Experiment No. 2

Study of different types of network cables, networking devices and network topologies

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AIM:

To study the different types of network cables and the straight wired connection and cross wired connection using crimping tool.

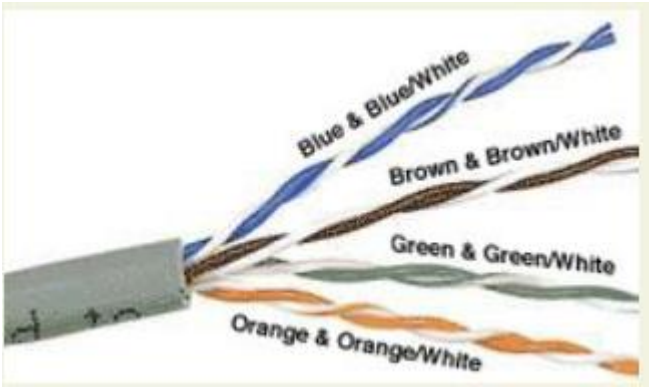
To study basic networking, implementation of Hub and Switch and Topologies.

APPARATUS:

RJ-45 (Registered Jack 45) connector, Crimping Tool, Twisted pair Cable

PROBLEM STATEMENTS AND THEIR SOLUTIONS:

1. **Prepare straight and cross cable with RJ45 connector using crimping tool.**
   Here is what the internals of the ethernet cable look like:



Internal Cable Structure and Color Coding

Inside the ethernet cable, there are 8 color coded wires. These wires are twisted into 4 pairs of wires, each pair has a common color theme. One wire in the pair being a solid or primarily solid colored wire and the other being a primarily white wire with a colored stripe (Sometimes ethernet cables won't have any color on the striped wire, the only way to tell which is which is to check which wire it is twisted around). Examples of the naming schemes used are: Orange (alternatively Orange/White) for the solid-colored wire and White/Orange for the striped cable. The twists are extremely important. They are there to counteract noise and interference. It is important to wire according to a standard to get proper performance

from the ethernet cable. The TIA/EIA-568-A specifies two wiring standards for an 8-position modular connector such as RJ45. The two wiring standards, T568A and T568B vary only in the arrangement of the colored pairs. Tom writes to say "...sources suggest using T568A cabling since T568B is the AT&T standard, but the US Government specifies T568A since it matches USOC cabling for pairs 1 & 2, which allows it to work for 1/2-line phones...". Your choice might be determined by the need to match existing wiring, jacks or personal preference, but you should maintain consistency. I've shown both below for straight through cabling and just T568B for crossover cabling.

Standard, Straight-Through Wiring Diagram(both ends are the same):

RJ45 Pin #	Wire Color (T568A)	Wire Diagram (T568A)	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Green		Transmit+	BI_DA+
2	Green		Transmit-	BI_DA-
3	White/Orange		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Orange		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Straight-Through Ethernet Cable Pin Out for T568A

Crossover Cable Wiring Diagram:

RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

STEPS FOLLOWED TO WIRE ETHERNET PATCH CABLE:

1. Strip off about 2 inches of the ethernet cable sheath.
2. Untwist the pairs - don't untwist them beyond what you have exposed, the more untwisted cable you have the worse the problems you can run into.
3. Align the colored wires according to the wiring diagrams above.

