

# **COMPUTER** **NETWORKS** **LABORATORY**

## **ASSIGNMENT 8**

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**BATCH:** CS1

**Q.1) Use CISCO packet tracer to create a network topology as shown in Fig. 1, and configure the network with Open Shortest Path First (OSPF) protocol.**

### **Algorithms :-**

First we made the connections as in the figure with the PC's connected to the routers through the ethernet cable and routers connected among themselves with the serial cable. Then we assigned the IP addresses to the PC's and kept all of the PC's within the same area. Here, we used the ospf protocol to send the ICMP packets between the two PC's. Open Shortest Path First (OSPF) is a routing protocol for Internet Protocol (IP) networks. 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).

The ICMP(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 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. At last, I enabled the OSPF protocols for all the routers connected with all the peripheral devices through the command line interface for each router.

You can then check the OSPF protocols if are being followed by generating the traffic between different nodes(i.e., PC's and Routers).

# Screenshots :-

## 1.) Router 2 sending OSPF hello message.

The screenshot shows the Cisco Packet Tracer interface. The network topology consists of three routers (Router0, Router1, Router2) and two PCs (PC0, PC1). Router2 is sending an OSPF hello message to Router0. The Event List on the right shows the following events:

Vis.	Time(sec)	Last Device	At Device	Type
0.001	0.001	PC0	Router2	ICMP
0.002	0.002	Router2	Router1	ICMP
0.003	0.003	Router1	PC1	ICMP
0.004	0.004	PC1	Router1	ICMP
0.005	0.005	Router1	Router2	ICMP
0.006	0.006	Router2	PC0	ICMP
6.180	6.180	--	Router2	OSPF
6.181	6.181	Router2	Router1	OSPF
9.932	9.932	--	Router2	OSPF
9.933	9.933	Router2	Router0	OSPF
9.935	9.935	--	Router0	OSPF

The Play Controls section shows the simulation is running. The Event List Filters - Visible Events section lists various protocols and services. The bottom status bar shows the time as 00:10:10.640 and the simulation is in the Realtime mode.

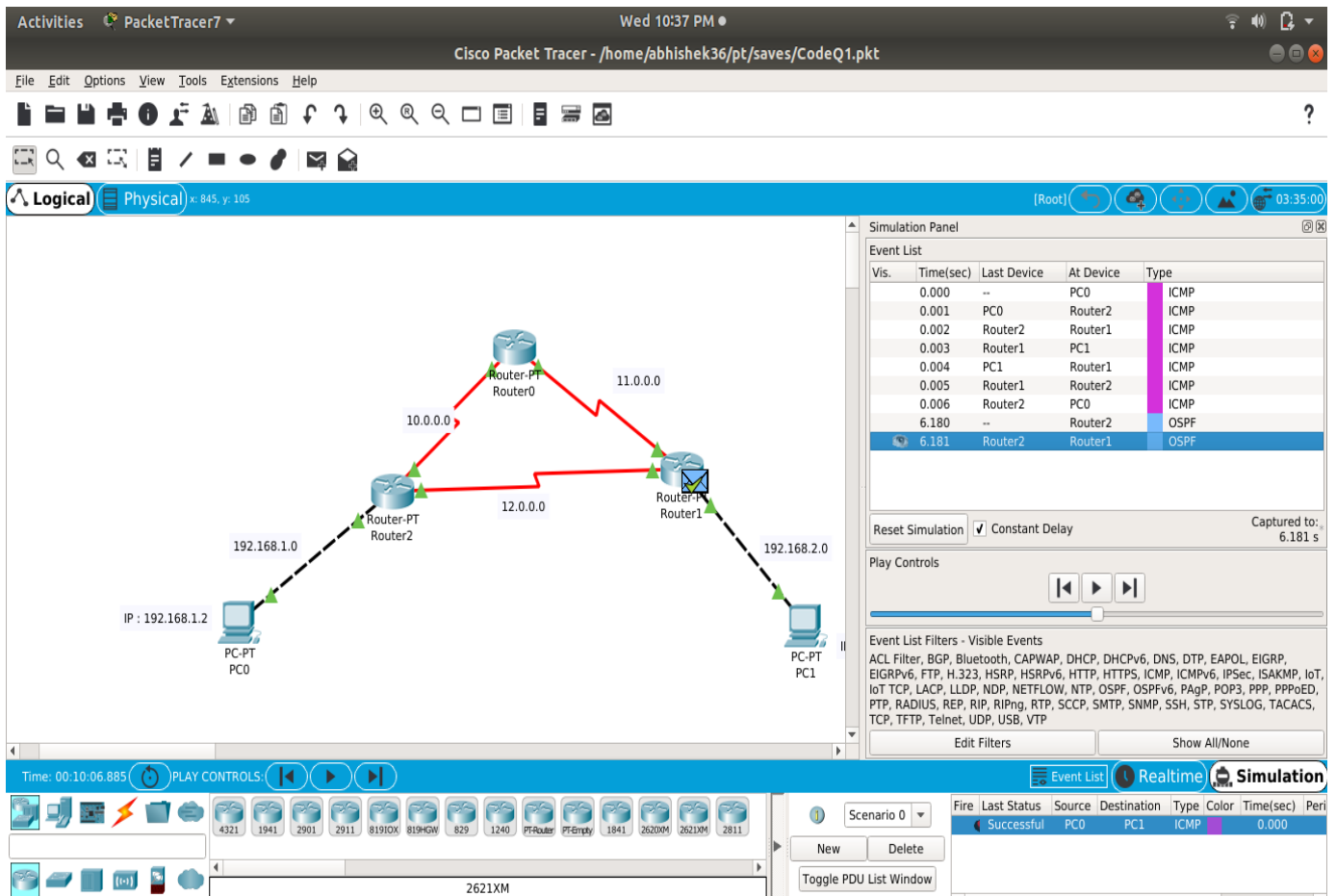
## 2.) Router 0 receiving hello OSPF message and responding by tick that the OSPF is working fine to router 2.

