



# Review Module 1 CCNA

By Eng. Eman Osama



## Communicating over the Network



## Network Fundamentals

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# Objectives

1. Network definition.
2. Network components.
3. Network Types
4. Network topologies.
5. Cabling.



Network definition



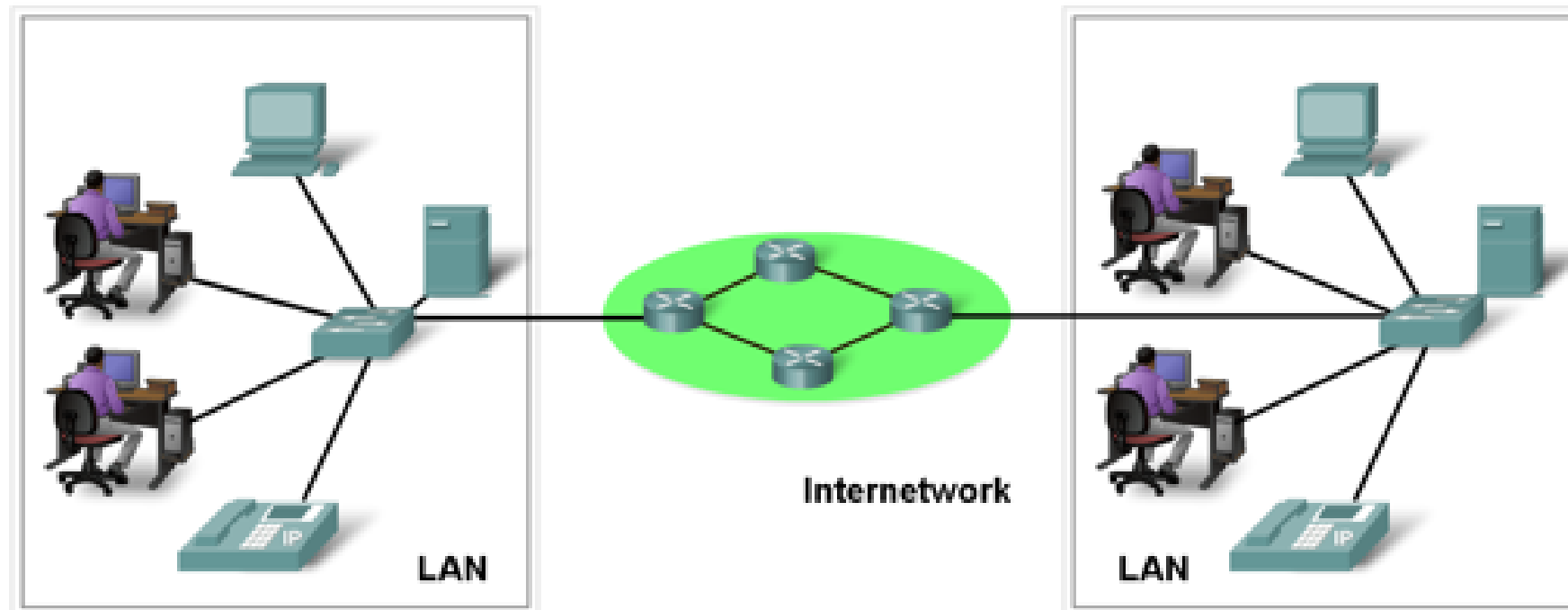
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# 1- Network definition

- Network:

Group of components or **devices** which are **connected** together to give the user a certain **service** (application).



# Importance of Networks

**Data network is a result of business need.**

- **Easy access and sharing of information** (share data)
- **Sharing of expensive devices and network resources** (cost)
- **Modern Technologies (IP telephony, Video Conferencing, ....etc)**

## 2- Network components

- **Network has three main components**
  - ✓ **End devices** (servers and hosts)
    - Source of applications (network aware applications)
    - ex: HTTP (Hyper Text Transmission Protocol),  
FTP (File Transfer Protocol),  
SMTP (Simple Mail Transfer Protocol)  
POP3 (Post Office Protocol 3)  
Telnet
  - ✓ **Network Devices**
    - Devices that interconnect different computers together
    - ex: Repeaters, hub, bridge, switch, router, NIC and modems
  - ✓ **Connectivity**
    - Media that physically connect the computers and network devices
    - ex: Wireless and cables



## End devices



- End devices:
  - Computers (work stations, laptops, file servers, web servers)
  - Network printers
  - VoIP phones
  - Security cameras
  - Mobile handheld devices (such as wireless barcode scanners, PDAs)
- End devices are referred to as **hosts**.
- A host device is either the source or destination of a message.





## Network types

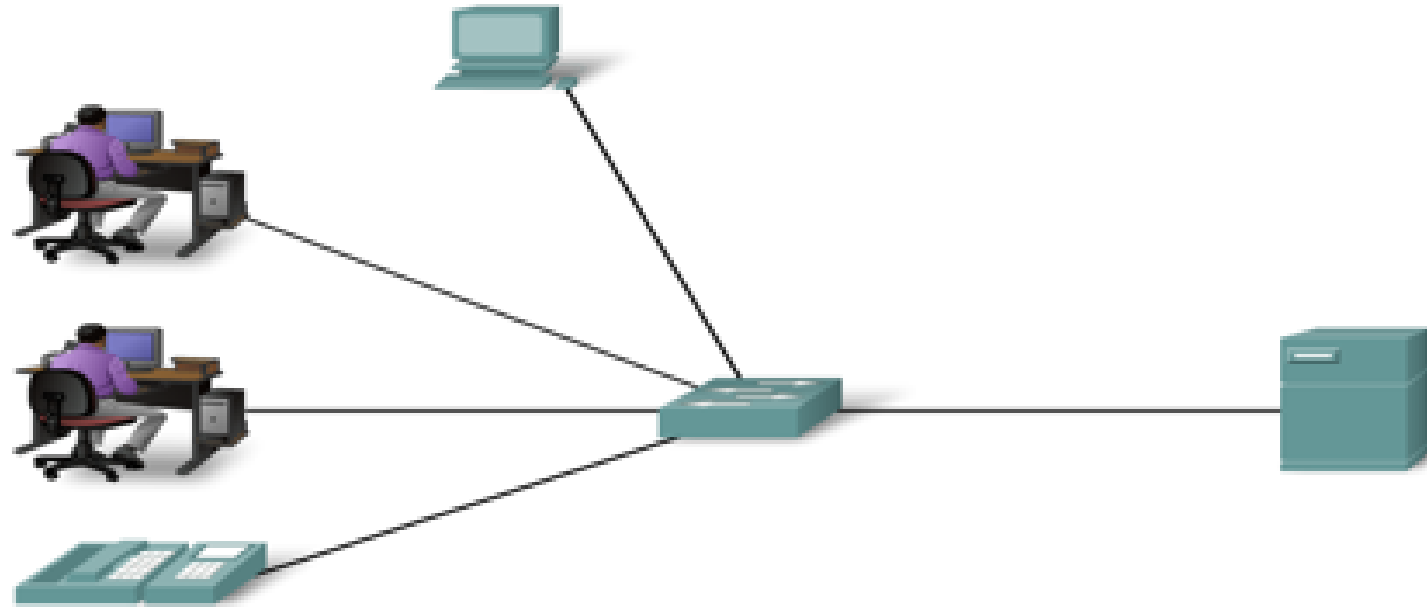


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# Physical Types of Network

## ➤ Local Area Network (LAN)



- **Local Area Network (LAN)**

*An individual network usually spans a single geographical area, providing services and applications to people within a common organizational structure, such as a single business, campus or region. (It is a group of network components that work within small area.)* <10km

