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HOME WORK - 5

DC - I

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Problem 3

The checksum is computed as follows:

01001100	01101001
01101110	01101011
10111010	11010100
+ 01000000	01001100
11011011	01000000
+ 01100001	01111001
00111100	10011010
+ 01100101	01110010
10100010	00001100

$\therefore$ Hence, we will find the one's complement of the sum i.e 01011101 11110011

Problem 5

Given 7-bit generator, G = 10011

Given: D = 1010101010

Let us devide 10011 into 1010101010 0000,

we get 1011011100

R = 0100

Problem 8:

a) Given: Efficiency of slotted ALOHA

$= Np(1-p)^{N-1}$

$$E'(P) = N(1-P)^{N-1} - NP(N-1)(1-P)^{N-2}$$
$$= N(1-P)^{N-2}((1-P) - P(N-1))$$

$\therefore E'(P) = 0$

i.e $N(1-P)^{N-2}((1-P) - P(N-1)) = 0$

$$(1-\cancel{P}) - NP + \cancel{P} = 0$$

$$1 = NP$$

$$\therefore P^* = 1/N$$

b) We have to find the efficiency of slotted ALOHA by letting N-approaches infinity.

i.e $E(P^*) = N\frac{1}{N}\left(1-\frac{1}{N}\right)^{N-1} = \left(1-\frac{1}{N}\right)^{N-1}$

can also be written as:

$$\frac{\left(1-\frac{1}{N}\right)^N}{1-\frac{1}{N}}$$

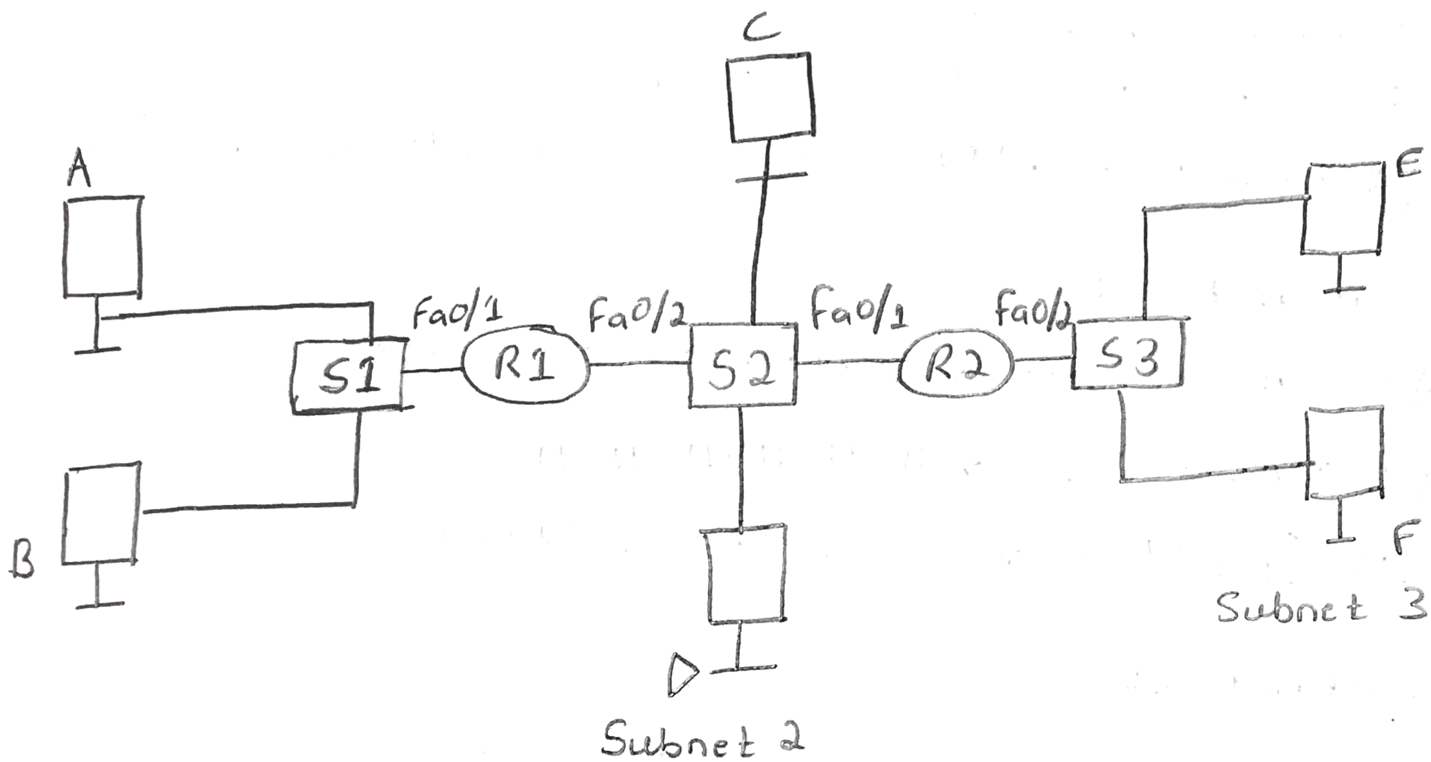
Now, $\lim_{N\to\infty}\left(1-\frac{1}{N}\right) = 1$ .... <i>

