

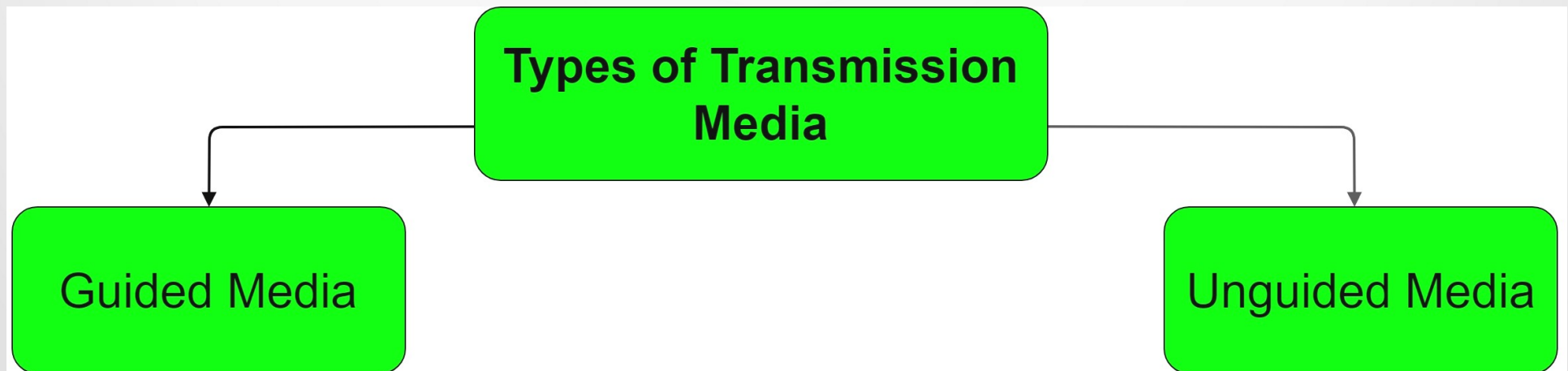
GLS UNIVERSITY

0301404 DATA COMMUNICATION &
NETWORKING.

UNIT– III

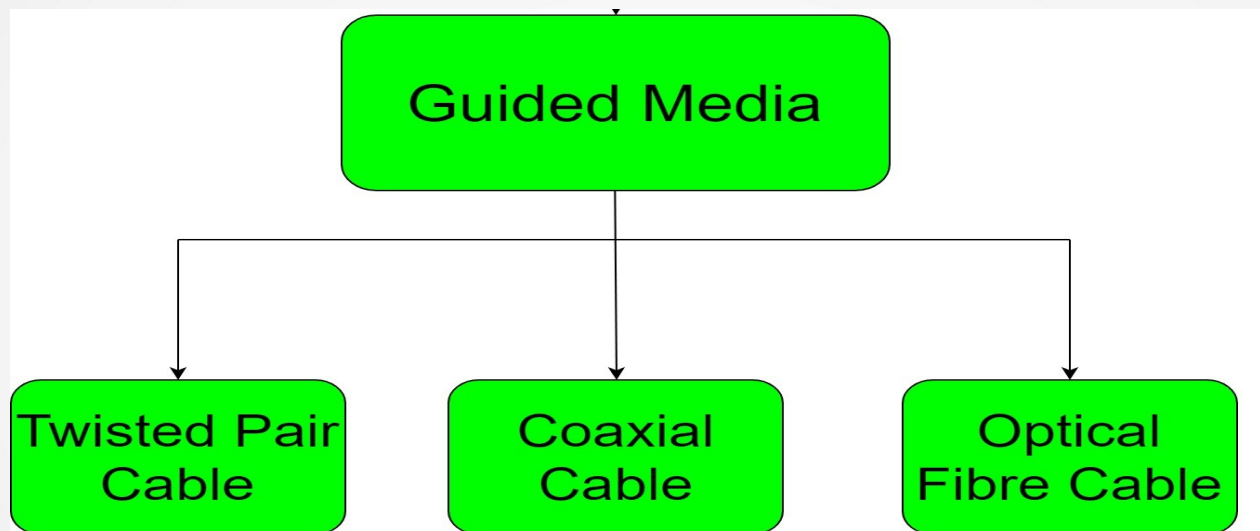
Transmission Media

- Transmission media are the physical infrastructure components which carry data from one computer to another.
- In other words, a **transmission medium** is a **physical path between the transmitter and the receiver** i.e it is the **channel through which data is sent from one place to another**.
- All transmission media can be divided into the following two main categories:



Transmission Media

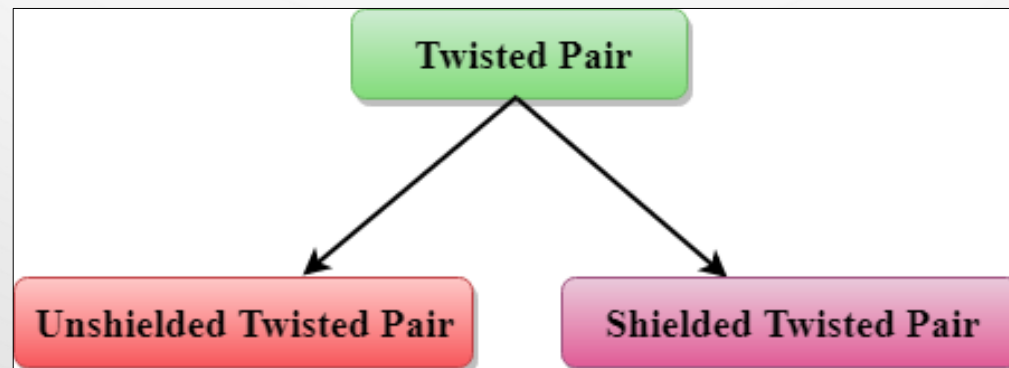
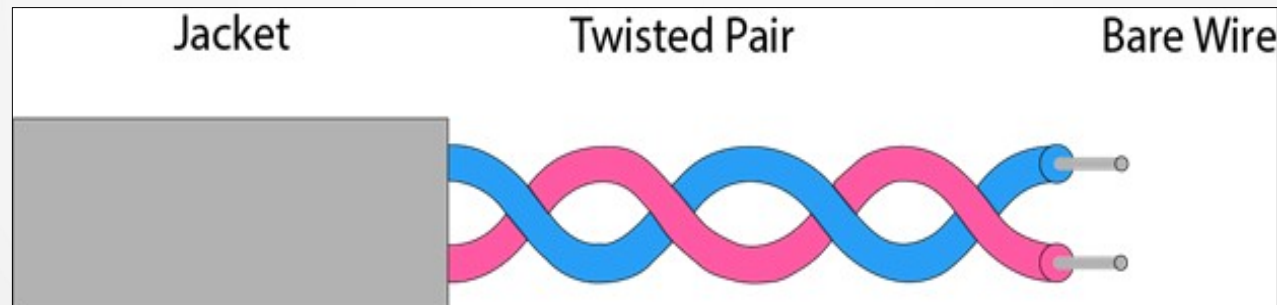
- Guided Media can be further divided into three main types:



- Guided media is based on physical cable. **Twisted pair and coaxial cable** carry signal in form of **electric current** whereas **optical fibres** carry signals in form of **light**.

Transmission Media: Guided Media – Twisted Pair

- Twisted pair is a physical media made up of a pair of cables twisted with each other. A twisted pair cable is cheap as compared to other transmission media. Installation of the twisted pair cable is easy, and it is a lightweight cable.
- The frequency range for twisted pair cable is from 0 to 3.5KHz.
- A twisted pair consists of two insulated copper wires arranged in a regular spiral pattern.



Transmission Media: Guided Media – Twisted Pair

- **UTP: Unshielded Twisted Pair**
- Copper wires are the most common wires used for transmitting signals because of good performance at low costs.
- This cable can carry both voice as well as data.
- They are most commonly used in telecommunication.
- Following are the categories of the unshielded twisted pair cable:
 - Category 1: Category 1 is used for telephone lines that have low-speed data.
 - Category 2: It can support upto 4Mbps
 - Category 3: It can support upto 16Mbps.
 - Category 4: It can support upto 20Mbps. Therefore, it can be used for long-distance communication.
 - Category 5: It can support upto 200Mbps.

