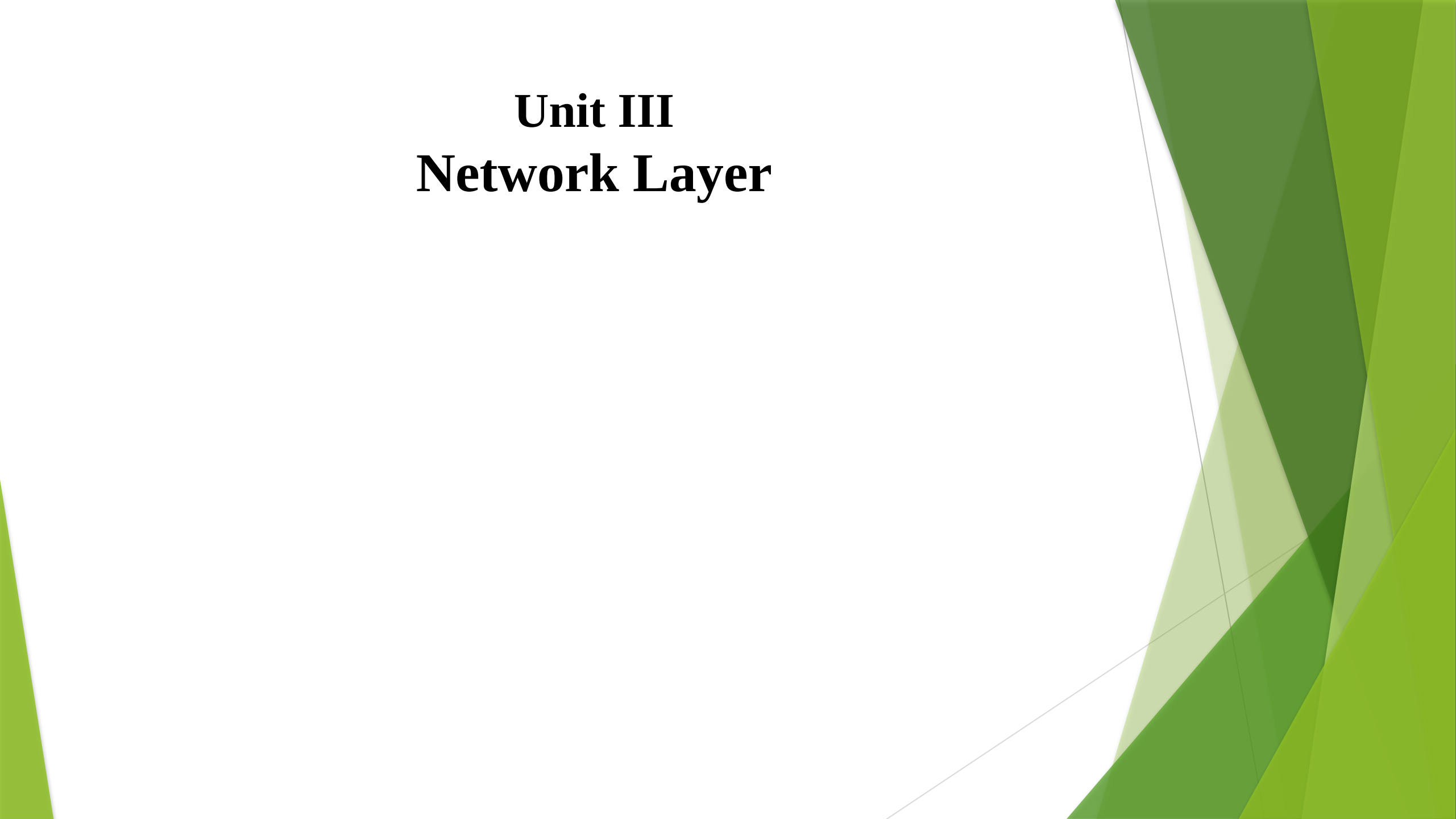
