Computer Network
Laboratory

Assignment 8

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Class: 3rd year, B.Tech CSE
Course: CSN-361

GitHub link - https://github.com/gagankumre/CSN361/tree/master/Assignment

Two problems were given for this assignment. They are-

Problem 1 :

Use CISCO packet tracer to create a network topology and configure the network with Open Shortest Path First (OSPF) protocol.

Data structure used :

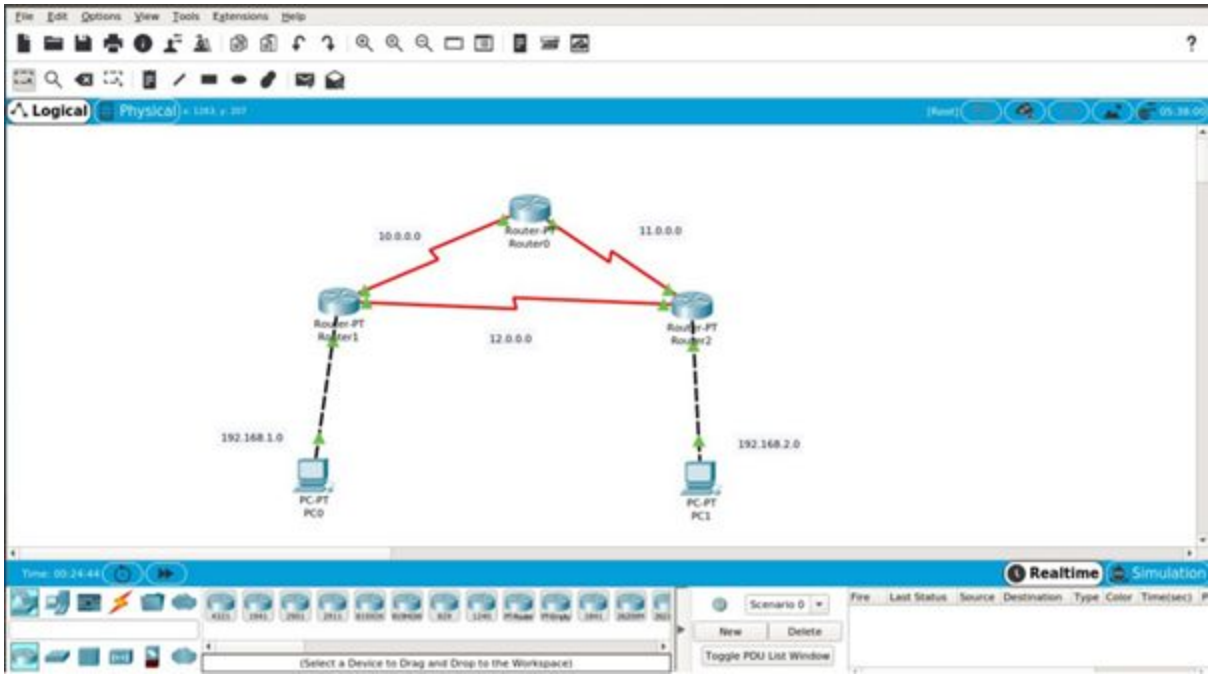
- Router: A router examines a packet header's destination IP address and compares it against a routing table to determine the packet's best next hop. Routing tables list directions for forwarding data to particular network destinations, sometimes in the context of other variables, like cost.

- Ethernet: a system for connecting a number of computer systems to form a local area network, with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems.

