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**Q: Different types of transmission media?**

**ANS:**

**(1) Twisted-pair wire (UTP cable):**

Twisted pair of cabling is a type of wiring in which conductors of a single circuit are twisted together for the purpose of improving electromagnetic capability.

**Characteristics:**

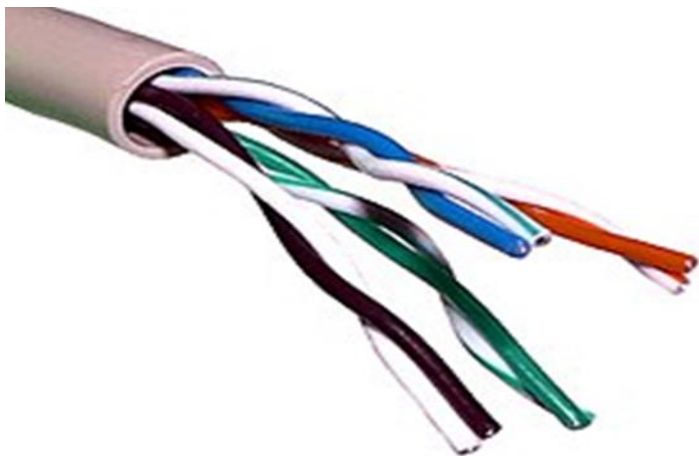
- Physical dimension
- Temperature rating
- Flex radius
- Pulling tension

**Benefits:**

- It can be used to carry both digital data and analog data.
- It's the least expensive media of transmission.

**Limitations:**

- The twisting of the individual pairs reduces electromagnetic interference.



**Diagram:**

## (2) Coaxial cable:

Coaxial cable is a type of cable consisting on inner conductor surrounded by a concentric conducting shield, with the two separated by dielectric it also have outer protective jacket.

### Characteristics:

- Cost is relatively inexpensive.
- Installation relatively simple.
- Typically bandwidth of 10mbps.
- Susceptible to EMI.

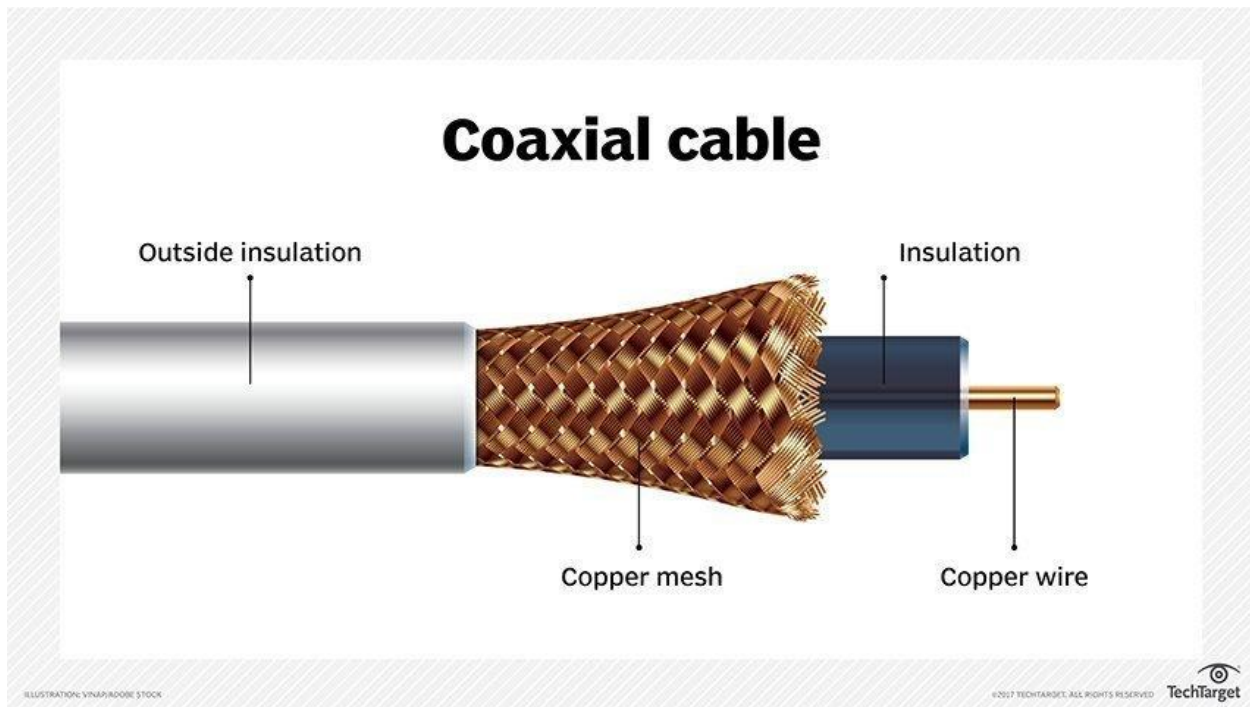
### Benefits:

- Less expensive than fiber.
- Requires fewer repeaters than twisted pair.

### Limitations:

- Need more room in wiring ducts than twisted pairs
- More difficult to install than twisted pair.

### Diagram:



### (3) Microwave system:

It is a system of gear used for microwave data transmission. This system includes radios located high atop microwave towers, which are used for the transmission of microwave communication using line of sight microwave radio technology.

#### Characteristics:

- Can be rapidly installed
- Can cross complicated terrains.
- Can use point to point radio transmission.