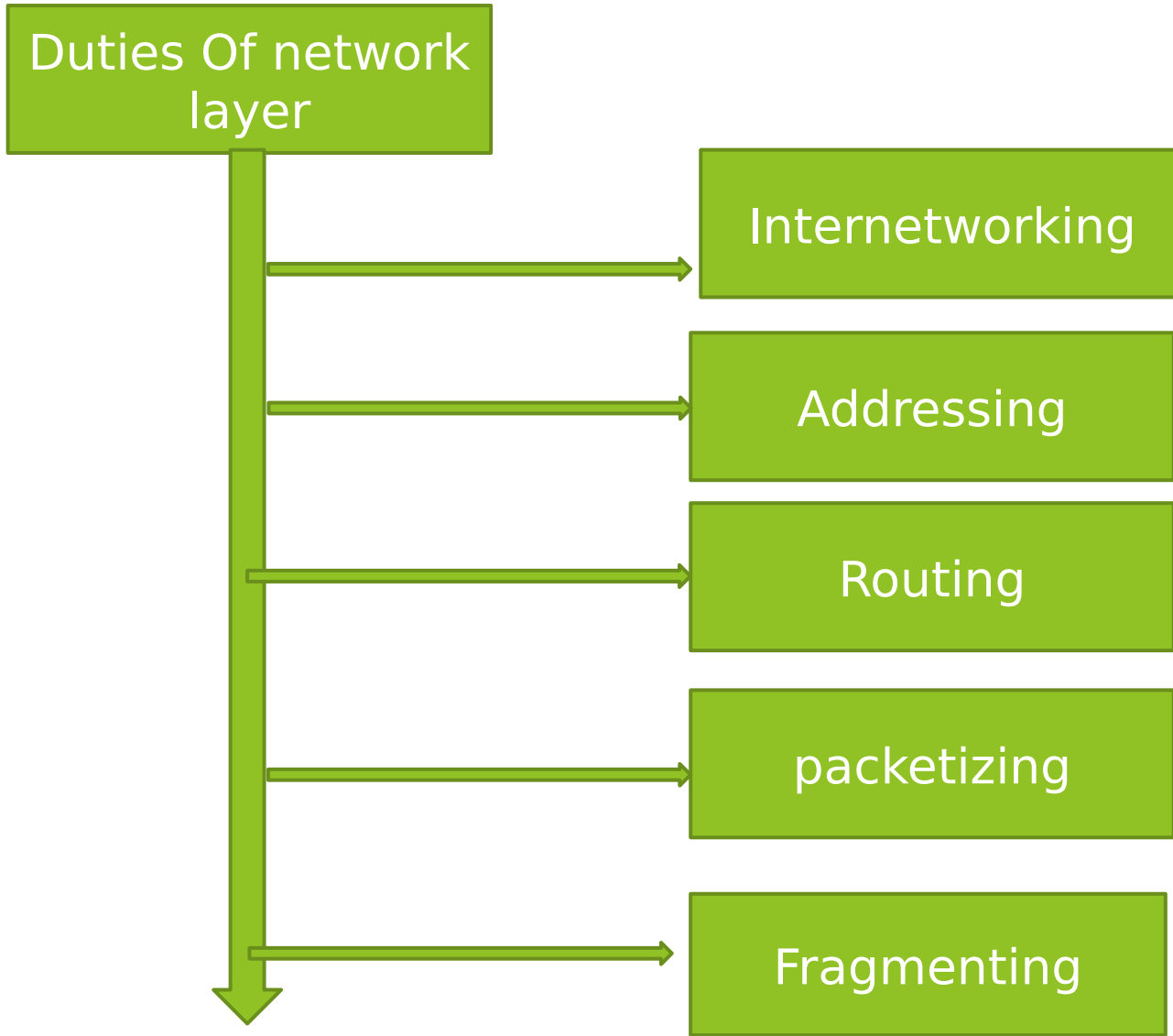


