Lab Activity 1

1. Study of different networking devices and their applications

<u>Aim</u>: Study of following Network Devices in Detail
- Repeater
- Hub
- Switch
- Bridge
- Router
- Gate Way

<u>Apparatus:</u> No software or hardware needed.

<u>Procedure:</u> Following should be done to understand this practical.

1. Repeater:Functioning at Physical Layer.A repeater is an electronic device that receives a signal and retransmits it at a higher level and/or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances. Repeater have two ports ,so cannot be use to connect for more than two devices

2. Hub: An Ethernet hub, active hub, network hub, repeater hub, hub or concentrator is a device for connecting multiple twisted pair or fiber optic Ethernet devices together and making them act as a single network segment. Hubs work at the physical layer (layer 1) of the OSI model. The device is a form of multiport repeater. Repeater hubs also participate in collision detection, forwarding a jam signal to all ports if it detects a collision.

3. Switch:A network switch or switching hub is a computer networking device that connects network segments.The term commonly refers to a network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally process data at the network layer (layer 3 and above) are often referred to as Layer 3 switches or multilayer switches.

4. Bridge: A network bridge connects multiple network segments at the data link layer (Layer 2) of the OSI model. In Ethernet networks, the term bridge formally means a device that behaves according to the IEEE 802.1D standard. A bridge and switch are very much alike; a switch being a bridge with numerous ports. Switch or Layer 2 switch is often used interchangeably with bridge.Bridges can analyze incoming data packets to determine if the bridge is able to send the given packet to another segment of the network.

5. Router: A router is an electronic device that interconnects two or more computer networks, and selectively interchanges packets of data between them. Each data packet contains address information that a router can use to determine if the source and destination are on the same network, or if the data packet must be transferred from one network to another. Where multiple routers are used in a large collection of interconnected networks, the routers exchange information about target system addresses, so that each router can build up a table showing the preferred paths between any two systems on the interconnected networks.

6. Gateway: In a communications network, a network node equipped for interfacing with another network that uses different protocols.
• A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.
• A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions.

2. Study of different cabling types and standards for data communications and the procedure for crimping RJ45 connectors used in LAN.

Cable types :
.Unshielded twisted pair cable
UTP cable consists of unshielded twisted pairs surrounded by an outer jacket. They have no metallic shield. This makes the cable small in diameter but unprotected against electrical interference. The twist helps to improve its immunity to electrical noise and EMI.


Fig.1. Unshielded twisted pair
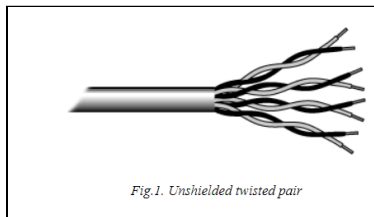
.Shielded twisted pair cable
Same like UTP but ,there is a shield around each individual pair, as well as around the entire group of wires.
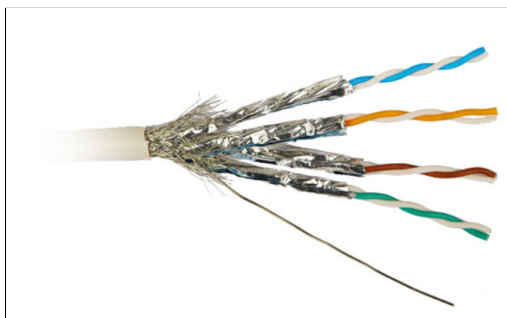

.Coaxial Cable

Coaxial cabling has a single copper conductor at its center. A plastic layer provides insulation between the center conductor and a braided metal shield. The metal shield helps to block any outside interference from fluorescent lights, motors, and other computers.
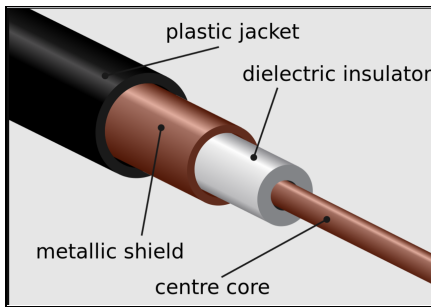
.Fiber Optic Cable

Fiber optic cabling consists of a center glass core surrounded by several layers of protective materials. It transmits light rather than electronic signals eliminating the problem of electrical interference. its immune to the effects of moisture and lighting.
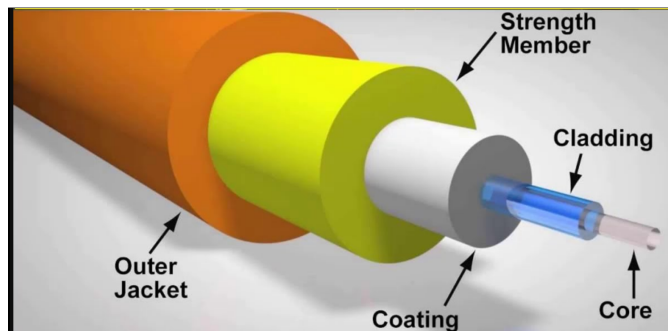
Aim: Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using crimping tool.

Apparatus (Components): RJ-45 connector, Crimping Tool, Twisted pair Cable

Procedure: To do these practical following steps should be done:
1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render is useless. Check the wires, one more time for nicks or cuts. If there are any, just whack the whole end off, and start over.
2. Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket. Category 5 cable must only have 1/2 of an inch of 'untwisted' wire at the end; otherwise it will be 'out of spec'. At this point, you obviously have ALOT more than 1/2 of an inch of un-twisted wire.
3. You have 2 end jacks, which must be installed on your cable. If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install - the crossed over end. Below are two diagrams, which show how you need to arrange the cables for each type of cable end. Decide at this point which end you are making and examine the associated picture below.

