Assignment-2

Dipta Mazumder

ID-24141264

section-23 (CSE421)

1. (a) First IP = 109.64.0.1

last " = 109.127.255.253

∴ network address = 109.64.0.0/10

Ans.

2nd octet range 64 → 127

∴ block size = 127 − 64 + 1 = 64

∴ subnet = 255.192.0.0 (/10)

(ii) Total bits = 32

Net " ~~host~~ = 10

∴ ~~Host~~ bits = 32 − 10 = 22

∴ Total hosts = 2^{22} = 4194304

usable = 4194304 − 2 = 4194302

Ans

(b)	Network address	prefix mask	usable host
LAN (2000)	109.64.0.0	/21	2096
LAN (1400)	109.64.8.0	/21	2046
switch (4 routers)	109.64.16.0	/29	6
WAN Link	109.64.16.8	/30	2

2] (a) TTL = 104 denotes remaining Time to live (hope count) of the ICMP packet.

It means the packet has passed through several routers (24 hops If the initial TTL was 128).

TTL is used to prevent infinite routing loops by discarding packets when the value reaches zero.

(b) (i) Data per MF = 1 fragment

2883 - 35 = 2848 bytes.

→ Data of last fragment

985 - 35 = 950 byte

∴ original data size = (10 × 2848) + 950

= 29430 bytes

(ii) offset field of the 2nd packet

offset unit = 8 bytes

first fragment data = 2848 bytes

$$\text{offset} = \frac{2848}{8} = 356$$

(iii) last fragment

↳ MF flag = 0.

(c) Reason:

PC1's DHCP Discover is a broadcast packet and routers do not forward broadcasts by default. Since PC1 is in network 192.168.4.0/29 and the DHCP server (R3) is in a different subnet, the DHCP Discover is dropped at Router R2.

Solution:

Configure DHCP Relay (IP helper address) on the router interface connected to PC1's LAN (R2 interface ~~to~~ forward 192.168.4.0/29) .

3]

i. Algorithm: Dijkstra's Algorithm (Link-State Routing Algorithm)

ii. Shortest path from Node 5 to first five nodes (excluding itself)

Order	Node	Shortest Cost	Shortest Path
1	4	1	5 → 4
2	6	2	5 → 6
3	0	4	5 → 4 → 0
4	2	6	5 → 6 → 2
5	1	8	5 → 4 → 0 → 1

(b) A router sends it's LSP to neighbour only if;

→ The LSP is new

→ The LSP has a higher sequence number than the stored one

→ The age (TTL) of the LSP has not expired

(c) In the distance vector algorithm;

→ Router do not need neighbor discovery

→ They periodically exchange routing tables with directly connected neighbors.

→ Neighbor reachability is inferred from routing updates.

(hello packets are unnecessary)

4) (a) Lan C : 100.9.128.128/27

Router C through multi-access network (112.191.63.0/29)

Router C on that network = 112.191.63.3

∴ Static route ~~for~~ on Router B

100.9.128.128 255.255.255.224 112.191.63.3

(b) AD = 5

exit interface : S1/1

∴ ip route 100.9.128.128 255.255.255.224 S1/1 5

(c) Next hop only static route cause recursive lookup ; use fully specified static route.

5] (a) IPv6 routers drop ~~such~~ oversized packets and notify the source; fragmentation is done by the sender using fragment extention headers.

→ if a packet larger than MTU, the router drops the packet.

→ The router sends an ICMPv6 "packet Too big" message to source

(b) IPv6 replaces broadcast with multicast.

since IPv6 doesn't have ~~brau~~ broadcast it functionality achieved using multicast address like;

FF02::1 → All nodes on the local link

FF02::2 → " routers " " " "

(c) stateful ~~DA~~ DHCPv6 doesn't require DAD ~~because~~ because the server guarentees unique addresesss.

Reason;

→ DHCP assigns addresses centrally

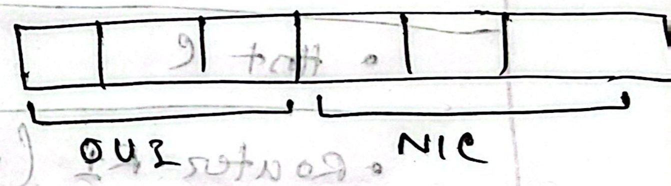
→ server ensures address uniqueness

→ DAD unnecessary.

6] (a) Two part of MAC address.

1. OUI (organizationaly unique identifier)

2. NIC → last 24 bits.



0 → unicast (individual)

1 → Multicast (Group)

(b) No. (Host A will never learn the MAC of host D)

Reason;

→ Host D is on a different network

→ ARP works only within the local broadcast domain

ARP request sent by host A for host C

The ARP request is a Layer-2 ~~brao~~ broadcast, so it is recieved by,

Device	Action
• Host B	~~Recognise IP → sends ARP reply~~
• Host C	Recognise IP - sends ARP reply
• Router R1 (fa0/1 interface)	IP doesn't match - Ignore

(c) SW1 unicasts the frame since D is known, while SW2 floods it due to an empty MAC table; (No flooding at SW1)

After delivery, SW2 learns both A and D's MAC addresses.

Updated MAC Address Table;

SW1 - MAC Address Table

MAC address	port
Host A	Fa0/1
Host D	Fa0/3

(No change)

SW.2 MAC address Table

MAC address	Port
Host A	Fa 0/1
Host D	Fa 0/3