Computer Network

Lab 1

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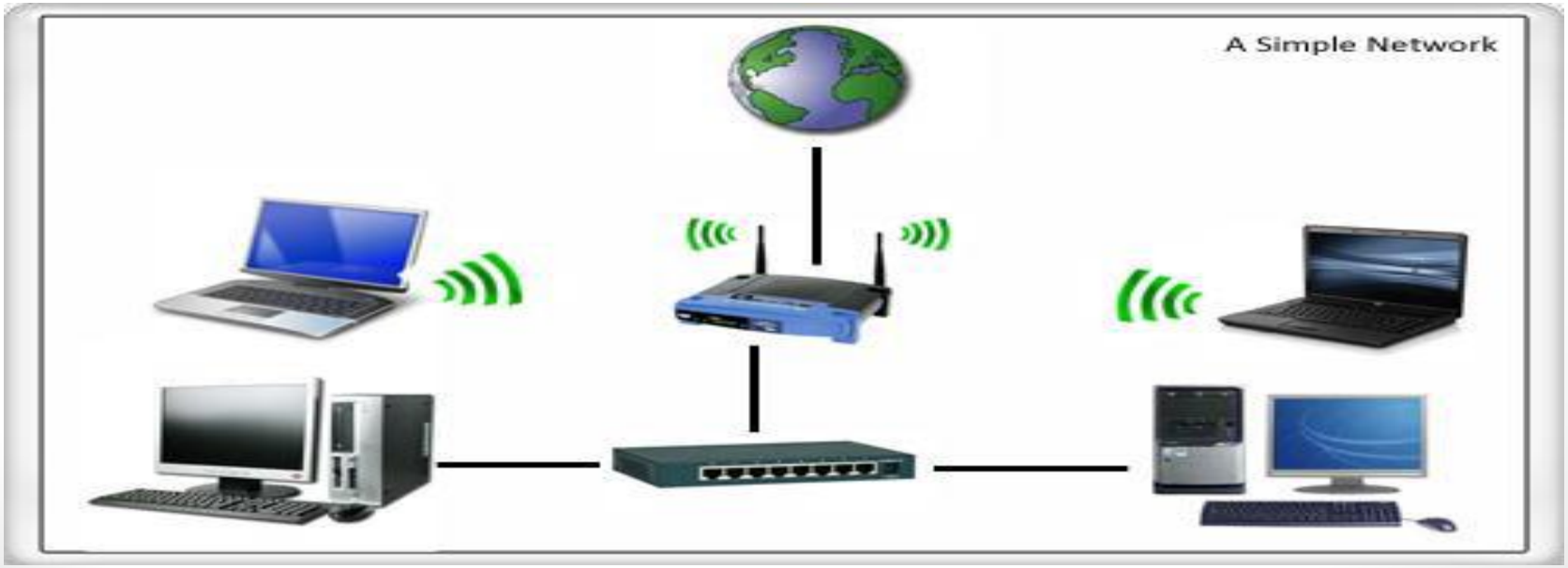
Outline

- What is Computer Network?
- Network Devices
- Types of network
- Network architecture
- Topologies
- Protocols

What is computer network?

Computer network is collection of devices that are connected together and sharing resources between each other.



Network Devices

- Hubs
- Switches
- Bridges
- Routers
- Wireless Access Point (WAP)
- Firewalls

Hub

- A hub is a device used to connect a PC to the network. The function of a hub is to direct information around the network, facilitating communication between all connected devices.

Switches

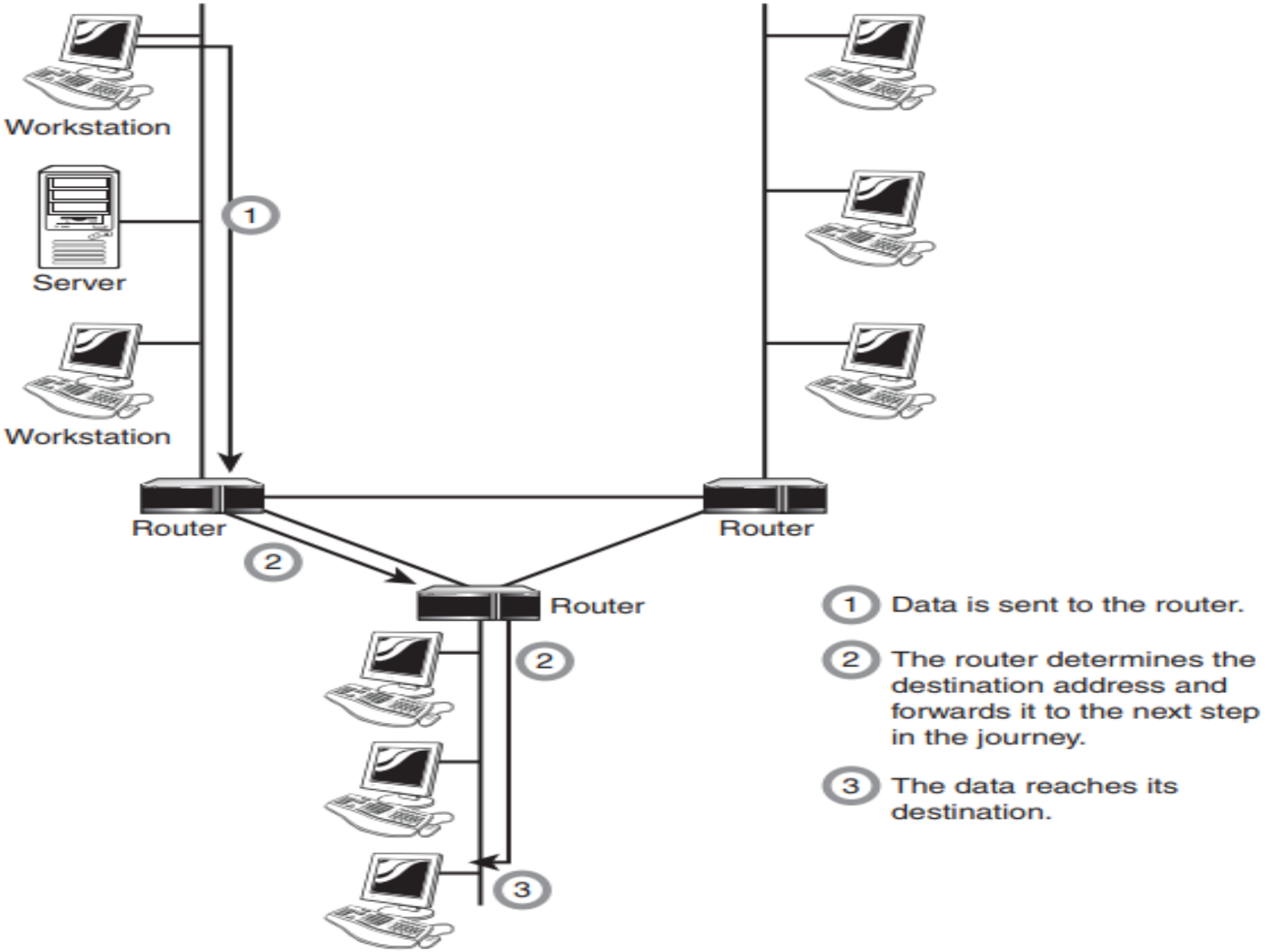
- a switch looks much like a hub. Despite their similar appearance, switches are far more efficient than hubs and are far more desirable for today's network environments. switches offer significant operational advantages over hubs.