UTP's of higher categories are also used in Computer networks due to high speeds & Realibility.



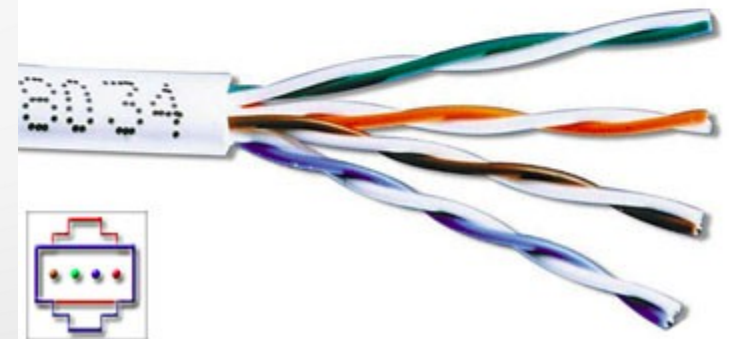
Transmission Media: Guided Media – Twisted Pair

- **UTP: Unshielded Twisted Pair**
- **Advantages Of Unshielded Twisted Pair:**
 - It is cheap.
 - Installation of the unshielded twisted pair is easy.
 - It can be used for high-speed LAN.
- **Disadvantage:**
 - This cable can only be used for shorter distances because of attenuation.

Shielded twisted pair (STP)



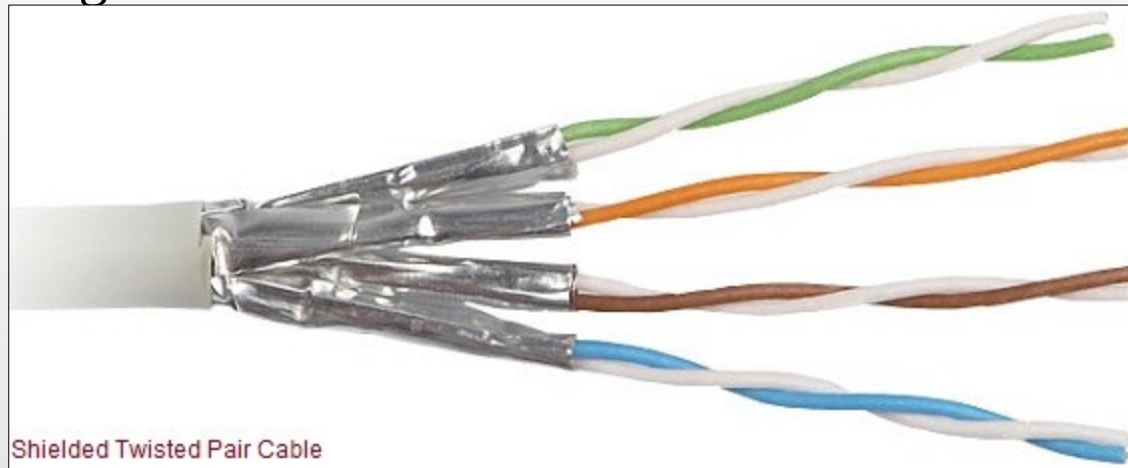
Unshielded twisted pair (UTP)



Transmission Media: Guided Media – Twisted Pair

- **STP: Shielded Twisted Pair**

- In this, the twisted pair wire itself is carried by a metal shield, and finally by a plastic cover.
- The metal shield prevents penetration of electromagnetic noise, it helps to eliminate crosstalk.
- A shielded twisted pair is a cable that contains the mesh surrounding the wire that allows the higher transmission rate.



