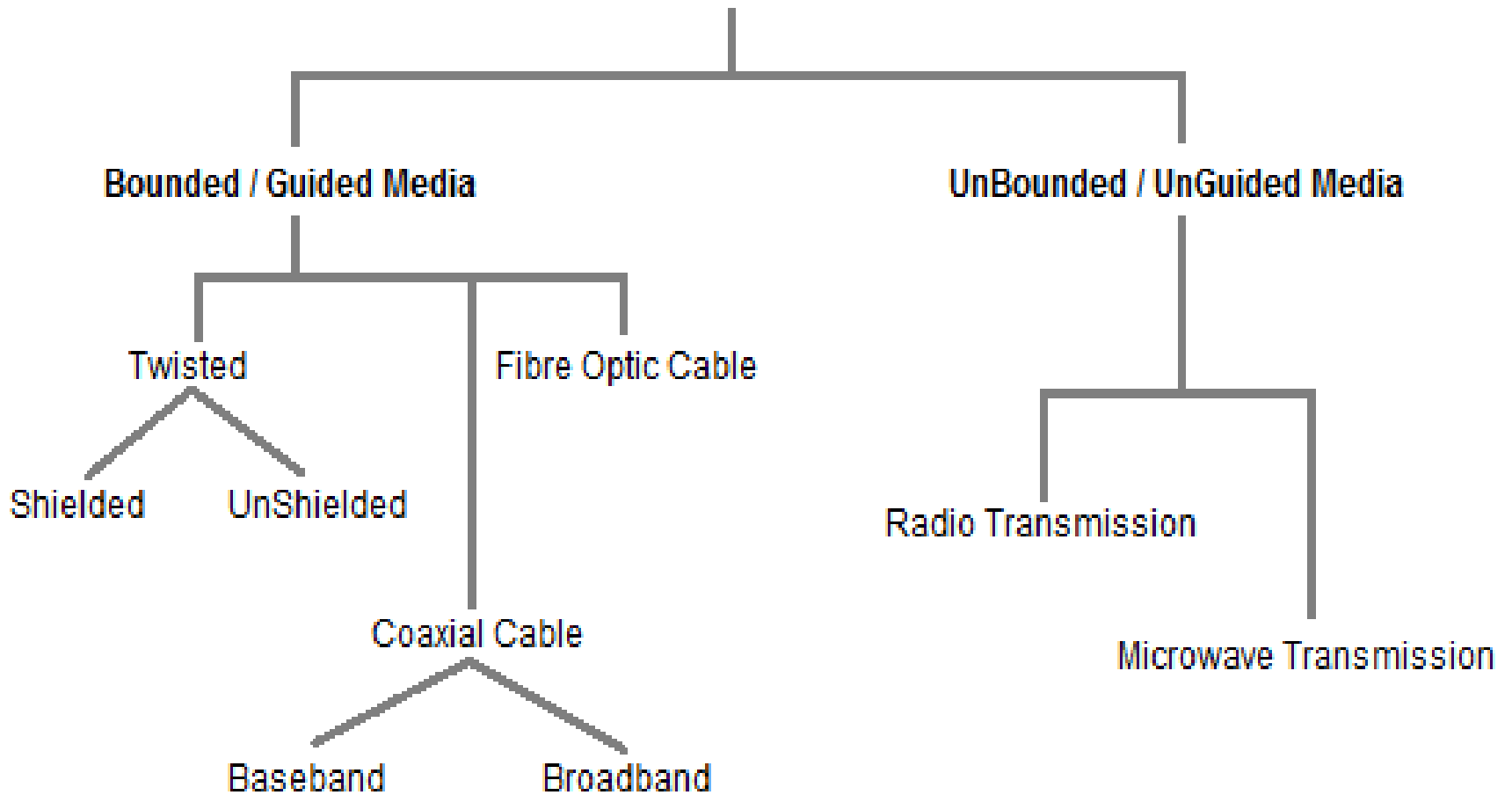


CHAPTER -6 Transmission medium

- Transmission medium is the means through which we send our data from one place to another. The first layer (physical layer) of Communication Networks OSI Seven layer model is dedicated to the transmission media.

