

**Practical Network
Computer Science
Third Class part 2
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Teacher**

Identifying Network Topologies

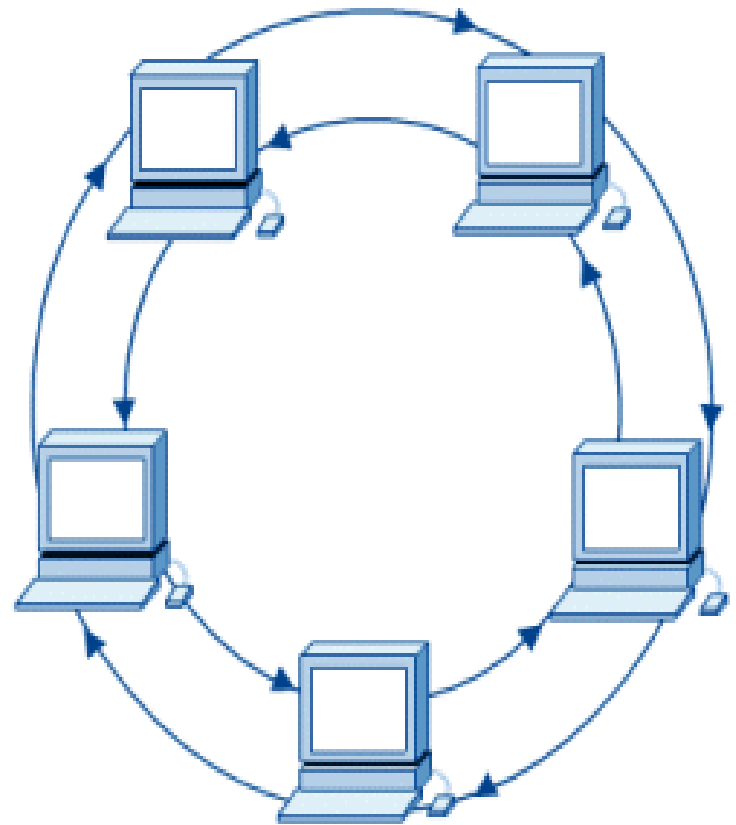
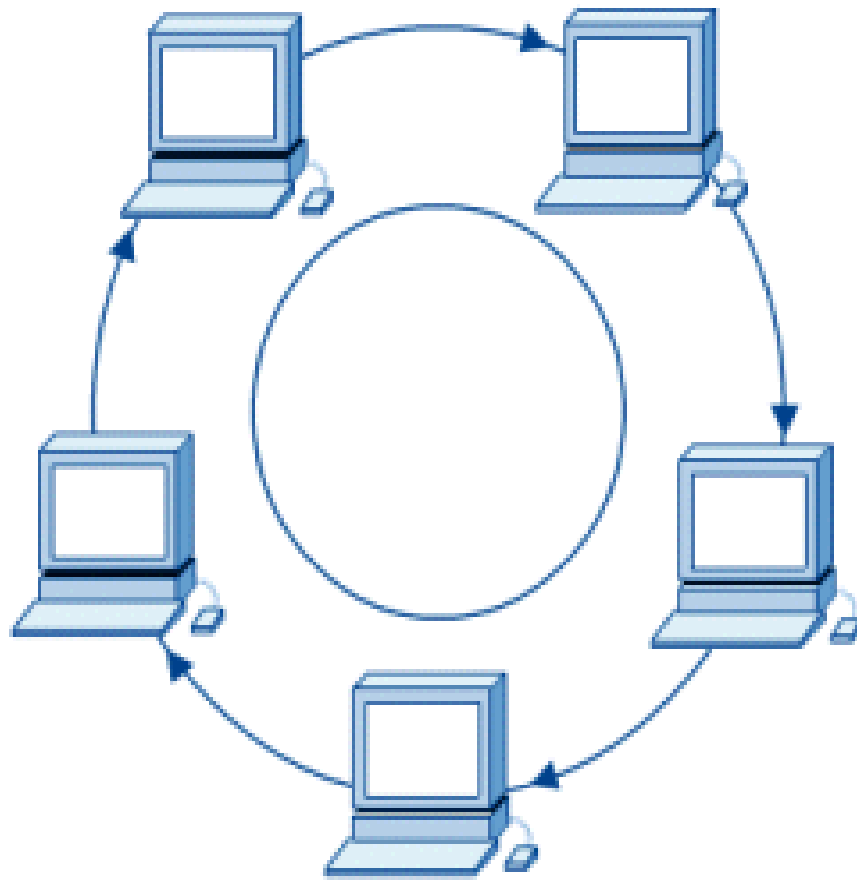
- ❑ Nodes connected in a circle
- ❑ Tokens used to transmit data
- ❑ Nodes must wait for token to send

