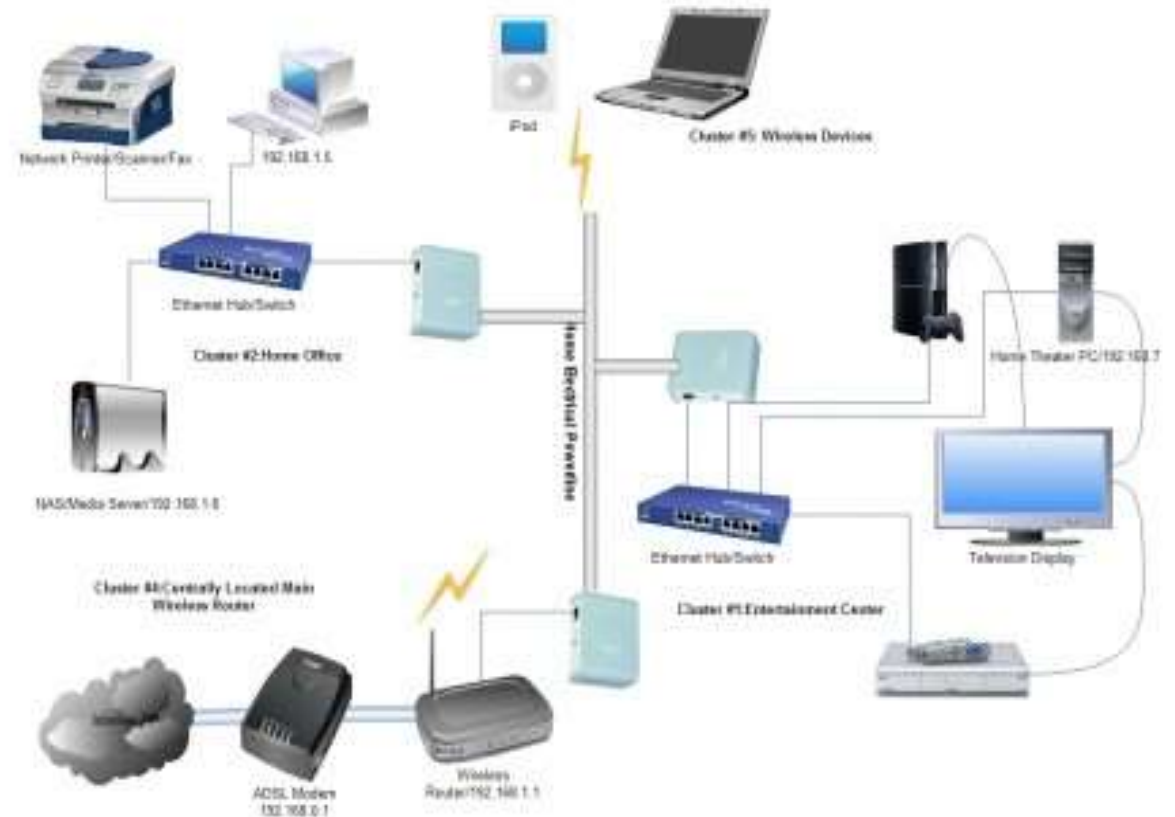


# *Network Devices*

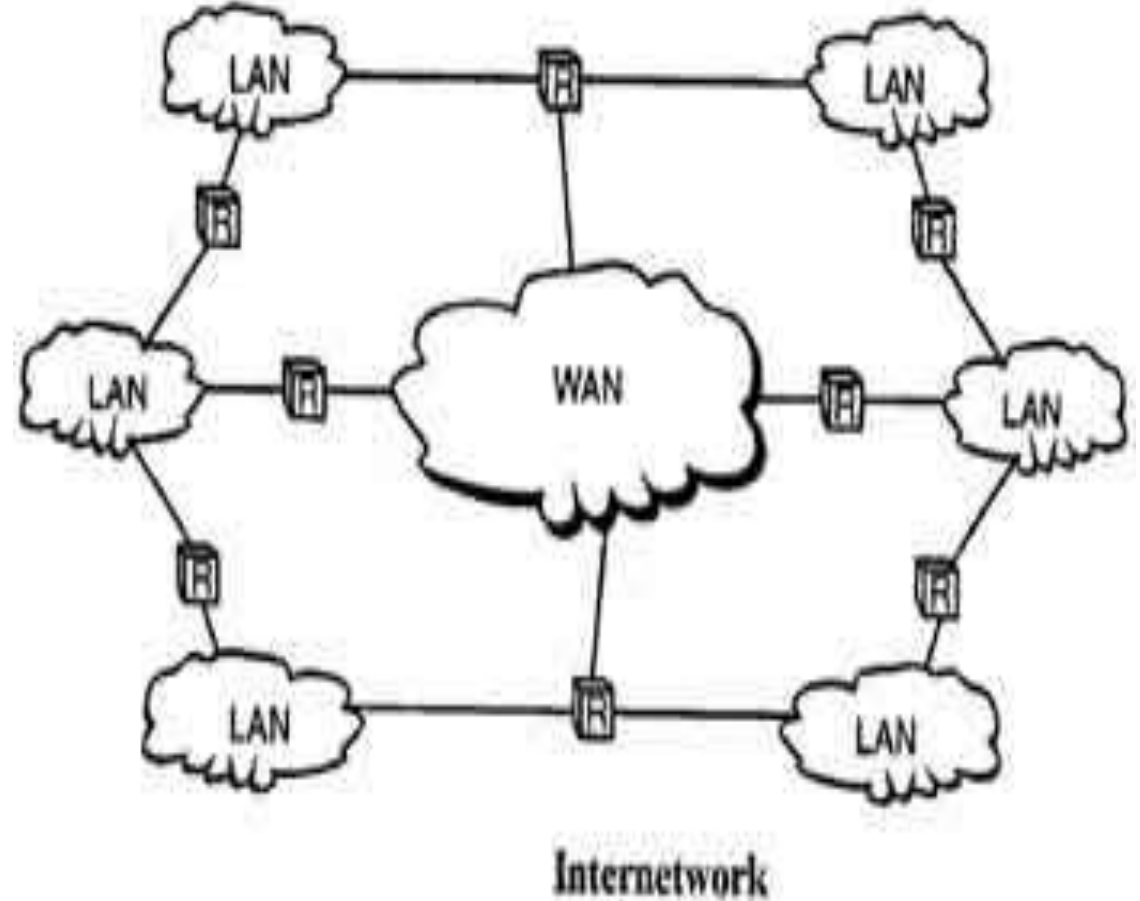
# Topics

- ☐ Introduction
- ☐ Repeater
- ☐ Router
- ☐ Brouter
- ☐ Hub
- ☐ Switches
- ☐ Bridge
- ☐ NIC
- ☐ Gateway