Transmission Mediums



GUIDED MEDIA

- It is the transmission media in which signals are confined to a specific path using wire or cable.
- 1) Open wire
- 2) Twisted pair
- 3) Co-axial cables
- 4) Optical fiber

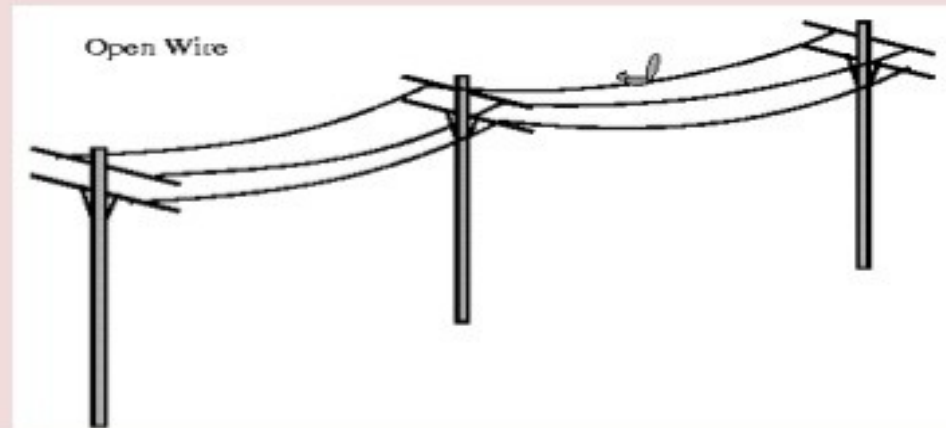
Open Wire

There is a single wire strung between poles

No shielding or protection from noise interference is used.

This media is susceptible to a large degree of noise and interference

Not acceptable for data transmission except for short distances under 20 ft



Twisted Pair

The wires in Twisted Pair cabling are twisted together in pairs.

Each pair would consist of a wire used for the +ve data signal and a wire used for the -ve data signal.

Any noise that appears on 1 wire of the pair would occur on the other wire

Because the wires are opposite polarities, When the noise appears on both wires, it cancels or nulls itself out at the receiving end.



Unshielded twisted pair

- Unshielded twisted pair is the most popular and is generally the best option for most networks.
- The cable has four pair of wires inside the jacket .Each pair is twisted with a different number of twists per inch to help eliminate interference from adjacent pairs and other electrical devices.
- The most common UTP connector is BRJ45B and

Advantages of UTP

- It is economical and easy to use
- UTP is cheap , flexible and easy to install
- Higher grades of UTP are used in LAN technologies like Ethernet.

Shielded twisted pair

- It has a metal foil or mesh covering that encases each pair of insulated conductors. The metal casing prevents penetration of electromagnetic noise.
- It also eliminates crosstalk.

