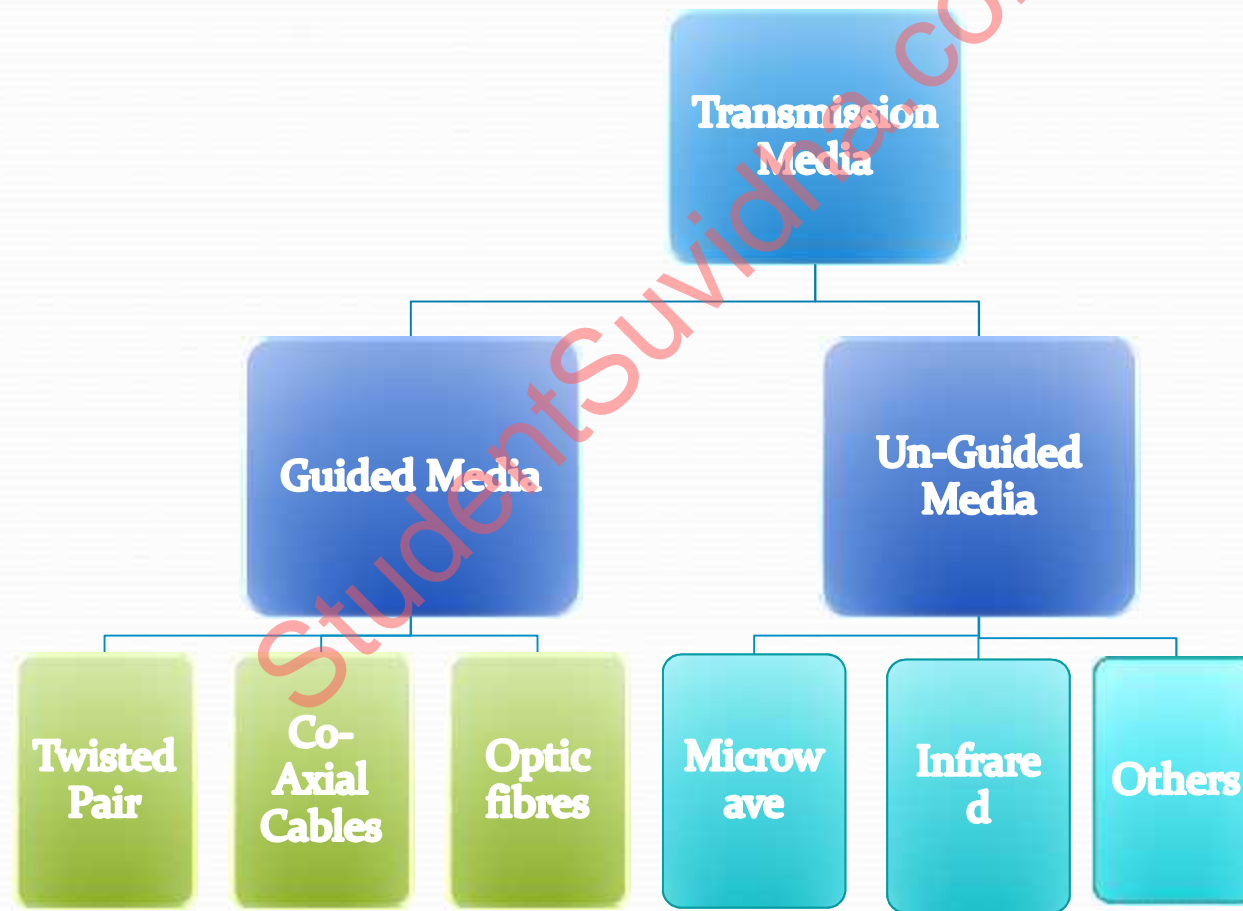


BASIC INTRODUCTION OF COMPUTER NETWORKS

Data Communication Media

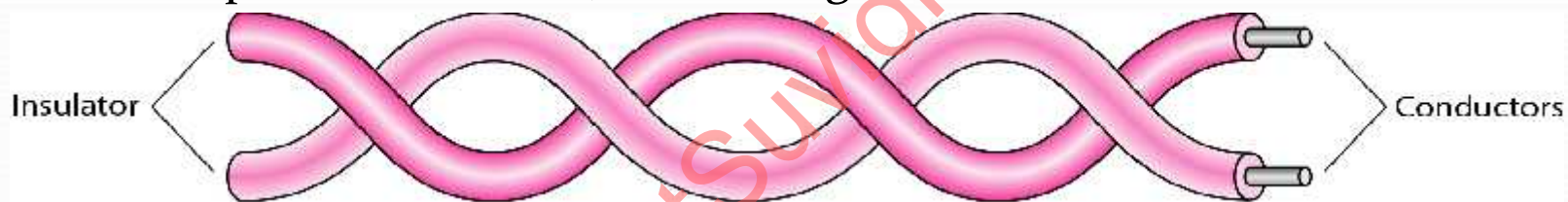


Guided Media

- Guided media, which are those that provide a conduit from one device to another, include twisted-pair cable, coaxial cable, and fiber-optic cable.

1. *Twisted-Pair Cable*

- A twisted pair consists of two conductors (normally copper), each with its own plastic insulation, twisted together.

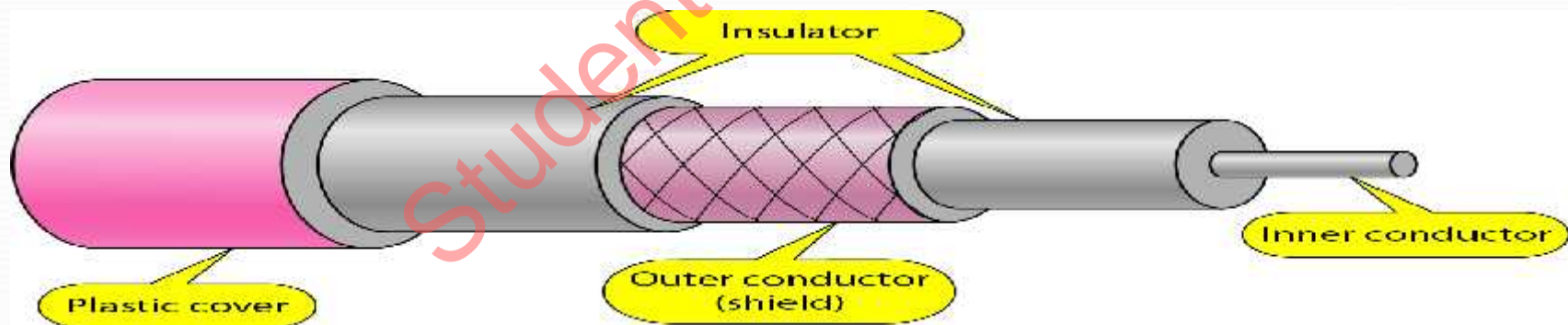


- A twisted pair consists of two insulated copper wires arranged in a regular spiral pattern.
- The twisting tends to decrease the crosstalk interference between adjacent pairs in a cable.
- Twisted pair may be used to transmit both analog and digital transmission.
- Twisted pair is limited in distance, bandwidth, and data rate.
- The attenuation for twisted pair is a very strong function of frequency

Guided Media(Cont...)

2. Coaxial Cable:

- Coaxial cable consist the followings layers in its construction
 - The copper conductor
 - Insulation layer of plastic foam
 - Second conductor or shield of wire mesh tube or metallic foil
 - Outer jacket of tough plastic
- Coaxial cable can be used over longer distances and support more stations on a shared line than twisted pair.



Now a days, it is very widely used in cable TVs.

