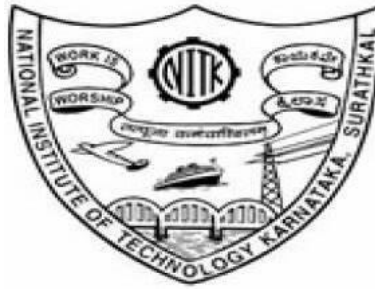


**NATIONAL INSTITUTE OF TECHNOLOGY SURATHKAL,
MANGALORE KARNATAKA-575025**

LAB ASSIGNMENT-05



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BRANCH:- INFORMATION TECHNOLOGY

**COURSE:- COMPUTER COMMUNICATION AND
NETWORKING LAB**

**SUBMITTED TO :-
GEETHA V MADAM**

HUB AND SWITCH

Exercise

ICMP : The Internet Control Message Protocol (ICMP) is a network layer protocol used by network devices to diagnose network communication issues. ICMP is mainly used to determine whether or not data is reaching its intended destination in a timely manner. ICMP creates and sends messages to the source IP address indicating that a gateway to the internet, such as a router, service or host, cannot be reached for packet delivery. Any IP network device has the capability to send, receive or process ICMP messages.

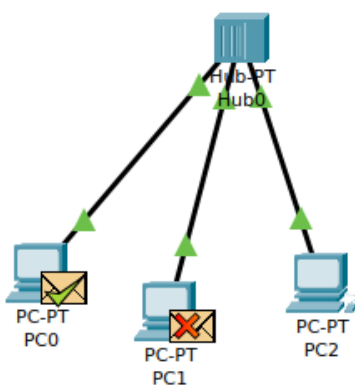
ARP : ARP finds the hardware address, also known as Media Access Control (MAC) address, of a host from its known IP address. The packet between PC0 and PC2 was broadcast by the hub, whereas the switch sent the packet from PC3 meant for PC5 only to PC5 (unicast). On a single physical network, individual hosts are known on the network by their physical hardware address. ARP uses a lookup table, or cache, to perform this translation

QUESTION NO 1 :-

The packet between PC0 and PC2 was broadcast by the hub,

whereas the switch sent the packet from PC3 meant for PC5 only to PC5 (unicast).

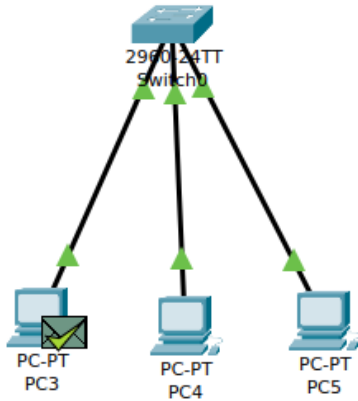
PC0 to PC2:



Simulation Panel			
Event List			
Vis.	Time(sec)	Last Device	At Device
	0.000	--	PC0
	0.001	PC0	Hub0
	0.002	Hub0	PC1
	0.002	Hub0	PC2
	0.003	PC2	Hub0
	0.004	Hub0	PC0
	0.004	Hub0	PC1

Reset Simulation ☒ Constant Delay

PC3 to PC5:



Simulation Panel			
Event List			
Vis.	Time(sec)	Last Device	At Device
	0.000	--	PC3
	0.001	PC3	Switch0
	0.002	Switch0	PC5
	0.003	PC5	Switch0
	0.004	Switch0	PC3

