EXPERIMENT NO. 7

Introduction to packet tracer and implementation of Hub and Switch

Aim: Implementation of Hub and Switch using Packet Tracer

Objectives:
1. Familiarize with Cisco Packet Tracer tool.
2. Overview of ARP and ICMP.
3. Configuring devices in Packet Tracer. Configuring hosts and switches.
4. Observe difference in operation of a hub and a switch.

Tool:

Cisco packet tracer is a network simulator. It has a very simple and intuitive GUI. This simulator is a Cisco product specific and provides a platform to test networking concepts using virtual components.

Features:-

1. Real-time Simulation Modes
2. Logical Topology and Physical Modes
3. Portable can be installed in laptops also.
4. Global Packet Sniffer called “Event Viewer”; Adjustable Windows
5. RIP v1, RIP v2, EIGRP, ICMP, ARP, CDP, DHCP, NAT, IP
6. Ethernet, VLANs, 8021q, Inter-VLAN Routing, Frame Relay, PPP,
7. HDLC

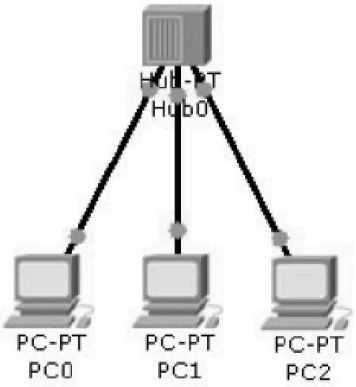
Limitations:-

1. No ISDN, DSL, Cable Modem.
2. Doesn’t debug OSPF packets.
3. Limited TCP.
4. Doesn’t support all the functionalities of HTTP, FTP, DNS, Telnet.

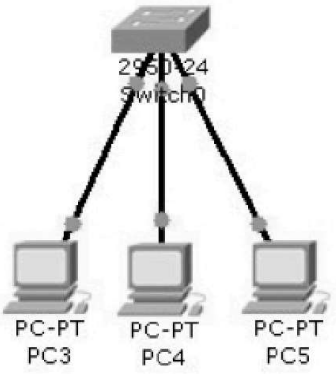
Scenarios:

Implement the following scenarios one at a time

1. Place the clients and network components (generic hub and 2950-24 switch) as shown in figures below.
2. Use straight through cables from the options in lower menu bar.
3. Straight through cables are used to connect dis-similar components.
4. Use IP addresses as given in table below.
5. If all connections and IP addresses are fed correctly the lights on link-ends will turn green. If any other color shows up then troubleshoot it.
6. While setting up scenario 2, wait for the lights to turn green. It takes a while for the switch to configure connections with clients.



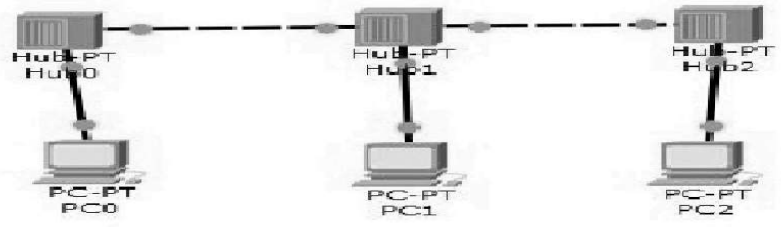
Scenario 1



Scenario 2

Table 1

PC	IP Address	Subnet Mask
PC0	192.168.1.1	255.255.255.0
PC1	192.168.1.2	255.255.255.0
PC2	192.168.1.3	255.255.255.0
PC3	192.168.2.1	255.255.255.0
PC4	192.168.2.2	255.255.255.0
PC5	192.168.2.3	255.255.255.0



Scenario 3

PC	IP Address	Subnet Mask
PC0	192.168.3.1	255.255.255.0
PC1	192.168.3.2	255.255.255.0
PC2	192.168.3.3	255.255.255.0

Observations:

Scenario 1(Star Topology using Hub):
Go to Simulation mode. In the Event List Filters, enable only ARP.
a) Using the "Simple PDU", issue a ping from PC0 to PC1. Play the simulation using "Capture/Forward". Pay close attention to how the hub processes the ARP packets.
b) After that, once again, use "Add Simple PDU" to issue a ping from PC1 to PC0. Play the simulation again.
Comment on the ARP in case a) & b)
c) After that, once again, use "Add Simple PDU" to issue a ping from PC2 to PC0 and from PC1 to PC0. Play the simulation again. Identify the difference in ARP packets in case b) & case a).

Scenario 2(Star Topology using Switch):
Go to simulation mode. In the Event List Filters, enable only ICMP and ARP.
a) Using "Add Simple PDU", issue a ping from PC3 to PC4. Play the simulation. Pay close attention to how the switch processes the ICMP and ARP packets. Repeat the procedure for a ping from PC4 to PC5.
b) After that, once again, use "Add Simple PDU" to issue a ping from PC4 to PC3. Play the simulation again. Observe the behavior of the switch changed from the first and second ping attempts.

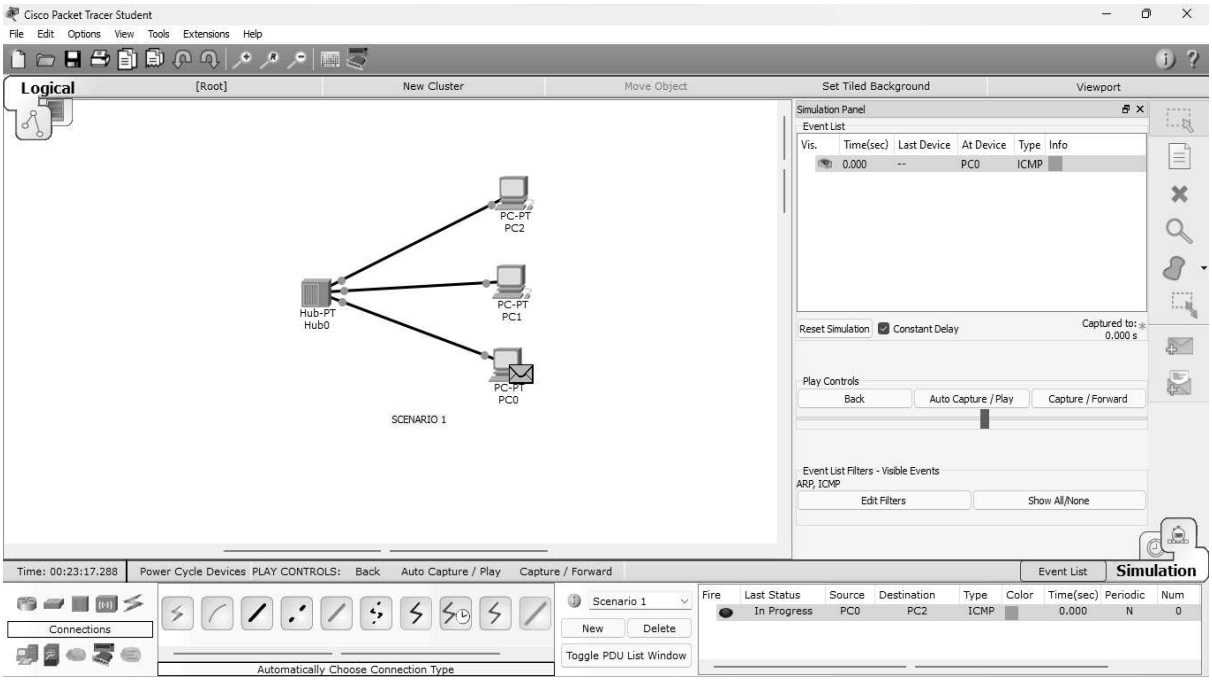
Scenario 3(Bus Topology using Hub):
Go to simulation mode. In the Event List Filters, enable only ICMP and ARP.
a) Using "Add Simple PDU", issue a ping from PC0 to PC1. Play the simulation. Pay close attention to how the hub processes the ICMP and ARP packets. Repeat the procedure for a ping from PC1 to PC2.
b) After that, once again, use "Add Simple PDU" to issue a ping from PC2 to PC0. Play the simulation again. Observe the behaviour of the hub changed from the first and second ping attempts.

Conclusion: *(To be handwritten on journal sheets)*

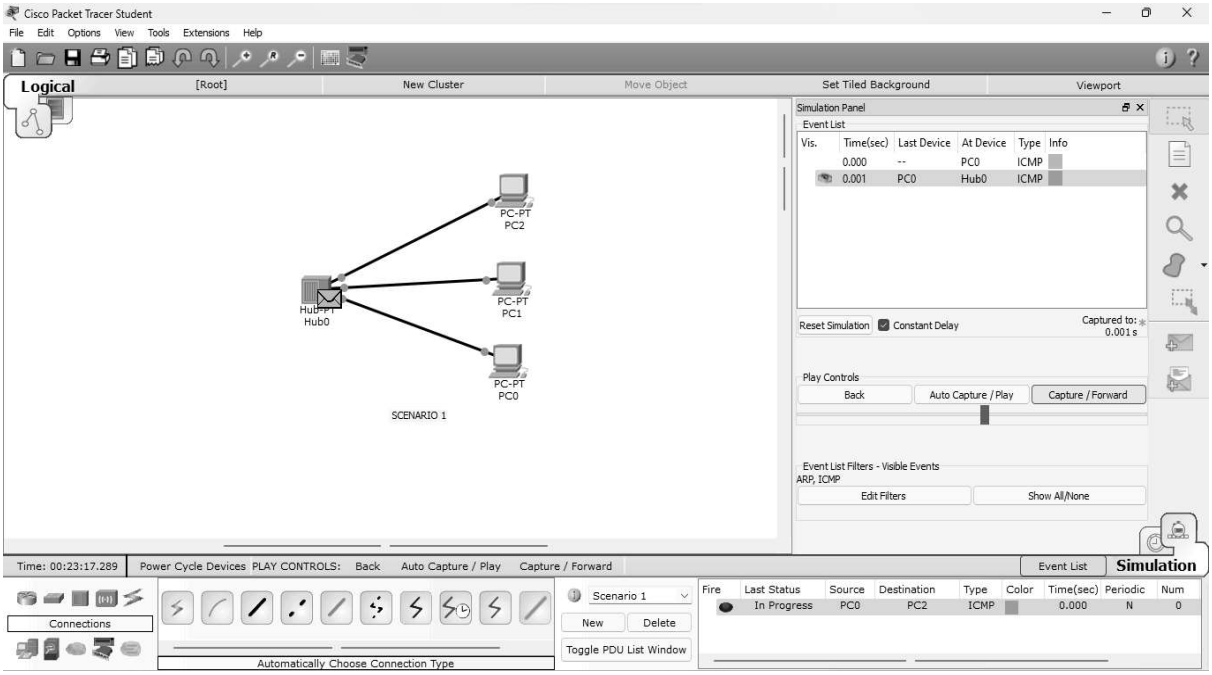
Post Experimental Exercise:

1. Implement mesh topology using Hub and Switch.

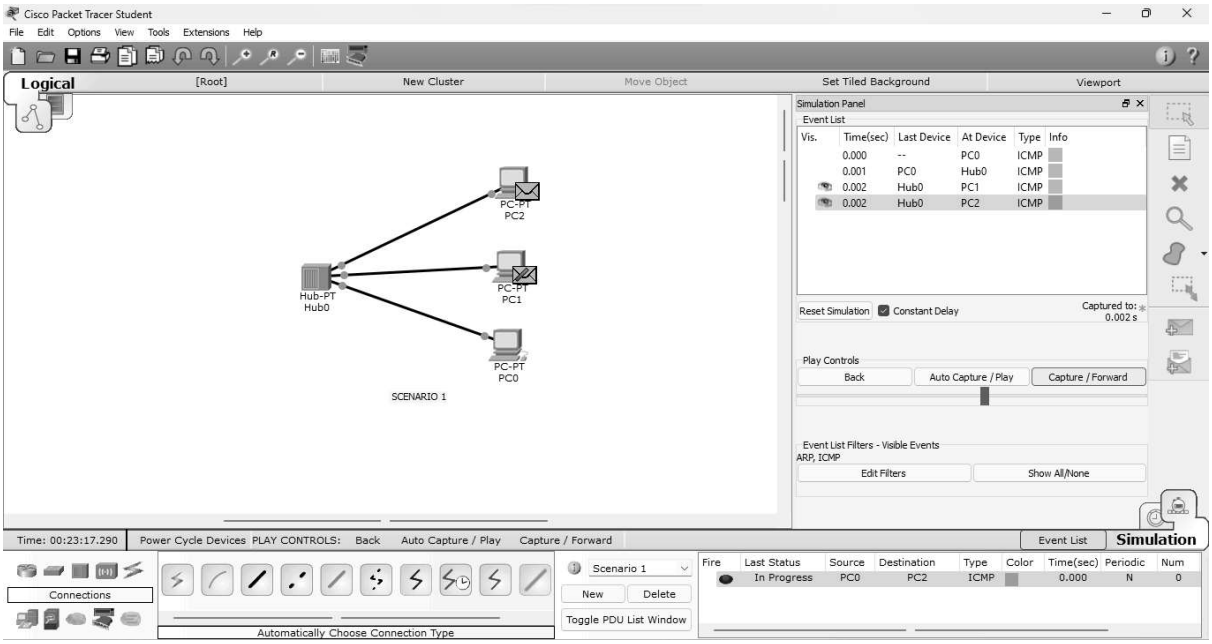
Scenario 1:



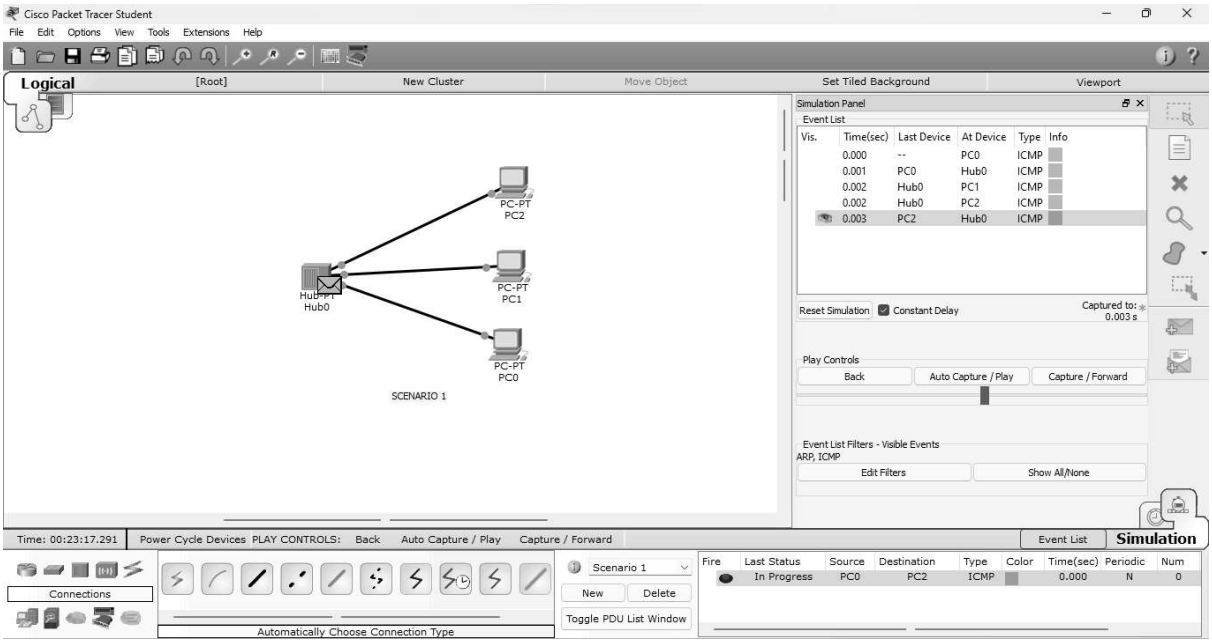
In the above image, a star topology with a hub is depicted. A packet has been configured with its source set to PC0 and its destination set to PC2.



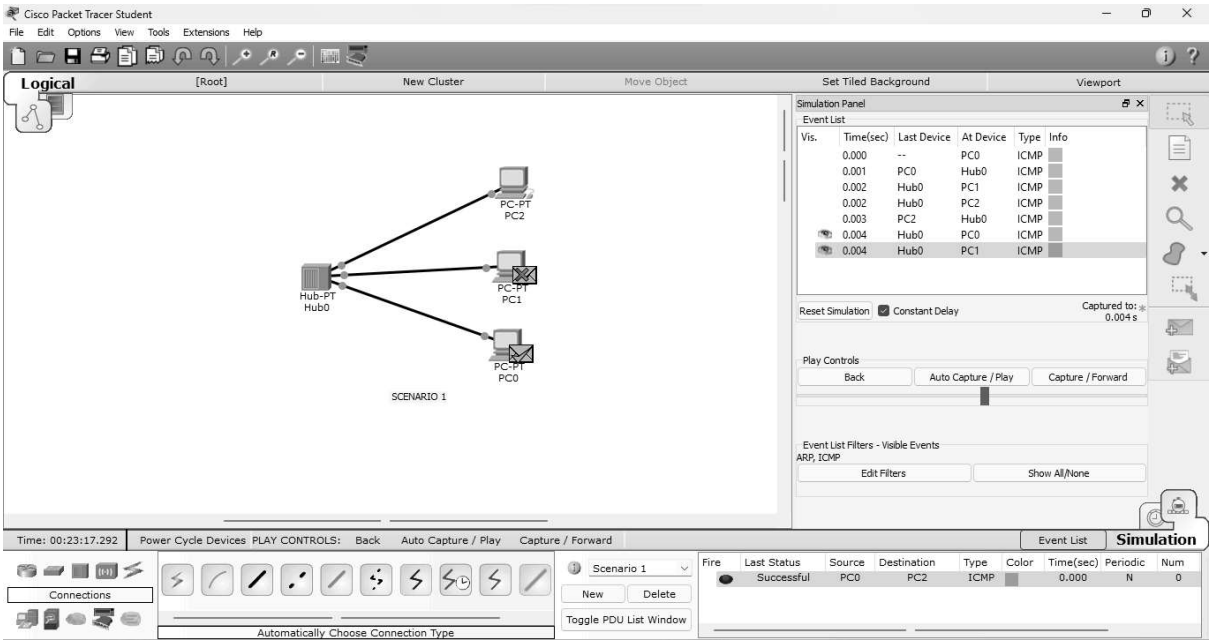
In the given scenario, the packet originating from PC0 is sent to the hub in the star topology.



Once the packet reaches the hub, it is broadcasted out to all the remaining PCs (PC1 and PC2) in the network.