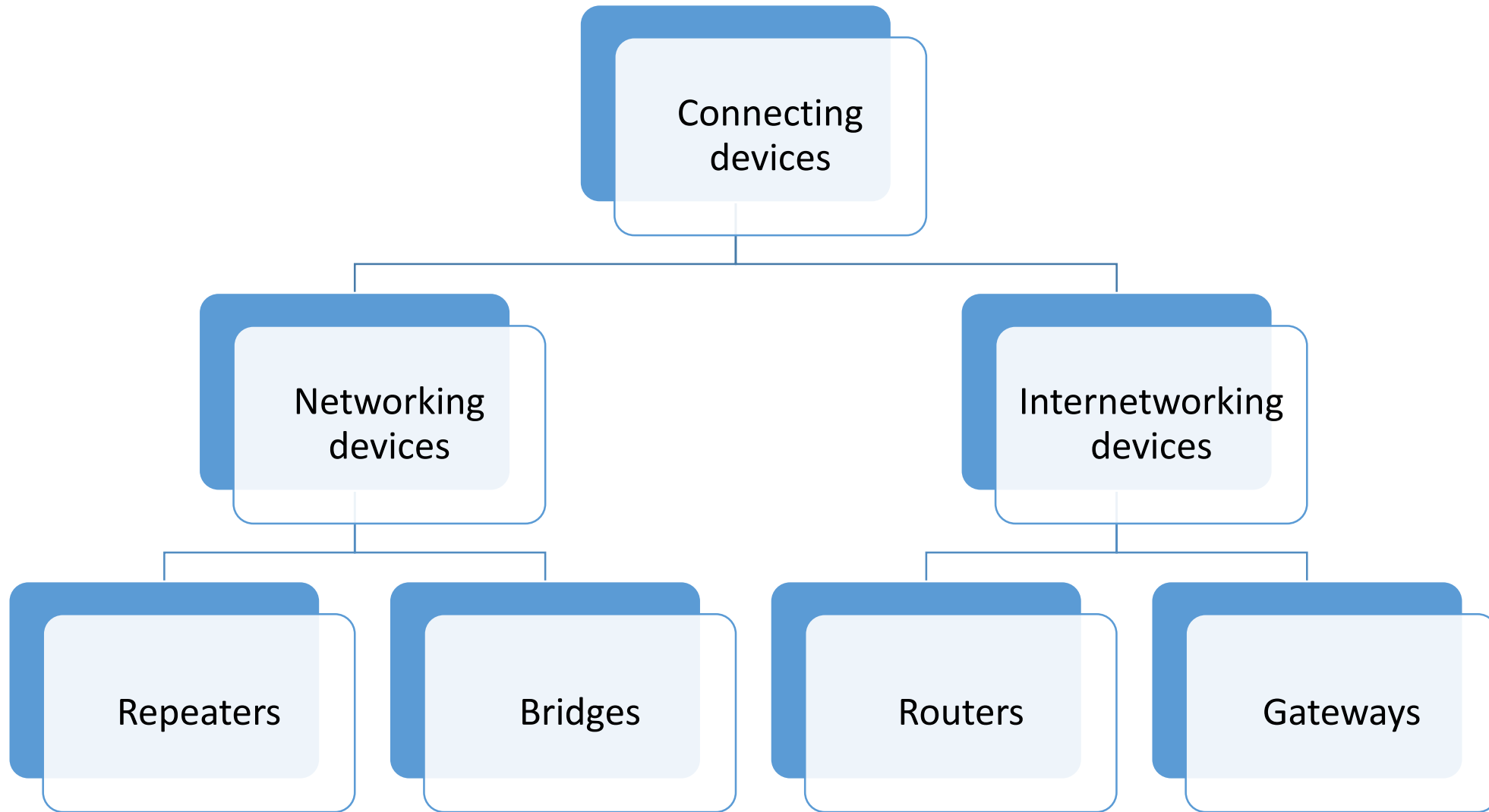


# What is internetwork?

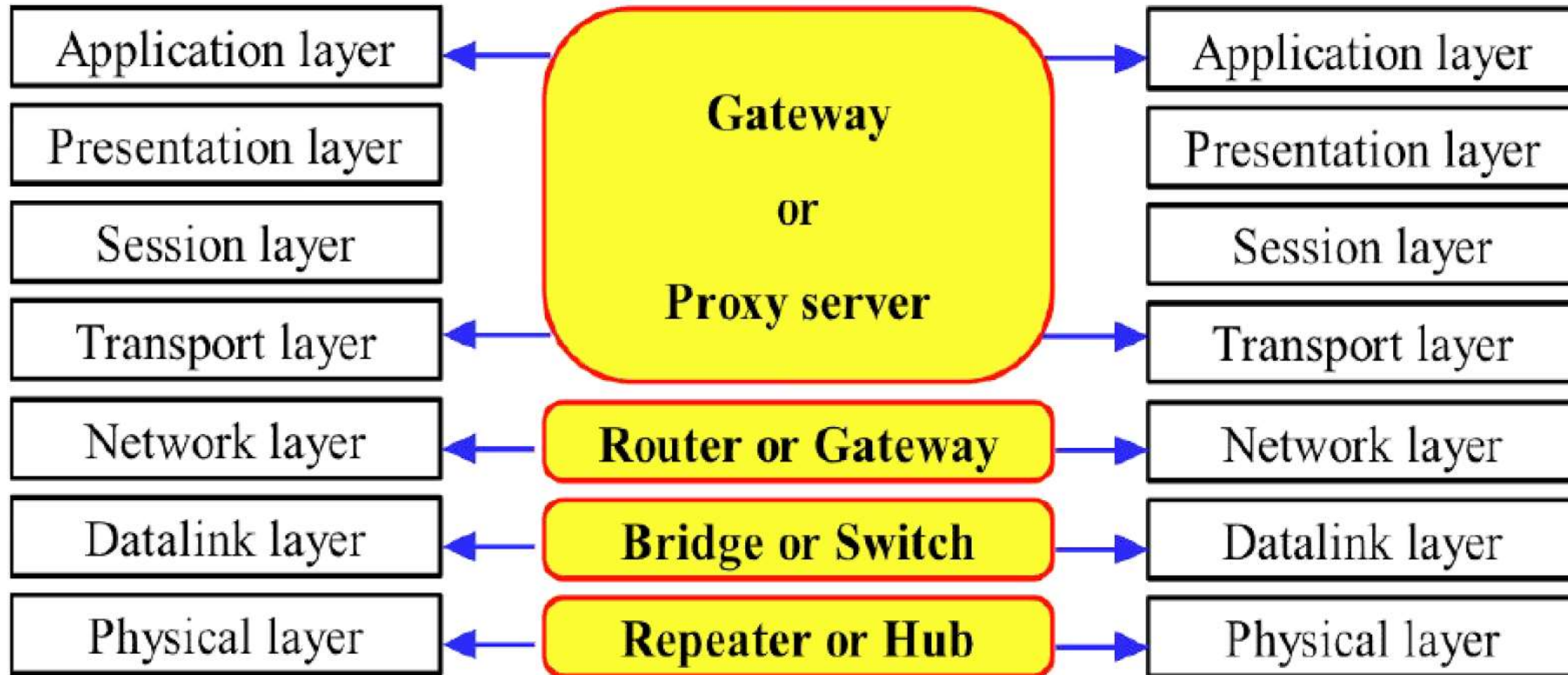
When two or more networks or subnets connected to each other for communication between hosts on different types of network then it forms internetwork.



