

# TRANSMISSION MEDIA: ANALYSIS OF THE GUIDED AND UNGUIDED MEDIA

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**Abstract:** The transmission media that are used to carry the records can be classified as guided or unguided. guided media offer a bodily direction alongside in which the alerts are propagated; these include twisted pair, coaxial cable, and optical fibre. Unguided media appoint an antenna for transmitting via air, vacuum, or water. Transmission medium is the manner through which we send our information from one area to some other. The very first layer (physical layer) of communication networks OSI seven layer model is devoted to the transmission media. This paper deals with types of transmission media, and comparison of those media with that of with the real time application. The main aspect of this paper is to study different types of the transmission media.

**Keywords:** transmission media, comparison, guided, unguided

## 1.INTRODUCTION:

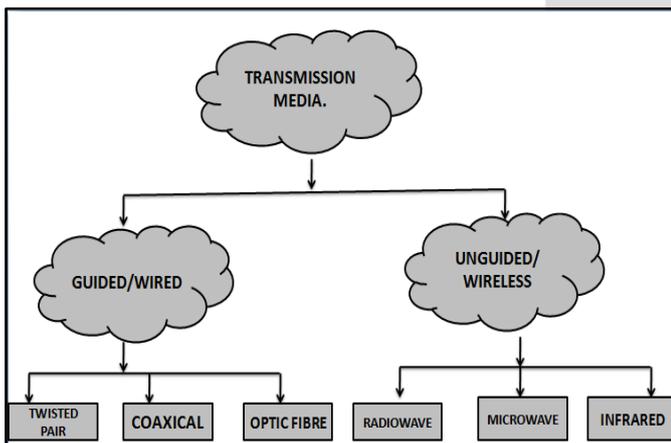
Transmission medium is the physical path among transmitter and receiver in a facts transmission gadget. Transmission media may be categorized as guided or unguided. In both cases, communicate is in the form of electromagnetic waves. With guided media, the waves are guided along a solid medium, consisting of copper twisted pair, copper coaxial cable, and optical fibre. The atmosphere and outer area are examples of unguided media that offer a means of transmitting electromagnetic alerts but do no longer guide them; this shape of transmission is normally known as wireless transmission. The characteristics and excellent of a records transmission are decided each by means of the traits of the medium and the characteristics of the signal. Within the case of guided media, the medium itself is extra vital in figuring out the limitations of transmission. For unguided media, the bandwidth of the signal produced via the transmitting antenna is more essential than the medium in determining transmission characteristics. One key belongings of indicators transmitted by antenna is directionality. In well known, alerts at lower frequencies are omnidirectional; that is, the sign propagates in all guidelines from the antenna. At better frequencies, it's miles feasible to awareness the sign directional beam.

## 2. DIFFERENCE BETWEEN GUIDED AND UNGUIDED MEDIA:

The computer and different communicating gadgets represent information inside the shape of alerts. The indicators transmit between speaking gadgets within the shape of electromagnetic energy, and hence the indicators are called electromagnetic alerts. Electromagnetic alerts are the aggregate of electrical and magnetic fields that vibrates on the subject of every different. The electromagnetic signals can tour thru numerous transmission media. The transmission media is broadly categorized into classes which are guided and unguided media.

**Table 1: comparison of guided and unguided media**

Basis for comparison	Guided media	Unguided media
<b>Basic</b>	The signal calls for a bodily course for transmission.	The signal is broadcasted via air or once in a while water.
<b>Alternative name</b>	It is referred to as wired communication or bounded transmission media.	It's far referred to as wireless communicate or unbounded transmission media.
<b>Direction</b>	It gives path to signal for traveling.	It does not offer any direction.
<b>Types</b>	Twisted pair cable, coaxial cable, fibre optic cable.	Radio wave, microwave and infrared



