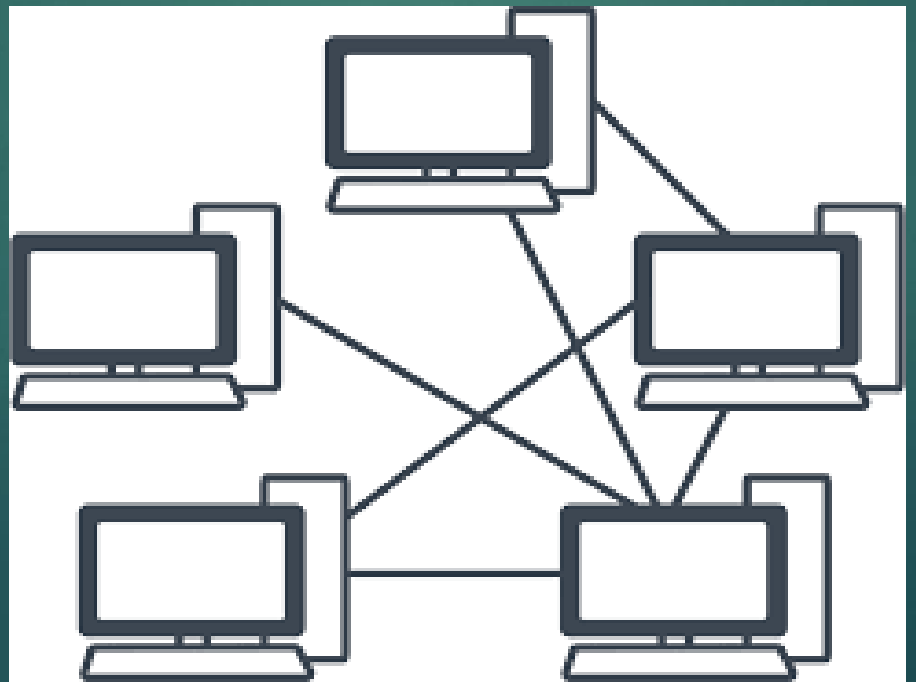
# NETWORKING

# WHAT IS Network?

- Computer Network is a group of devices connected physically/logically for communication.
- Each device in the network is known as host/node.

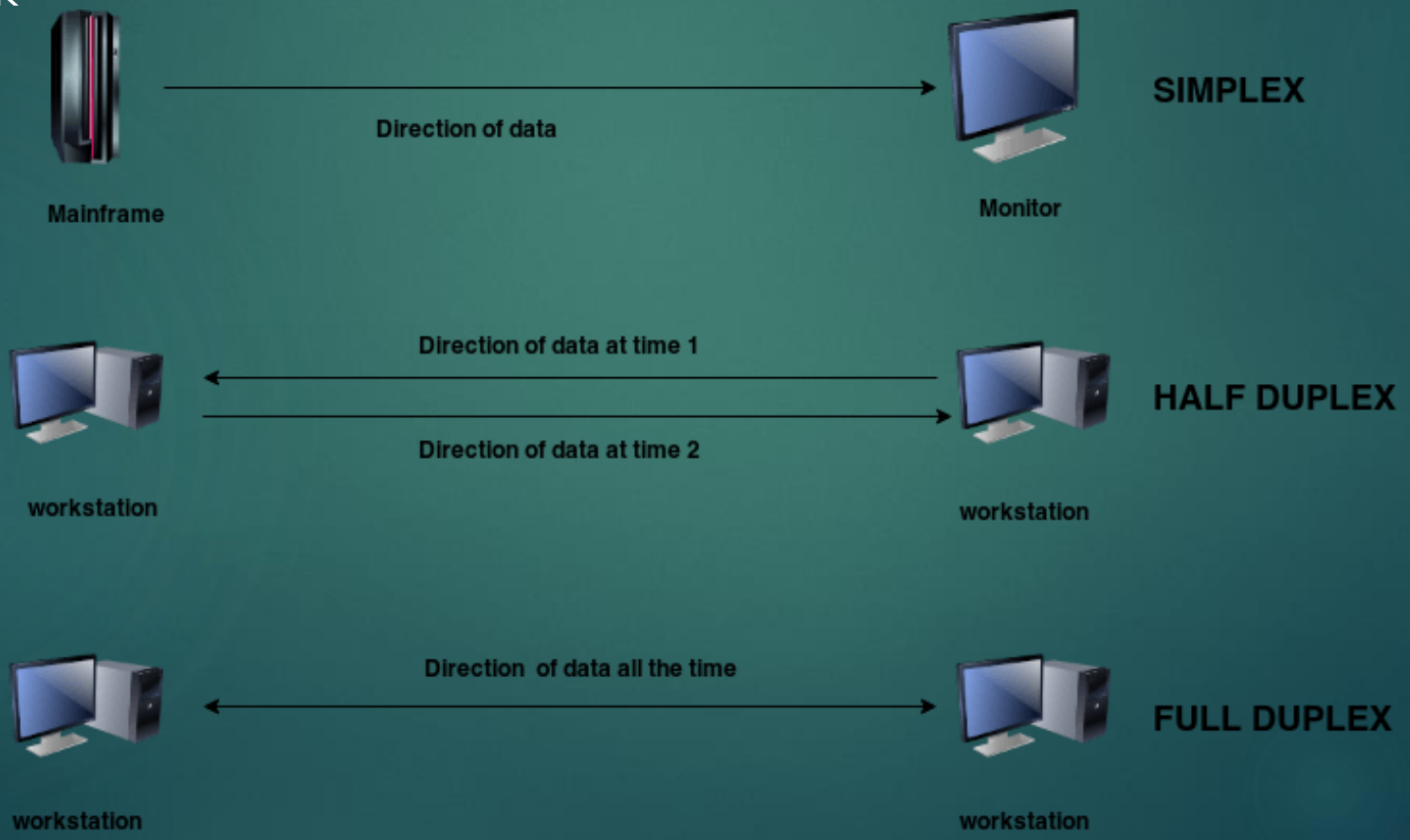


## From where is this internet coming from

- https://www.submarinecablemap.com/#/

# Transmission Modes

- It defines the direction of flow of data between the devices in the network



# Repeater

- Repeater is used to regenerate the signal in the network before it gets weak or corrupted
- It is a two port device
- They do not amplify the signals

## How are n/w's organized?

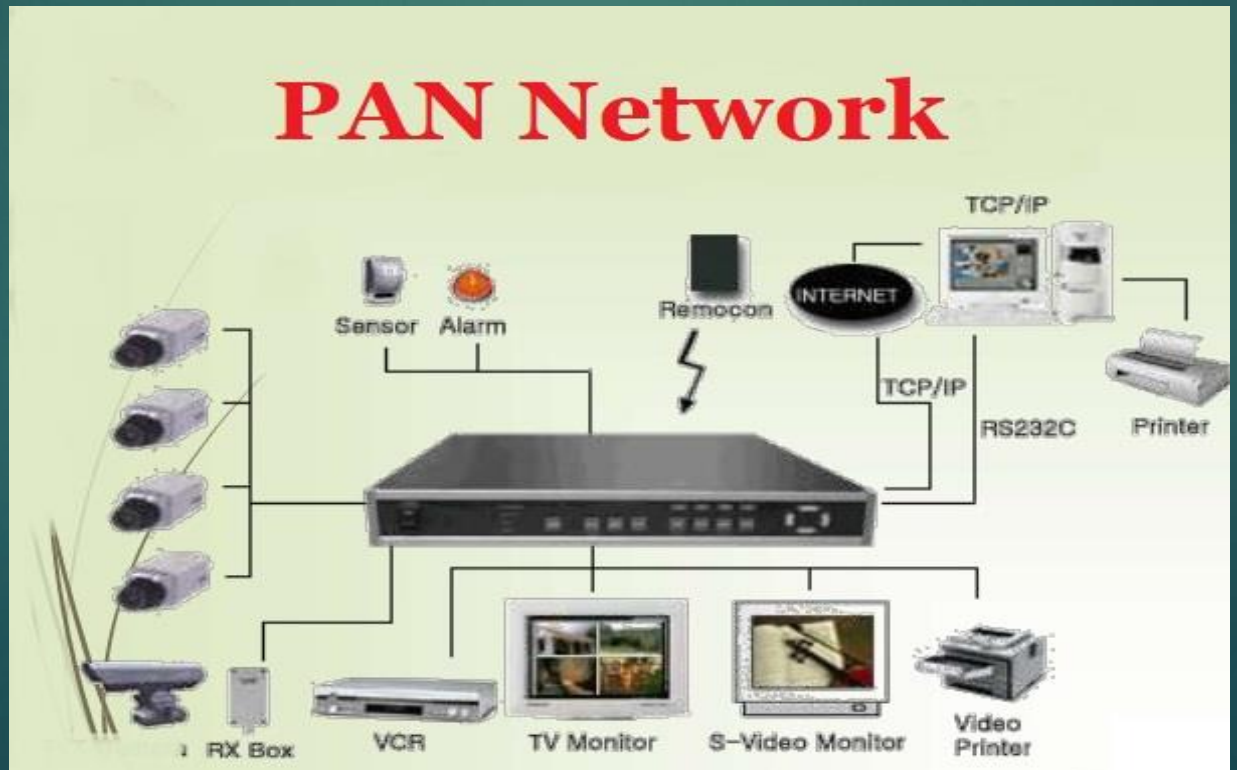
- Networks r organized based on there geographic location.