# Connecting devices

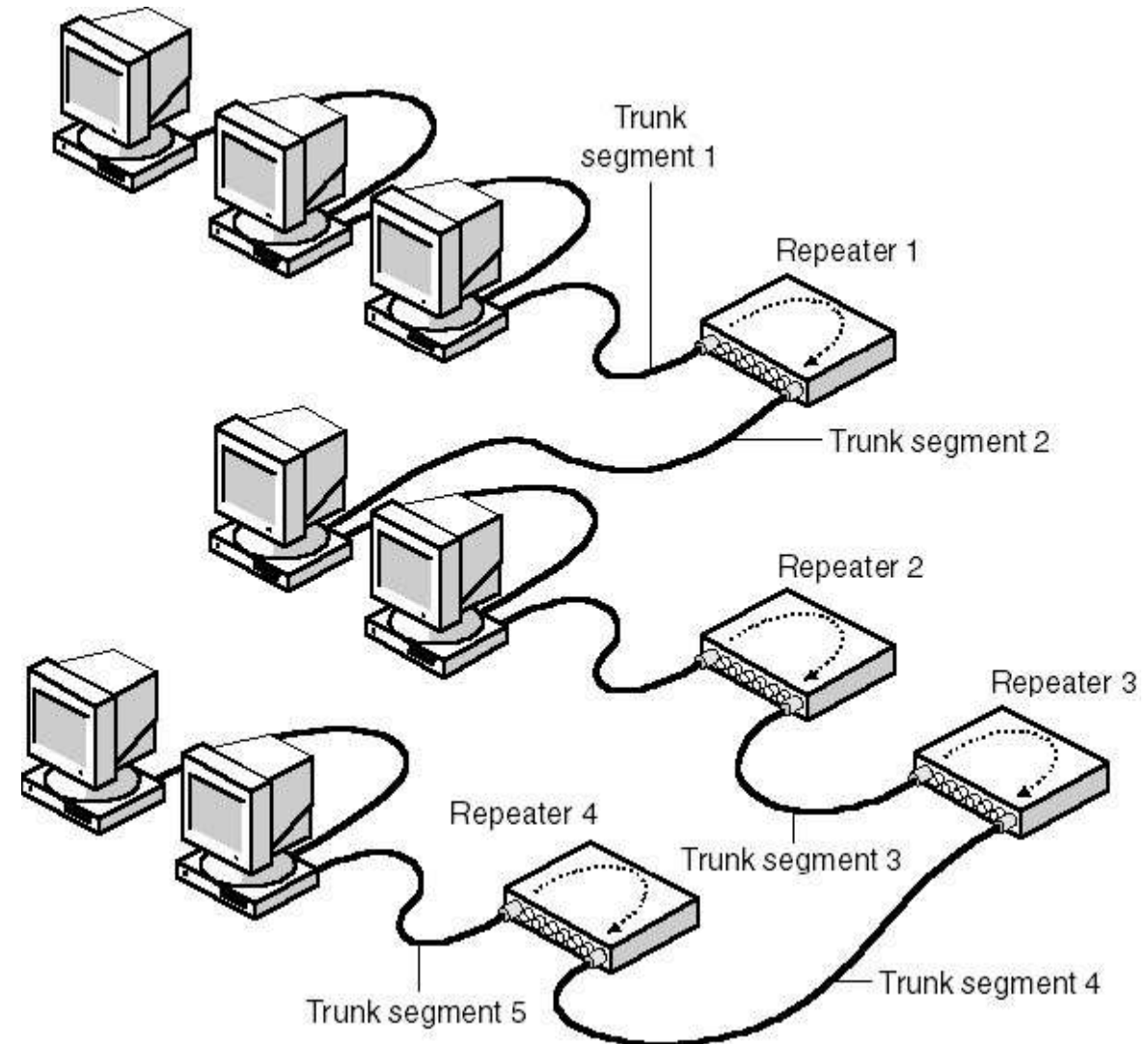


# Connecting devices and OSI model



# Repeater

- Repeater operates on physical layer.
- It receives the signal before it becomes corrupted and regenerates the original bit pattern.
- It allows to extend the physical length of the network.
- It doesn't change the functionality of network.



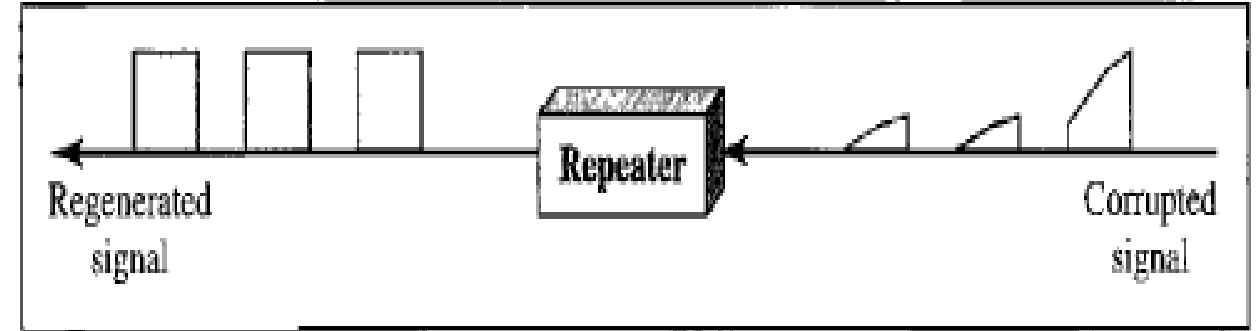
# **Has three basic functions:**

- 1.Receives a signal which it cleans up
- 2.Re-times the signal to avoid collisions
- 3.Transmits the signal on to the next segment

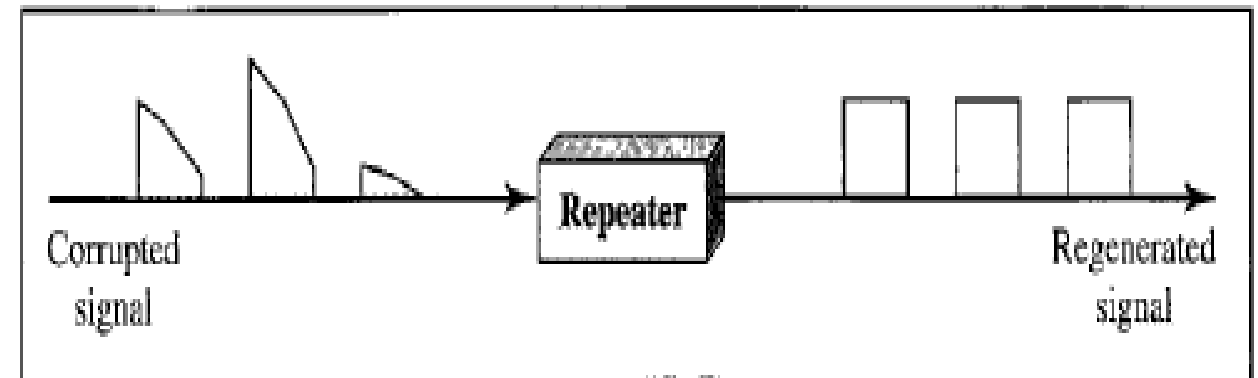


# Not an amplifier

- An amplifier can't discriminate between the intended signal and noise; it amplifies everything fed in to it.
- A repeater does not amplify the signal, it regenerates it.



a. Right-to-left transmission.



b. Left-to-right transmission.

# Advantages

- Can connect different types of media
- Can extend the network in terms of distance

# Disadvantages

- Can not filter the data
- Can not connect different network architectures

# Router

- Routers operate in the physical, datalink and network layers.
- It chooses the best optimum path from available paths.
- Can interconnect different networks.
- Simplest function of routers is to receive packets from one connected network and pass them to second connected network.



A router determines how information is passed in the most efficient manner.

# Two primary functions:

- 1.To determine the best path
- 2.To share details of routes with other router.

Routers consults with a routing table.

## **Routing table**

- Routers forward packets to other network by maintaining information about other networks in a database called a routing table

# **Types of routers**

## **Static router**

Routes are manually configured by a network administrator.

## **Dynamic router**

Adjust automatically to changes in network topology and informations it receives from other routers.

# Routing concepts:

## *Least-cost routing*

In this, decision is based on efficiency of network, cheapest and shortest path.

## Non-adaptive routing

In non adaptive routing in which once a path way to destination has been selected, the router sends all packets for that destination along that one route.

## *Adaptive routing*

In adaptive routing router send the packets depending on which route is most efficient at the moment.

