
ondia

Connectors and Wiring Standards

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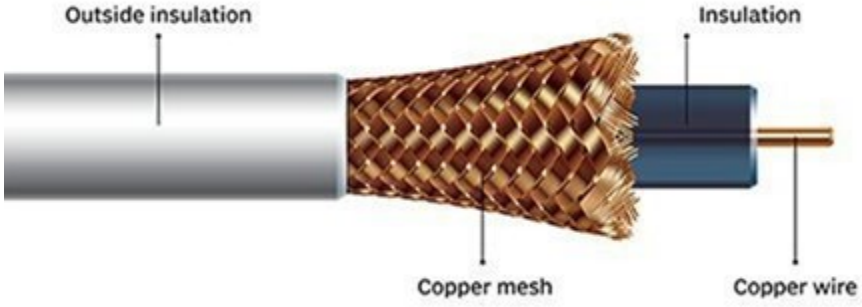
Physical Media

Coaxial Cable

A type of copper cable specially built with a metal shield and other components engineered to block signal interference



- Inexpensive
- Easy to install
- Easy to expand
- Resistance to EMI
- Up to 10 Mbps
- Durable

Coaxial Cable

There are two types of coaxial cable:

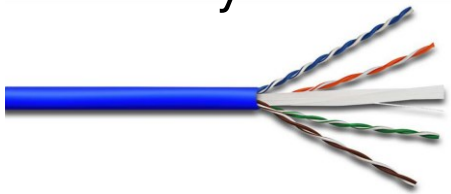
Thicknet (10Base5)

Thinnet (10Base2)

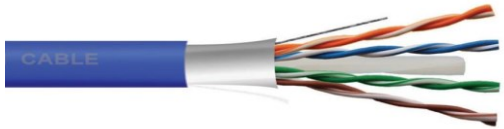
Thicknet and thinnet are used in Ethernet implementations

Twisted-Pair Cable

The most common type of network medium used in LAN today



UTP - Unshielded Twisted pair



STP - Shielded Twisted pair

- Cheaper
- Easy to work
- High transmission

Twisted-Pair Cable

N <Signaling> X

N: Signaling rate in Mbps

<Signaling>: Signalling type *(baseband or broadband)*

X: Unique identifier

Examples:

10Base-T: 10Mb or 10Megabits twisted pair

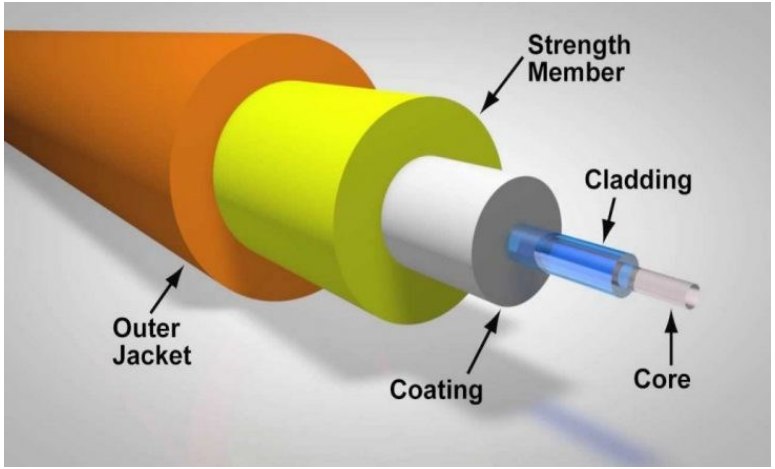
100Base-F: 100Mb or 100Megabits fiber

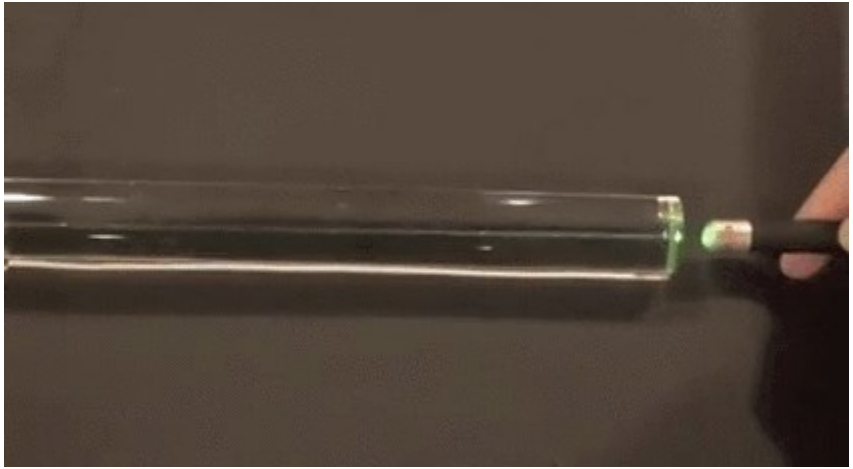
Twisted-Pair Cable

UTP Categories - Copper Cable				
UTP Category	**Data Rate**	**Max. Length**	**Cable Type**	**Application**
CAT1	Up to 1Mbps	-	Twisted Pair	Old Telephone Cable
CAT2	Up to 4Mbps	-	Twisted Pair	Token Ring Networks
CAT3	Up to 10Mbps	100m	Twisted Pair	Token Rink & 10BASE-T Ethernet
CAT4	Up to 16Mbps	100m	Twisted Pair	Token Ring Networks
CAT5	Up to 100Mbps	100m	Twisted Pair	Ethernet, FastEthernet, Token Ring
CAT5e	Up to 1 Gbps	100m	Twisted Pair	Ethernet, FastEthernet, Gigabit Ethernet
CAT6	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT6a	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT7	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (100 meters)

Fiber-Optic Cable

Very thin strand of pure glass that acts as a waveguide for light over long distances



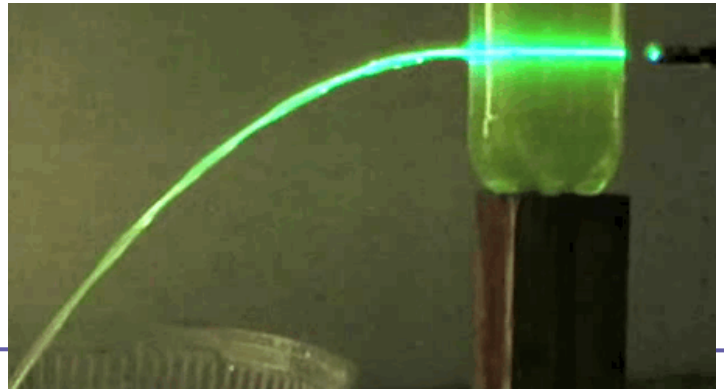


Total internal reflection

Fiber-Optic Cable

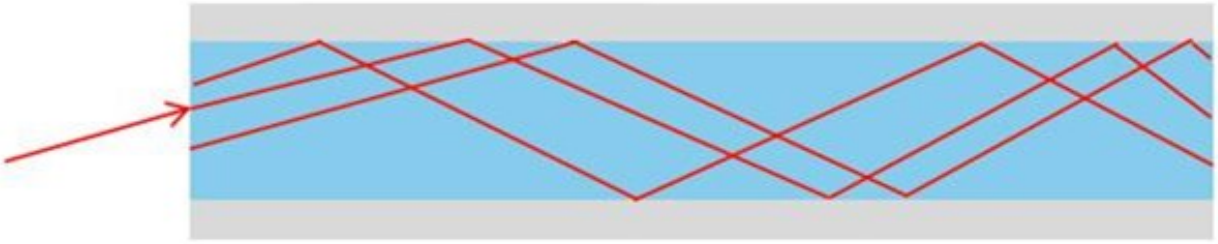
- Immune to EMI and RFI*
- Very long range
- Broad bandwidth (Tbits/s or THz)
- Low transmission loss
- Not dissipate heat

- Difficult to install
- More expensive than TP
- Troubleshooting equipment is more expensive then TP test equipment
- Harder to troubleshoot



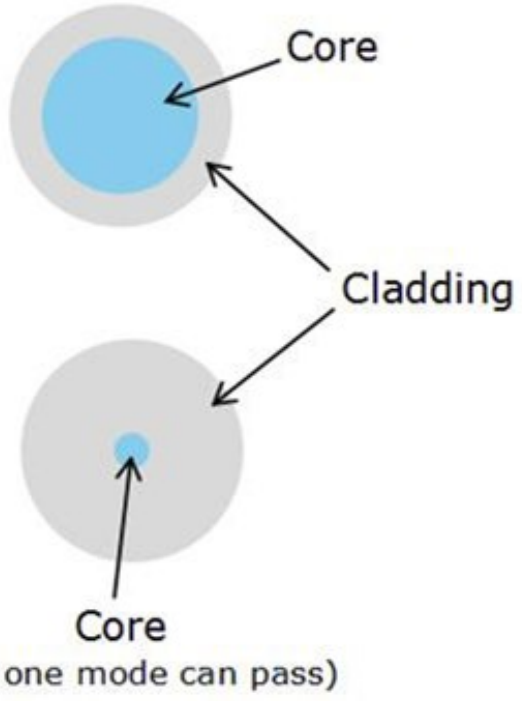
*EMI: Electromagnetic interference
RFI: Radio frequency interference