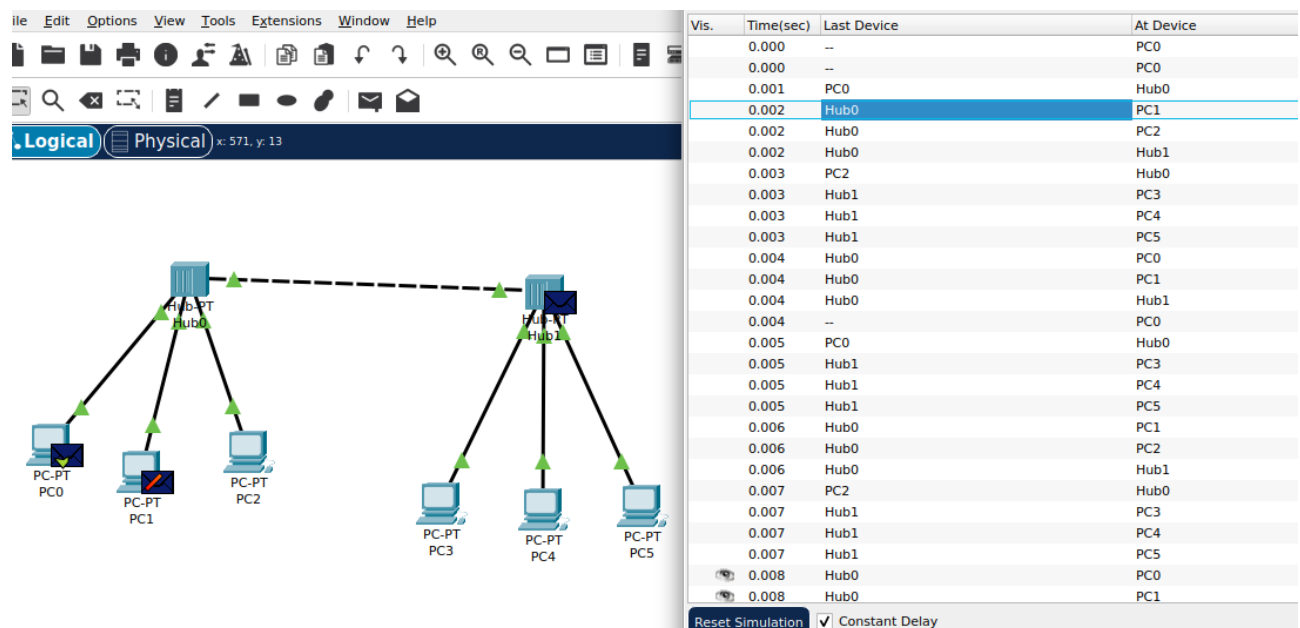
Differences between Hub and Switch :-

S.No.	Hub	Switch
1.	It functions in a physical layer.	It functions in the data link layer.
2.	Switch allows packet switching.	There is a separate collision domain in the switch.
3.	Hub follows broadcast transmission.	Switch follows three i.e., multicast, unicast, and broadcast type transmission.
4.	In Hub, half duplex transmission technique is utilized.	In switch, full duplex transmission technique is utilized.
5.	Hub does not allow packet filtering.	Switch allows packet switching.
6.	There can be 4 ports in Hub.	24 to 28 ports contained by a Switch

QUESTION NUMBER 2 :-










PC0 to PC2:

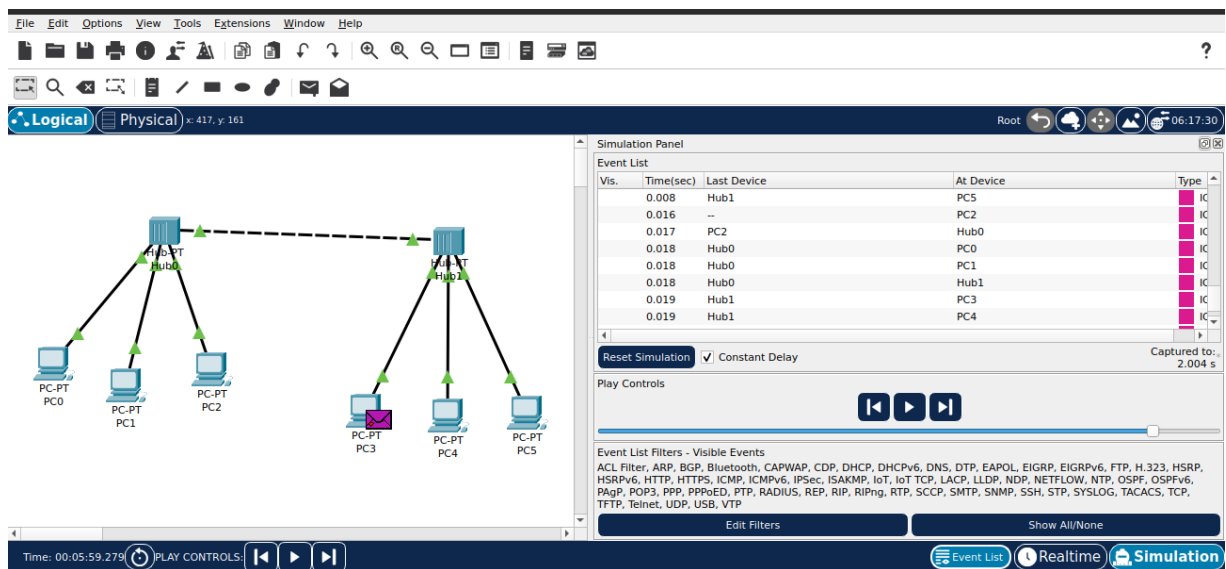
a. In ICMP transfer of packets from PC0 to PC2, the packet gets broadcast by Hub0. The packet is received by Hub1, which then broadcasts it to PC3, PC4, and PC5. The packet is only accepted by PC2.



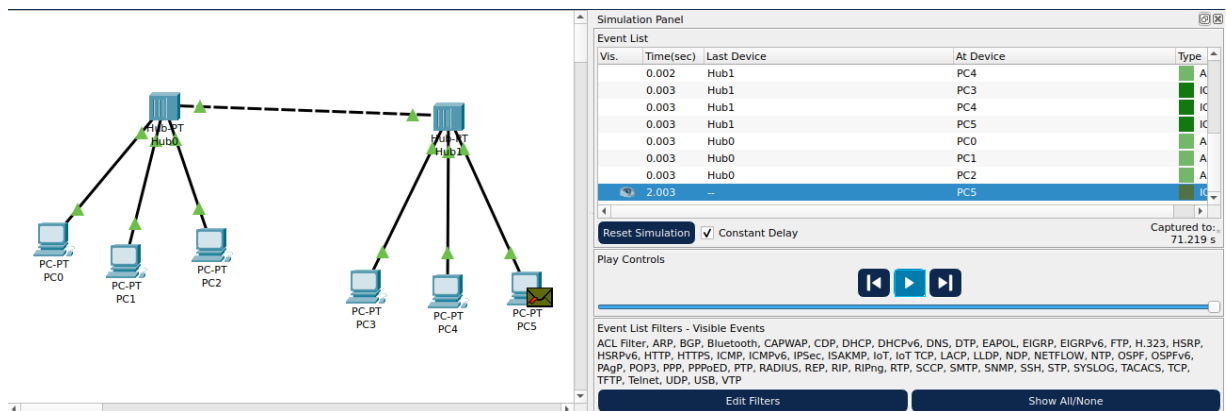
b. In ICMP transfer of packets from PC0 to PC4, the packet gets broadcast by Hub0. The packet is received by Hub1, which then broadcasts it to PC3, PC4, and PC5. The packet is only accepted by PC4