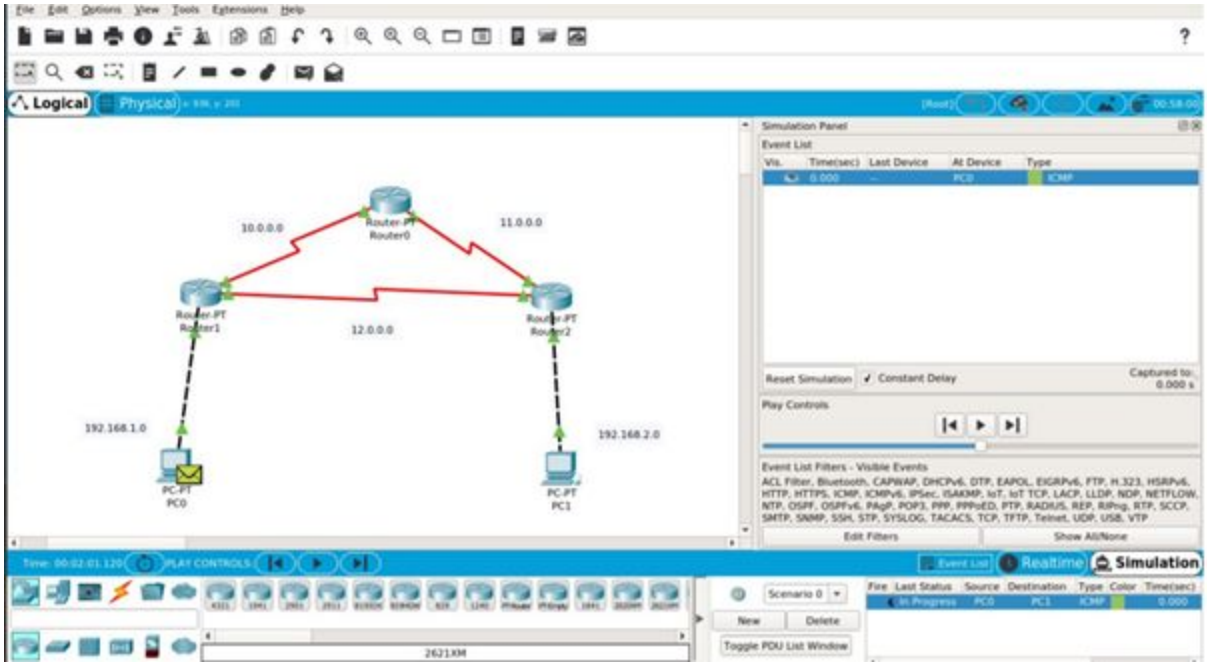
Algorithms used :

- I have made the connections with the PC's connected to the routers through the ethernet cable and routers connected among themselves with the serial cable.
- I have used the OSPF (Open Shortest Path First for IP networks) protocol as mentioned to send the ICMP packets between the two PC's.
- I've assigned IP addresses to the PC's and kept all of them within the same area. It uses a link state routing (LSR) algorithm and falls into the group of interior gateway protocols (IGPs), operating within a single autonomous system (AS).
- Here the Internet Control Message Protocol is an error-reporting protocol for network devices like routers which use to generate error messages to the source IP address, when network problems prevent delivery of IP packets. Also, the routers send the OSPF ping (hello) messages among themselves and to all the links they are connected with so as to get the shortest path for to send the message packets.

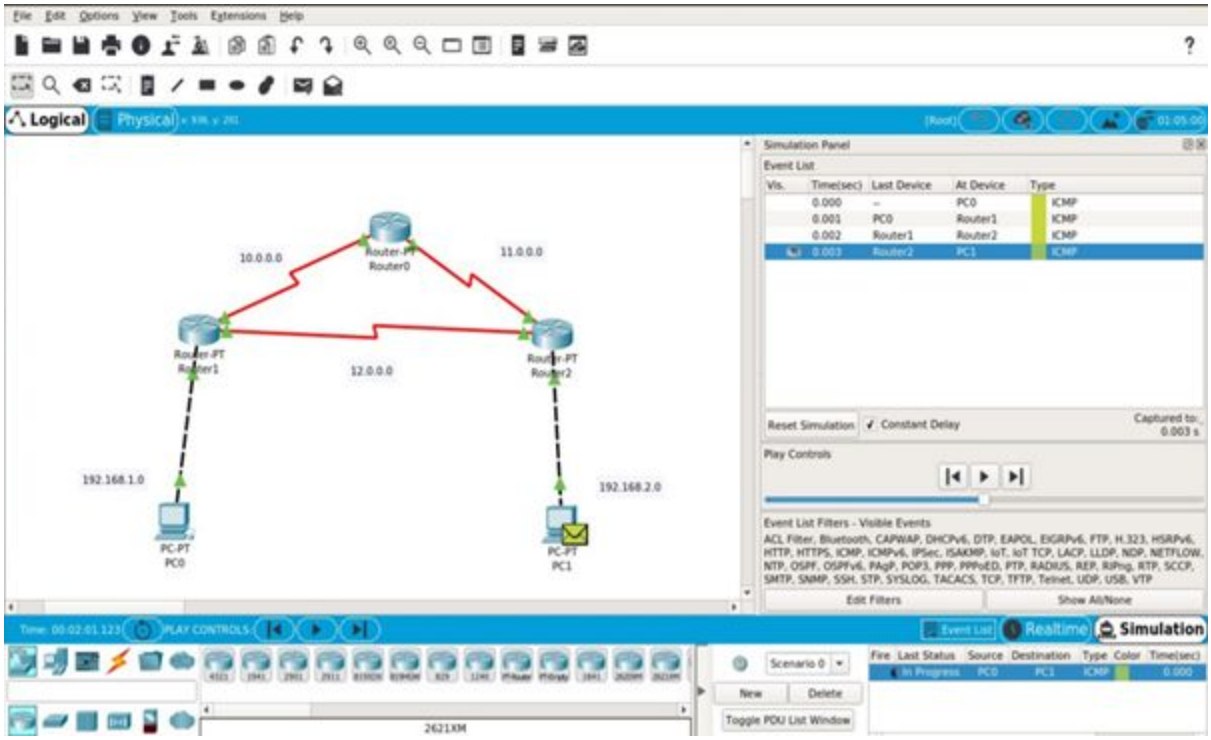
Screenshots :



