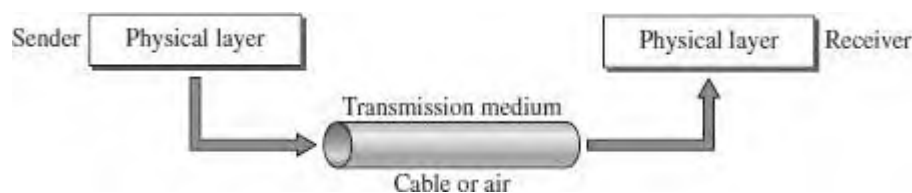


5.13 Physical Layer: Data and Signals

- The physical layer coordinates the functions required to **transmit a bit stream over a physical medium**.
- **Signals:** It determines the type of the signal used for transmitting the information.
- **Data Rate or Transmission rate** - The number of bits sent each second –is also defined by the physical layer.

5.14 TRANSMISSION MEDIA

- Transmission media is a communication channel that carries the information from the sender to the receiver.
- Data is transmitted through the electromagnetic signals.
- The main functionality of the transmission media is to carry the information in the form of bits (Either as Electrical signals or Light pulses).
- It is a physical path between transmitter and receiver in data communication.
- The characteristics and quality of data transmission are determined by the characteristics of medium and signal.
- Transmission media is of two types : Guided Media (Wired) and UnGuided Media (wireless).



FACTORS FOR DESIGNING THE TRANSMISSION MEDIA

- **Bandwidth:** All the factors are remaining constant, the greater the bandwidth of a medium, the higher the data transmission rate of a signal.
- **Transmission impairment:** When the received signal is not identical to the transmitted one due to the transmission impairment. The quality of the signals will get destroyed due to transmission impairment.

- **Interference:** An interference is defined as the process of disrupting a signal when it travels over a communication medium on the addition of some unwanted signal.

5.15 SWITCHING

- The technique of transferring the information from one computer network to another network is known as **switching**.
- Switching in a computer network is achieved by using switches.
- A switch is a small hardware device which is used to join multiple computers together with one local area network (LAN).
- Switches are devices capable of creating temporary connections between two or more devices linked to the switch.
- Switches are used to forward the packets based on MAC addresses.
- A Switch is used to transfer the data only to the device that has been addressed. It verifies the destination address to route the packet appropriately.
- It is operated in full duplex mode.
- It does not broadcast the message as it works with limited bandwidth.

5.16 CIRCUIT SWITCHING

- Circuit switching is a switching technique that establishes a dedicated path between sender and receiver.
- In the Circuit Switching Technique, once the connection is established then the dedicated path will remain to exist until the connection is terminated.
- Circuit switching in a network operates in a similar way as the telephone works.
- A complete end-to-end path must exist before the communication takes place.
- In case of circuit switching technique, when any user wants to send the data, voice, video, a request signal is sent to the receiver then the receiver sends back the acknowledgment to ensure the availability of the dedicated path. After receiving the acknowledgment, dedicated path transfers the data.
- Circuit switching is used in public telephone network. It is used for voice transmission.
- Fixed data can be transferred at a time in circuit switching technology.

Advantages

- It is suitable for long continuous transmission, since a continuous transmission route is established, that remains throughout the conversation.
- The dedicated path ensures a steady data rate of communication.
- No intermediate delays are found once the circuit is established. So, they are suitable for real time communication of both voice and data transmission.

Disadvantages

- Circuit switching establishes a dedicated connection between the end parties. This dedicated connection cannot be used for transmitting any other data, even if the data load is very low.
- Bandwidth requirement is high even in cases of low data volume.
- There is underutilization of system resources. Once resources are allocated to a particular connection, they cannot be used for other connections.
- Time required to establish connection may be high.