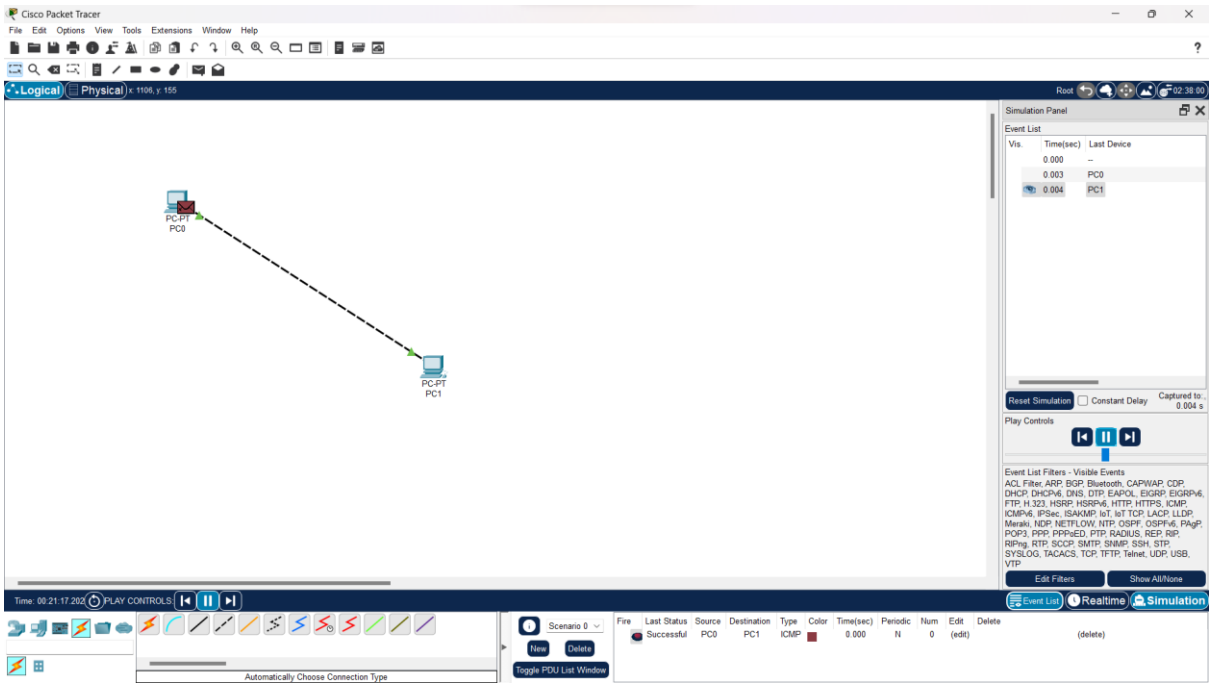
4. Trim all the wires to the same length, about 1/2" to 3/4" left exposed from the sheath.
5. Insert the wires into the RJ45 plug - make sure each wire is fully inserted to the front of the RJ45 plug and in the correct order. The sheath of the ethernet cable should extend into the plug by about 1/2" and will be held in place by the crimp.
6. Crimp the RJ45 plug with the crimper tool.
7. Verify the wires ended up the right order and that the wires extend to the front of the RJ45 plug and make good contact with the metal contacts in the RJ45 plug
8. Cut the ethernet cable to length - make sure it is more than long enough for your needs.
9. Repeat the above steps for the second RJ45 plug.

2. Connect two or more computers in LAN using your cables.

To verify, LAN cable was connected to computer and Internet LAN port. It was found that the internet was working fine. Hence, the connections are correct and the task is completed.

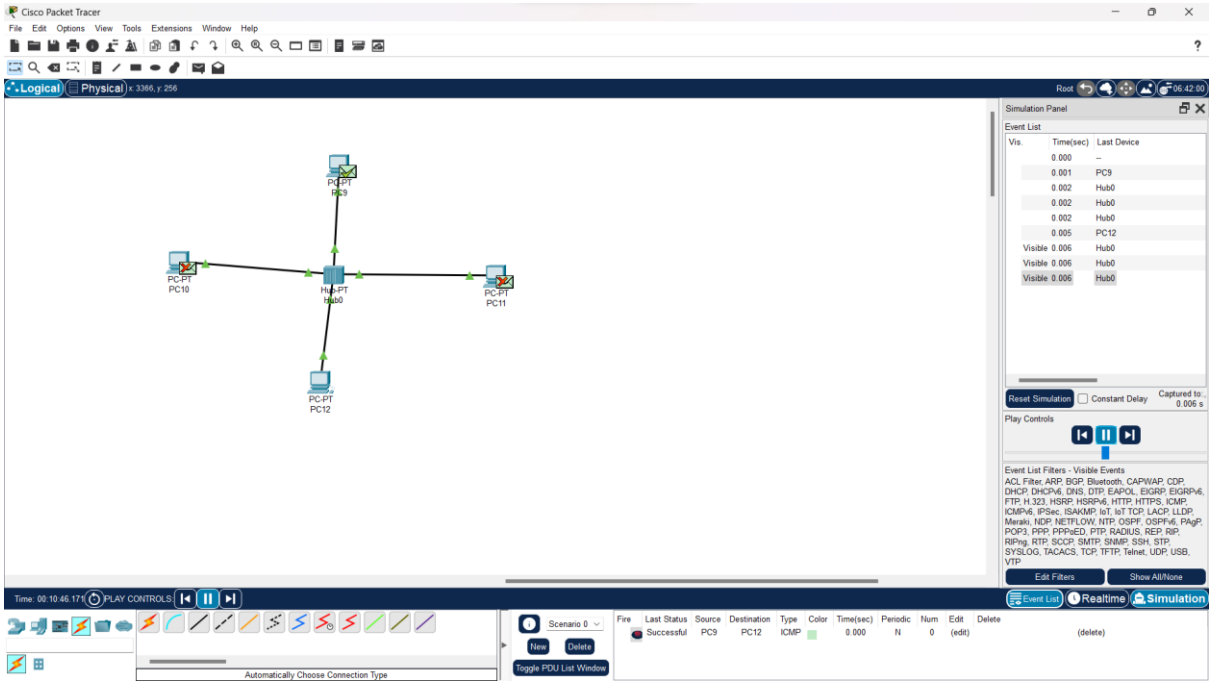
3. Cisco Packet Tracer Task:

