

# Cable

## IEEE 802.3 Ethernet standard

Standard	Speed	Distance
10BASE - T	10 mbps	100 m
100BASE - T	100 mbps	100 m
1000BASE - T	1 gbps	100 m
1000BASE - LX	1 gbps	1 km
10GBASE - T	10 gbps	100 m

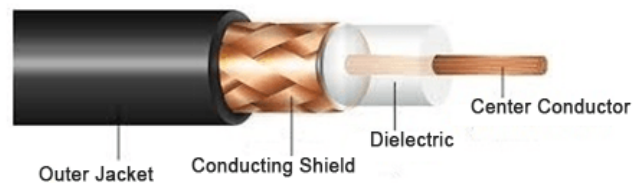
T - Twisted pair

LX - Fiber optic

## Types

### 1. Coaxial

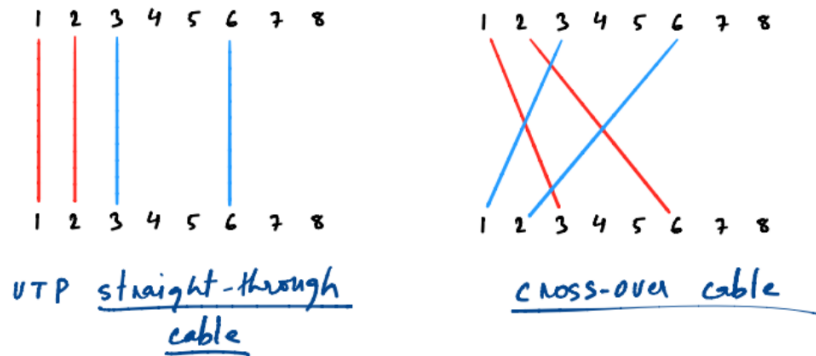
- Layers
  - Copper cable - conductor
  - Plastic layer - insulation b/w copper cable and metal shield
  - Braided metal shield - protect from interference
  - Outer jacket
- Support longer length but hard to install



## 2. Twisted pair

### a. UTP (Unshielded Twisted Pair)

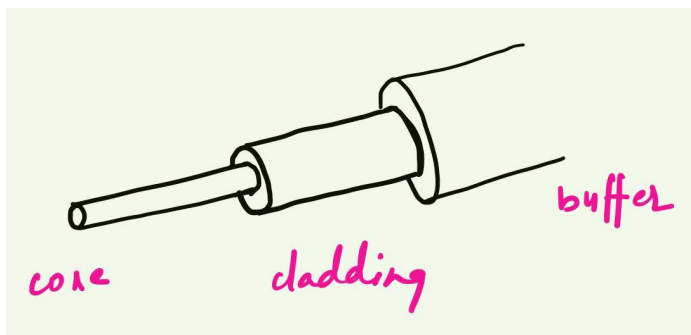
- Used with RJ-45 connector with 8 pins
- Susceptible in electromagnetic interference
- Transmit on
  - Router/AP/NIC - 1,2
  - Switch/Hub - 3,6
- **Auto-mdix** - automatically configure if wrong pins are set



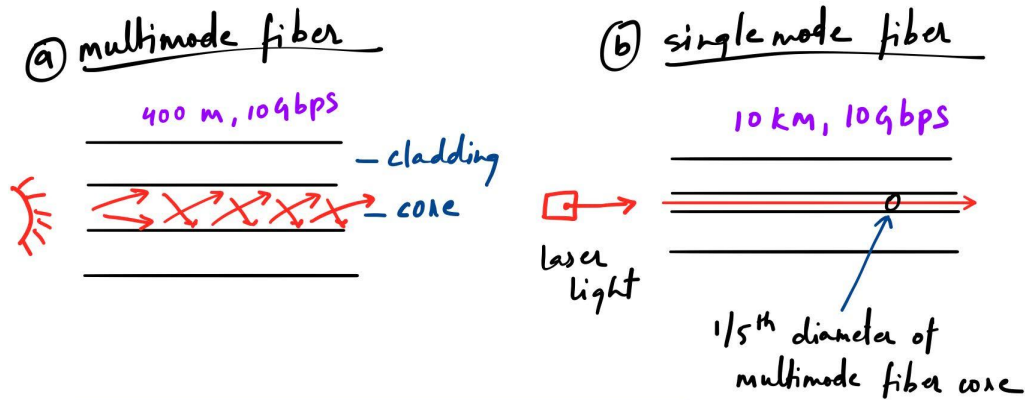
### b. STP (Shielded Twisted Pair)

- Less affected by interference as covered by metallic foil

## 3. Fiber optic

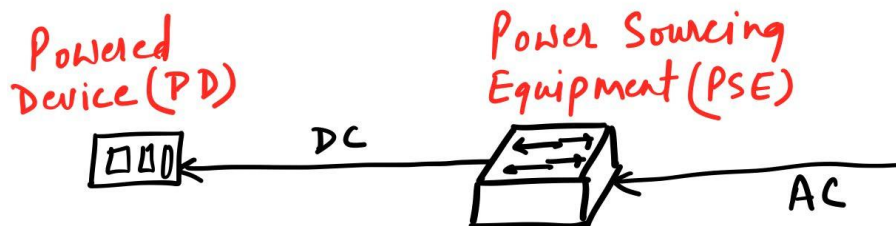


Types :



## PoE (Power over Ethernet)

- Provide power to ip devices via Ethernet cable
- **Powered Device (PD)**
  - ip phone, ip camera , AP
- **Power Sourcing Equipment (PSE)**
  - COverts AC to DC



- Working
  - Negotiation
    - Determine which device needs power over Ethernet
  - Autonegotiation
    - Adjust the min<sup>m</sup> required power to operate
  - Monitor
    - Use CDP and LLDP to adjust the power

# Issues

- Due to collision, error, duplex or speed mismatch

## Collision

- When two devices try to send signals at the same time, collision happens.
- Collision detection
  - CSMA/CD - Mechanism to detect collision by Ethernet
- Late collision
  - Collision happens after 64th byte of frame is transmitted
  - Reason - duplex mismatch
- Full duplex - collision is disabled

## Error

- Input errors, output errors
- Runts (< 64 bytes) , Giants (> 1518 bytes)

## Duplex and Speed mismatch

- Duplex { auto | half | full }
- Speed { auto | 10 | 100 | 1000 }
  - 10,100 - half duplex
  - 1000 - full duplex
- Autonegotiation -
  - by default - ON
  - duplex/speed - half/10
- Traffic will still pass but retransmission or reduced throughput can occur