## TYPES OF NETWORKS

- Personal area network, or PAN.
- Local area network, or LAN.
- Wireless Local area network, or WLAN.
- Campus area network, or CAM.
- Metropolitan area network, or MAN.
- Wide area network, or WAN.
- Enterprise private network, or EPN
- Virtual private network, or VPN

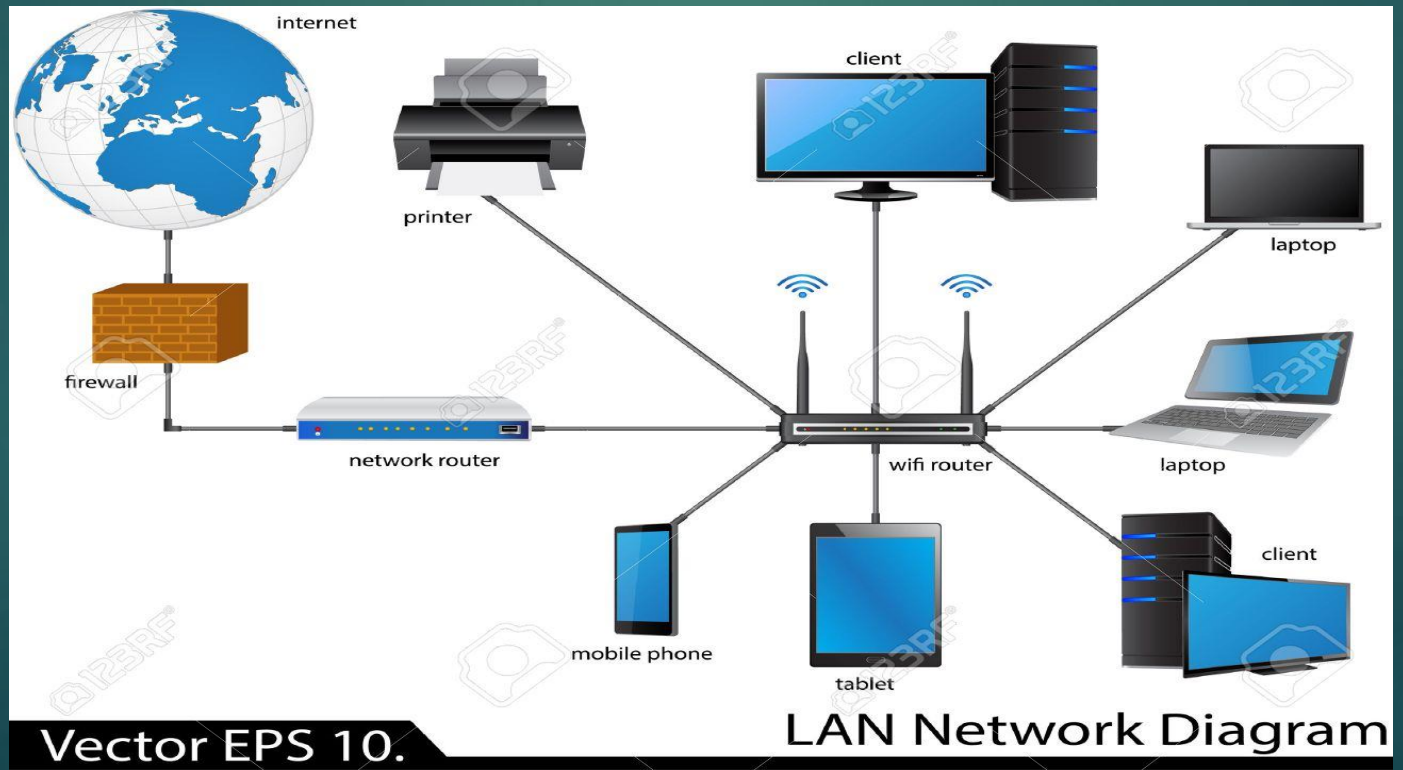
**Personal area network, or PAN.**

- Network that is used for personal level. Mostly used to transfer small files.
  wireless: Bluetooth, infrared, NFC.
  Wired: USB cable



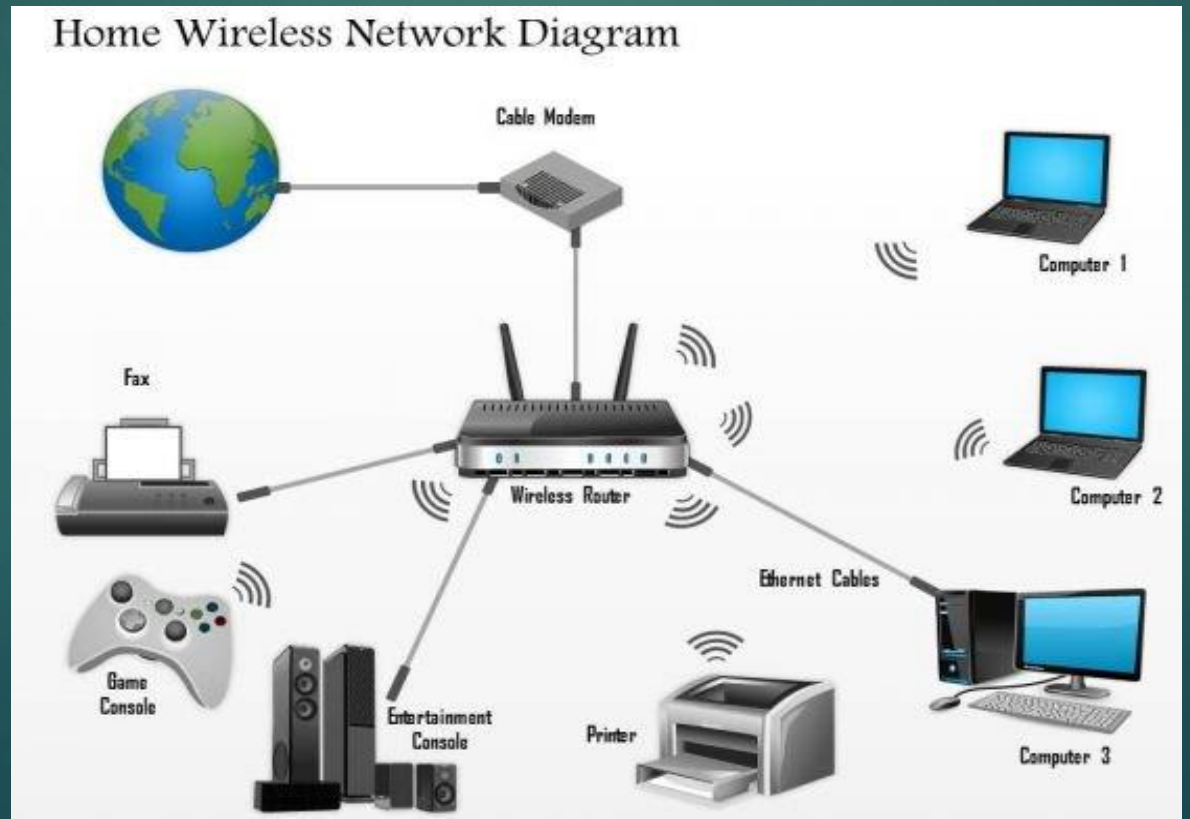
**Local area network, or LAN.**

- Devices such as computers, severs, switches, printers located in same building are connected to network using wired connection that is ethernet LAN.



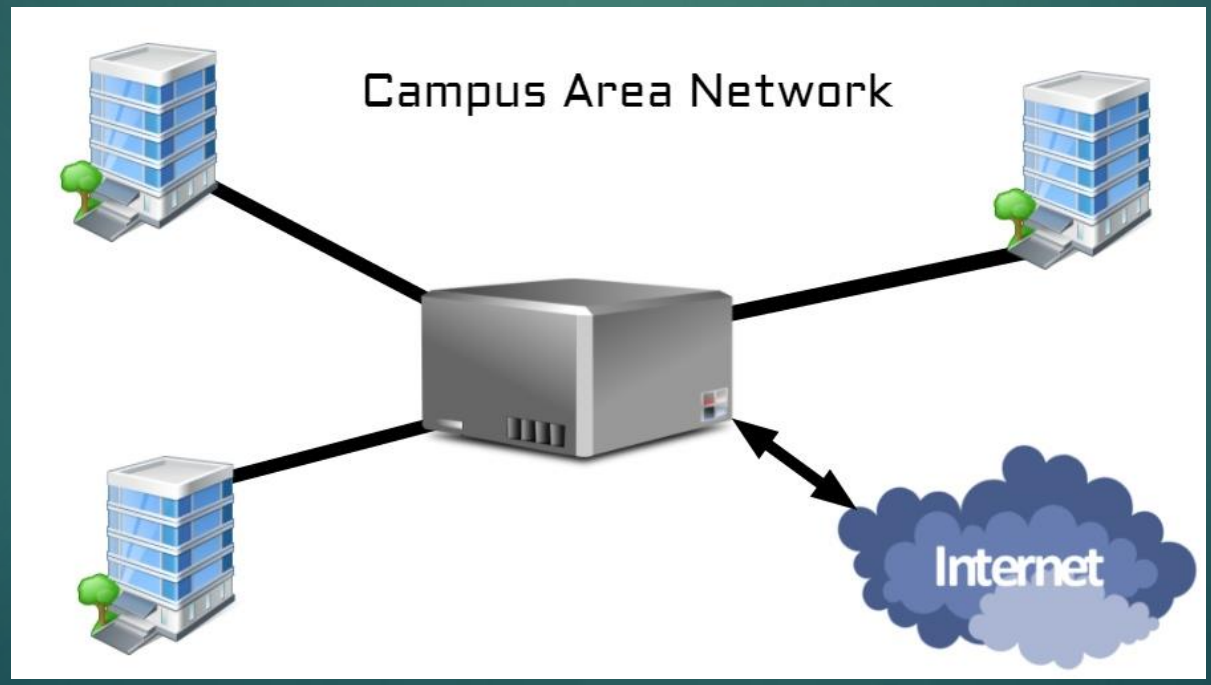
**Wireless Local area network, or WLAN.**

- Devices such as computers, severs, switches, printers,mobiles located in same building are connected to network using wireless connection that is Wifi is WLAN.