# Advantages

- Can function in LAN or WAN
- Connects differing media
- Can determine best path or route

# Disadvantages

- Expensive
- Must use routable protocols
- Slower than a bridge

# Brouters

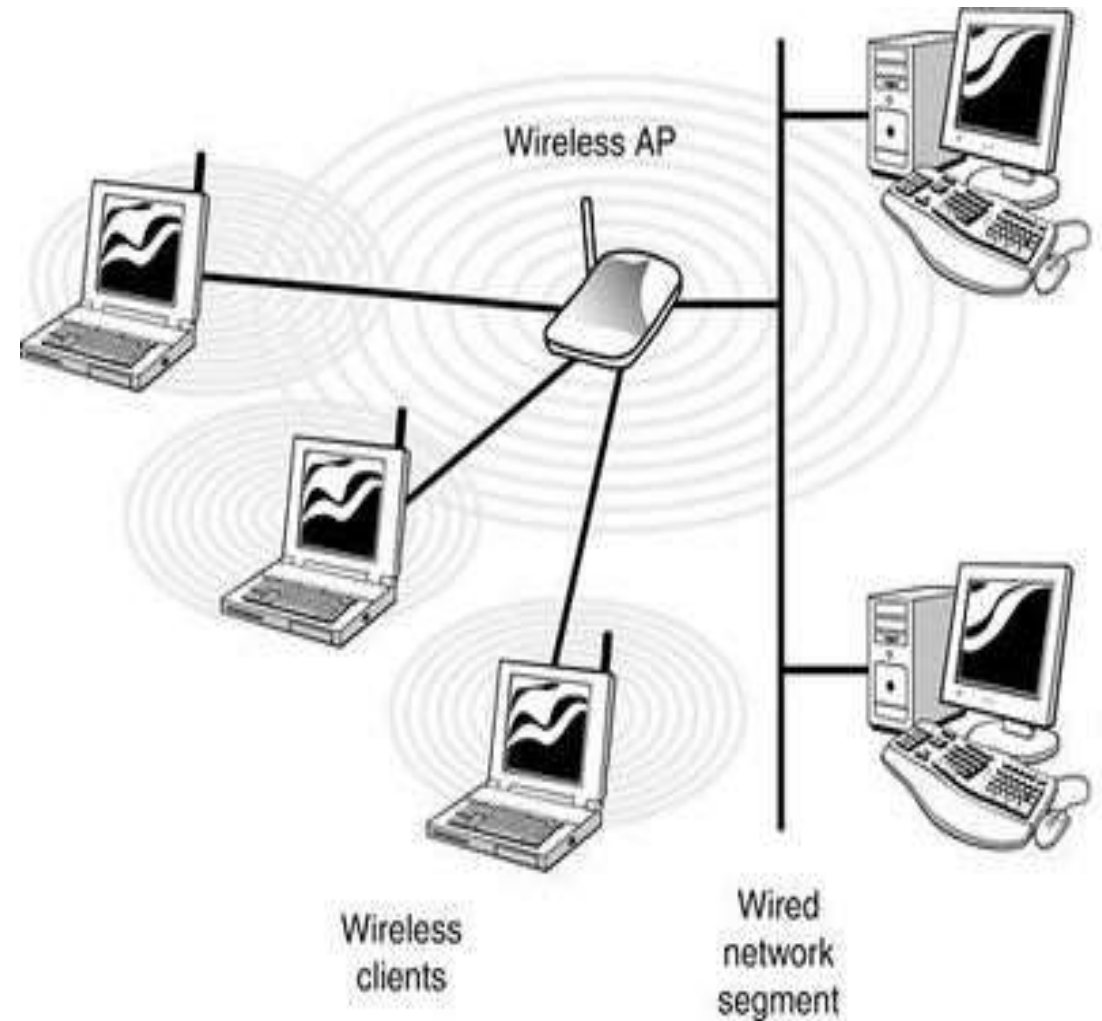
- Brouters are a combination of router and bridge.
- Brouters are operated in network layer(routable protocols) & data link layer(non-routable protocols).
- Brouter provides combine features of router for routing protocol & bridge for non-routable protocol.





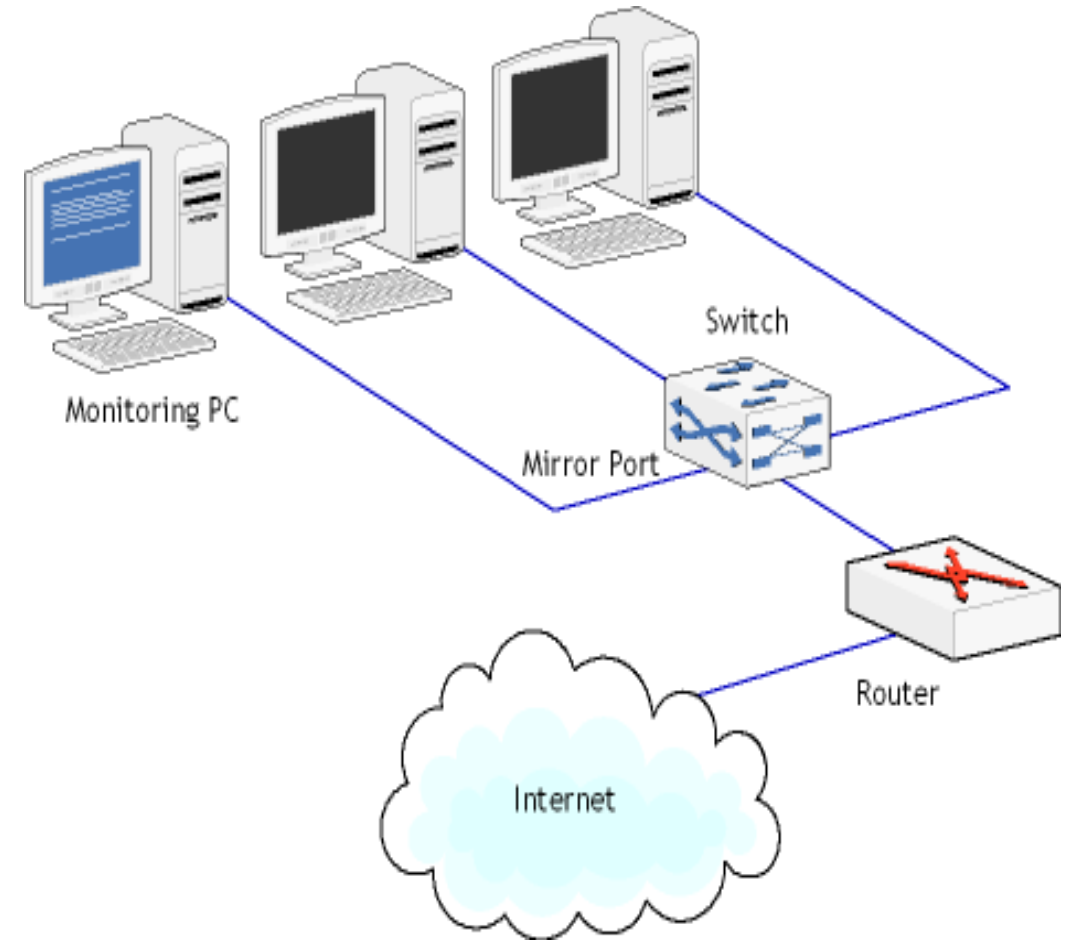
# Access point:

- It is hardware or software that acts as a communication hub for users of wireless device to connect to wired LANs.
- It provides higher wireless security.