Bridges

- A network bridge connects multiple network segments. A bridge and switch are very much alike; a switch being a bridge with numerous ports.

Routers

- Routers are network devices that literally route data around the network. By examining data as it arrives, the router can determine the destination address for the data; then, by using tables of defined routes, the router determines the best way for the data to continue its journey.

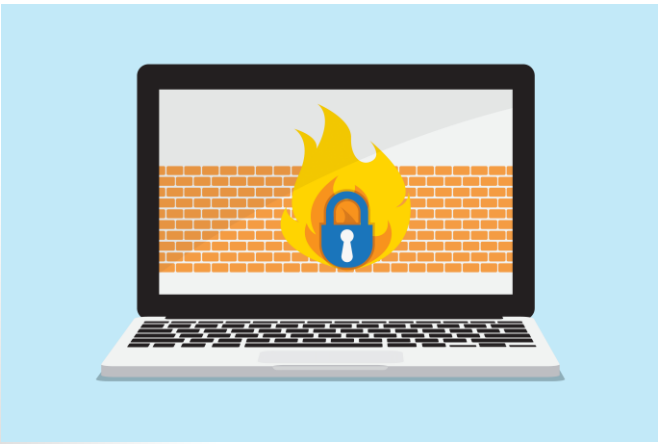

Workstation
Server
Workstation
1
Router
Router
2
Router
2
3
1 Data is sent to the router.
2 The router determines the destination address and forwards it to the next step in the journey.
3 The data reaches its destination.

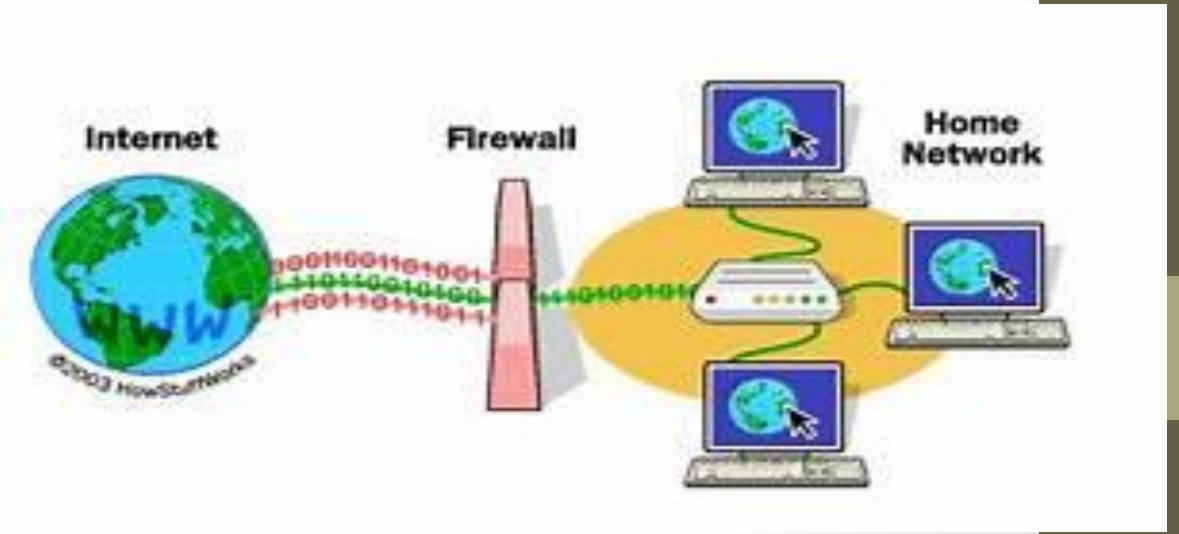
Wireless Access Point (WAP)

- Wireless access points, referred to as either WAPs or wireless APs, are a transmitter and receiver (transceiver) device used for wireless LAN (WLAN) radio signals. WAPs use the wireless infrastructure network mode to provide a connection point between Wireless and a wired network .

Firewall

- A firewall is a networking device, either hardware or software based, that controls access to your organization's network. This controlled access is designed to protect data and resources from outside threat.