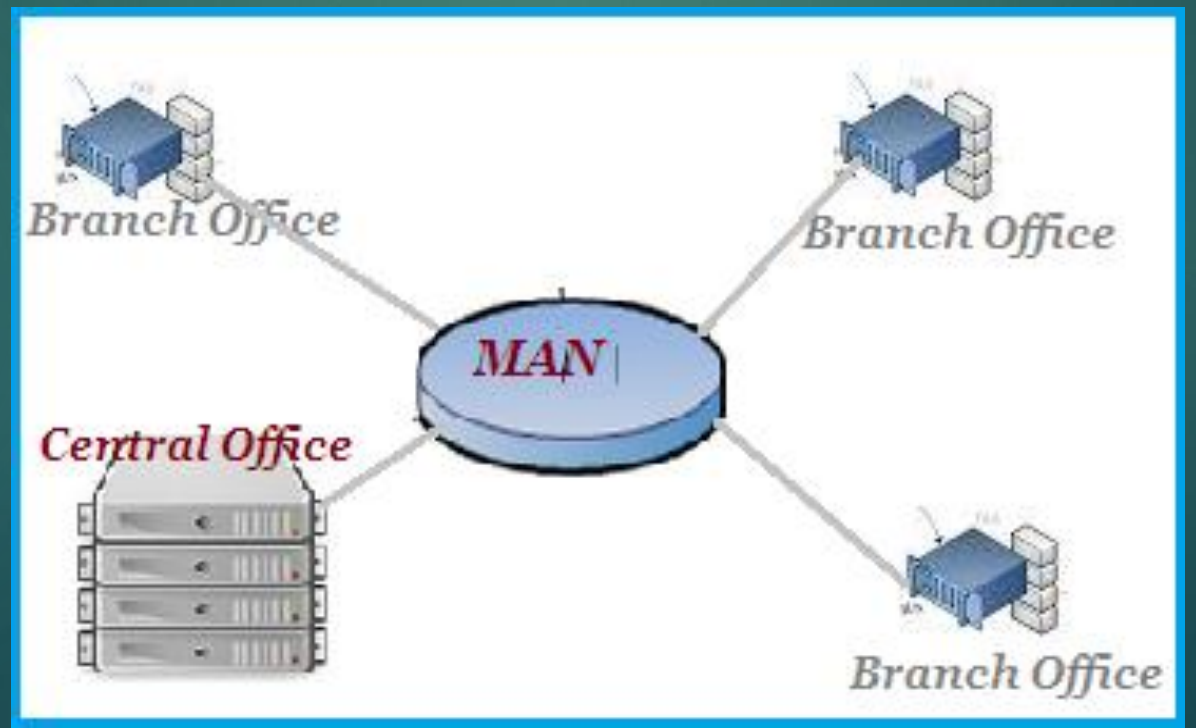
**Campus area network, or CAM.**

- A network which joins 2 or more LAN's together.



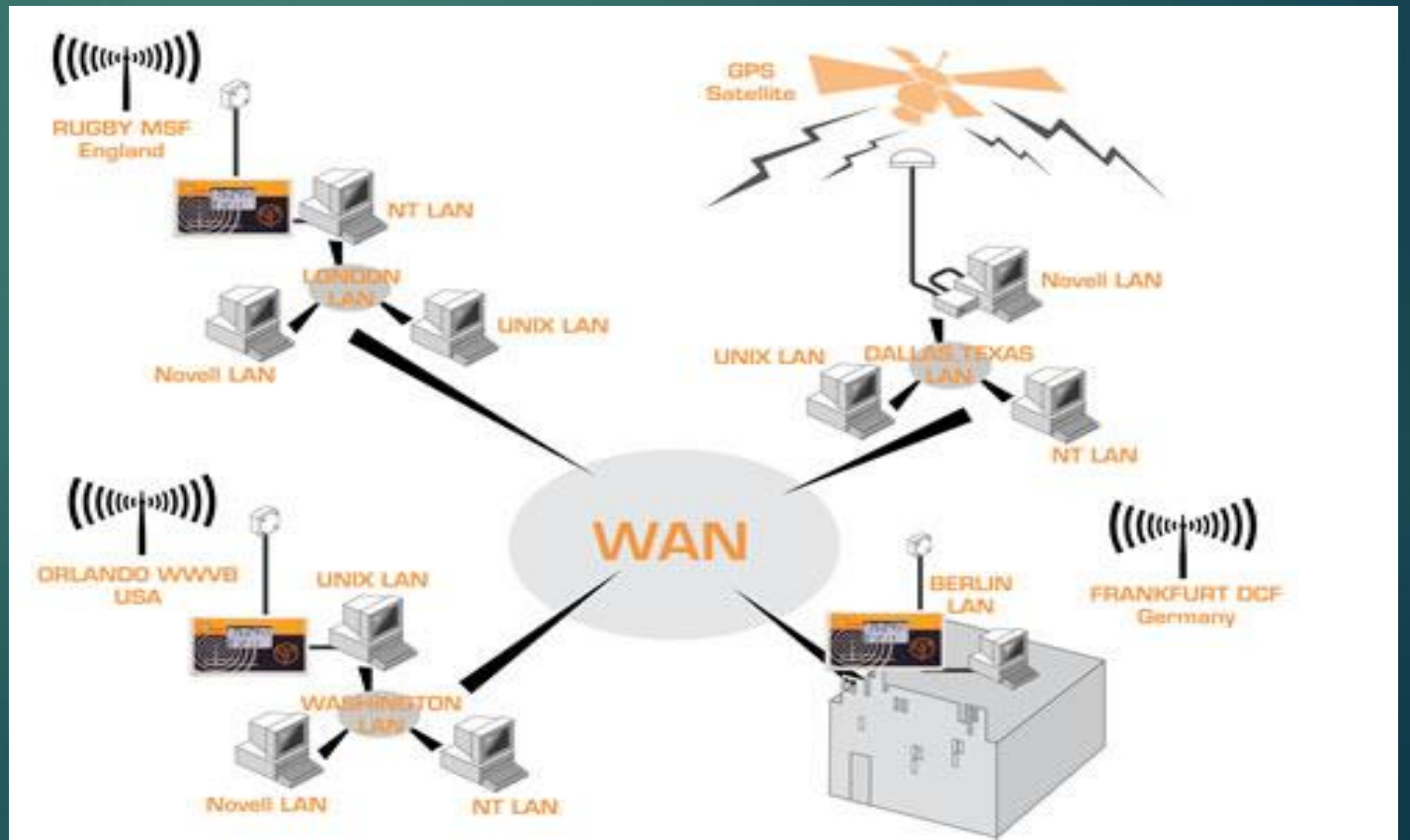
**Metropolitan area network, or MAN.**

- MAN is larger than CAN. CAN spams over several buildings in city or town.
- MAN's are typically connected using a high speed connection such as fiber optic cables.



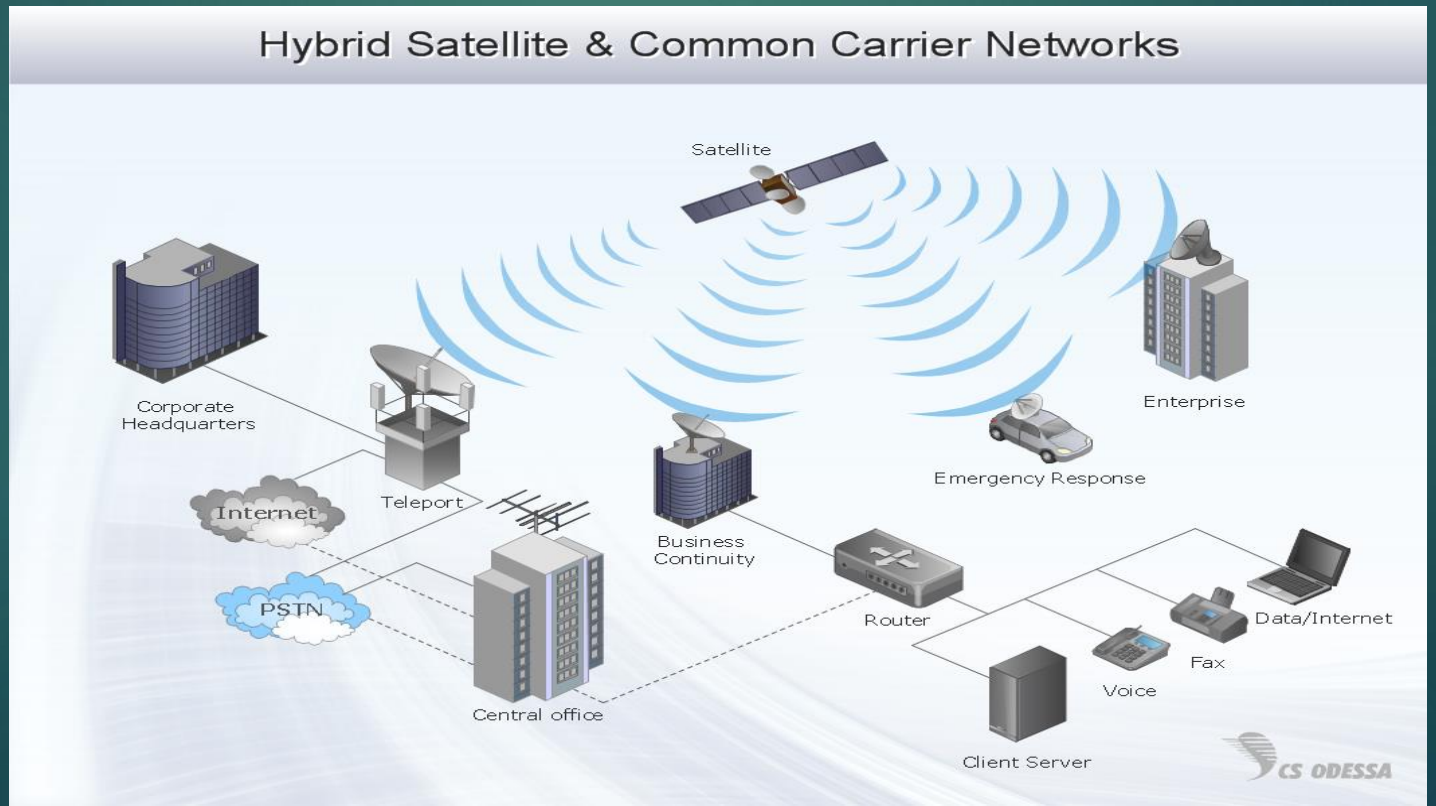
**Wide area network, or WAN.**

- WAN includes LAN's, CAN's, MAN's . It spans over large geographic area like country, continent or globe.
- Example : Internet.