Advantages

- Time to send data is known
- No data collisions

Disadvantages

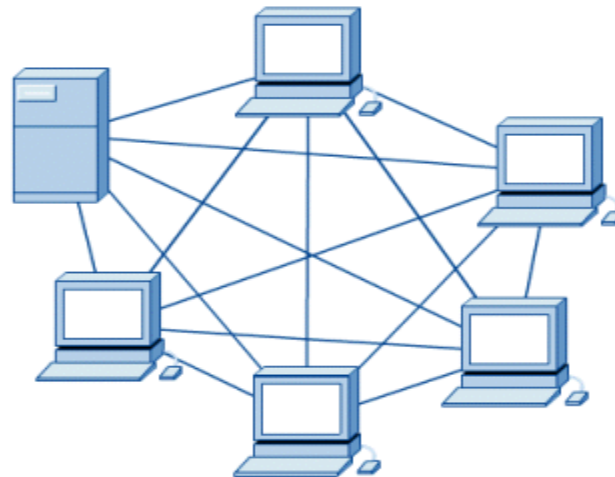
- ❖ Slow
- ❖ Lots of cable



Identifying Network Topologies

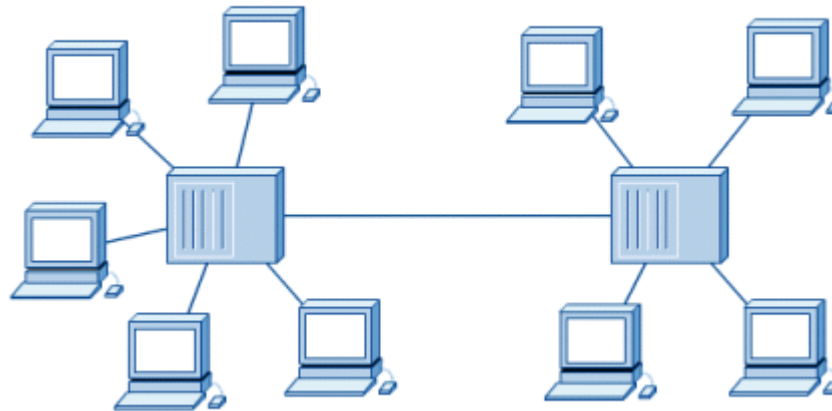
Mesh Topology

- ❑ Mesh topology connects all devices (nodes) to each other for redundancy and fault tolerance.
- ❑ It is used in wide-area networks (WANs) to interconnect LANs and for critical networks.
- ❑ The mesh topology is expensive and difficult to implement.



Identifying Network Topologies

- The hybrid topology combines more than one type of topology.
- When a bus line joins two hubs of different topologies, the configuration is called a star bus.
- The bus line is used to transfer the data between the star topologies.



Type of cabling for network

A: Twisted–Pair Cable

B: Coaxial Cable

C: Optical Fiber Cable

Twisted-Pair Cable

Twisted-pair cable is a type of cabling that is used for telephone communications and most modern Ethernet networks. A pair of wires forms a circuit that can transmit data. The pairs are twisted to provide protection against *crosstalk*, the noise generated by adjacent pairs. When electrical current flows through a wire, it creates a small, circular magnetic field around the wire. Two basic types of twisted-pair cable exist:

Unshielded Twisted Pair (UTP).

Shielded Twisted Pair (STP).



UTP Cable

UTP cable is a medium that is composed of pairs of wires. UTP cable is used in a variety of networks. Each of the eight individual copper wires in UTP cable is covered by an insulating material. In addition, the wires in each pair are twisted around each other.