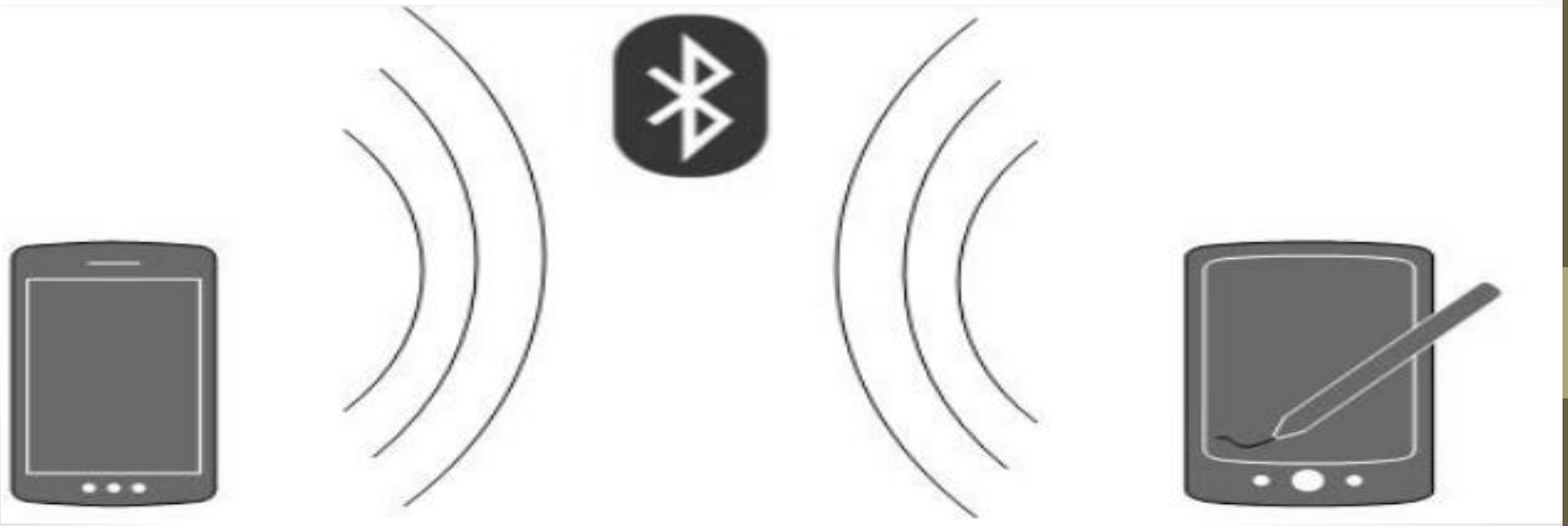
Types of network

- Depending upon the geographical area covered by a network, it is classified as:

  - Personal Area Network (PAN)
  - Local Area Network (LAN)
  - Metropolitan Area Network (MAN)
  - Wide Area Network (WAN)

Personal Area Network (PAN)

- A Personal Area Network (PAN) is smallest network which is very personal to a user. This may include Bluetooth enabled devices. PAN has connectivity range up to 10 meters.



Local Area Network (LAN)

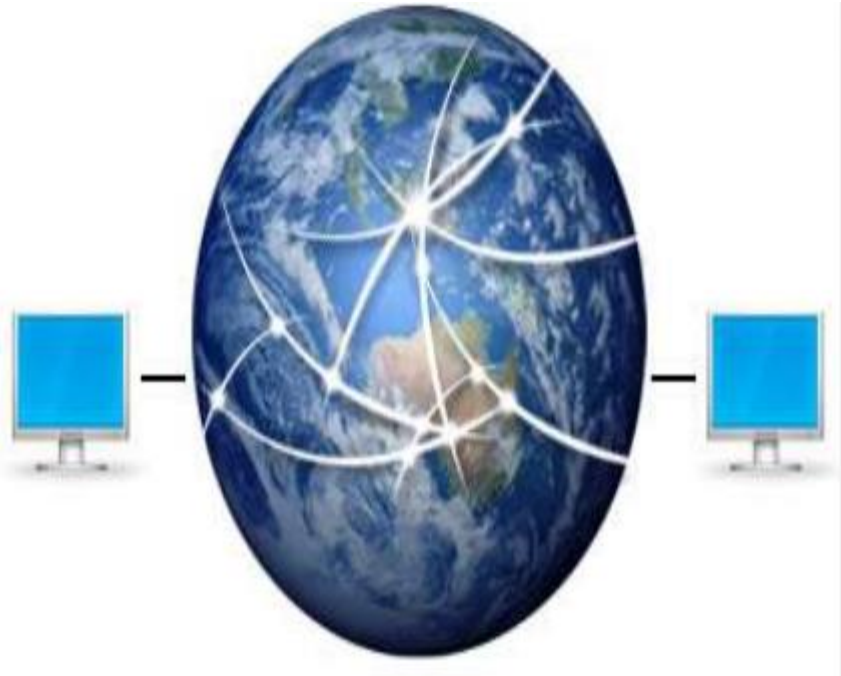
- A LAN is a network that is used for communicating among computer devices, usually within an office building or home.
- Is limited in size, typically spanning a few hundred meters, and no more than a mile
- Is fast, with speeds from 10 Mbps to 10 Gbps.
- Requires little wiring, typically a single cable connecting to each device.
- Has lower cost compared to MAN's or WAN's

Metropolitan Area Network (MAN)

- is a large computer network that usually spans a city or a large campus.
- A MAN is optimized for a larger geographical area than a LAN, ranging from several blocks of buildings to entire cities.
- A MAN often acts as a high speed network to allow sharing of regional resources.

Wide Area Network (WAN)

- WAN covers a large geographic area such as country, continent or even whole of the world.
- A WAN is two or more LANs connected together.



Network architecture

- Peer-to-peer networks
- Client/server networks

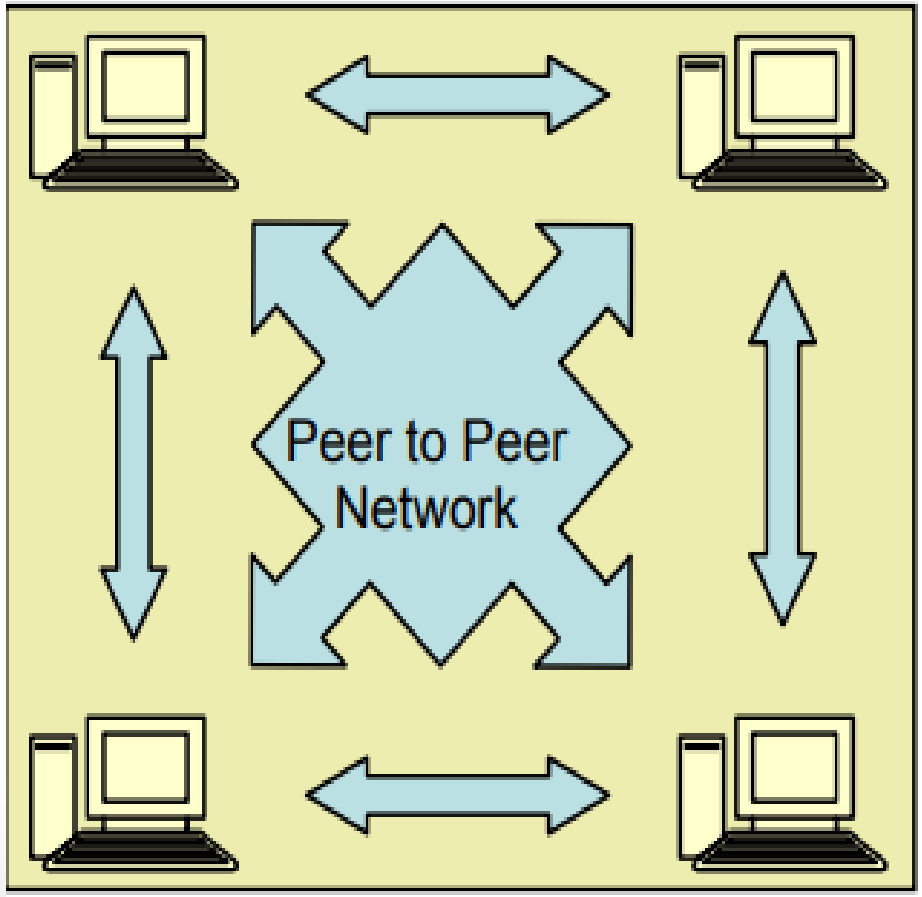
Network architecture(Cont.)