# Ethernet Port

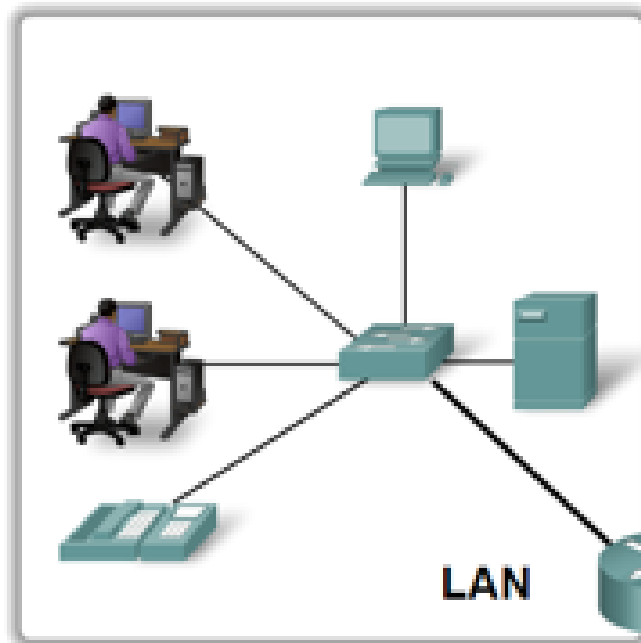


## ➤ Wide Area Networks (WANs)

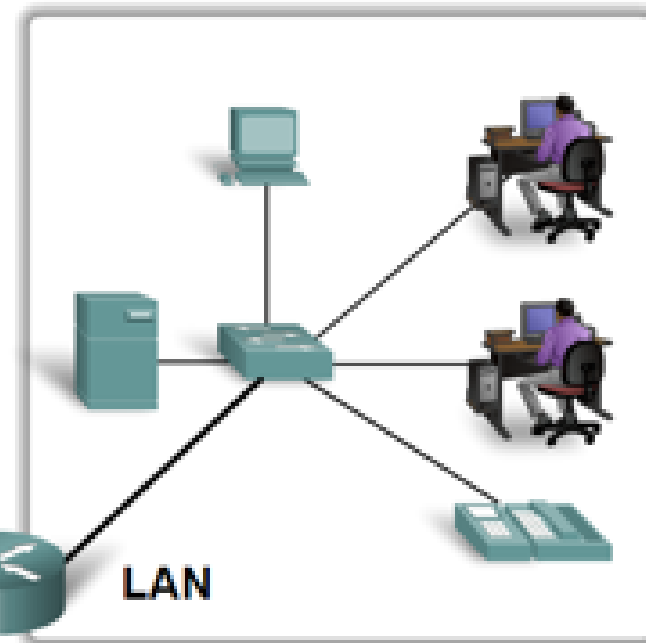
- Define Wide Area Networks (WANs)

- LANs separated by geographic distance are connected by a network known as a Wide Area Network (WAN) (It is a group of LANs that are interconnected within large area)

