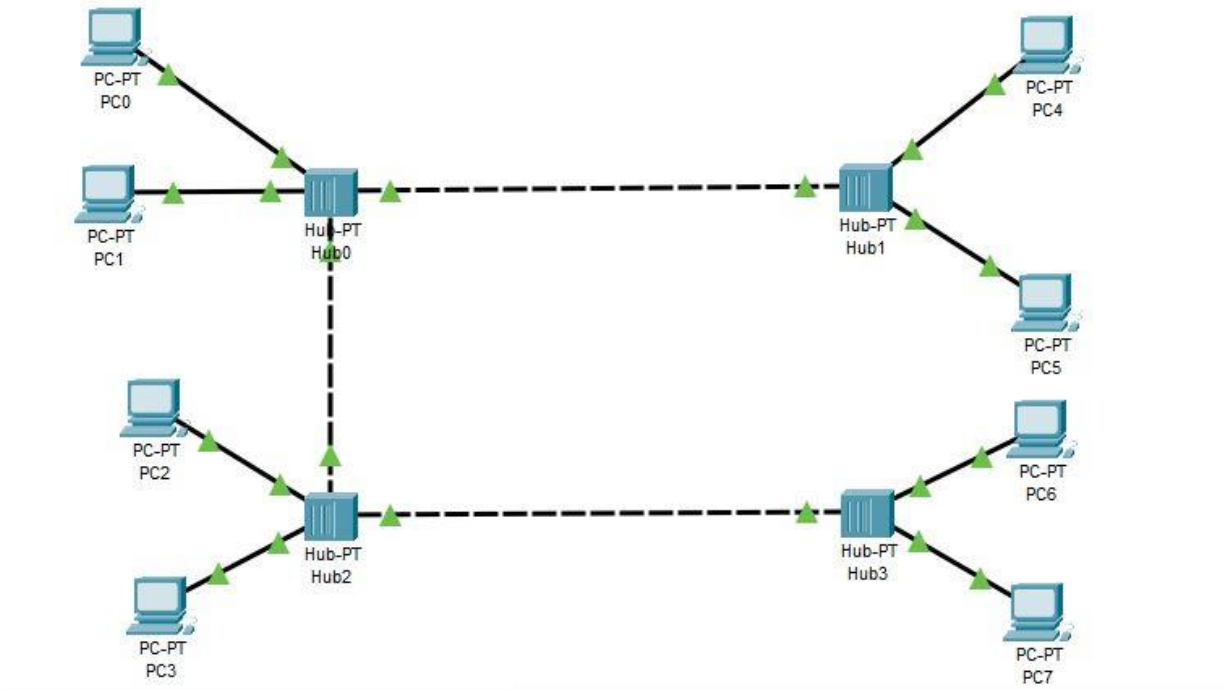
Hub: Hub is a networking device which is used to transmit the signal to each port to respond from which the signal was received. Hub is operated on Physical layer.

Switch: Switch is a network device which is used to enable the connection establishment and connection termination on the basis of need. Switch is operated on Data link layer.

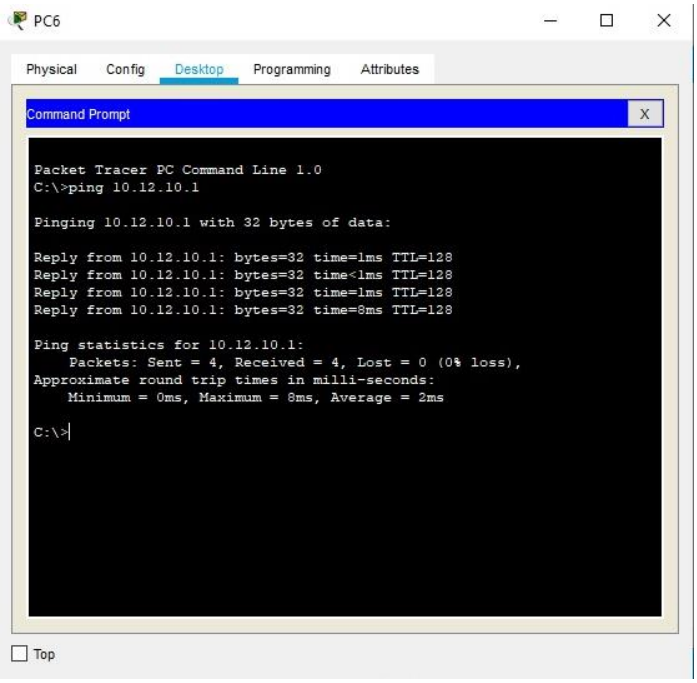
Differences: Hub works on physical layer, while switch works on data link layer. Hub can't be a repeater while switch can.