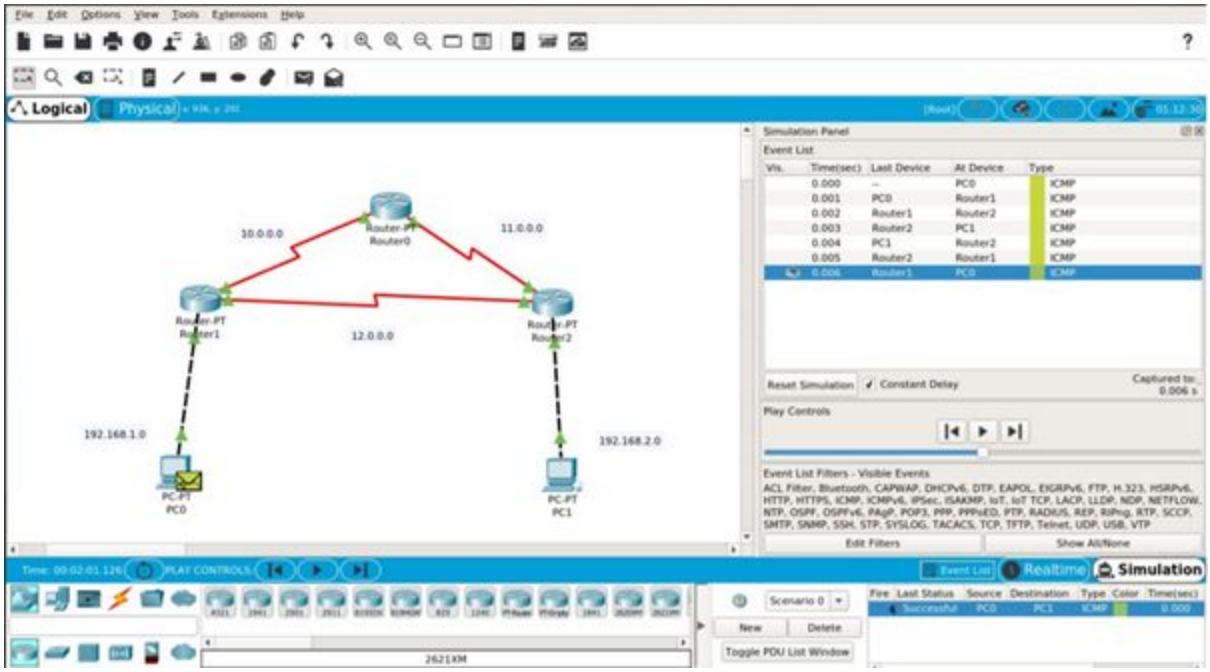
Packet received by PC-1 through PC-0 -> Router1 -> Router2 -> PC1



