Transmission Media & Types

1. Twisted Pair Cable

Twisted pair cables have been around for a long time.

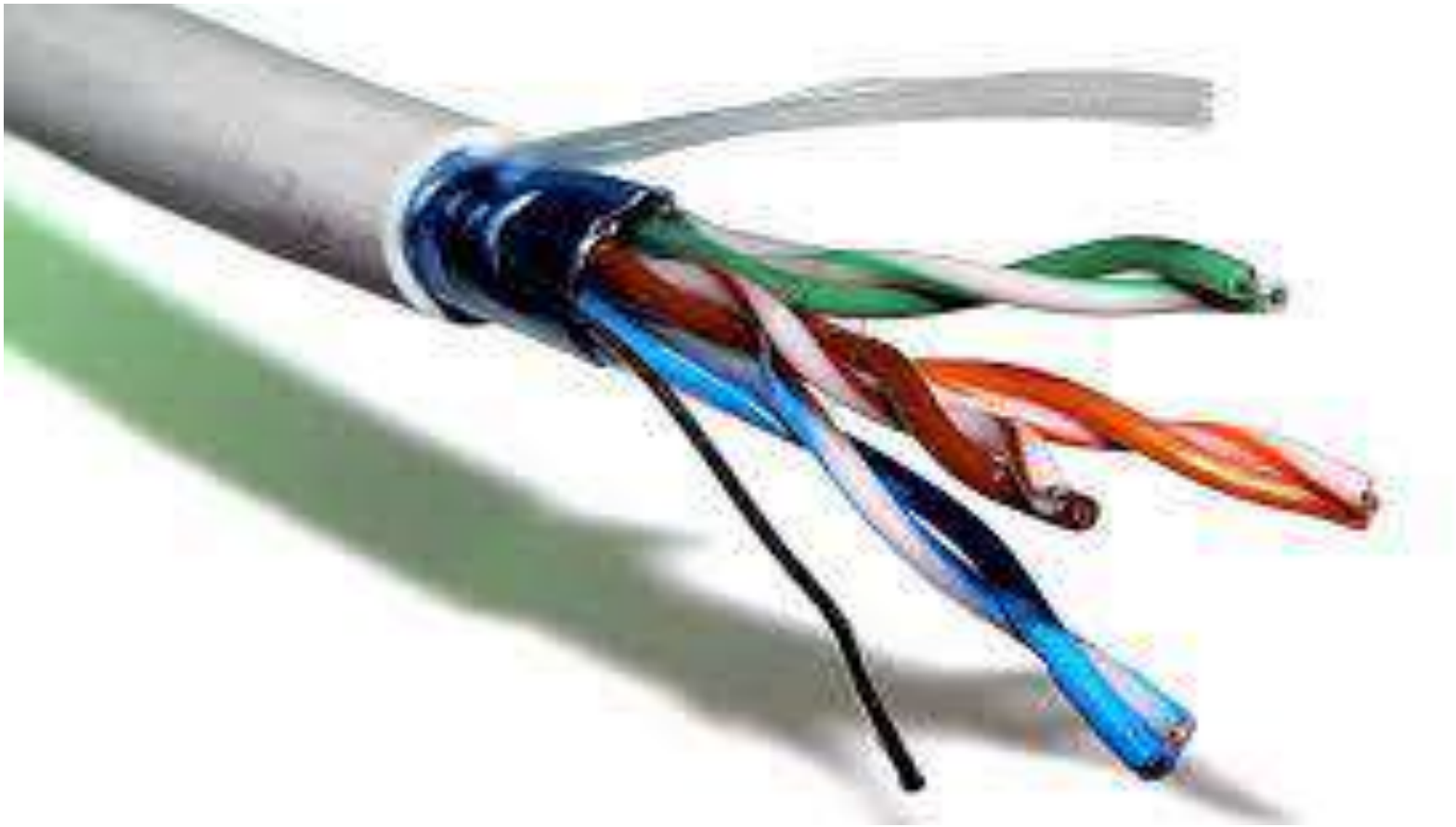
•Twisted pair is a widely used medium in networking because it's lighter, cheaper, more flexible, easy to install, and provides greater speeds than coaxial cables.

