Experiment 01 – Classify various types of Transmission medium used in networking

Learning Objective: Student should be able to understand various types of Transmission medium used in networking to create a network.

Tools: Goggle, MS Word

Theory:

Transmission Medium

Transmission medium refers to the physical path or channel through which data is transmitted from a source (transmitter) to a destination (receiver) in computer networks. It plays a crucial role in facilitating communication by carrying information in the form of electromagnetic signals. Transmission media can be categorized into two main types: guided (wired) and unguided (wireless).

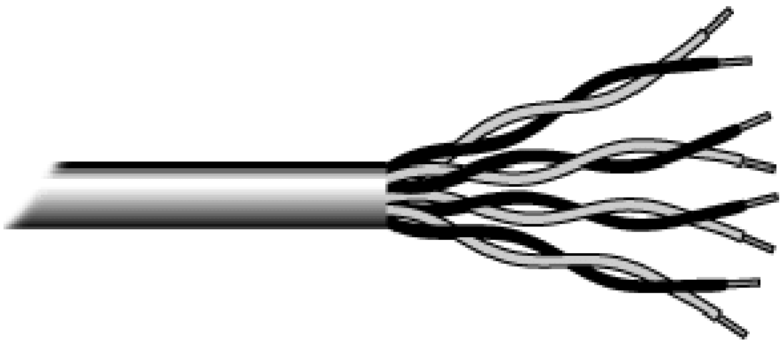
- **Wired Medium**

Wired medium, also known as guided transmission media, refers to physical pathways that carry data signals from one device to another in a network. This type of transmission is characterized by its use of cables or wires, which provide a stable and reliable means of communication.

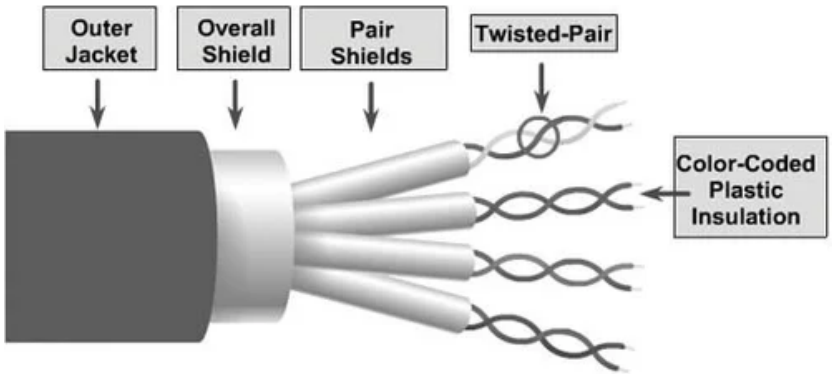
Wired Medium	Speed	Performance	Durability	Distance	Cost	Advantages	Disadvantages
Unshielded Twisted Pair (UTP)	Up to 10 Gbps (e.g., Cat 6/6a)	Good for short distances; susceptible to EMI	Moderate	Up to 100 meters	Low	- Affordable - Lightweight - Easy to install - Suitable for LANs	- Susceptible to interference - Limited distance - Lower performance in noisy environments
Shielded Twisted Pair (STP)	Up to 10 Gbps	Better than UTP in high-EMI environments	Moderate	Up to 100 meters	Moderate	- Better interference resistance than UTP	- More expensive than UTP - Harder to install due to shielding

						- Higher data rates	
Coaxial Cable	10 Mbps to 1 Gbps	Excellent EMI resistance	High	Up to 500 meters or more	Moderate	- High resistance to interference - Suitable for high-frequency signals - Robust design	- Bulky and less flexible - More expensive than twisted pair cables
Optical Fiber Cable	Up to several Tbps	Superior performance; minimal signal loss	Very High	Up to hundreds of kilometers	High	- Extremely high bandwidth - Immune to EMI - Low signal loss over long distances	- Higher initial cost - Delicate and requires careful handling