Cairo site



Alex site



WAN



## Network topologies

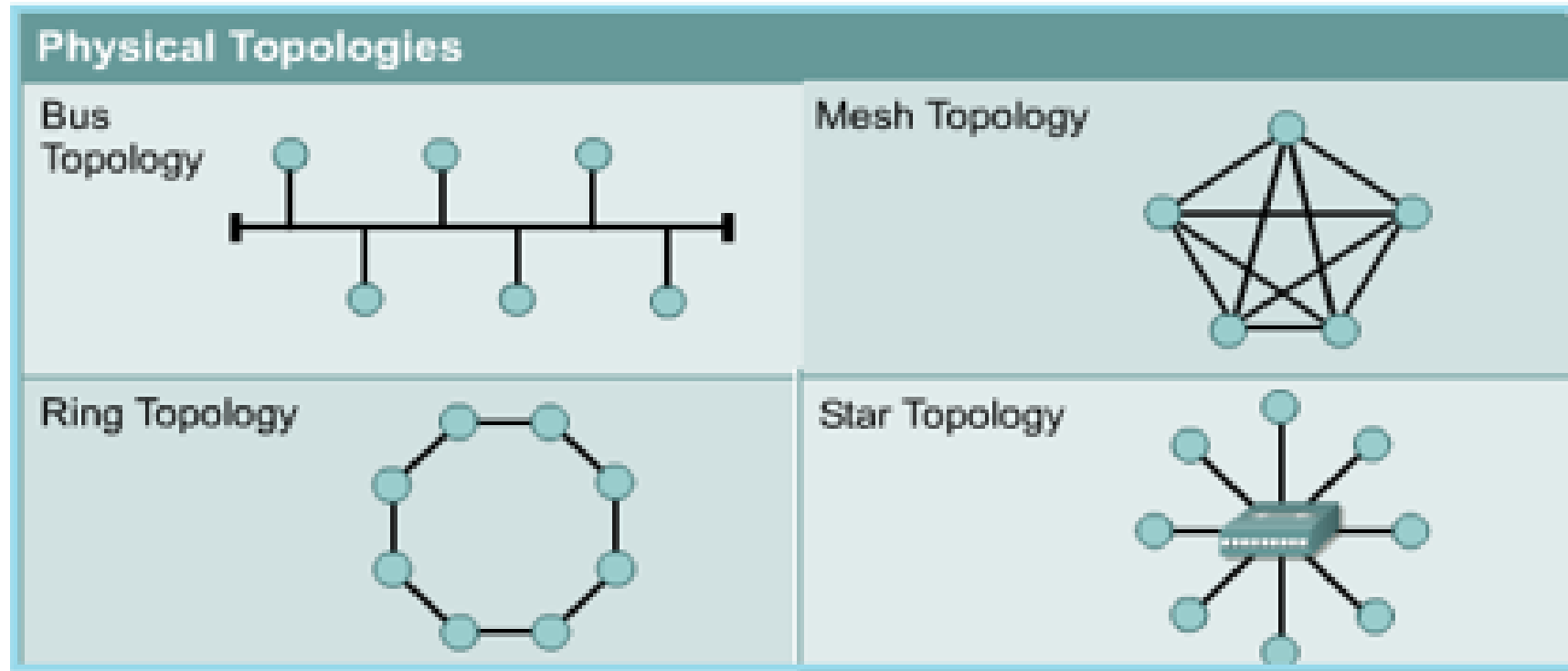


## Network Fundamentals

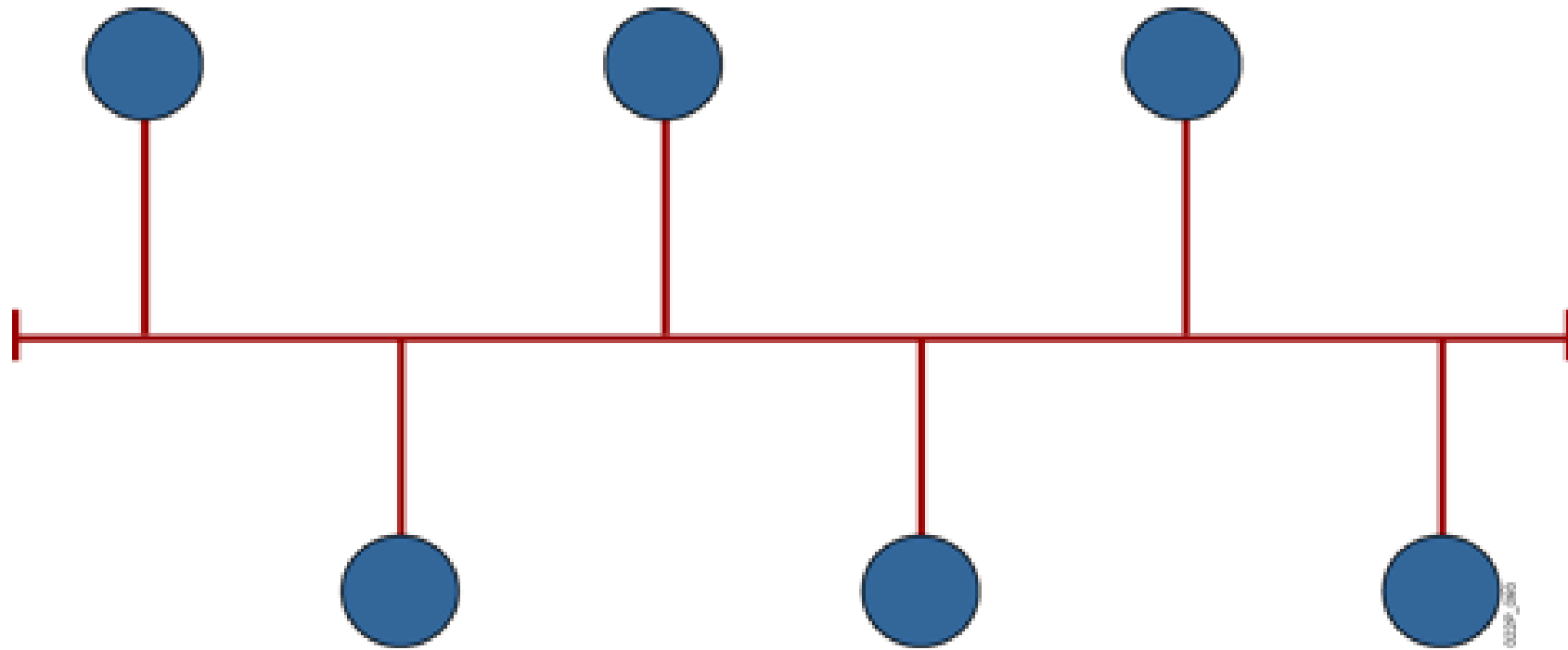
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# 4- Network Topologies

- **Topology**: How devices are connected together



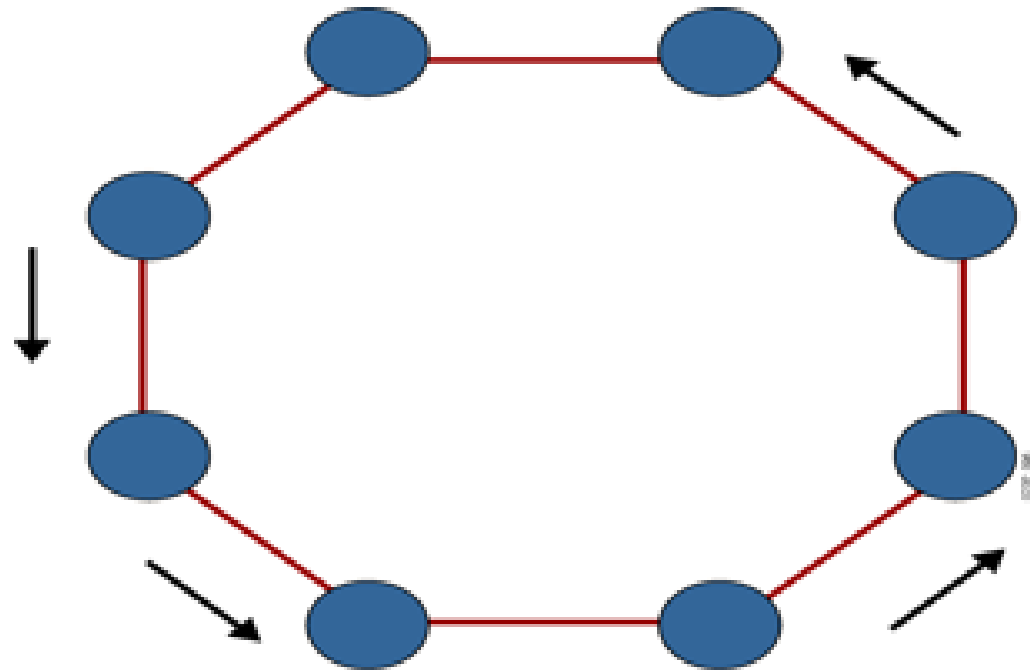
# Bus Topology



- In a physical bus topology, a single cable effectively connects all the devices.
- All devices receive the signal.



# Ring Topology



- Signals travel around ring.
- Single point of failure.

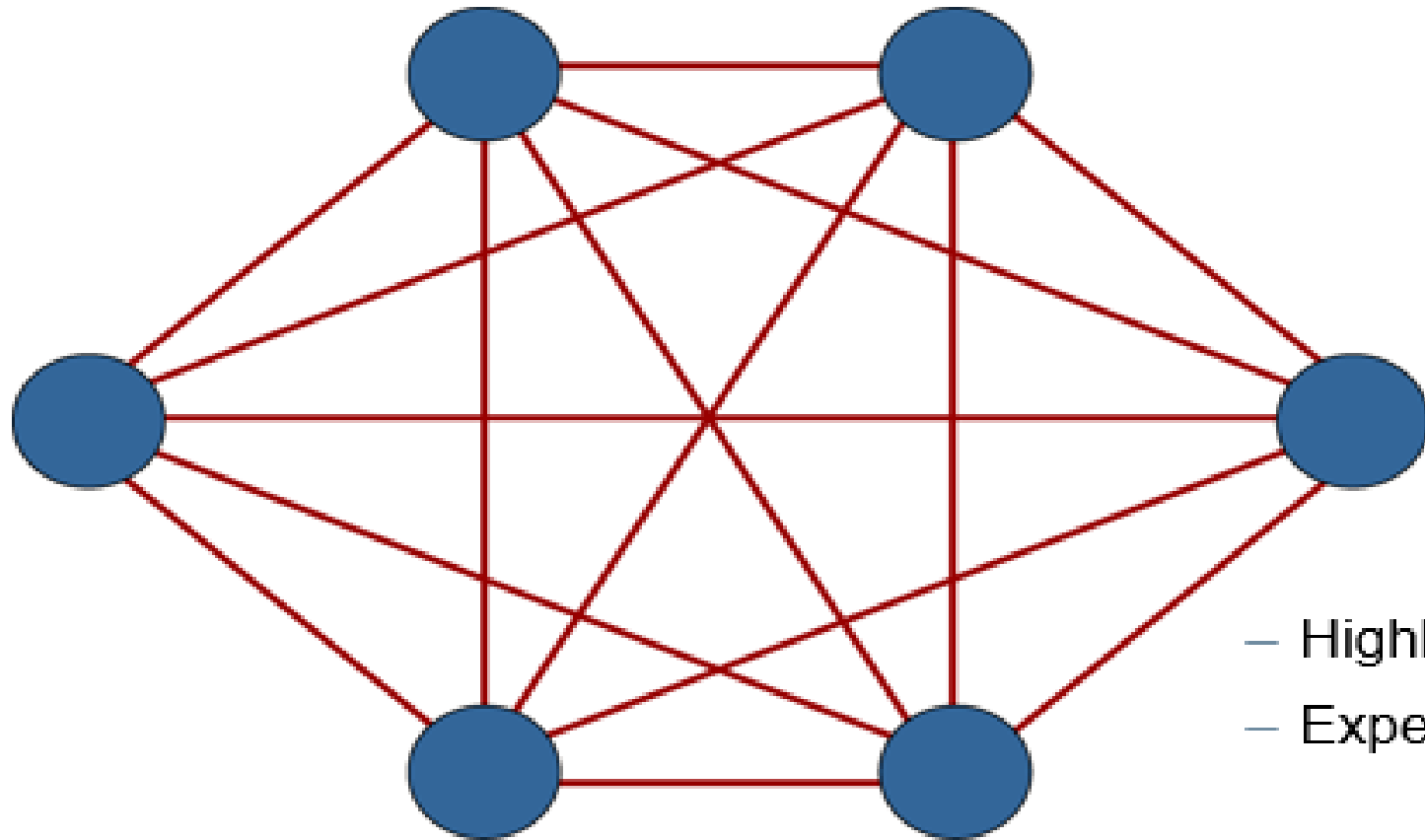
In a ring topology, all the hosts are connected in the form of a ring or circle.