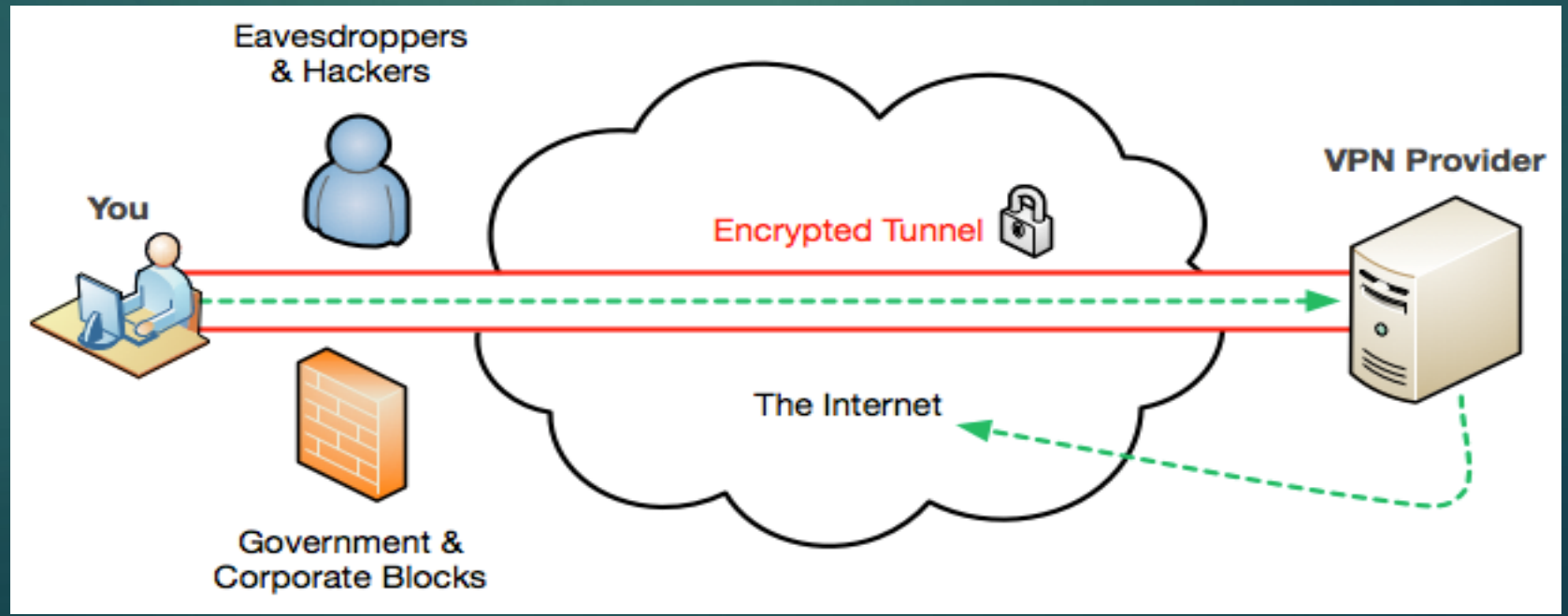
## Enterprise private network, or EPN

- An **enterprise private network** is a computer **network** built by a business to interconnect its various company sites (such as production sites, offices and shops) in order to share computer resources.



## Virtual private network (vpn)

A virtual private network (VPN) is programming that creates a safe and encrypted connection over a less secure network, such as the public internet. A VPN works by using the shared public infrastructure while maintaining privacy through security procedures and tunneling protocols. In effect, the protocols, by encrypting data at the sending end and decrypting it at the receiving end, send the data through a "tunnel" that cannot be "entered" by data that is not properly encrypted. An additional level of security involves encrypting not only the data, but also the originating and receiving network addresses.



**Network topologies :**

- Topology means the way how a network communicates with devices.

- Wired topology

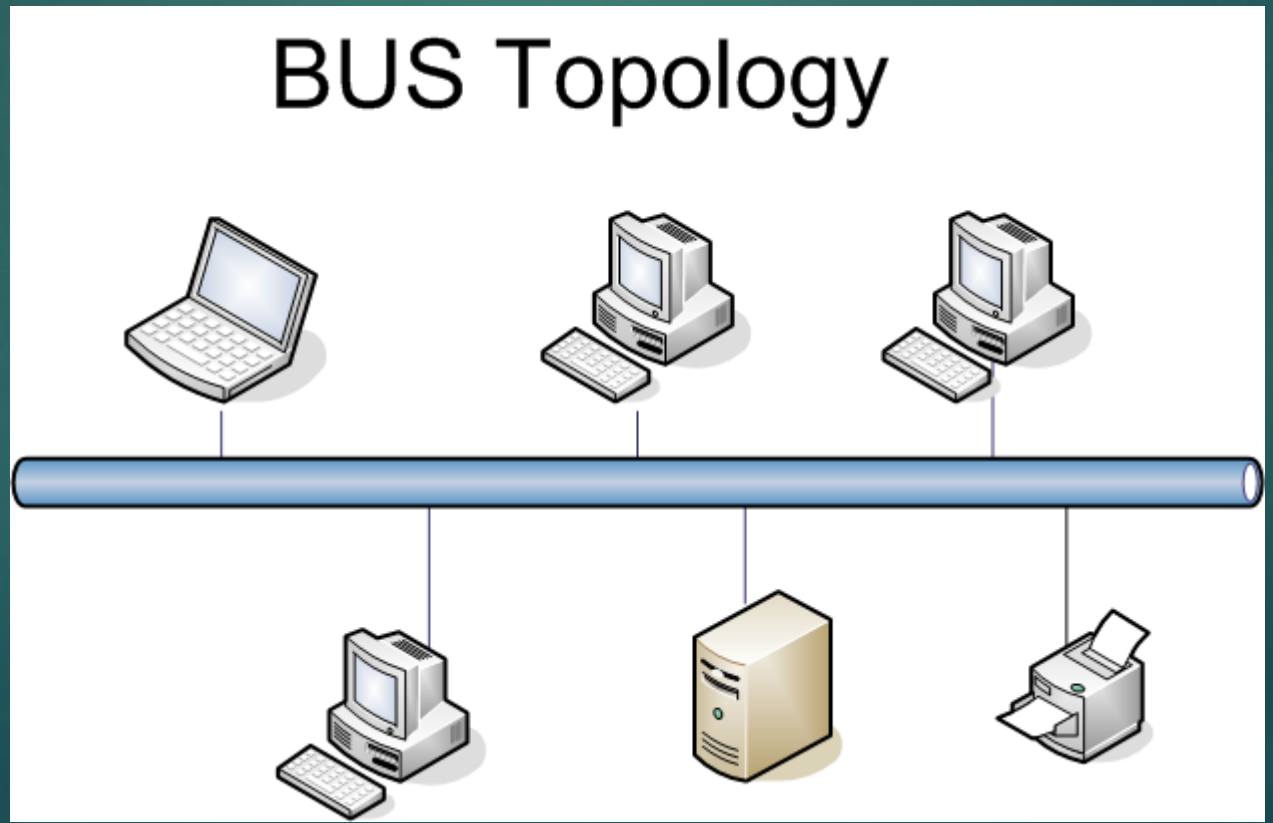
1. Star
2. Bus
3. Ring
4. Mesh
5. Hybrid

