Arab Academy for Science, Technology & Maritime Transport
School of Engineering
Computer Engineering Department
Computer Networks 2 CC514

Midterm 2 **May, 2004**
Time: 90 minutes **Prof. Dr. Magdy Saeb**

Student Name: ---------- ID number: ----------

Answer problem 1 and any other three of the following problems:

Problem 1:
Explain, using schematics whenever possible, the following statements:

(a) IPv6 routers can identify and process IPv4-type addresses.
(b) IPv6 header is theoretically faster to process as compared to IPv4 header.
(c) The "Urgent Pointer" function(s) of the TCP header.
(d) The Ring repeater states.
(e) The protocol architecture for Bridge and Router.
(f) The formation of the MAC frames starting from the application data layer.

Answer here:

Problem 2:

2.1 What are the LLC service primitives associated with Unacknowledged Connectionless Service?

2.2 (a) Data is sent at 1Mbps over a transmission line, wherein the propagation delay is 5µs. In the absence of errors, what range of frame sizes gives a Utilization ($U = t_f / t_C$) of at least 50% for stop and wait ARQ protocol?

(b) Plot the relation between (U) and (a) for the given p value. Examine the resulting relation and give your analysis of this function plot.

Hint: $U = t_f / t_C = (1-p)/ (1 + 2a)$, where $a = t_{prop} / t_f$, and p is the Pr {a frame is being received incorrectly at the receiver side}, t_{prop} is the propagation delay, and t_f is the frame transmission time.

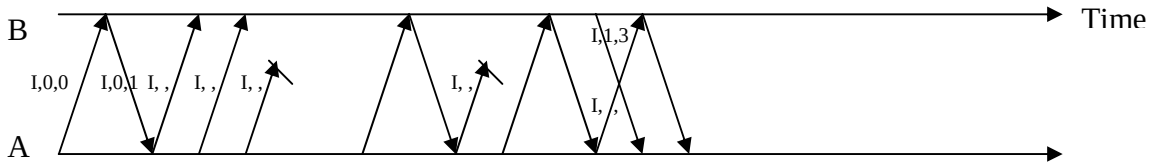
(c) Repeat for the case when probability of a frame being received incorrectly at the receiver side is equal to 0.15.

Answer here:

Problem 3:

3.1 In go-back N, for a k-bit sequence number field, which provides a sequence number range of 2^k, the maximum window size is limited to $2^k - 1$, Explain the reason behind this fact.

3.2 For a two-bit sequence number and a window size equal to three, write the missing sequence and acknowledgment numbers in the following time sequence diagram.



Answer here:

Problem 4:

4.1 Explain and show using a schematic, the CSMA actions in the following cases: 0-persistent, 1-persistent, and p-persistent.

4.2 In non-persistent CSMA, the throughput is given by:

$$S = G\, e^{-a\,G} / [G\,(1 + 2a) + e^{-a\,G}]$$

Where, a = propagation delay/packet transmission time, S throughput, and G is the offered load.

(a) Find the throughput for low traffic conditions, which is for very small propagation delay.

(b) The load of maximum throughput, $G_{optimum.} = G^{*}$

(c) The channel capacity S_{max}.

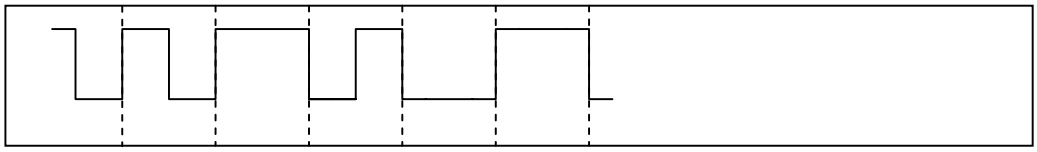
(d) The load range for stable operation, that is: ? $\leq G \leq$? for stability.

Answer here:

Problem 5:

5.1 Explain the reason why Manchester and differential Manchester techniques are used for data encoding.

5.2 The waveform in the following figure belongs to a differential Manchester encoded binary stream. Determine the beginning and end of bit period and give the data sequence. Assume the dotted lines represents the clocking.



Answer here:

Good Luck…we all need some!