

CSE - 421

Assignment - 2

[Final of Summer 2024 (Set - A)]

Name : Shawfin Alam

ID : 24341282

Sec : 22

Section AAns. to the question no. 01

I) The subnet mask is 255.255.128.0

II) The network address is 107.168.128.0/17

III) VLSM Subnetting:

Subnets are allocated from largest to smallest host requirement:

<u>Network</u>	<u>Hosts</u>	<u>Prefix</u>	<u>Network Address</u>
LAN A	2500	/20	107.168.128.0
LAN B	1200	/21	107.168.149.0
LAN C	1050	/21	107.168.152.0
WAN 1	2	/30	107.168.160.0
WAN 2	2	/30	107.168.160.4

Answer to the question no. 02

I) The ISP router uses Port Address Translation (PAT). Even though both devices use the same source port, the router assigns different external port numbers. When a reply arrives, the router checks its PAT table and forwards the packet to the correct device.

II) Devices A & B use Private IP addresses, which are not routable on the internet. The ISP router uses a public IP address, which allows communication with internet servers.

Answer to the question no. 03

Given — Total packet size = 7240 bytes

Header size = 40 bytes

Maximum fragment size = 800 bytes.

I) Each fragment carries 760 bytes of data.

Total fragments created = 10

II) Remaining data = 360 bytes

Last fragment size = $360 + 40 = 400$ bytes

III) Fragment offset of 8th fragment

$$= (7 \times 760) / 8$$

$$= 665$$

IV) The MF (more fragments) bit is set to 0 in the last fragment to indicate that no more fragments follow and reassembly can be completed.

Section B

Answer to the question no. 04

B) Shortened version of the following IPv6 addresses:

I) 2001:db8::1:0:0:100

II) ff02::1

III) 2001::3e10:0:0:0

Ans. to the question no. 05

I) The static route uses only a next-hop IP address, which can cause unnecessary recursive lookups. It can be improved by specifying the exit interface along with the next-hop.

II) Default static routes should be configured on sub network routers because they have only one path to external networks, which simplifies routing.

Ans. to the question no. 06

I) An ARP request is sent as a broadcast frame (FF:FF:FF:FF:FF:FF)

- * Switches (S2 & S3) will receive the ARP request and flood it out of all ports except the incoming port.
- * Routers will receive the frame but drop it, because ARP broadcasts are not forwarded beyond the local network.

So, switches forward the ARP request, while routers drop it.

II) After device A sends the ARP reply (which is unicast) :

1) S2 MAC table will contain:

- * MAC address of Device E mapped to the port connected to E.
- * MAC address of device A mapped to the port toward S3.

2) S3 MAC table will contain:

- * MAC address of Device A mapped to the port connected to A.
- * MAC address of Device E mapped to the port toward S2.

The switches learn MAC addresses by observing the source MAC address of received frames.

Ans. to the question no. 07

The field added in the IPv6 header is the Flow Label.

It is used to identify packets belonging to the same flow and helps routers handle real-time traffic and provide quality of service (QoS).

Ans. to the question no. 08

Distance vector routing is decentralized because each router shares routing information only with its immediate neighbors and does not have a complete view of the network.

Differences:

- * Distance vector uses periodic updates and converges slowly.
- * Link state uses event-driven updates and converges faster.

Ans. to the question no. 09

I) Routers do not forward broadcast messages by default, so DHCP requests from LAN2 cannot reach R1.

The issue can be solved by configuring a DHCP relay agent. (ip helper-address).

II) The messages exchanged during renewal are:

- * DHCPREQUEST
- * DHCPACK

Ans. to the question no. 10

I) OUI part of the MAC Address:

For AF:CC:FE:12:34:90 the OUI part is
AF:CC:FE

II) MAC addresses considered flat because they have no hierarchical structure and do not provide information about network location.

Ans: to the question no . 11

When a router receives an ARP request:

- * If checks whether the target IP matches any of its interfaces.
- * If it matches, the router sends an ARP reply.
- * If it does not match, the packet is dropped.

The destination MAC address in an ARP request is FF:FF:FF:FF:FF:FF (Broadcast)