- Speed and throughput—10 to 1000 Mbps
- Maximum cable length—100 m (short)



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)

Advantages & Disadvantages of UTP

Advantages

- Small size can be advantageous during installation.
- A small external diameter, UTP does not fill up wiring ducts as rapidly as other types of cable.
- UTP cable is easy to install.
- UTP is less expensive than other types of networking media. In fact, UTP costs less per meter than any other type of LAN cabling.
- UTP can be used with most of the major networking architectures, it continues to grow in popularity.

Disadvantages

- ❖ UTP cable is more prone to electrical noise and interference than other types of networking media.
- ❖ The distance between signal boosts is shorter for UTP than it is for coaxial and fiber-optic cables. slower at transmitting data than other types of cable.

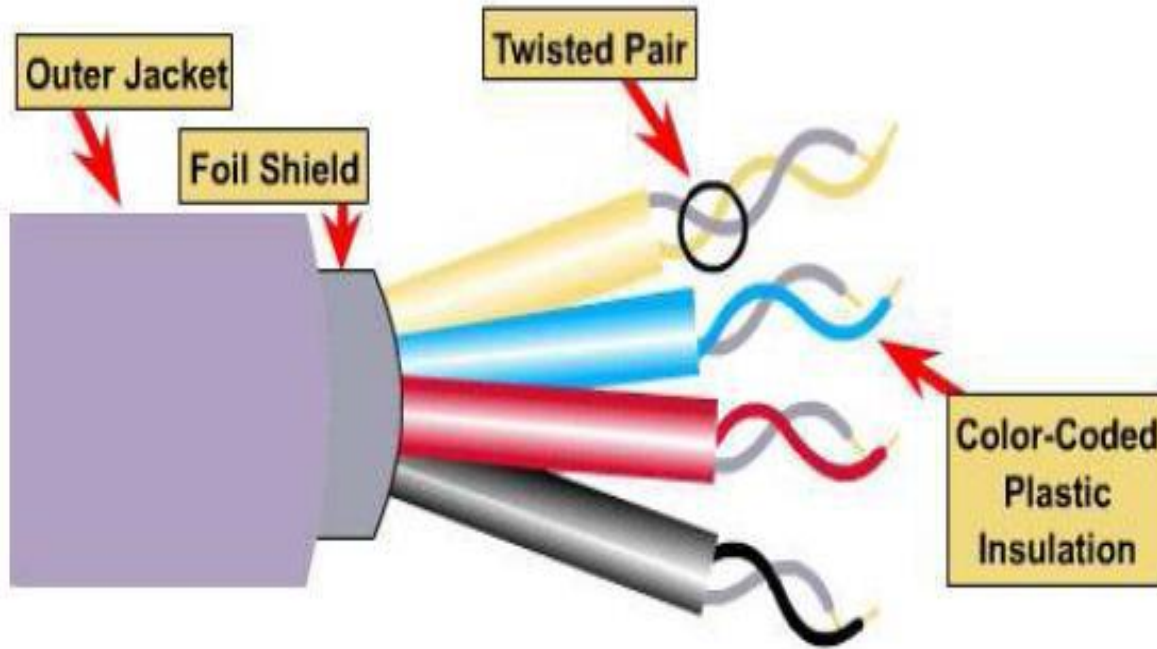
STP Cabling

- It is contain with four pairs wires then are wrapped in an overall metallic braid or foil.
- Use in Ethernet network
- It is more expensive
- Difficult to install. Speed and throughput 10 to 100 Mbps
- Average cost is expensive
- Maximum cable length 100 m (short)

