

Assignment - 2

Summer 24-B

i) Given,

IPv4 : 137.168.210.108

Subnet Mask : 255.255.240.0

Default gateway : 137.168.211.10

i) Here, prefix length = 10.

so, Host bits = $32 - 10 = 22$

No. of hosts = $2^{22} - 2 = 4096 - 2 = 4094$ hosts (Ans.)

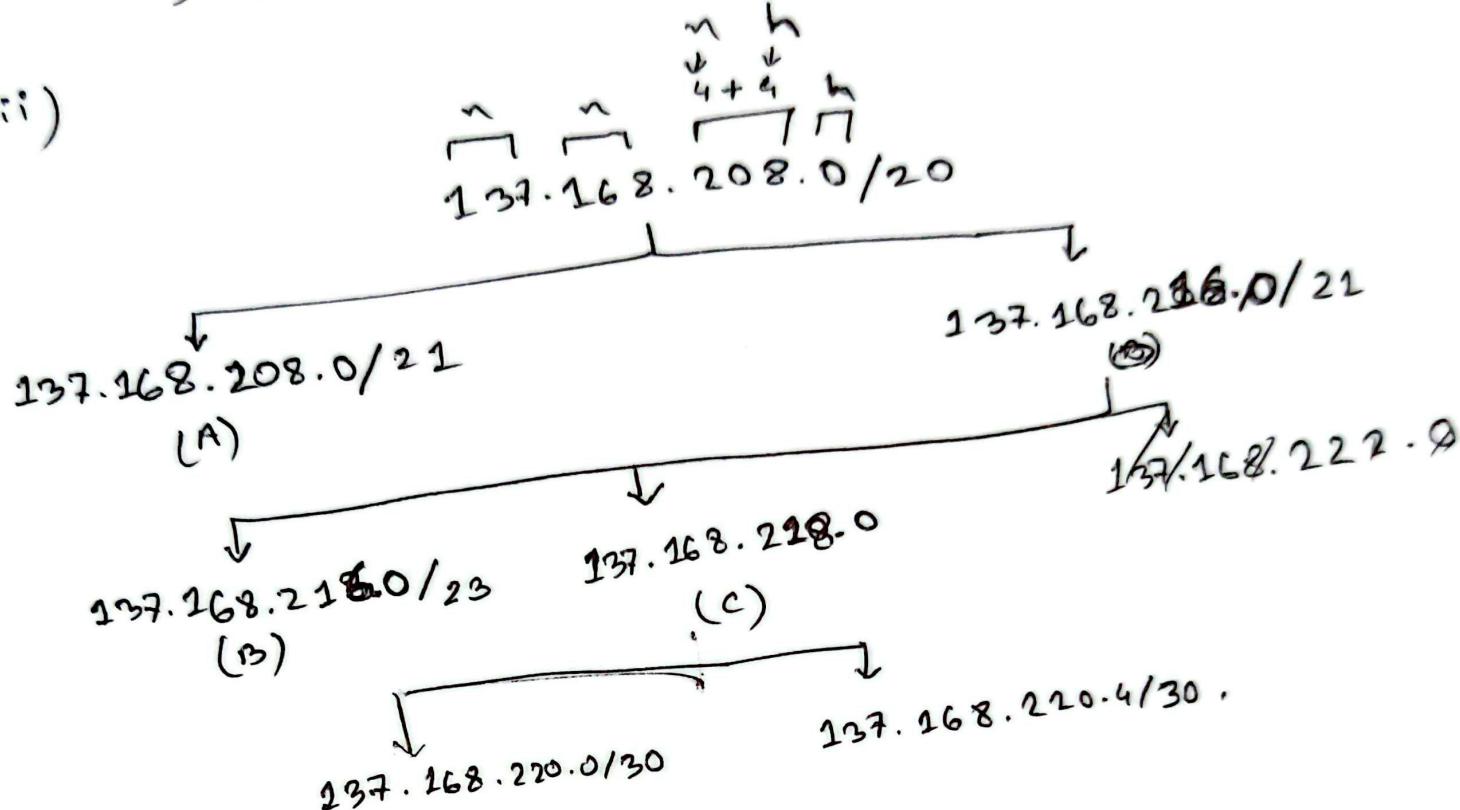
ii) IP = ~~10001001 10101000 11010010 01101100~~
 Subnet mask = ~~11111111 11111111 11111111 00000000~~
~~10001001 10101000 11010000 00000000~~