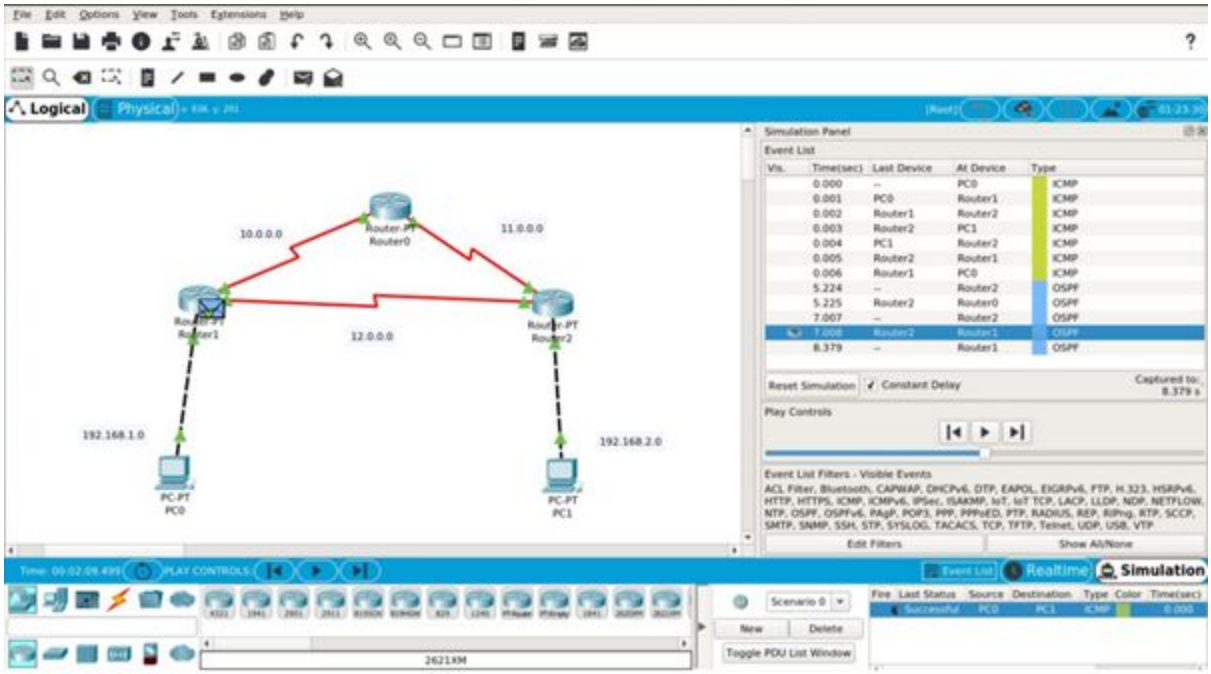
Packet received by PC-1 through PC-0 -> Router1 -> Router2 -> PC1



