Experiment - 1

Aim :- Introduction to Networking Technologies.

Theory :-

Network :- A network is defined as a group of two or more computer systems linked together. It is a combination or collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data. An excellent example of a network is the Internet, which connects millions of people all over the world.

Network Topology :- A network topology is the arrangement of a network, including its nodes and connecting lines.

Types of Network Topology :-

1. **Bus Topology :-** It is a network type in which every computer and network device is connected to single cable. Every device is connected to a single cable.

2. **Ring Topology :-** It forms a ring as each computer is connected to another computer, with the last one connected to the first. Exactly two neighbours for each device.

3. **Mesh Topology :-** It is a point-to-point connection to other nodes or devices. All the network nodes are connected to each other. Mesh has $n(n-1)/2$ physical channels to link n channels.

4. **Star Topology :-** In this type of topology all the computers are connected to a single hub through a cable. This hub is the central node and all other nodes are connected to the central node.

5. **Tree Topology :-** It has a root node and all other nodes are connected to it forming a hierarchy. It is also called hierarchical topology. It should at least have three levels to the hierarchy.

Types of Communication medium used in Networks :-

Communication medium refers to the physical channel through which data is sent and received.

Wired Networks :-

1. **Twisted Pair Cable :-** It consists of a pair of copper wires twisted around each other. The wires are around 1 to 2 mm thick and they are twisted to reduce the interference from the surrounding wires.

2. **Coaxial Cable :-** Offering better data rates and less signal attenuation, a coaxial cable consist of a central copper conductor that is surrounded by a foil shield. The foil is covered by yet another shield known as a braided shield. Unlike twisted pairs, coaxial cables only have a single copper conductor. The conductor and the foil shield are separated by a dielectric.

3. **Optical Fibre :-** A fibre optic cable is a thin, flexible, transparent medium made of very fine glass or plastic fibres. It utilizes the principle of total internal reflection.

Wireless Networks :-

1. **Radio Wave :-** Radio wave transmissions are used for communication between computers in inaccessible locations or for short range communications.

2. **Microwave :-** The way to transfer data straightly from one point to another point in the way of light in the universe is called microwave system.

3. **Infrared :-** Infrared signals can propagate within a room but cannot penetrate walls. They are used for very short distance communication like TV remote, wireless speakers etc

Network Devices :-

1. **Hub :-** A hub is a multiport repeater. A hub connects multiple wires coming from different branches. Hubs cannot filter the data, so data packets are sent to all connected devices.

2. **Repeater :-** A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak so as to extend the length to which the signal can be transmitted.

3. **Switch :-** It is a data link layer device. Switch can perform error checking before forwarding data, that makes it very efficient as it does not forward packets that have errors and forward good packets selectively to correct port only.

4. **Router :-** It is a device like a switch that routes data packets based on their IP addresses. It is a Network Layer device. Routers normally connect LANs and WANs together.

5. **Gateway :-** It is a passage to connect two networks together that may work upon different networking models. It takes data from one system, interpret it, and transfer it to another system. It can operate at any network layer.