• There are two types of twisted pair cables: the unshielded twisted pair (UTP) and the shielded twisted pair (STP).

•The **unshielded twisted pair cable** has 4 pairs of copper wires that are present inside a plastic sheath. These wires are twisted to protect them from interference. The only protection available for a UTP cable is a plastic sheath that is thin in size.

Unshielded Twisted Pair Cable

Shielded Twisted Pair Cable



- The **shielded twisted pair cable** is widely used in high-speed networks.
- The major difference between UTP and shielded twisted pair is that STP makes use of a metallic shield to wrap the wires. This metallic shield prevents interference to a better extent than UTP.
- These STP cables come with numbering; the higher the numbering, the better the interference prevention. As an example:

- CAT5,CAT5A,CAT6,CAT6A

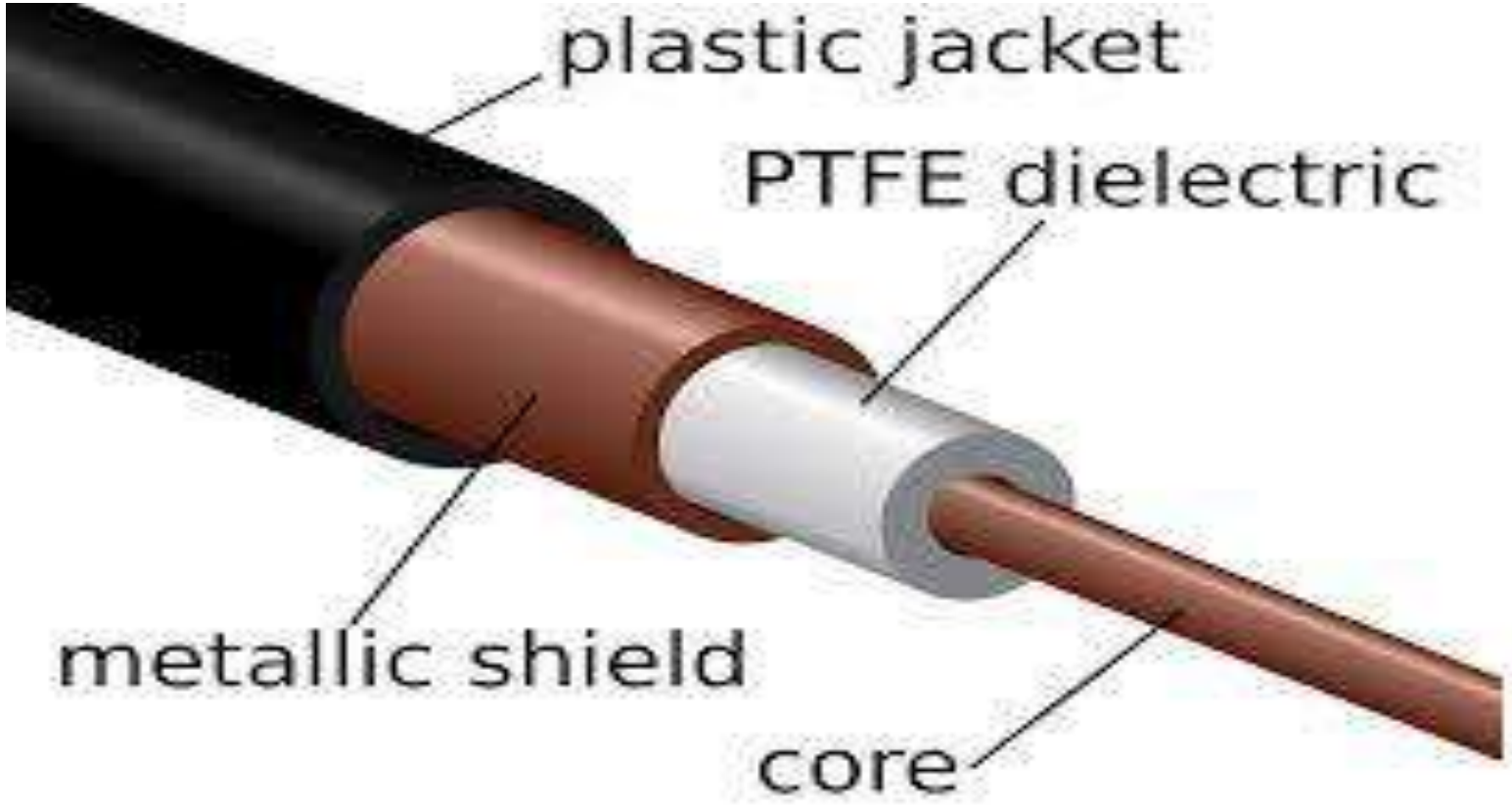
ETHERNET CABLE PERFORMANCE SUMMARY

CATEGORY	SHIELDING	MAX TRANSMISSION SPEED (AT 100 METERS)	MAX BANDWIDTH
Cat 3	Unshielded	10 Mbps	16 MHz
Cat 5	Unshielded	10/100 Mbps	100 MHz
Cat 5e	Unshielded	1000 Mbps / 1 Gbps	100 MHz
Cat 6	Shielded or Unshielded	1000 Mbps / 1 Gbps	>250 MHz
Cat 6a	Shielded	10000 Mbps / 10 Gbps	500 MHz
Cat 7	Shielded	10000 Mbps / 10 Gbps	600 MHz
Cat 8		Details to be released later	

2. Coaxial Cables

- The coaxial cables have a central copper conductor, surrounded by an insulating layer, a conducting shield, and the outermost plastic sheath. Thus, there are three insulation layers for the inner copper cable
- Cable TV and analog **televisions mainly use coaxial cables**.
- Coaxial cables have **better resistance** to cross talk than twisted pair cables.
- The coaxial cables **are used for long distance communication.** The most widely used types of coaxial cables are RG-59 and RG-6 (RG stands for 'radio guide'). RG-59 has lesser shielding and is suitable for short cable lengths and cable TV connections.
- RG-6 has better insulation than RG-59 and is used for satellite TV and digital signal transmissions for better strength and longer distances.

Coaxial Cable



- There are many advantages to coaxial cables, including the following:

1. High bandwidth
