Practical Network
Computer Science IT&CS
Third Class part 2 2019
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Assistant Teacher

Identifying Network Topologies

Ring network topologies

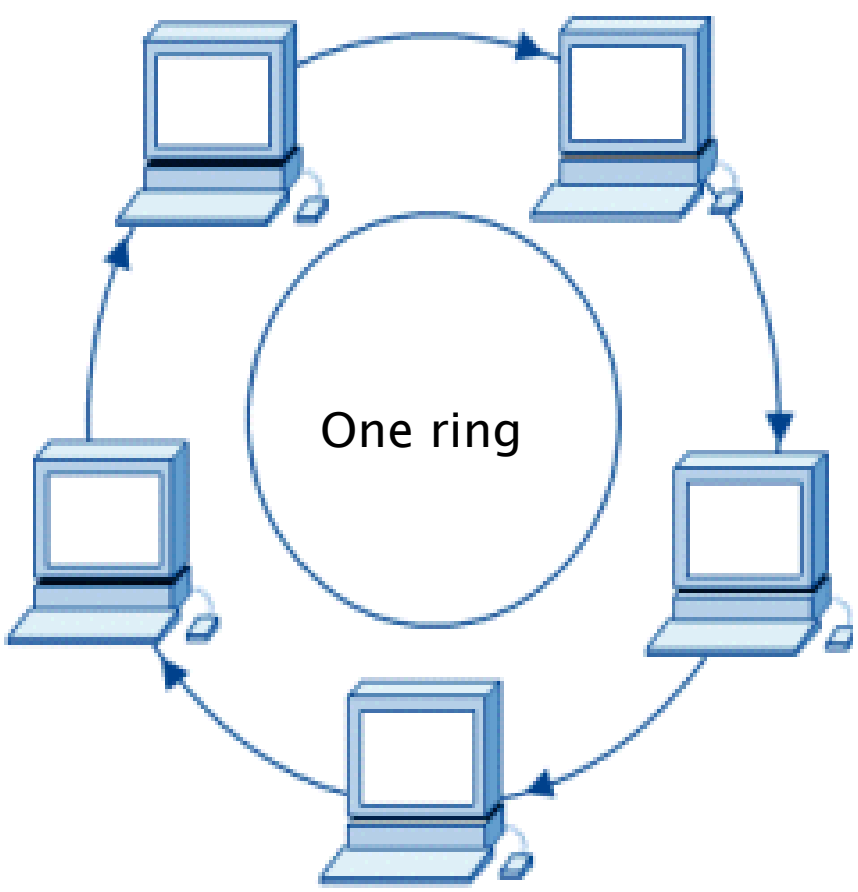
- Used in local area network (LAN) technology Nodes connected in a circle form
- Tokens used to transmit data
- Nodes must wait for token to send data

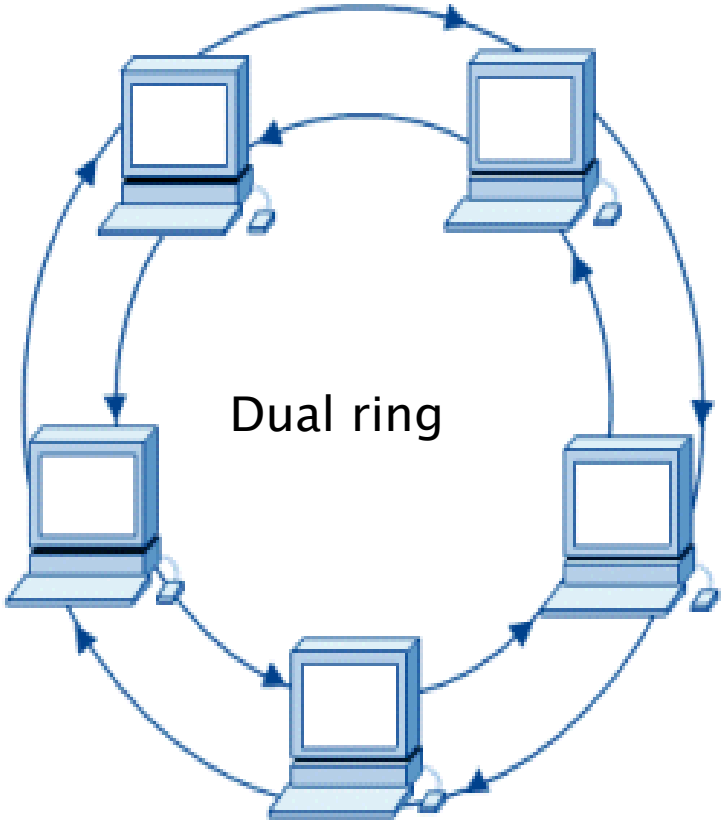
Advantages

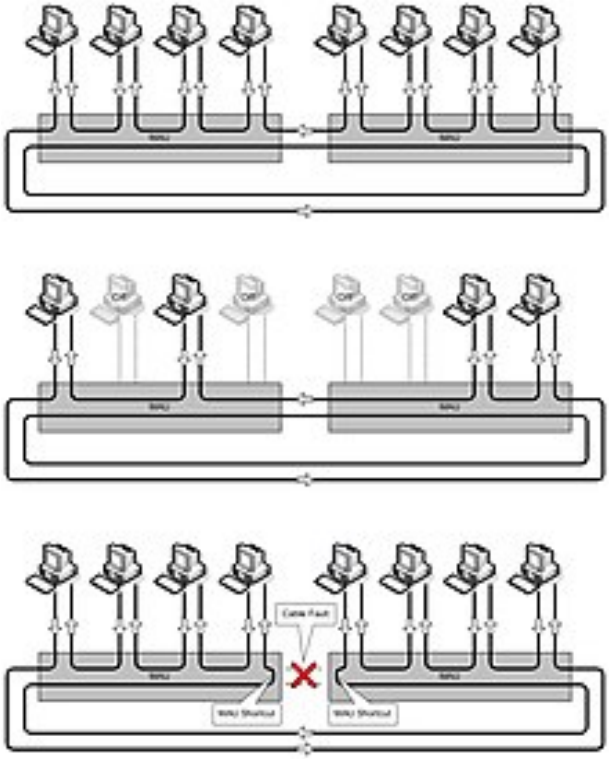
- Time to send data is known
- No data collisions