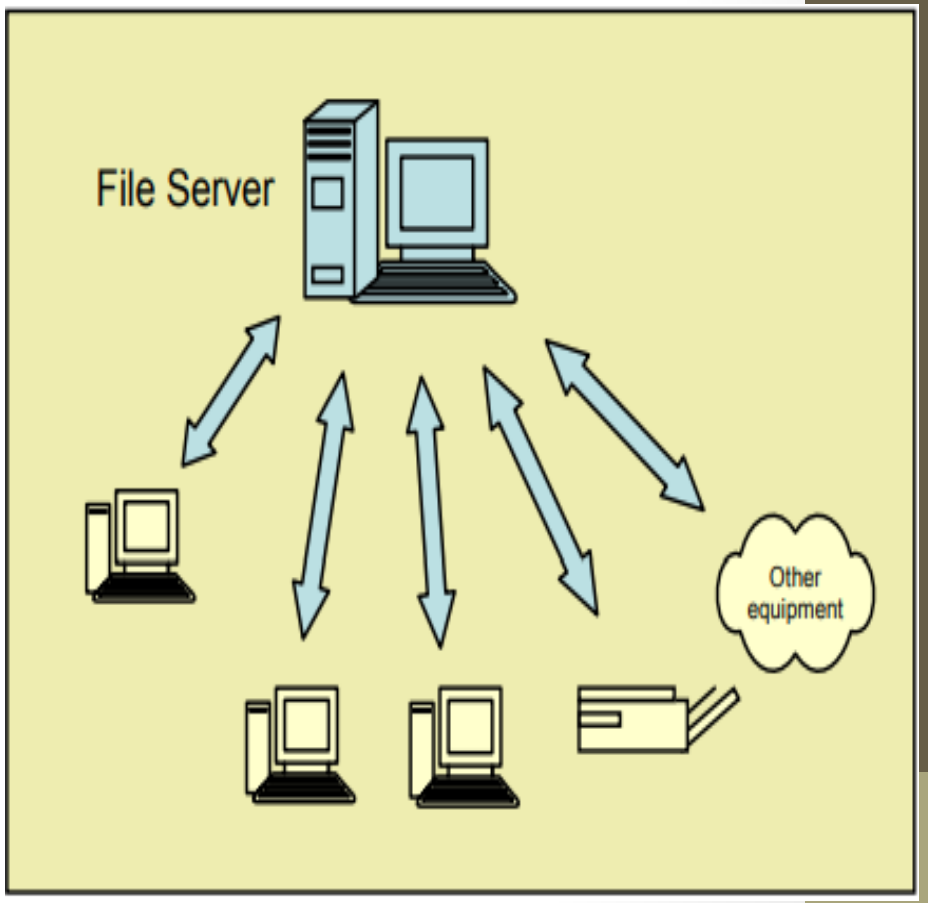
- Peer-to-peer networks are more commonly implemented where less then ten computers are involved.
- Files, such as word processing or spreadsheet documents, can be shared across the network and all the computers on the network can share devices, such as printers or scanners, which are connected to any one computer.

Network architecture(Cont.)

- Client/server networks are more suitable for larger networks. A central computer, or 'server', acts as the storage location for files and applications shared on the network.

Network architecture(Cont.)