- Wireless topology

1.ADHOC

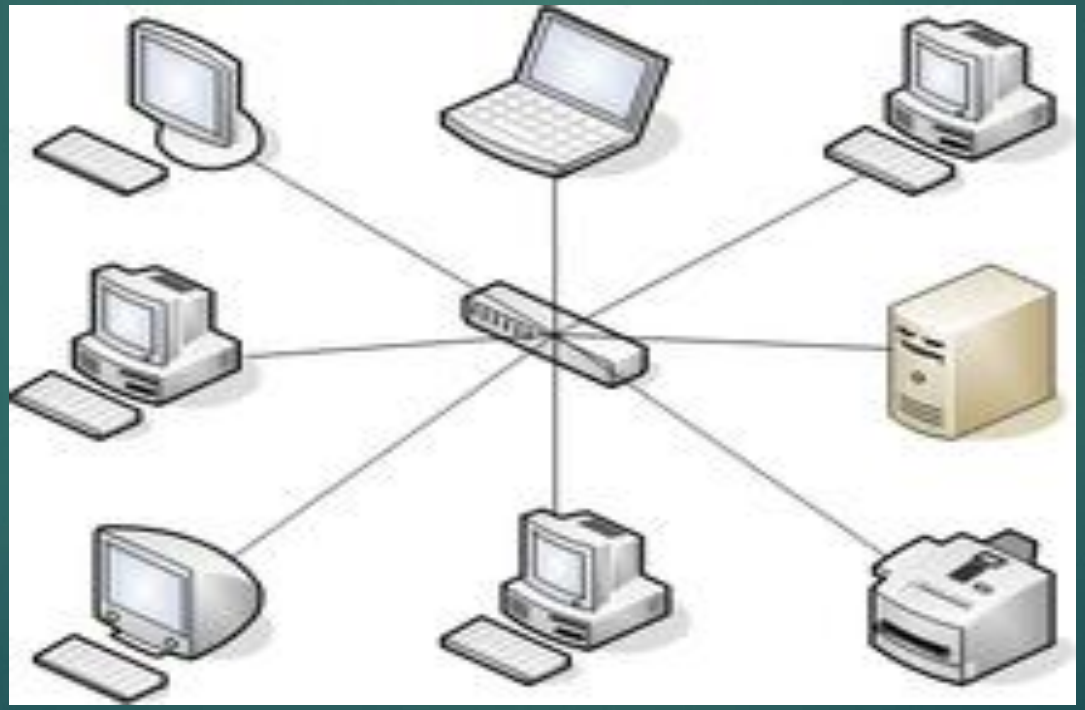
## Bus

- ,,,,,,,,,



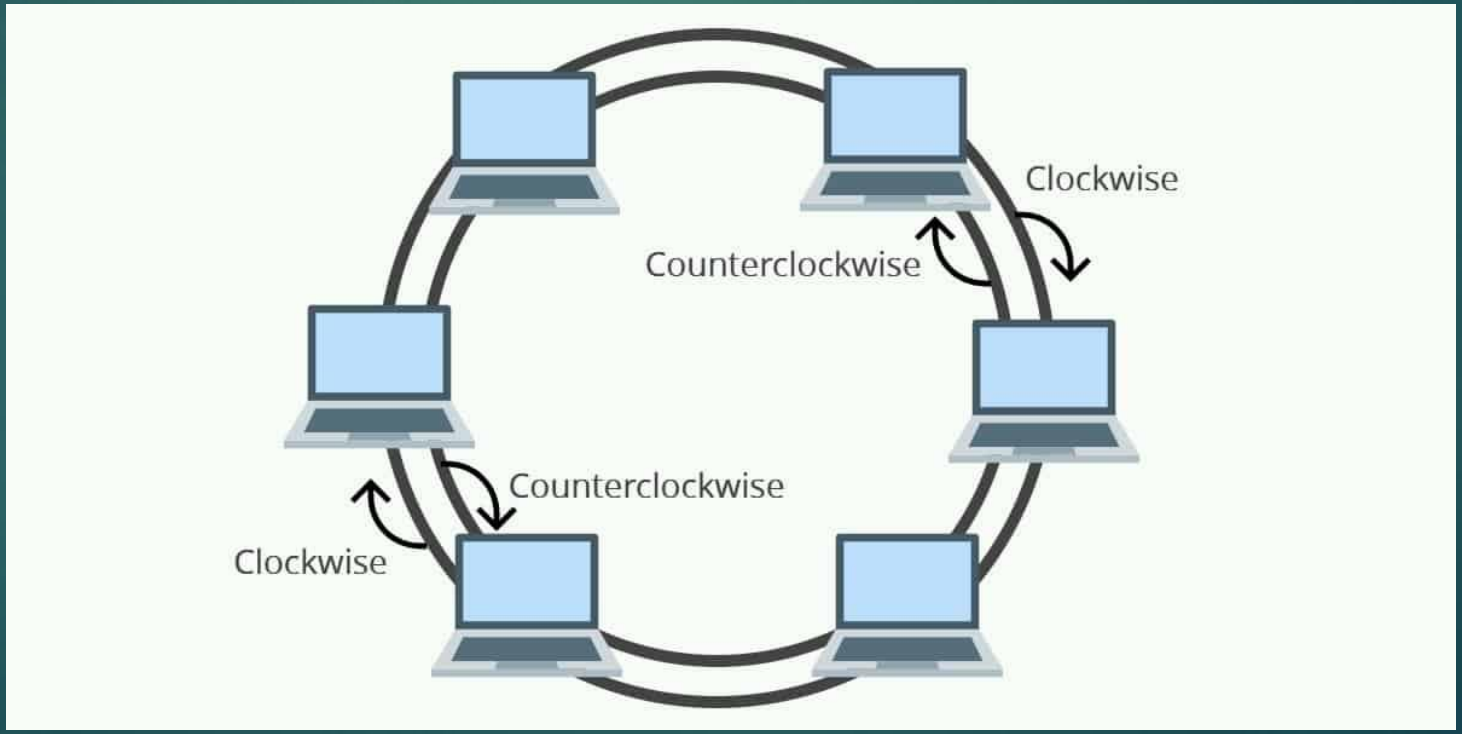
## Star topology

- ,,,,,,,,,



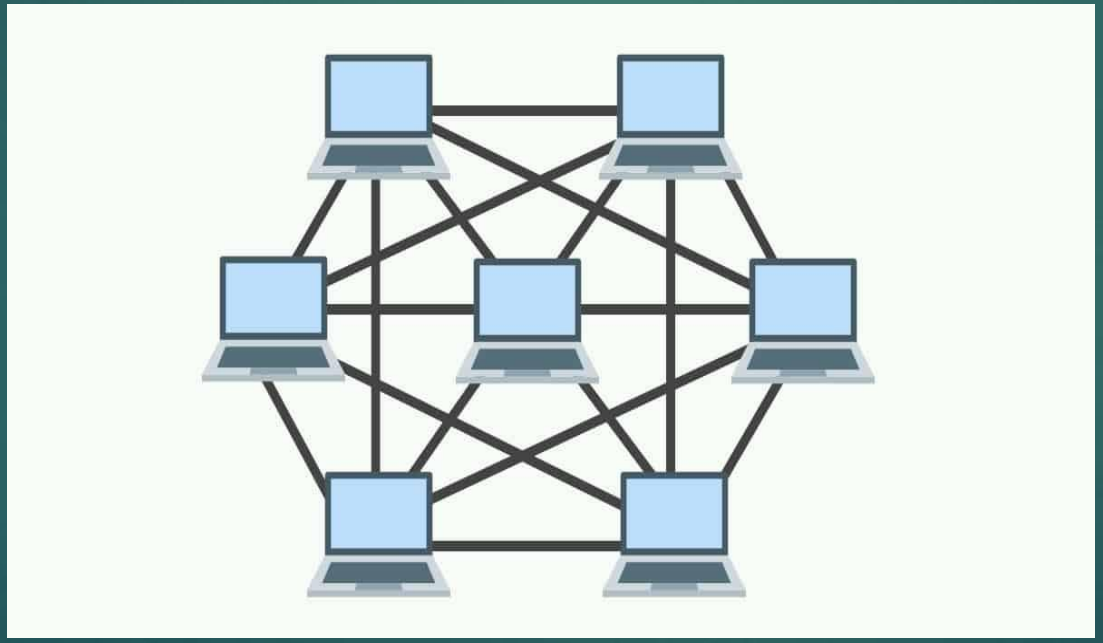
# ring

- ,,,,,,,,,


Clockwise
Counterclockwise
Counterclockwise
Clockwise