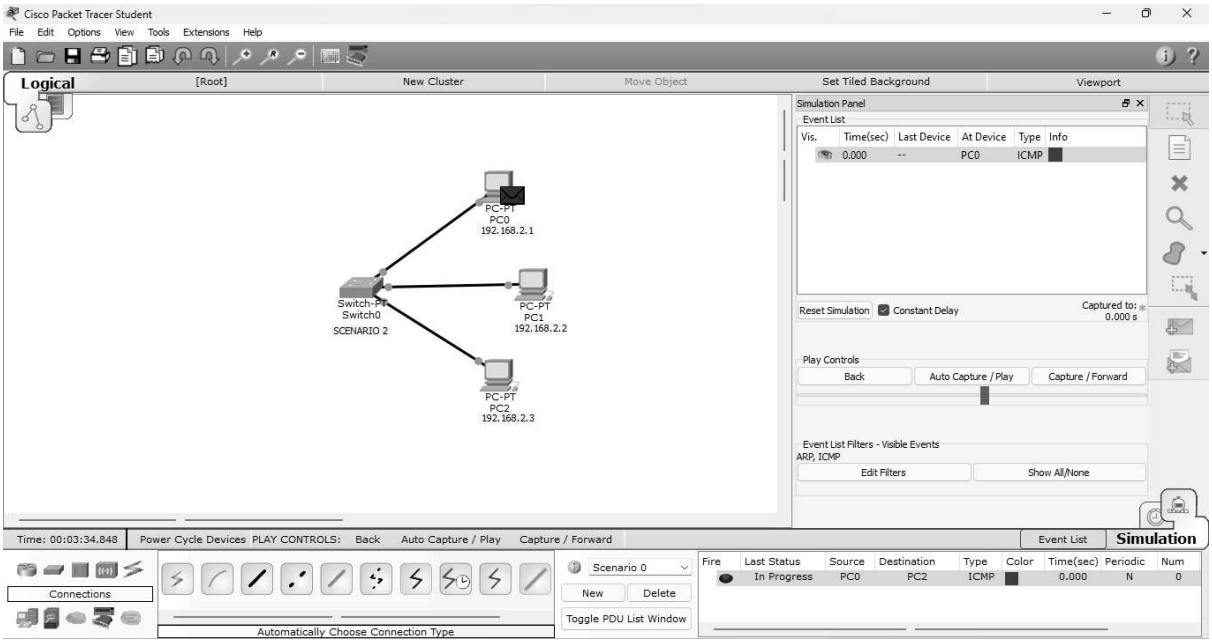


When PC1 receives the broadcasted packet and realizes it is not the intended destination, it discards the packet. Meanwhile, PC2, which is the destination, sends an acknowledgment (ACK) back to the hub after receiving the packet.

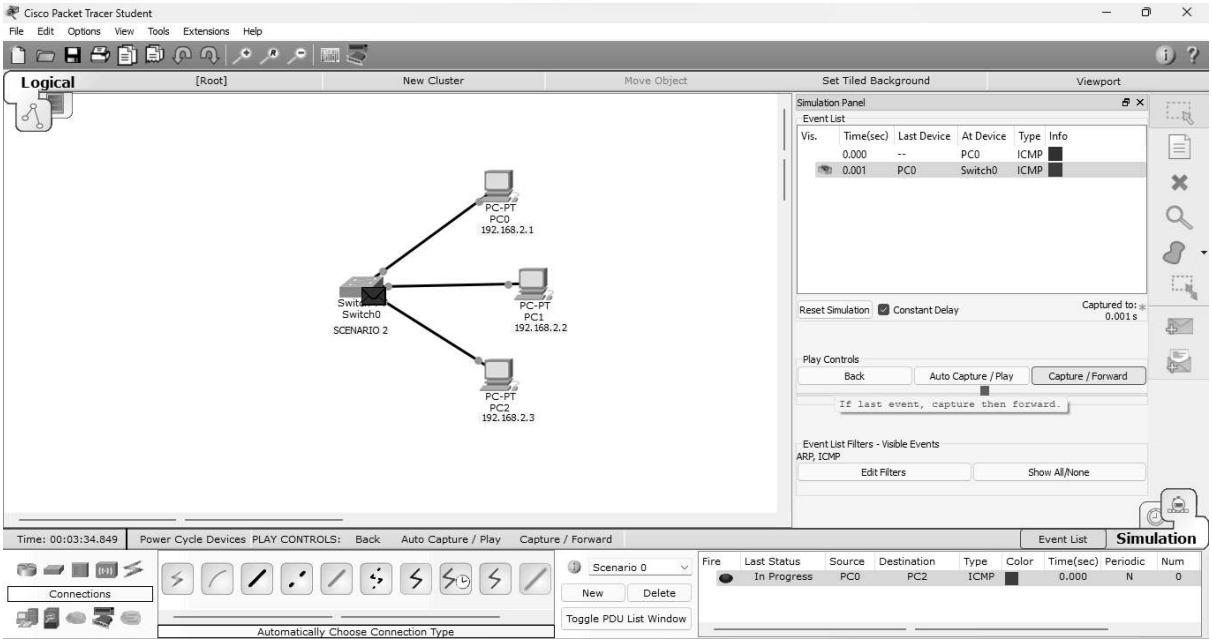


After receiving the acknowledgment from PC2, the hub broadcasts the acknowledgment packet to all the remaining PCs (PC0 and PC1). Since PC1 is not the intended recipient, it declines the acknowledgement. However, PC0, upon receiving the acknowledgment, accepts it, and the scenario is considered successful.

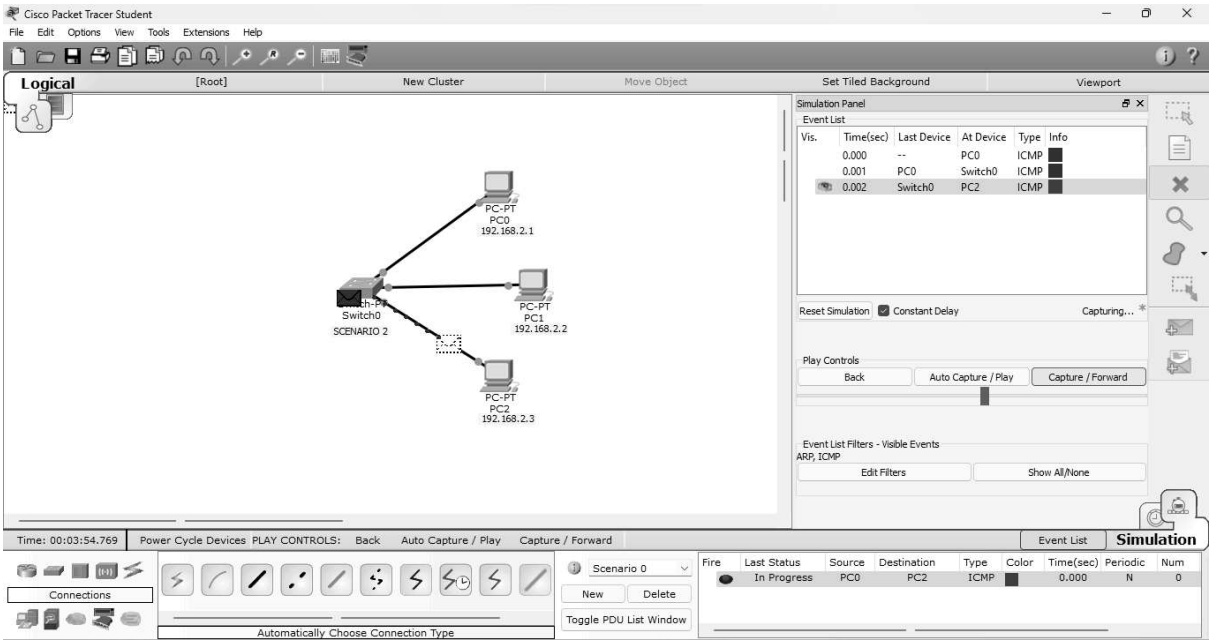
Scenario 2 :



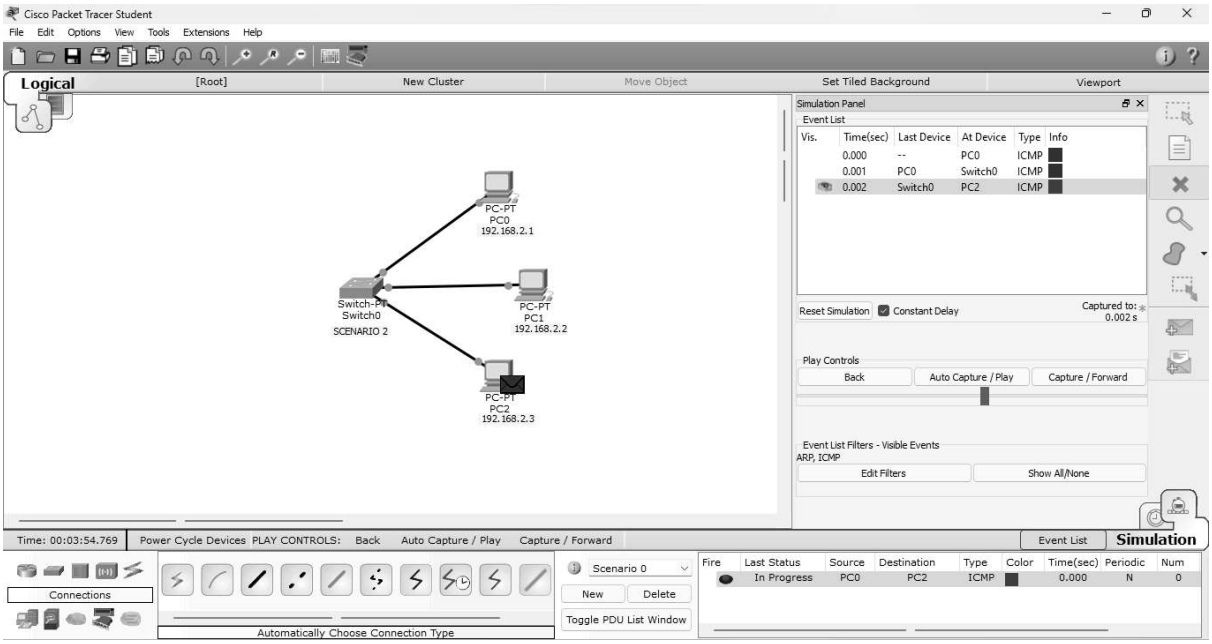
In the above image, a star topology using a switch is illustrated. A Packet has been initiated with its source set to PC0 and its destination set to PC2.