Advantage of STP

It avoids cross talk

Disadvantage of STP

It costs more than UTP

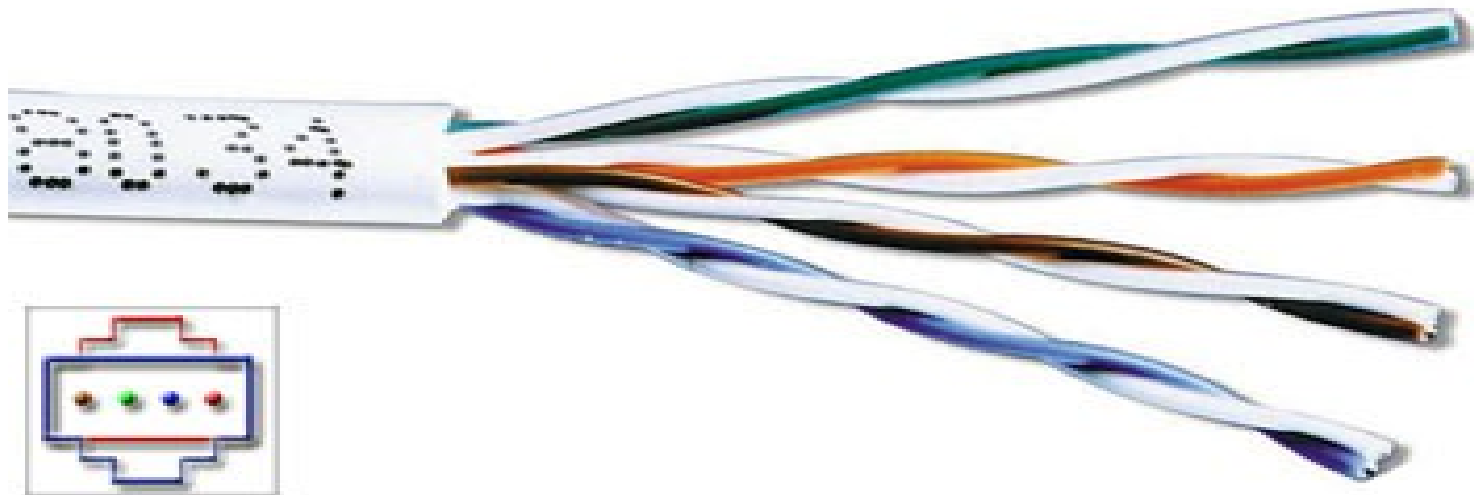
Applications of Twisted pair

Within building , telephone network , for
Local Area Network

Shielded twisted pair (STP)

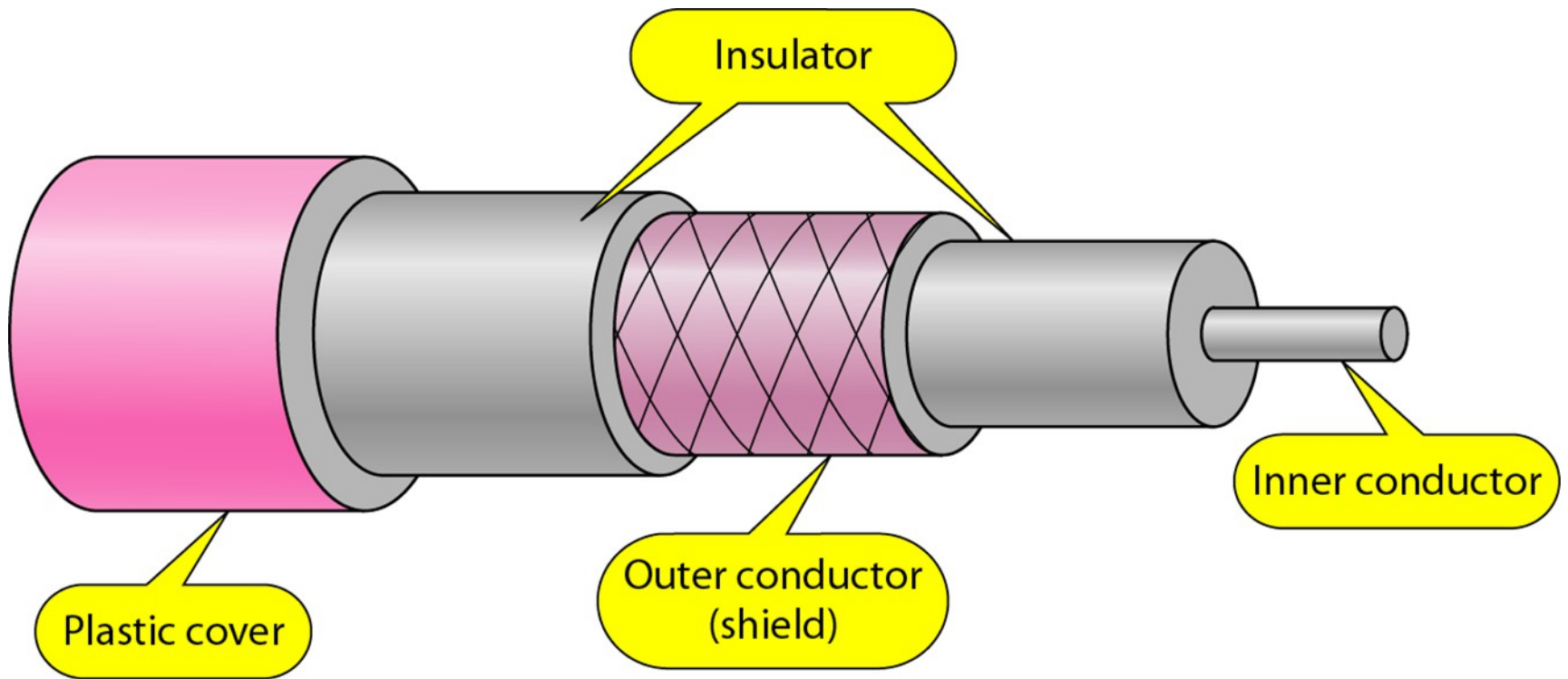


Unshielded twisted pair (UTP)