Simulation Panel			
Event List			
Vis.	Time(sec)	Last Device	At Device
	0.000	--	PC0
	0.000	--	PC0
	0.001	PC0	Hub0
	0.002	Hub0	PC1
	0.002	Hub0	PC2
	0.002	Hub0	Hub1
	0.003	Hub1	PC3
	0.003	Hub1	PC4
	0.003	Hub1	PC5
	0.004	PC4	Hub1
	0.005	Hub1	Hub0
	0.005	Hub1	PC3
	0.005	Hub1	PC5
	0.006	Hub0	PC0
	0.006	Hub0	PC1
	0.006	Hub0	PC2
	0.006	--	PC0
	0.007	PC0	Hub0
	0.008	Hub0	PC1
	0.008	Hub0	PC2
	0.008	Hub0	Hub1
	0.009	Hub1	PC3
	0.009	Hub1	PC4
	0.009	Hub1	PC5
	0.010	PC4	Hub1
	0.011	Hub1	Hub0
	0.011	Hub1	PC3

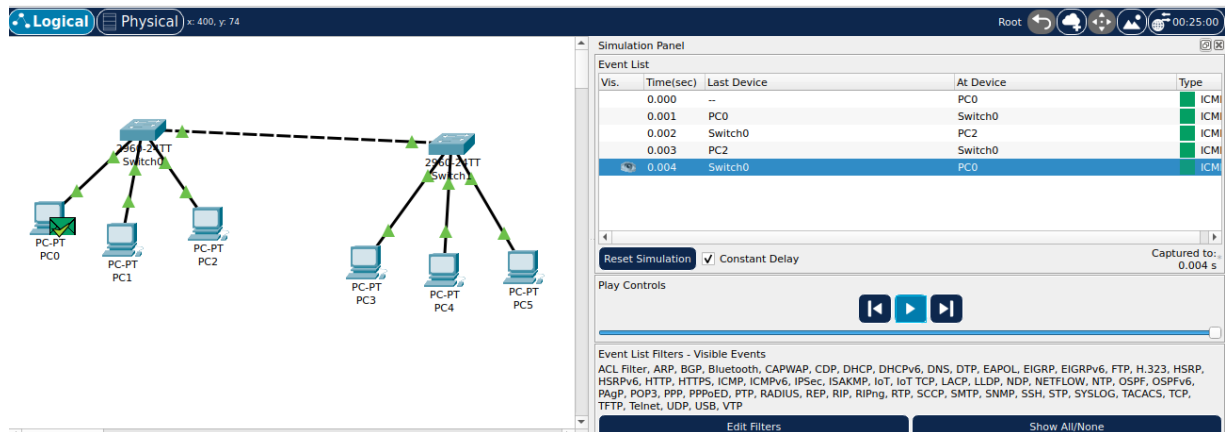
	0.011	Hub1	Hub0		ICMP
	0.011	Hub1	PC3		ICMP
	0.011	Hub1	PC5		ICMP
	0.012	Hub0	PC0		ICMP
	0.012	Hub0	PC1		ICMP
	0.012	Hub0	PC2		ICMP



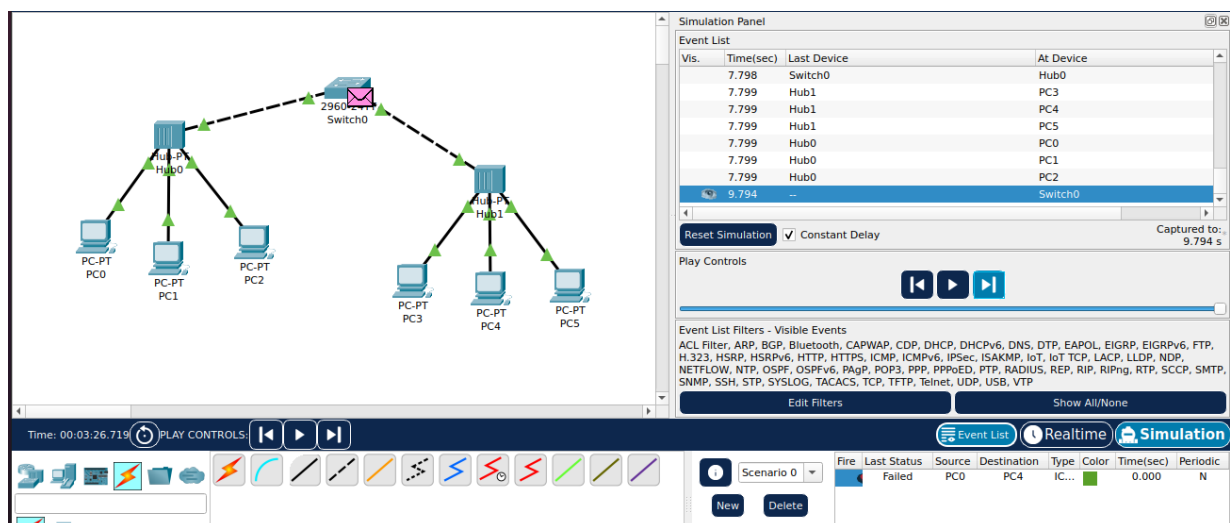
c. In ICMP transfer of packets from PC0 to PC2, and PC3 to PC5, the packet gets broadcast by Hub0 and Hub1 respectively. Collisions happen at both Hub0 and Hub1, and may lead to packet corruption. It is highly likely that one or more of the packets fail to transfer correctly. Since PC2 directly receives the broadcast from Hub0, and PC5 from Hub1, there is a slight chance of successful transfer in one case.