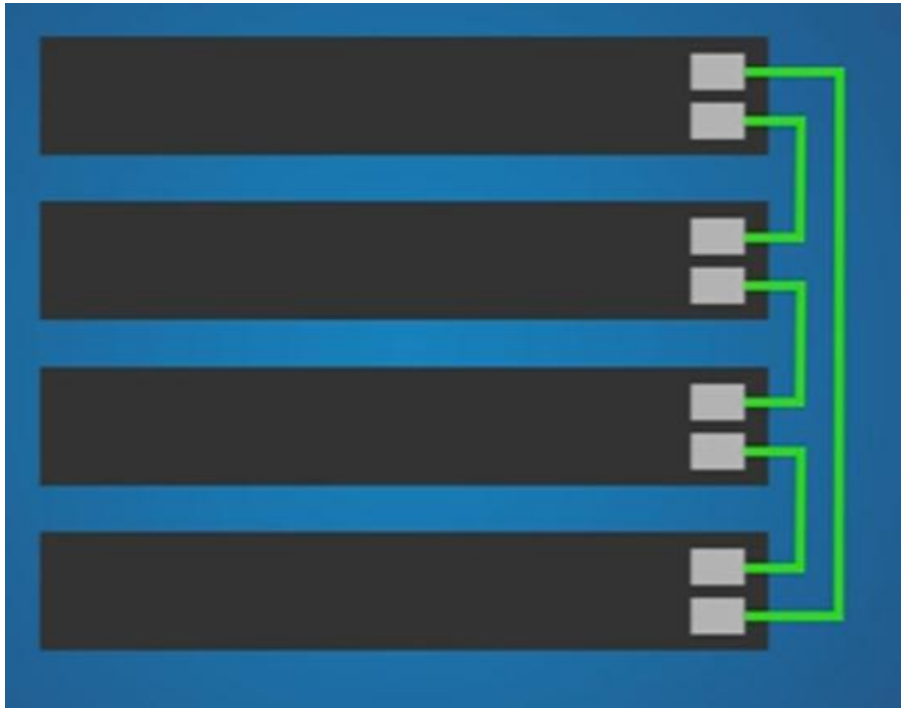
Disadvantages

- Slow
- Lots of cables


One ring


Dual ring

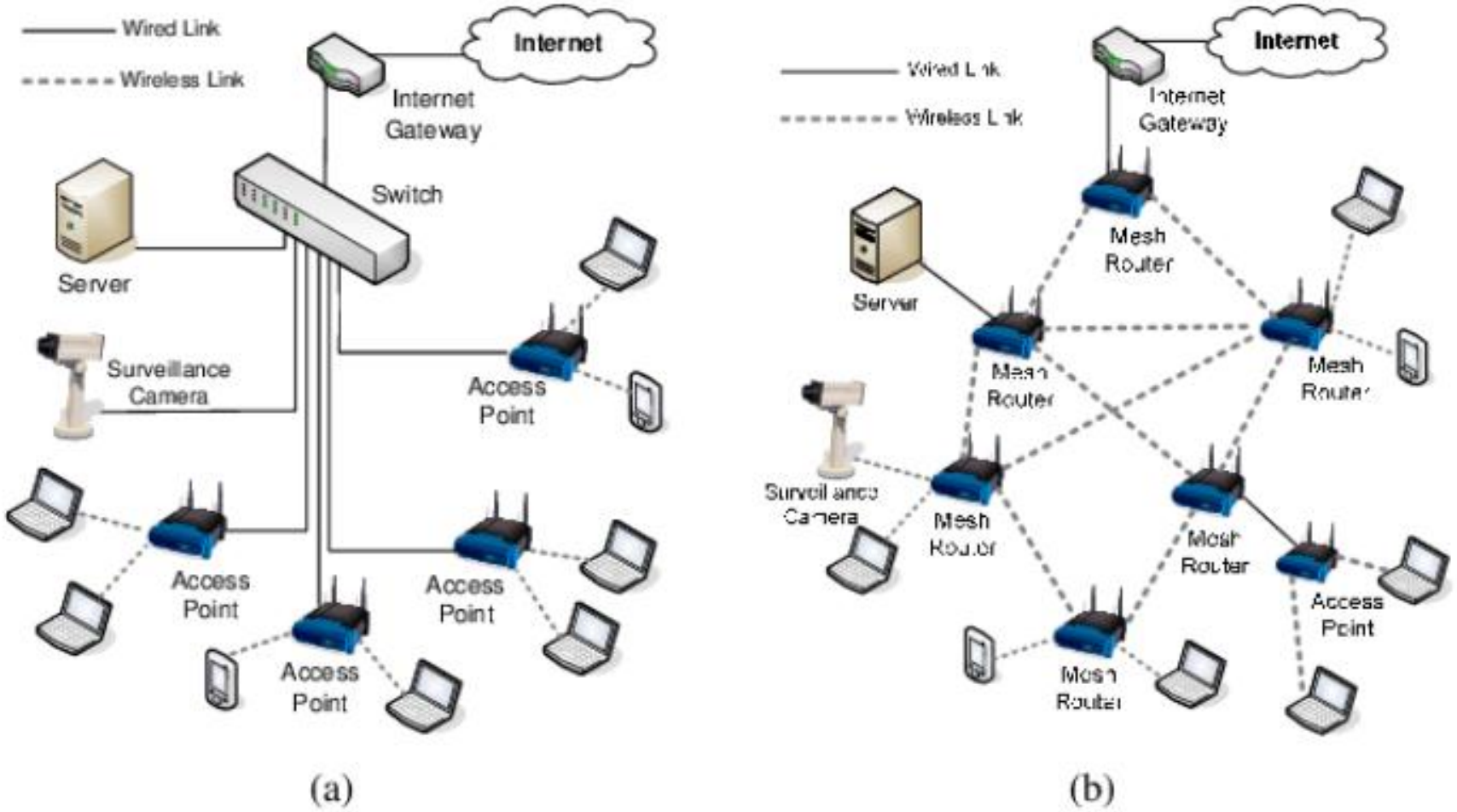


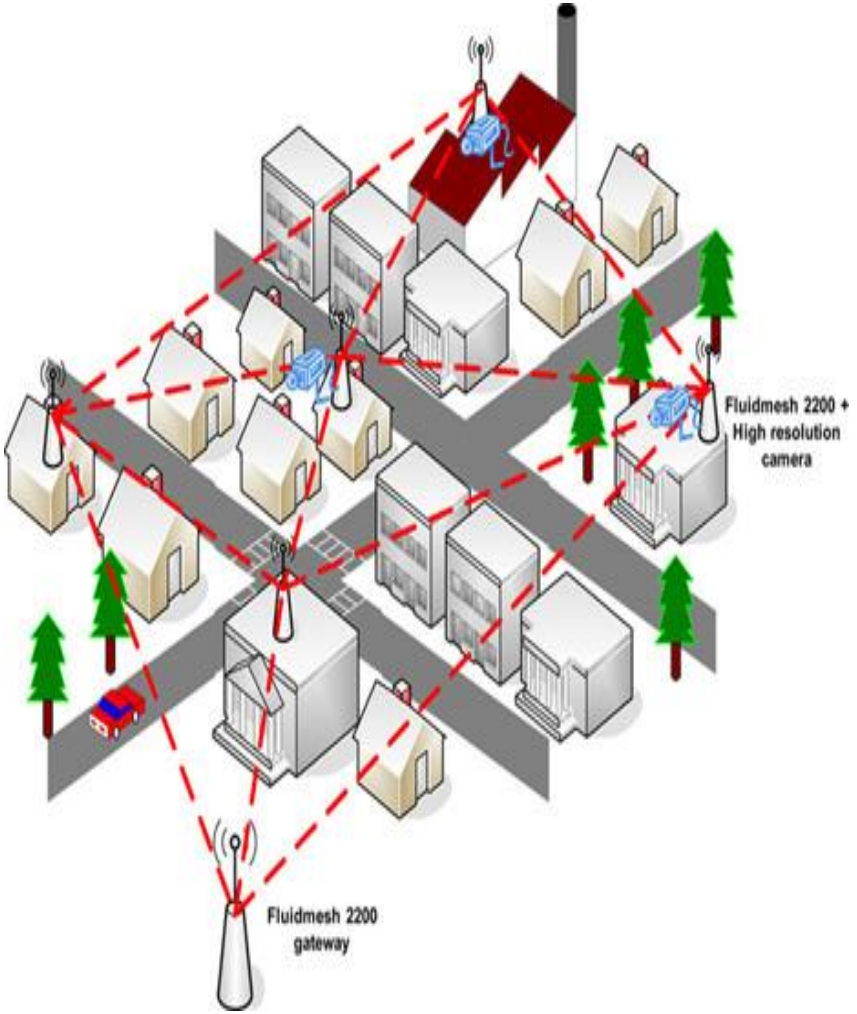


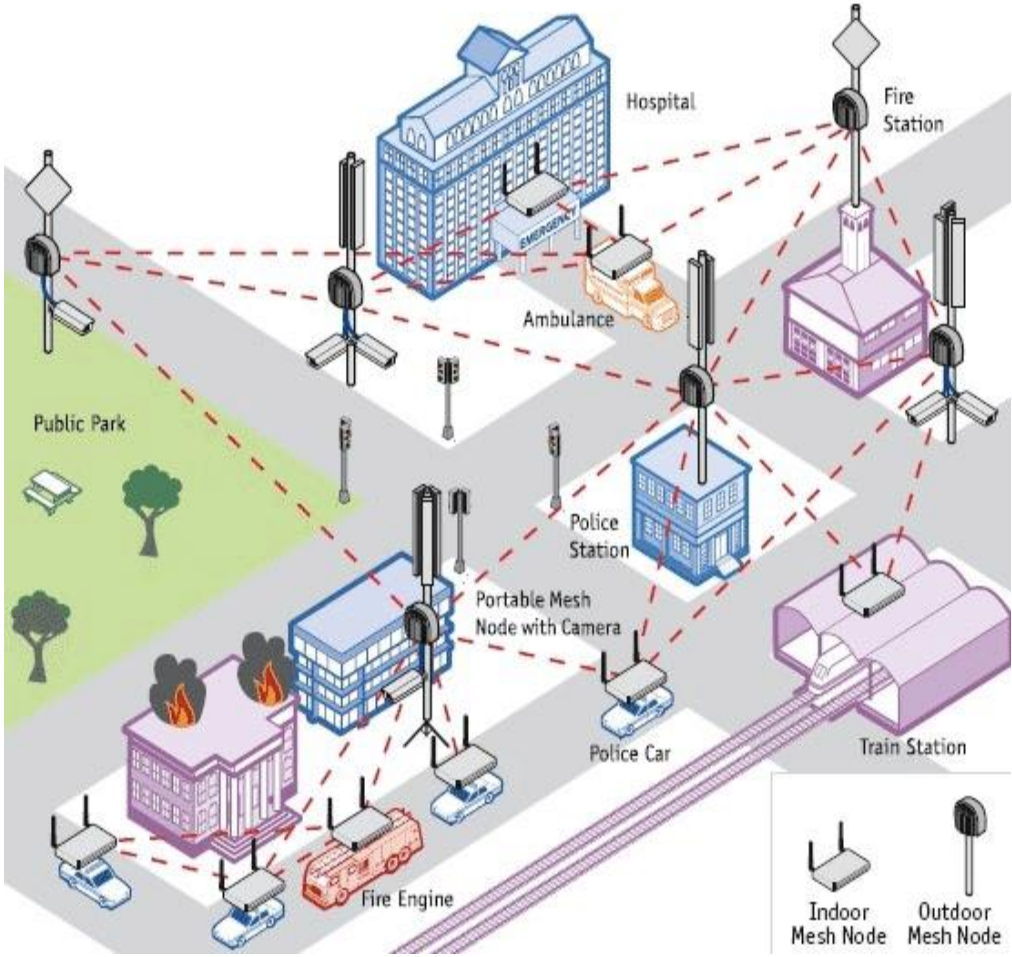
Identifying Network Topologies

Mesh Topology

- It is used in wide-area networks (WANs) to interconnect LANs and for critical networks
- they are typically used for internet of things like home automation, and smart buildings.
- This topology commonly used for wireless networks. The mesh topology is expensive and difficult to implement.

