COMS 7201 - Assignment Two

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Part A

Q1. Frame Size = 1200 bytes = 1200 x 8 bits

Data rate = 10 M bps

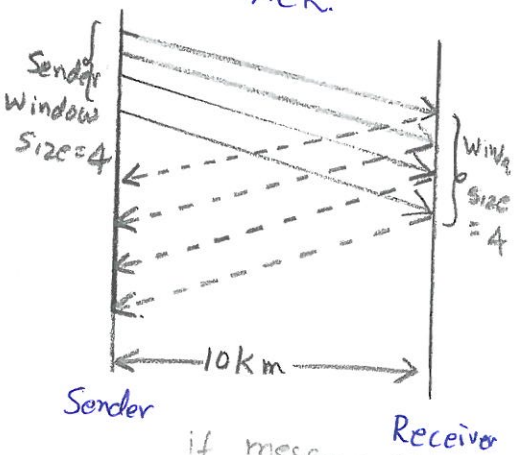
Time taken by each frame to transmit $= \frac{1200 \times 8}{10 \times 10^6} = 0.00096 \text{ sec} = 960\mu \text{ sec}$

Total time to send 1 frame = Transmission Time to Send + Propogation delay to send + Transmission Time to ACK + Propogation delay to ACK.

Propogation Delay For 10 km = $\frac{\text{Propogation delay}}{1 \text{ km}} \times 10 \text{ km}$

$= \frac{5\mu \text{ sec}}{\text{km}} \times 10 \text{ km}$

Propogation Delay For 10 km = 50μ sec



Transmission Time to ACK = 0 [Assumption]

∴ Total Time to send 1 frame = $960 + 50 + 0 + 50 = 1060\mu$ sec

Sliding window protocol, (Selective repeat) allows packet to be accepted out of order. Hence only half of available sequence numbered frames can be sent at any given time.

With 3 bits, $2^{3-1} = 4$ frames can be sent at any given time

Efficiency $= \frac{4 \times 960}{1060} = 3.622 = 362.2\%$

Q2. Frames Size = 1200 abytes

Data rate = 10 Mbps

Propogation delay = 5 μsec/km

Sequence Number Size = 3 bits

Distance = 10000 km

Time taken to transmit 1 frame $= \frac{1200 \times 8}{10 \times 10^6} = 0.00096$ sec $= 960$ μ sec

Total time to send 1 frame = Transmission Time to send + Propogation delay to transmit + Transmission Time to ACK + Propogation delay to ACK

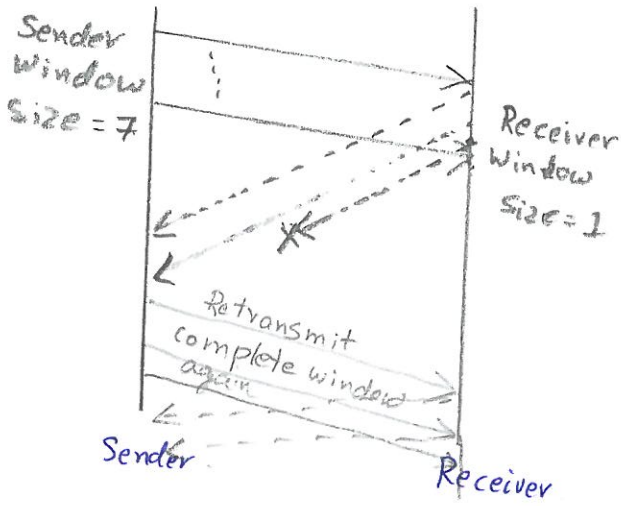
Propogation Delay for 10000 km $= \frac{5 \text{ μ sec}}{1 \text{ km}} \times 10000 \text{ km} = 50000$ μ sec

∴ Total time to send 1 frame = 960 + 50000 + 0 + 50000 = 100,960 μ sec

With 3 bit sequence number we have $2^3 - 1 = 7$ frames to transmit at any point in time.

∴ Efficiency $= \frac{7 \times 960}{100\,960} = 0.06656$

$= 6.656\%$



Q3.

Performance Calculation from Q1:

In selective repeat, $2^{bits-1} = 2^{7-1} = 64$ frames can be ~~transmitted~~ sent at any point in time,

Time taken to transmit 1 frame = 960 μ sec [from Q1]

Total time taken to send 1 frame = 1060 μ sec [from Q1]

$\therefore$ Efficiency = $\frac{64 \times 960}{1060} = 57.96$

Performance Calculation from Q2

In Go back-N protocol, $2^{bits} - 1 = 2^7 - 1 = 127$ frames can be sent at any point in time

Time taken to transmit 1 frame = 960 μ sec [from Q2]

Total time taken to send 1 frame = 100960 μ sec [from Q2]

$\therefore$ Efficiency = $\frac{127 \times 960}{100960} = 1.207$

Q4

Source MAC	Dest MAC	Source host	Destination host	Protocol	Contents
m6	m4	b	Server 2	TCP/IP	SYN=1, ACK=0 Syn(seq)=x, TCP Window size, Max size per packet (segment size)
m8	m7	Server 2	b	TCP/IP	SYN=1, ACK=1 Syn(Seq)=y, Ack(Seq)=x+1 Segment size, TCP Window size
m6	m4	b	Server 2	TCP/IP	ACK=1 Syn(Seq)=x+1, Ack(seq)=y+1 [connection established]
m8 ⋮ m6 ⋮	m7 ⋮ m4 ⋮	⋮	⋮	⋮	~~Syn(Seq)=~~ ~~Ack(seq)=~~ [Above 2 are repeated till all data is sent]
m6	m4	b	Server 2	TCP/IP	FIN=1 Syn(Seq)=a
m8	m7	Server 2	b	TCP/IP	FIN=1 ACK=1
m6	m4	b	Server 2	TCP/IP	ACK=1 [Connection Terminated]