**Fig 1 :Transmission media**

**\*GUIDED MEDIA****3.TWISTED PAIR CABLE:**

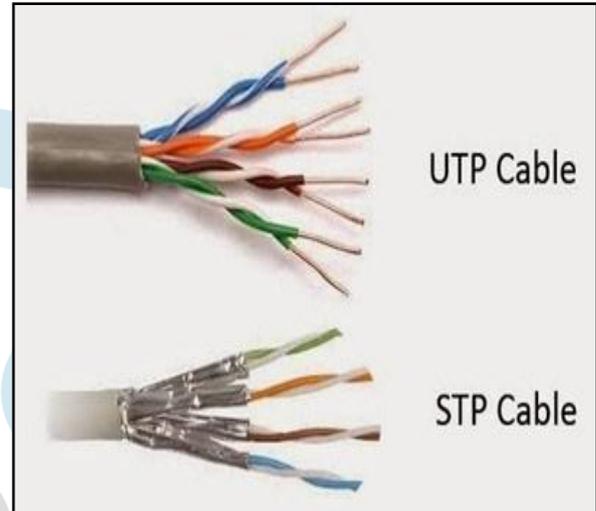
Twisted pair cables are pretty literally a pair of insulated wires which can be twisted together to assist lessen noise from outdoor resources. Twisted-pair cabling was invented by Alexander Graham Bell in 1881.while this does assist some, those cables are nonetheless very liable to out of doors noise. Twisted pair cables are the most cost-effective choice of the 3 but that also brings about decrease bandwidth and excessive attenuation. Experts factor out that twisted pair cabling is often used to assist keep away from positive kinds of sign interference. Two extraordinary kinds of twisted pair cable, unshielded twisted pair (UTP) and shielded twisted pair (STP) are utilized in special styles of installations. UTP is not unusual in ethernet installations, whilst STP is utilized in various forms of networks to save you cross talk and electromagnetic interference. STP cable can also assist to provide grounding. In widespread, twisted-pair cabling can be preferred over a common opportunity, coaxial cable, for one-of-a-kind motives. Coaxial cable involves a single, thicker wire. A lot of individuals who use this type of cable declare that twisted pair has a more accommodating bend radius, is less difficult to terminate, and presents more versatility in selecting community topologies. One of a kind styles of twisted-pair cable are rated by means of industry requirements along with ISO/EIC and EIA/TIA.

The twisted pair cables are of types, which are: shielded twisted pair cables: those cables protect cable from external electromagnetic interferences and are used with token ring networks. unshielded twisted pair cables: these are the unshielded twisted pair cables which are highly flexible and long lasting in nature. our cables are utilized in many ethernet networks and phone systems.

**4. COMPARISON ON SHIELED AND UNSHIELED TWISTED PAIR CABLES:**

Twisted pair cables are substantially utilized in transmitting statistics, mainly across first-rate distances. The twist in the twine cancels out any magnetic interference which can enlarge in the wiring. there are common sorts of twisted pair cabling, STP and UTP. The S stands for shielded, the U stands for unshielded, and the TP stands for twisted pair for each .STP simply has more shielding fabric this is used to cancel any outside interference that may be introduced at anything in the course of the cable. UTP cables don't have any safety in opposition to such interference and its overall performance is often degraded in its presence. using STP cables make certain that you get the maximum bandwidth out of your cabling even though the outside condition is lots less than perfect. the largest drawback to the use of STP cables is the higher rate. The protective is an additional cloth that is going into every meter of the cable, thereby raising its total rate. the protective moreover makes the cable heavier and a bit extra difficult to bend or manage in any manner. this isn't always a big difficulty but a few factor that users need to recognize while selecting among STP and UTP. In terms of usage, UTP is the extra fashionable and famous cabling that is utilized in most houses, workplaces, or maybe in massive scale corporations due to its lower fee.

STP is commonly utilized by massive scale agencies in immoderate-quit packages that require the most bandwidth. STP cables also are utilized in outdoor environments in which the cables are exposed to the factors and manmade structures and tool which can introduce greater interference. suitable examples of this can be the telephone/internet cables that run from your home, to the junction area, down to the institutions of your company or isp.

**Fig 2 :comparison of STP and UTP****Table 2: comparison of UTP and STP**

Basis for comparison	UTP	STP
Basic	UTP (unshielded twisted pair) is a cable with wires that are twisted together.	STP (shielded twisted pair) is a twisted pair cable enclosed in foil or mesh shield.
Noise and cross talk generatio	High relatively.	Much less prone to noise and crosstalk.
Grounding cable	No longer required	Necessarily required
Ease of handling	Without problems installed as cables are smaller, lighter, and flexible.	Set up of cables is difficult relatively.
cost	Inexpensive and does not require a good deal preservation.	Moderately pricey.
Data rates	Slow relatively.	Gives excessive statistics rates

