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Assignment -2

CSE 421 : Computer Networks

Solution to [Summer 2022 - set A] Final Question Paper

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Section : 22

Fall 25

Assignment - 2

Summer 22 - set A

Ans. to the Question No - 1

(a)

I. ipV4 : 19.96.99.49

~~subnet mask~~
~~(110)in binary~~ :

ipV4 in binary : 00010011 · 01100000 · 01100011 · 00110001

Subnet mask (110)
in binary : 11111111 · 11000000 · 00000000 · 00000000

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network address : 00010011 · 01000000 · 00000000 · 00000000
(AND)   ↓   ↓   ↓   ↓
                            19   64   0   0

So, | the network address is 19·64·0·0/10 |

ii. subnet mask : 11111111 · 11000000 · 00000000 · 00000000
(/10 in binary)   ↓   ↓   ↓   ↓
                      255   192   0   0

So, | subnet mask is 255·192·0·0 |

iii. Total bits in IPV4 = 32 ; Network bits = 10

∴ Host bits = 32 - 10 = 22

So, | possible Hosts = $2^{22} - 2$ = 4194302 |

1(b) S_Two:

S_Two has 600 Hosts.

So, $2^{10} - 2 = 1022$ (enough Host)

So, prefix = $(32-10) = $ /22

So, | S_Two ~~Lan~~ : 19.64.00/22 |

Subnet Mask : 255.255.252.0

usable : 19.64.0.1 - 19.64.3.254

→ next available after /22.

S_one : Hosts = 254

$2^9 - 2 = 510$

So, prefix = $32 - 9 = $ /23

So, | S_ONe ~~Lan~~ : 19.64.4.0/23 |

S_Three : has 3 routers. So needs at least 3 IPs.

$2^3 - 2 = 6$

∴ prefix = $32 - 3 = $ /29

| S_Three : 19.64.6.0/29 |

usable for S_one
19.64.4.1 - 19.64.5.254
next available

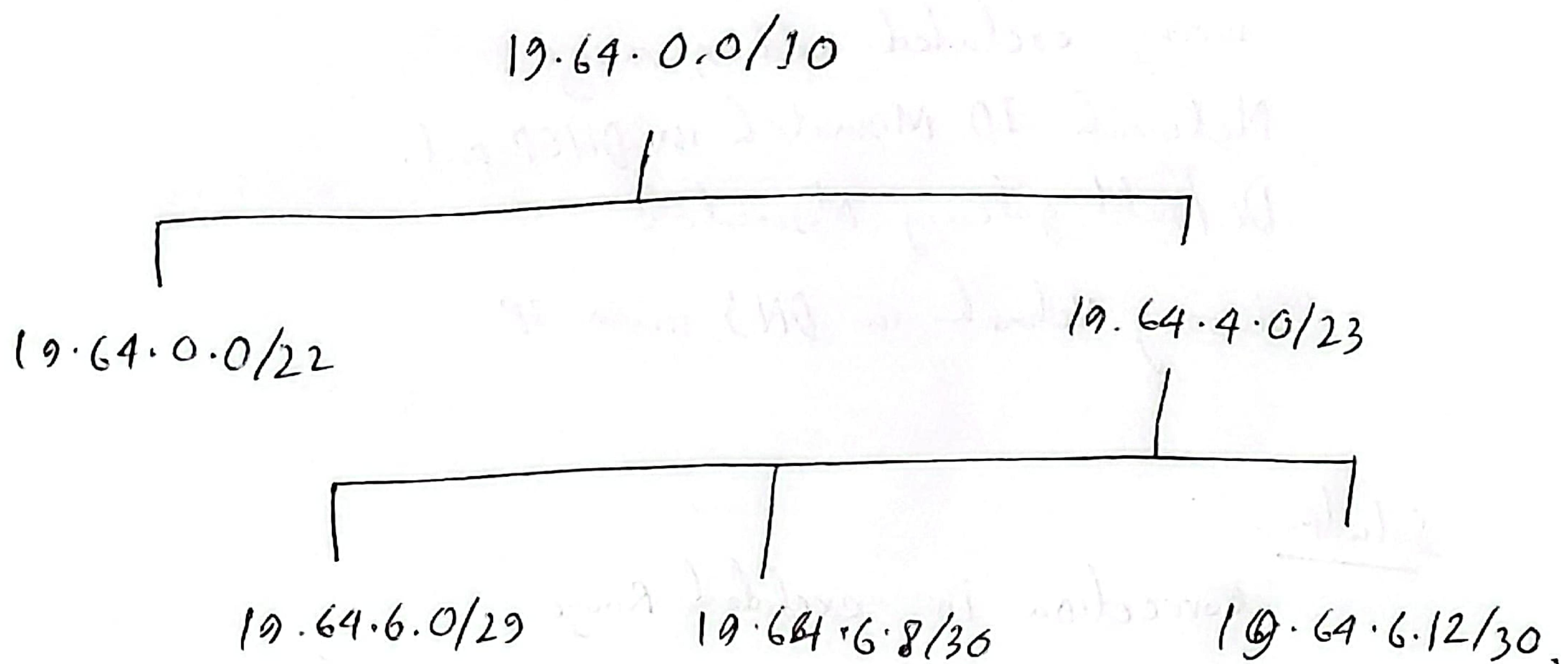Now, R_ONE to R_THREE and R_TWO to R_THREE :

↳ needs 2 IPs

(next available)   ∴ $32 - 2 = $ /30

So, | 19.64.6.8/30 |

↳ needs 2 IPs

$32 - 2 = $ /30

So, | 19.64.6.12/30 |

P.T.O.

hierarchical tree : (VLSM) :

19.64.0.0/10

19.64.0.0/22   19.64.4.0/23

19.64.6.0/29   19.64.6.8/30   19.64.6.12/30.