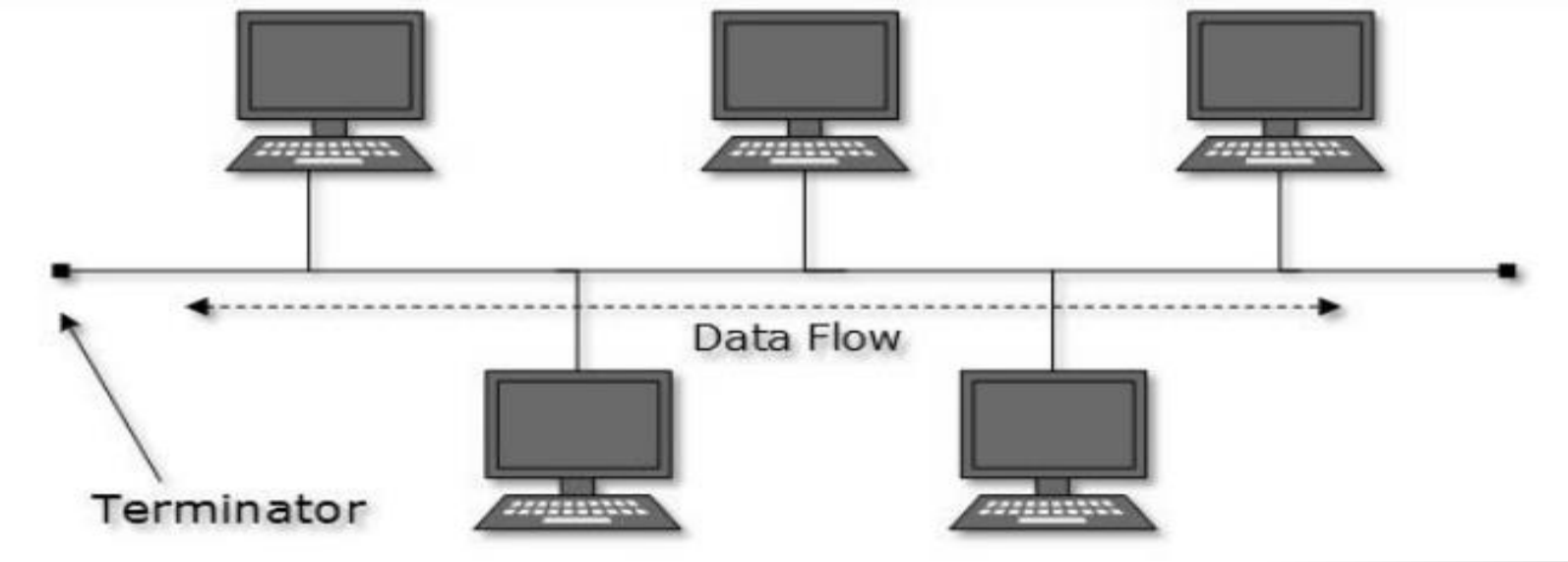
COMPUTER NETWORK TOPOLOGIES

Network Topology is the arrangement with which computer systems or network devices are connected to each other.

- Bus Topology
- Star Topology
- Ring Topology
- Mesh Topology
- Tree Topology
- Hybrid Topology

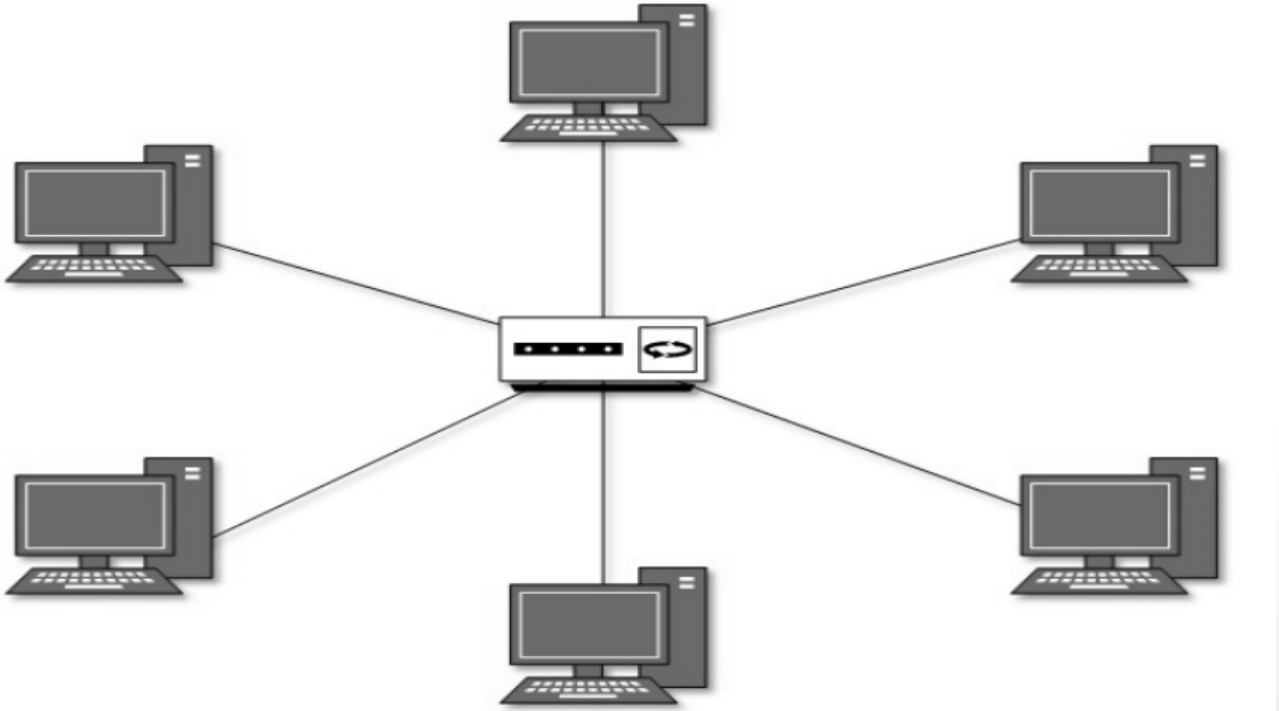
Bus Topology

- In case of Bus topology, all devices share single communication line or cable. Bus topology may have problem while multiple hosts sending data at the same time.



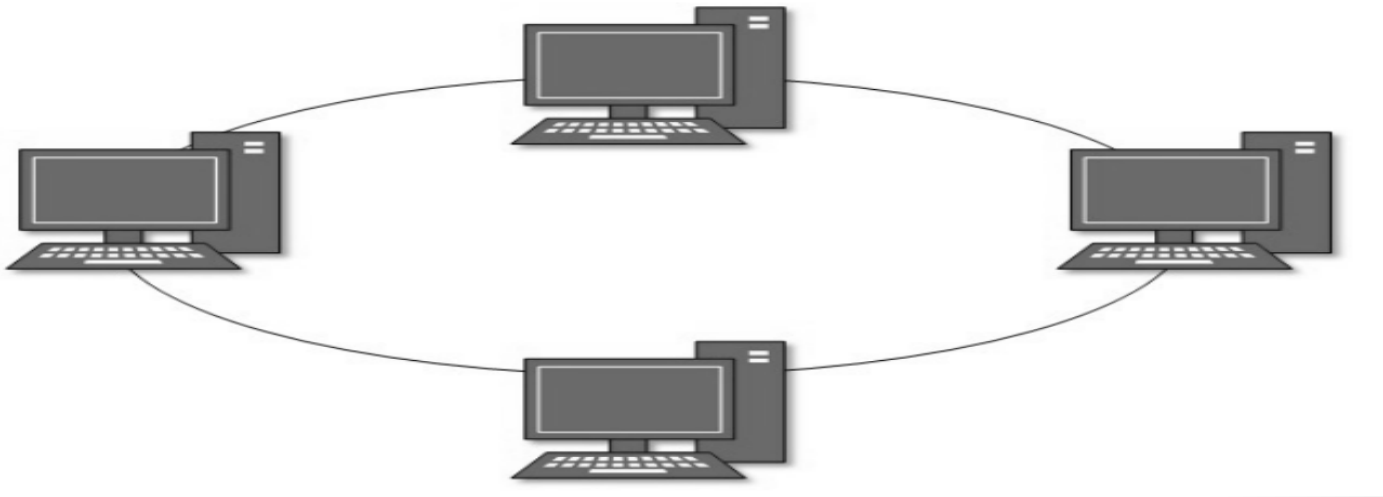
Star Topology

- All hosts in Star topology are connected to a central device using a point-to-point connection. That is, there exists a point to point connection between hosts and hub.