a. Connect two computers in a network and show the data transfer.



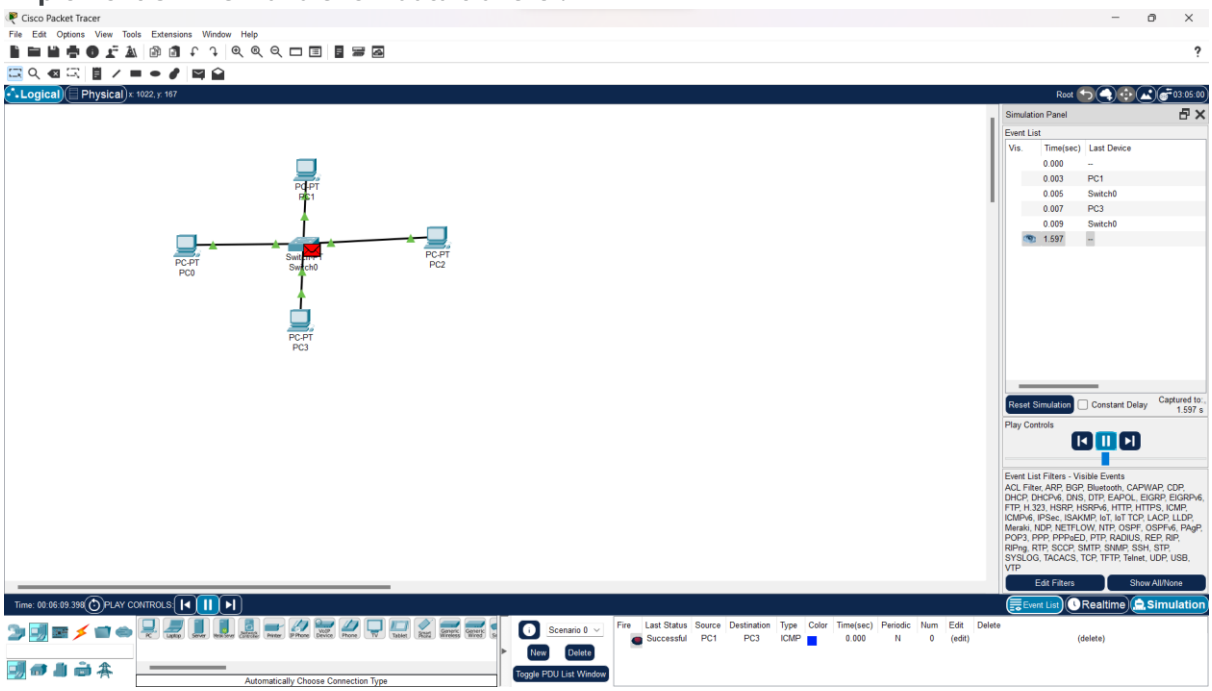
The data packet was being sent from PC0(IPV4: 10.0.0.1) to PC1(IPV4: 10.0.0.2). As the simulation shows PC0 sends data at 0.003 sec and PC1 receives it at 0.004 sec. The successful data transfer shows that all configuration and implementation is correct.

b. Implement HUB and show data transfer.