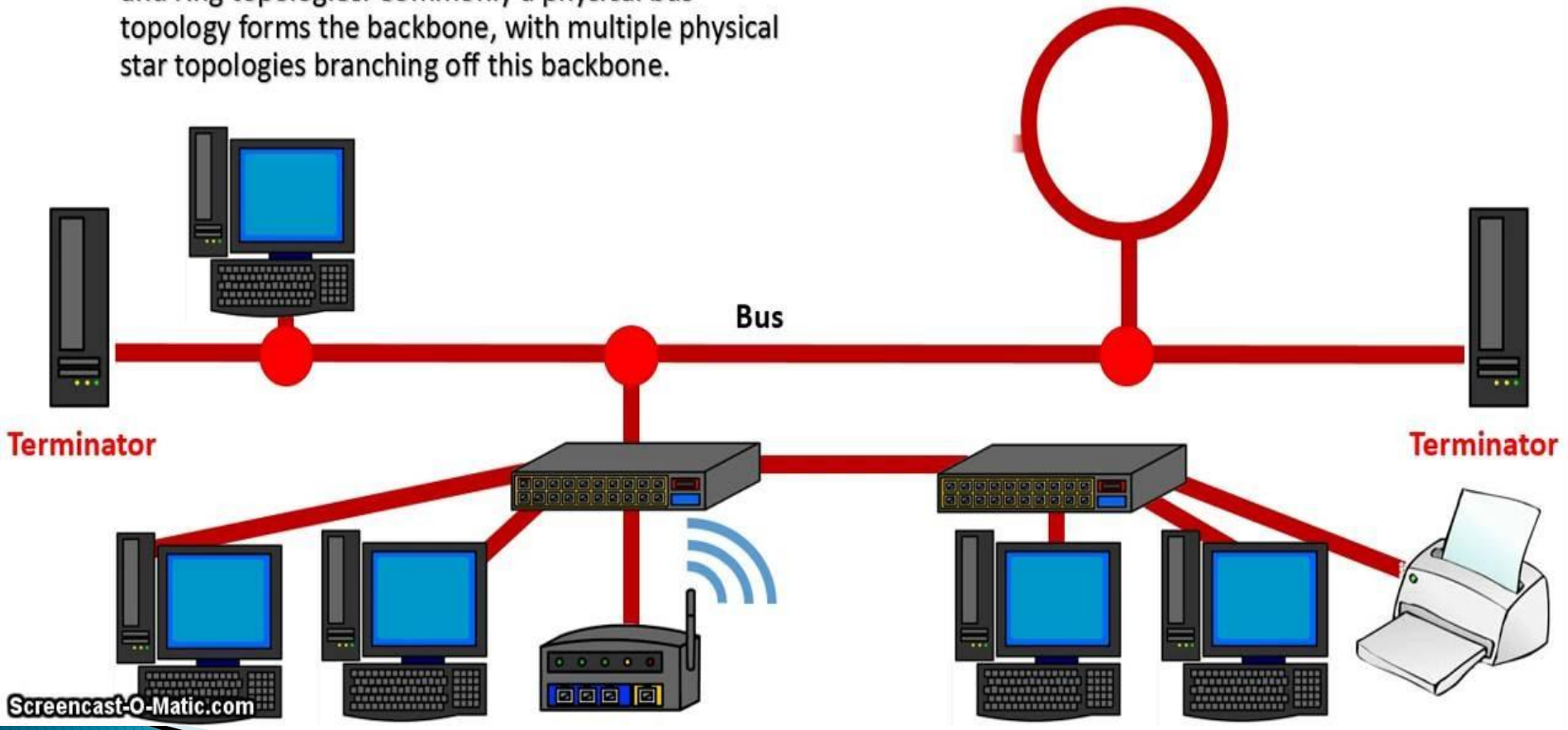

Wired Link
Wireless Link
Internet
Internet Gateway
Switch
Server
Surveillance Camera
Access Point
Access Point
Access Point
Access Point
(a)
Internet
Internet Gateway
Mesh Router
Server
Mesh Router
Mesh Router
Mesh Router
Mesh Router
Access Point
Mesh Router
(b)


Fluidmesh 2200 +
High resolution
camera
Fluidmesh 2200
gateway


Hospital
Fire
Station
Ambulance
Public Park
Police
Station
Portable Mesh
Node with Camera
Police Car
Train Station
Fire Engine
Indoor
Mesh Node
Outdoor
Mesh Node

Hybrid Topology

Hybrid uses a combination of connected bus, star and ring topologies. Commonly a physical bus topology forms the backbone, with multiple physical star topologies branching off this backbone.



Screencast-O-Matic.com

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 consist of pairs wires. UTP cable is used in a many type local topology 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