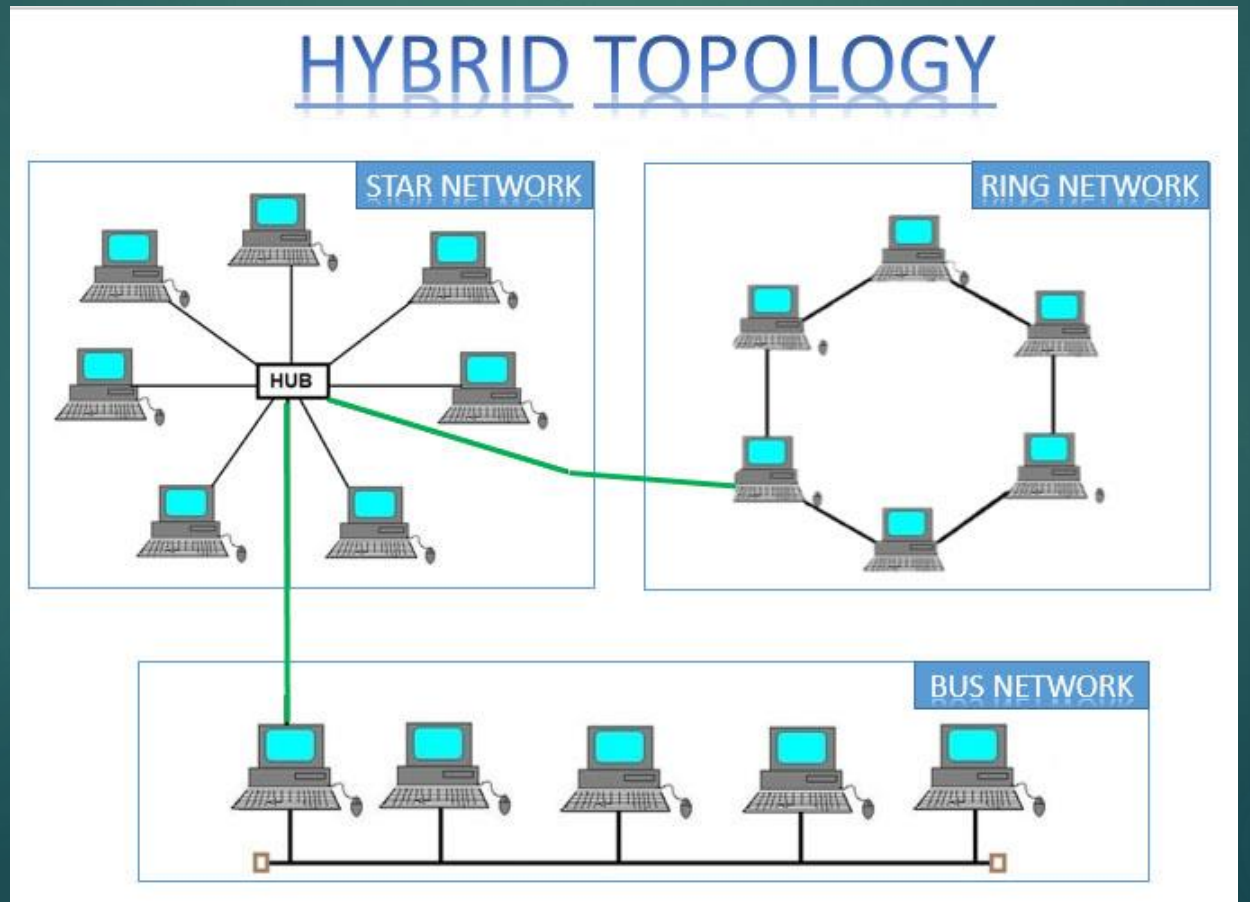
## mesh

- ,,,,,,,,,



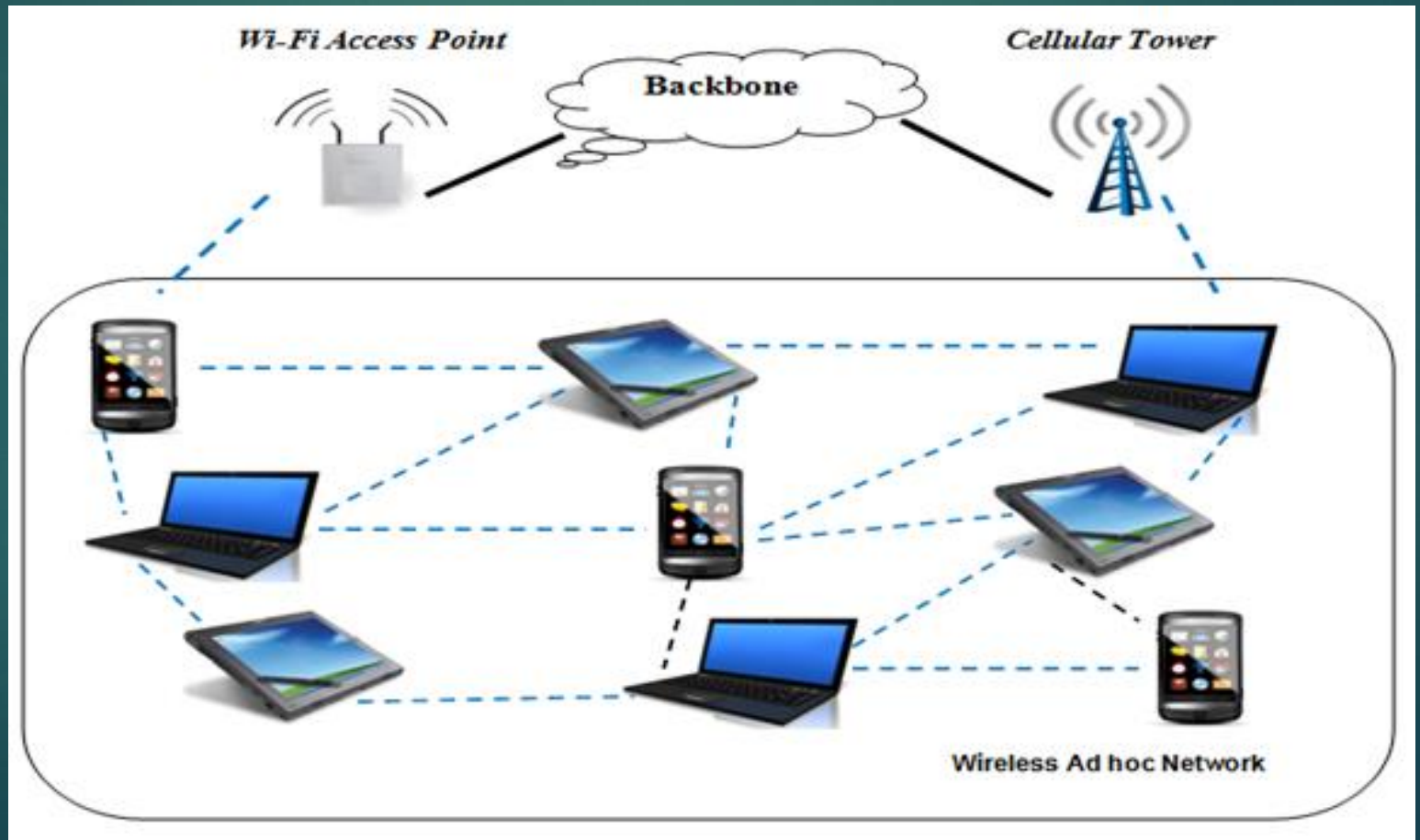
## Hybrid

- ,,,,,,,,,

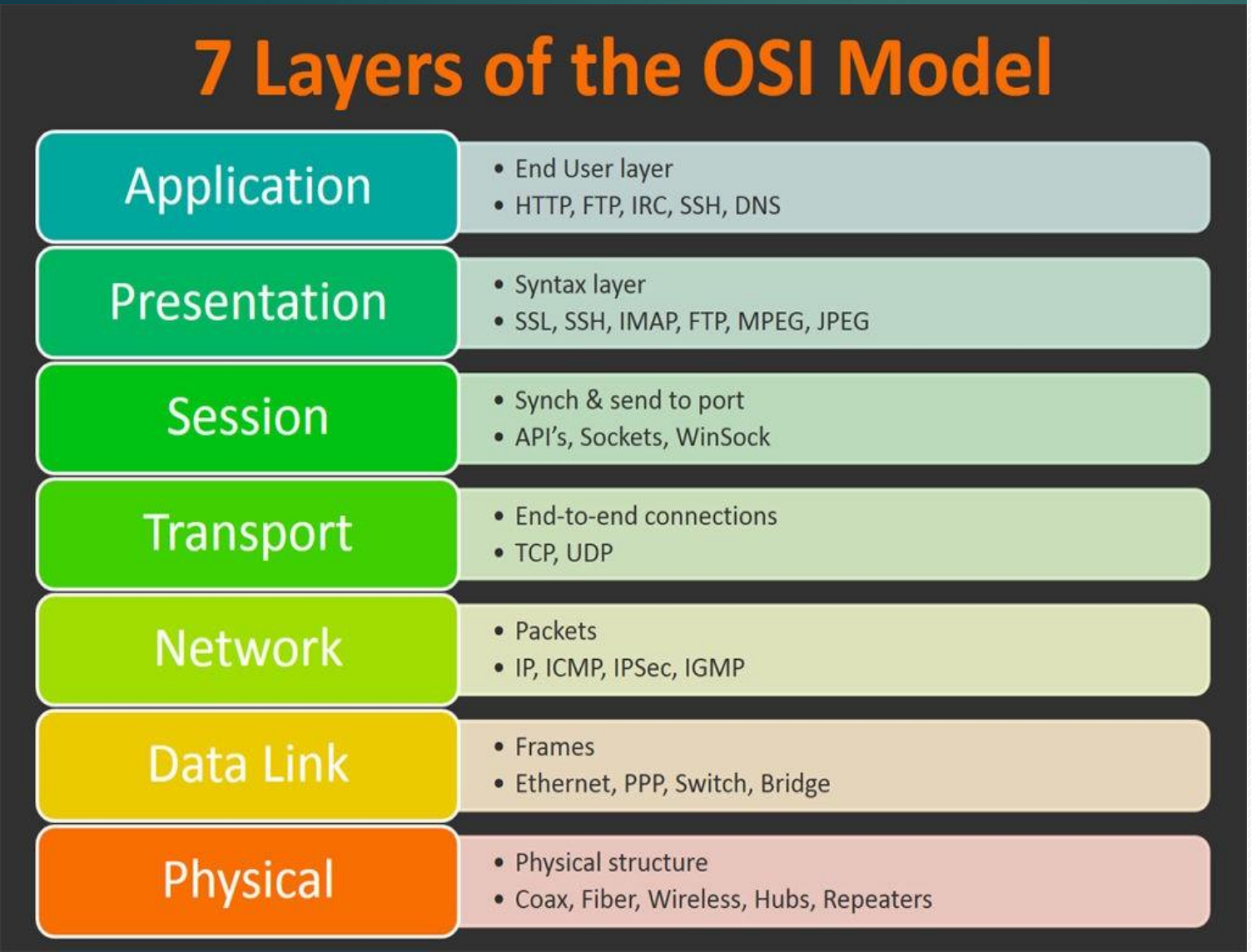


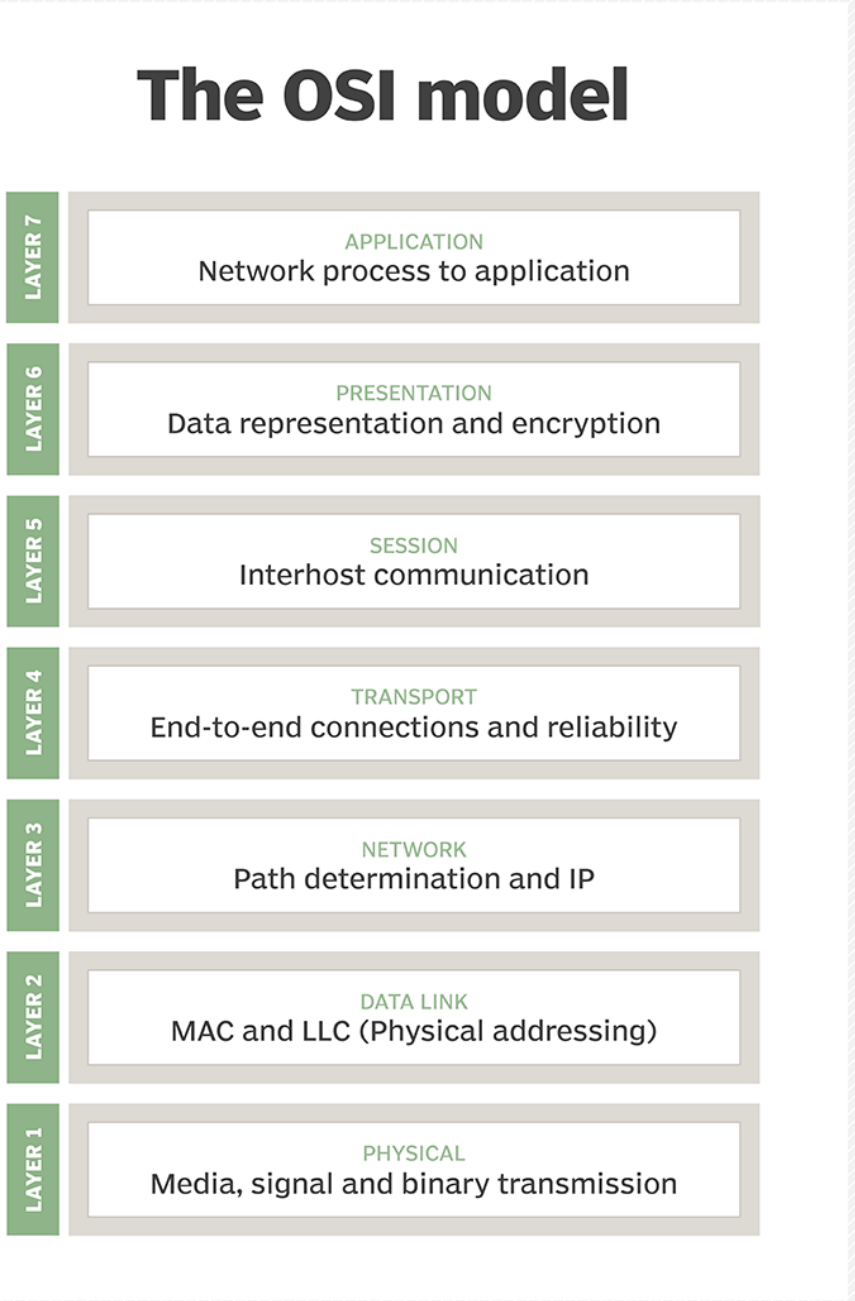
## ADHOC

- Temporary network is created in emergency situations.