d. In ICMP transfer of packets from PC0 to PC4, and PC5 to PC2, the packet gets broadcast by Hub0 and Hub1 respectively. Collisions happen at both Hub0 and Hub1, and may lead to packet corruption. It is highly likely that both the packets fail to transfer correctly. Since PC2 and PC5 are reliant on their respective hubs to transfer the packet, and the data may be corrupted at the hubs, the packet likely arrives corrupted at destination.

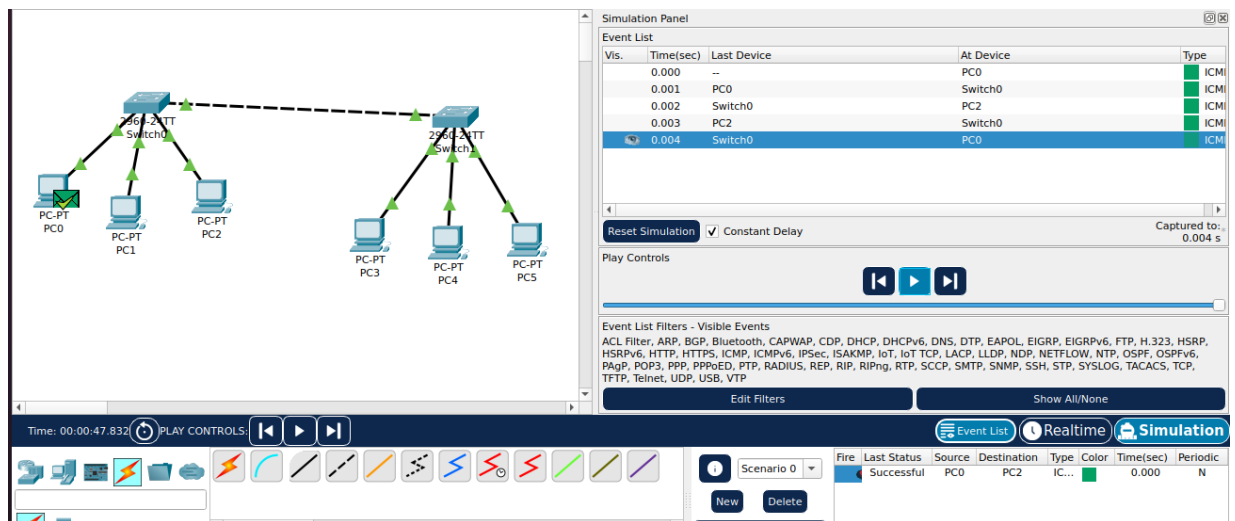


e. The ICMP packet transfer from PC0 to PC4 fails, as the hub is a data link layer device.

