EEE465 Assignment 02

Summer 2024 Set A

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Section - 23

Answer to Question 01

IPv4 address : 107.168.177.108

Prefix Mask : 17

(I) <u>107.168.1</u> 011 0001. 0110 1100

   Subnet mask : 255.255.128.0

(II) Network address : 107.168.128.0/17

(III) VLSM

2500+2	4096	12	20	16 (3rd octet)
1200+2	2048	11	21	8 (3rd octet)
1150+2	2048	11	21	8 (3rd octet)
2+2	4	2	30	4 (4th octet)
2+2	4	2	30	4 (4th octet)

107.168.128.0/20

107.168.144.0/21

107.168.152.0/21

107.168.160.0/30

107.168.160.4/30

Answer to Question 02

(I) The ISP router uses PAT (Port Address Translation) and maintains a translation table:

Private IP + Source Port → Public IP + New Port

Replies from the server arrive with public IP and specific port.

The router matches port in the PAT table and forwards the packet to device A or B accordingly.

(II) Device A and B uses private IP addresses.

Private IPs are not routable on the internet and can be reused.

The ISP router uses a public IP address for Internet communication.

This public is globally unique and shared using PAT.

Answer to Question 03

(I) no. of fragments = $\dfrac{7240 - 40}{800 - 40}$ = 10

(II) $(9 \times 760) = 6840$

   $7200 - 6840 + 40 = 400$

(III) $\dfrac{7 \times 760}{8} = 665$

(IV) The MF (More Fragments) bit set to 1 for all segments except the last to indicate that more fragments will follow.

For the final fragment, the MF bit is set to 0, showing that no additional fragments are expected.

This helps the receiver identify the last fragment and correctly reassemble the original packet.

Answer to Question 04

(I)   2001 : 0db8 : 0000 : 0000 : 0001 : 0000 : 0000 : 0100

   Shortened version: 2001 : db8 :: 1 : 0 : 0 : 100

(II)   ff02 : 0000 : 0000 : 0000 : 0000 : 0000 : 0000 : 0001

   Shortened version: ff02 :: 1

(III)   2001 : 0000 : 0000 : 3C10 : 0000 : 0000 : 0000 : 0000

   Shortened version: 2001 : 0 : 0 : 3C10 ::

Answer to Question 05

(I) wrong next-hop address

From R1, the next hop towards R2 is 10.10.20.1

Use the correct next hop address or
- specify the exit interface.

(II)

R2 only has one path towards ISP to
reach any non-local networks.

Configuring a default route on R2
acts as a " gateway of last resort".

Answer to Question 06

(I) Intermediary devices that will receive the
ARP request and forward it to other ports:

→ S2

→ SI

→ S3

Intermediary devices that will receive the
ARP request and drop the frame

→ R2

(II)

S2

MAC	Port	TTL
E	f1	60
A	f2	60

S3

MAC	Port	TTL
E	f1	60
A	f2	60

Answer to Question 07

The Flow Label is a 20-bit field newly added to the IPv6 header, absent in IPv4.

It allows sources to tag packets belonging to the same traffic flow,

Routers use it to identify and apply consistent QoS.

This is vital for real-time applications and when transport headers are encrypted.

Answer to Question 08

Distance vector is decentralized because each router independently computes routes using only information from direct neighbours.

No router has full network topology view or coordinates with non-adjacent routers.

Difference 1: DV shares full routing table with neighbours while LS floods link details to all routers.

Difference 2: DV has partial topology knowledge and slow convergence while LS builds complete topology maps with faster convergence.

Answer to Question 09

(I) DHCP discover messages are broadcast and R2 does not forward them to R1.

Configure R2 with command:

ip helper-address <IP of R-1> on the la2 interface to convert broadcast to unicast and forward them to R1.

(II) PC sends unicast DHCP ~~uni~~ request directly to DHCP server's IP address.

DHCP server responds with a unicast DHCP ACK to confirm the lease.

Answer to Question 10

(I) OUI Part = First 3 octets

= AF : CC : FE

(II) MAC addresses are flat because they lack hierarcy, providing no information about network topology or device location.

OUI identifies the manufacterer while the rest is vendor assigned. This makes the address unique but non-hierarchical.

This flat structure limits routers from making any forwarding decisions based on MAC addresses.

Answer to Question 11

If the router receives the ARP request whose destination MAC address in broadcast,

it checks the target IP address in the ARP request.

If it matches one of router's own interface IP, it send an ARP reply with its MAC address.

If the target IP does not match, it ignores the ARP request and does not forward it.