The screenshot shows the Cisco Packet Tracer interface. The network topology is the same as in the first screenshot. Router0 is receiving an OSPF hello message from Router2 and responding with a tick. The Event List on the right shows the following events:

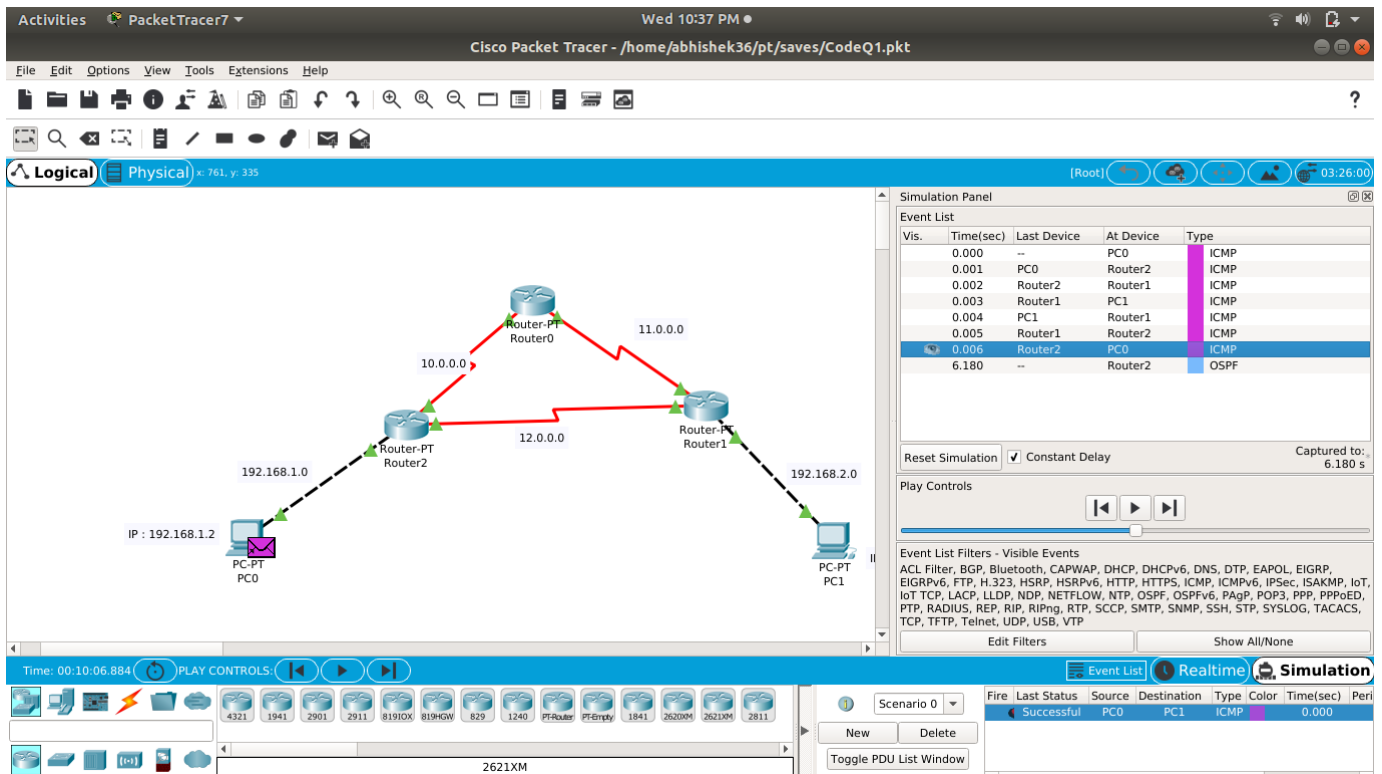
Vis.	Time(sec)	Last Device	At Device	Type
0.000	0.000	--	PC0	ICMP
0.001	0.001	PC0	Router2	ICMP
0.002	0.002	Router2	Router1	ICMP
0.003	0.003	Router1	PC1	ICMP
0.004	0.004	PC1	Router1	ICMP
0.005	0.005	Router1	Router2	ICMP
0.006	0.006	Router2	PC0	ICMP
6.180	6.180	--	Router2	OSPF
6.181	6.181	Router2	Router1	OSPF
9.932	9.932	--	Router2	OSPF
9.933	9.933	Router2	Router0	OSPF