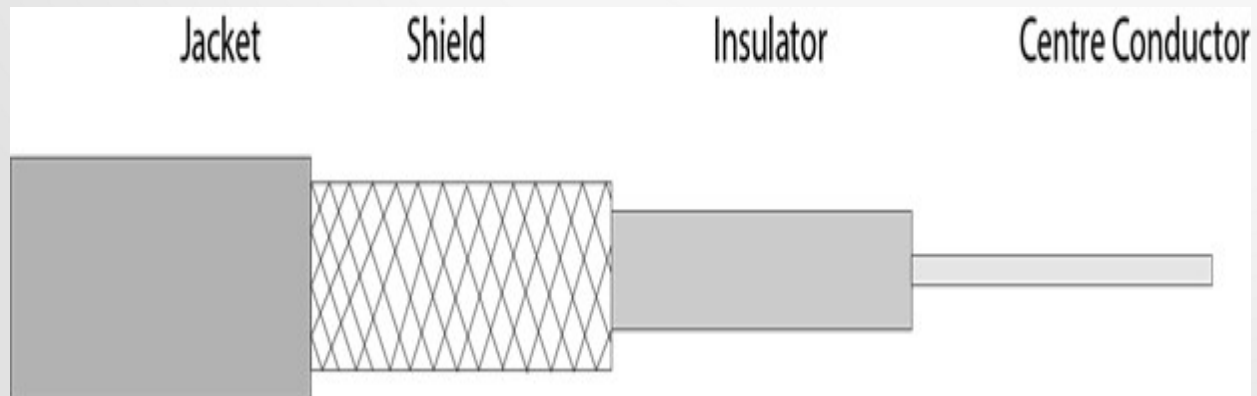
Transmission Media: Guided Media – Twisted Pair

- **STP: Shielded Twisted**
- **Characteristics Of Shielded Twisted Pair:**
 - The cost of the shielded twisted pair cable is not very high and not very low.
 - An installation of STP is easy.
 - It has higher capacity as compared to unshielded twisted pair cable.
 - It is shielded that provides the higher data transmission rate.
 - It is more expensive as compared to UTP and coaxial cable.

Transmission Media: Guided Media – Coaxial Cable

- **Coaxial Cable:**

- Coaxial cable also called coax.
- Coaxial cable is very commonly used transmission media, for example, TV wire is usually a coaxial cable.
- It has an inner central conductor surrounded by an insulating sheath, which in turn is enclosed in an outer conductor. Then outer conductor is covered by a plastic cover.



Transmission Media: Guided Media – Coaxial Cable

- **Coaxial Cable:**
- As compared to UTP or STP, coaxial cable is more expensive, less flexible and more difficult to install in a building where a number of twists and turns are required.
- Coaxial cables are divided into various categories depending upon the thickness and size of the shields, insulator and the outer coating, etc.
- They are commonly used by cable companies to carry cable transmission.
- Various coaxial cable standards are RG-8, RG-9, RG-11, RG-58 and RG-59.

Transmission Media: Guided Media – Coaxial Cable

- **Coaxial Cable:**
- **Advantages Of Coaxial cable:**
 - The data can be transmitted at high speed.
 - It has better shielding as compared to twisted pair cable.
 - It provides higher bandwidth.
- **Disadvantages Of Coaxial cable:**
 - It is more expensive as compared to twisted pair cable.
 - If any fault occurs in the cable causes the failure in the entire network.

Transmission Media: Guided Media – Optical Fiber

- **Optical Fiber:**
- **Light** is used as means of signal propagation, instead of **electrical signals**.
- Optical fibres are made up of glass fibres that are enclosed in a plastic jacket, which allows fibres to bend and not break.
- Fibre optics provide faster data transmission than copper wires.
- A transmitter at the sender's end of the optical fiber sends a light emitting diode (LED) or laser to send pulses of light across the fiber.
- A receiver at the other end makes use of a light-sensitive transistor to detect the absence or presence of light indicates a 0 or 1.

Transmission Media: Guided Media – Optical Fiber

- **Optical Fiber:**
- **Core:** The optical fibre consists of a narrow strand of glass or plastic known as a core. A core is a light transmission area of the fibre. The more the area of the core, the more light will be transmitted into the fibre.
- **Cladding:** The concentric layer of glass is known as cladding. The main functionality of the cladding is to provide the lower refractive index at the core interface as to cause the reflection within the core so that the light waves are transmitted through the fibre.
- **Jacket:** The protective coating consisting of plastic is known as a jacket. The main purpose of a jacket is to preserve the fibre strength, absorb shock and extra fibre protection.

