CNS unit - 3 imp notes

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CNS unit 3 IMP Notes

1] Functions of network layer ?

→ • Main task of network layer is to move packets from the source host to destination host.
• It transport packets from sending to recieving host via internet.
• The network layer is third layer in OSI model.
• network layer services are Packetizing, Routine, Forwarding

• **Packetizing**

Encapsulating the payload in a network layer packet at the source and decapsulating the payload from the network layer packet at the destination is called packetizing.

• **Routine**

- Routine is the process of moving data from one device to another device.
- The network layer specifies some strategies which find out best possible route.

• **Forwarding**

- Forwarding refers to the way a packet is delivered to next node so Routers are used for forwarding a packet from local network to remote network.

2] Different switching techniques (circuit switching, Packet Switching, message switching)

→ Circuit Switching:

- There is physical connection between transmitter and receiver
- All the ~~path~~ Packet use same Path
- needs an end to end path before data transmission
- waste of bandwidth is possible
- not suitable For handling interactive traffic
- It cannot support store and forward transmission.

Packet Switching:

- There is no physical path is established between transmitter and receiver.
- All the ~~path~~ Packet use different path.
- no needs of end to end path before data transmission
- No wase of bandwidth
- Suitable for handling interactive traffic
- It support store and forward transmission.

message switching:

- In message switching end-users communicate by sending and receiving messages that included the entire data to be shared.

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3] IPV4 header

→ • IPV4 is a communication Protocal in computer networks

VER	HEL	service type	Total length	
Datagram identification			Flags	Fragment
Time to live	Protocal	Header checksum		
some IP address				
Destination IP address				
options				

Fig IPV4 header Format

Here's a brief overview of key fields in IPV4

1. VER (version)
Indicates the version of IP protocal

2 HEL (Header length)
Specifies the length of IP header in 32-bit words.

3 Service type
Indicates quality of service requested for this IP datagram.

4. Total length
Specifies total length of the datagram, header and data.

5. Identification
used for uniquely identifying fragments of an IP datagram when fragmentation occurs.

6. Flags
contains control Flags

7. Time to Live
Specifies number of routers the packet can traverse

8. Protocal
Identifies protocal used in TCP, UDP, ICMP

9. Header checksum
Provides error checking for the header

10. Source IP address
contains source and destination IP addresses

11. Options
This field includes various options such as security settings or route records.

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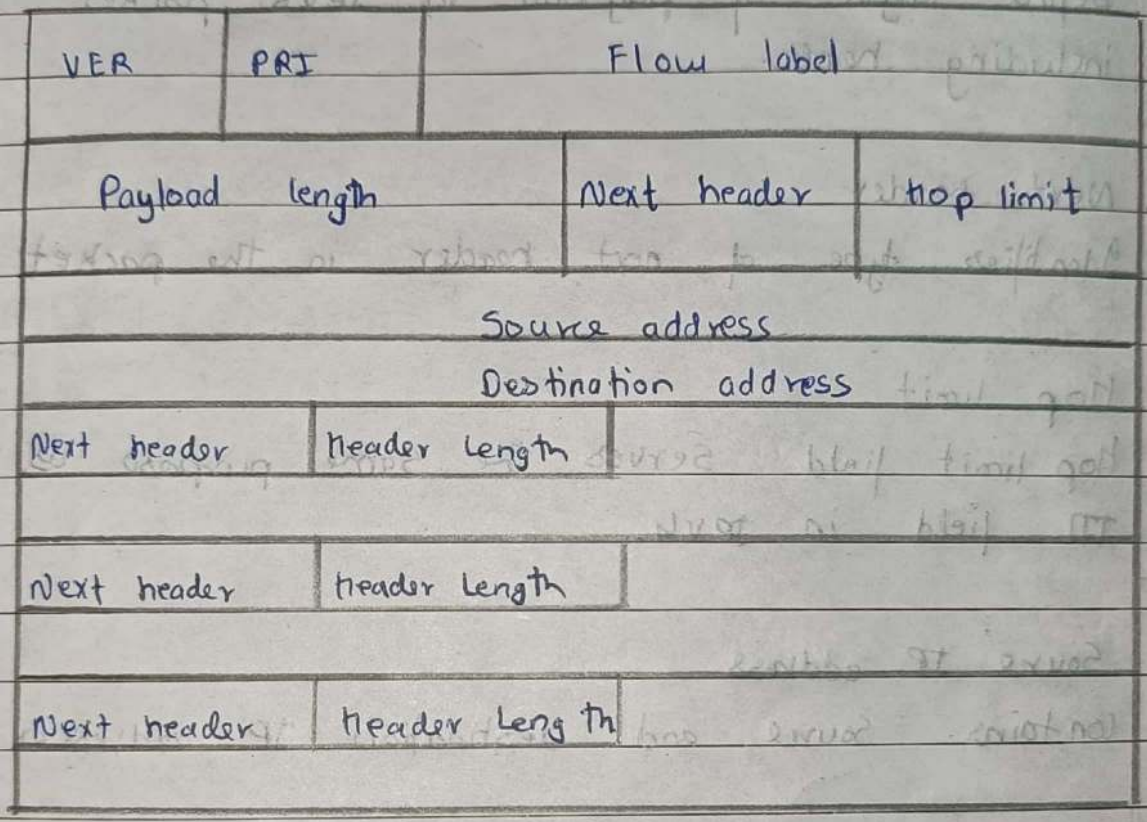
4] IPV6 header

→ - IPV6 is a communication Protocal in computer network
- IPV6 header is designed to be more efficient than IPV4 header.