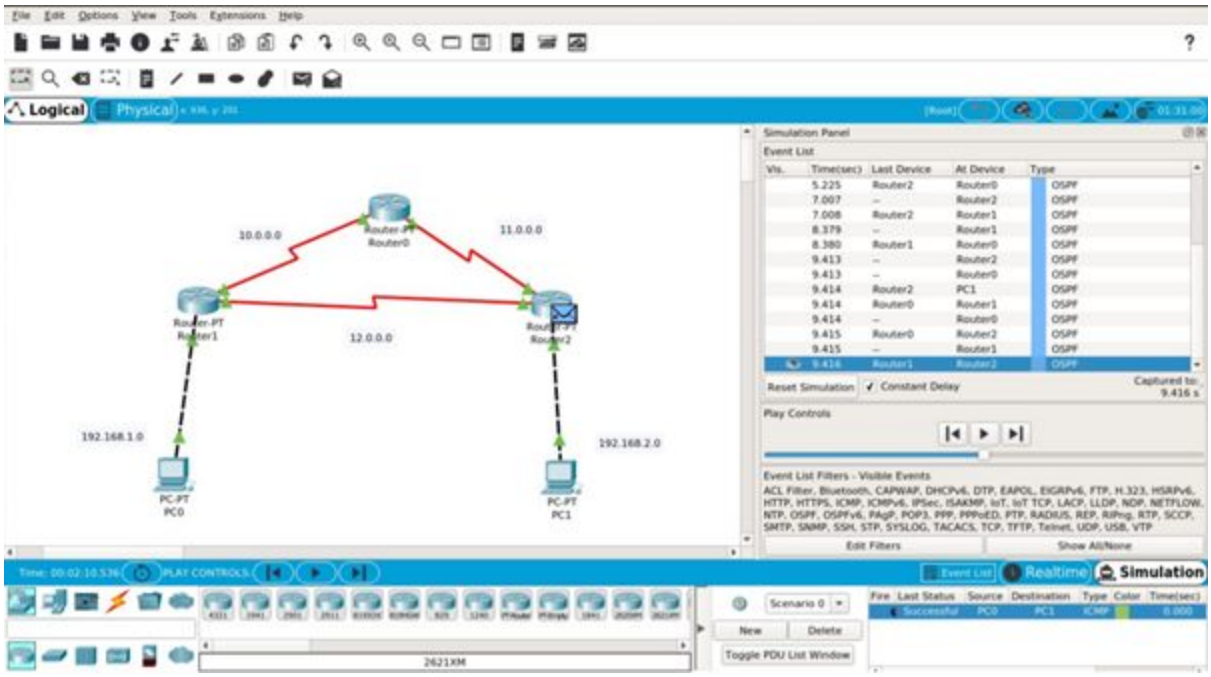
Packet received by PC-1 through PC-0 -> Router1 -> Router2 -> PC1



Router 2 sending OSPF Hello message to Router1



Router 2 sending OSPF Hello message to Router1



Problem 2 :

Use CISCO packet tracer to demonstrate Address Resolution Protocol (ARP) in a ring topology.

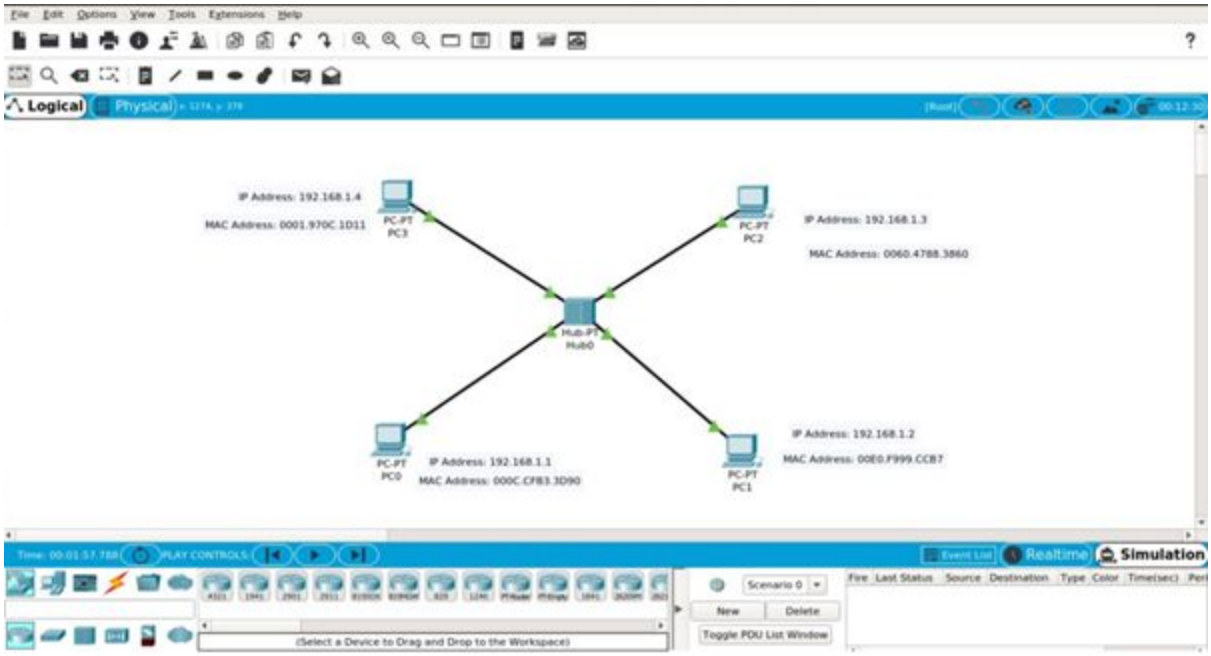
Algorithms used :