A ring topology connects one host to the next and the last host to the first.

This creates a physical ring of cable.

If the first host needs to send data to the last host, the data must path through all the hosts before reaching the end host.

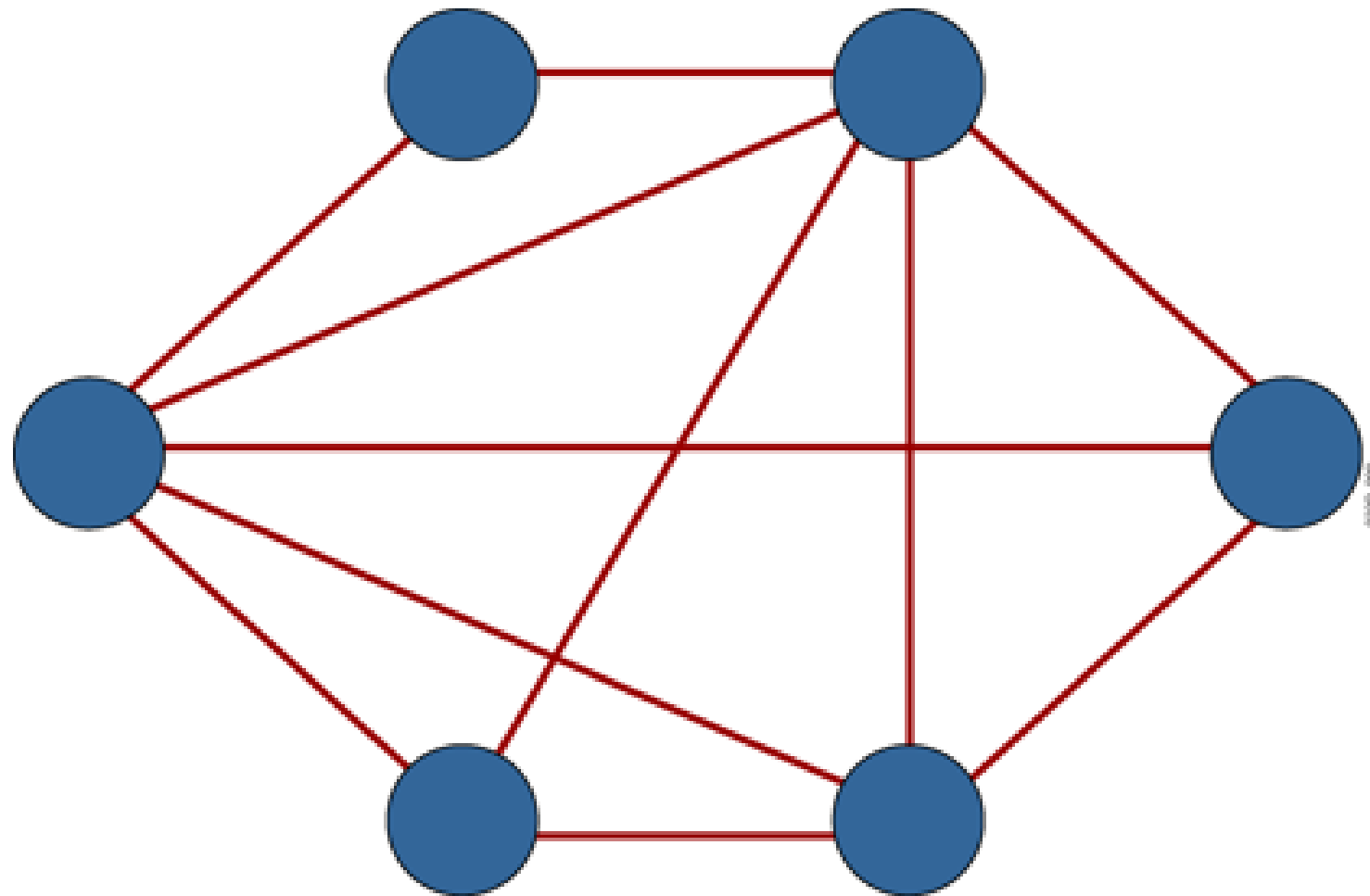
# Full-Mesh Topology



- Highly fault-tolerant
- Expensive to implement

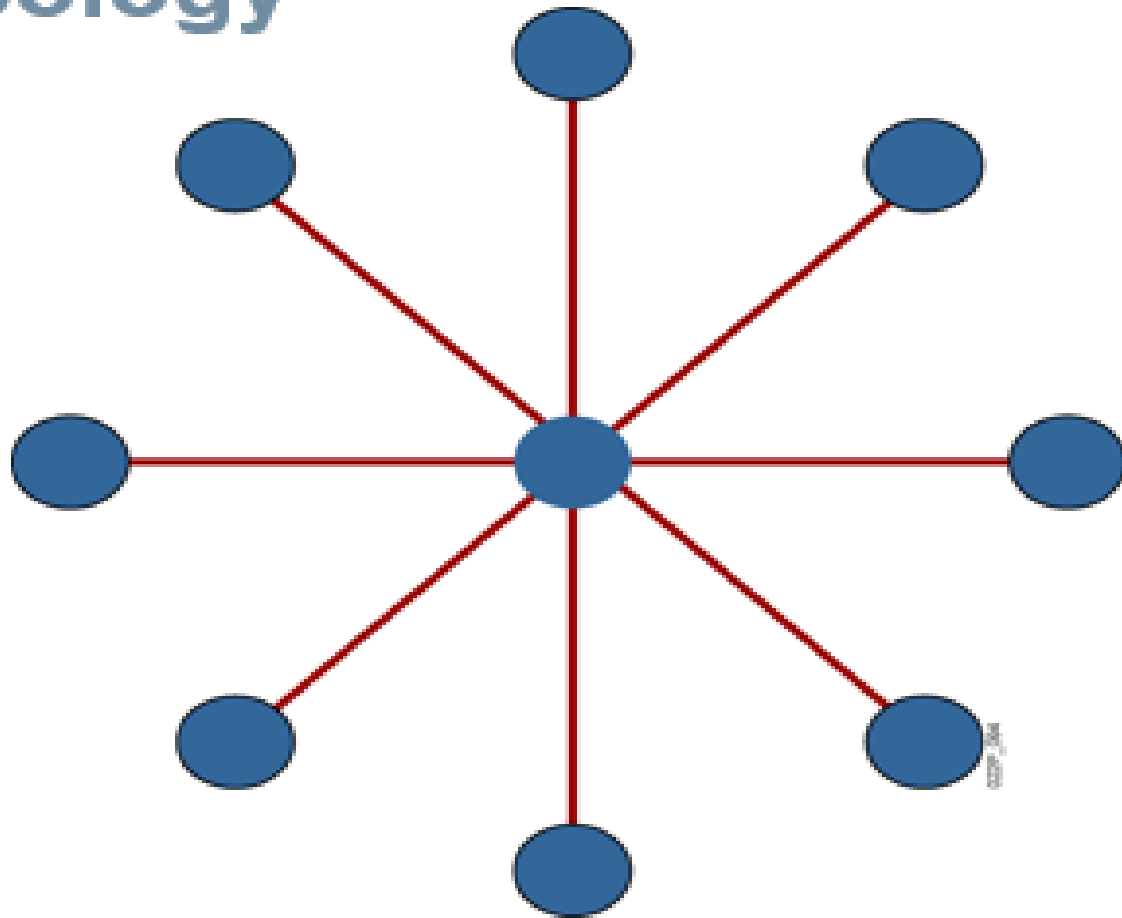
A mesh topology is implemented to provide as much protection as possible from interruption of service. Each host has its own connections to all other hosts. Although the Internet has multiple paths to any one location, it does not adopt the full mesh topology.