Hub do not know where the destination is so it sends data to all PC's and whichever sends acknowledgement turns out to be destination. As shown in simulation HUB0 is shown 3 times meaning it is sending data to 3 PC's and only PC12 is returning acknowledgement. Hence, implementation is successful.

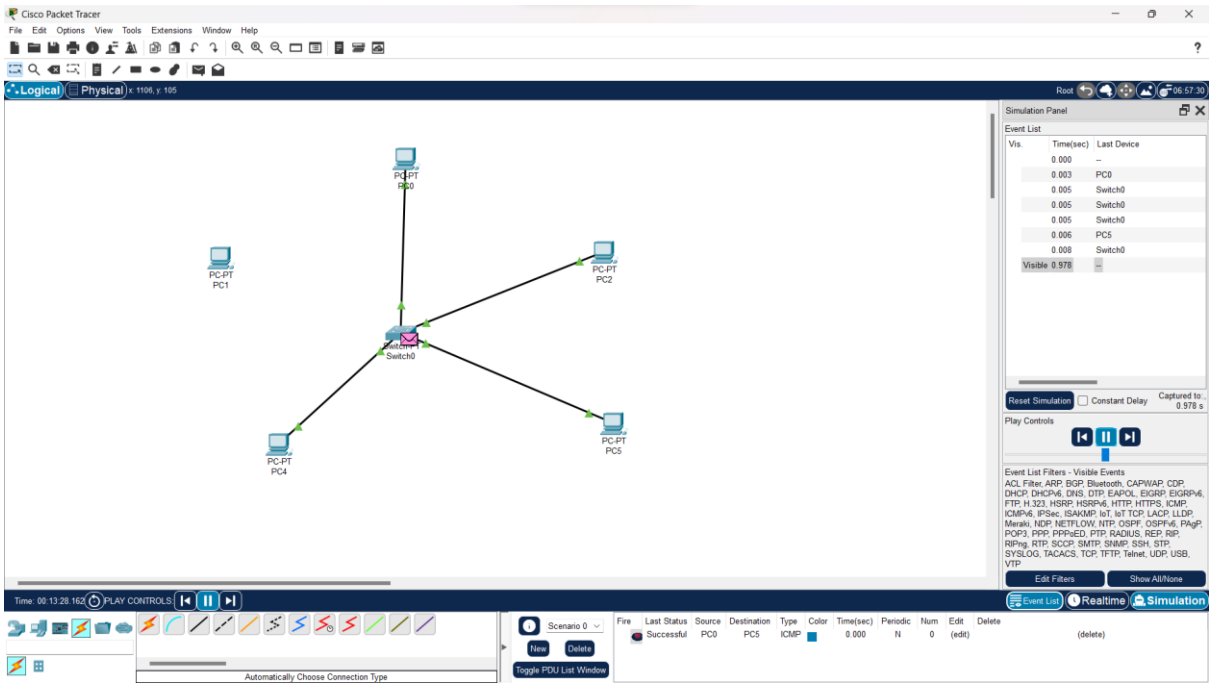
c. Implement SWITCH and show data transfer.



Switch is intelligent device, it knows where to send the data as we can see unlike hub, switch only sends data packet to destination as it is shown in simulation panel switch directly send data from PC1 to PC3. Hence implementation is successful.