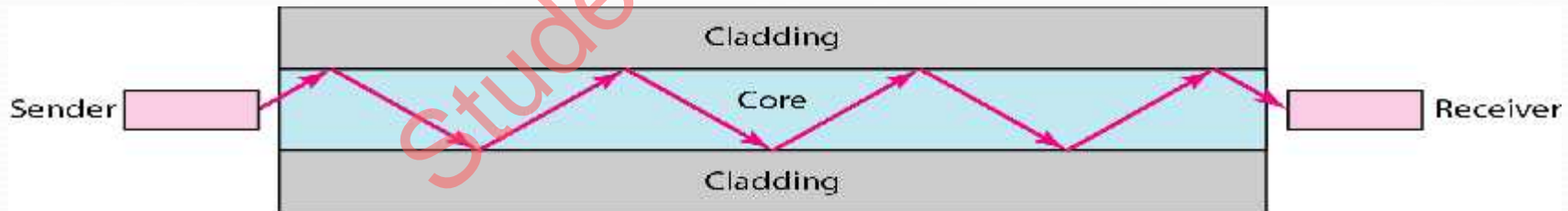
Coaxial Cable(Cont...)

- Coaxial cable is a versatile transmission medium, used in a wide variety of applications, including:
 - Television distribution - aerial to TV systems.
- Characteristics
 - It is comparatively inexpensive
 - Its installation is comparatively simple
 - It must be grounded properly in a network connection
 - Its bandwidth capacity is around 10 Mbps
 - It is thin Ethernet connection maximum 30 nodes and in thick Ethernet connection maximum 100 nodes can be successfully interlinked with this cable connection
 - It suffers from data attenuation

Guided Media(Cont...)

3. Fiber-Optic Cable

- Fiber optic cable is known as most sophisticated cables used in long distance network connection.
- Through this cable data transmission is done through « Light ray signal transmission» rather than electrical signal transmission.
- It has inner core of glass that conducts light. This inner core is surrounded by cladding.
- Cladding is nothing but layer of glass material that reflects light back into the core.
- Each fiber is then surrounded by plastic sheath



Applications: Fiber-optic cable is often found in backbone networks because its wide bandwidth & is cost-effective. Today, with wavelength-division multiplexing (WDM), we can transfer data at a rate of 1600 Gbps.

Guided Media(Cont...)

Advantages

Fiber-optic cable has several advantages over metallic cable (twisted- pair or coaxial).

1. Higher bandwidth.
2. Less signal attenuation.
3. Immunity to electromagnetic interference.
4. Resistance to corrosive materials.
5. Light weight.
6. Greater immunity to tapping.

Disadvantages

There are some disadvantages in the use of optical fiber.

1. Installation and maintenance. Fiber-optic cable is a relatively new technology. Its installation and maintenance require expertise that is not yet available everywhere.
2. Unidirectional light propagation. Propagation of light is unidirectional. If we need bidirectional communication, two fibers are needed.
3. Cost. The cable and the interfaces are relatively more expensive than those of other guided media. If the demand for bandwidth is not high, often the use of optical fiber cannot be justified.

Distinguish optical fiber from twisted pair or coaxial cable

- ✓ **Greater capacity:** The potential bandwidth, and hence data rate, of optical fiber is immense; data rates of hundreds of Gbps over tens of kilometers have been demonstrated.
- ✓ **Smaller size and lighter weight:** Optical fibers are considerably thinner than coaxial cable or bundled twisted-pair cable.
- ✓ **Lower attenuation:** Attenuation is significantly lower for optical fiber than for coaxial cable or twisted pair, and is constant over a wide range.
- ✓ **Electromagnetic isolation:** Optical fiber systems are not affected by external electromagnetic fields. Thus the system is not vulnerable to interference, impulse noise, or crosstalk.
- ✓ **Greater repeater spacing:** Fewer repeaters mean lower cost and fewer sources of error.



Assignment

Explain what do you understand by data communication media.