# Partial-Mesh Topology



- Trade-off between fault tolerance and cost

# Star Topology



- In a physical star topology, each device in the network is connected to the central device with its own cable.
- Transmission through a central point.
- Single point of failure.



## Types of Cables & Connectors



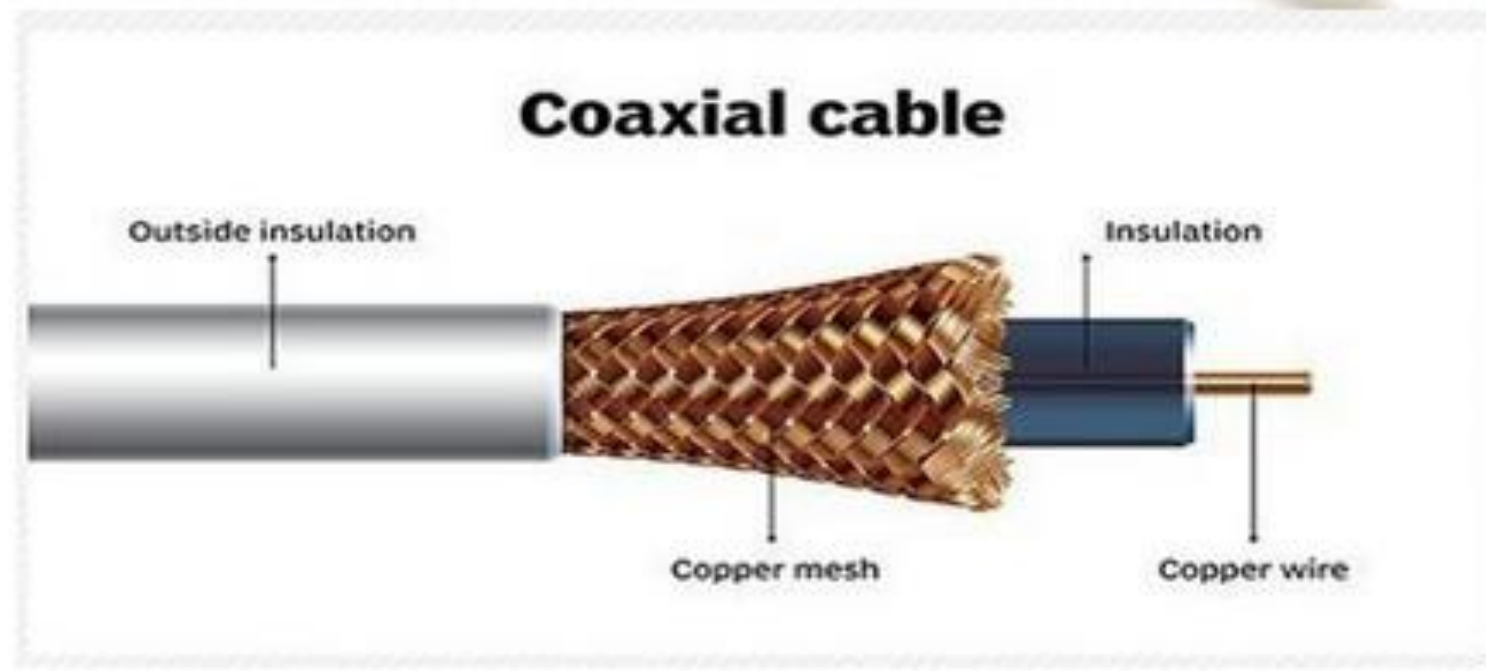
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# Types of Cables

- Copper cable
  - Coaxial
  - Twisted Pair
- Fiber Cable
  - Fiber Optic Cable

# Coaxial cable





# Twisted-Pair Cable

- Two basic types of twisted-pair cable exist:
  - shielded twisted pair (STP).
  - unshielded twisted pair (UTP)

*Shielded twisted pair (STP)*



*Unshielded twisted pair (UTP)*



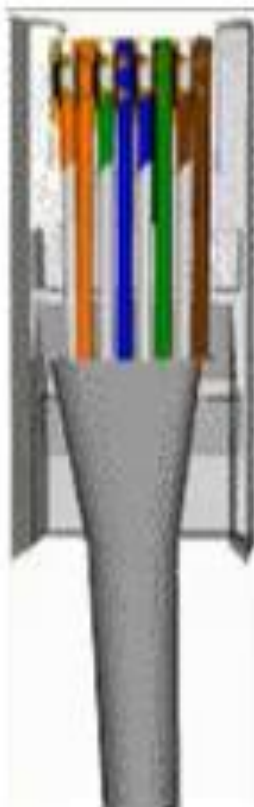
## UTP Categories - Copper Cable

UTP Category	Data Rate	Max. Length	Cable Type	Application
<b>CAT5</b>	Up to 100Mbps	100m	Twisted Pair	Ethernet, FastEthernet, Token Ring
<b>CAT5e</b>	Up to 1 Gbps	100m	Twisted Pair	Ethernet, FastEthernet, Gigabit Ethernet
<b>CAT6</b>	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)