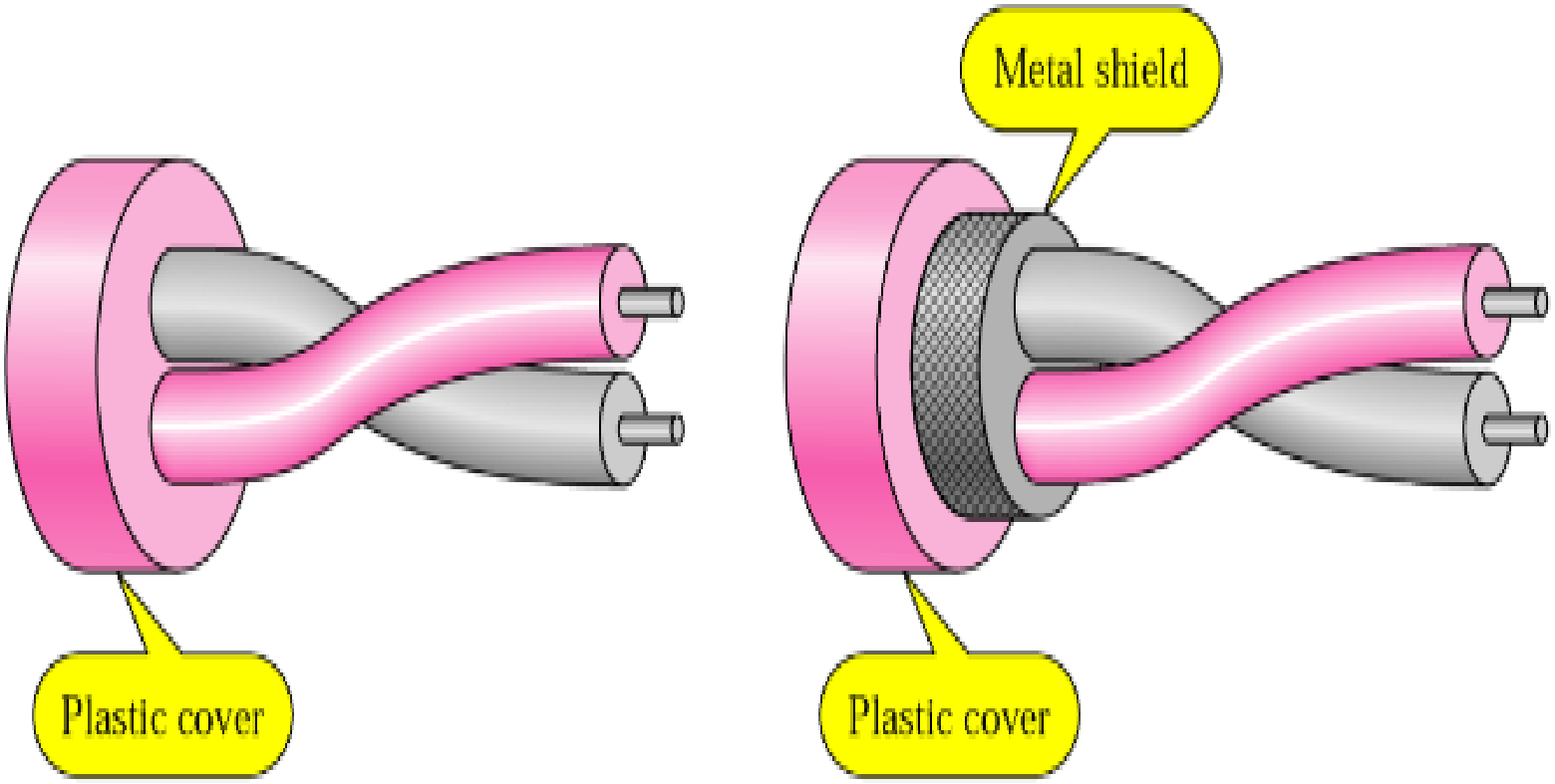
- Small size can be easy to install during installation.
- A small external diameter, UTP does not fill up wiring ducts as rapidly as other types of cable.
- UTP is less expensive than other types of networking media.
- UTP can be used with most of the major networking architectures.

Disadvantages

- UTP cable is more prone to electrical noise and interference than other types of networking media.
- The distance to transmission signal in utp is shorter than another cables, such as coaxial cables and fiber optics.

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)