# OSI (open systems Interconnection)




A helpful guide
TCP
data
UDP
data

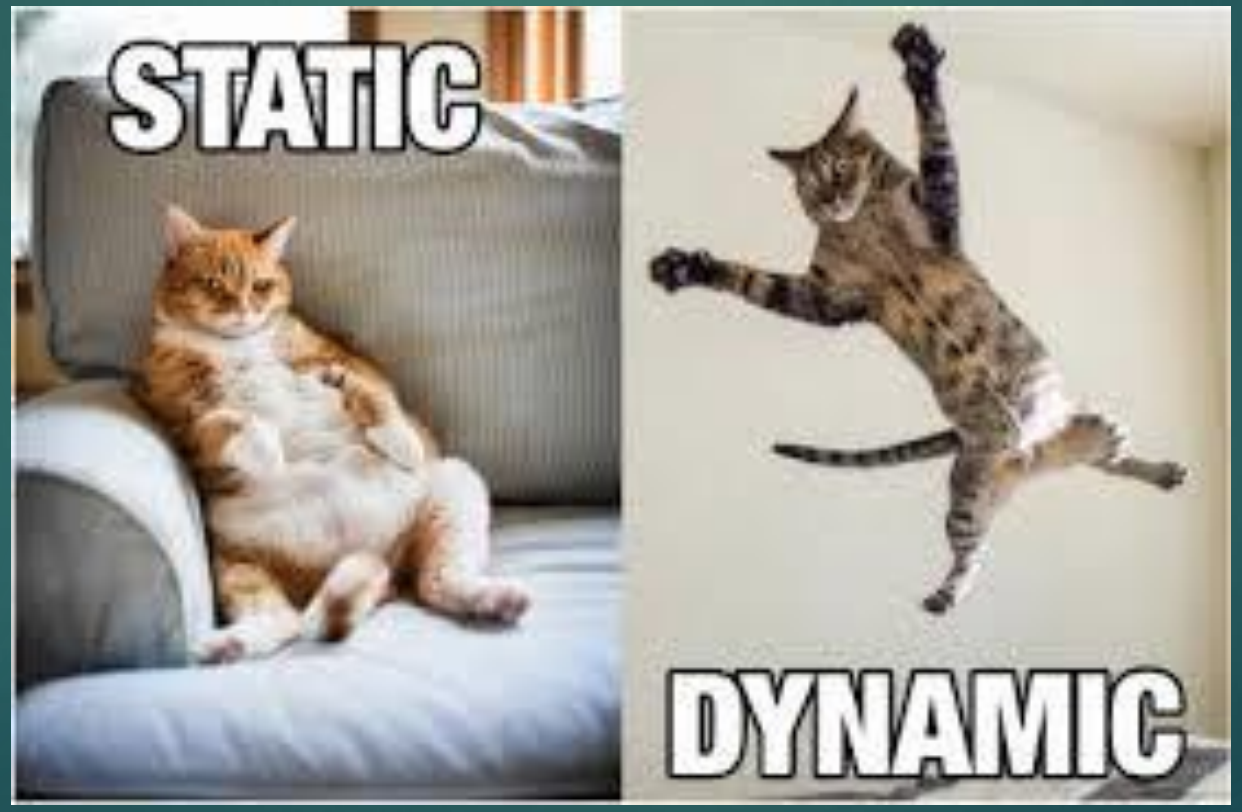
# Important Ports and protocols

| PORT NUMBER | TRANSPORT PROTOCOL | SERVICE NAME | RFC |
|---|---|---|---|
| 20, 21 | TCP | File Transfer Protocol (FTP) | RFC 959 |
| 22 | TCP and UDP | Secure Shell (SSH) | RFC 4250-4256 |
| 23 | TCP | Telnet | RFC 854 |
| 25 | TCP | Simple Mail Transfer Protocol (SMTP) | RFC 5321 |
| 53 | TCP and UDP | Domain Name Server (DNS) | RFC 1034-1035 |
| 67, 68 | UDP | Dynamic Host Configuration Protocol (DHCP) | RFC 2131 |
| 69 | UDP | Trivial File Transfer Protocol (TFTP) | RFC 1350 |
| 80 | TCP | HyperText Transfer Protocol (HTTP) | RFC 2616 |
| 110 | TCP | Post Office Protocol (POP3) | RFC 1939 |
| 119 | TCP | Network News Transport Protocol (NNTP) | RFC 8977 |
| 123 | UDP | Network Time Protocol (NTP) | RFC 5905 |
| 135-139 | TCP and UDP | NetBIOS | RFC 1001-1002 |
| 143 | TCP and UDP | Internet Message Access Protocol (IMAP4) | RFC 3501 |
| 161, 162 | TCP and UDP | Simple Network Management Protocol (SNMP) | RFC 1901-1908, 3411-3418 |
| 179 | TCP | Border Gateway Protocol (BGP) | RFC 4271 |
| 389 | TCP and UDP | Lightweight Directory Access Protocol | RFC 4510 |
| 443 | TCP and UDP | HTTP with Secure Sockets Layer (SSL) | RFC 2818 |
| 500 | UDP | Internet Security Association and Key Management Protocol (ISAKMP) / Internet Key Exchange (IKE) | RFC 2408 - 2409 |
| 636 | TCP and UDP | Lightweight Directory Access Protocol over TLS/SSL (LDAPS | RFC 4513 |
| 989/990 | TCP | FTP over TLS/SSL | RFC 4217 |

| Class | Address range | Supports |
|---|---|---|
| **Class A** | 1.0.0.1 to 126.255.255.254 | Supports 16 million hosts on each of 127 networks. |
| **Class B** | 128.1.0.1 to 191.255.255.254 | Supports 65,000 hosts on each of 16,000 networks. |
| **Class C** | 192.0.1.1 to 223.255.254.254 | Supports 254 hosts on each of 2 million networks. |
| **Class D** | 224.0.0.0 to 239.255.255.255 | Reserved for multicast groups. |
| **Class E** | 240.0.0.0 to 254.255.255.254 | Reserved for future use, or research and development purposes. |

| | | | | |
|---|---|---|---|---|
| **In decimal:** | 255 | 255 | 255 | 255 |
| **In binary:** | 11111111 | 11111111 | 11111111 | 11111111 |
| **In octal:** | 377 | 377 | 377 | 377 |
| **In hexadecimal:** | FF | FF | FF | FF |