$\lim_{N\to\infty}\left(1-\frac{1}{N}\right)^N = \frac{1}{e}$ .... <ii>

From <i> & <ii> we get,

$$\therefore \lim_{N \to \infty} E(p^*) = \frac{1}{e}$$

Problem 14:



a) Subnet 1:

A: IP address → 192.168.1.120

B: IP address → 192.168.1.121

R1: IP address → 192.168.122
(Interface fast ethernet 0/1)

Subnet 2:

C: IP address → 192.168.2.100

D: IP address → 192.168.2.101

R_1: IP address → 192.168.2.102 (Interface fa0/2)

R_2: IP address → 192.168.2.103 (Fa 0/1)

Subnet 3:

E: 192.168.3.100 → IP address

F: 192.168.3.101 → IP address

R_2: 192.168.3.102 → IP address (Interface Fa 0/2)

b) Subnet 1:

A: MAC address → 00-00-00-00-00-00

B: MAC address → 11-11-11-11-11-11

R1: (Fa 0/1) → 22-22-22-22-22-22

Subnet 2:

C: MAC address → 33-33-33-33-33-33

D: MAC address → 44-44-44-44-44-44

R_1: (Fa 0/2) → 55-55-55-55-55-55

R_2: (Fa 0/1) → 66-66-66-66-66-66

Subnet 3:

E: MAC address → 77-77-77-77-77-77

F: MAC address → 88-88-88-88-88-88

R_2: (Fa 0/2) → 99-99-99-99-99-99

c) 1. Host E's forwarding table determines that packet needs to be forwarded / routed to host 'B' i.e 192.168.1.121 (5)

2. Host E creates an ethernet frame with destination MAC address to be the default gateway's MAC address. i.e R2 (Interface fa 0/2) = 99-99-99-99-99-99

3. R_2 recieves the packet and sees that it is destined for 192.168.1.121 which is in subnet 1.

4. R_2 now sends a packet with destination MAC address of 55-55-55-55-55-55 and source MAC address = 66-66-66-66-66-66

5. The process continues till the packet arrives at its destination (Host B).

d) In this case, host E will ARP for the MAC address of router R2's fa 0/2 interface. The ARP query packet is in a broadcast frame. R_2 recieves the packet & sends back it's own MAC address

Problem 17 : The wait is $\dfrac{51.2 \times 10^3 \text{ bits}}{10 \times 10^6}$

$= 5.12$ msec

Hence, for 100 Mbps, wait is 512 μsec.