1. In the Address Resolution Protocol (ARP) is a procedure for mapping a dynamic Internet Protocol address (IP address) to a permanent physical machine address in a local area network (LAN).
2. The Topology consists of 1-Hub and 4-PCs and we will ping the PC-1 from PC-3 and generate traffic on PC-3. Traffic Generator will send the traffic (ping) to the destination. Two types of packets will appear on PC-3, ARP Packet and ICMP (ping) Packet.
3. Before sending the ICMP packets to the destination (PC-1 here) on the LAN, the MAC address of the destination device, should be the ARP table of the source device (PC-3 here). ARP will first collect the MAC address of the destination device, only then the ICMP will be able to send its traffic to destination device.

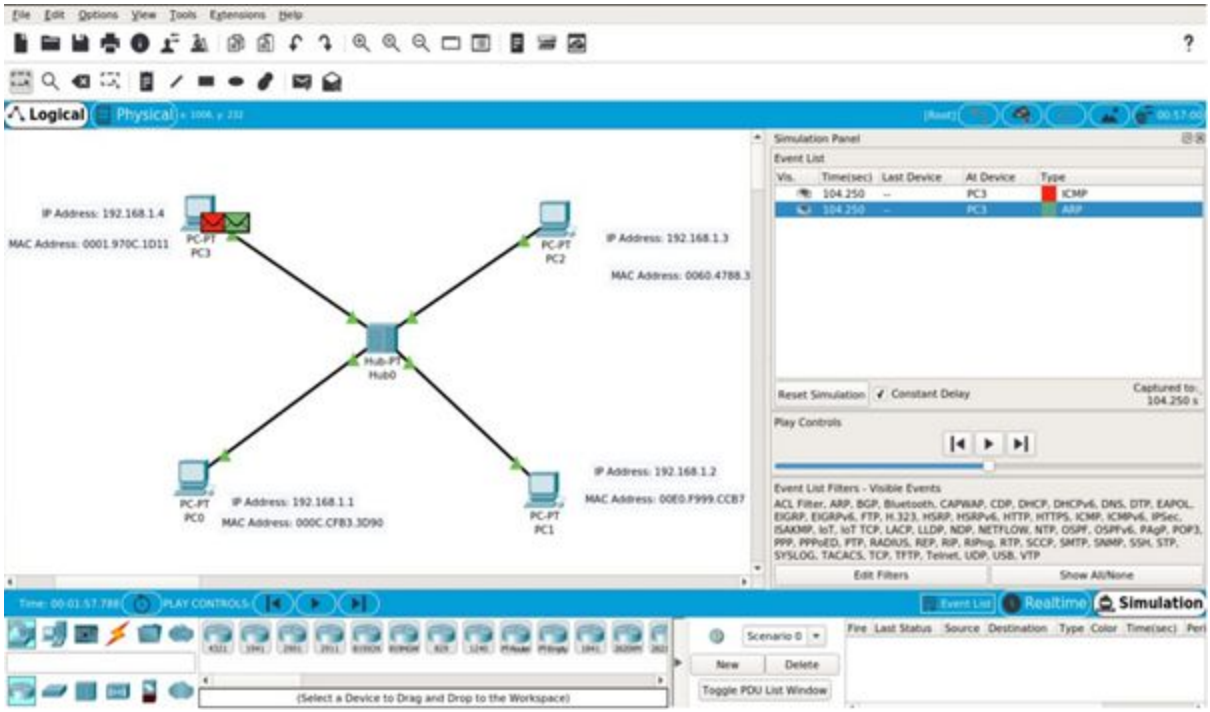
Data structures used :

1. Hub: It is the most basic networking device that connects multiple computers or other network devices together. Unlike a network switch or router, a network hub has no routing tables or intelligence on where to send information and broadcasts all network data across each connection.