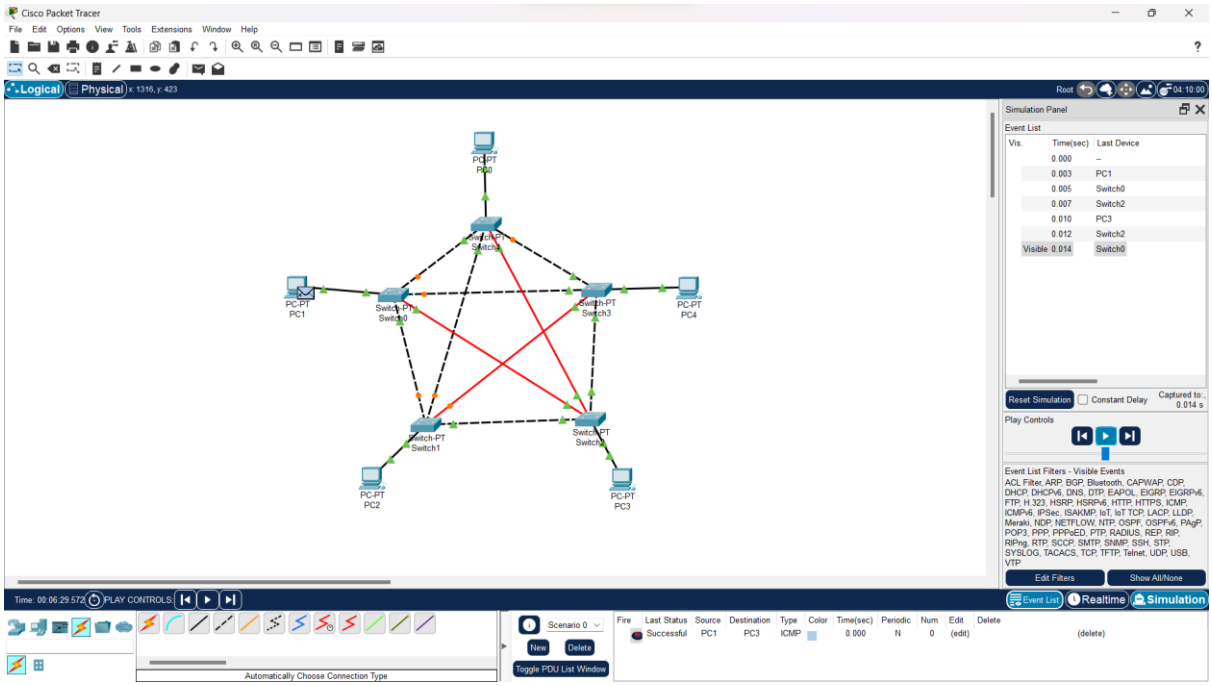
d. Implement STAR, MESH, BUS and RING topology using SWITCH and show the data transfer.

STAR:



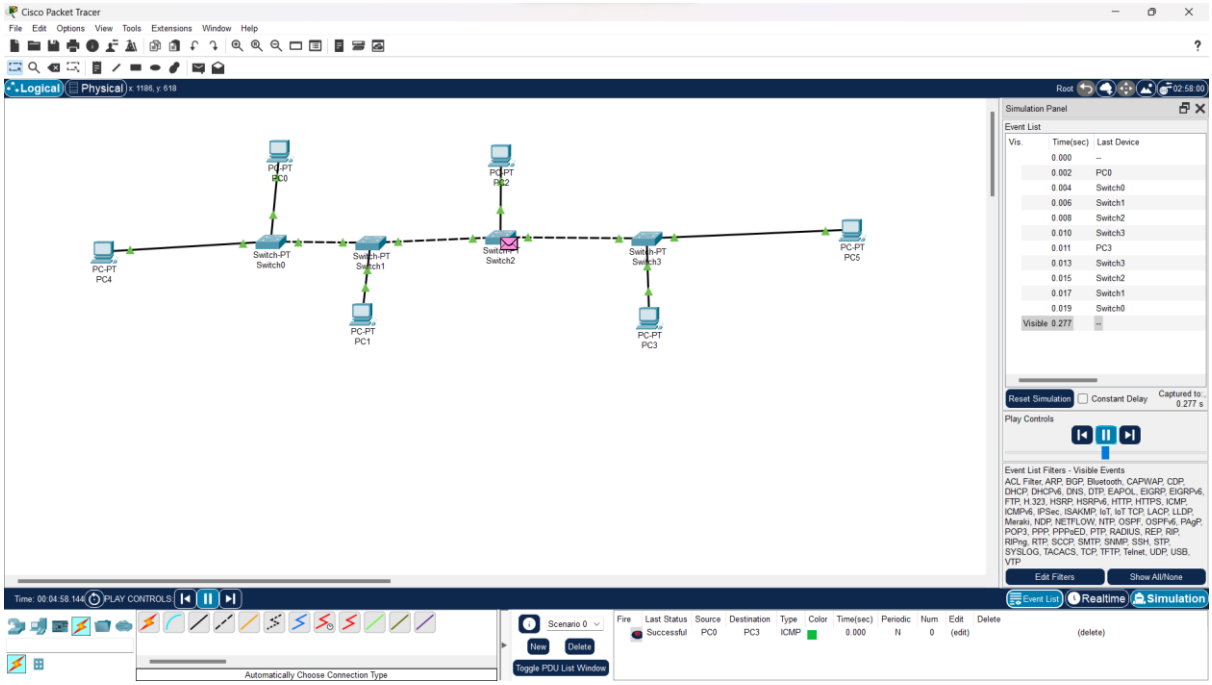
Switch is only allowing 4 devices. Faulty switch results into termination of data transfer.