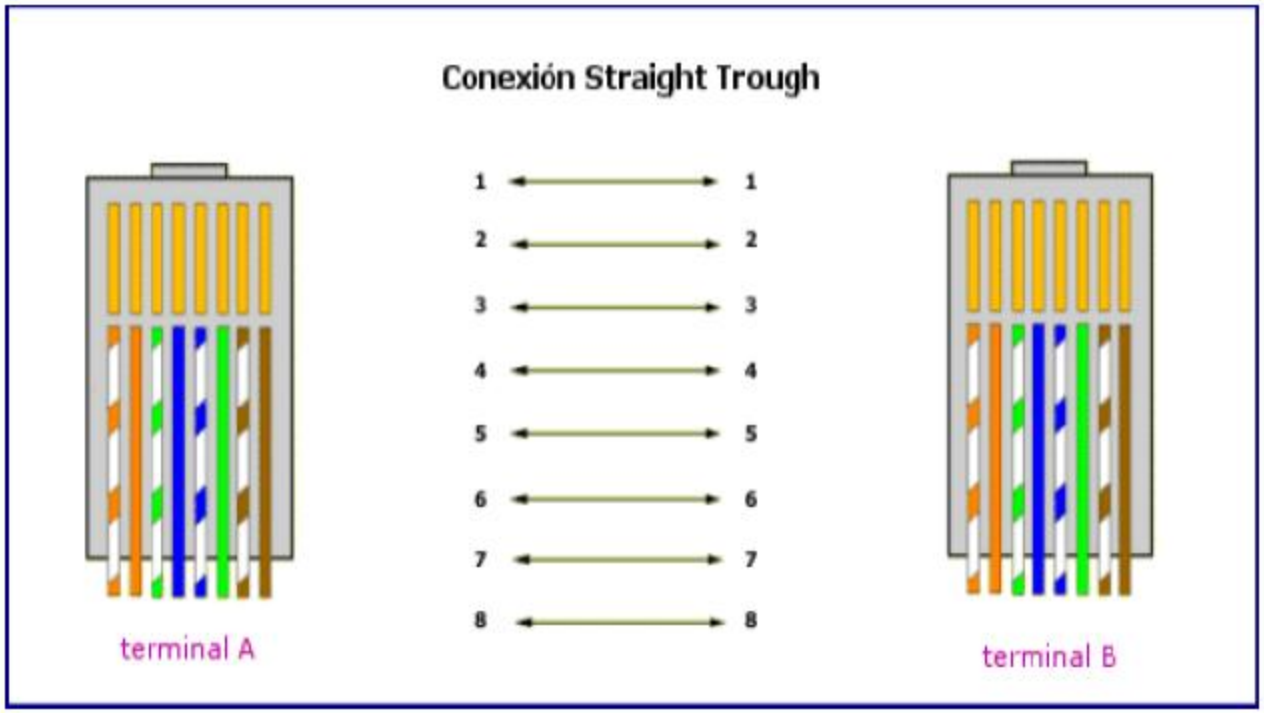


a. UTP

b. STP

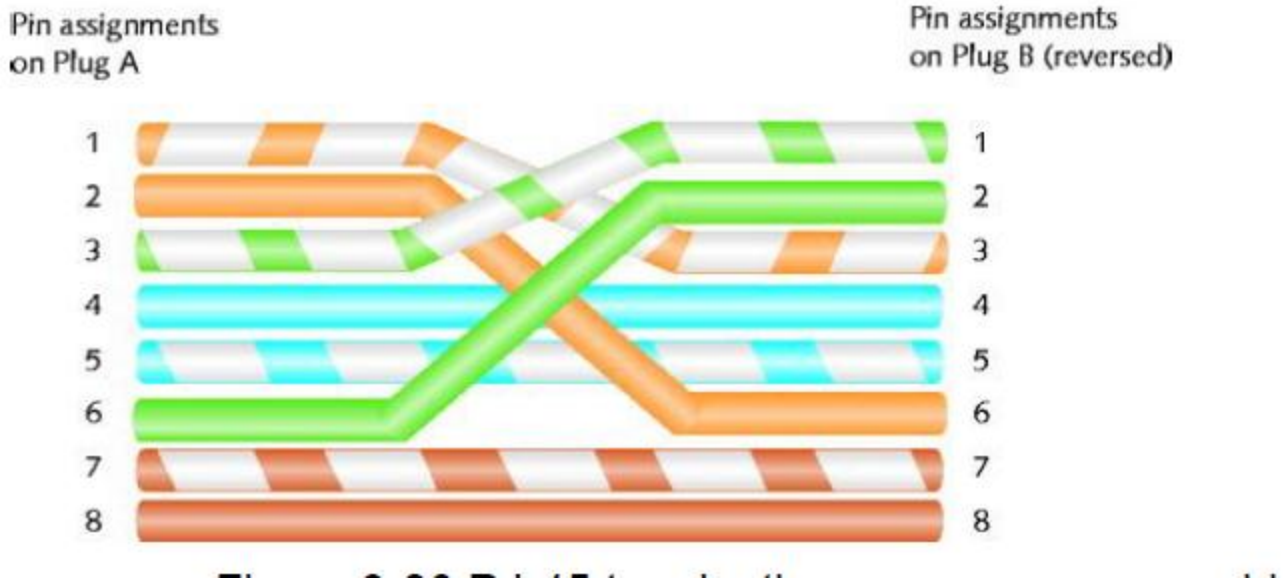
Arrange the Colors of Cable

1- Straight line

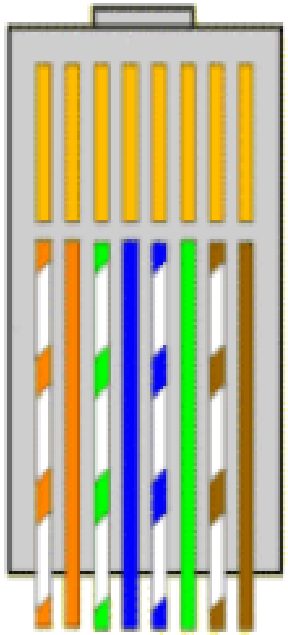


Crossover cable

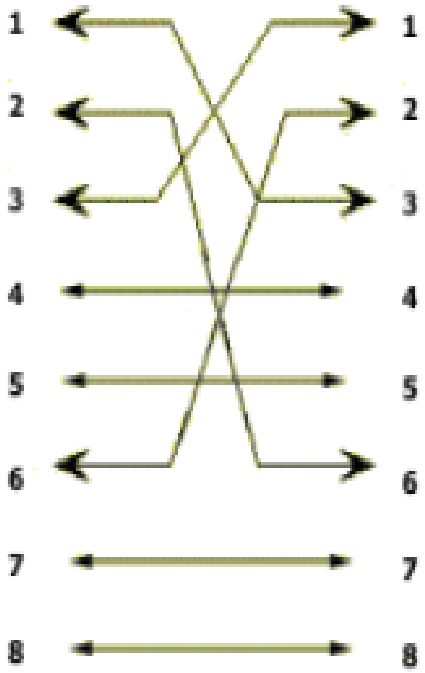
Transmit and receive wires on one end reversed

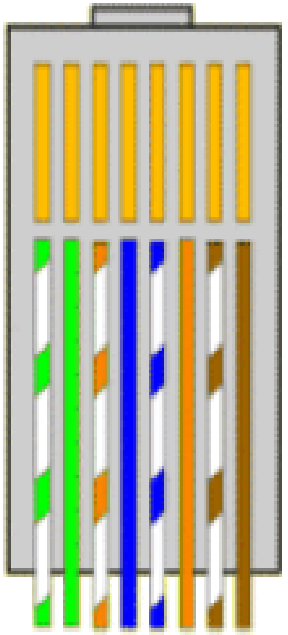


Conexión Cross-Over



terminal A

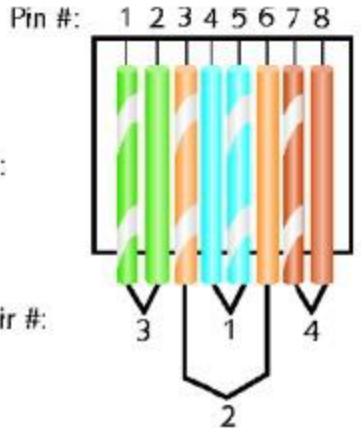




terminal B

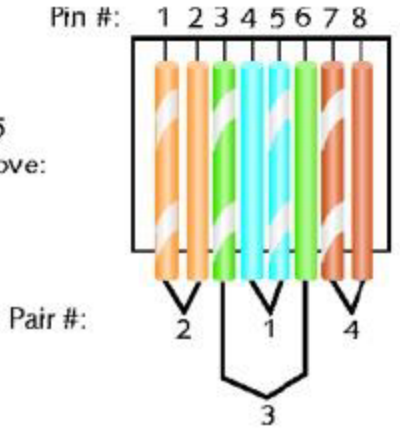
The Wires Are Using

View of RJ-45 plug from above:



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

View of RJ-45 plug from above:



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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

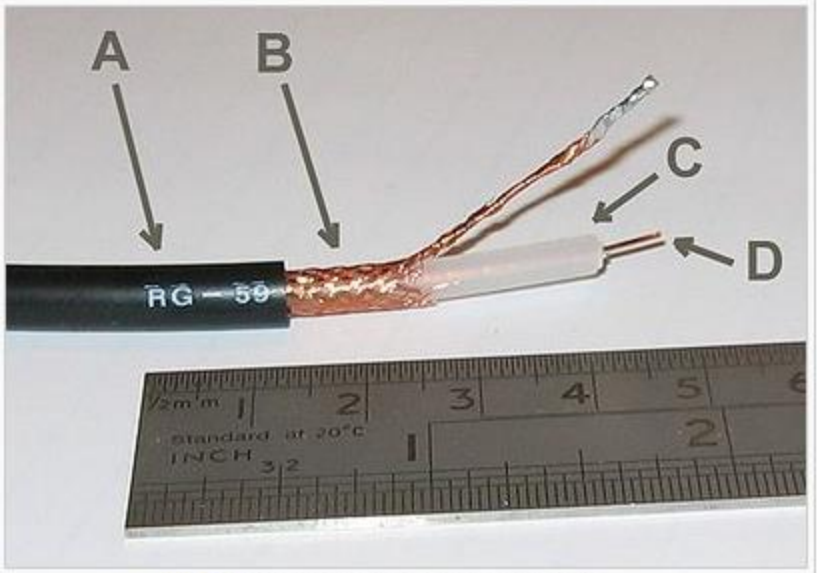
Is an electrical cable with an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield, design in 1880.