# **Unit III**

## **Network Layer**



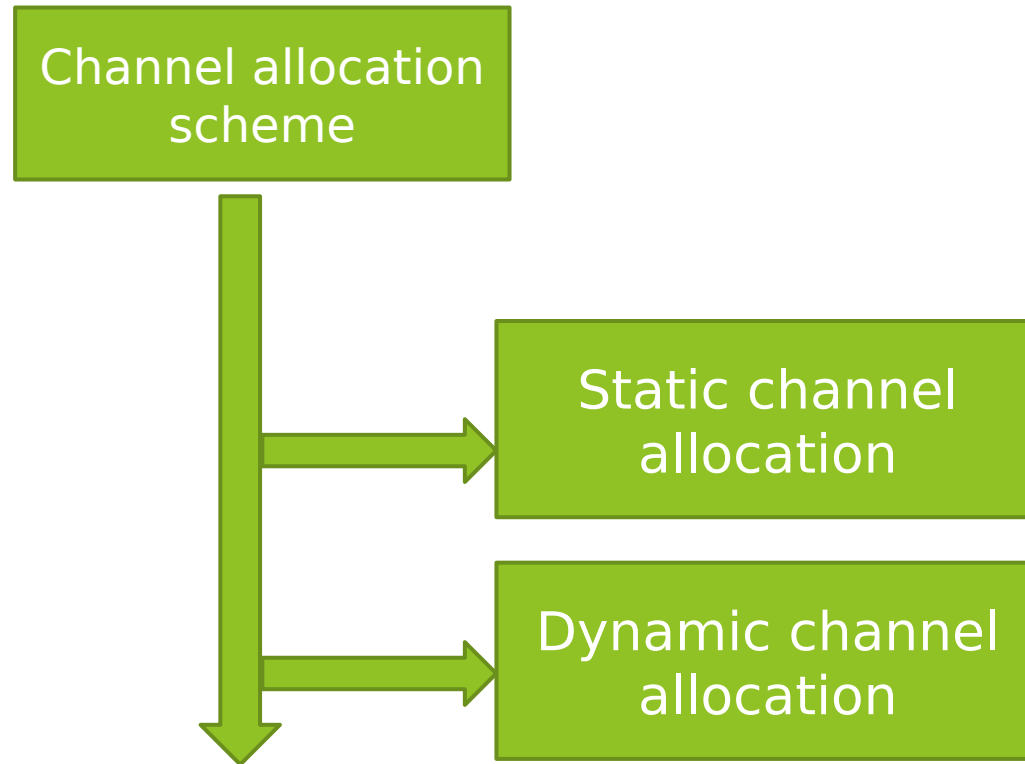
# Introduction



- ▶ **MAC**
- ▶ Control access of medium
- ▶ Address stations in LAN
- ▶ Detection of error
- ▶ **LLL**
- ▶ Error recovery
- ▶ Flow control
- ▶ User addressing

# Channel allocation schemes

- ▶ Single channel is allocated to single user or within multiple user.