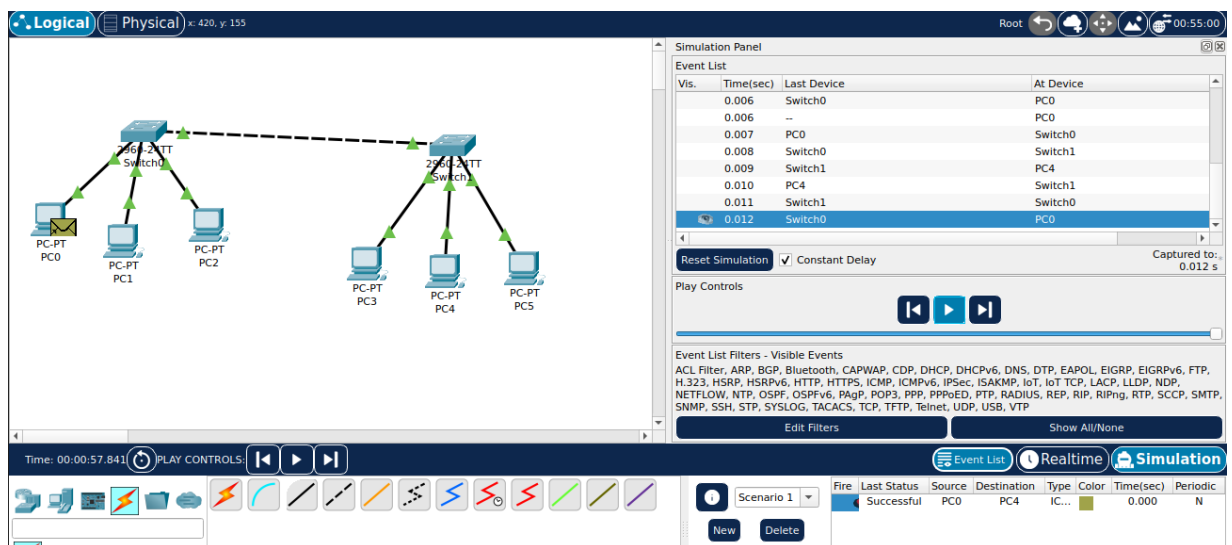


QUESTION NUMBER 3:-

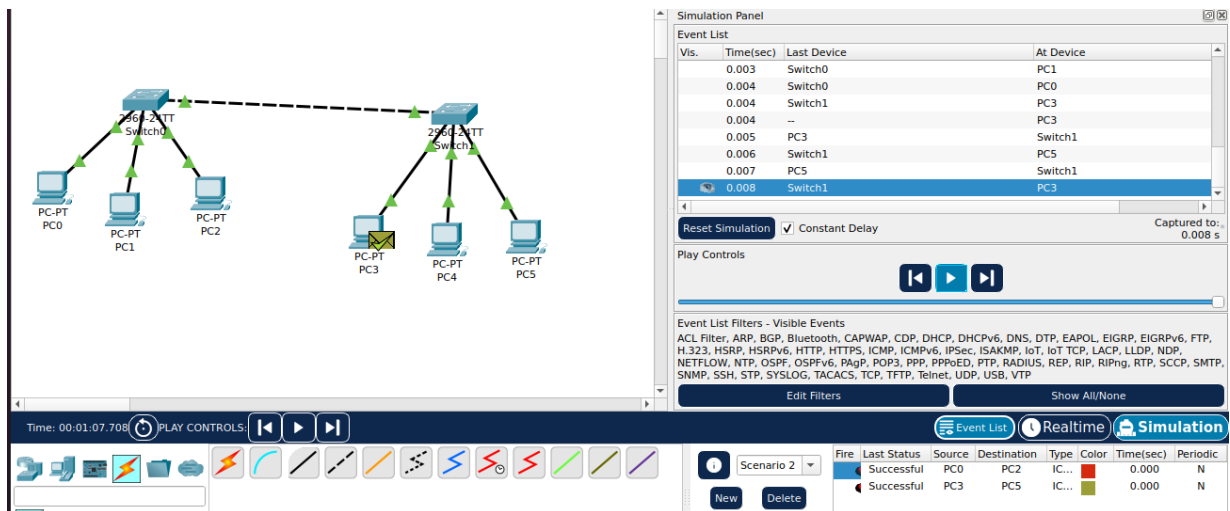
- In ICMP packet transfer from PC0 to PC2, the packet is unicast by switch0 to PC2. It does not reach Switch1.



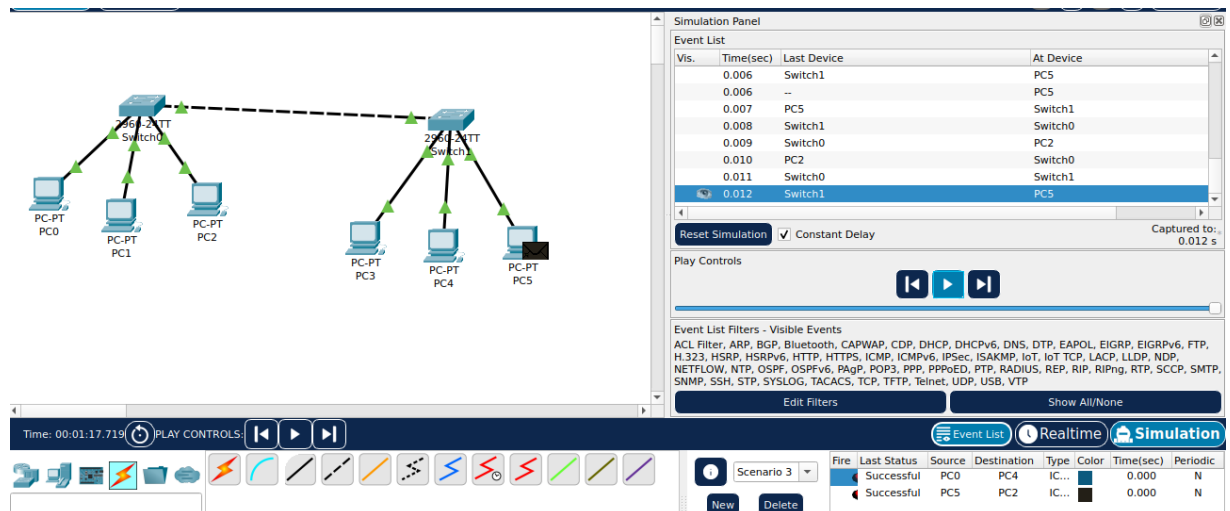
b. In ICMP packet transfer from PC0 to PC4, the packet is unicast by switch0 to Switch1, which unicasts it to PC4.



c. For simultaneous ICMP packet transfer from PC0 to PC2 and PC3 to PC5, the packet is unicast. From PC0 to PC2, the packet is transferred from PC0 to Switch0 and then from Switch0 to PC2. Similarly from PC3 to PC5, it is transferred from PC3 to Switch1 and then from Switch1 to PC5.