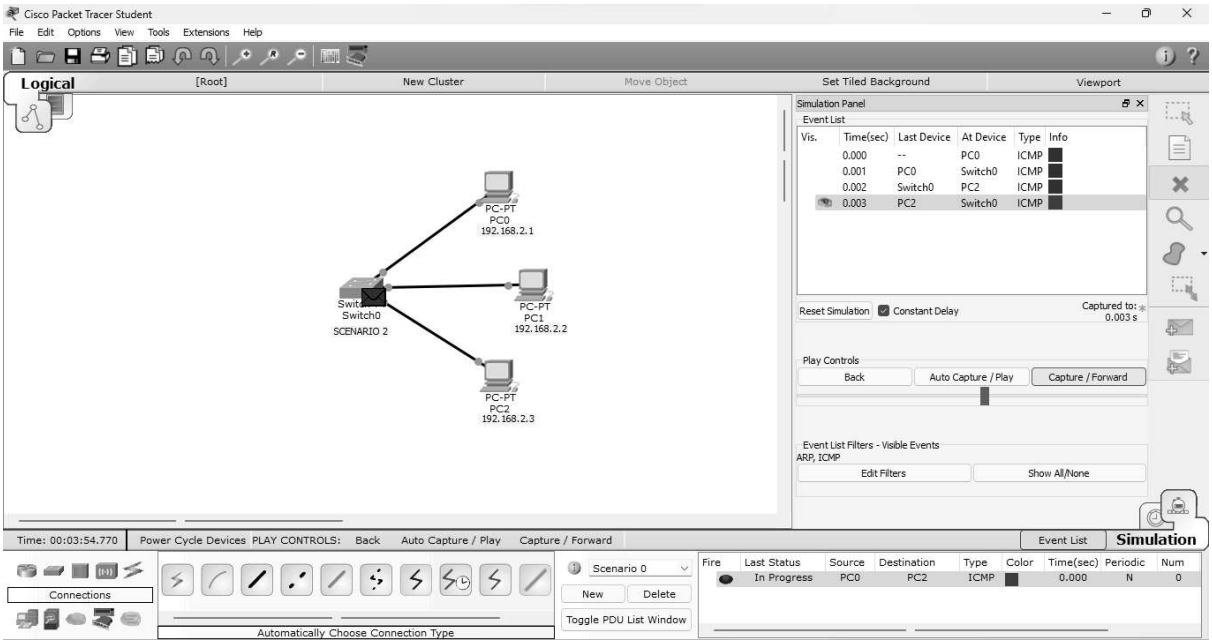
The packet is then sent from PC0 to the switch in the star topology



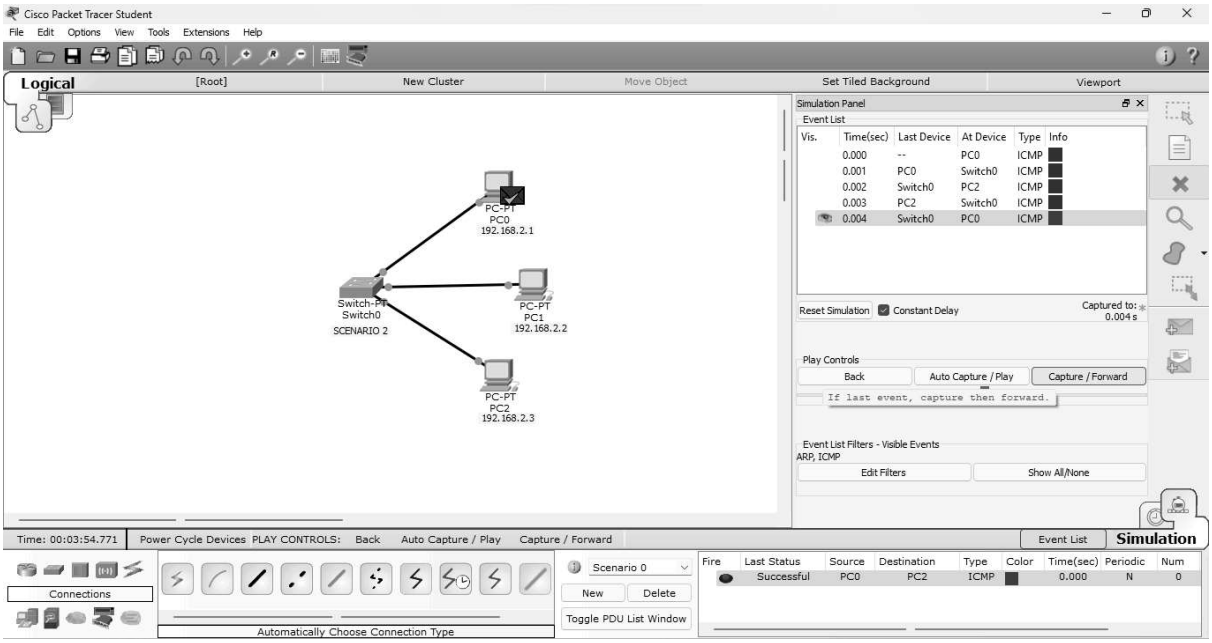
A packet is then sent directly from the switch to PC2



PC2 receives the packet sent directly from the switch.

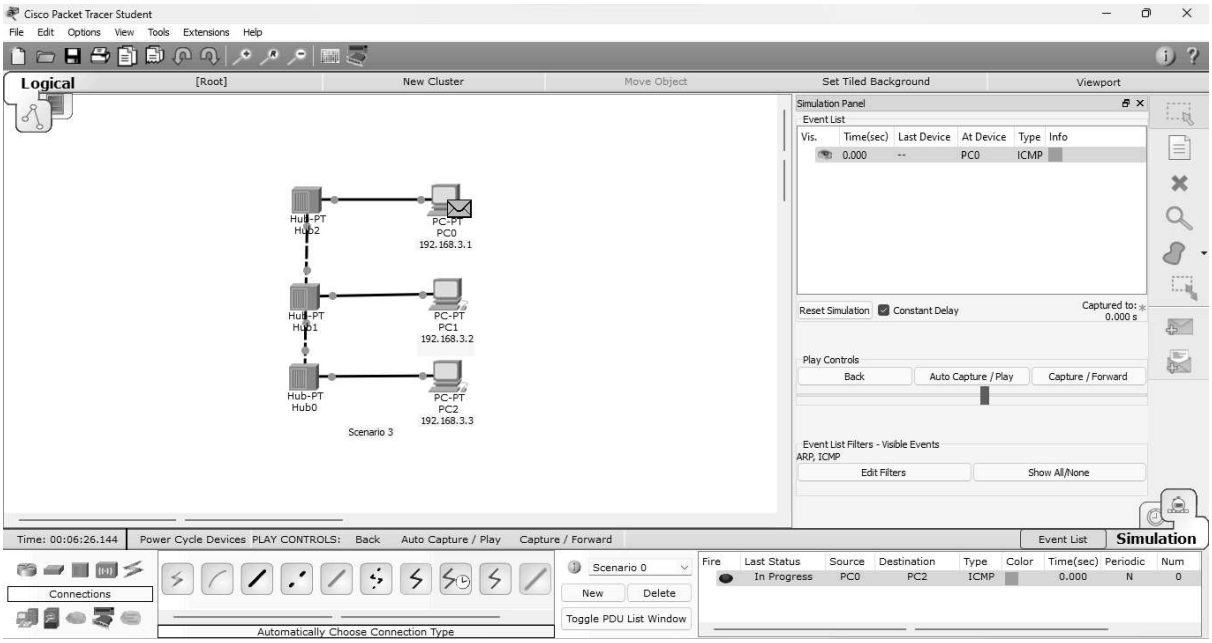


PC2 sends back an acknowledgment after receiving the packet from the switch.

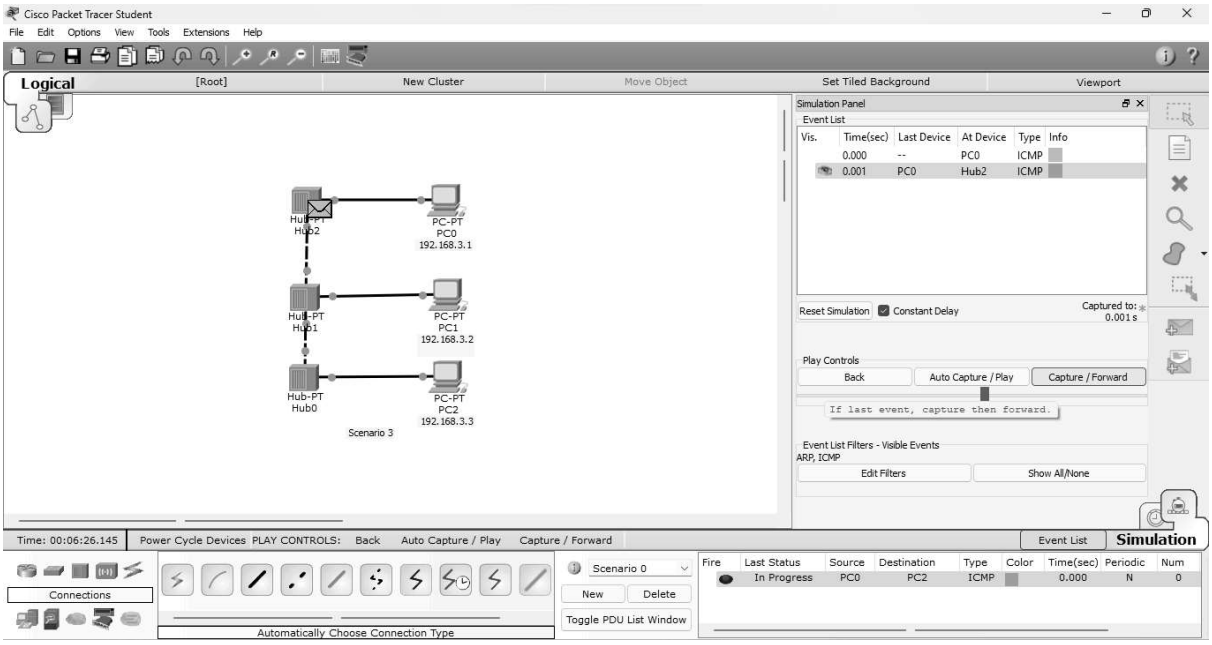


The acknowledgment is sent only to PC0, which is the intended recipient, rather than being broadcasted to all devices , and the scenario is successful.