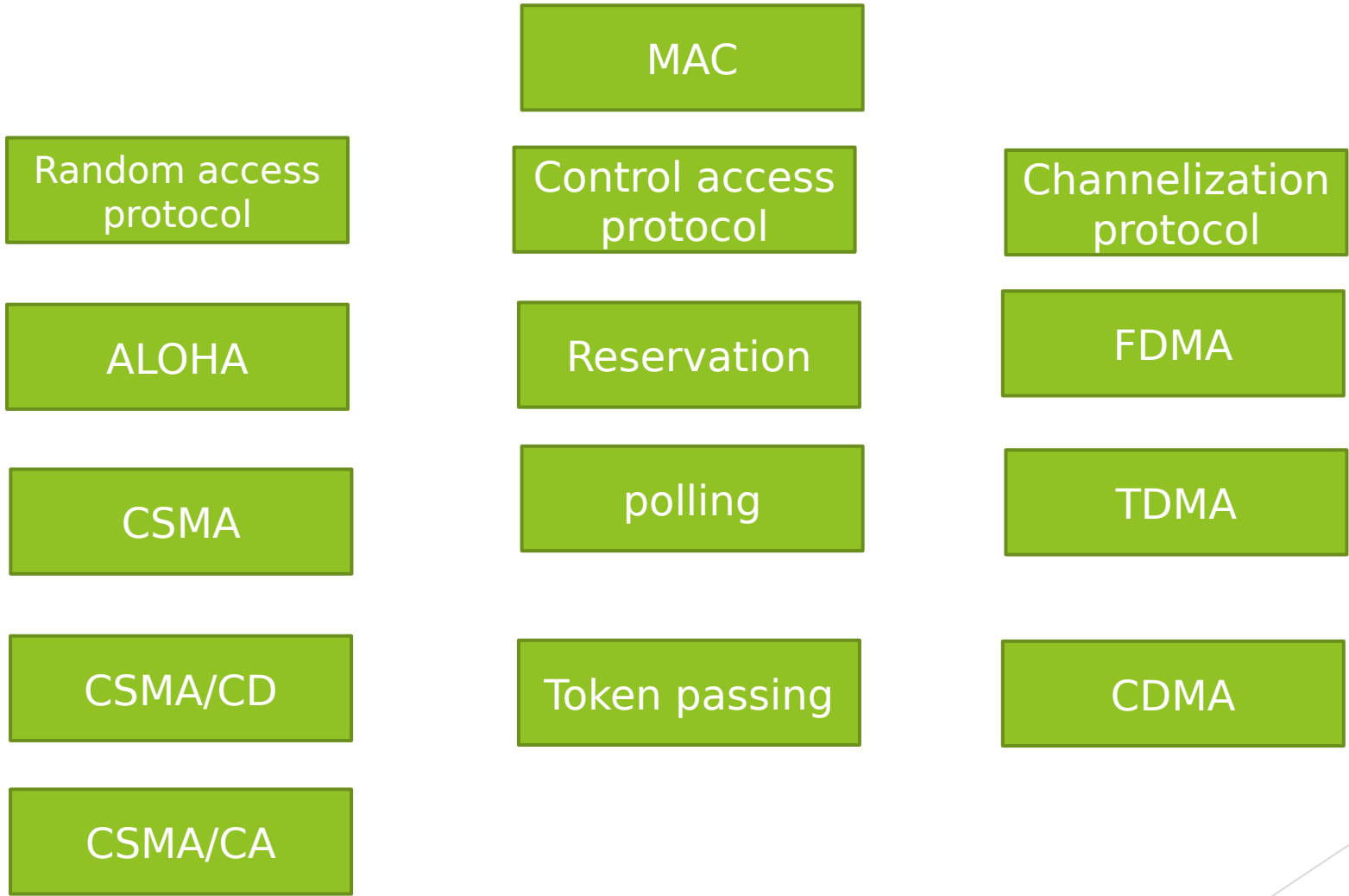


# Static channel allocation

- ▶ Single channel allocate within multiple users by using FDM & TDM
- ▶ In this **fix frequency band or fix time slot** is allocate to each user.
- ▶ **Problems in static channel allocation**
- ▶ 1)wastage of channel bandwidth: no of user less
- ▶ 2)lack of channel bandwidth: number of user more
- ▶ 3)low efficiency: poor performance of large number of user
- ▶ 4)poor performance for busty traffic

## Dynamic channel allocation

- ▶ In this fix frequency band or fix time slot is not allocate to the user.
- ▶ User can use channel when required.
- ▶ Following assumptions are made for implementation of dynamic channels
- ▶ 1)station model:PC
- ▶ 2)single channel
- ▶ 3)collision:when two or more station transmit frame at a time collision occur
- ▶ 4)continuous or slotted time
- ▶ 5)carrier or no carrier: sense the channel before transmitting frame.



# CSMA

- ▶ Sense channel before transmit
- ▶ Carrier busy = transmission is taking place .
- ▶ Carrier idle = no transmission currently taking place



## Types of CSMA

- ▶ 1persistent CSMA
- ▶ P-Persistent CSMA
- ▶ Non-Persistent CSMA

- ▶ 1) 1-persistent CSMA
- ▶ Before transmitting data on channel station sense the channel.
- ▶ If channel is free it transmit data. if it is busy it wait .
- ▶ **But it continuously sense the channel. until channel become free.**
- ▶ **This is called as 1-persistent CSMA.**
- ▶ 2) Non-persistent CSMA.
- ▶ Before transmitting data on channel station sense the channel.
- ▶ If channel is free it transmit data. if it is busy it wait .
- ▶ **But it is not continuously sense the channel.**
- ▶ **It wait random period of time**

- ▶ 3)P-Persistent CSMA
- ▶ It apply sloted channel
- ▶ When station ready to send.it sense channel
- ▶ If it is idle it transmit with the probability P.
- ▶ It transmit until the next station has to transmit the frame

# CSMA/CD

- ▶ If two stations sense the **channel to be ideal & begin transmitting simultaneously** .they will both detect the collision.
- ▶ Collision can be **detected by looking the width of received signal**.
- ▶ They should **stop transmitting as soon as collision is detected**.
- ▶ Wait random amount of time (during waiting time no other station can transmit frame)and repeat the transmission.
- ▶ **Contension period**:host check whether the collision occur or not
- ▶ **Ideal**:when all complete the transmission.
  