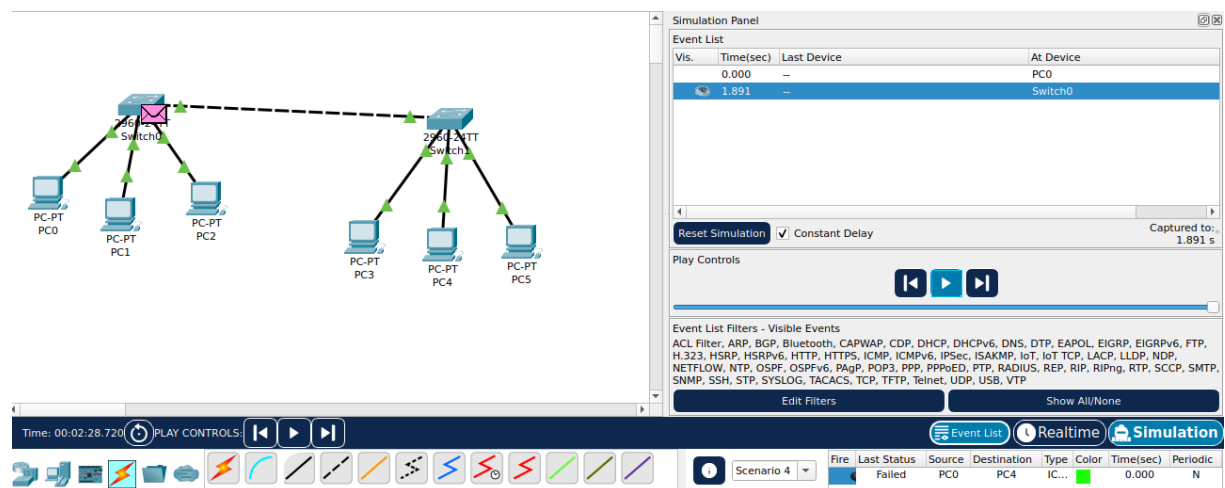


d. For simultaneous ICMP packet transfer from PC0 to PC4 and PC5 to PC2, the packet is unicast. From PC0 to PC4, the packet is transferred from PC0 to Switch0 and then from Switch0 to Switch1. Switch1



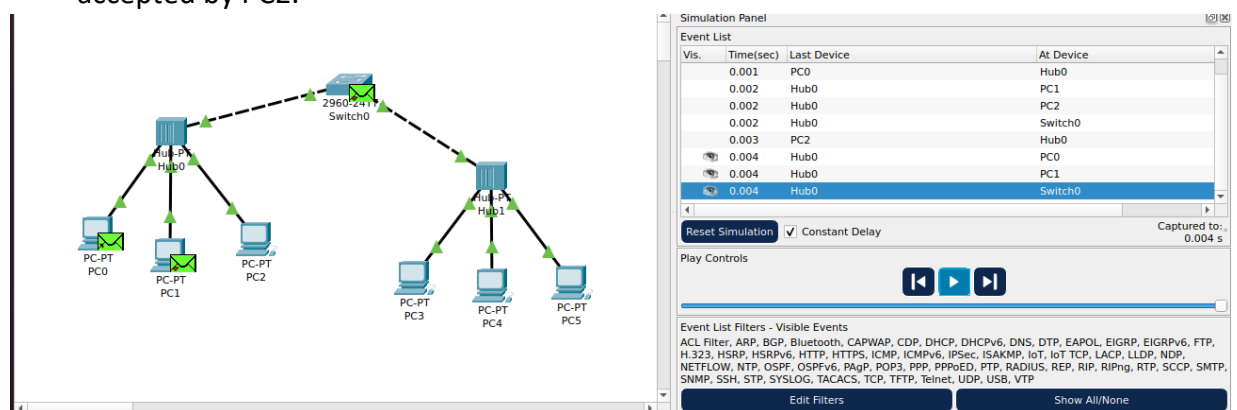
then sends it to the destination, PC4. Similarly from PC5 to PC2, it is transferred from PC5 to Switch1 and then from Switch1 to Switch0. Switch0 then sends the packet to the destination, PC2.