# Workstation:

- It is an individual single user computer which is connected with server.
- It has communication capabilities.
- It has two types:
  1. Diskless
  2. Computer with hard disk



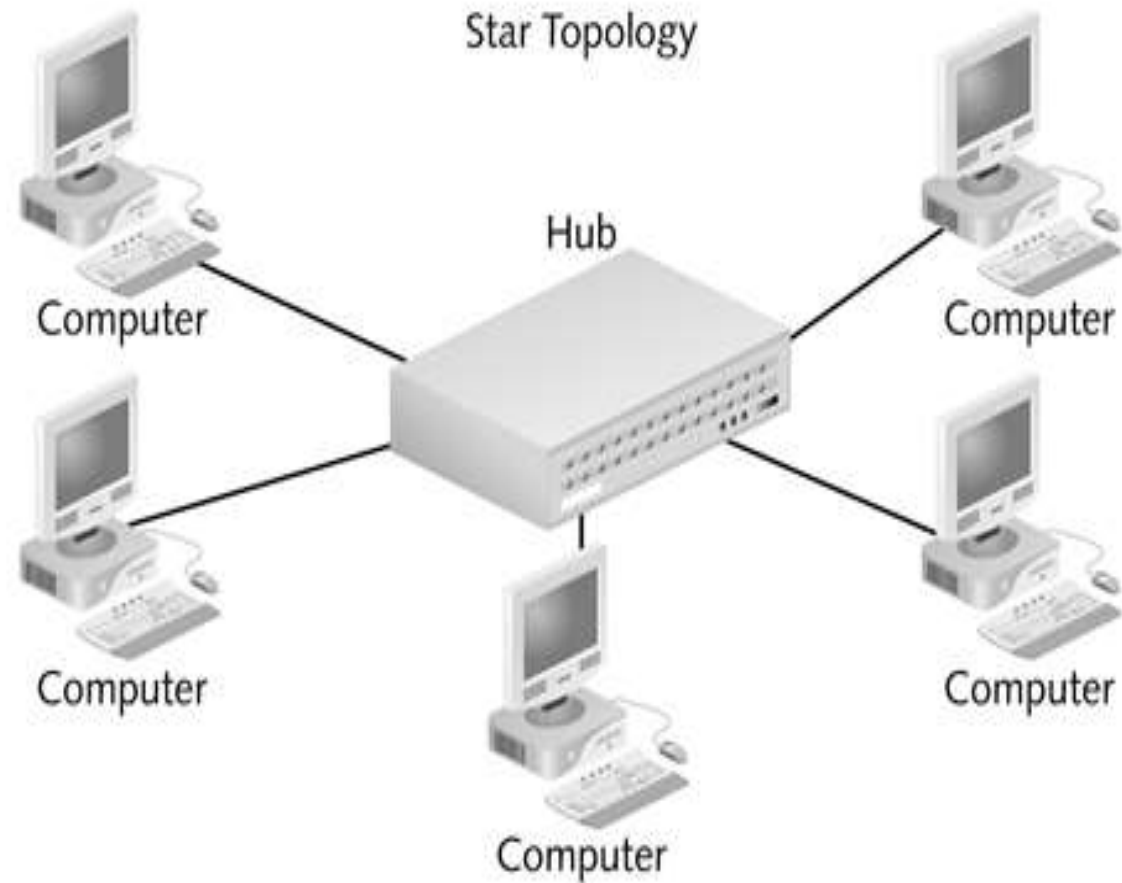
# Hubs

- A Hub interconnects two or more stations in a star topology.
- Multiple inputs and output to all active devices at a time.
- Enables high speed communication.
- It uses different media types like co-axial, fiber optic, twisted pair.
- Hub is operated in physical layer of the OSI model.

# Types of Hub

## 1.Active Hub

- Also called multiport repeater.
- Need electrical power supply to run repeater.





## 2.Passive Hub

- Act as connection point, not as repeater.
- Do not require electricity to run.
- Inexpensive and easy to configure.

# Advantages

- Cheap
- Can connect different media types

# Disadvantages

- Bandwidth is shared by all hosts.
- Time consuming.
- Extends collision domain.
- Passes packets to all connected segments.

# Switches

- Acts as multiport bridge.
- It operates at OSI's data link layer .
- Multiple inputs & output to specific device.
- It receives a frame & store it into buffer of receiving link & checks address to find outgoing link and then send it to particular link.



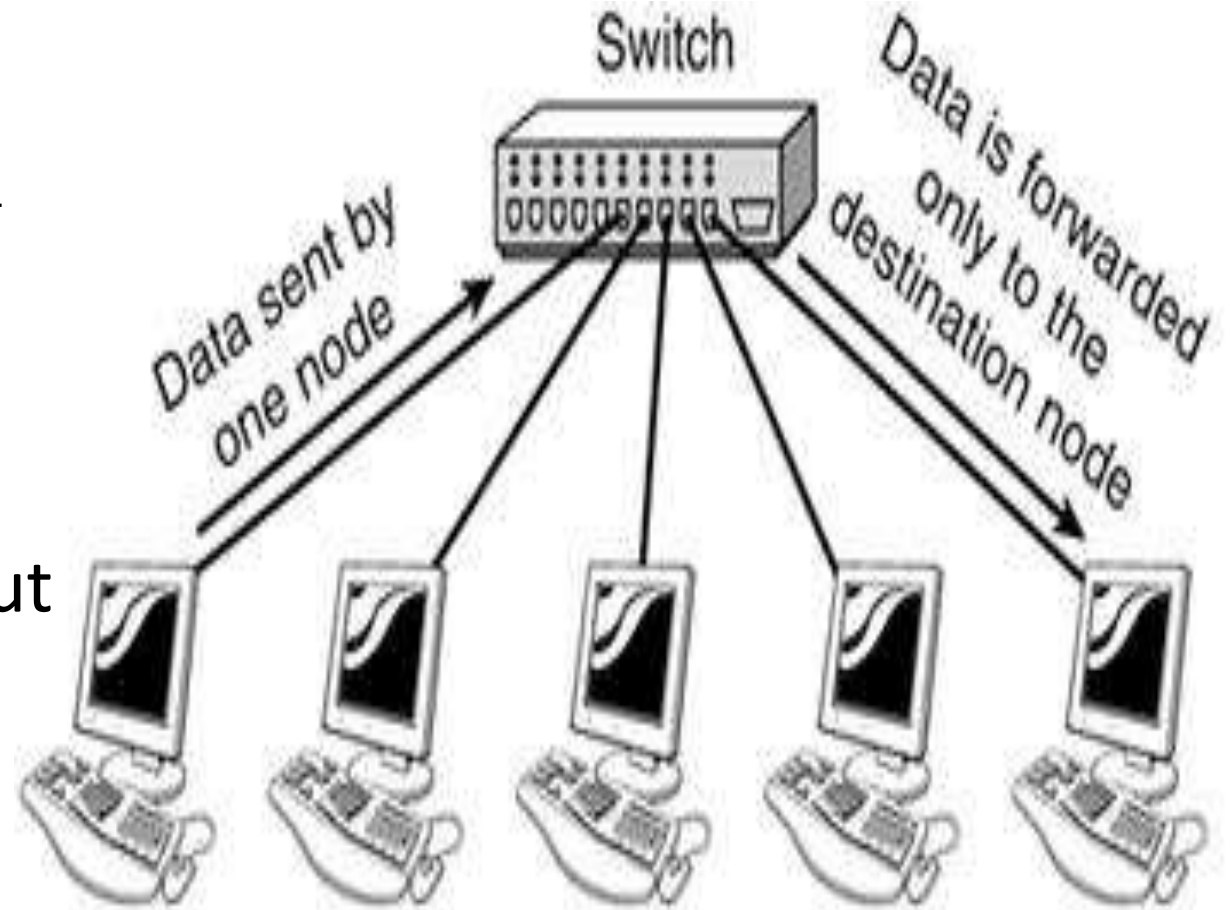
# Types of switches

## 1. Store and forward switch

Stores frame in the input buffer.

## 2. Cut through switch

Forwards the frame to the output buffer.





# Advantages

- Limits the collision domain.
- Can provide bridging.
- Can be configured to limit broadcast domain.

# Disadvantages

- More expensive.
- Configuration of additional functions can be very complex.

# Network Interface Card(NIC)

- It is also called Network Adaptor. Installed in Motherboard port of CPU.
- Each NIC has a unique address that differentiates from other NIC.
- The network adapter provides one or more ports for the network cable to connect transmits and receives data onto the network cable.