Here is a brief overview of the key fields in IPV6

1. VER (version)
Indicates versions of IP protocal

2. PRI (Priority)
Define the priority of packet with respect to traffic congestion

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3 Flow label
used to label packets for special handling by routers and switches.

4. Payload length
Define length of payload in IPV6 packet including header

5. Next header
Identifies type of next header in the packet

6. Hop limit
Hop limit field serves the same purpose as the TTL field in IPV4.

7 Source IP address
Contains source and destination IP addresses.

8] Extension headers
IPV6 allows series of extension header to be included between IPV6 header and the ~~play~~ payload. This header includes options, routing, fragment information.

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5] Network Address translation.

→ • To access the internet, one public IP address is needed
• But we can use private IP address in private network.
• The idea of NAT is to allow multiple devices to access the internet through single public address.
• To achieve this the translation of private IP address to public IP address is required
• NAT (network address Translation) is process in which one or more local IP address is translated into one or more global IP address
• NAT generally operates on router or firewall.

6] Network layer protocals (ARP, RARP, ICMP, IGMP)

→ ARP

- ARP stands for Address Resolution Protocal
- ARP protocal is one of the best protocal in Data link layer
- It is responsible to find hardware address of host from a known IP address.
- Three important terms Associated with ARP
  - Reverse ARP
  - Proxy ARP
  - Inverse ARP

Reverse ARP

Reverse ARP is a protocal that is used in LAN by client machine for requesting IP address from Router's ARP table.

Proxy ARP

Proxy ARP protocal used to enable communication between devices on different networks

Inverse ARP

Inverse ARP protocal performs inverse of ARP Inverse ARP resolves a MAC address to an IP address.

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ICMP :

- ICMP stands for internet control message protocol
- ICMP has PING features.
- ICMP can be operate between host to host or router to router.
- ICMP is used to test reachability to host or network.
- used for error reporting purposes

I GMP :

- IGMP stands for Internet Group message Protocol
- IGMP has multicast feature.
- IGMP can be operate between client to multicast router
- IGMP is used in group packet transmission like DTS service
- used for ~~error~~ multicast ~~routers~~ purposes.

78] Network Routing and algorithm

→ • Routing is the process of path selection in any network.
• Routing algorithm can be classified in two ways
  - Static (non-adaptive) Routing
  - Dynamic (adaptive) Routing

• Static (non adaptive) Routing
In static routing manually sets up optimal paths between source and destination

• Dynamic (adaptive) Routing
In Dynamic Routing algorithm changes their routing decisions if there is change in traffic.

▷ Distance vector Routing

• Distance vector routing algorithm is the dynamic routing algorithm
• It is also called Bellman Ford routing algorithm.
• Distance vector routing finds optimal paths by routers maintaining tables of distances based on estimated cost.

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Path vector routing

- Path vector routing algorithm is dynamic routing algorithm
- Path vector routing maintains path information that gets updated dynamically.
- ex- BGP

link State Routing

- Link State Routing is a technique in which each Routers shares the knowledge of its neighborhood with every router.

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Q] Routing Protocals (RIP, OSPF, ~~EGP~~ BGP)

→ Routing Information Protocal (RIP) :

- RIP is distance vector protocal
- each router maintains a routing table and exchanges its entire routing table with neigbors after 30 sec
- Suitable for small to midium sized networks.

Open shortest Path first (OSPF)

- OSPF is link state routing protocal
- Routers exchange link state information and each Routers builds a complete map of network.
- Well suited for larger networks.

Border Gateway Protocal (BGP)

- BGP is Path vector protocal
- BGP is primarily used for routing between different autonomous systems on the internet.
- ~~Critical for inter-domain Routing~~
- establish communication and data transfer on worldwide scale.

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q] Routing in (MANETs)

→

1. Ad-hoc on Demand Distance Vector (AODV)

- Routing Protocal for mobile Ad-hoc networks (MANETs)
- It establishes routes on demand when a node needs to send data.

2. Dynamic Source Routing (DSR):

- Routing Protocal for MANETs
- ~~It allows nodes to dynamically discover routes by maintaining source notes in packet headers~~
- (IMP). Routes are updated as network topology changes

3. Mobile IP

- network layer Protocal
- It enables Seamless communication for mobile devices.

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4. Multiprotocal Label Switching (MPLS)

- network layer technology
- MPLS is technique used in high performance networks
- It enhances routing efficiency and support traffic engineering.