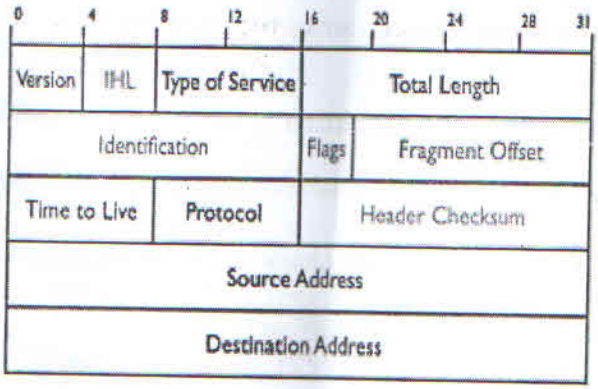
Q1 A.Design the structure for IPv4 and IPv6 Protocol 10m [CO 3]

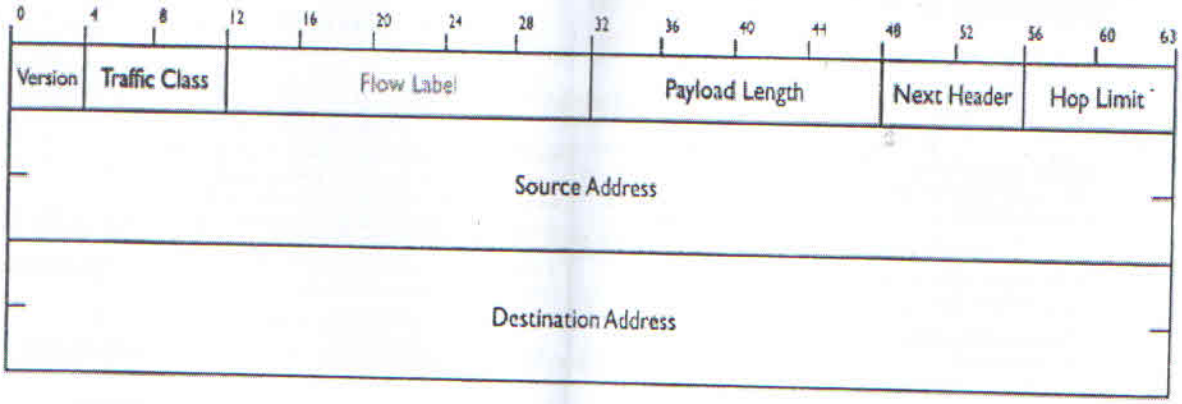
IPv4 structure with each field explanation [5m]

IPv6 structure with each field explanation [5m]

IPv4 Header



IPv6 Header



B)How reliable data transfer takes place in Selective Repeat protocol. 10m CO 3

Selective Repeat with diagrammatic explanation [6m + 4m]

- Go-Back-N ARQ simplifies the process at the receiver site. Receiver only keeps track of only one variable, and there is no need to buffer out-of-order frames, they are simply discarded.
- However, Go-Back-N ARQ protocol is inefficient for noisy link. It bandwidth inefficient and slows down the transmission.
- In Selective Repeat ARQ, the size of window of sender and receiver is almost same.

- only the damaged frame is resent. More bandwidth efficient but more complex processing at receiver.
- It defines a negative ACK (NAK) to report the sequence number of a damaged frame before the timer expires.

Q2 A Explain different framing techniques for data link layer [10m] CO 4

Framing Methods:

[state 3 methods – 1 mark] [Explanation of each with suitable example 3 mark]

1 Character count [3 mark]

2 Starting and ending characters, with character stuffing [3 mark]

3 Starting and ending flags, with bit stuffing [3 mark]

Q2 B .Compare Leaky Bucket and Token Bucket [10 m] CO 4

Diagram [5m for both] & difference [5m]

leaky bucket	Token bucket
Leaky bucket Algorithm does not allow idle host to save up permission to send large burst later.	Token Bucket Algorithm does allow saving, up to the maximum size of the bucket, This allows some burstiness in the output stream and giving faster response to sudden bursts of input
In contrast, LBA discards packets when the bucket fills up	TBA throws away tokens when the bucket fills up but never discards packets
LB doesn't allow saving, a constant rate is maintained	TB allows saving up tokens (permissions) to send large bursts.
LB sends the packets at an average rate.	TB allows for large bursts to be sent faster by speeding up the output.

