COMP 3234 A4 (3035946760)

Q1 Total 36 bits ($r_c = 36$, $r :=$ row, $c :=$ colums)

EDC field $r + c + 1$ ← Target to minimise.

Then $i = j = 6$ acheives this

1	0	0	1	1	1	1
1	0	1	0	0	0	1
1	0	0	1	0	1	0
0	1	0	1	0	0	1
1	1	1	0	0	1	1
1	1	1	0	0	1	1
0	0	0	0	0	1	0

Q2 Compute the intermediate results.

① 10 10 10 11 1010 10 11

② 10 10 10 11 1010 10 11

③ 10 10 10 11 1010 10 11

④ 10 10 10 11 11 01 11 10

⑤ 00 11 10 11 00 00 01 10

⑥ 10 0000 11 01 11 00 11

⑦ 01 00 11 01 11 01 11 11

⑧ 00 11 01 10 00 10 10 11

⑨ 10 0001 10 11 01 11 01

$\Sigma \Rightarrow$ 01 11 10 00 01 00 00 11

Final Checksum,

10000111 10 11 11 00

Q3 (a) $G =$ 10 00 01 11 → 8 bit, $r = 7$.

We skip the working & only present the solutions

(1) $R =$ 01 01 111

(2) $R =$ 00 1011 0

(3) $R =$ 111 1000

Q4 Host A creates an IP datagram addressed to Hos F (dst), with source A. The next hop, dictated by the Routing Protocol, is at Router 1's interface 192.168.1.002. However since host A's ARP table is empty, it first broadcasts an ARP query packet.

(I) Src IP: 192.168.1.001
Src MAC: 11-11-11-22~22-22
Dst IP: 192.168.1.002
Dst MAC: FF-FF-FF-FF-FF-FF.

Router 1 should then be able to respond to A which lets host A learn about Router1's Left interface's MAC address, with which A can address a link-layer frame to.

(II) Src IP: 192.168.1.001
Src MAC: 11-11-11-22-22-22
Dst IP: 192.168.3.003
Dst MAC: 22-22-22-22-22-22

The router then receives the sent frame, extracts the message from it (removing the IP encapsulment from the frame) & learns that this is addressed to Host F. The router knows that its next hop will be at router 2 & using the ARP table looks up the MAC address corresponding to the dst IP.

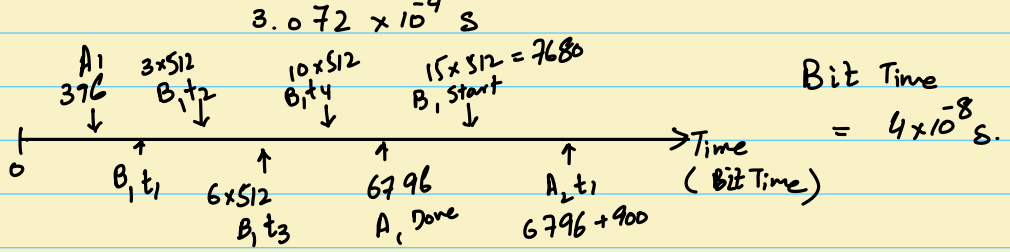
(III) Src IP: 192.168.1.001
Src MAC: 33-33-33-33-33-33
Dst IP: 192.168.3.003
Dst MAC: 55-55-55-55-55-55

Router 2 does the same to learn host F's MAC address.

(IV) Src IP: 192.168.1.001
Src MAC: 88-88-88-88-88-88
Dst IP: 192.168.3.003
Dst MAC: 99-99-99-99-99-99.

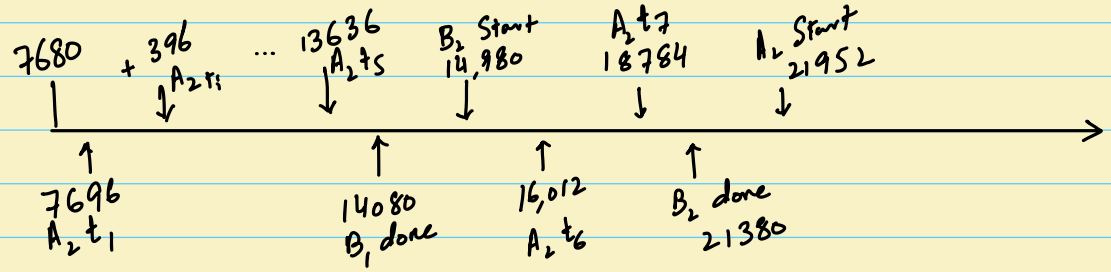
Host F then receives this message.

Q5 (1) B begins transmission of first frame.



B's transmission begins at $7680 \times 4 \times 10^{-8} s = 3.072 \times 10^{-4} s$.

(2) A's Successful transmission Time



$= 21982 \times 4 \times 10^{-8}$

$= 8.78 \times 10^{-4} s.$

(3) Total Transmission Time 28,352

Total transmit data 25 600 bit time

is

efficiency: $\frac{25600}{28352} \times 100 = 90.3\%$

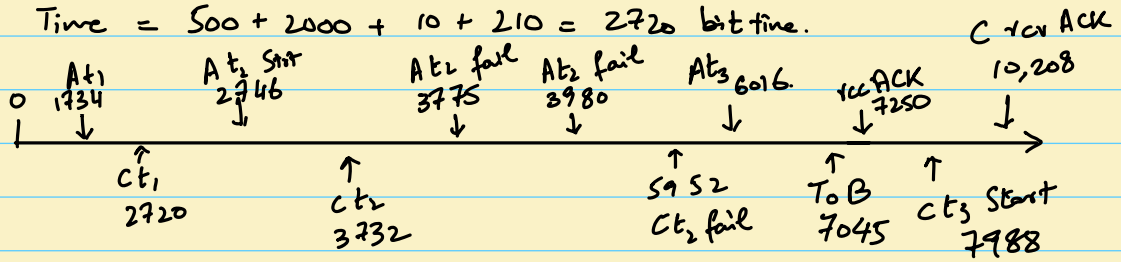
Q6 Transmission Delays

A: 128 bytes = 1024 bit time
C: 250 bytes = 2000 bit time.

Bit Time.
$1/10 \Rightarrow 1 \times 10^{-7}$ s
$= 0.1\,\mu s$.

DIFS = $50 \times 10^{-6} / 0.1\,\mu s$ = 500 bit time.
SIFS = $10 \times 10^{-6} / 0.1\,\mu s$ = 100 bit time.
ACK = 100 bit time.

(1) A's Time = 500 + 1024 + 5 + 205 = 1734 bit time.
C's Time = 500 + 2000 + 10 + 210 = 2720 bit time.



Successful Retransmission Start Time from A:
6016 bit time = 601.6 μs
Time A rcv ACK w/out collision
7250 bit time = 725 μs
Start Time for successful retransmission of C:
7988 bit time = 798.8 μs
Time C rcv ACK w/out collision
10,208 bit time time = 102.8 μs

(2) Total Time = 10,208 bit time.
4 pkts, A & C's frames & two ACKs
So 1024 + 2000 + 2(100) = 3224 bit times used

efficiency = $\frac{3024}{10,208} \times 100$ = 29.6 % (3 s.f.)