Assignment No. 2

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Ans: to the ques. no. 11(a)

(I)

Here,

Subnet mask = 255.255.128.0 /17 = 11111111.11111111.10000000.00000000

∴ Mask IP address upto 12 bits. = /17 (bit is 1 upto 12th position)

IP address = 17.50.96.81

In binary = 00010001.00110010.01100000.01010001

Mask with /17 = 00010001.00110010.0

∴ Network ~~Broadcast~~ address = 17.50.0.0

Subnet size = $2^{(32-17)} = 2^{15}$

In ~~broadcast~~ network address, from the third octet: 00010001.00110010.01111111.11111111 (Rightmost 15 bits)

∴ The broadcast address is 17.50.127.255.

(II)

Network address = 17.50.0.0

First usable host = 17.50.0.1

∴ Second usable host = Default gateway

= 17.50.0.2

Ans: to the ques. no. 1(b)

In LAN S_ONE:

512 hosts = (512 + 2) = 514

$\log_2(514) = 9.006 \approx 10$ (closest greater number)

Prefix = /(32 − 10) = /22

∴ First subnet = 172.50.0.0 /22

Last ~~usable~~ range = 00010001.00110010.00000011.11111111

= 172.50.3.255

Gateway = 172.50.0.1

In LAN BRAC:

254 hosts = (254 + 2) = 256

$\log_2(256) = 8$

Prefix = /(32 − 8) = /24

~~First~~ Next subnet = 172.50.4.0/24

Last range = 00010001.00110010.00000100.11111111

= 172.50.4.255

Gateway = 172.50.4.1

In LAN S_THREE :

13 hosts = (13 + 2) = 15

$\log_2(15) = 3.9 \simeq 4$ (Closest greater number)

Prefix = /(32 − 4) = /28

Next

~~First~~ subnet = 12.50.5.0/28

Last range = 00010001.00110010.00000101.00001111

= 17.50.5.15

Gateway = 12.50.5.1

The remaining space would be addressable for CSE, PHR and MNS. If their host numbers were provided, their range could be retrievable too.

Ans: To the ques. no. 2(a)

(I)

The given ~~net~~ network address is wrong. To fix it, it should be changed to 10.10.1.0. The DHCP server is in a different subnet. To fix this, DHCP relay agent needs to be configured on router R_THREE interface facing the LAN.

(II)

The location for setting up DHCP Relay Agent would be on Router R_THREE. The interface would be the wire facing towards the R_THREE LAN. (S@0/0/0).

(III)

If there had been a WAN link between R_ONE and R_THREE, DHCP relay should still be on R_THREE ~~to~~ LAN interface. This is because relay agent must be on router that hears DHCP broadcasts from clients and forwards unicast to DHCP server.

Ans: to the ques. no. 2(b)

(I)

Here,

Last fragment size = 230 bytes including header (22 bytes).

Data in last fragment = (230 - 22) = 208 bytes

offset = 182

Total data before last fragment = (182 × 8)
= 1456 bytes

∴ Total data = (1456 + 208) = 1664 bytes
original packet

(II)

All fragments except last one = 230 bytes

Therefore, MTU ≥ 230

Data per fragment = (230 - 22) bytes = 208 bytes

Offset per fragment increment = $\frac{208}{8}$ = 26

Now,

Frag-1 offset = 0

Frag-2 offset = 26

Frag-3 offset = (26+26) = 52

Frag-4 offset = (52+26)
= 78

Frag-5 offset = (78+26)
= 104

∴ Frag. 6 offset = 104 + 26 = 130

And, MTU = 230 bytes.

(Ans.)

(III)

For 6th fragment, more fragments after it exists. So, the MF value for ~~At~~ 6th segment is 1.

Ans: to the ques. no. 3(a)

~~(a)~~ (I)

The table shows initial distances, updates and the topology gradually, meaning it is the Distance Vector algorithm.

(II)

A's table before one iteration:

	A	B	C	D	E	F	G	H	I	J	K
A	0	5	2	inf	9	4	inf	inf	inf	inf	inf

A receives updates from B, C, F but not E.

Here,

A → B → E = 5+3 = 8 [8 < inf)

A → C → D = 2+4 = 6 (6 < inf)

A → F → E = 4+3 = 7 (7 < 8)

A → F → I = 4+1 = 5 (5 < inf)

A → F → G = 8 (8 < inf)

A → E = 7 (7 * 2)

G → H = inf

I → J = 7

J → K = 10

∴ A's table after one iteration:

	A	B	C	D	E	F	G	H	I	J	K
A	0	5	2	6	7	4	8	inf	5	7	10

(XX)

Ans: to the ques. no. 3(b)

Link state requires keeping track of neighbors. Because each router builds a map of the entire network topology by flooding link state advertisements (LSAs). To flood LSAs correctly, it must know its neighbors. To send LSAs to them.

Ans: to the ques. no. 3(e)

Distance vector ~~routing~~ might not reflect real shortest path because of slow convergence, counting to infinity problem and because routers know only distance to destination via next hop, not full topology. So, routing loops can cause incorrect distances.

Ans: to the ques. no. 4(a)

(I)

R4 LAN on R1 with the AD of 5 can be constructed using the command;

ip route 1.1.4.0 255.255.255.0 s0/0/1 5

(II)

The backup route can be constructed by executing; ip route 1.1.4.0 255.255.255.0 1.1.0.2 10

Ans: to the ques. no. 4(b)

If a router doesn't have static default route, router will drop packets destined to networks not ~~using~~ in its routing table.

Ans: to the ques. no. 4(c)

In the given routing table of a router, (0) means metric 0 for static route which is set administratively. '50' is the AD value. Default AD for static is 1, but here it's 50, meaning it might be a floating static route for backup.

Ans: To the ques. no. 5(a)

Anycast:

i) One-to-nearest

ii) Single sender

iii) Multiple receiver with same address

iv) routed to closest

Multicast:

i) One-to-many

ii) Single sender

iii) Multiple receivers

iv) All get packet

Anycast example: DNS root servers with same IP globally, where ~~not~~ traffic goes to nearest instance.

Ans: to the ques. no. 5(b)

IPv6 routers don't fragment packets. They drop and send ICMPv6 "Packet Too Big" to source. Source performs 'Path MTU Discovery' using ICMPv6.

Ans to the ques. no. 5(c)

SLAAC means 'Stateless Address Autoconfiguration'. Stateless because no servers track assigned addresses. Host generates its own address using router's prefix + EUI-64 or random interface ID. It works via Router Advertisement messages such as ICMPv6 type 134.