Name_____

EE 4603, LOCAL AREA NETWORKS, QUIZ 2
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RULES.

I This quiz is closed book. Calculators may be used.
ii Answer all questions and show all work to receive full credit.
iii All questions have the same weight. (20 Points). All sub-questions within a question are weighted equally.

iv Please do not ask the proctors any questions during the exam about exam questions. Part of the test is understanding the question, as written, without supplemental information. If you feel additional data is needed to solve the problem, make (and state) an assumption and then work the problem.

Question 1 – How 3 techniques detect frames (packets) within a stream of bits.

A. For character oriented bit streams (state "not needed" where that is the right answer).

_____ DLE STX _____ Starting flag

_____ DLE ETX _____ Starting flag

∨ **DLE** (STUFF A "DLE" BEFORE OR AFTER EVERY "DLE")
___A B ETX SOT EOD RET LF DLE NULL __Quoting technique –insert characters, or state "not needed."

B. For bit-oriented bit streams.

_____01111110 _____ Starting flag

_____01111110 _____ Ending flag

∨ **0** ∨ **0** **(STUFF A "0" AFTER FIVE 1'S)**
___0 1 1 0 1 1 1 1 1 0 0 0 1 1 1 1 1 1 0 0 0 0 0 0 1 0 __Quoting technique –insert bits, or state "not needed."

A. For a T-1 AMI bit streams.

_____ + _____ Starting flag (after **0 0 - +**) **("+" OR "-" SAME AS LAST)**

_____ + _____ Ending flag (after **0 0 - +**)

___ + 0 0 - + - 0 0 - + __ Quoting technique –insert characters or bits, or state "not needed." (NOT NEEDED)

Question 2 – Stop and Wait Flow Control Utilization

_____ 80 _____ What is the time to send a frame of 1000 bytes at 100 Mbps (in microsec (us)).

_____ 50 _____ How long does it take for a bit to travel 10 km to the next station (at 200 m/us) (in us).

_____ 0.44_____ What is the utilization factor for a stop and wait protocol with these parameters?

____44,000,000 ____ What is the average throughput (rate x utilization) in bits/second?

_____ 0 _____ What is the maximum distance for the Utilization to be 100%.

____8,000 meters___ What is the distance where the Utilization falls to 50%.

Question 3 – Sliding Window Flow Control Utilization (W = 15)

_____ **80** _____ What is the time to send a frame of 1000 bytes at 100 Mbps (in microsec (us)).

____16,000 m ____ What is the physical length of the frame (1st to last bit as it travels along)

_____ **50** _____ How long does it take for a bit to travel 10 km to the next station (at 200 m/us) (in us).

_____ **1.0** _____ What is the utilization factor for a sliding-window protocol with these parameters?

___ **100,000,000**____ What is the average throughput (rate x utilization) in bits/second?

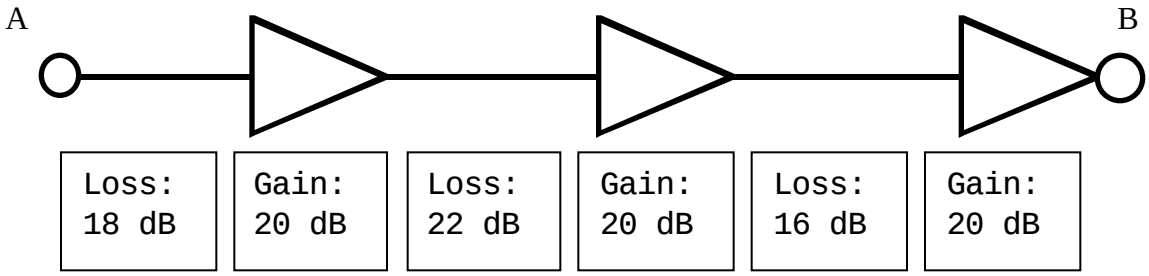
____ 112,000 ____ What is the maximum distance for the Utilization to be 100%.

2 X / 200 = (W-1) x 80 W=15 X = 8000 * (15-1) = 112,000

_____232,000 _____ What is the distance where the Utilization falls to 50%.

U = 0.5 = (W * 80) / (80 + 2 (X / 200)) X = 240,000 - 8,000 = 232,000 meters

Question 4 - Network Transmission System Losses and Gains (dB)



_____ **4 dB** _____ What is the overall gain in dB for this transmission system (from A to B)?

G = -18 +20 -22 +20 -16 +20 = 4

____ **2.5** _____ What is the ratio of (Power Out)/(Power In) as a dimensionless number.

G = 10 log(R) R = 10^(4/10) = 2.5

_____ **1.6** _____ What is the ratio of (Voltage Out)/(Voltage In) as a dimensionless number.

Question 5- Network Short Questions (one or two word answers)

____ **Establish (or Setup)** _____ (1) Name the three stages of a connection in a connection-oriented network

____**Transfer Data (Transmission)** ___ (2)

____ **Disconnect (Takedown)** _____ (3)

____ Non-Blocking ___ What is a switch called that can connect every station to every other station simultaneously?

____ **Time Division** _____ (1) Name three types of multiplexing.

____ **Frequency Division** ___ (2)

____ **Code Division** _____ (3) ("Spread Spectrum")

_____ **CRC** _____ What technique is used that typically can detect any burst of errors up to 32 bits long? (Cyclic Redundancy Check)

____ X (Non-Blocking) __ What is a switch called that can connect every station to every other station simultaneously?

____ **Async** ___ What is the coding technique where different bytes or characters are not synchronized to a common bit clock? (Asynchronous)