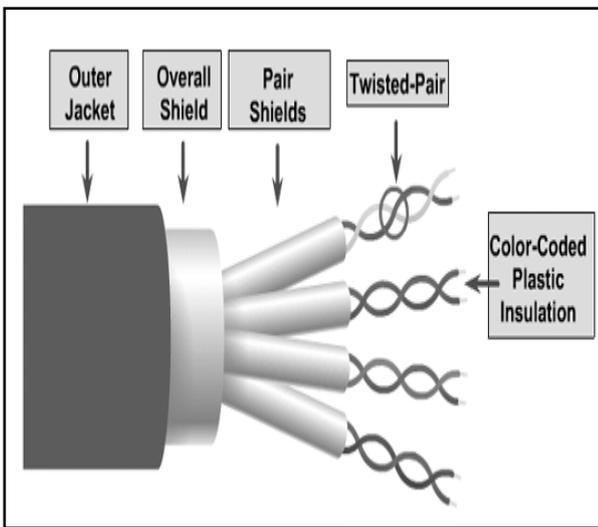


Fig 3 :shielded twisted pair

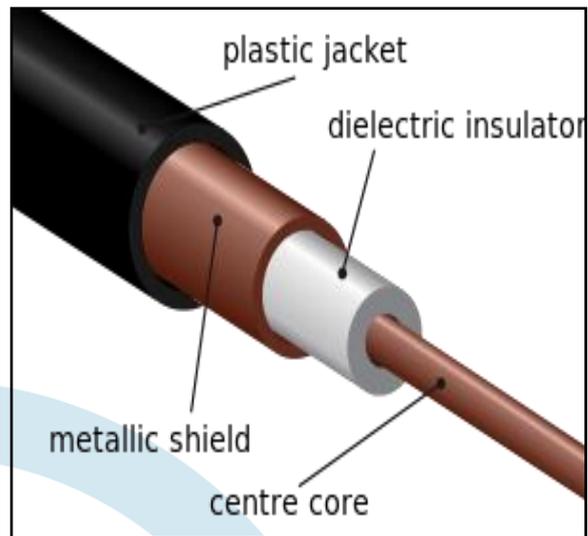


Fig 5 :coaxial cable

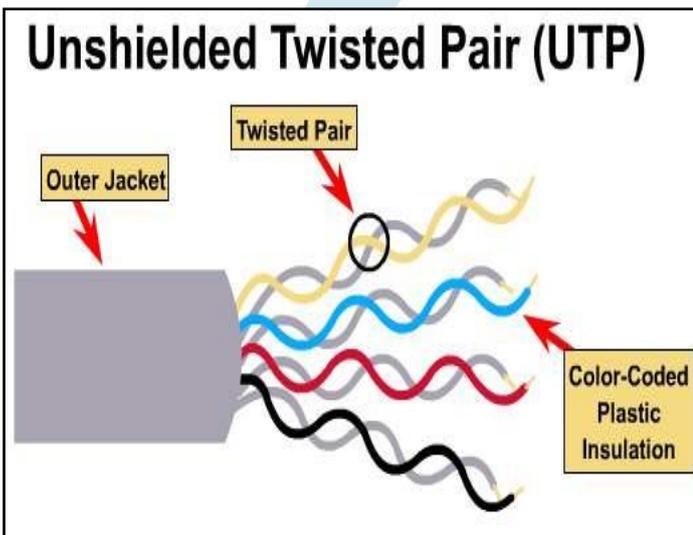


Fig 4 : unshielded twisted pair

**5.COAXIAL CABLE:**

coaxial cable, or coax, is a sort of electric cable that has an internal conductor surrounded with the aid of a tubular insulating layer, surrounded by a tubular undertaking defend.Many coaxial cables additionally have an insulating outer sheath or jacket. The time period coaxial comes from the inner conductor and the outer shield sharing a geometric axis. Coaxial cable was invented with the aid of english engineer and mathematician Oliver Heaviside, who patented the design in 1880. Coaxial cable differs from other shielded cables because the scale of the cable are controlled to give a particular, constant conductor spacing, which is needed for it to characteristic successfully as a transmission line.

A coaxial cable consists of these layers, starting from the innermost –

- Stiff copper wire as core
- Insulating cloth surrounding the core
- Closely woven braided mesh of carrying out fabric surrounding the insulator
- Protecting plastic sheath encasing the cord

**APPLICATION:**

Coaxial cable is used as a transmission line for radio frequency indicators. Its applications consist of feedlines connecting radio transmitters and receivers with their antennas, pc network (net) connections, virtual audio (s/pdif), and dispensing cable television indicators. one gain of coaxial over other varieties of radio transmission line is that during a super coaxial cable the electromagnetic field carrying the signal exists only within the area among the internal and outer conductors. this allows coaxial cable runs to be installed subsequent to metallic objects such as gutters without the power losses that arise in different types of transmission strains. coaxial cable additionally presents protection of the sign from external electromagnetic interference.