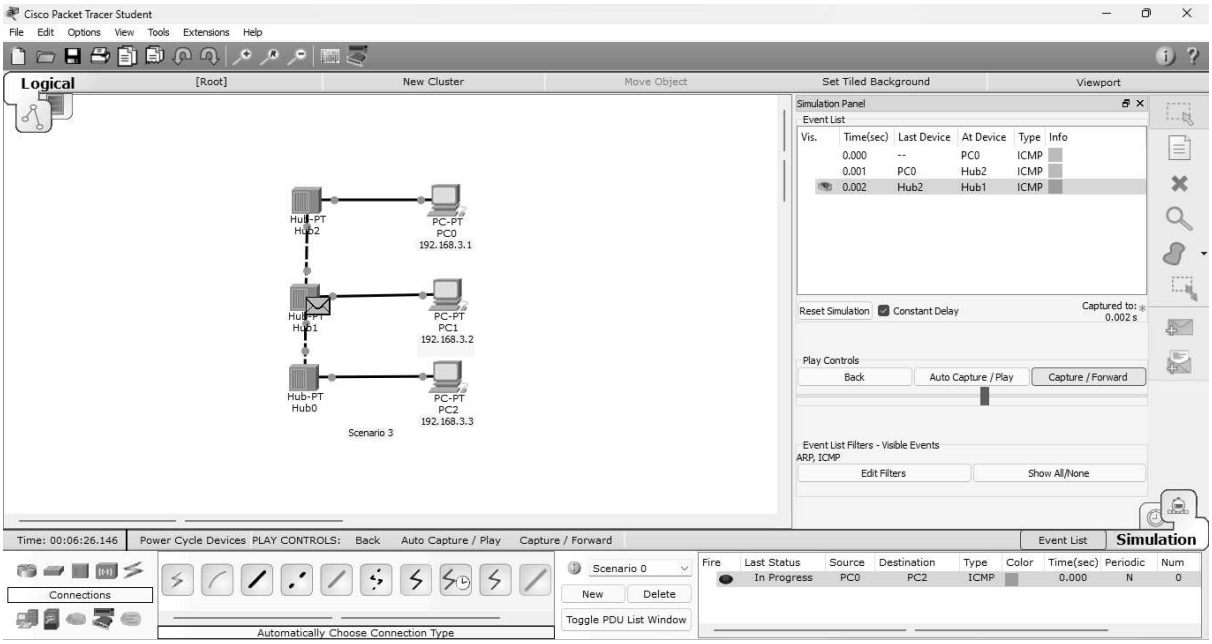
Scenario 3 :



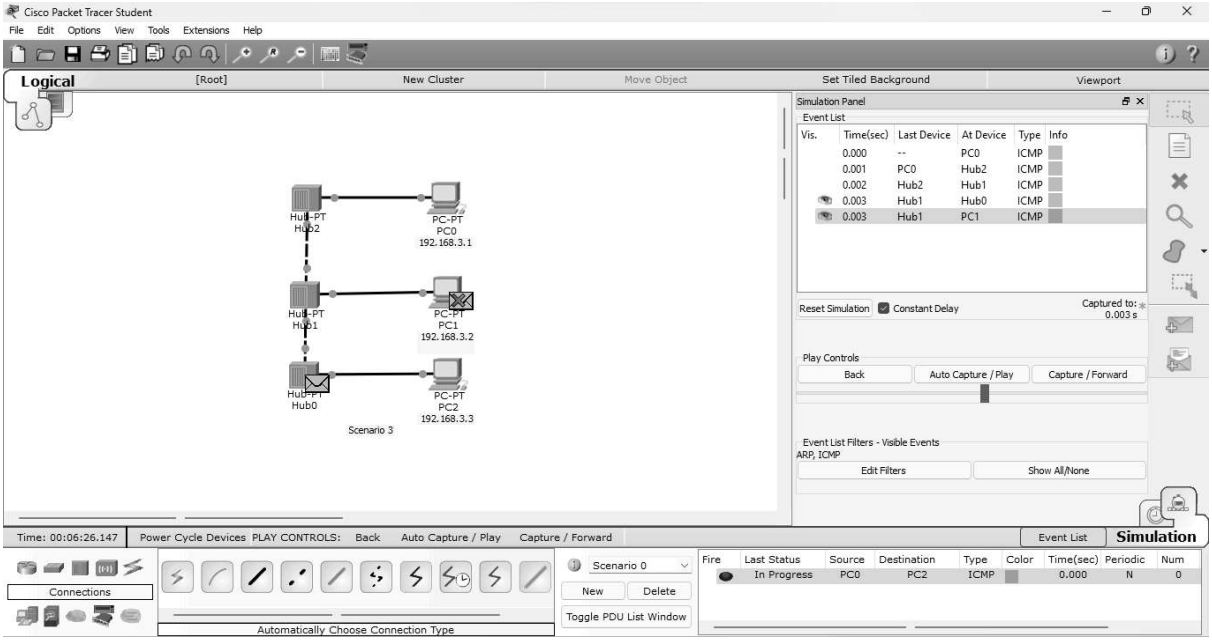
A packet is set from the source PC0 to the destination PC2 in the bus topology using hubs.



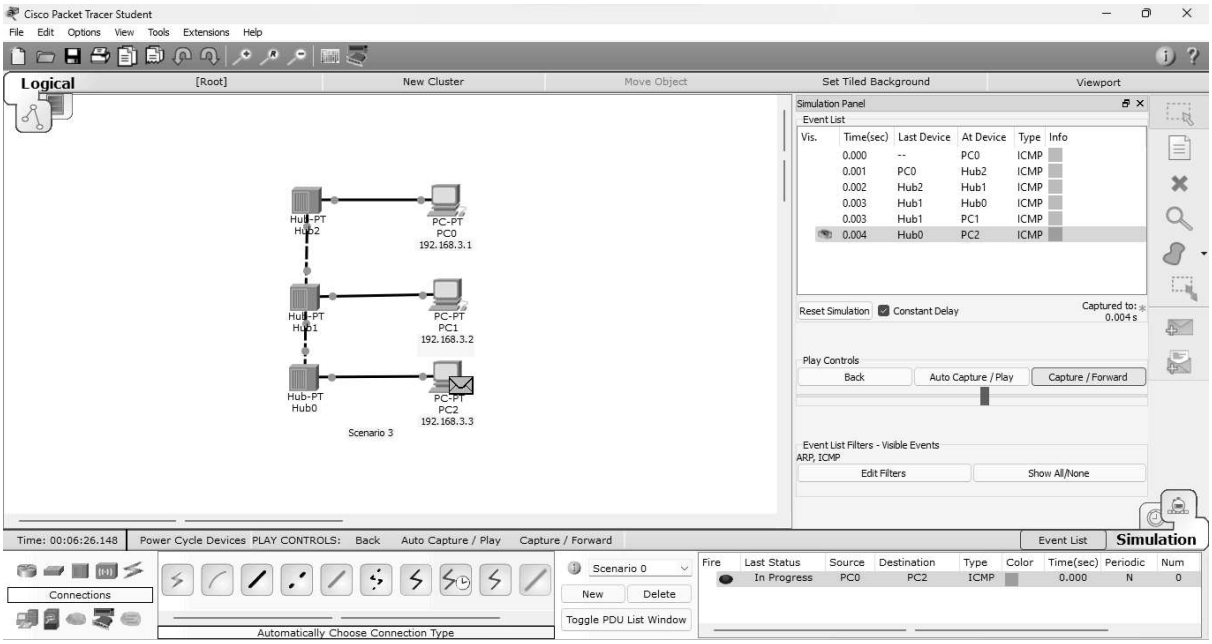
The packet is sent from PC0 to Hub2 in the bus topology using hubs.



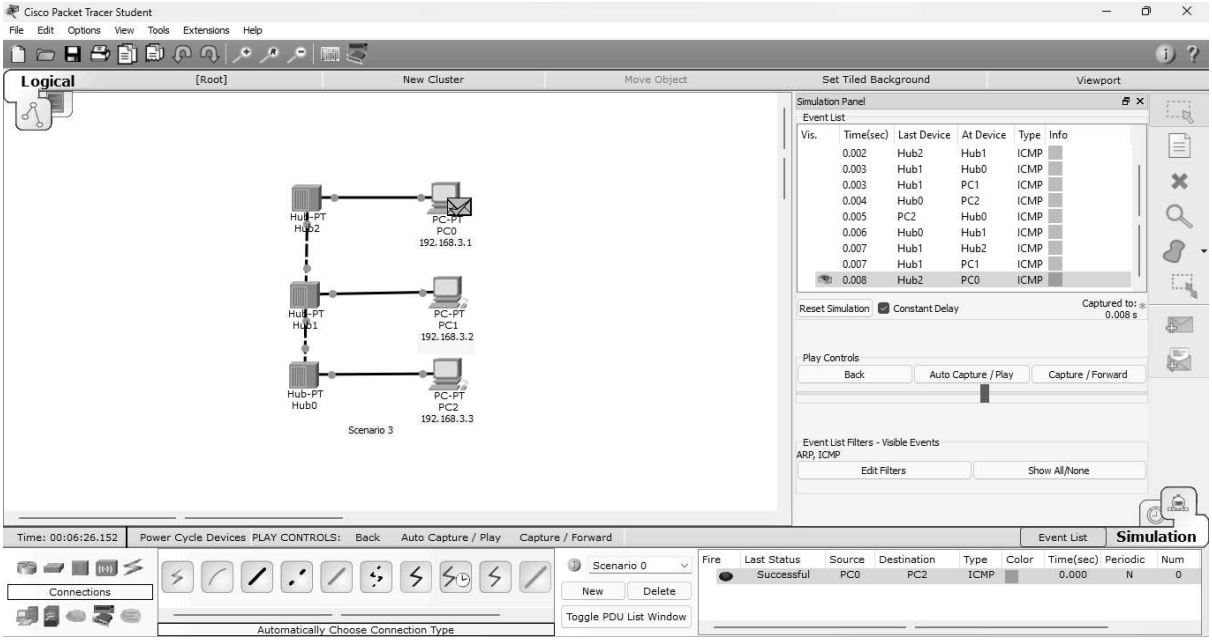
The packet is forwarded from Hub2 to Hub1 in the bus topology.