NOT

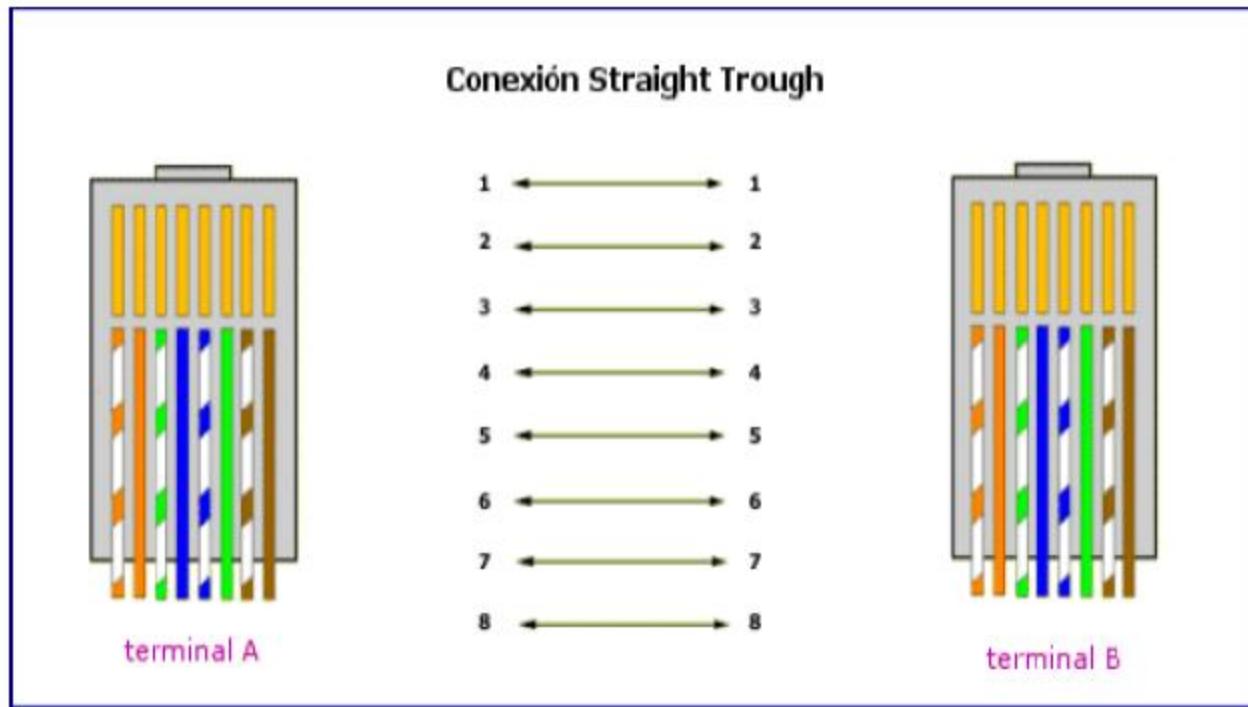
Because most buildings are already wired with UTP, many transmission standards are adapted to use it, to avoid costly rewiring with an alternative cable type.

Shielded Twisted Pair (STP)



Arrange the Colors of Cable

1- Straight line



Crossover cable

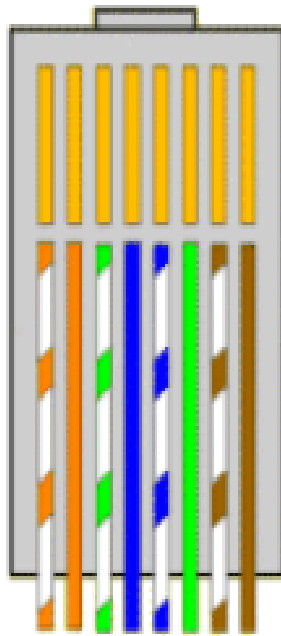
Transmit and receive wires on one end reversed

Pin assignments
on Plug A

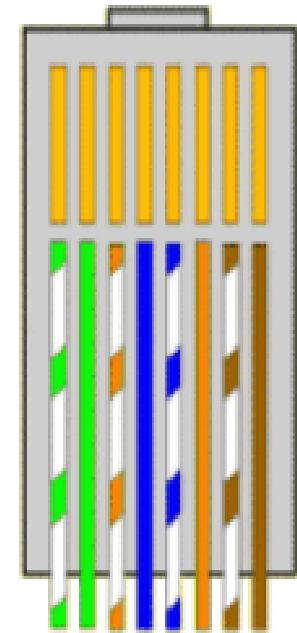
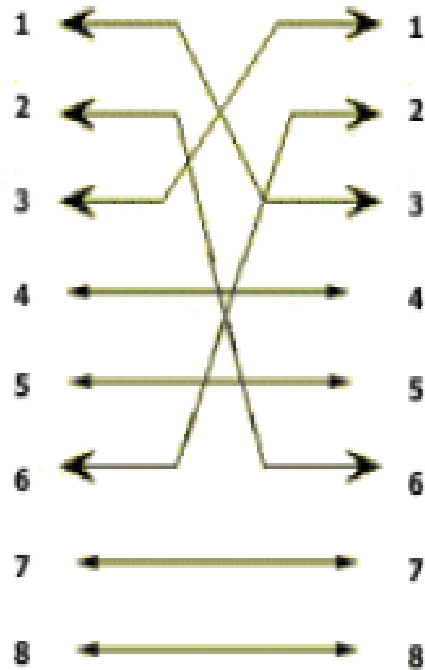
Pin assignments
on Plug B (reversed)