Q3 A . What is the first address and last address , no. of addresses in the block if one of the addresses is 167.199.170.82/27? *10 M CO 3*

Solution

The value of n is 27. The network mask has twenty-seven 1s and five 0s. It is 255.255.255.240[1m].

a. The number of addresses in the network is $232 - n = 232 - n = 25 = 32$.[3M]

b. We use the AND operation to find the first address (network address).The first address is 167.199.170.64/27. [3M]

c. To find the last address, we first find the complement of the network mask and then OR it with the given address: The last address is 167.199.170.95/27[3M].

OR

What is the netid and subnetid of the address 130.45.34.56 with mask 255.255.240.0.

130.45.34.56 is class B address

- Class B address (16 bit network address , 16 bit host address)
- Network address is 130.45.0.0
- Subnet masking is 255.255.240.0
- 240 – i.e - 11110000 - so 4 subnet bit available and host bit 16-4=12 host bit available
- And operation bet subnet mask and address to obtain the subnet address is:

11111111 11111111 11110000 00000000 (255.255.240.0)

10000010 00101101 00100010 00111000 (134.45.34.56)

10000010 00101101 00100000 00000000 (134.45.32.0)

So subnet address is 130.45.32.0 . Max no. of subnetwork will be $2^4 = 16$.

Q3 B How ARP ,RARPand DHCP protocol are used for address resolution in networking [10m] CO3

ARP and RARP-- The Address Resolution Protocols

ARP --Address Resolution Protocol [3m]

What is it for: Arp translates IP numbers into hardware addresses.

How ARP works: Send a packet from the querrying host with an Ethernet broadcast address asking the target host with the given IP address to respond. All hosts on the physical network receive this packet, and the one with the given IP number responds. Then the original querring host knows the physical address of the target host. Does not use IP; uses's physical frames.

Common ARP improvements: Keep a cache of recently received translations. Remember that these addresses are quite small, and the space needed to store them is also small. Store both the physical and IP addresses of all ARP broadcasting hosts. Then every host who

receives a broadcast ARP request can know the address translation of the sender. This is especially imporant for the receiver of the broadcast.

How to Write ARP Software: There are two parts. The first part uses the cache to map IP -> physical addresses. The second part fills the cache with mapping upon request from the first part.

RARP -- Reverse Address Resolution Protocol[3m]

What is it for: Diskless clients don't have a place to store there IP number. Rarp translates machines addresses into IP numbers.

How RARP works: The client broadcasts a RARP packet with an ethernet broadcast address, and it's own physical address in the data portion. The server responds by telling the client it's IP address. Note there is no name sent. Also note there is no security. Does not use IP; uses's physical frames.

DHCP -- The Dynamic Host Configuration Protocol[3m]

What is it for: Allows hosts to dynamically get a unique IP number on each bootup. Allows more hosts than IP numbers, as long as the total number of hosts up at any one time does not exceed the number of IP addresses available. Further, DHCP provides more info (like netmask) than bootp. Finally, it can take the IP addres back when no longer needed.

Answer explained with diagram [1m]

Compare Transparent and Non Transparent Fragmentation

- It requires every host to be able to do reassembly.
- The exit gateway must know when it has received all the pieces , so that either a count field or end of packet bit must be included in each packet.
- All packets must exit via the same gateway. [diagram]
- It refrain from recombining fragments at any intermediate gateways.
- When a large packet is fragmented the total overhead increases , because each fragment must have header.
- All sub packets are treated as original one .
- Recombining occurs only at the destination host. [diagram

Q4. **A Illustrate the purpose, different modes of FTP.State anonymous FTP 10M CO 4**

Purpose of FTP [5m]

Modes [3m]

Anonymous FTP [2M]

FTP (File Transfer Protocol)

File Transfer Protocol is a standard network protocol used to exchange and manipulate files over a TCP/IP-based network, such as the Internet. FTP is built on client-server architecture and utilizes separate control and data connections between the client and server applications. FTP is used with user-based password authentication or with anonymous user access. Applications were originally interactive command-line tools with standardized command syntax, but graphical user interfaces have been developed for all desktop operating systems in use today. The Trivial File Transfer Protocol (TFTP) is a similar, but simplified, not interoperable, and unauthenticated version of FTP.