2. Easy and cheap installation
3. Better immunity from noise
4. Better scaling

- disadvantages to coaxial cables, which include the following:

1. They cover less distance than fiber optic cables.
2. They carry less bandwidth than both fiber optic and twisted pair cables.

3. Optical Fibers

- Optical fibers use light waves for transmission. These cables are well-suited for **voice, data, and video transmissions**.
- Optical fibers are the most **secure** of all the cable media.
- installation and maintenance are **difficult and costly**.
- Fiber optic cables **have greater transmission speed, high bandwidth, and the signal can travel longer distances** when compared to coaxial and twisted pair cables.

Optical Fiber Cable

- The advantages of optical fibers include the following:

1. There is zero interference and covers major cities and countries.
2. They have high speed and high bandwidth.
3. They're highly secure.

- disadvantages, including the following:

1. Installation and maintenance are difficult.
2. Cabling is costly.
3. Retrofitting an existing network is difficult, since optical fibers are incompatible with many types of electronic networking equipment.

- There are two modes of operation for optical fibers. First there's single-mode fiber, which uses a single beam of light and allows communication over great distances with better transfer speed. Then there is multimode fiber, which uses multiple light beams inside a single fiber cable, has a reduced length and travel speed, and has a larger bandwidth, but signal strength is weakened.

4. Wireless or Unguided Transmission Media

- The features of wireless/unguided transmission media are that the signal gets broadcast without any guided medium through the air and is less secure. There are three types of wireless transmission media:

1. Radio wave
2. Infrared
3. Microwave

- The advantages of unguided transmission media include the following:

1. They are useful in wireless remote accessing methods.
2. Networks can be expanded without disturbing the current users.

- The disadvantages include:

1. Potential security issues.
2. They have limited speed compared to guided transmission media.