Coaxial Cable

- A coaxial cable is a type of shielded and insulated copper cable that is used in computer networks and to deliver cable TV services to end users.



- The outer conductor acts as a shield against noise and crosstalk. The outer conductor is enclosed and whole cable is protected by a plastic cover.
- The distance between the outer conductor and inner conductor plus the type of material used for insulating the inner conductor determine the cable properties.

Categories of coaxial cables

Category	Use
RG-59	Cable TV
RG-58	Thin Ethernet
RG-11	Thick Ethernet

Coaxial Cable connectors

- The most standard coaxial cable connector

BNC (Bayone – Neill concealman) connector.

- BNC connector is used to connect to the end of the cable to a device(Such as TV).

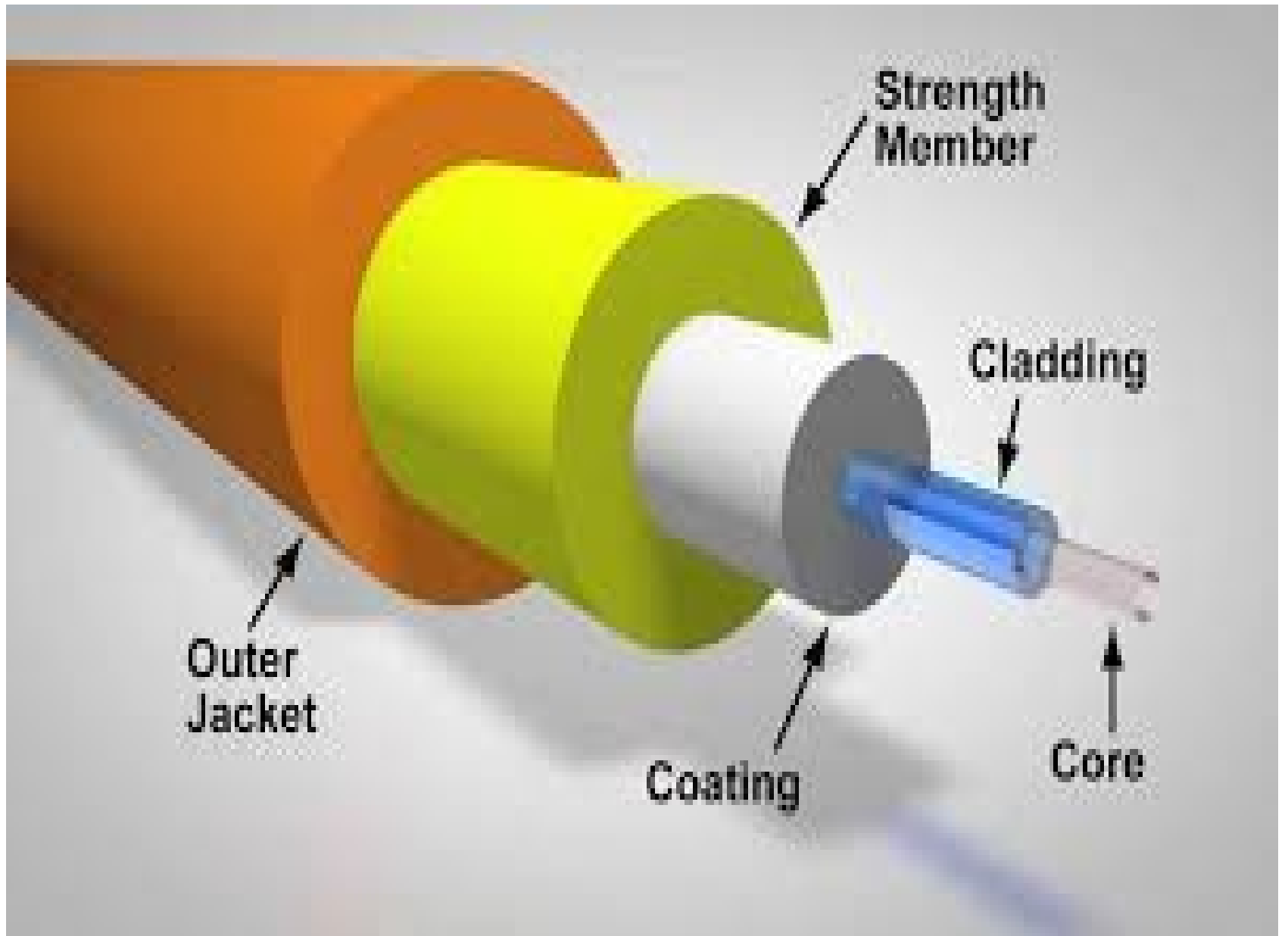


Applications of coaxial cables

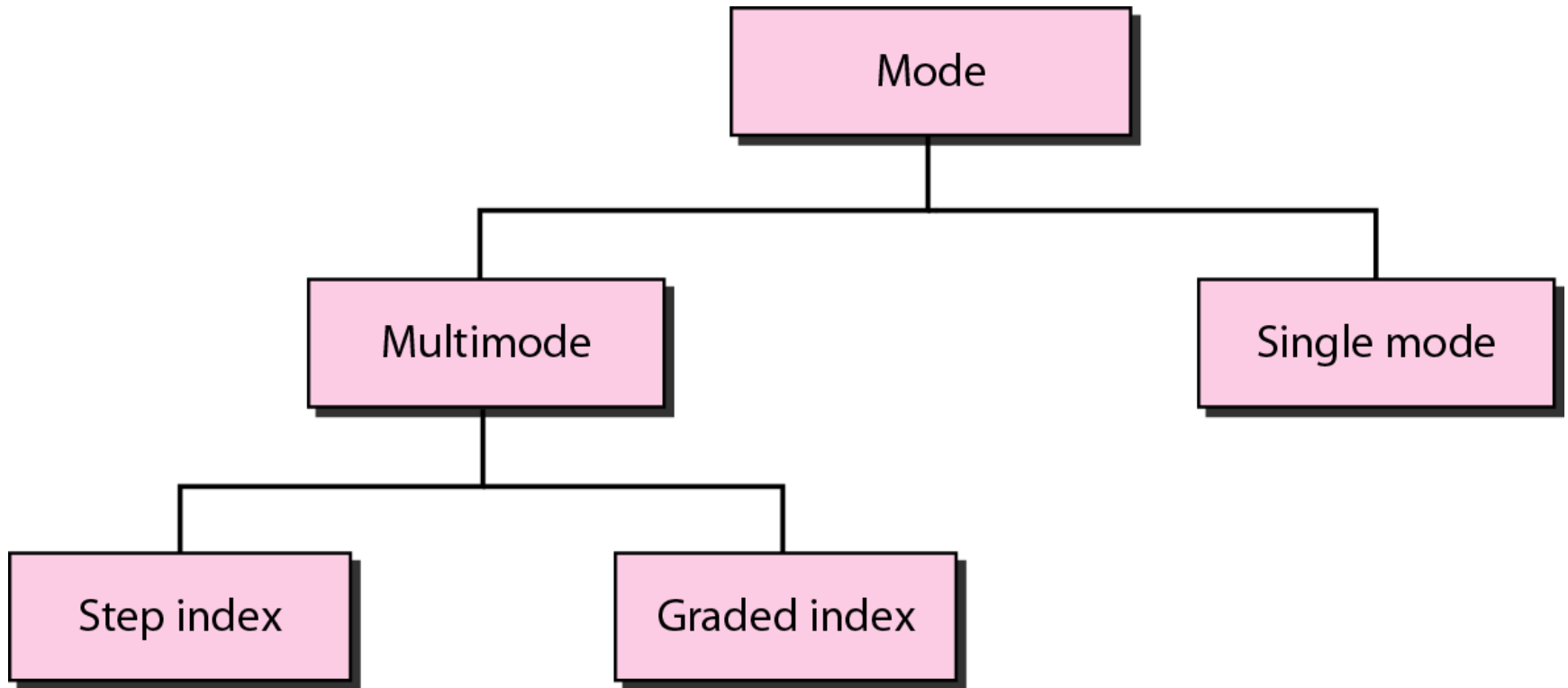
- Used in cable TV networks
- Used in analog telephone networks
- Used in Ethernet LAN.