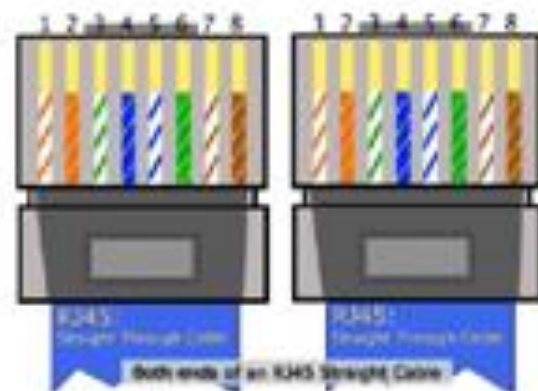
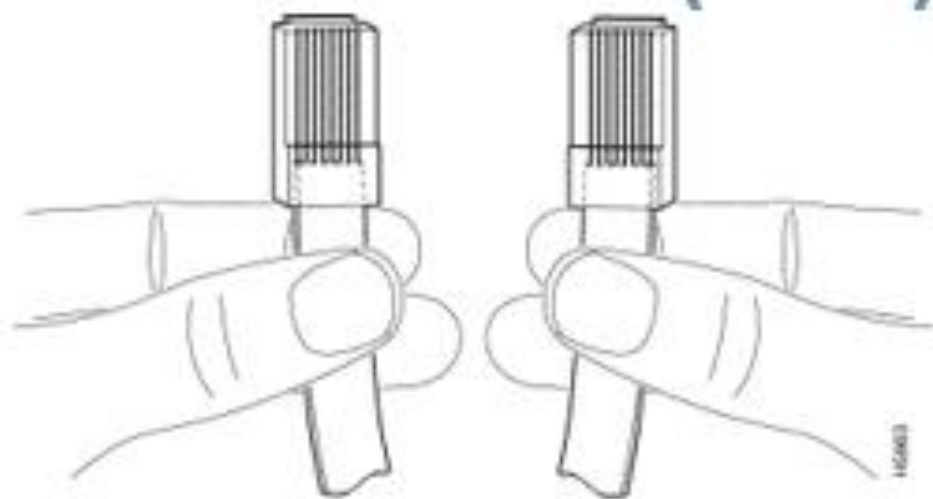


# unshielded twisted pair (UTP)

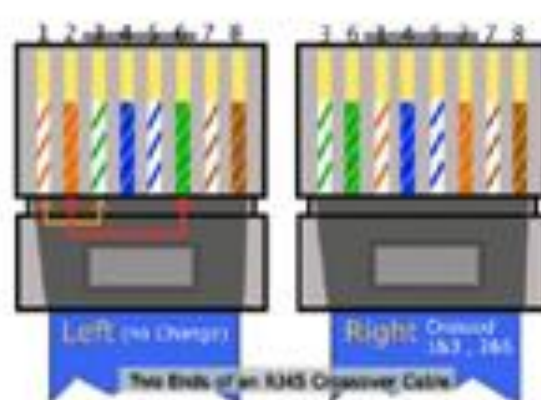
- STP and UTP use RJ-45 (Registered Jack 45) connector



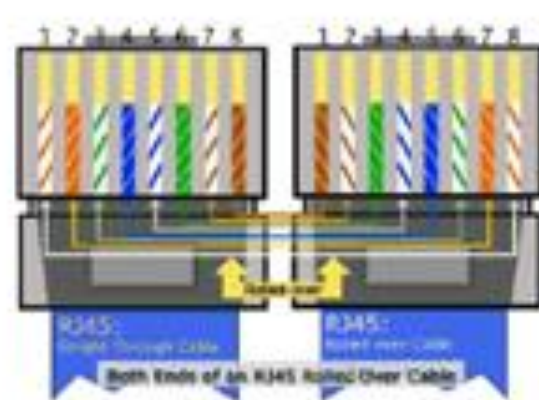
# Unshielded Twisted Pair (UTP)



**Straight-through**

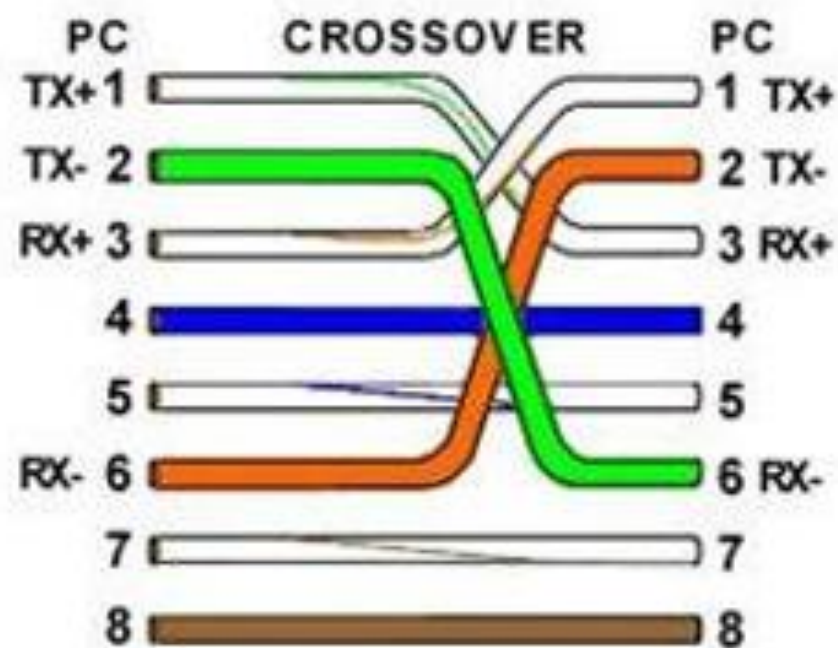
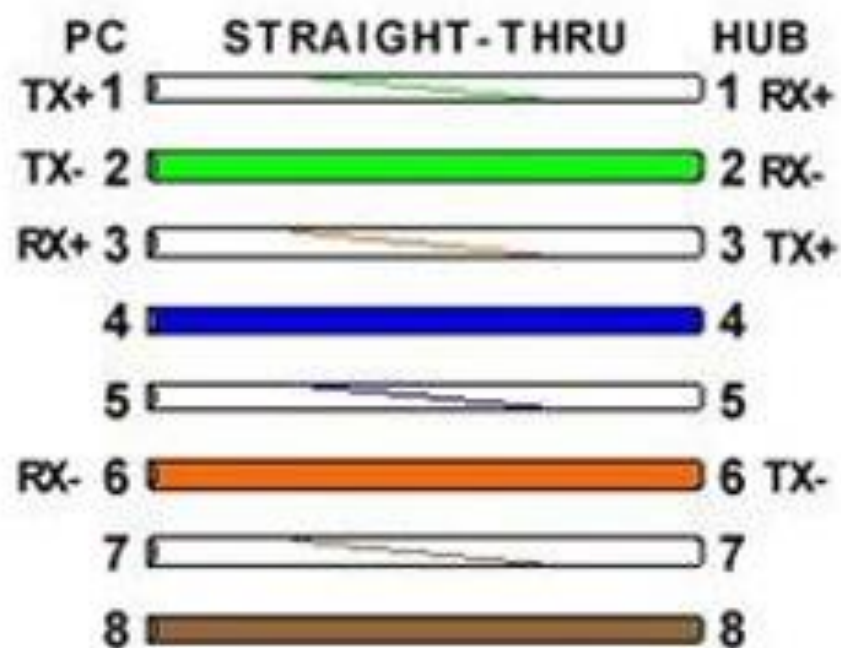