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

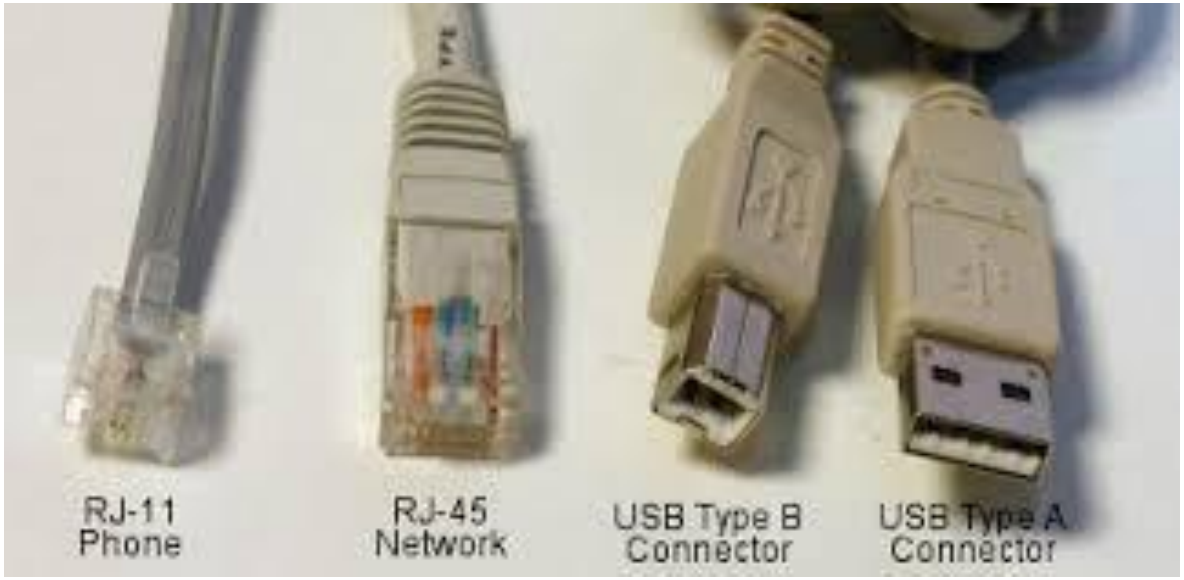
Thin **Coaxial Cable**



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

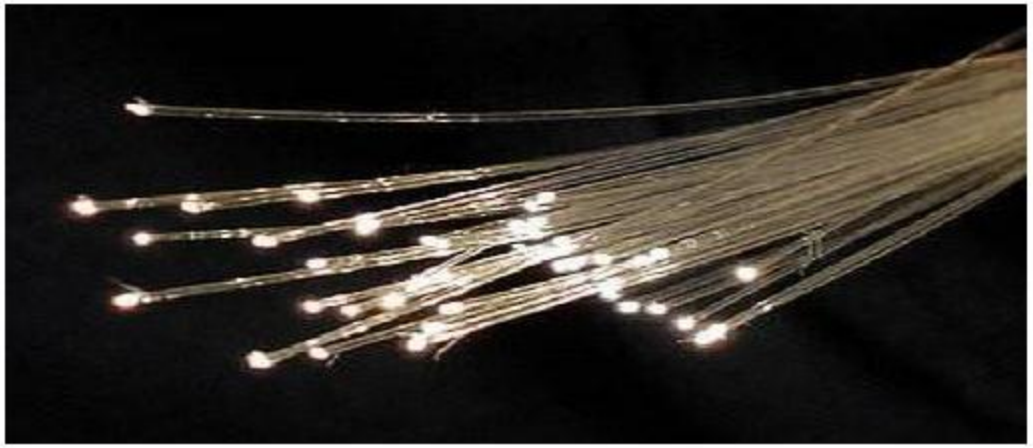
Keystone Jacks

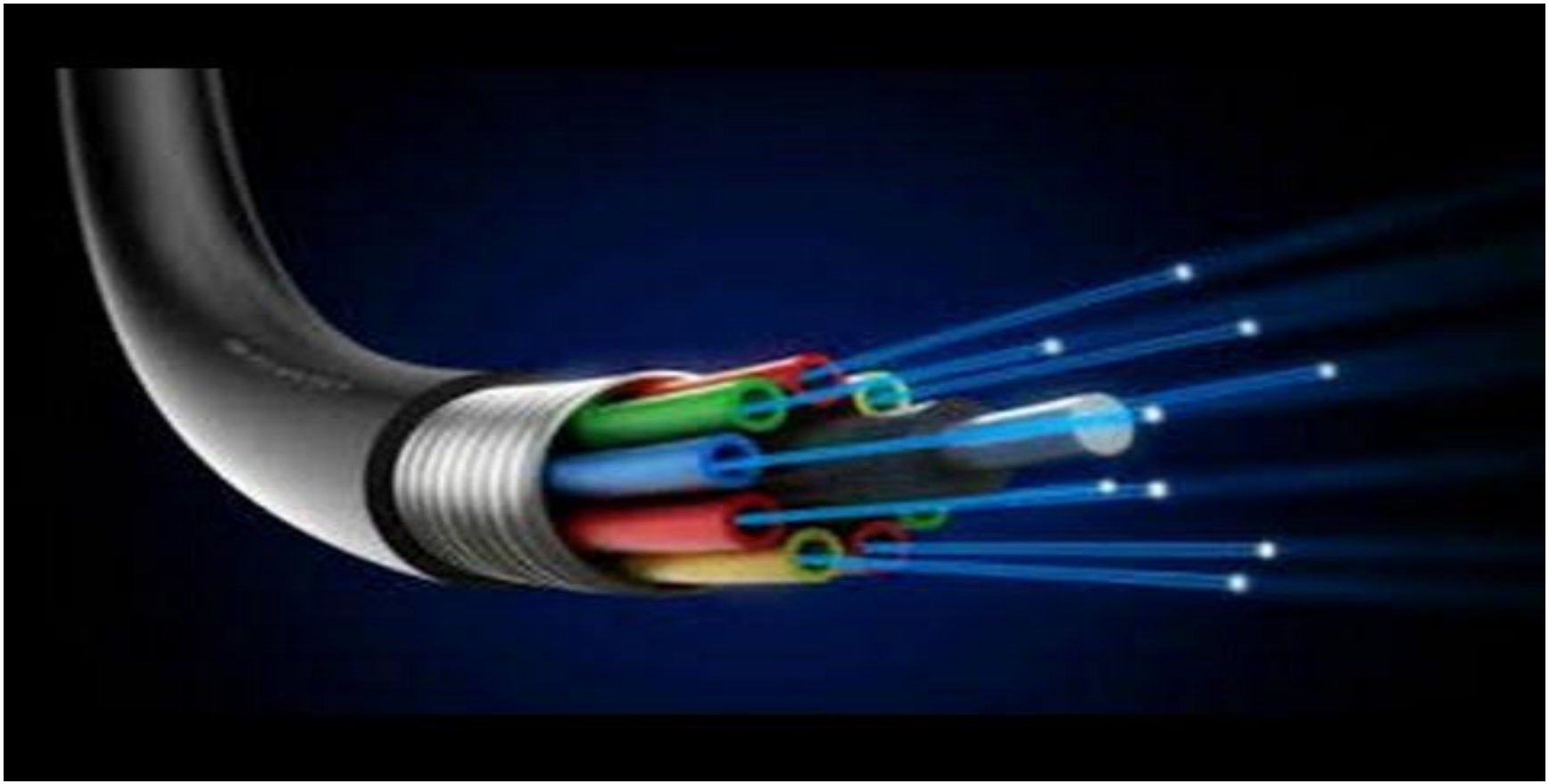
RJ45 Connectors & Acc.