The Play Controls section shows the simulation is running. The Event List Filters - Visible Events section lists various protocols and services. The bottom status bar shows the time as 00:10:10.637 and the simulation is in the Realtime mode.

3.) Router 1 receiving hello OSPF message and responding by tick that the OSPF is working fine to router 2.



4.) PC0 receiving the correct acknowledgement for transmitted ICMP message to PC1 from router2.



## Data structures used :-

### Router:

A router is a physical or virtual appliance that passes information between two or more packet-switched computer networks.

### 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.

## Question 2: Use CISCO packet tracer to demonstrate Address Resolution Protocol (ARP) in a ring topology as shown in Fig2

### Algorithm used:-

We connected the hub with the four PC's and assigned the IP addresses to the PC's. Then we need to check for each PC that whether its ARP history is cleared, or else otherwise if present we must delete it as then the PC will not send the ARP packet to find its destination. This can be done using the command prompt.

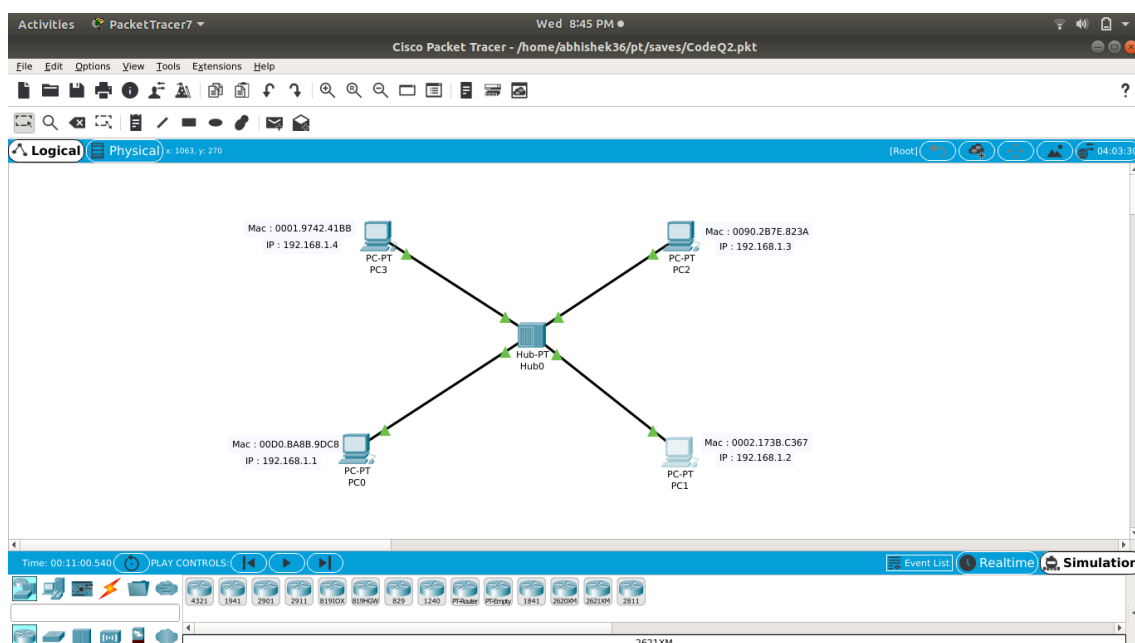
Two types of packets will be transmitted during the simulation :- ARP packets and the ICMP packets.