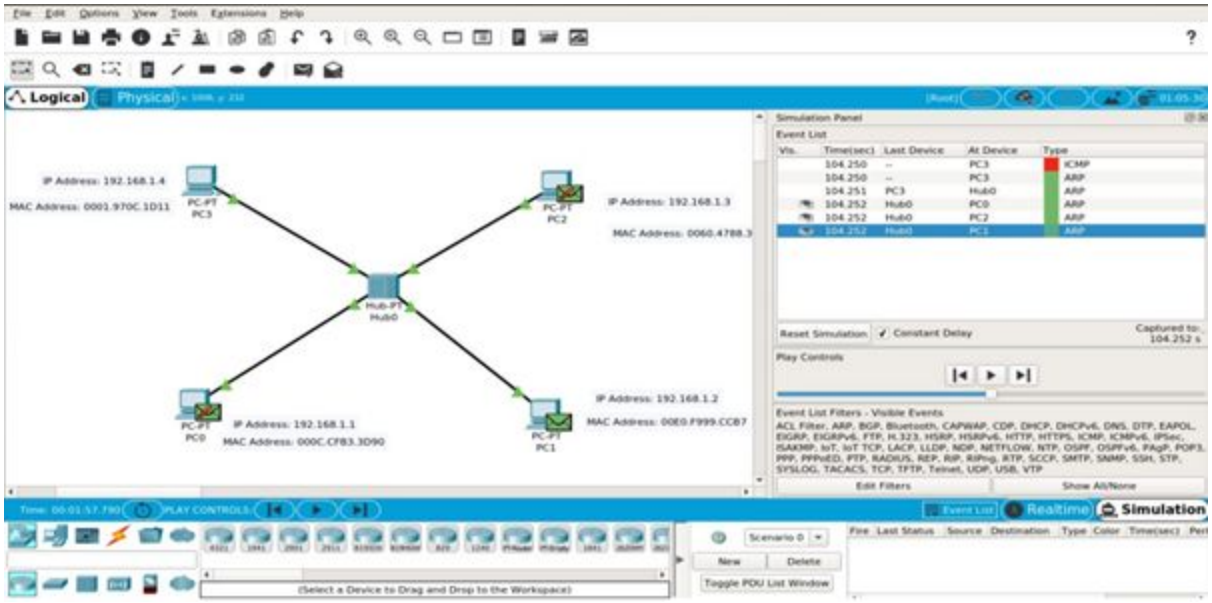
Screenshots :



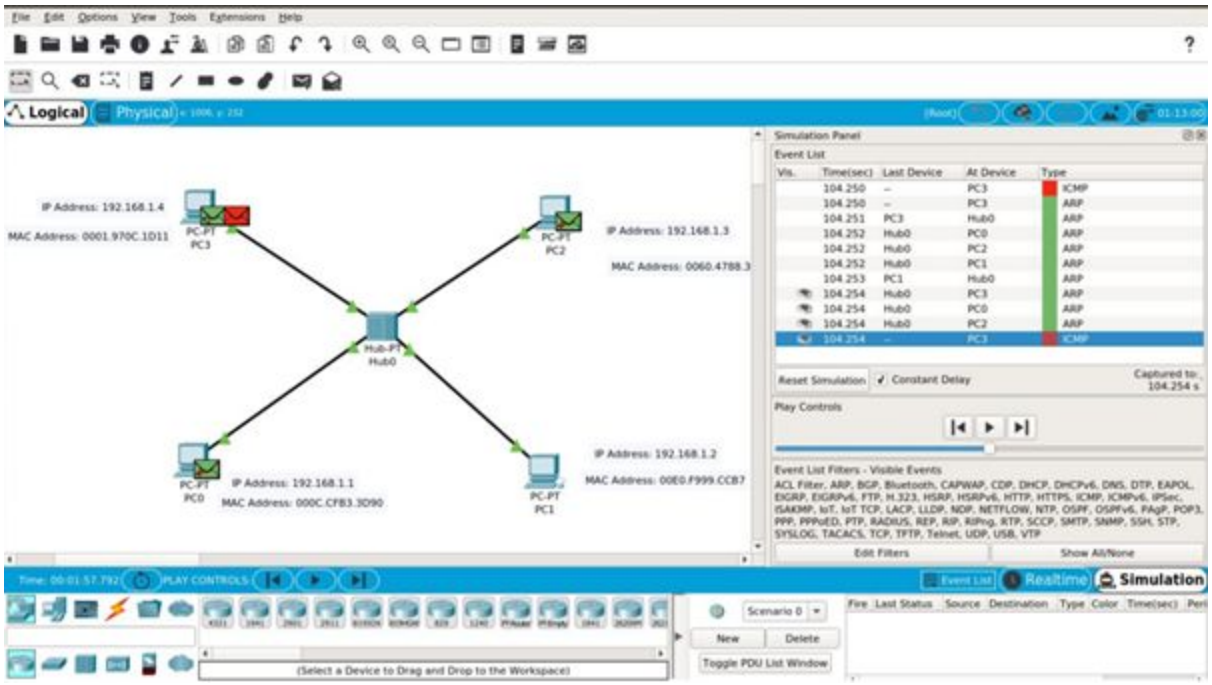
PC-3 will first collecting the MAC address of the destination device by sending ARP packet.