# Types of NIC

## 1.ARCNET Card

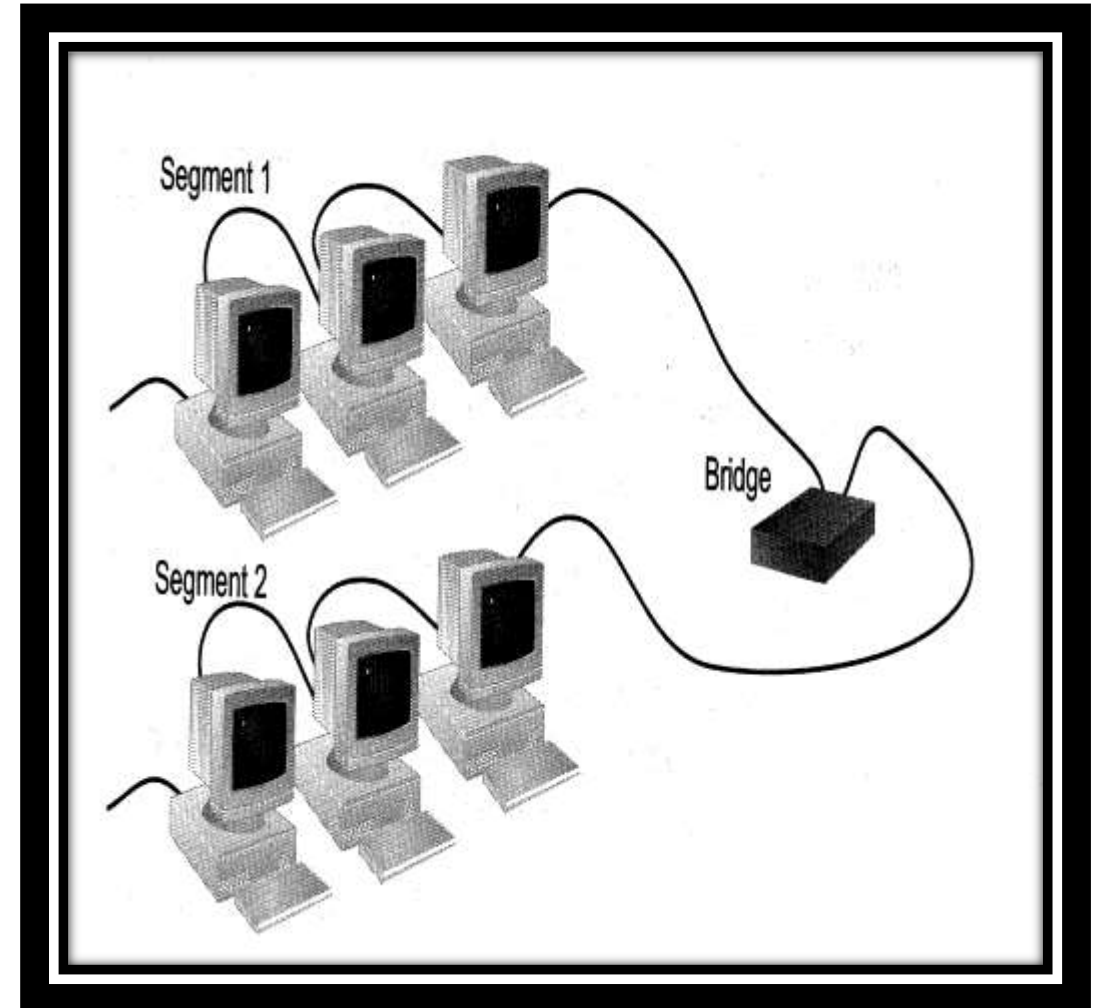
- Transmission rate:2.6 mbps.
- Eight Dual Inline Package(DIP) Switches.
- The name driver for this card is TURBORXNET(TRXNET).
- This type of NIC supports bus and star topology but usually implemented on star topology.
- The cable used with ARCNET card is co-axial usually it is RG-62 and maximum length of cable is 20000 ft.

## 2. **ETHERNET Card**

- Transmission rate:10 mbps.
- Dual Inline Package (DIP) switches are not available.
- This type of NIC supports bus and star topology but unlike ARCNET card is usually supports bus topology.
- The cable use is RG-68 and node address between 0 to 1023.

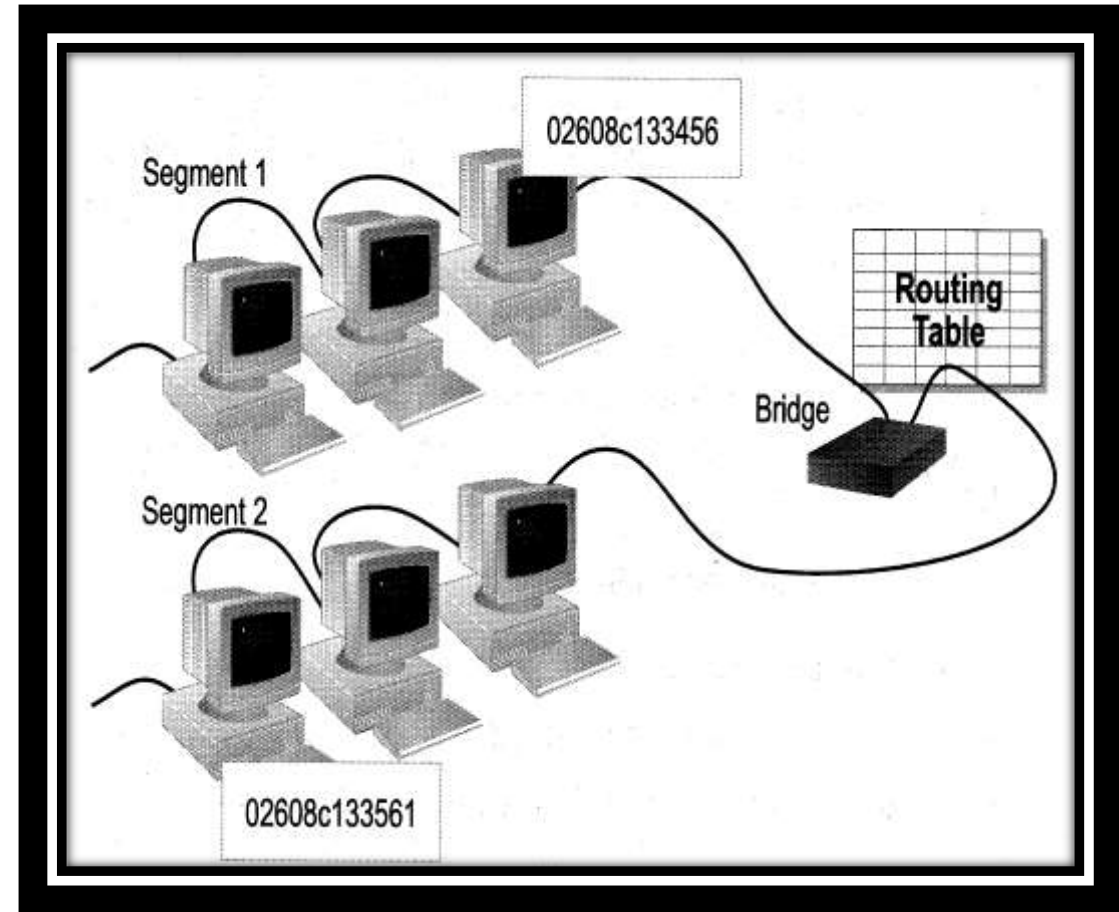
# Bridges

- Bridges can operate : physical & data link layer of OSI model.
- Bridges can divide large network smaller segments.
- Bridges contain logic that allows keep the traffic for each separate, in this way traffic.
- Bridge can also provide security this partitioning of traffic.