ARP - The Address Resolution Protocol is a communication protocol used for discovering the link layer address, such as a MAC address, associated with a given internet layer address, typically an IPv4 address. This mapping is a critical function in the Internet protocol suite.

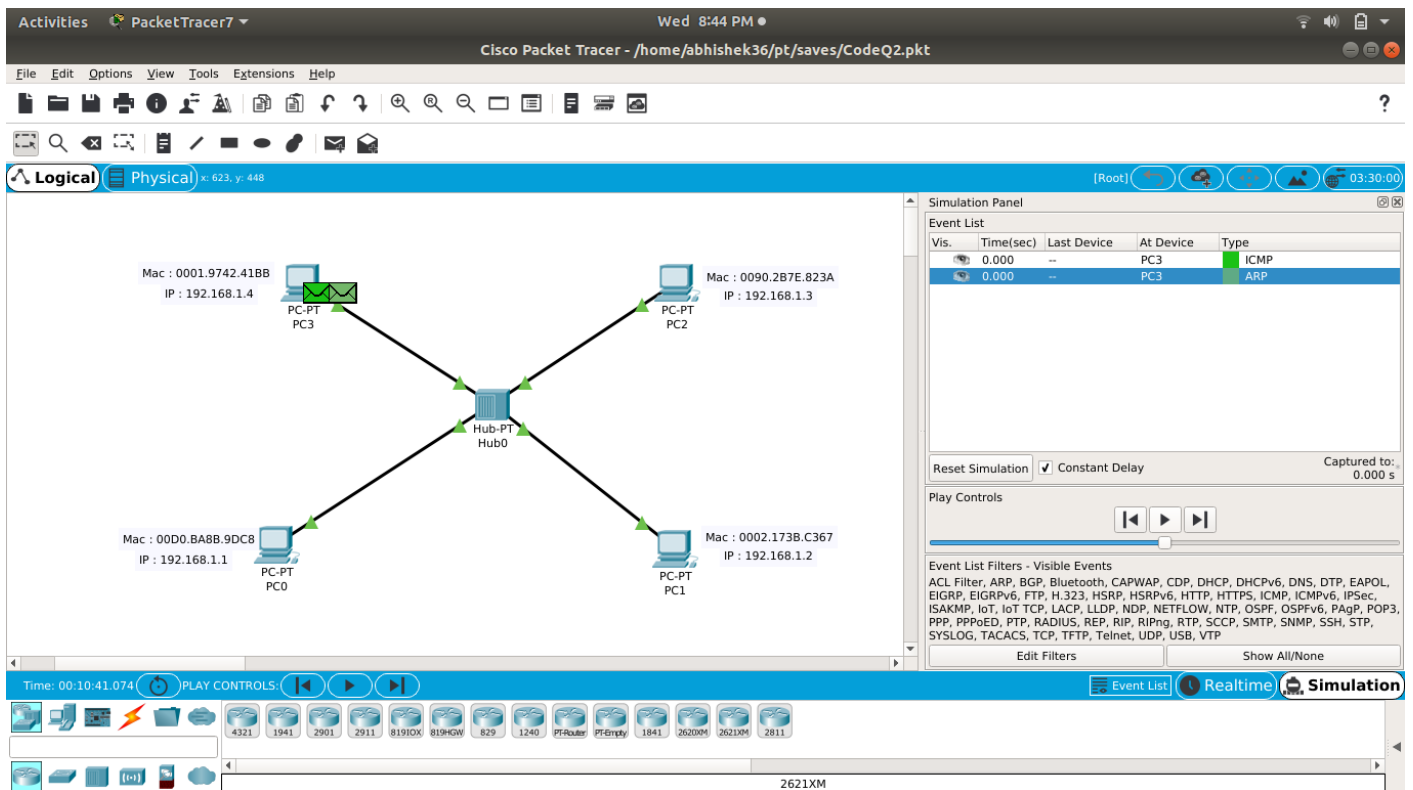
ICMP - The ICMP(Internet Control Message Protocol) is an error-reporting protocol for network devices like routers which use to generate error messages to the source IP address, when network problems prevent delivery of IP packets.