The packet is broadcasted from Hub1 and is accepted on Hub0 but declined on PC1 in the bus topology.



The packet is accepted by PC0 in its entirety after being broadcasted from Hub1.

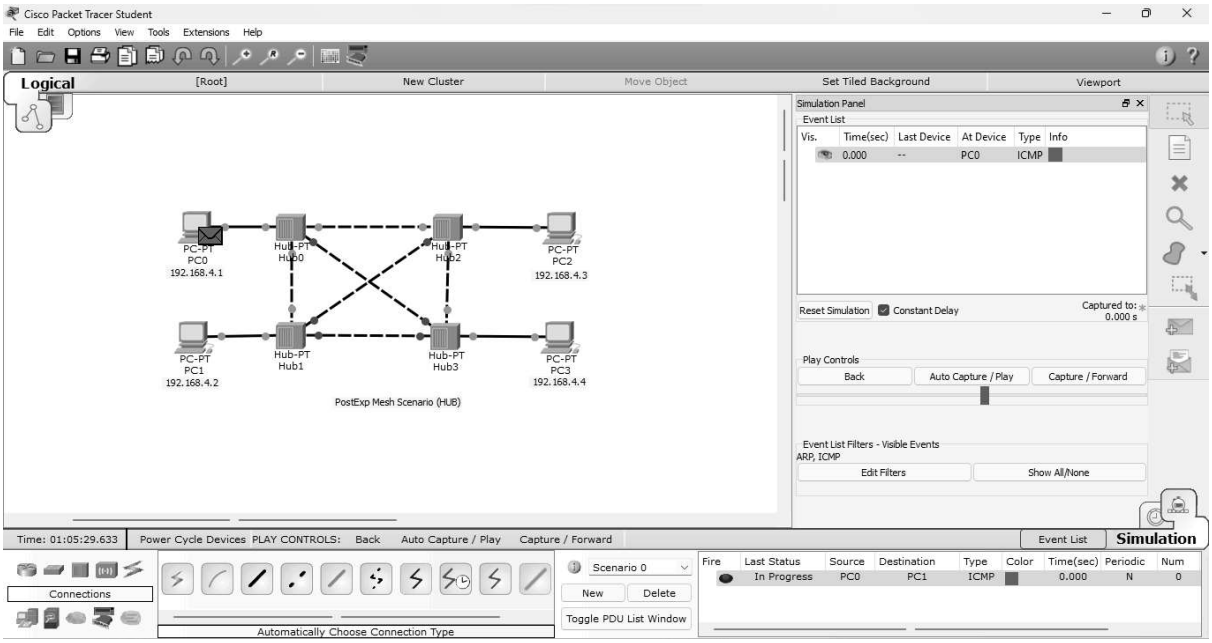


The acknowledgment travels back the same way to Hub0 and ends up at PC0, completing the scenario in the bus topology.

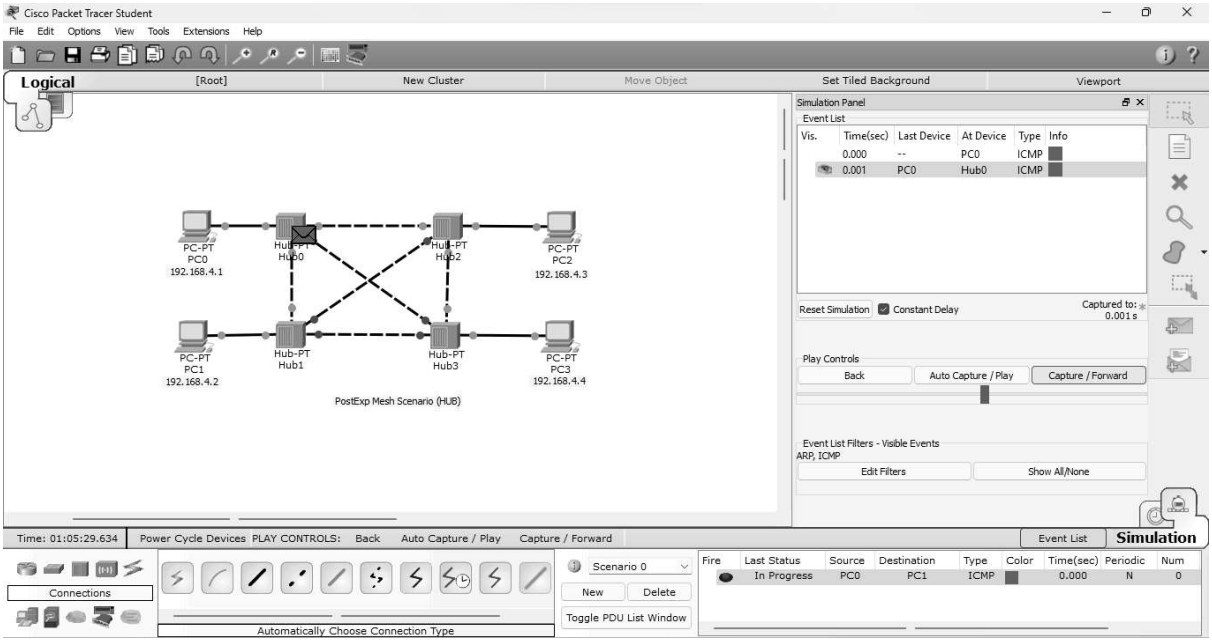
POST EXPERIMENT

Q1.Implement mesh topology using Hub and Switch.

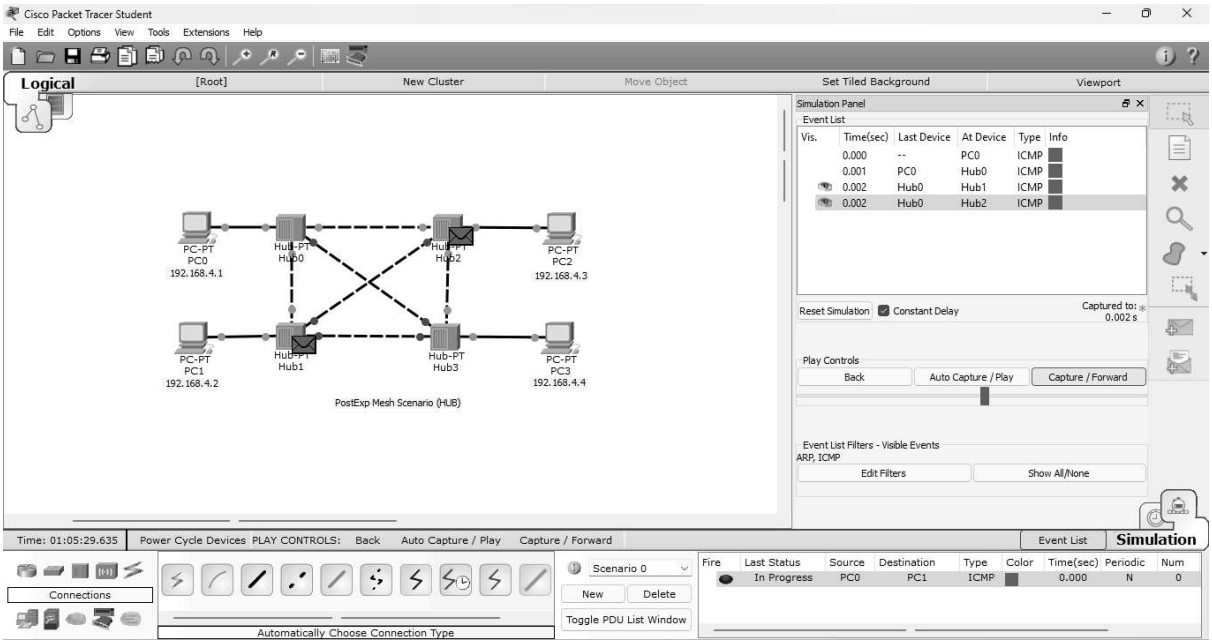
USING HUB:



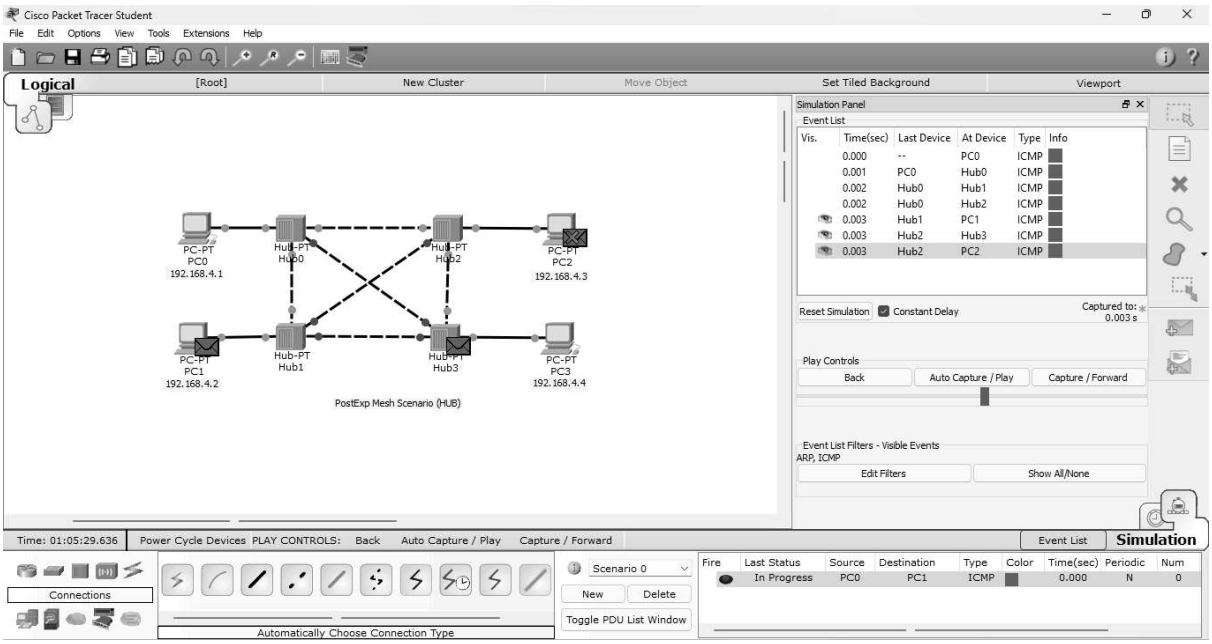
A packet is set with its source at PC0 and its destination at PC1 in the mesh topology using hubs.