# STATIC IP AND DYNAMIC IP



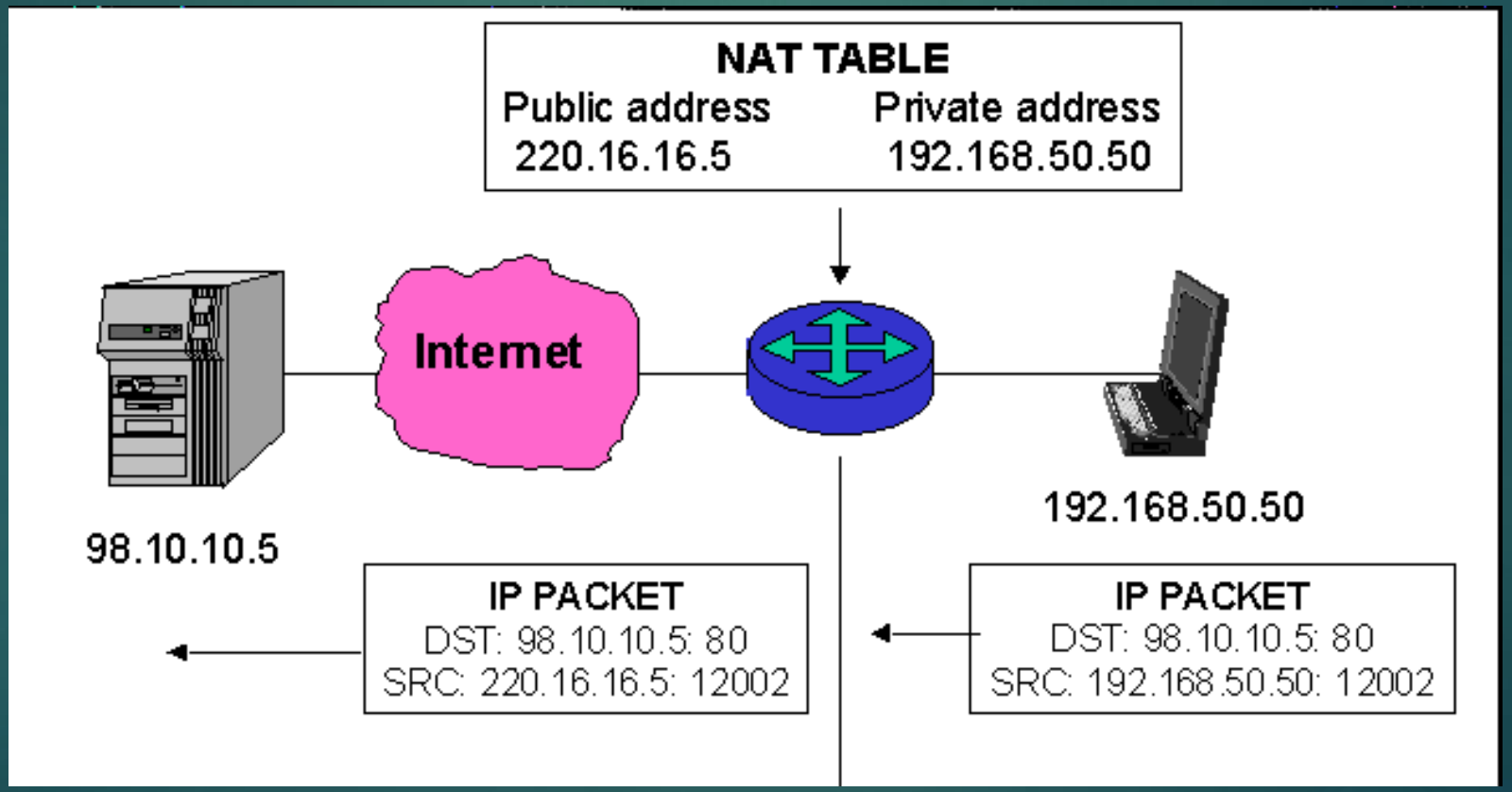
# Routers,switches and hubs

router

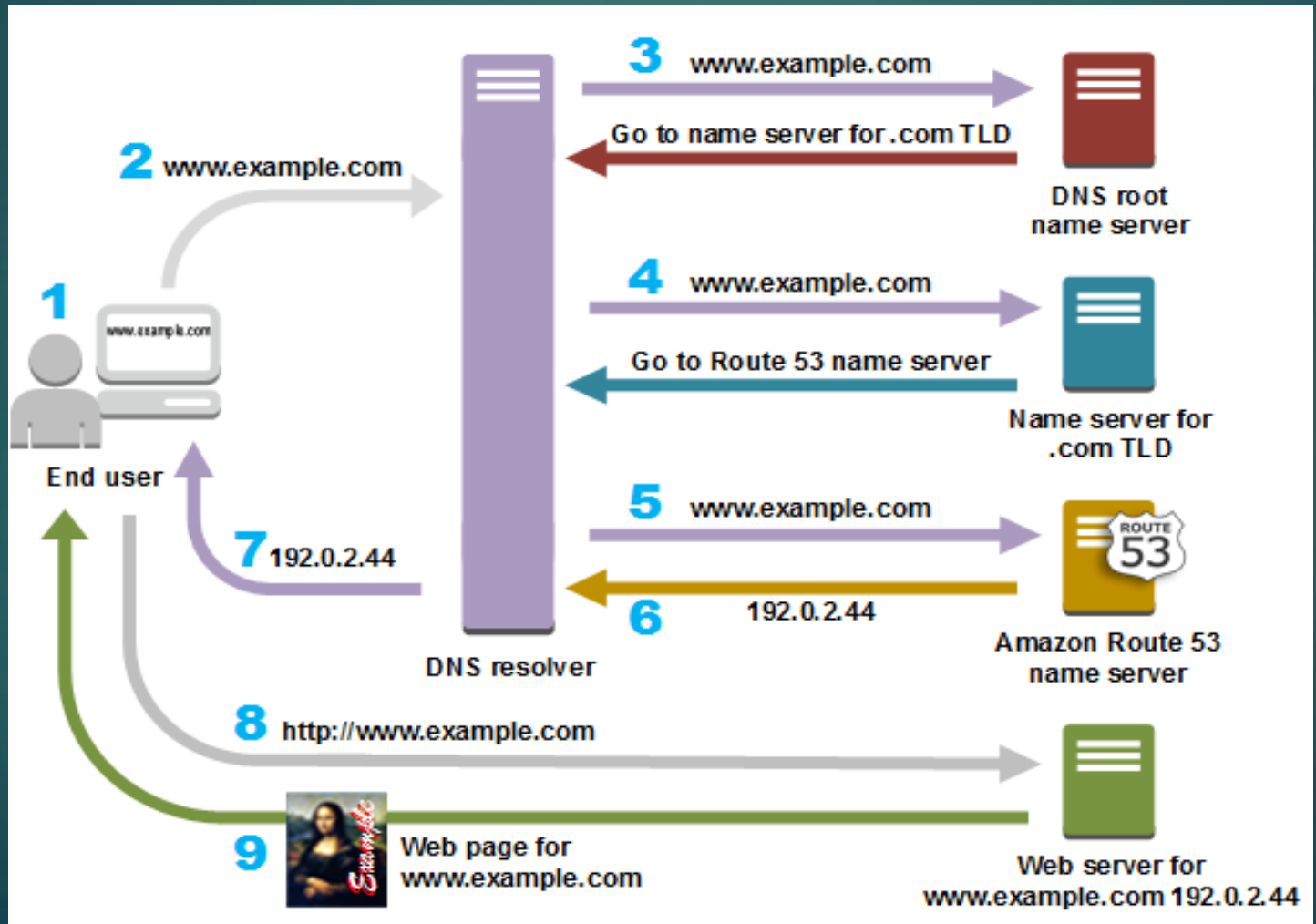
Hub

Switch

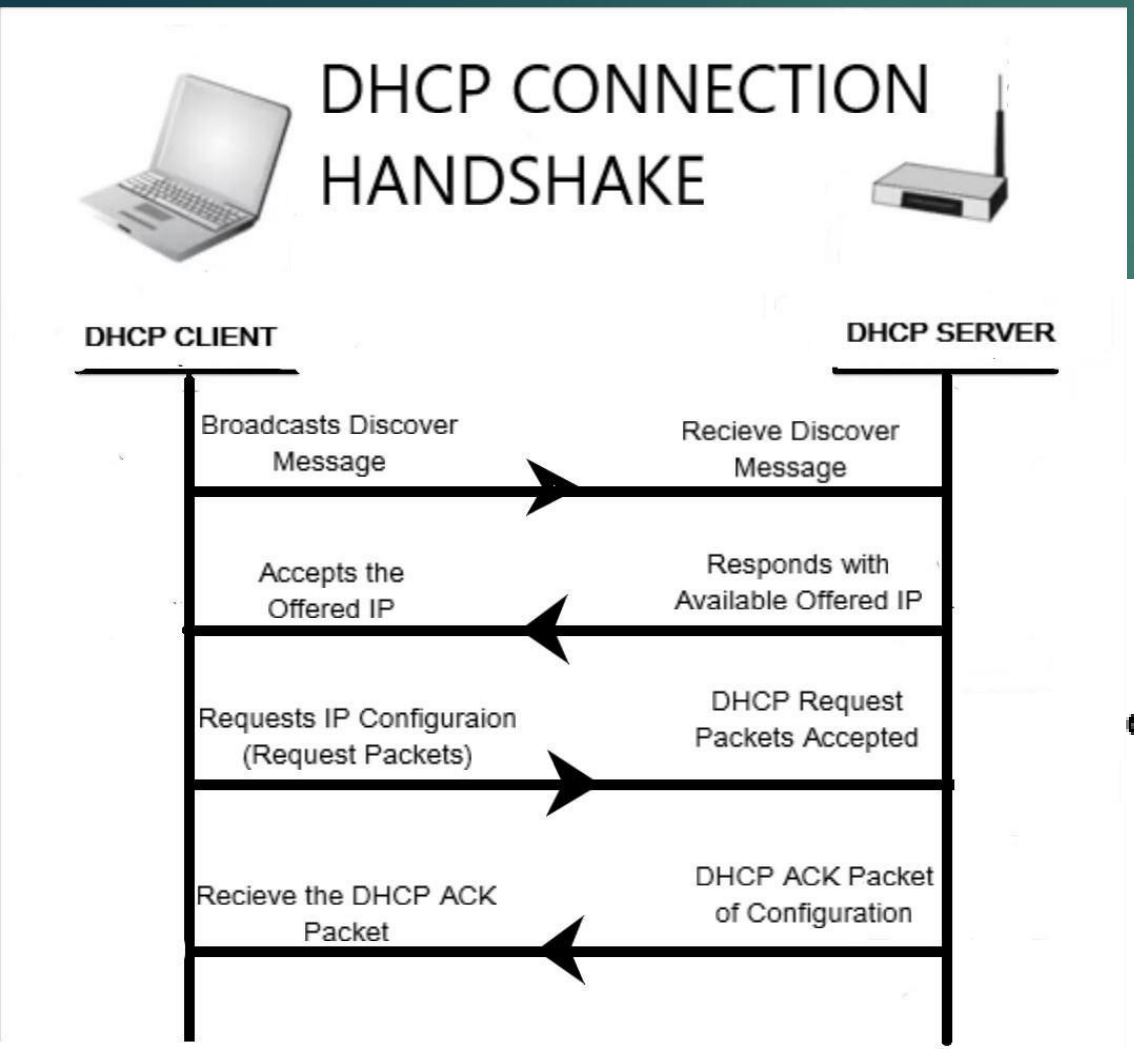
# ROUTERS

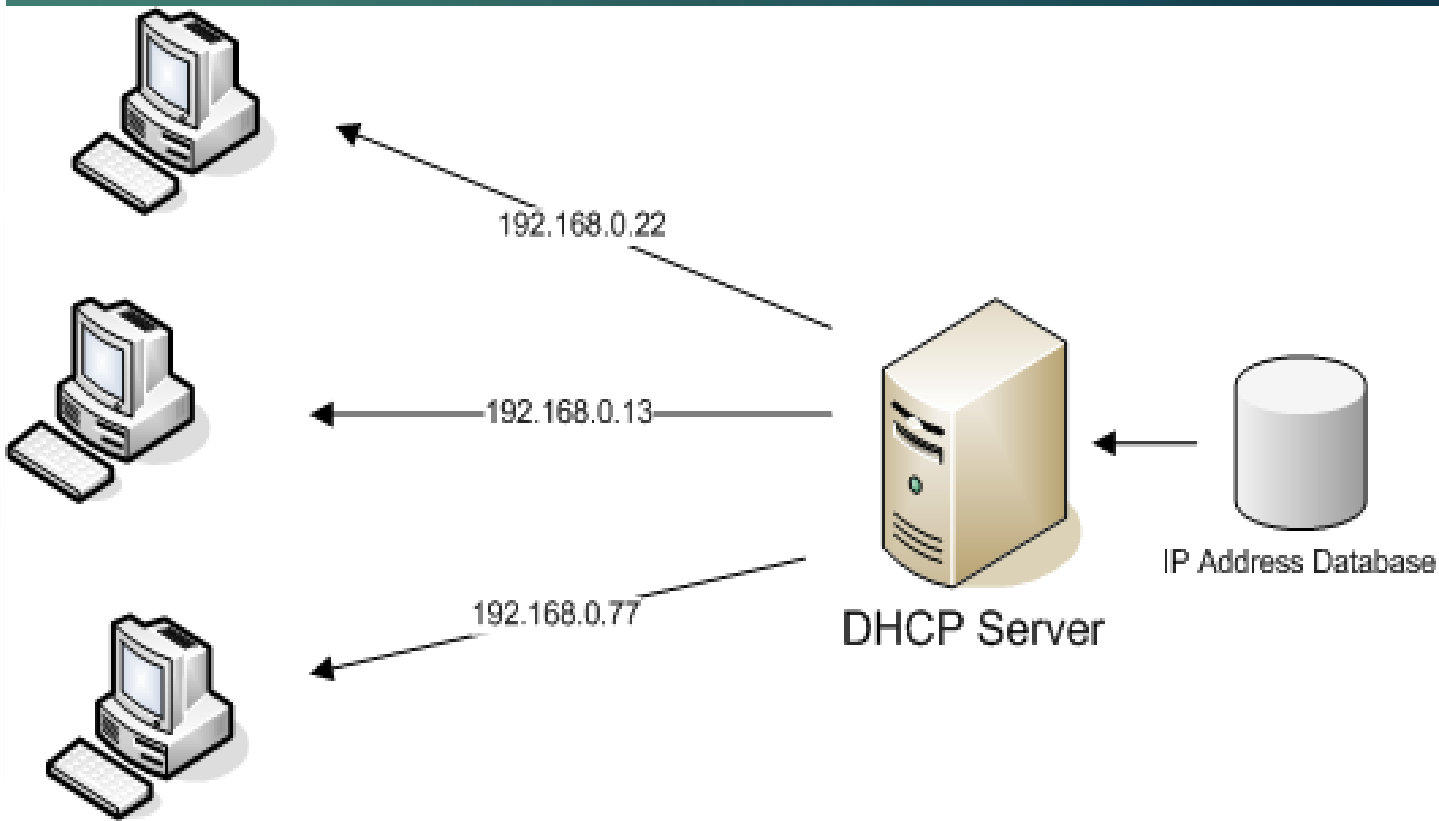

NAT TABLE
Public address
220.16.16.5
Private address
192.168.50.50
Internet
98.10.10.5
192.168.50.50
IP PACKET
DST: 98.10.10.5: 80
SRC: 220.16.16.5: 12002
IP PACKET
DST: 98.10.10.5: 80
SRC: 192.168.50.50: 12002

# DNS(domain name systems)



# DHCP(dynamic host configuration protocol)



# DHCP on a router works like…