e. The ICMP packet transfer from PC0 to PC4 fails

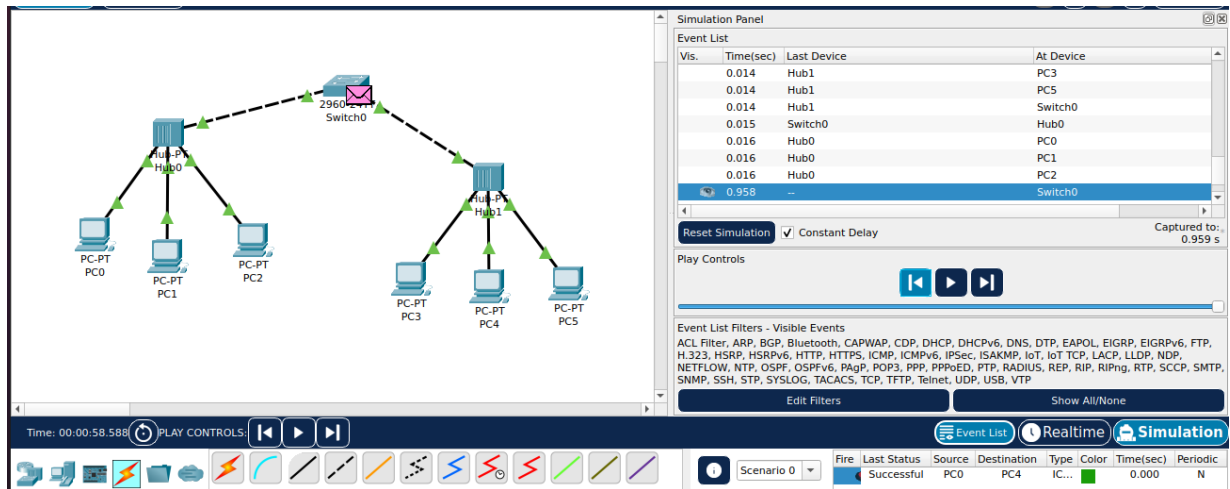


QUESTION NUMBER 4:-

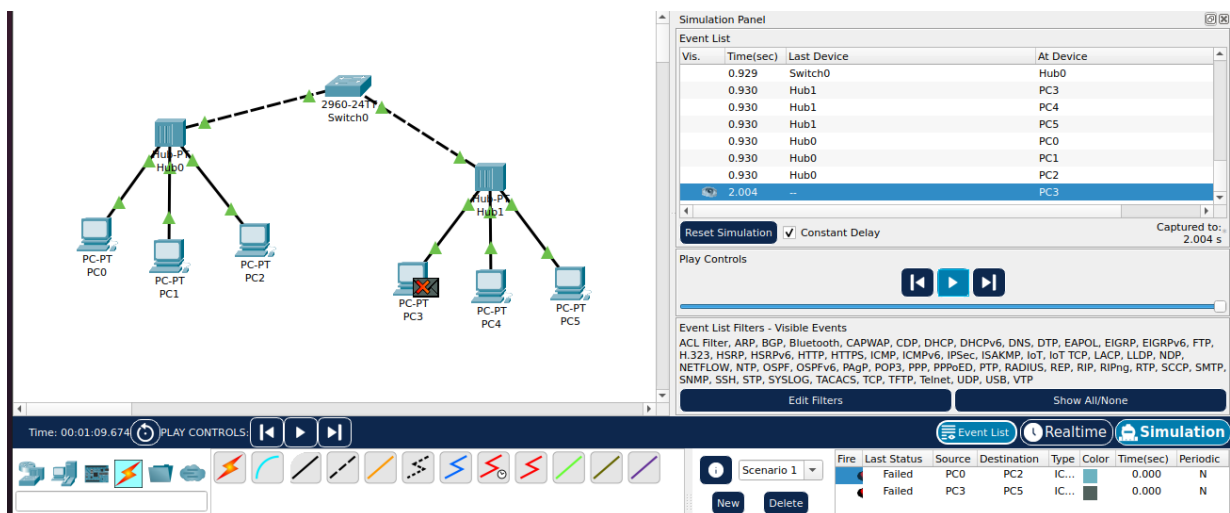
- a. In ICMP transfer of packets from PC0 to PC2, the packet gets broadcast by Hub0. Hub 0 sends it to PC1, PC2 and Switch2. The packet is received by Switch2, which does not send it to Hub 1, so the packet is not received by PC3, PC4, and PC5. The packet is only accepted by PC2.



b. In ICMP transfer of packets from PC0 to PC2, the packet gets broadcast by Hub0. Hub 0 sends it to PC1, PC2, and Switch2. The packet is received by Switch2, which unicasts it to Hub 1, which broadcasts it to PC3, PC4, and PC5. It is only accepted by PC4.