MESH:



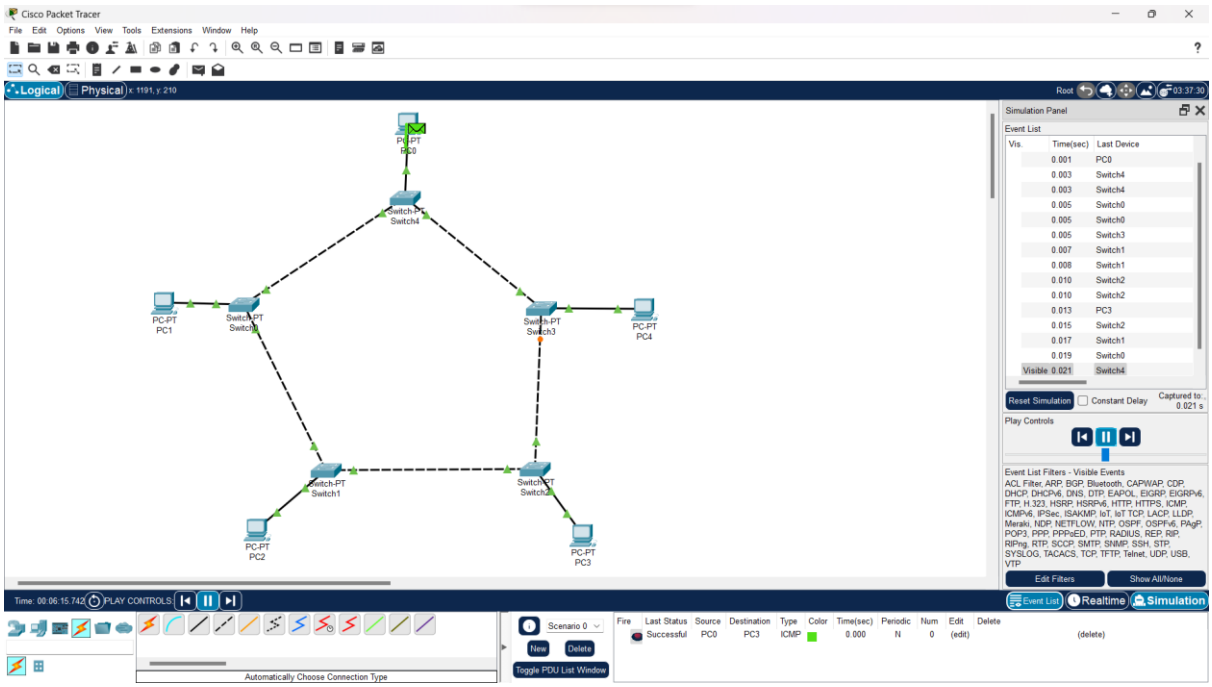
In mesh if the any switch stop working the connection will still be there as every switch is connected directly to one another and there will be very low affect of faulty switch on data transfer.

BUS:



In BUS faulty switch results into connection blockage from it's one end to other but in both parts internal data sharing will work the faulty switch will work as a blockage of both parts, but it is easier to find out the faulty switch.

RING:



In Ring faulty switch results into delay as data has to follow longer path to reach destination.