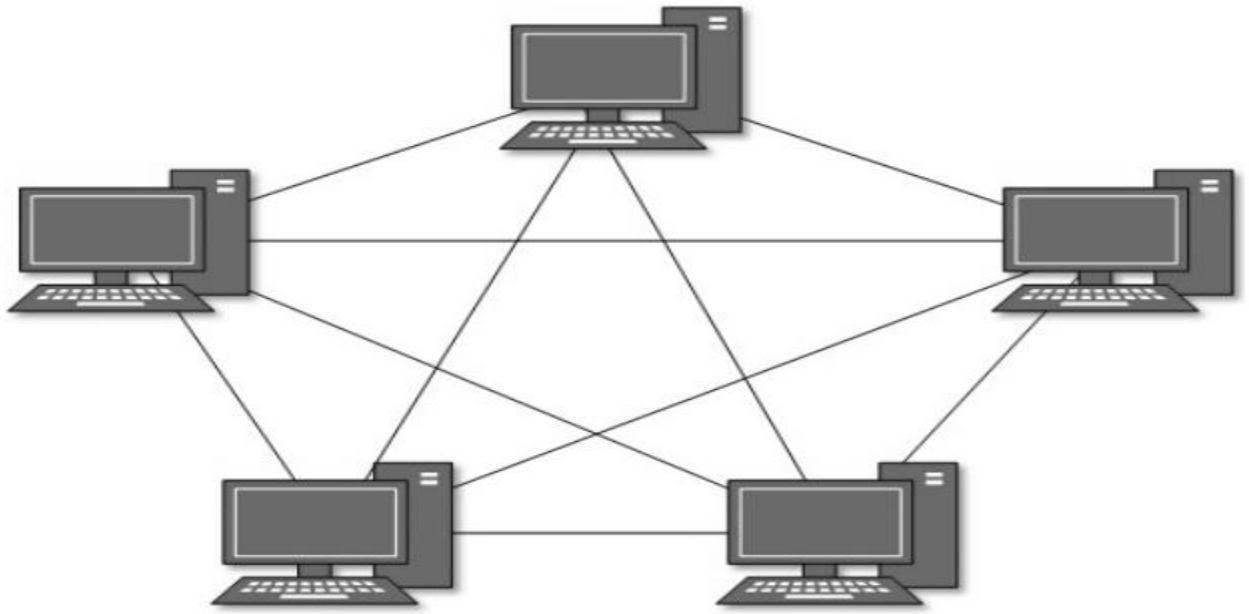
Ring Topology

- In ring topology, **each host connects to exactly two other machines**, creating a circular network structure. When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts.



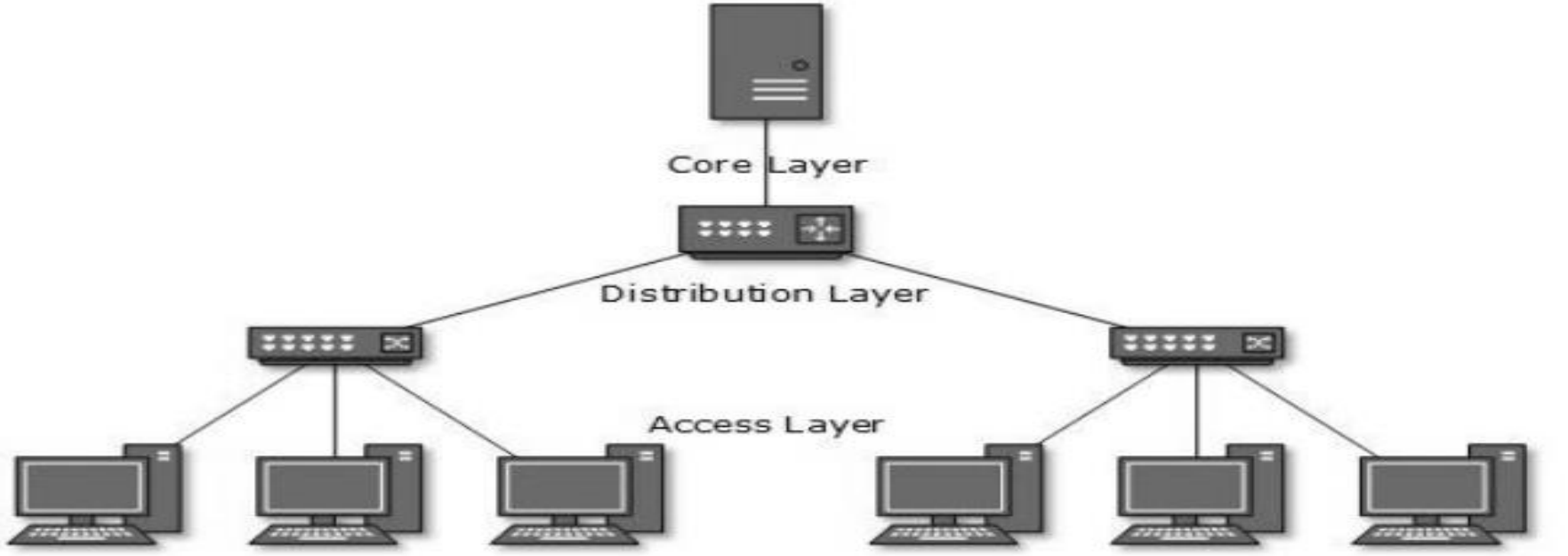
Mesh Topology

- In this type of topology, a host is connected to one or multiple hosts. Mesh technology comes into two types
  - **Full Mesh**: All hosts have a point-to-point connection to every other host in the network.
  - **Partially Mesh**: Not all hosts have point-to-point connection to every other host.