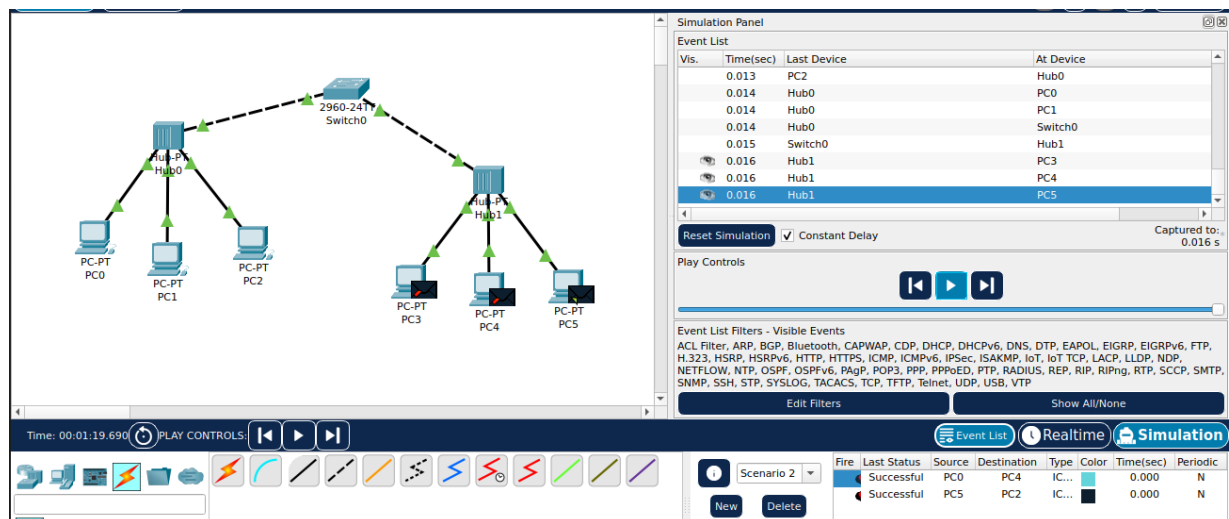


c. In ICMP transfer of packets from PC0 to PC2, and PC3 to PC5 simultaneously, the packet is sent by

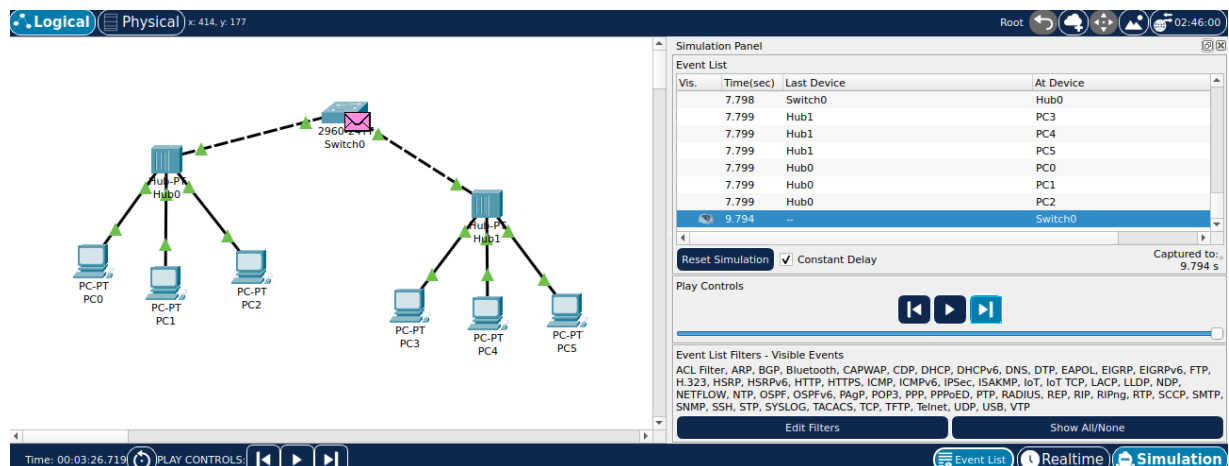


PC0 to Hub0, and PC3 to Hub1. Hub0 broadcasts it to PC1, PC2, and switch2. Hub1 broadcasts it to PC4, PC5, and switch2. The switch receives the packets from hub0 and hub1 simultaneously, and handles the collision. PC2 receives the packet in Hub0's initial broadcast, and PC5 receives the packet in Hub1's initial broadcast. The transfer was successful.

d. In ICMP transfer of packets from PC0 to PC4, and PC5 to PC2 simultaneously, the packet is sent by PC0 to Hub0, and PC3 to Hub1. Hub0 broadcasts it to PC1, PC2, and switch2. Hub1 broadcasts it to PC4, PC5, and switch2. The switch receives the packets from hub0 and hub1 simultaneously, and handles the collision by using a buffer. The order of packets is decided arbitrarily. Assuming it first sends the packet received from hub 0, the packet is sent to hub 1 and broadcast by it to PC3, 4, 5. PC5 accepts the package. Then the packet from Hub1 is sent to Hub0, and broadcast by it to PC0, 1, 2. PC2 accepts the package. The transfer was successful.



e. The ICMP packet transfer from PC0 to PC4 fails. Switch is a data link layer device, and generally cannot connect devices across different networks.



Hub: A hub is a hardware device that transfers communication data. A hub transmits data packets (frames) to all devices on a network, regardless of whether the data packet contains MAC addresses or not. A hub has many ports and a computer to be connected to the network is connected to one of these ports. When a data frame arrives at a port, the hub broadcasts it to every other port, without considering whether it is destined for a particular destination or not. So, hubs can create network congestion.

Switch: A switch is a device responsible for routing data from multiple input ports to a particular output port, sending the data to its final destination. It is mainly used to transmit data packets between various network devices such as routers and servers. It is a data connection layer device. A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address and sends the frame to the corresponding device/devices. Thus, it supports both unicast and multicast communications.