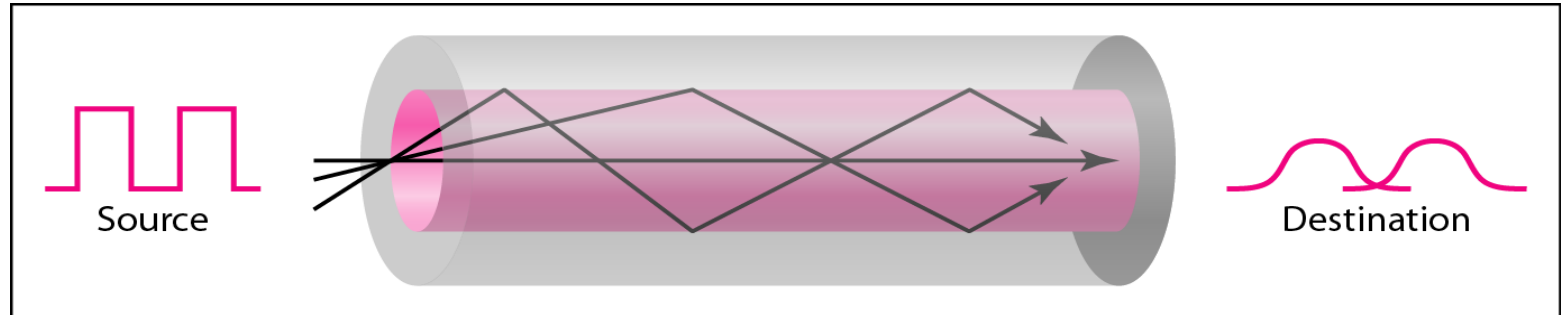
Optical Fiber

- Optical fiber transmission systems were introduced in 1970. It offered greater advantages over copper based digital transmission systems.
- A fiber optic cable is made up of a center glass core surrounded by a concentric layer of glass(cladding).
- The information is transmitted thru the glass core in the form of light.
- Fiber optic cable has the ability to transmit