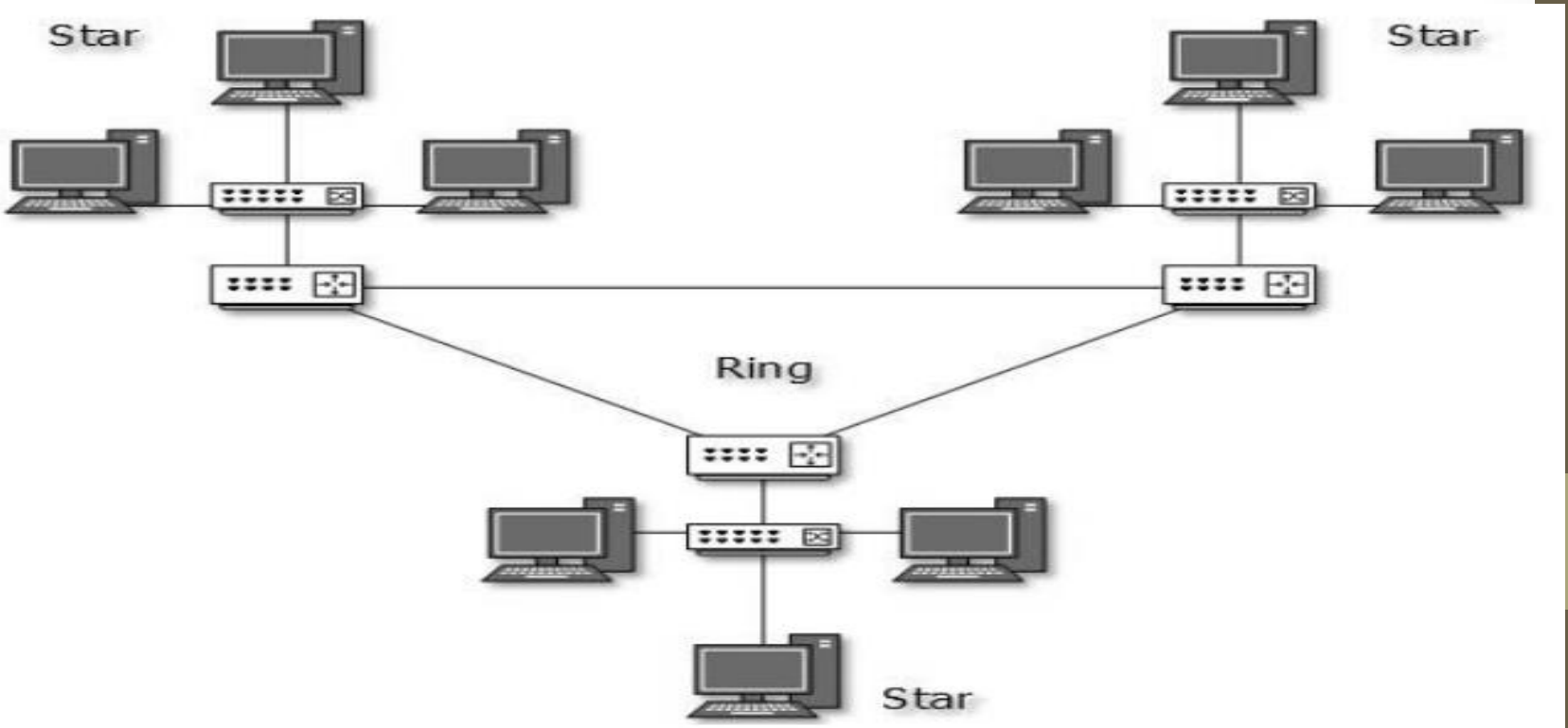
Tree Topology

- Also known as Hierarchical Topology, this is the most common form of network topology in use presently.
- This topology divides the network into multiple levels/layers of network.



Hybrid Topology

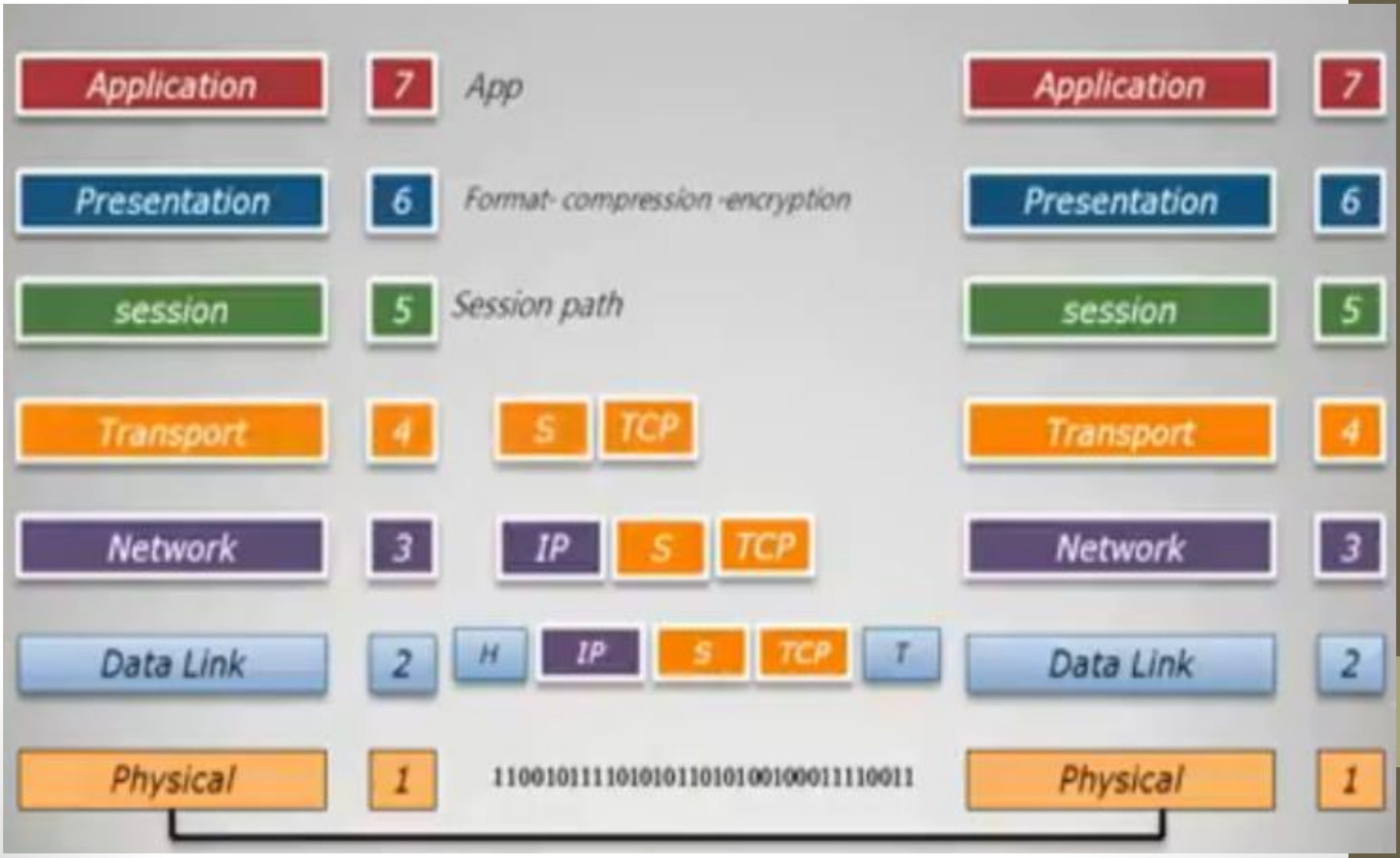
- A network structure whose design contains more than one topology is said to be hybrid topology.