Fiber-Optic Cable



Multimode Fiber

Single-Mode Fiber

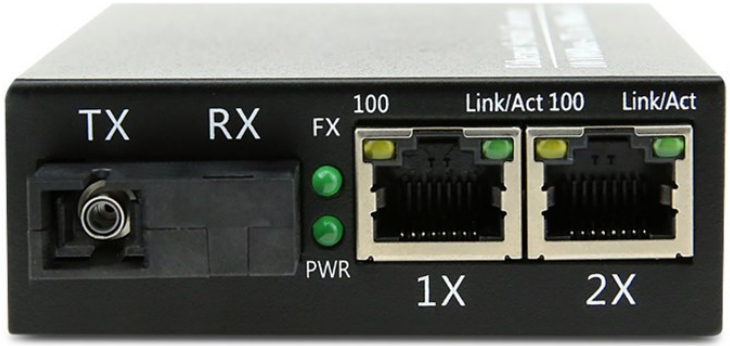


Media Converters

Converts Ethernet or other communication protocols from one cable type to another type

Main types:

- Fiber-to-Ethernet
- Fiber-to-Coaxial
- Fiber-to-Fiber
- Ethernet-to-Coaxial



Fiber-to-Ethernet converter

2 Cable Properties

Cable Properties

Transmission Speeds

Based on the type of cable or fiber, network administrators can control the speed of a network to meet the network's traffic demands

Media Type	Bandwidth	Performance: Typical Error Rate
Twisted-pair for analog voice applications	1 MHz	Poor to fair (10^{-5})
Coaxial cable	1 GHz	Good (10^{-7} to 10^{-9})
Microwave	100 GHz	Good (10^{-9})
Satellite	100 GHz	Good (10^{-9})
Fiber	75 THz	Great (10^{-11} to 10^{-13})

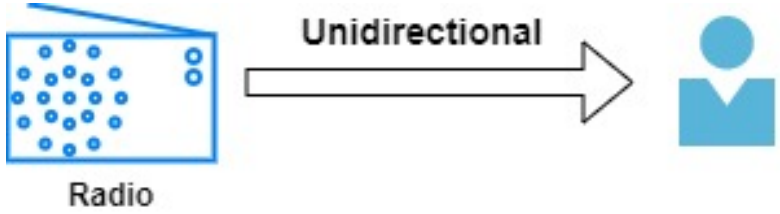
Cable Properties

Distance

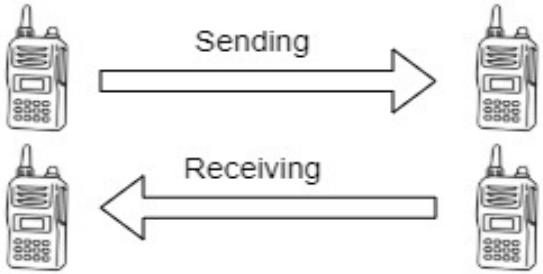
Standard	Data Rate	Max Distance	Cable Type
10Base2	10 Mbps	185 m	Coaxial
10Base5	10 Mbps	500 m	Coaxial
10BaseT	10 Mbps	100 m	Ethernet
100BaseT	100 Mbps	100 m	Ethernet
1000BaseT	1 Gbps	100 m	Ethernet
10BaseFL	10 Mbps	2 km	Fiber (Multi Mode)
100BaseSX	100 Mbps	300 m	Fiber (Multi Mode)
100BaseLX	100 Mbps	100 km	Fiber (Single Mode)
1000BaseLH	1 Gbps	70 km	Fiber (Single Mode)

Cable Properties

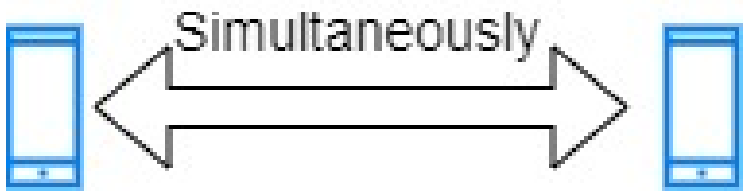
Simplex



Half-duplex



Full-duplex



THANKS!

Any questions?