# How bridge work

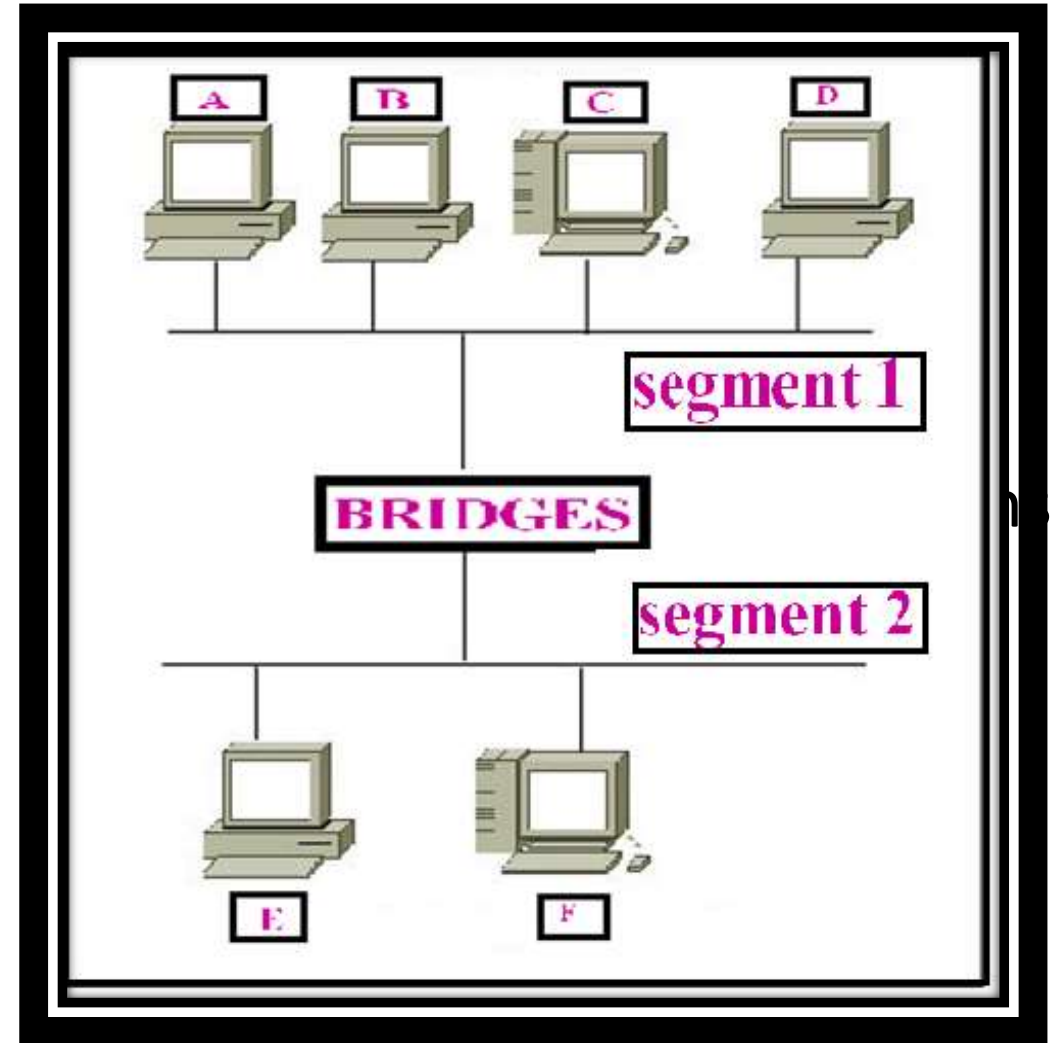
- Bridges can creates routing table.
- Routing table is built to record the segment no. of address.
- If destination address is in the same segment as the source address, stop transmit otherwise, forward to the segment.



# Types of bridges

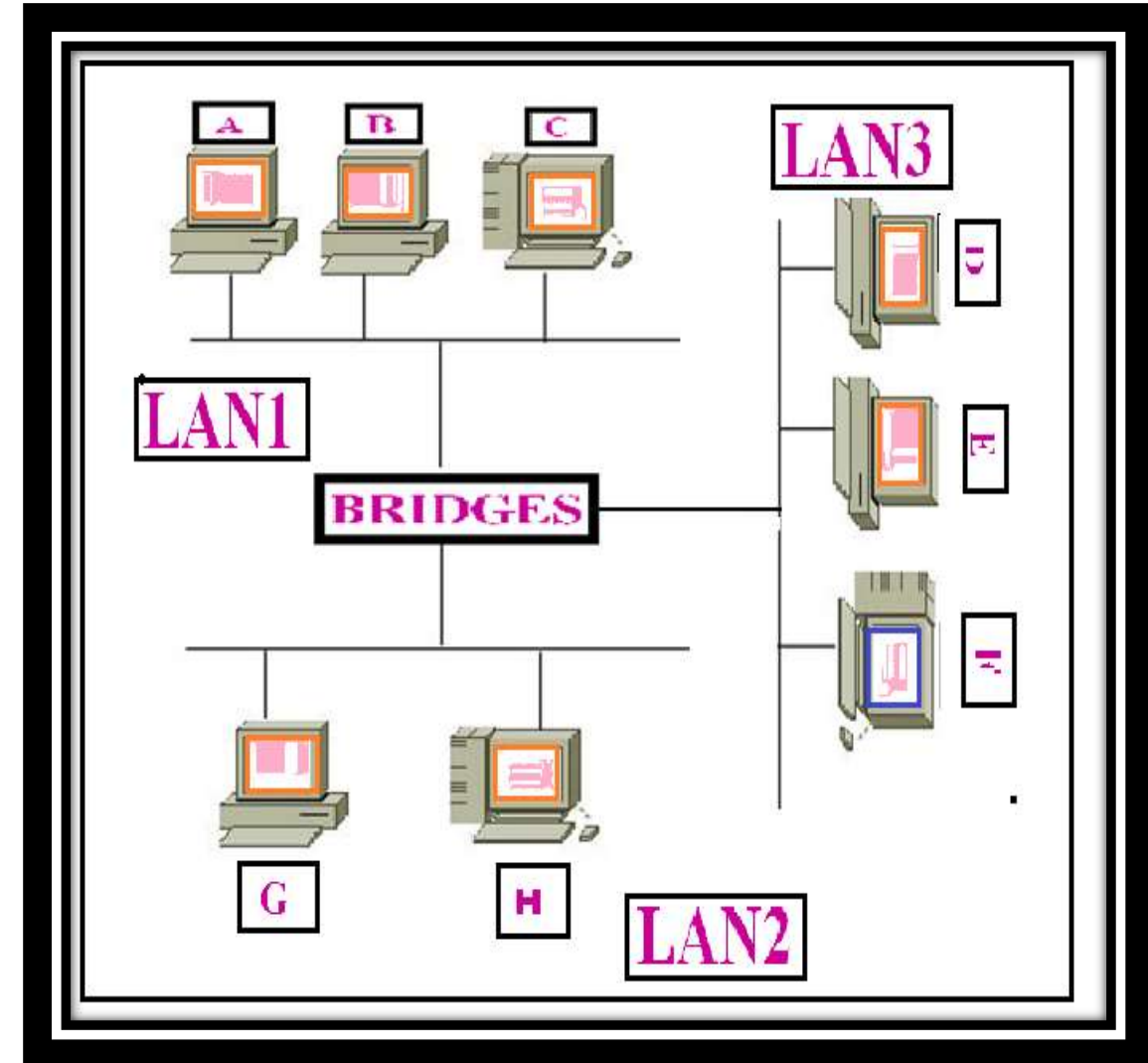
## 1.Simple bridge

- Simple bridge links two segments and a table that lists the addresses included in each of them.
- Most primitive and least expansive.
- Time consuming.