- ▶ It is widely used in LAN MAC layer.
- ▶ Access method used by Ethernet CSMA/CD.



Transmission period contention period



ideal

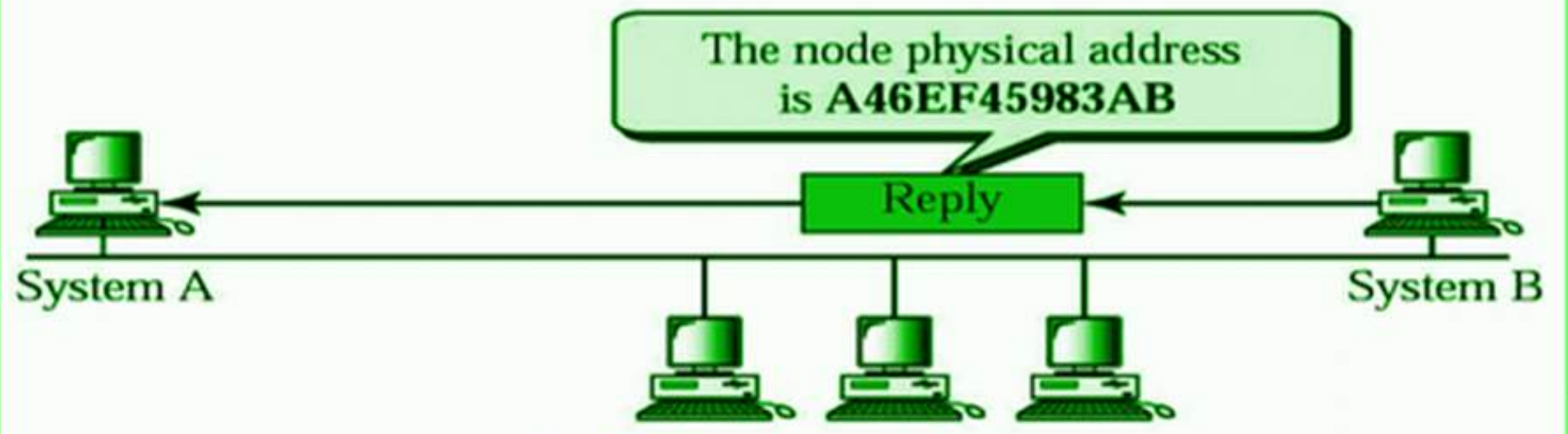
# N/W Layer Protocols :ARP

## ▶ 1)ARP (Address Resolution Protocol)

- ▶ ARP stands for Address Resolution Protocol.
- ▶ ARP is used to **convert the logical address ie. IP address into physical address ie. MAC address.**
- ▶ While **communicating with other nodes**, it is necessary to **know the MAC address or physical address of the destination node.**
- ▶ If any of the node in a network wants to know the physical address of another node in the same network,
- ▶ the host then sends an ARP query packet. This ARP query packet consists of IP address and MAC address of source host and only the IP address of destination host.
- ▶ This ARP packet is then received to every node present in the network. The node with its own IP address recognizes it and sends it MAC address to the requesting node.