**6. FIBRE OPTIC CABLE:**

An optical fiber cable, additionally referred to as fiber optic cable, is an meeting much like an electrical cable, but containing one or greater optical fibers which are used to hold mild. The optical fiber elements are normally for my part coated with plastic layers and contained in a shielding tube appropriate for the surroundings wherein the cable might be deployed. Different types of cable are used for unique programs, for example long distance telecommunication, or presenting a high-speed information connection between specific components of a constructing.

Every fibre is made up of these three layers, beginning with the innermost layer –

- Core fabricated from high satisfactory silica glass or plastic
- Cladding fabricated from high pleasant silica glass or plastic, with a decrease refractive index than the middle
- Shielding outer masking called buffer

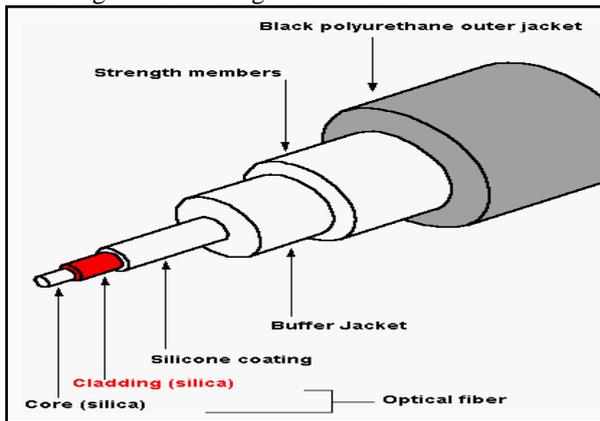


Fig 6 :fibre optical cable

**FIBER MATERIAL:**

There are principal types of material used for optical fibers: glass and plastic. they offer widely distinctive traits and locate makes use of in very distinctive applications. generally, plastic fiber is used for terribly quick range and client programs, glass fiber is used for short/medium range (multi-mode) and long variety (unmarried-mode) telecommunications.

**JACKET MATERIAL:**

The jacket fabric is application specific. The cloth determines the mechanical robustness, growing older due to UV radiation, oil resistance, and so on. Nowadays percent is being replaced by halogen loose options, particularly pushed by means of more stringent policies.

Polyurethane (PU R)	Yes	-	Highly flexible cables
Polybutylene terephthalate (PB T)	Yes	Fair	Good for indoor use
Polyamide (PA)	Yes	Good/Poor	Indoor and outdoor use

**7. COMPARISON OF WIRED TRANSMISSION MEDIA:**

Table 3: Comparison of wired transmission media:

	UNSHIELED (UTP)	SHIELED (STP)	COAXIAL	FIBRE OPTIC
<b>COST</b>	least	low	moderate	excessive
<b>SPEED</b>	low	low	moderate	high
<b>DISTANCE</b>	short	short	Moderate distance	Long
<b>RELIABILITY</b>	least	low	moderate	high
<b>SECURITY</b>	low	low	moderate	High
<b>REAL LIFE APPLICATION</b>	Telephone networks	Telephone networks	TV cable	Data transmission, telephone lines

**\*UNGUIDED MEDIA**

**8. RADIO WAVES:**

Electromagnetic waves ranging in frequencies among three khz and 1 ghz are generally called radio waves. Radio waves are omnidirectional. when an antenna transmits radio waves, they may be propagated in all directions. Which means the sending and receiving antennas do not ought to be aligned. a sending antenna send waves that can be acquired with the aid of any receiving antenna. The omnidirectional assets has downside, too. The radio waves transmitted by using one antenna are at risk of interference with the aid of any other antenna which can send signal suing the equal frequency or band.radio waves, especially with the ones of low and medium frequencies, can penetrate walls. This characteristic may be both an advantage and a drawback. It's far an advantage because, an am radio can

Material	Halogen-free	UV Resistance	Remark
LSFH Polymer	Yes	Good	Good for indoor use
Polyvinyl chloride (PVC)	No	Good	Being replaced by LSFH Polymer
Polyethylene (PE)	Yes	Poor	Good for outdoor applications

acquire signals interior a building. It's far a drawback due to the fact we cannot isolate a conversation to simply inside or outside a constructing. Radio waves use omnidirectional antennas that send out signals in all directions.

#### APPLICATION:

- The omnidirectional characteristics of radio waves lead them to useful for multicasting in which there's one sender but many receivers.
- AM and FM radio, television, maritime radio, cordless phones, and paging are examples of multicasting.