Conexión Cross-Over

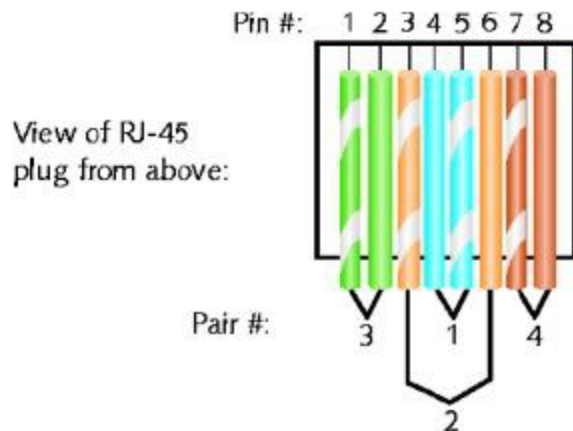


terminal A

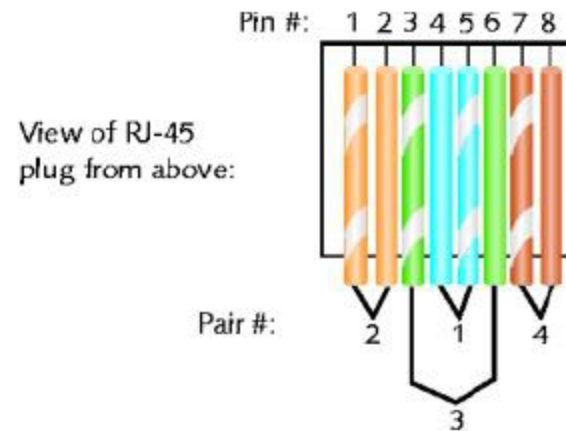


terminal B

The Wires Are Using



Pin #	Color	Pair #	Function
1	White with green stripe	3	Transmit +
2	Green	3	Transmit -
3	White with orange stripe	2	Receive +
4	Blue	1	Unused
5	White with blue stripe	1	Unused
6	Orange	2	Receive -
7	White with brown stripe	4	Unused
8	Brown	4	Unused



Pin #	Color	Pair #	Function
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2	Orange	2	Transmit -
3	White with green stripe	3	Receive +
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6	Green	3	Receive -
7	White with brown stripe	4	Unused
8	Brown	4	Unused

Crossover and straight UTP connect between hub, switch, router, workstation

	Hub	Switch	Router	Workstation
Hub	Crossover	Crossover	Straight	Straight
Switch	Crossover	Crossover	Straight	Straight
Router	Straight	Straight	Crossover	Crossover
Workstation	Straight	Straight	Crossover	Crossover

Coaxial Cable

Is an electrical cable with an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield, design in 1880.

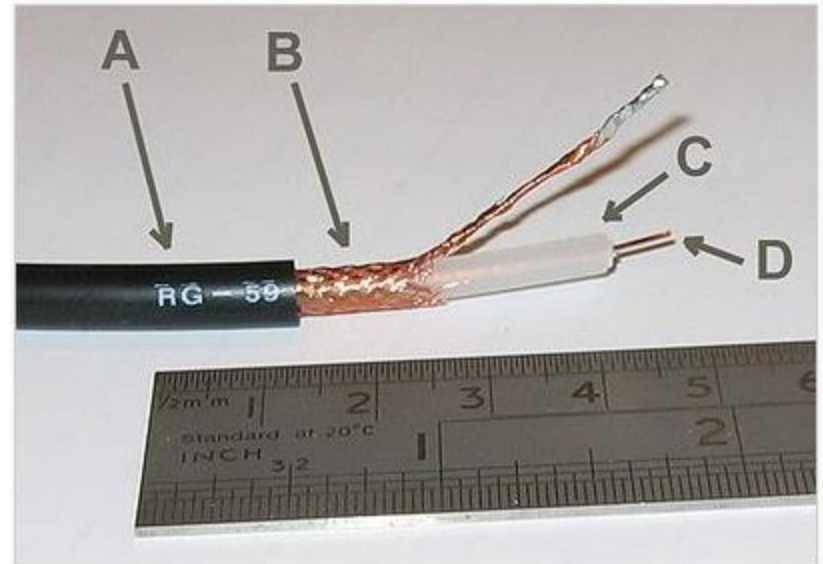
Coaxial cable supports 10 to 100 Mbps and is relatively inexpensive, although it is more costly than UTP on a per-unit length. However, coaxial cable can be cheaper