Fiber Optic Connectors

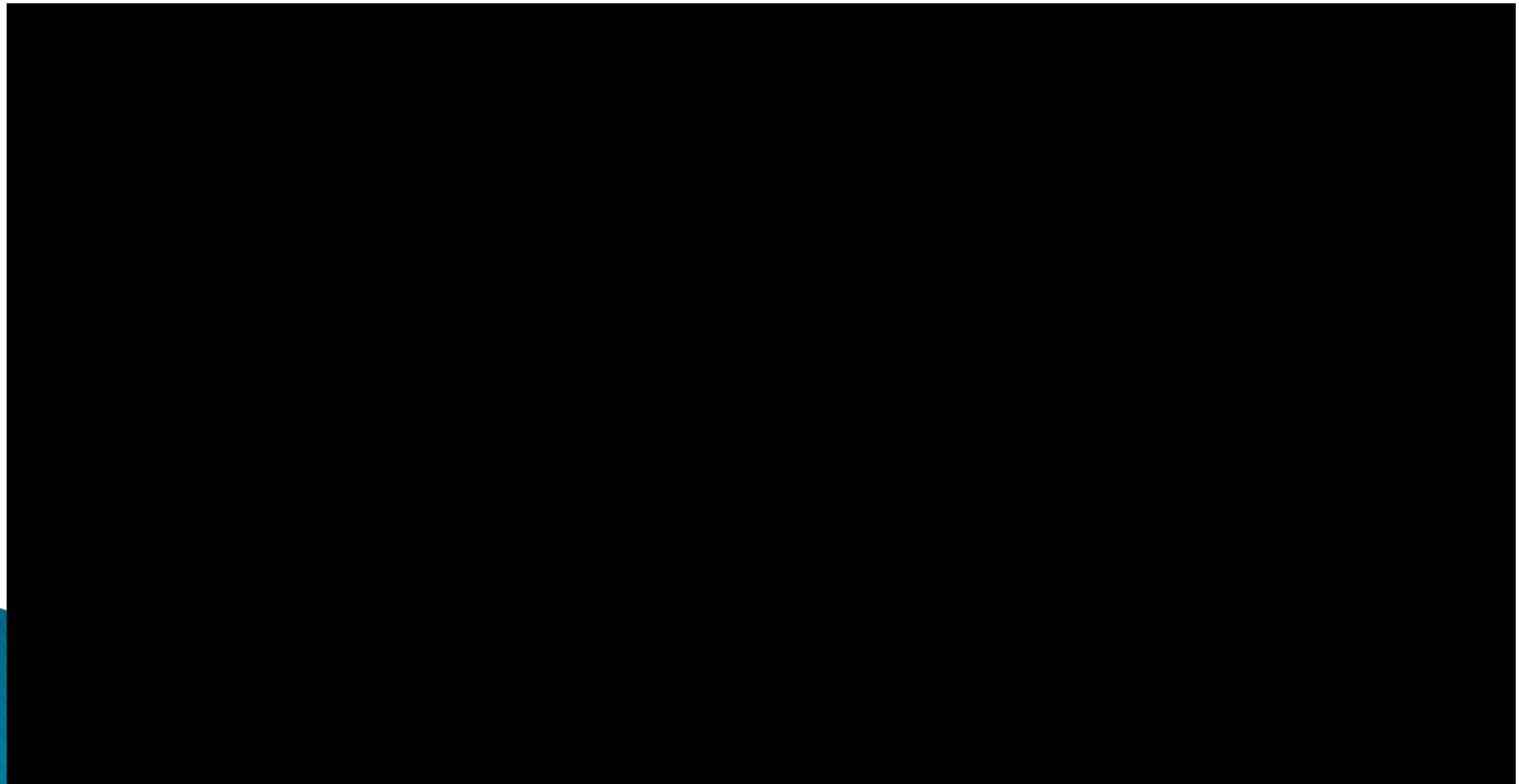
Optic Fiber Cables

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
OTDR
Marker
Event Analysis
MENU
F1
F2
F3
F4
FILE
SCALE
ENTER
SETUP
REAL TIME
AVG

رابط فيديو تعليمي عن اشكال الشبكات

https://www.youtube.com/watch?v=zbqrNg4C98U