STEPS TAKEN:

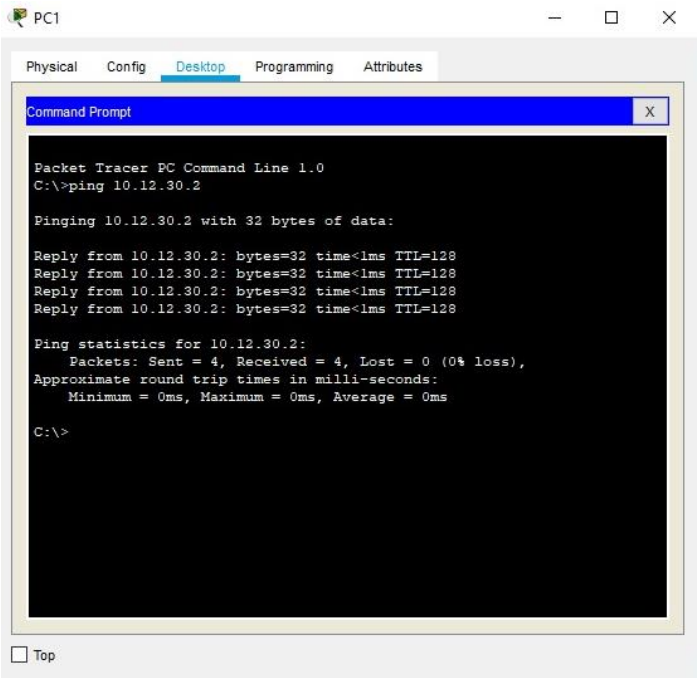
Hub-net:



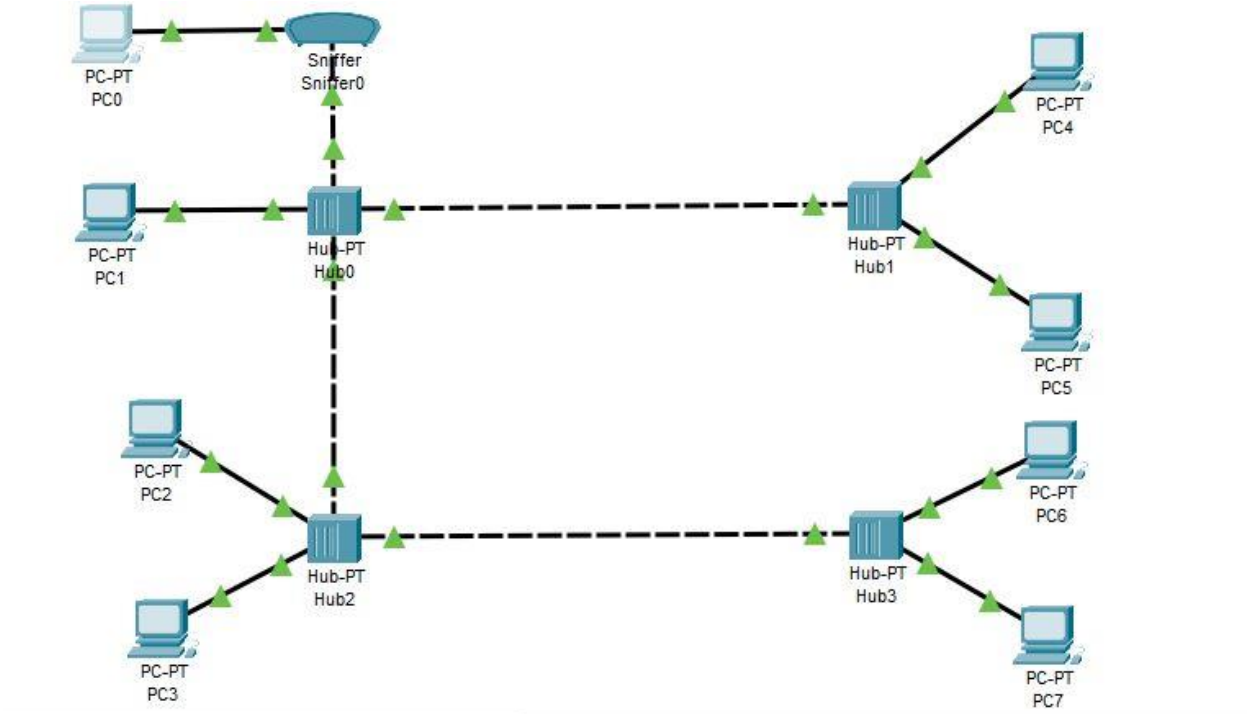
PC6 to PC0:



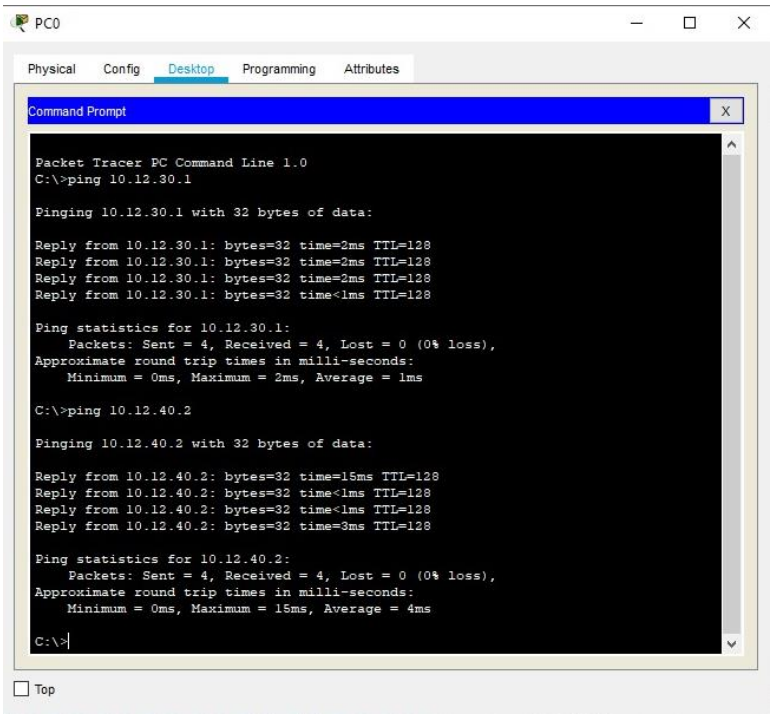
PC1 to PC5:



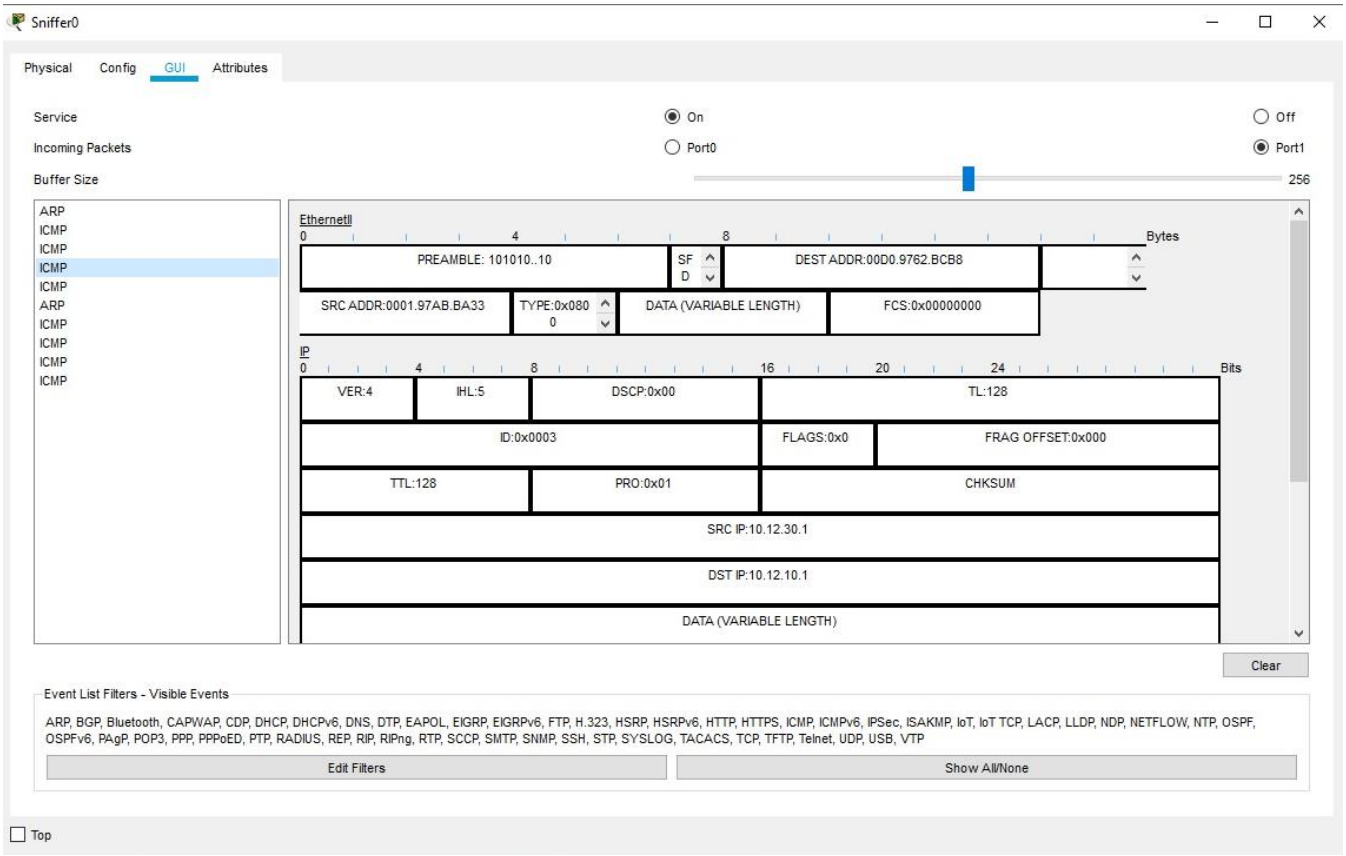
Hub-net with sniffer:



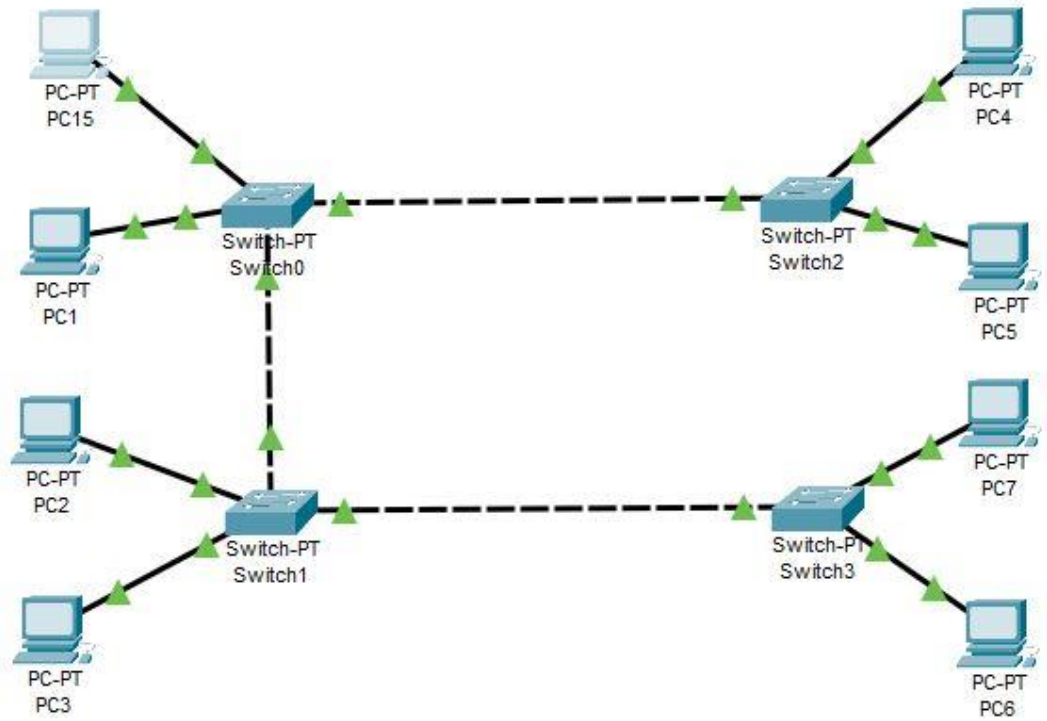
PC0 to PC4 and PC7:



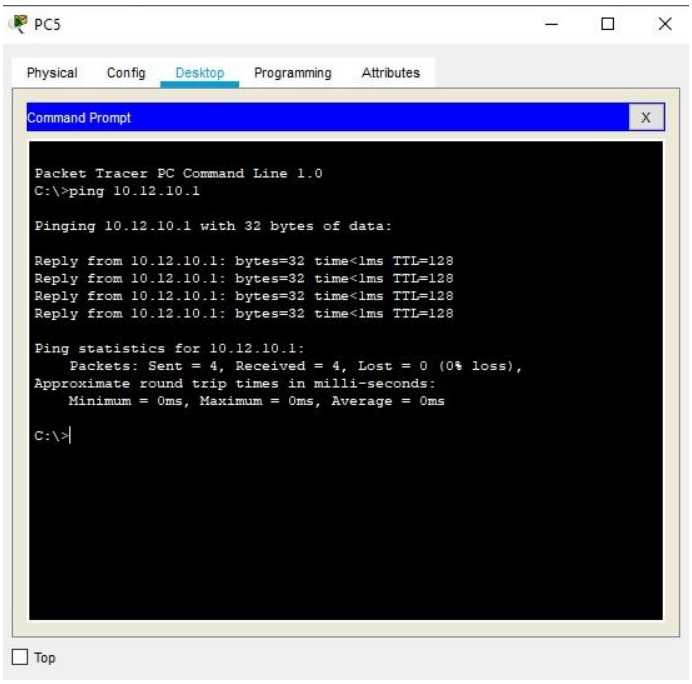
Dest : PC0 / src : PC4



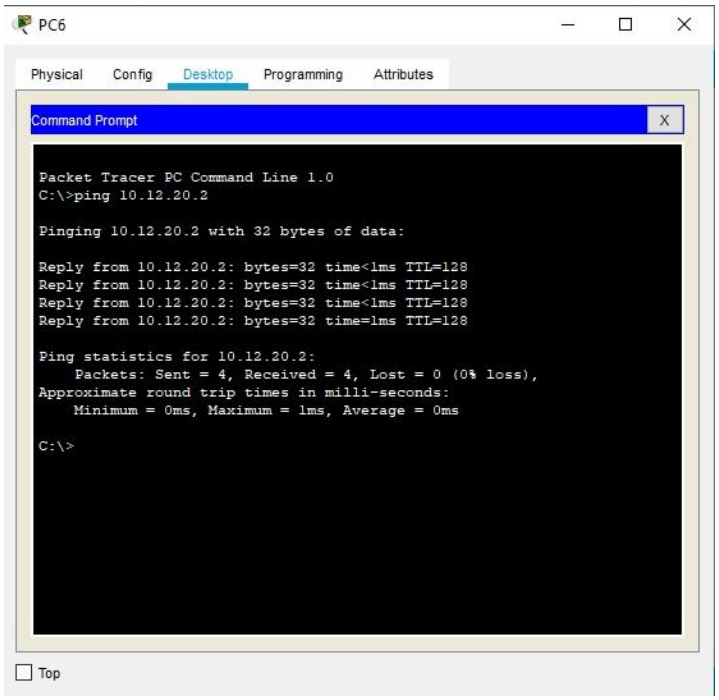
Switch-net:



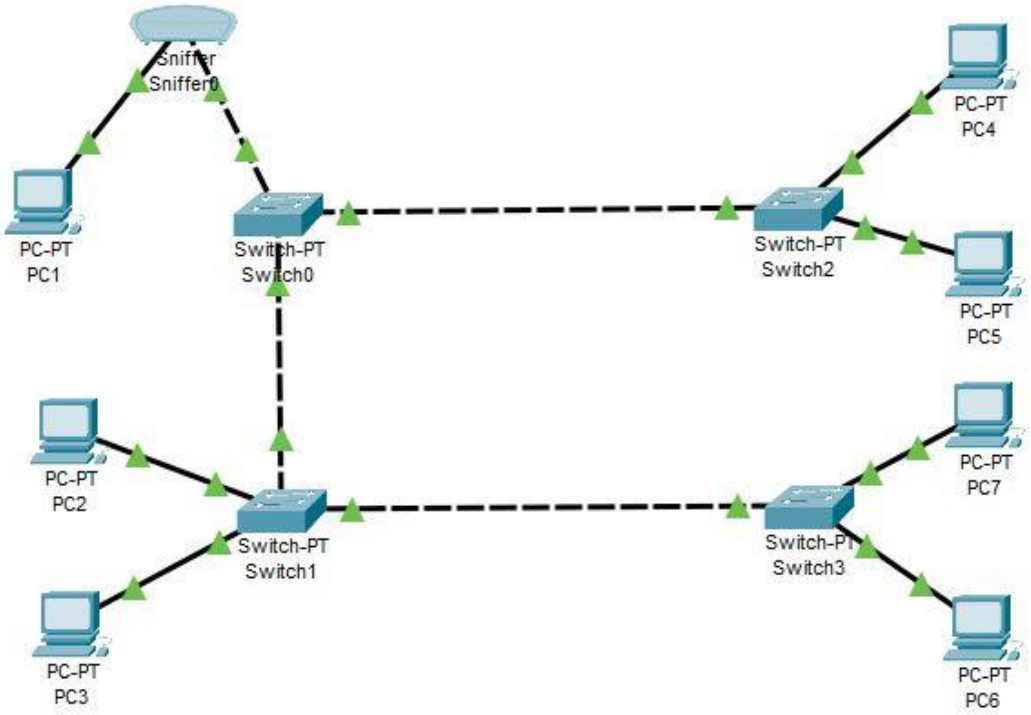
PC5 to PC1:



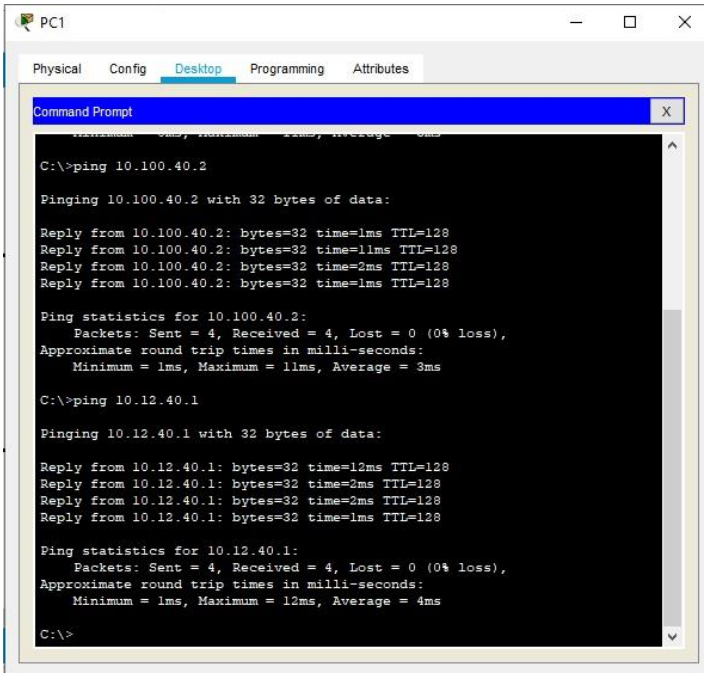
PC6 to PC3:



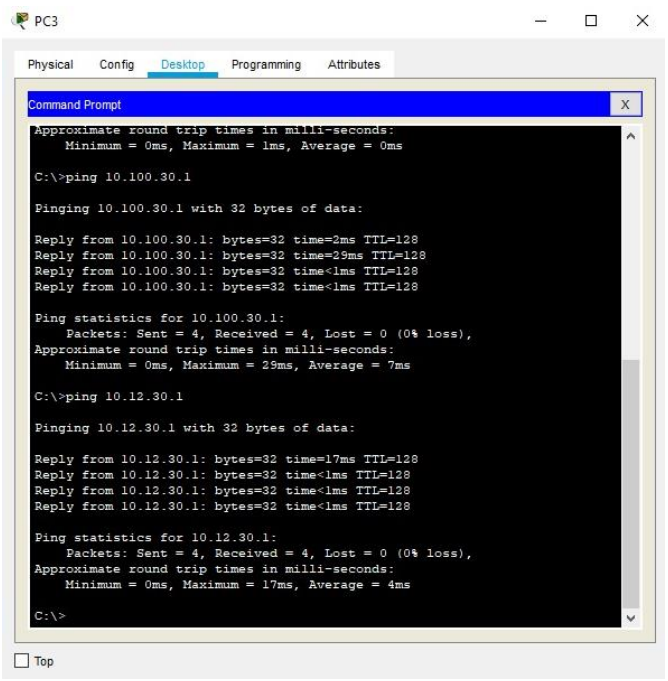
Switch-net with sniffer:



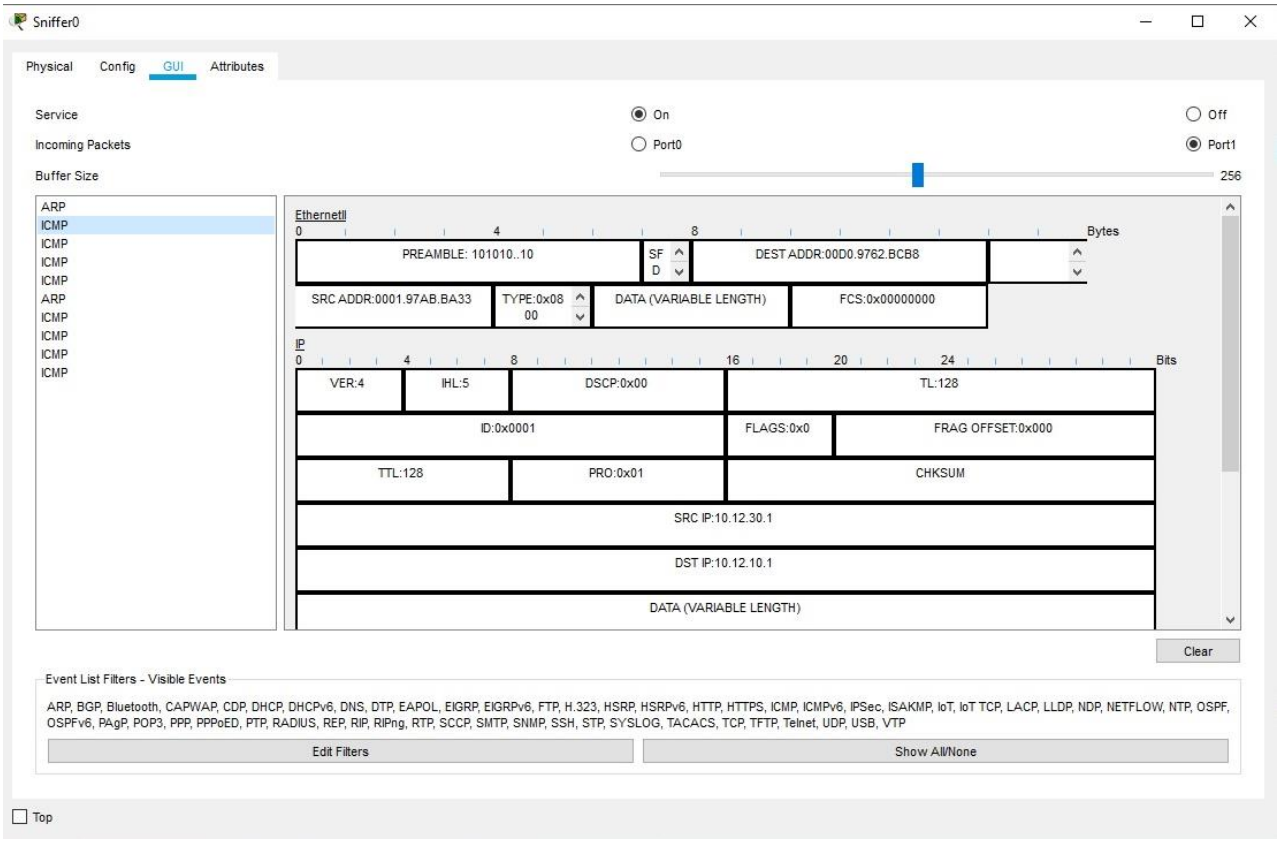
PC1 to PC6 and PC7:



PC3 to PC1 and PC4:



PC3 to PC1:



CONCLUSIONS:

PS: Because we are group 12 our IP addresses go like 10.12.xx.x .

A Hub is a networking device that lets us connect multiple PCs -which is an end device- to a single network and operates on physical layer. Hubs have 4 to 8 ethernet ports. Hub uses half-duplex cables and uses electrical signal orbits.

A Switch is a networking tool that lets us connect to various devices like multiple computers together. Switches have 4 to 8 Ethernet ports. It operates on data link layer and uses Full-duplex cables. Switch also uses frames and packets.

A hub and a switch are both can be used in LAN.

In this experiment to capture results we used Sniffer as Wireshark.

Ping is a networking utility program that is used to check if computer is connected to a server or a network. It also shows the delay between two computers. Ping is used to detect problems with connection, if the ping is successful there will be some outputs like, confirmation line, size in bytes, time and Time to Live (TTL). The TTL is number 1 to 128 and it shows the number of networks which the ping is passed to go to it' s target. The value 128 means that the device went to the target without other networks in between. In both of the

experiments- hub and switch- it shows that TTL is 128 so there are no other networks in between the source and target.

MAC addresses are linked to hardware of network adapters and all devices in the network have different MAC addresses. MAC addresses do not change by time it always stays the same which makes it a reliable identifier.

Other than ICMP we saw The Address Resolution Protocol (ARP) which is used to find the link layer address which is MAC address which is connected to given ethernet layer address. The ARP is used when a computer interacts with another remote computer using ping program. In the experiment we take it as the computer had no previous interactions happened on this computer so ARP is used to identify MAC address of the other remote computer.

Time part shows how long the process took in milliseconds. Lost shows that the address connected doesn't have a reliable connection and has lost data during transmission, in the experiment our lost value is 0 so this shows that our connection is stable and reliable.

In our experiment signal didn't drop so the ping operation happened successfully and there were no problem. Also our experiment shows that because hub broadcasts the signal to the whole network, sniffer even though the signal isn't sent from the PC it is not connected to, sniffer still gets the readings.

Our experiment shows that because we have no timeout, our IP addresses and MAC addresses of the sender and receiver PCs match. And also we didn't experience any errors because we used the correct cables on the correct places.