**Cross-over**



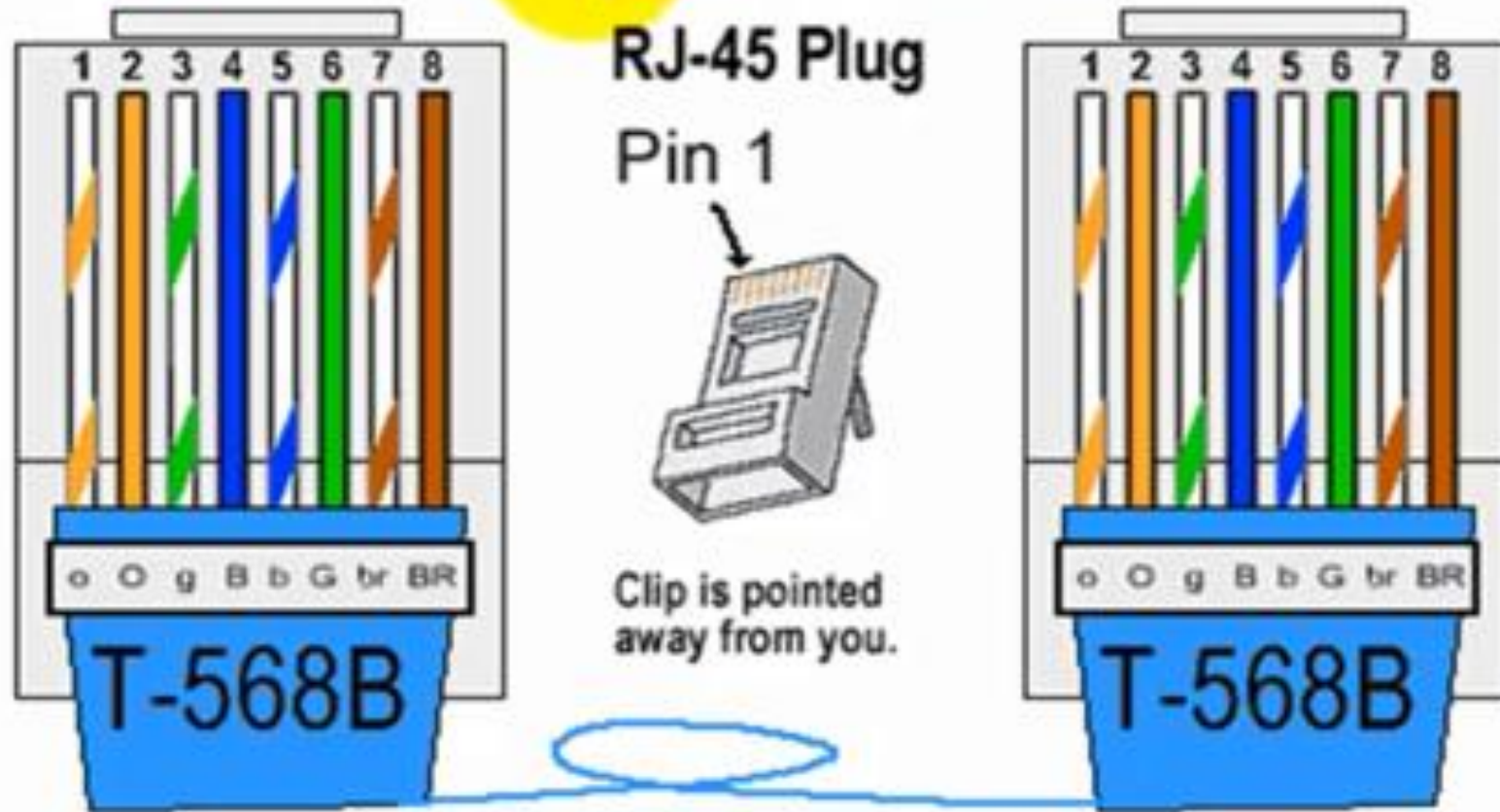
**Rollover**

# Straight-Through vs Crossover cables



# Straight-through

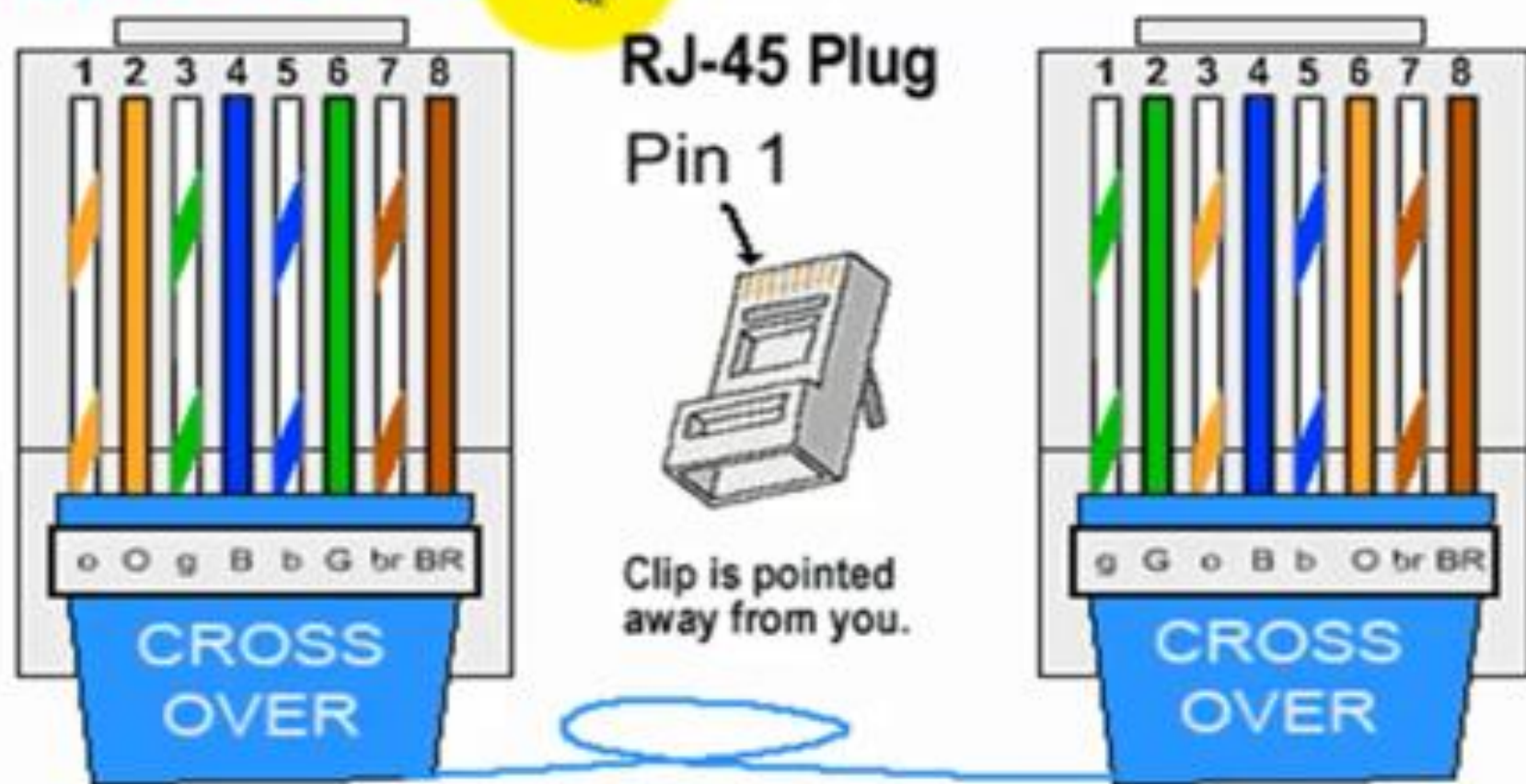
## Straight Through Cable





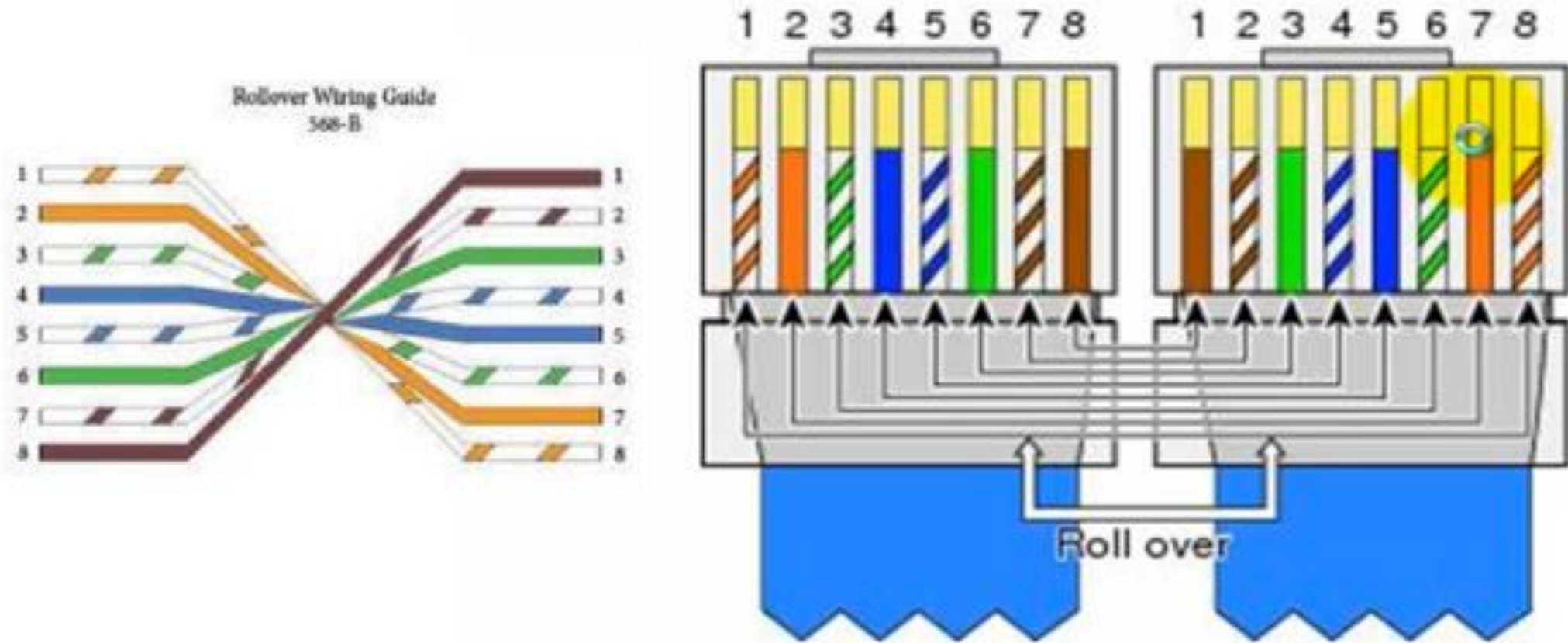
# Cross-over

## Crossover cable



# Rollover

## Rollover (Console) Cable

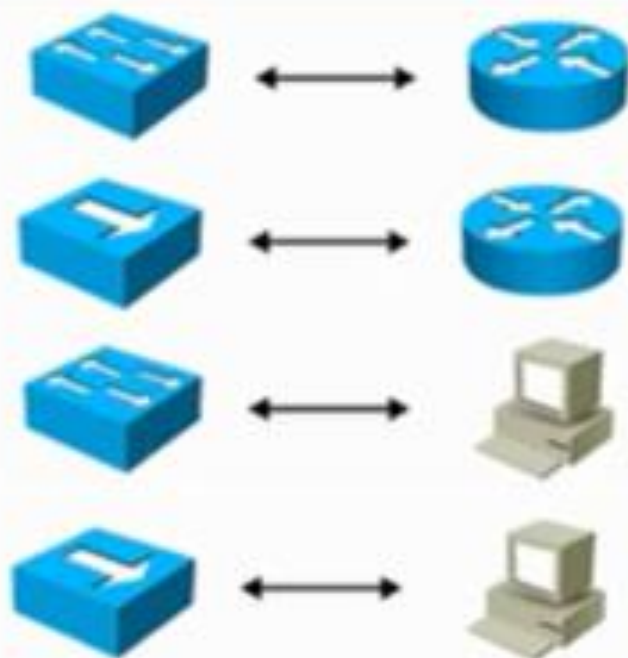




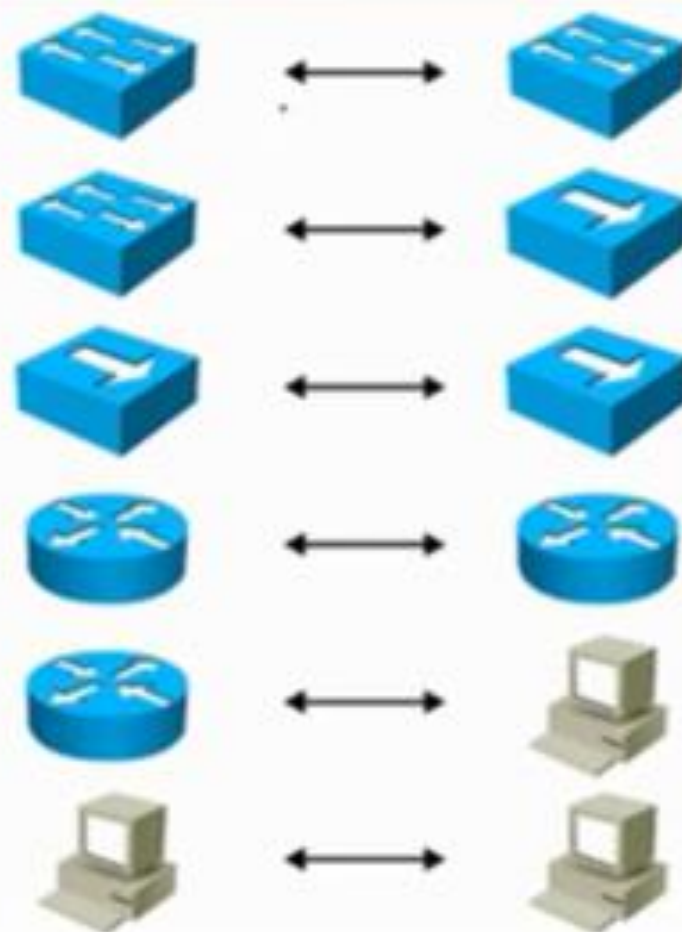
## Console Cables



## Straight-Through Cable



## Crossover Cable



# How to Make an Ethernet Cable



<https://www.youtube.com/watch?v=WvP0D0jiyLg>

# Primary Command Modes

## User EXEC Mode:

- Allows access to only a limited number of basic monitoring commands
- Identified by the CLI prompt that ends with the > symbol

```
Router>
```

```
Switch>
```

## Privileged EXEC Mode:

- Allows access to all commands and features
- Identified by the CLI prompt that ends with the # symbol

```
Router#
```

```
Switch#
```

# Configuration Mode and Subconfiguration Modes

## Global Configuration Mode:

- Used to access configuration options on the device

```
Switch(config) #
```

## Interface Configuration Mode:

- Used to configure a switch port or router interface

```
Switch(config-if) #
```