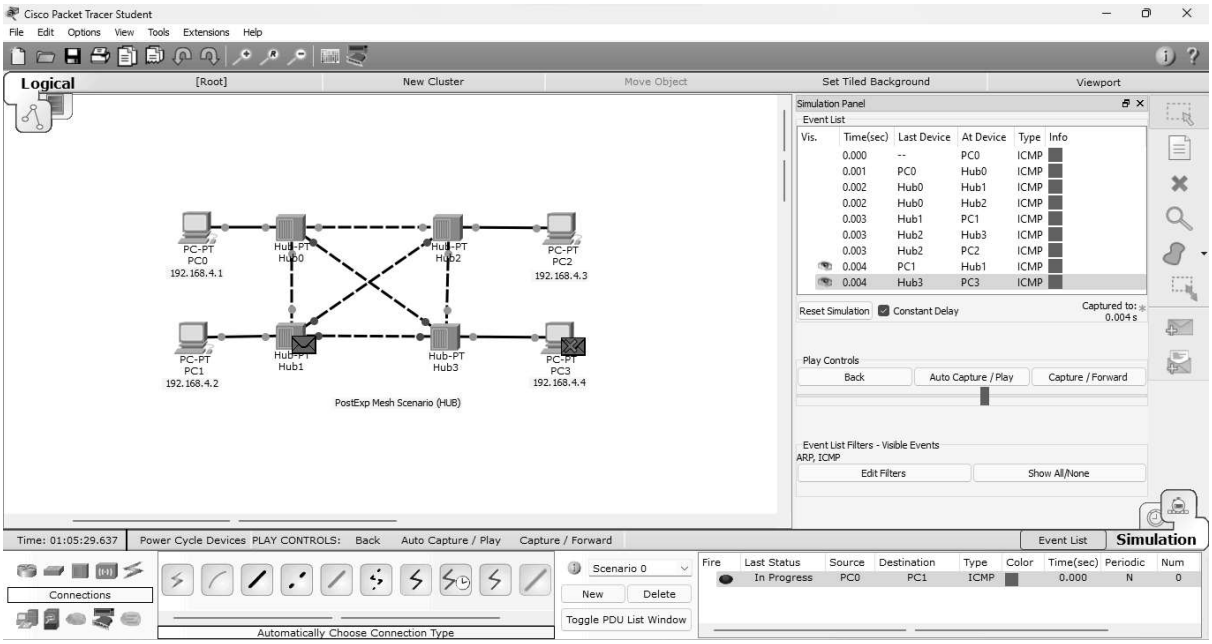
The packet is sent from PC0 to Hub0 in the mesh topology using a combination of hubs.



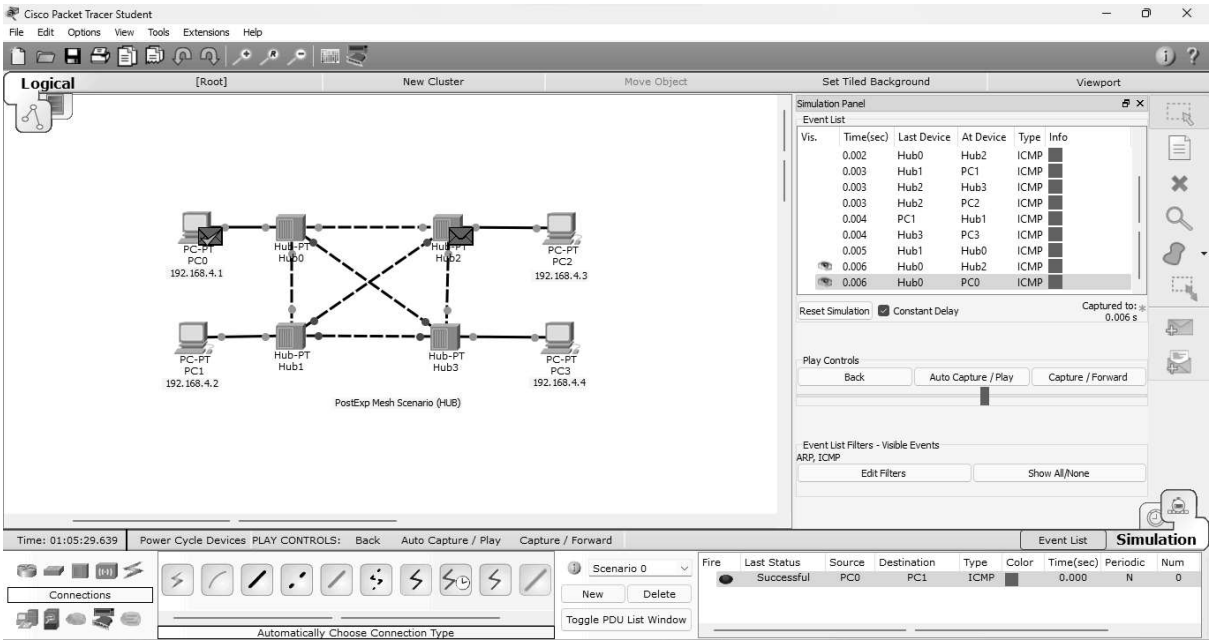
Hub0 broadcasts the packet to all its connected devices in the mesh topology.



The packet reaches Hub1 from Hub0 and is then broadcasted to PC1. PC1 accepts it. On the other side, the packet also reaches PC1 directly, but PC1 declines it.

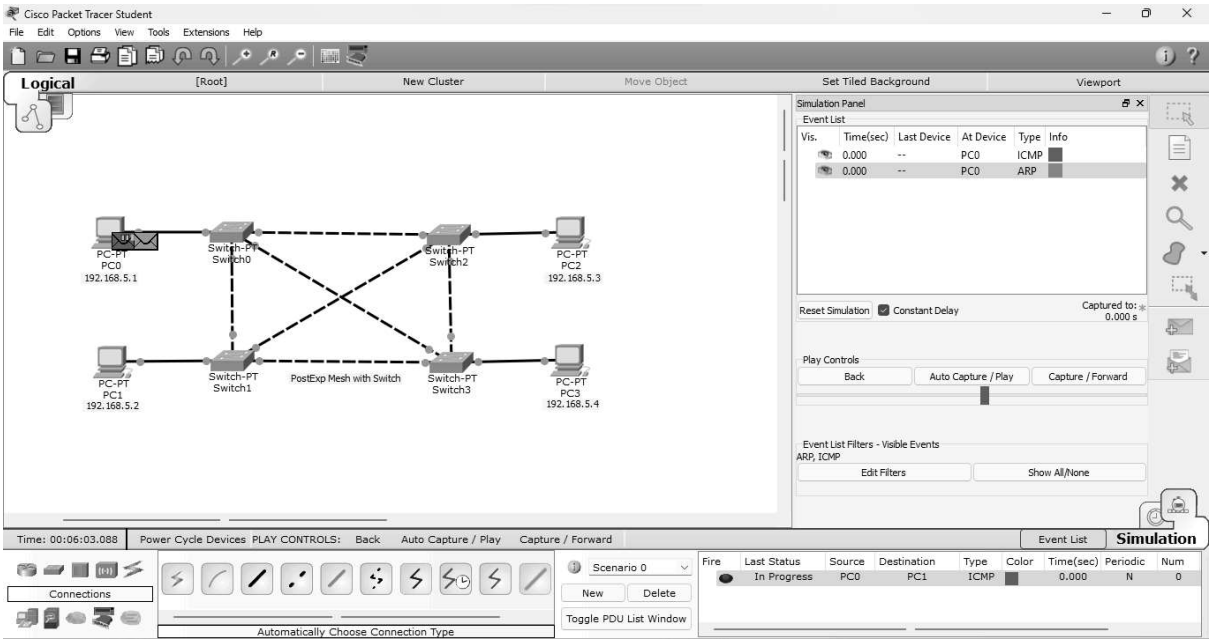


An acknowledgment is generated by PC1 and sent to Hub1 in the mesh topology scenario.