## 2. Multiport bridge

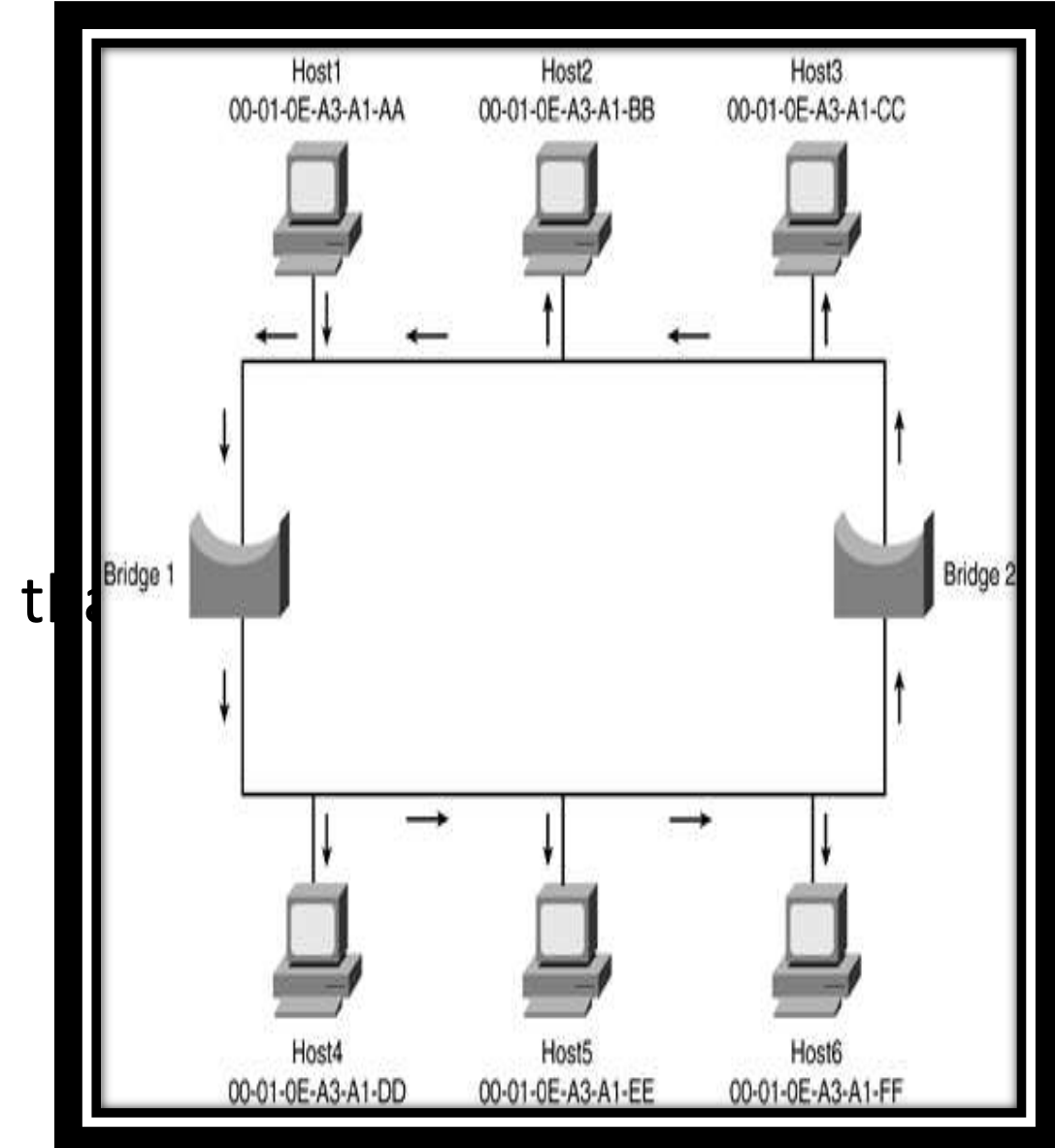
- Multiport bridge can be used to connect more than two LANs.
- In this bridge three tables are created, each one holding the physical address of station reachable through the corresponds port.





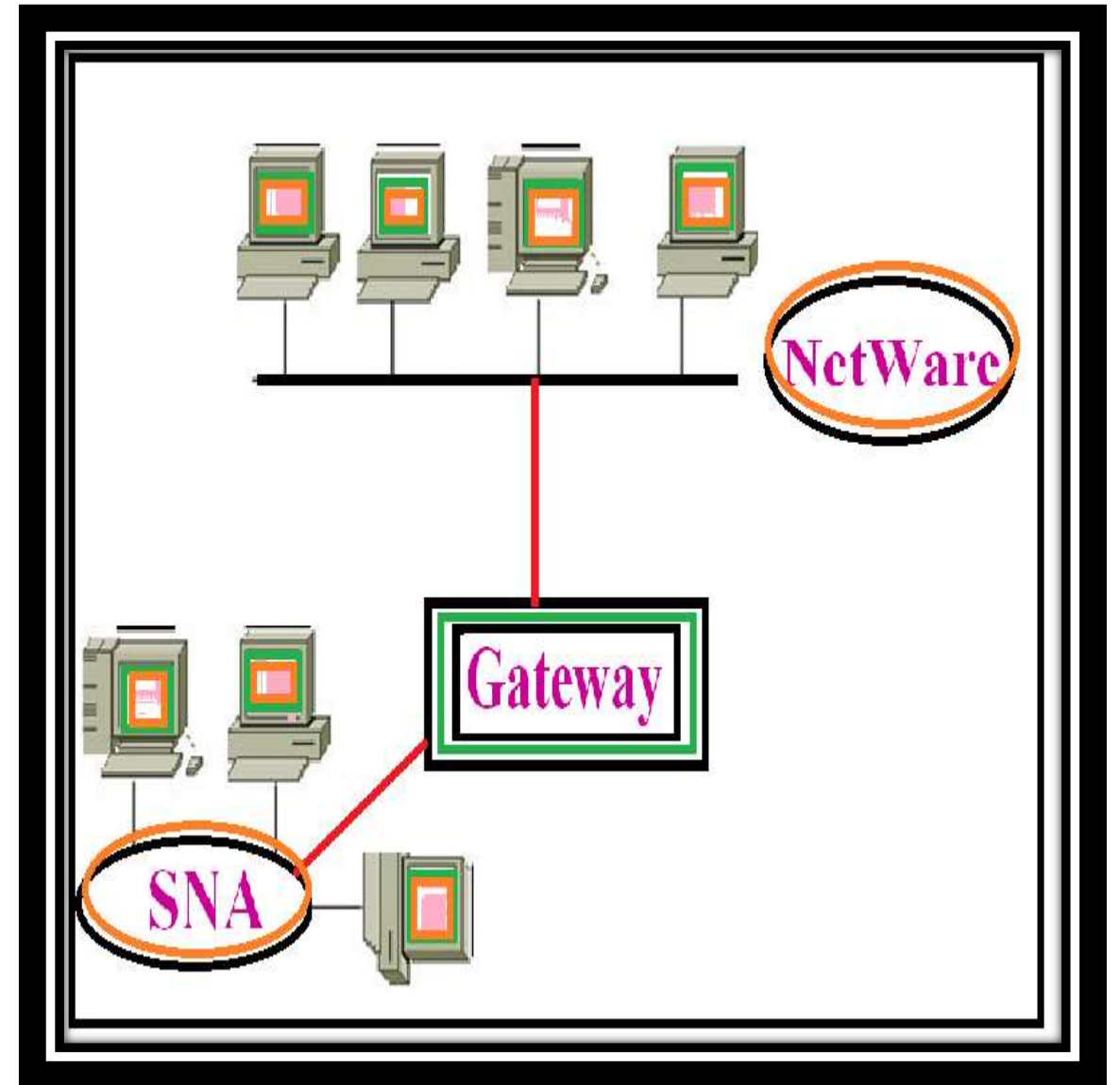
### 3.Transparent bridge

- Transparent bridge builds table from frame movements
- A bridge observes each frame that pass through its port, extracts the source and destination addresses and places them in its table.
- It has self updating feature.



# Gateway

- It is operate in all seven layers of OSI model .
- A Gateway is also called as protocol converter. Gateway is used to connect two different network systems.
- A Gateway is generally software installed within a router.



- The gateway is device controls the flow of data between the two networks.
- A gateway also connects one type of computer system with another.
- Gateway must adjust data rate, size and format .