- To Use FTP, a user needs an account (user name) and a password on the Remote server.
- Some sites have a set of files available for public access; to enable *anonymous FTP*.
- To access these files, a user does not need to have an account or password. Instead, the user can use ***Anonymous*** as the user name and *guest* as the password.

Q4 B.Explain the process of Three Way handshake in TCP. 10M CO4

Diagram [4M]Explanation [6m]

TCP uses a three-way handshake to open a connection:

(1) ACTIVE OPEN: Client sends a segment with

- SYN bit set *
- port number of client
- initial sequence number (ISN) of client

(2) PASSIVE OPEN: Server responds with a segment with

- SYN bit set *
- initial sequence number of server
- ACK for ISN of client

(3) Client acknowledges by sending a segment with:

- ACK ISN of server

(* counts as one byte)

Q5A State different types of ICMP messages used in Network layer.[10m] CO 3

- IP is an unreliable protocol.
- ICMP was designed to compensate for this shortcoming.
- ICMP does not correct the errors, it simply reports them.
- Error Message and Query Message [5 m each types and sub types in detail]

OR

An ISP is granted a block of addresses starting with 190.100.0.0/16 (65536) addresses the ISP needs to distribute these addresses to three groups of customers as follows:

1) The first group has 64 customers, each needs 256 addresses

2) The second group has 128 customers, each needs 128 bits.

3) The third group has 128 customers, each needs 64 addresses.

Design the sub blocks and find out how many addresses are still available after these allocations. CO 3

For this group, each customer needs 256 addresses this means that 8(log2256) bits are needed to define each host the prefix length is then 32 – 8 = 24 the addresses are

1st customer	**190.100.0.0/24**	**190.100.2.255/24**
2nd customer	190.100.1.0/24	190.100.1.255/24
64th customer	190.100.63.0/24	190.100.63.255/24

Total = 64 x 256 = 16384

Group 2:

For this group, each customer needs 128 addresses this means that 7(log2128) bits are needed to define each host the prefix length is then 32 – 7 = 25 the addresses are

1st customer	**190.100.64.0/25**	**190.100.64.127/25**

1st customer	**190.100.64.0/25**	**190.100.64.127/25**
2nd customer	190.100.64.128/25	190.100.64.255/25
128th customer	190.100.127.128/25	190.100.127.255/25

Total = 128 x 128 = 16384

Group 2:

For this group, each customer needs 128 addresses this means that 6(log264) bits are needed to define each host the prefix length is then 32 – 6 = 26 the addresses are

1st customer	**190.100.128.0/26**	**190.100.128.63/26**
2nd customer	190.100.128.64/26	190.100.128.127/26
128th customer	190.100.159.192/26	190.100.159.255/26

Total = 128 x 64 = 8192

Number granted addresses to the ISP -> 65536

Number of allocated addresses by the ISP -> 40960

Number of available addresses -> 24576

5B Illustrate working of atleast three connecting devices used in Communication in detail .C0 2

- An internet is an interconnection of individual networks.
- Networking and internetworking devices are divided into six categories: **Hub, Repeaters ,Switches ,Bridges, Routers and Gateways**
- Explanation of each including functions and advantages disadvantages [3 mark each]
- Diagram 1 mark

OR

5 B List different types of bridges and their use CO2

The bridges are categorized into 3 types as :[1M]

- Transparent Bridges [explanation 3M]
- Source Routing Bridges [explanation 3M]
- Spanning Tree Bridges [explanation 3M]