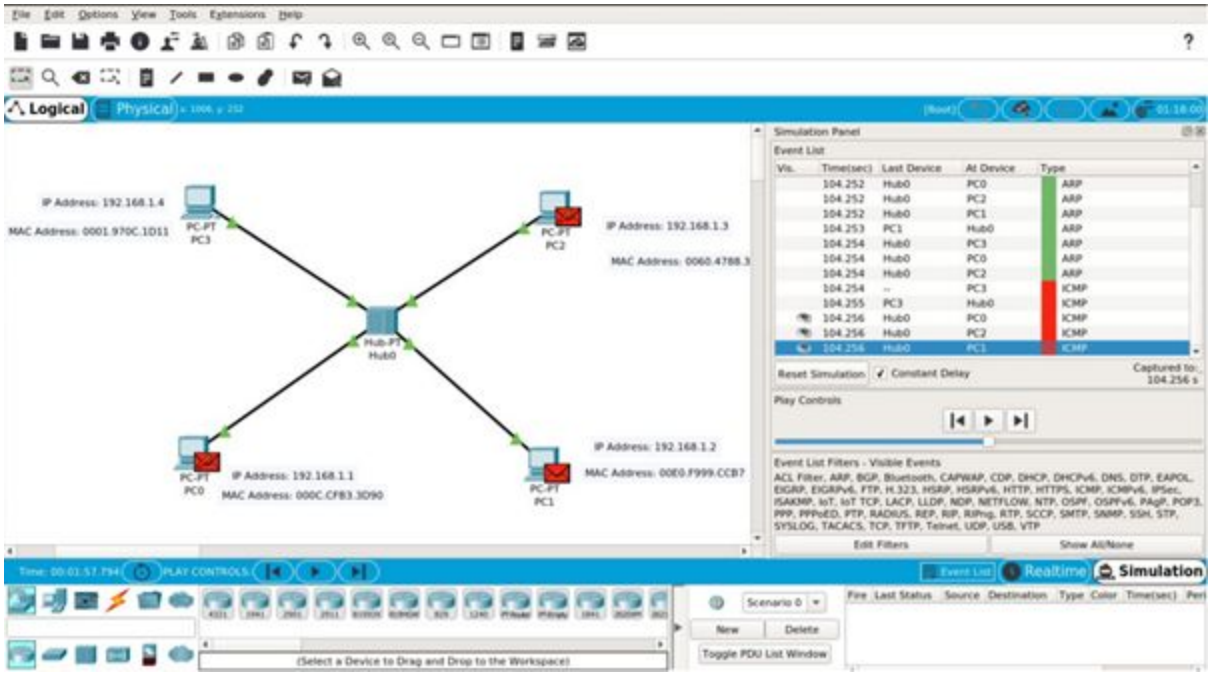
Hub transmitting the ARP packet it to every PC but only the destination PC(PC-1) accepts it rest of them drops the packet.



PC-1 sending the acknowledgement to Hub which transmit it to every PC but accepted by only PC-3



PC-3 sending the ICMP (ping) Packet to the hub which transmit it to every PC but accepted by only PC-1.



PC-1 sending the acknowledgement of ICMP Packet to the hub which transmit it to every PC but accepted by only PC-3.