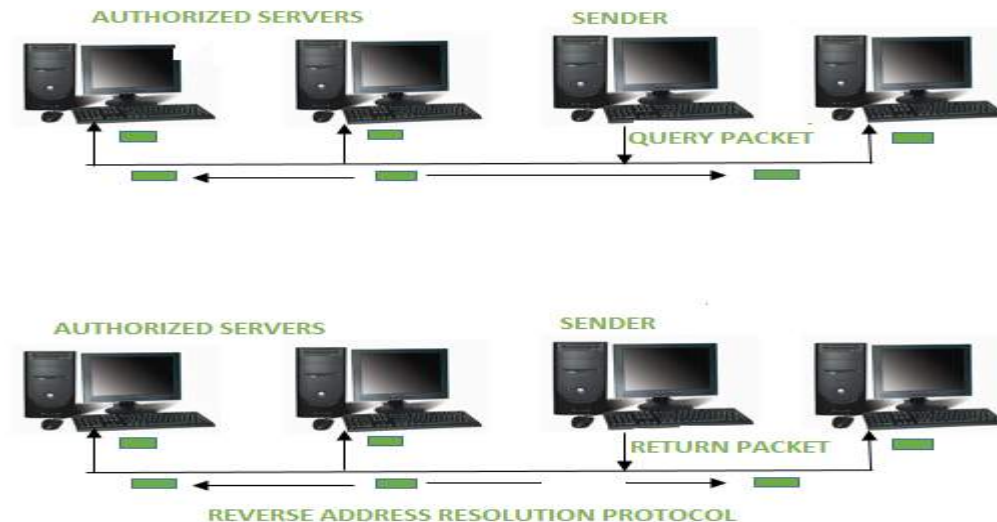
a. ARP request is broadcast



b. ARP reply is unicast

## 2)RARP

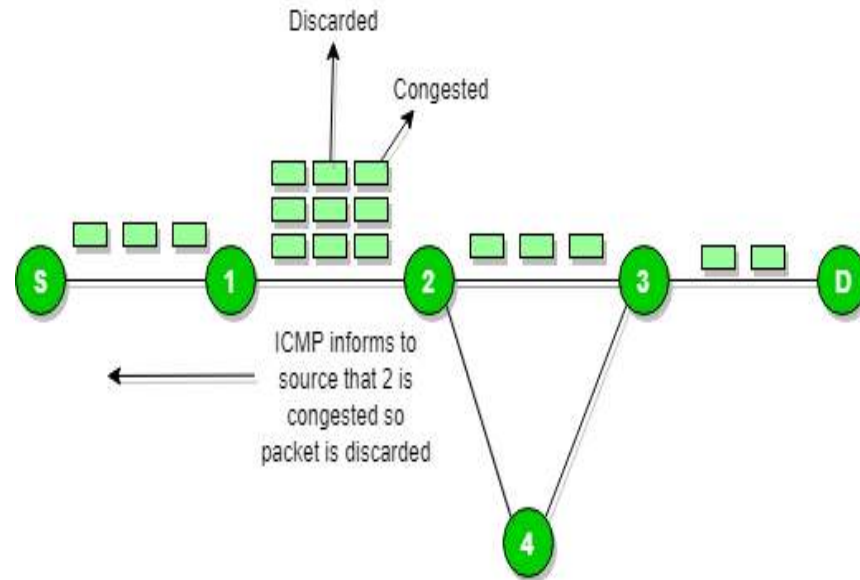
- ▶ RARP stands for **Reverse Address Resolution Protocol**.
- ▶ RARP works opposite of ARP.
- ▶ **Reverse Address Resolution Protocol is used to convert MAC address ie. physical address into IP address ie. logical address.**
- ▶ RARP provides with a feature for the systems and applications to get their own IP address from a DNS( Domain Name System) or router.





### 3)ICMP

- ▶ ICMP stands for **Internet Control Message Protocol**.
- ▶ ICMP is a part of IP protocol suite.
- ▶ ICMP is an **error reporting and network diagnostic protocol**.
- ▶ Feedback in the network is reported to the designated host.
- ▶ Meanwhile, if any kind of error occur it is then reported to ICMP. ICMP protocol consists of many error reporting and diagnostic messages.



## 4)IGMP

- ▶ IGMP stands for **Internet Group Message Protocol**.
- ▶ IGMP is a **multicasting communication protocol**.
- ▶ **It utilizes the resources efficiently while broadcasting the messages and data packets.**
- ▶ **Other hosts connected in the network and routers makes use of IGMP for multicasting communication.**
- ▶ In many networks multicast routers are used in order to transmit the messages to all the nodes.
- ▶ Multicast routers therefore receives large number of packets that needs to be sent. But to broadcast this packets is difficult as it would increase the overall network load. Therefore IGMP helps the multicast routers by addressing them while broadcasting