∴ Network address = 137.168.208.0/10.

iii)

Name	Host	Host+2	Block size	Host bits	Prefix	Waste
A	2000	2002	2048	11	21	46
B	480	482	512	9	23	30
C	350	352	512	9	23	160
D(WAN)	2	4	4	2	30	0
E(WAN)	2	4	4	2	30	0
						Total = 236.

1) iii)



00000000
11010000 00000000 → 208.0 (A)
11011000 00000000 → 216.0 (B)
11011010 00000000 → 218.0 (C)
11011100 00000000 → 220.0 (D)
11011110 00000000 → 222.0

2) i) The ISP router uses PAT, which changes the source port number for each internal device. When a reply comes back, the router checks the destination number and forwards the packet to the correct device.

ii) Device A and B uses Private IP addresses. ISP router uses Public IP address. Private IP is not routable on internet but Public IP is globally routable. Private IP can be reused and Public IP must be unique.

Q) Maximum data per fragment = $830 - 30 = 800$ bytes.

No. of fragments = $\frac{8240}{800} = 10.3 \approx 11$ fragments (Ans.)

iii) Data sent by first 10 fragments = $800 \times 10 = 8000$ bytes.

Remaining data = $8240 - 8000 = 240$ bytes.

iii) Data before 7th fragment = $800 \times 6 = 4800$ bytes.
Fragment offset = 8 bytes

iv) No. of 7th fragment = $\frac{4800}{8} = 600$ (Ans.)

iv) If DF bit is turned on then Router cannot fragment and the packet is dropped.
It has to be fragmented from the sender side.

4) i) $2001: \text{db8}:0001:0:100:0$

Expanded: $2001: \text{db8}:0000:0000:0001:0000:0100:0000$

ii) $0:1::$

Expanded: $0000:0001:0000:0000:0000:0000:0000:0000$

iii) $2002:\text{c6}:DB80:0:0$

Expanded: $2002:00c6:0000:0000:0000:DB80:0000:0000$

5) iii) Here, the command uses only next-hop IP, which causes recursive lookup. Improved version -

ip route $172.31.10.0\ 255.255.255.0\ 50/0/0$

ii) For configuring default static routes it should be done in a router which has only one exit path, reduces routing table size and also improves efficiency.

6) i) Switches will forward it to other ports (flood).
Routers will drop the frame.

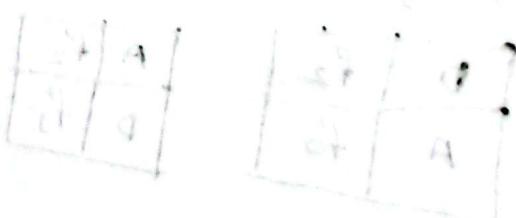
ii) S_1

D	f ₂
A	f ₀

S_2

A	f ₂
D	f ₁

- 7) Hop limit prevents packets from looping forever. Decreases in every loop hop and packet gets discarded when it reaches zero. In IPv4 the same function field is TTL.
- 8) We call Link State Routing protocol a global routing protocol because Routers know the entire network topology. Each Router has a complete map. It is more efficient than Distance vector Routing because it can converge faster, no routing loops and event-based updates.
- 9) i) The issue is DHCP uses broadcast but Routers block broadcasts. The solution can be -
ip helper-address <DHCP-server-IP>
- ii) Message exchanged between PC and a DHCP server for renewal of leased IP are DHCPREQUEST and DHCPACK.



10) i) 08:cc:12:23:40:bb .

First byte = 08 → it's binary ends with 0.

So, it is an unicast address .

ii) MAC address of a packet changes every hop because MAC is link-local but IP donot change because if is end to end. Each hop rewrites MAC header .

11) Device sends ARP for default gateway at first.

then gets gateway IP from manual configuration

or DHCP server.

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