Ans. to the Question No - 2

Q2. a) When TTL = 0, router sends ICMP Time Exceeded.
  When Destination is reached, it sends a reply.
  Traceroutes, stops when destination IP responds.

b) Fragment offset value is calculated $= \dfrac{\text{Byte offset}}{8}$

  Measured in 8 byte blocks.

  Exmp : Let's say, a fragment starts at the 1600th byte of Data.
  So offset $= \dfrac{1600}{8} = 200$

c) because, 192.168.10.10/24 is a [private IP] ;

  Where 210.21.21.10/24 seems like it points to routers / gateway.
  No port forwarding is configured.

— o —

Q2. (d)

1. **Problem:**

   wrong excluded address range.
   Network ID Mismatch in DHCP pool.
   Default gateway Mismatch
   Wrong Network in DNS server IP.

   Solution:

   Correction in excluded Range.
   Matching DHCP with Interface subnet.
   Set default router IP.
   Configuring correct DNS IP.

2. client sends DHCP Release.
   Sent to DHCP server
   Server IP frees immediately.

Ans. to the Question No - 3

Q3. a) Distance vector algorithm only stores destination, distance, next Hop. — for less memory consumption.

When neighbor is UP → recieves periodic routing updates/Hello packets

When " " " DOWN → neighbor set to ∞.

Q3. b) In the Link state algorithm,

Less Traffic because, Distance vector sends pevodic full routing table to neighbor.

Less problem, 'cause, LS runs Dijkstra on full Topology.

c) updated table of Z:

	X	Y	Z	W	U	M
Z	3	7	0	1	∞	2

Ans. to the Question No - 4

Q4. a) I. For R1,

Ip route 0.0.0.0 0.0.0.0 S3/0

For R2,
ip route 0.0.0.0 0.0.0.0 S0/1

II. We've to add __Adminstrative Distance (AD)__ at the end of command.

ip route 0.0.0.0 0.0.0.0 S0/1 10

b) __Purpose__: AD = 1 → static routes Highly preferred over dynamic routes.

Cost = 0 → no path calculation. fixed route.

AD is __not__ Always 1.

Q4. (c) Yes, there'll be problem.

Solution: Dynamic routing (OSPF)

Problem here is, a single summarized route can't represents networks that are reachable via different next hops.

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Solution to the Question - 5

Q5. a) Yes, this'll cause issues. IPV4 & IpV6 aren't directly compatible.

Solutions: Tunnelling

or, Dual stack

or, Translation

b) FF10:: AC 19: 0: 1000: E000

c) MAC: F0 - B2 - F0 | EA - DF - 35

inserting FFFE

F0 - B2 - F0 - FF - FE - EA - DF - 35

So, F0B2: F0FF: FEEA: DF 35

→ F0: 1111 0000

inverting 7th bit: 1111 0010 → F2 (Hex)

So. Finally, F2B2: F0FF: FEEA: DF35

So, fully shortened global unicast:

2001: db8: acad: 10: f2b2: f0ff: feea: df35

Q5. d) I. <u>False</u>

Stateless DHCP doesn't assign IPV6 address. Rather, SLAAC assigns it.

II. In SLAAC, it uses <u>Duplicate Address Detection</u>. sends

Neighbor Solication (NS) Message .

if No Neighbor Advertisement recieved → address is unique.

<u>Ans. to the Question No - 6</u>

Q6. (a) <u>Not directly</u>. In ARP, we can see next hop MAC, not remote

host MAC. Remote Host MAC is only visible to its own LAN.

(b) 1.

Switch	MAC	Interface
S1	empty	─
S2	empty	─
S3	empty	─

ii. <u>S1 MAC Table (after ping)</u>

MAC	Interface	TTL
A	F0/1	60s
D	F1/0	60s

Q6. (c) I. EE = 1110 1110

$\longrightarrow$ Last bit = 0

So, it's | unicast |.

II. OUI = first 24 bits

| = EE : A9 : B8 |

III. local administered Address
= 2nd least significant bit of 1st octet

EE = 1110 1110

Here, it's the 7th bit

Moreover, 1 $\rightarrow$ locally administered
0 $\rightarrow$ globally unique

(d) NIC means $\rightarrow$ Network Interface Card/Controller.

It's located in the device hardware (motherboard or

as an extra card)

It provides MAC address and physical network

Interface.

$\underline{\hspace{3cm}}$ o $\underline{\hspace{2cm}}$