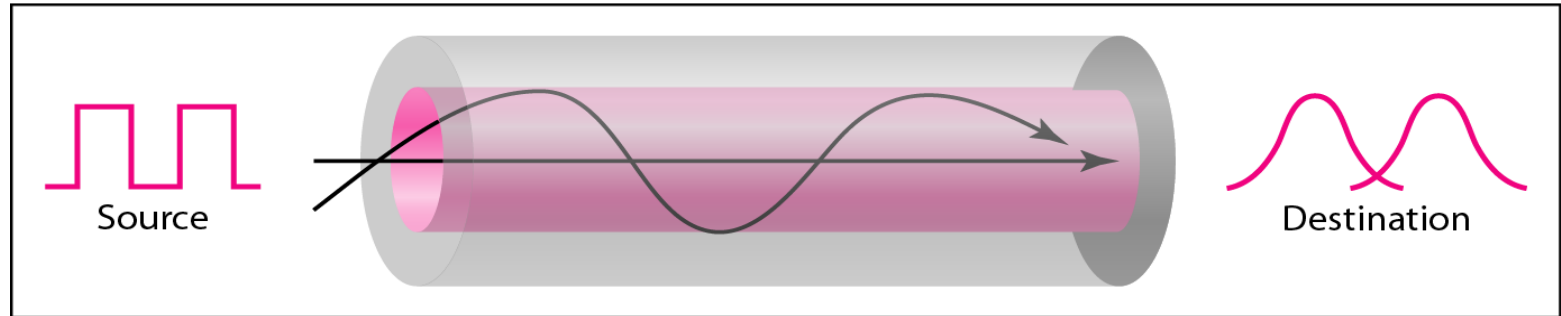


Propagation modes

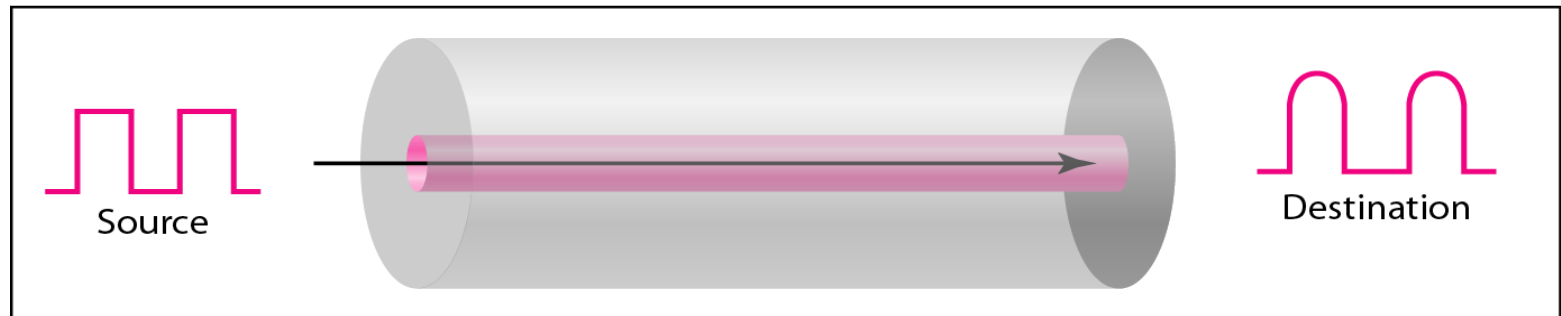




a. Multimode, step index

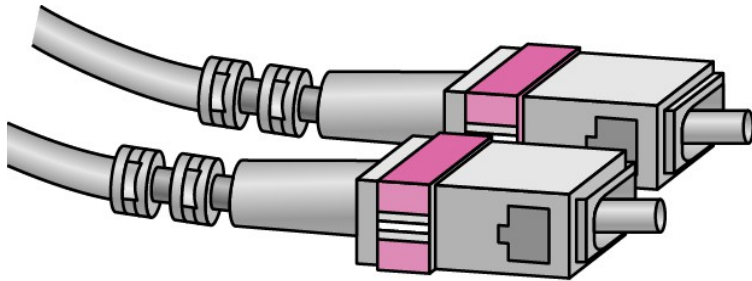


b. Multimode, graded index

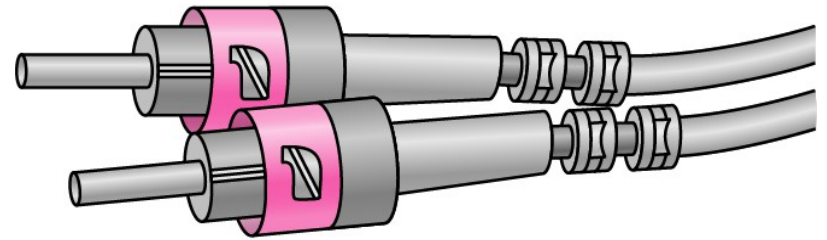


c. Single mode

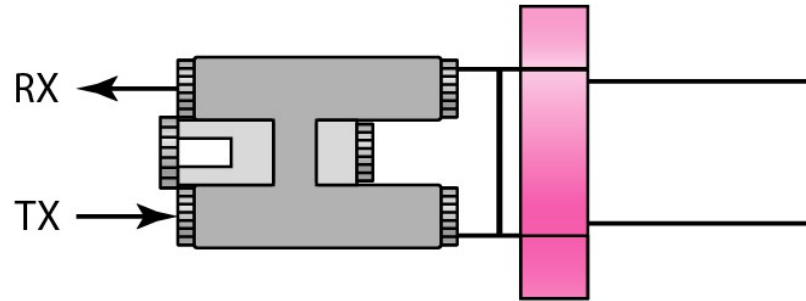
Connectors



SC connector



ST connector



MT-RJ connector

Advantages of optical fiber

- It supports higher bandwidth
- It runs greater distance.
- Electromagnetic noise cannot affect fiber optic cables
- Usage of glass makes more resistant than copper

Disadvantages

- Installation and maintenance is difficult.
- Unidirectional light propagation. Two fibers are used for bidirectional propagation.
- The cable and the interfaces are more expensive.

Applications

- Used in cable TV networks
- Used in LAN.

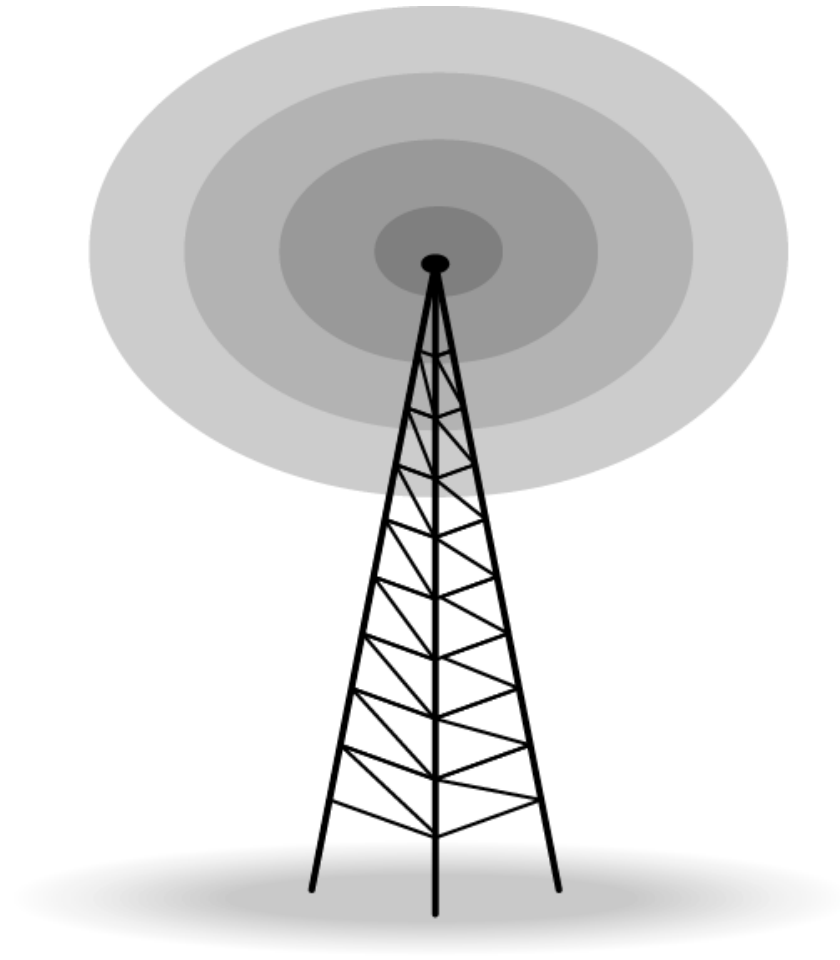
Unguided media or Wireless transmission

- Radio wave
- Micro wave
- Infrared.

Radio wave

- Electro magnetic waves ranging in frequencies between 3Khz to 1 Ghz are called radio waves.
- Radio waves are used for multicast communications, such as radio and television. They can penetrate through walls.
 - Highly regulated. Use omni directional antennas

Omni directional Antennas



Applications

- AM and FM radio
- Cordless phones
- television

Microwave

- Microwave operate at high frequencies of 3 to 10 Ghz. This allows to carry large quantities of data due to large bandwidth.
- Microwaves are used for unicast communication.one to one communication between sender and receiver.
- When an antenna transmits the microwaves, the sender and receiver need to be aligned and requires fewer repeaters for telecommunication.

Applications

- Cellular phones
- Satellite networks
- Wireless LANs

Infrared wave

- Infrared wave with frequencies from 300 Ghz to 400 Ghz can be used for short range communication in a closed area using light-of-sight propagation.

E-x

- Remote control used in television and VCRs.