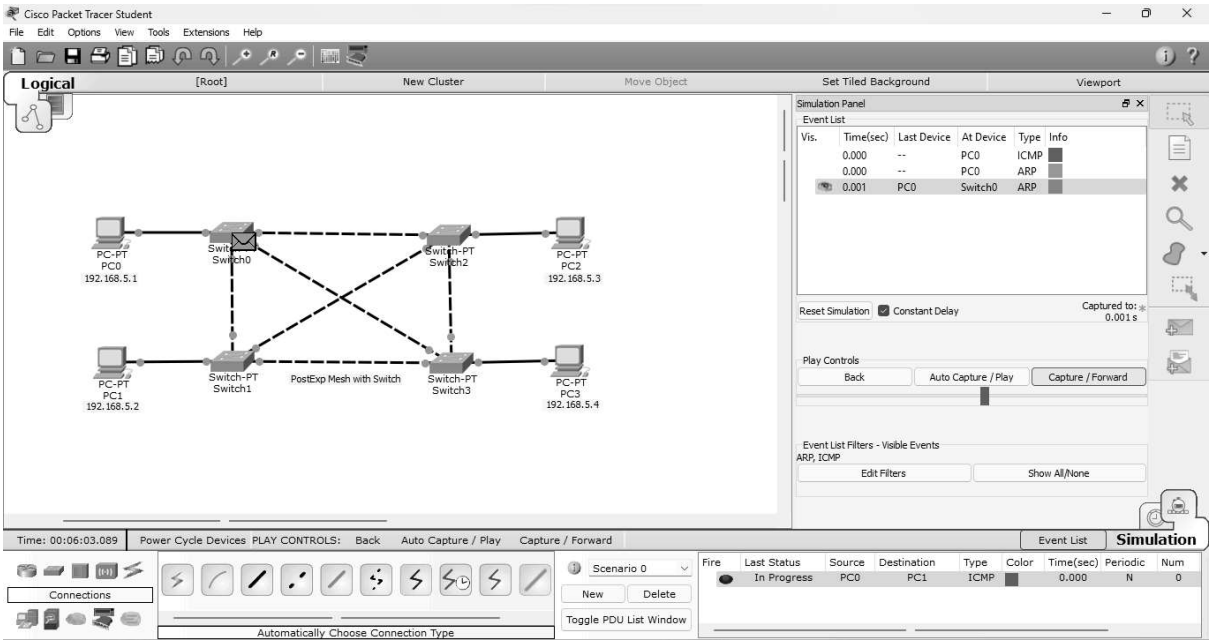


The acknowledgment travels back the same way to Hub0 and ends up at PC0, completing the scenario successfully.

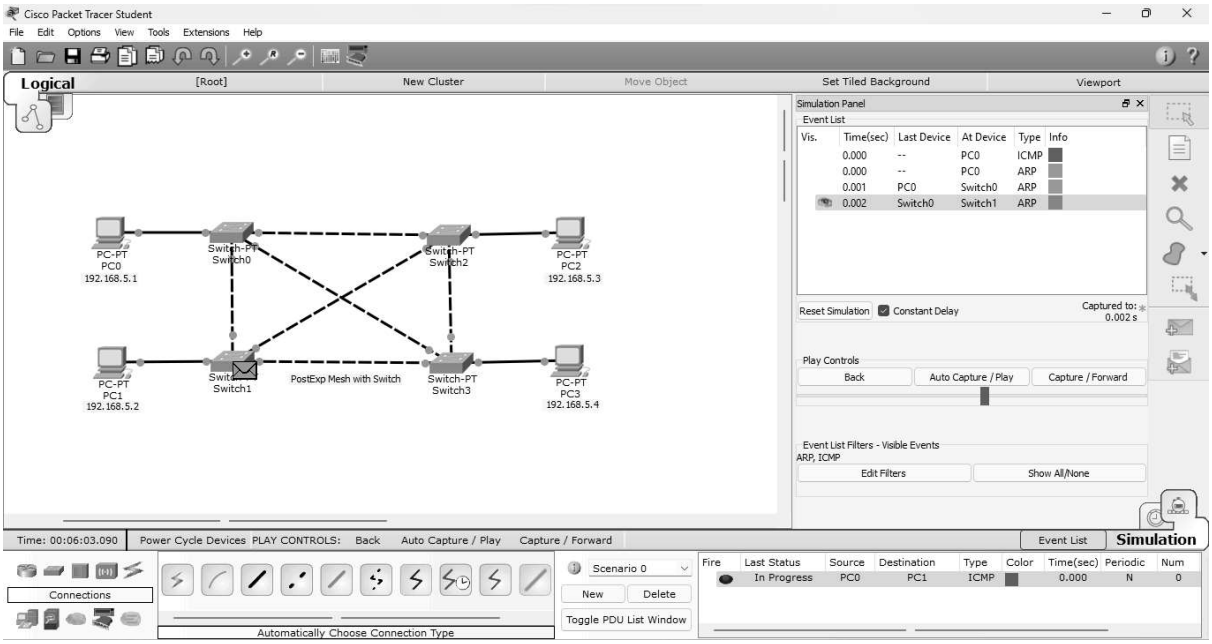
2.Using SWITCH



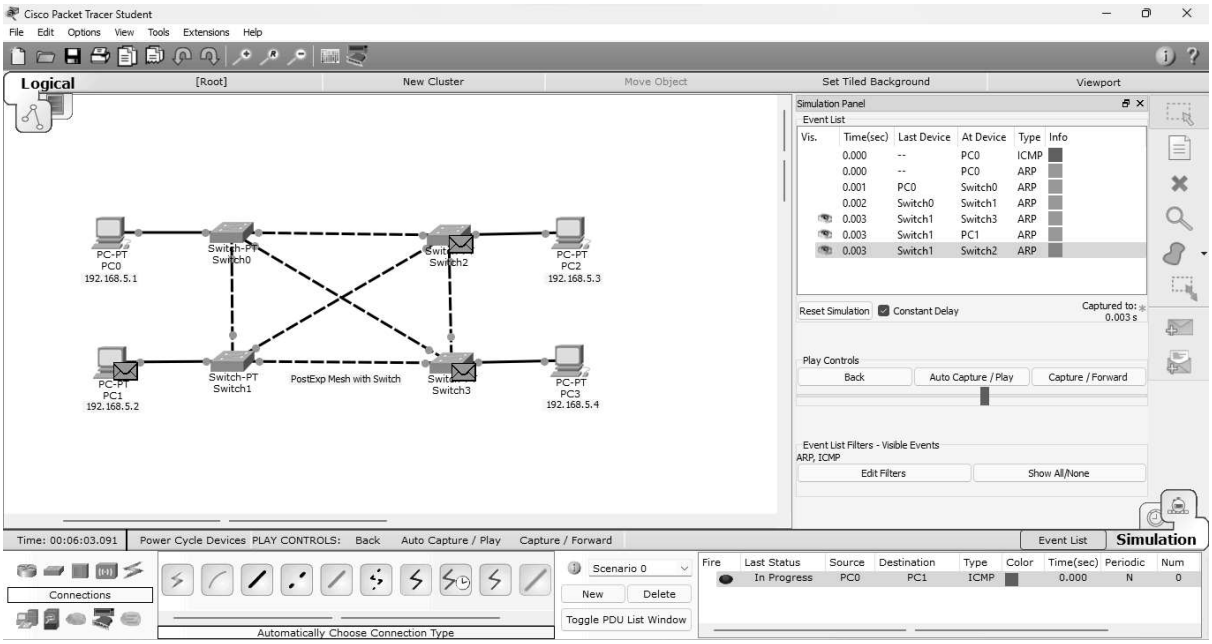
A packet is set with its source at PC0 and its destination at PC1 in the mesh topology using switchs.



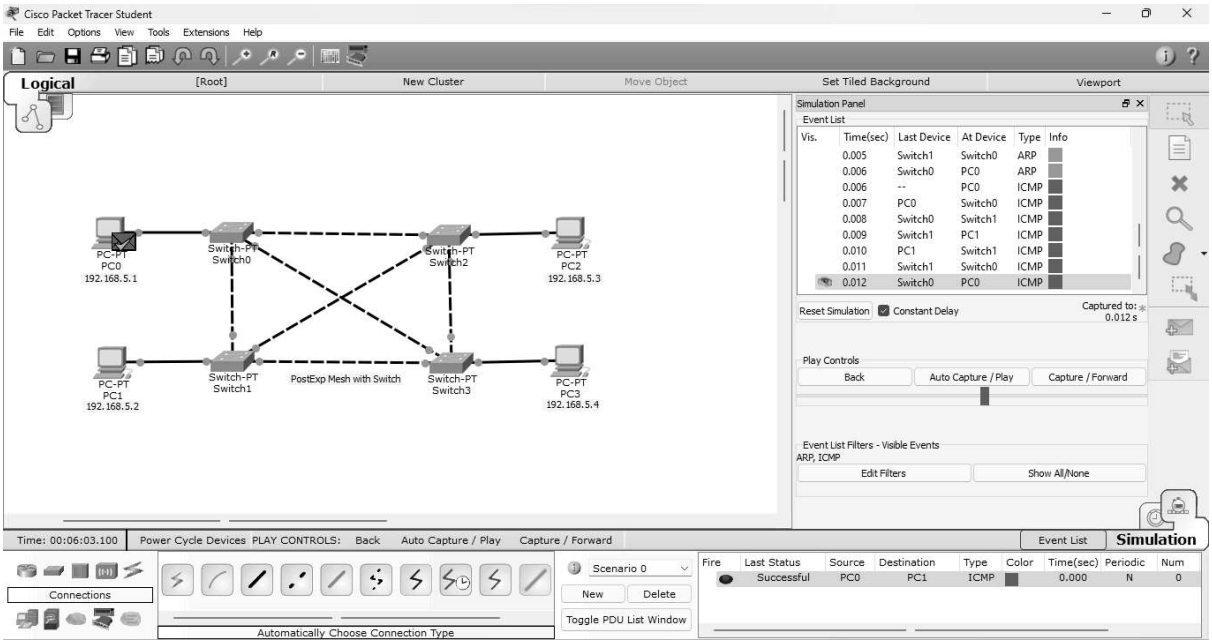
The packet is sent from PC0 to Switch0 in the mesh topology using a combination of switches.



As it was a switch, it didn't broadcast the Packet. Instead, it sent the Packet to Switch1, which is connected to the destination PC, PC1.



The packet then reaches its destination, PC1, in the mesh topology scenario.



In the same way, the acknowledgment is received at PC0 in the mesh topology scenario.and scenario ends successfully