The ARP packets will be sent to a particular IP address only once as, during the first time itself it will be saved in the history and only the ICMP packets will be sent.

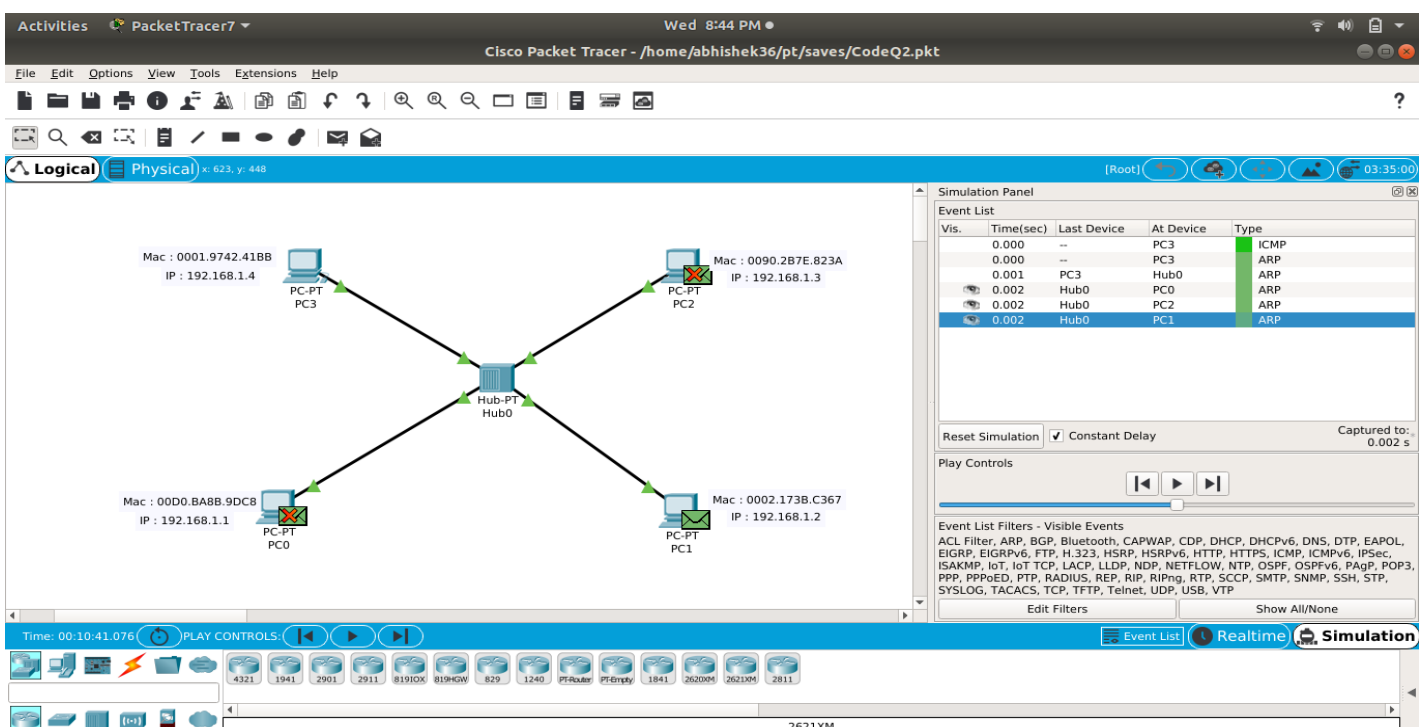
### Screenshots-



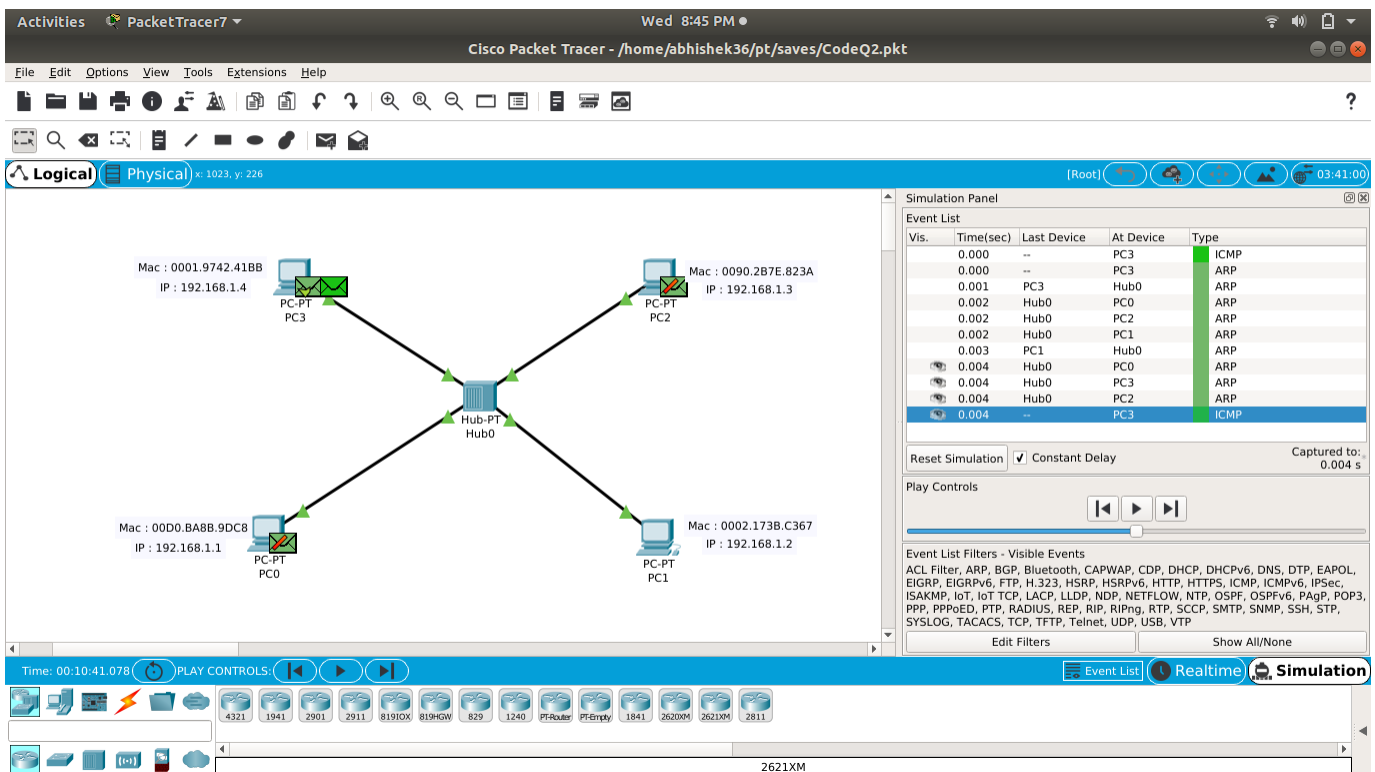
2.) Initialization of the packets transmission at PC3. Both the ICMP and ARP packets are ready to be transmitted.



3.) The ARP packet is then transmitted to the Hub, which is then further transmitted to all the links except from where it came. The IP in the message is recognized by the PC1 and is discarded by the other PC's.



4.) The response ARP packet is further sent to the Hub by the PC1, which is sent to all the other links. PC3 recognizes it and is ready to send the ICMP packet to PC1.



**Data structures used :**

**HUB -**

Hub is a network hardware device for connecting multiple Ethernet devices together and making them act as a single network segment.