PROTOCOLS

- In computer networks, communication occurs between entities in different systems. An entity is anything capable of sending or receiving information. However, two entities cannot simply send bit streams to each other and expect to be understood. For communication to occur, the entities must agree on a protocol.
- A **protocol** is a set of rules that govern data communications. A protocol defines what is communicated, how it is communicated, and when it is communicated

OSI Model


Application
7
App
Application
7
Presentation
6
Format- compression -encryption
Presentation
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session
5
Session path
session
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Transport
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Transport
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Network
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Network
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Data Link
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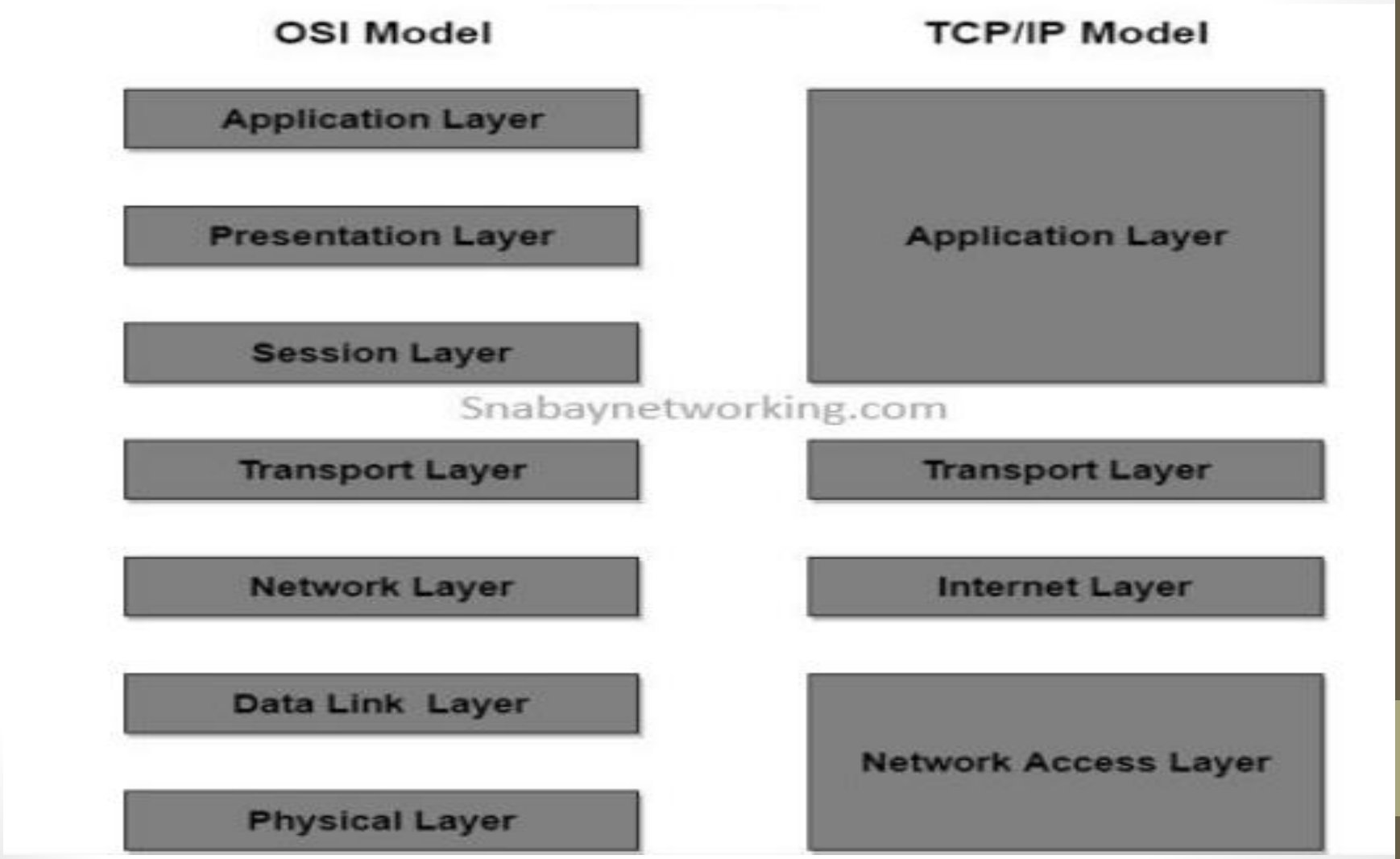
Physical
1

TCP/IP Model

- TCP/IP stands for Transmission Control Protocol/ Internet Protocol.
- It is a communication protocol that enables the devices to communicate on the internet.


OSI Model
TCP/IP Model
Application Layer
Presentation Layer
Session Layer
Application Layer
Snabaynetworking.com
Transport Layer
Transport Layer
Network Layer
Internet Layer
Data Link Layer
Network Access Layer
Physical Layer

END