for a physical bus topology because less cable will be needed. . Using coaxial cable increases this distance to 500 m (1640.4 feet).

10BASE5 Thicknet Cable



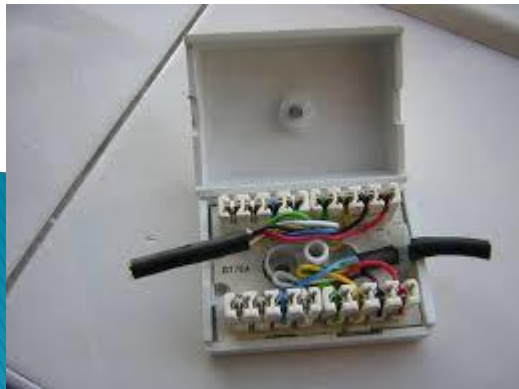
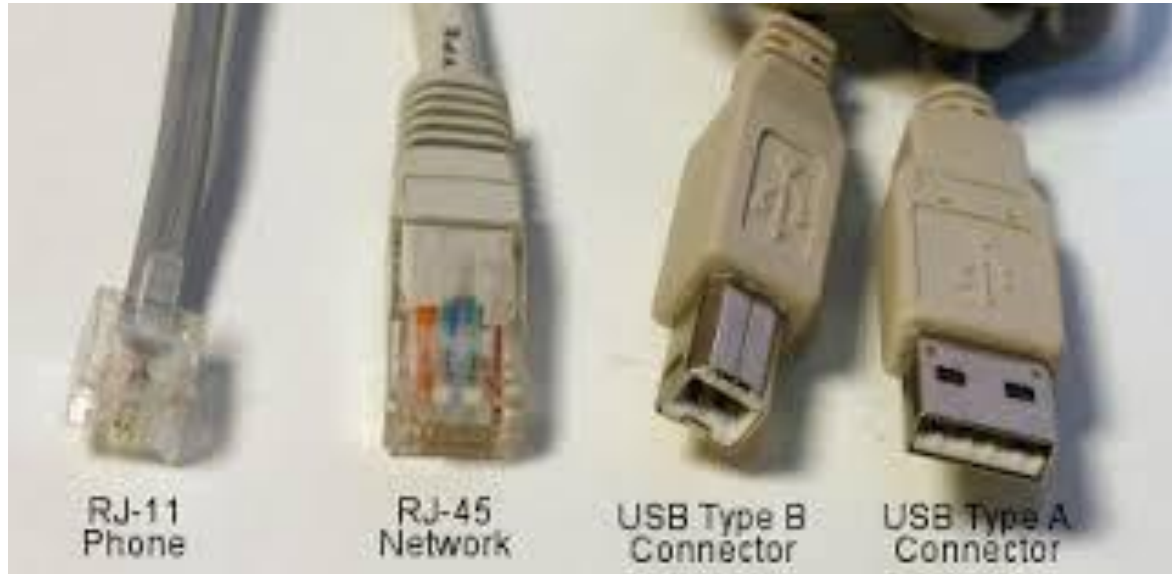
Thin Coaxial Cable



RG-59 flexible coaxial cable composed of:

- A: outer plastic sheath
- B: woven copper shield
- C: inner dielectric insulator
- D: copper core