Unshielded Twisted Pair : -



ShieldedTwisted Pair

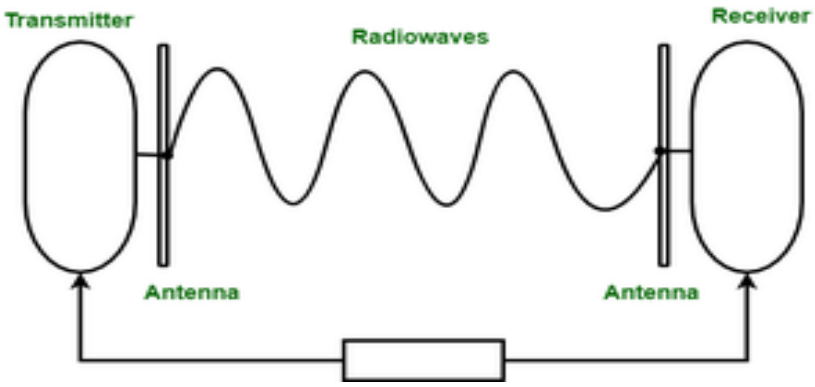


- **Wireless Medium**

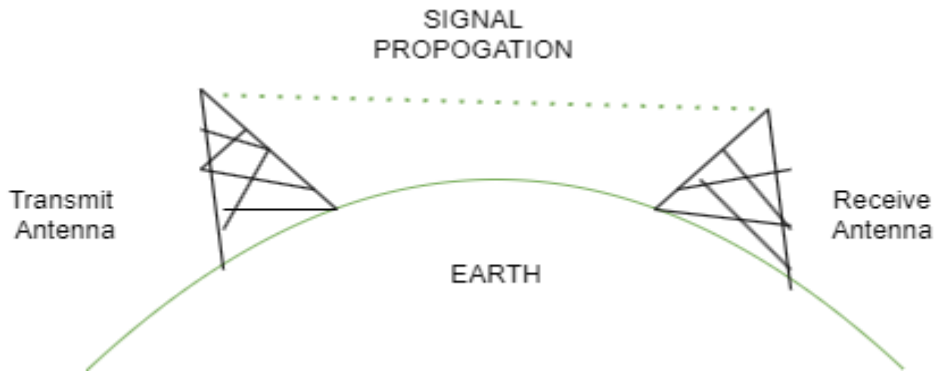
Wireless transmission media are unguided communication methods that use electromagnetic waves to transmit data through the air without physical cables

Wireless Medium	Speed	Performance	Durability	Distance	Cost	Advantages	Disadvantages
Radio Waves	Up to 1 Gbps	Moderate; suitable for broadcasting and multicasting.	Moderate; suitable for broadcasting and multicasting.	Long-range (can travel hundreds of kilometers).	Low to Moderate	- Can penetrate walls and obstacles. - Omnidirectional; suitable for multicasting. - Easy to generate and use.	- Susceptible to interference. - Less secure due to wide coverage. - Performance affected by weather conditions.
Micro - waves	1 Mbps to 10 Gbps	High; used for point-to-point communication with high bandwidth.	Moderate; requires precise alignment of antennas.	Short to medium distances (limited by line-of-sight).	Moderate	- High bandwidth and fast communication. - Suitable for unicast communication like radar and satellite. - No physical cables needed.	- Requires line-of-sight and precise antenna alignment. - Expensive installation and maintenance. - Affected by weather conditions.
Infrared	Up to 4 Mbps	Low; effective for short-range communication in controlled environments.	Low; cannot penetrate obstacles like walls.	Short-range (typically up to 5 meters).	low	- Simple, low-cost technology. - Secure for short-range communication. - Inexpensive and widely used in devices like remotes.	- Requires direct line-of-sight. - Cannot penetrate walls or obstacles. - Limited range and speed compared to other wireless media.

Radio Wave : -



Microwave : -



Infra-red wave : -

Television

Infrared Radiations

Remote

Learning Outcomes:

The student should have the ability to:

LO2.1 Outline various networking devices used in networking.
LO2.2 Express with real examples of the use of the devices.
LO2.3 Choose appropriate devices to create a network.
LO2.4 Summarize the use of each device used in networking.

Course Outcomes: Upon completion of the course students will be able understand the use of Transmission medium & each networking device.

Conclusion: Thus students have understood and successfully Compare various types of Transmission medium used in networking .

Viva Questions:

1. What is the difference between UTP & STP
2. What is the difference between Coaxial & Fiber Optic Cable?
3. What is the use of Bluetooth?

For Faculty Use:

Correction Parameters	Formative Assessment [40%]	Timely completion of Practical [40%]	Attendance/ Learning Attitude [20%]	
Marks Obtained				