Diagram shows you how to prepare Cross wired connection

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| 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	

Diagram shows you how to prepare straight through wired connection

| 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	

3.implement different network topologies using packet tracer simulator (mesh, star, bus, hybrid ,ring)
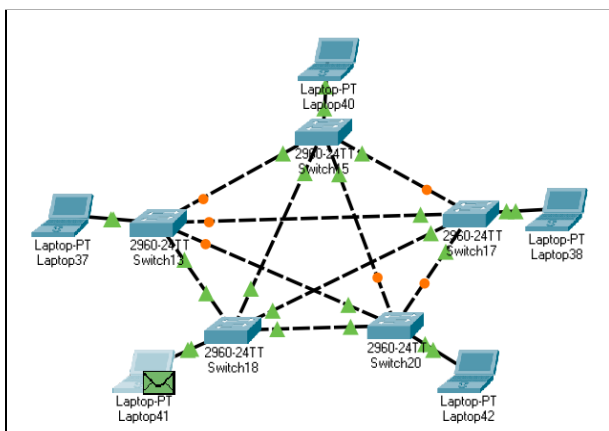**Aim**: implement different network topologies.

Star Topology: Here all the end devices are connected to a central node(hub)
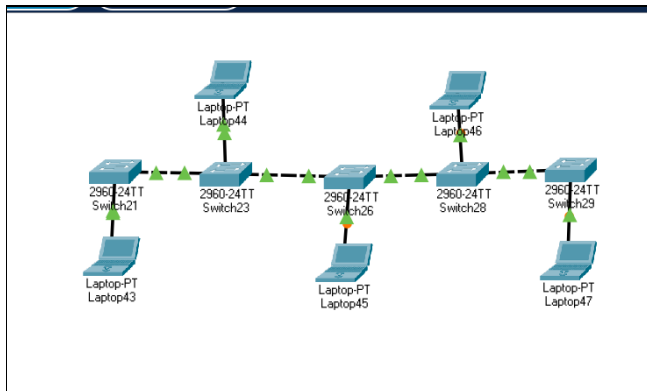
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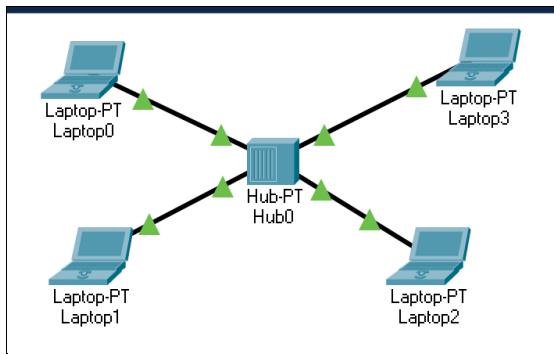
Ring Topology: Here each node(switch) is connected to the adjacent two nodes,
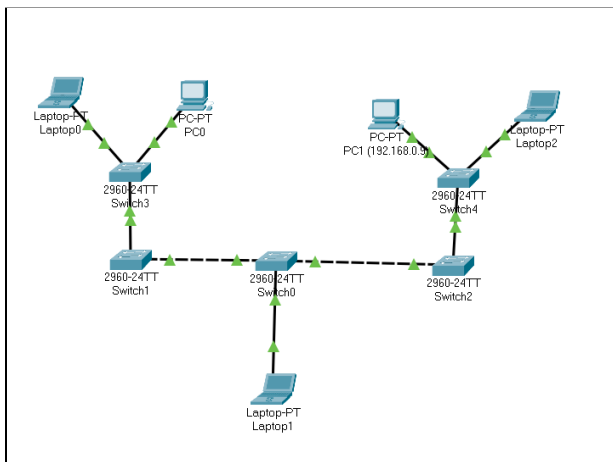The last node connects to the first, thereby forming a ring.
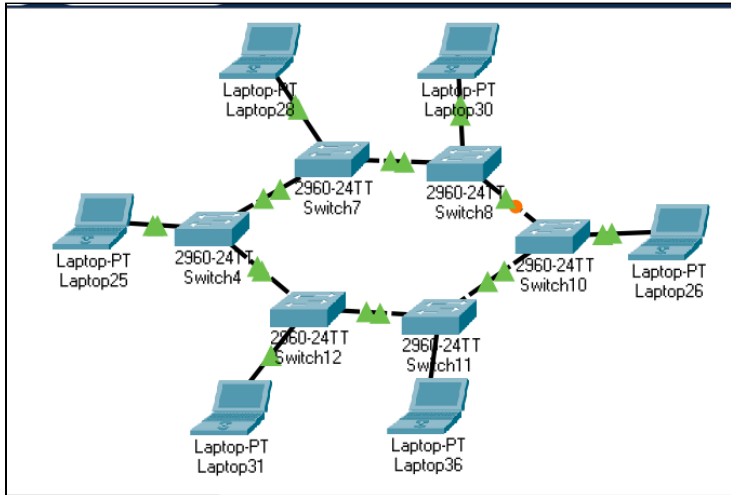
Mesh Topology: here each node(switch) is connected with a dedicated link to other node.

Bus topology: Here there is one main line to which node can be connected .this line is the backbone of this network.

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Hybrid topology: This is a mixture of 2 or more topologies.
Here we mixed star and bus topology.

Conclusion : The study of different networking devices and their applications was successfully done.Also the study of different cabling types and standards for data communications and the procedure for crimping RJ45 connectors used in LAN. Using a packet tracer simulator different network topologies were successfully implemented.