Connectors Type



CONNECTERS TYPE



Keystone Jacks



**RJ45 Connectors
& Acc.**

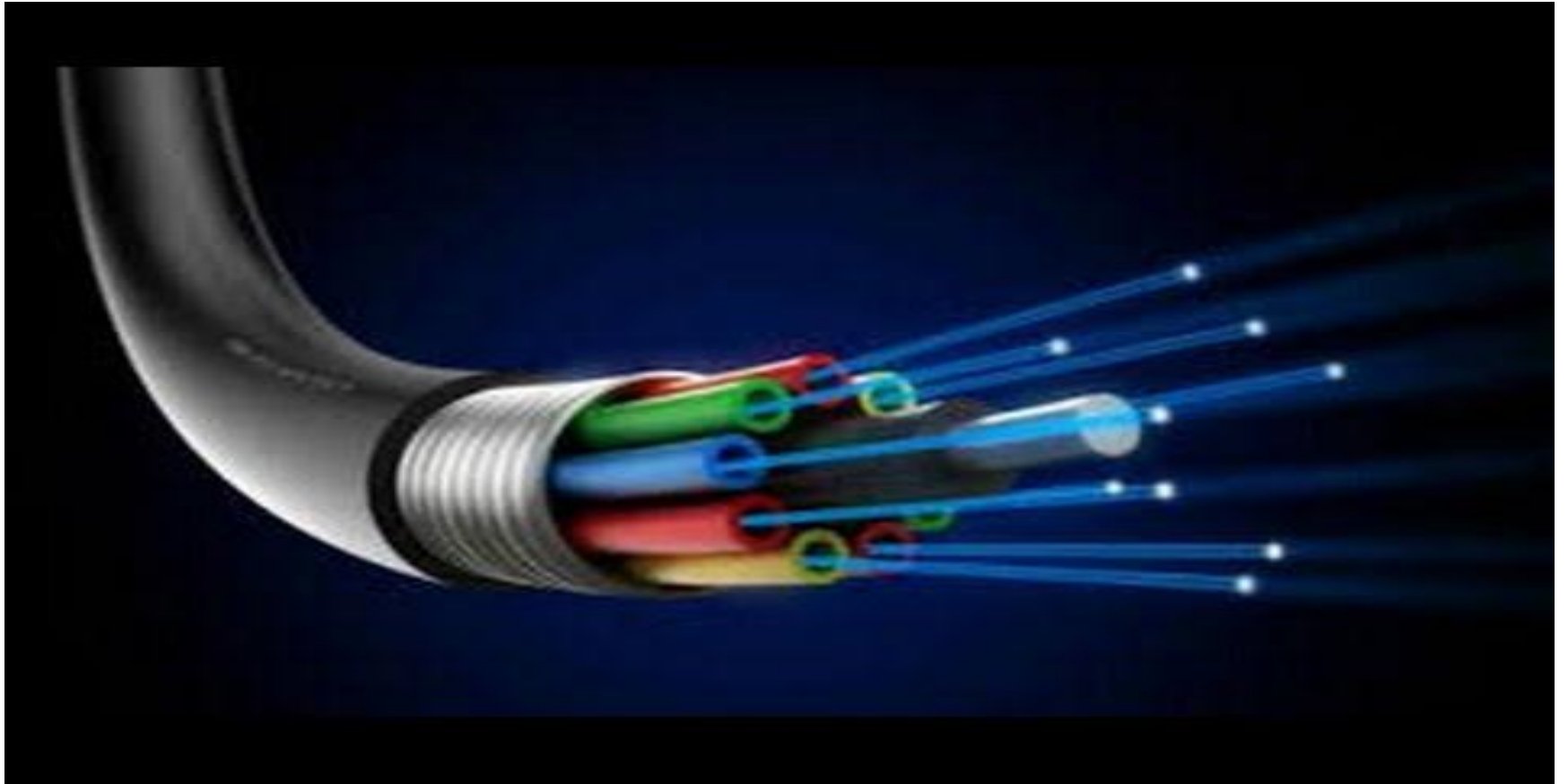


**Fiber Optic
Connectors**

Optic Fiber Cables

An **optical fiber** is a flexible, transparent fiber made of very pure glass (silica) not much wider than a human hair that acts as a waveguide, or "light pipe", to transmit light between the two ends of the fiber.









YOKOGAWA AQ7280 OTDR

2014/06/14 08:11
2081/div
Mode: Detail
File Name: 1550nm...SDR
Average: 00:10

Wavelength: 1550 nm
Distance Range: 2 km
Pulse Width: 10 ns
Average Duration: Auto
Attenuation: 1.0000

OTDR
Marker
Event Analysis
Reference

F1
F2
F3
F4
F5

FILE
SCALE
ENTER
SETUP
REAL TIME
AVG