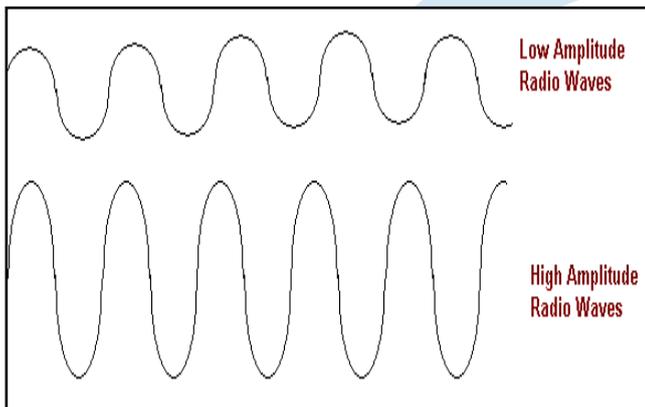


Fig 7 : Radio waves.

#### 9. MICROWAVES:

Electromagnetic waves having frequencies among 1 and three hundred ghz are referred to as micro waves. micro waves are unidirectional. When an antenna transmits microwaves, they may be narrowly focused. because of this the sending and receiving antennas need to be aligned. The unidirectional belongings has an obvious gain. A couple of antennas can be aligned without interfering with every other pair of aligned antennas.

The following describes a few characteristics of microwaves propagation:

- Microwave propagation is line-of-sight. since the towers with the mounted antennas want to be in direct sight of each different, towers which are far aside want to be very tall.
- Very excessive-frequency microwaves cannot penetrate walls. this feature can be a disadvantage if receivers are in the buildings.
- The microwave band is tremendously huge, nearly 299 ghz. therefore, wider sub-bands may be assigned and a high date price is possible.
- Use of sure portions of the band calls for permission from authorities.

#### APPLICATION:

microwaves, due to their unidirectional properties, are very useful while unicast(one-to-one) conversation is wanted among the sender and the receiver. they're utilized in mobile telephones, satellite networks and wireless lans.

There are two sorts of microwave transmission :

- Terrestrial microwave
- Satellite TV for pc microwave

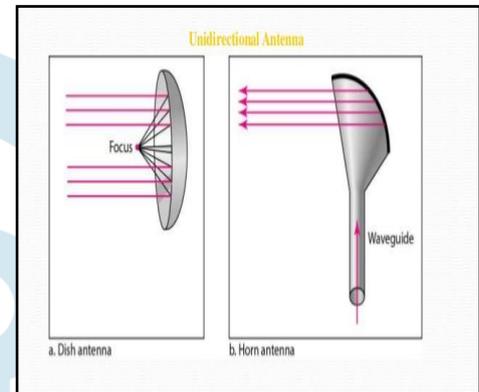


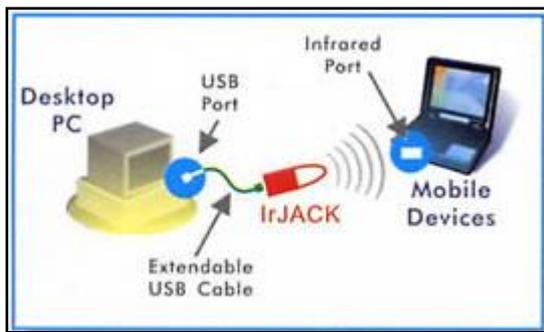
Fig 8 : Radio waves.

#### 10. INFRARED:

Infrared waves, with frequencies from 300 ghz to 400 thz, can be used for brief-range communique. Infrared waves, having high frequencies, can't penetrate walls. This tremendous feature prevents interference between one gadget and any other, a brief-variety communication system in on room can't be laid low with any other system inside the subsequent room. whilst we use infrared far off manipulate, we do now not intrude with using the remote via our neighbours. However, this equal function makes infrared indicators useless for lengthy-range communique. Further, we cannot use infrared waves out of doors a constructing because the sun's rays incorporate infrared waves which could intervene with the communication.

#### APPLICATION:

- The infrared band, almost four hundred thz, has an extremely good capability for information transmission. This type of extensive bandwidth can be used to transmit digital statistics with a very high information price.
- The infrared facts affiliation(irda), an affiliation for sponsoring the use of infrared waves, has set up standards for the use of these signals for communique among gadgets which includes keyboards, mouse, computers and printers.
- Infrared indicators may be used for quick-range verbal exchange in a closed region using line-of-sight propagation.



**Fig 9 : Infrared.**

## 11. CONCLUSION

This paper mainly focus on wired and wireless transmission media .Description of some inherent advantages and disadvantages on transmission media has been described in this paper. This paper has provided some knowledge of analysis for dealing with different cables. Transmission media are vital for communique system. In view that unique forms of transmission media have exclusive transmission characteristics and fees, they're used in exceptional programs.

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