ECE 50863 HOMEWORK 1

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QUESTION 1

(a) Time for whole stream = Transmission delay + Propagation delay

= (Data size/Bandwidth) + (RTT/2)

= ($8x10^6/1.5x10^6$)$+25 \times 10^{-3}$ s

= 5.35 s

Time for initial handshake = 2 x RTT = 100ms

Total time = 5.35 + 0.1 = 5.45 s

(b) Time for data = 5.45 s

Wait time in between packets = 999 x RTT = 999 x 50

= 49.95 s

Total time = 49.95 + 5.45 = 55.4 s

QUESTION 2

(a) RTT >= 2 x Propagation delay

RTT >= 2 x ($385x10^6$)/($3x10^8$) = 2.56s

(b) Delay x Bandwidth = $2.56x10^9$ Gb

(c) This is the maximum number of bits that could be sent in a packet

(d) Time for the request (assuming packet is very small) = RTT = 2.56 s

Time for the data = Transmission delay + Propagation delay

= ($25x10^6$/ ($1/8$)$x10^9$) + 2.56 = 2.76 s

QUESTION 3

(i) In circuit switching, only one connection can be serviced. Hence one requires 10% of the time, maximum number of users (assuming this is the same as one connection) is 10

(ii) One user requires 100kbps.

Hence, number of simultaneous users = 1Mbps/100kbps = 1000/100 = 10

QUESTION 4

For collision detection,

(minimum frame size/bandwidth) > 2*Propagation delay

1000/(100 x 106) > 2 x length/(2x108)

1000 > length

Therefore, maximum length of the wire is 1000m

QUESTION 5

(a) After the i^{th} collision, the wait period is between 0 and 2^i-1 time units.

This is the first collision. Hence i=1.

Hence, wait period is between 0 and (2-1) -> 0 and 1

(i) Hence, possible combinations: <0,0>,<0,1>,<1,0>,<1,1>
(ii) <0,1>

(b) This is the second collision for both A and B. Hence, i=2.

Hence, wait period is between 0 and 2^3-1 -> 0 and 3

(i) Hence, possible combinations:

<0,0>, <0,1>, <0,2>, <0,3>, <1,0>, <1,1>, <1,2>, <1,3>, <2,0>, <2,1>, <2,2>, <2,3>,

<3,0>, <3,1>, <3,2>, <3,3>

(ii) <0,1>, <0,2>, <0,3>, <1,2>, <1,3>, <2,3>

QUESTION 6

After applying the spanning tree algorithm, B1 is chosen as the root node.

Hence, ports (links) not chosen are: <A, B2>, <B, B5>, <I, B6>

QUESTION 7

Assumption: The transmissions occur one after another

Message	B1		B2			B3		B4	
	1	2	1	2	3	1	2	1	2
A to C		A			A	A			A
C to A	C	A		C	A	A	C		A
D to C	C	A	D	C	A	D,A	C	D	A

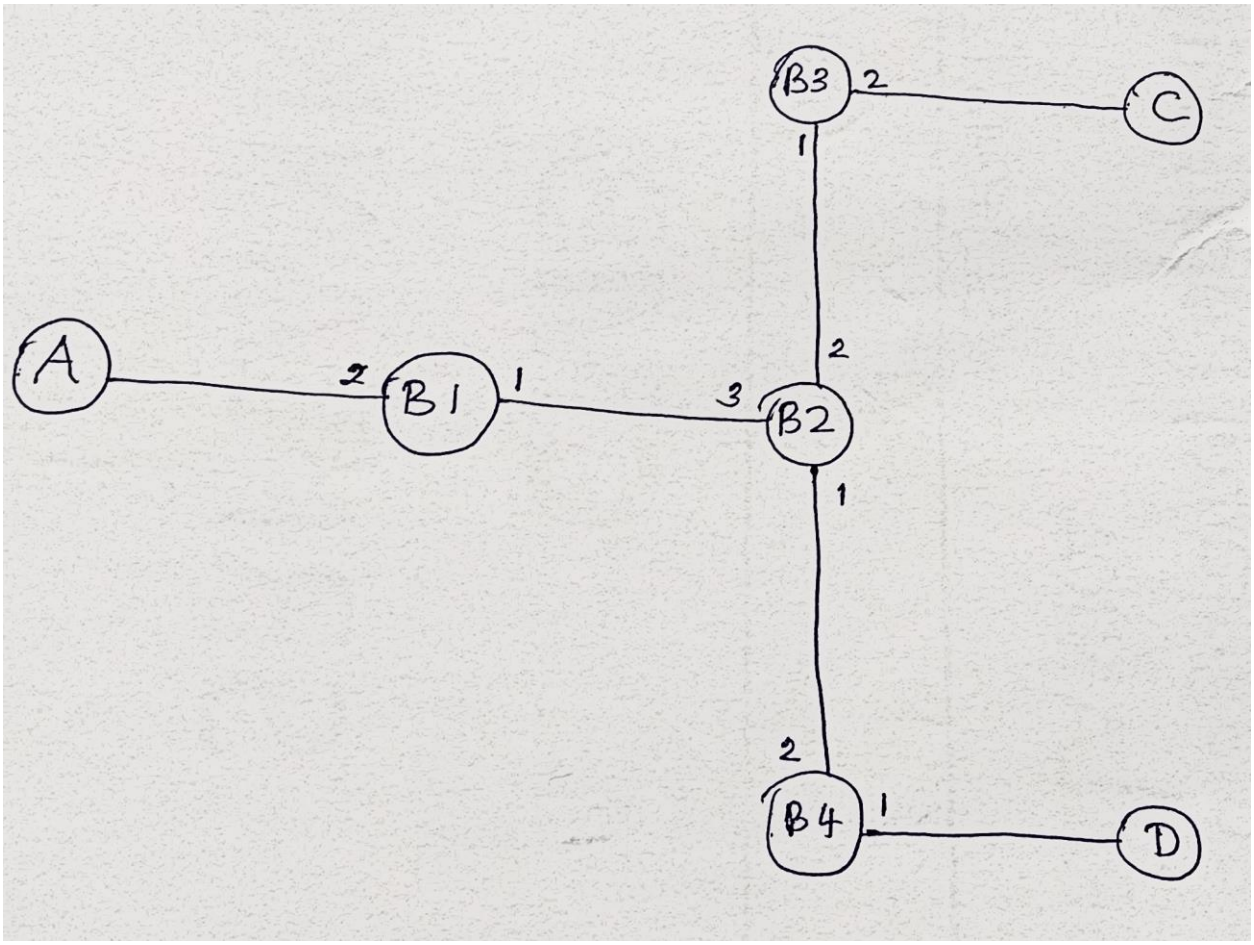

Figure 1: Port numbers