#### Benefits:

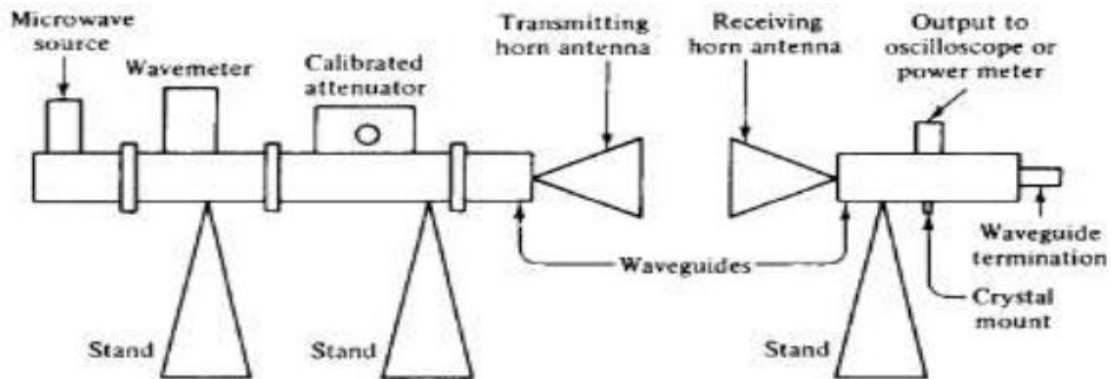
- Simple to generate
- Used half the LO frequency.

#### Limitations:

- More difficult to analyze electronic circuits.
- There is physical limitation in creating resonant circuit at microwave frequencies.

#### Diagram:

## Microwave System



#### (4) Communication satellite:

A communications satellite is an artificial satellite that relays and amplifies radio telecommunications signals via a transponder; it creates a communication channel between a source transmitter and a receiver at different locations on Earth.

#### Characteristics:

- It does not have its own light it reflects of sun light.
- It switches its phases systematically.

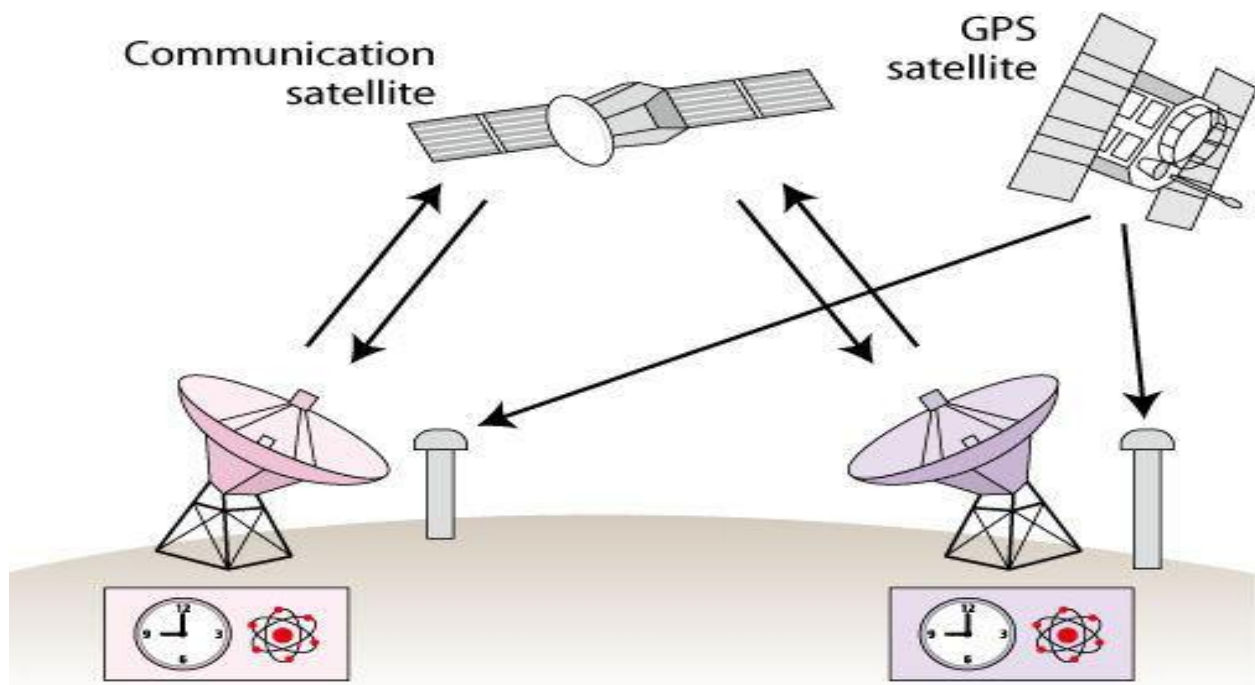
#### Benefits:

- Speed
- Developing sustainable cities
- Connecting remote assets.

#### Limitations:

- High initial investment
- Short life time
- Spectrum crowding.

#### Diagram:



## (5) Optical fibers:

They are long and thin strand of pure glass about the diameter of human hair. They are arranged in bundles called optical cables and used to transmit light signals over long distance.

### Characteristics:

- Transmission region from 400 to 2200 nm.
- Core material pure silica
- Cladding material polymer

### Benefits:

- Enormous bandwidth
- Low transmission loss
- Immunity to cross talk
- Electric isolation.

### Limitations:

- Difficulty in jointing.
- Costly if under utilized
- Tapping for emergency and gate communication is difficult.

Diagram:

