

FALL '24

SET A

Q1 I. $2^{14} - 2 = 16382$, n will be
14 bit, host bit = 14 so,
network bit = $32 - 14 = 18$ bit

/18 \rightarrow 1111 1111. 1111 1111. 1100 0000. 0000 0000

/18 \rightarrow 255. 255. 192. 0

∴ subnet mask \rightarrow 255. 255. 192. 0 /18

II From I network bit 18

42. 1. 63. 255

[00101010. 0000 0001. 001111. 111111 /18]

Network Address

[00101010. 0000 0001. 001111. 0000 0000 /18]

→ 42. 1. 0. 0 /18

2.I . The setup is NAT

Here, Outside Network : Internet

Inside private network getting /
wants to access public (outside)
network

Inside network private IP : 192.168.500/24

Outside network public IP : (198.51.100.1 ~ 198.51.100.3)

(II) The three directors can
use PAT.

- PAT uses UDP source port number which is fast.
- PAT ensures that device use a different TCP port number for each session with a server on the internet.
- 3 directors can use 3 private IPv4 address to a single 198.51.100.1 public IPv4 address. Which ensures less latency.

3I Total data = 5066 byte

each fragment carry 1224 byte

$$\therefore \text{Total fragment} = \frac{5066}{1224} = 4.14 \approx 5$$

3 II Payload = 5086 - 20
= 5066

Max data per fragment = 1244 - 20
= 1224 bytes

Data carried by full fragments : 4×1224
= 4896 bytes

remaining data = $5066 - 4896$
= 170 bytes

\therefore Last fragment size = $170 + 20$
= 190 bytes

3 III. Initial byte number = 0

Byte sent before 5th fragment = $4 \times 1224 - 4896$
Fragment offset = $\frac{4896}{8} = 612$

3

IV Significance

- ① uniquely identifies fragments belonging to the same original IP packet.
- ② Ensure the destination host can group fragment correctly and reassemble them in correct order.

3 ⑤ DF = 1 means fragmentation not allowed

Router behaviour

- drops the packet
- sends ICMP "Destination unreachable - Fragmentation needed" message to the sender.

the sender.

Q.4

(1) Recursive static Route \rightarrow uses next hop IP

• 192.168.196.0/24 \rightarrow LAN1 network

192.168.10.97 \rightarrow next hop IP, R3

2 \rightarrow AD

command on R4 ip route 192.168.96.0 255.255.255.0 192.168.10.97

4 11. Exit interface s4

AD = 3

Command on R4

IP route 192.168.96.0 255.255.255.0 s4 3

Q5

Router sending hello

packets

◦ R1

◦ R2

◦ R3

Reason:

Link state protocol

use hello packets to

◦ Discover neighbour

routers

◦ Maintain neighbour

relationship

◦ R1, R2, R3 are running

link state protocol, they

must send HELLO packet

periodically.

Router sending periodic routing updates:

- R1
- R4
- ISP

Inefficient Because

- To directly connected neighbours, regardless of changes
- Unnecessary bandwidth use
- Increased overhead
- Slower convergence.

6. ① Fe 80:: 1c35:67ab:3f9c:d81e

expanded form fe80:0000:0000:0000:1c35:67ab:
3f9c:d81e

② 2607:0:0:805::

Expanded form 2607:0000:0000:0805:0000:0000:0000:0000

③ fd00:abc:1234:5678::1

Expanded form fd00:0abc:1234:5678:0000:0000:0000:0001

Q7

①

Source mac address: MAC address of PCA

Destination mac address: (FF:FF:FF:FF:FF:FF)

②

• PC B compares the target IP with its own

• The ARP request packet contains PCB's IP address as the target IP.

③

• R1 will drop the ARP request

• Routers do not forward broadcast

80 ⓐ DHCP server is in a different subnet

ⓑ DHCP uses broadcast messages

ⓒ Broadcast must do not cross routers, so clients in new subnet cannot reach DHCP server.

① ① Configure DHCP relay agent.

Router forwards DHCP request to the DHCP server

② Install DHCP server in the new subnet: Local DHCP server serves local clients

Q10

The Dual Stack is the suitable approach for IPv4 and IPv6 transition.

In dual stack network device such as router, server and end system are configured to run IPv4 and IPv6 simultaneously.

When a device supports dual stack it can choose IPv4 or IPv6 automatically depending on the destination it is communicating with.

Dual stack provides seamless connectivity, better performance and easier troubleshooting.

Q9

Using ping

- Ping works by sending ICMP echo request packet from client to destination server and waiting for echo reply, this helps to verify whether the destination is reachable.

- If the client can successfully ping other internet services but cannot ping business application server, it indicates the client's local network & general internet connectivity are functioning well.

- Additionally ping provides RTT and packet loss info.

Q 11

(i) Action by SI

- It reads destination mac address
- Looks up the mac address table
- Finds the port connected through PC C
- Forwards the frame only through that port
- Does not broadcast the frame.

(ii)

Because

- End device are unaware of switch
- No configuration is required on hosts
- Frames forwarded silently