COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Computer Engineering

Lecturers: Prof. Dr. Magdy Saeb

Course: Local Area Networks 2

Course No. CC514

Date: August 2002 **Time:** 120 minutes **Grade:** 40 Marks

Answer five only of the following problems:

Problem (1):

A simple medium access control protocol would be to use a fixed assignment time division multiplexing (TDM) scheme. Each station is assigned one time slot per cycle for transmission. For the bus, the length of each slot is the time to transmit 100 bits plus the end propagation delay. For the ring assume a delay of one bit time per station, and assume a round robin assignment is used. Stations monitor all time slots for reception. Assume a propagation time of 1.5×10^8 m /s. For N stations what is the throughput per station for a two-km, 15 Mbps base band bus.

Problem 2:

2.1 Why should we divide a network into two LANs with the same protocol and then connect them using a bridge?

2.2 Discuss the differences between LLC and MAC sub-layers.

2.3 At a propagation speed of 200 m/us, what is the effective length added to a ring by a bit delay at each repeater at 40 Mbps?

2.4 Explain what we mean by CSMA/CD 0-persisitent, one-persistent, and p-persistent.

Problem 3:

3.1 Compare, using schematics whenever possible, between the following two levels of addressing:

- MAC address,
- LLC address.

3.2 Consider a system that has N stations that are all ready to transmit. If each station is ready to transmit with probability p during a contention slot, show that the probability P_a that some station acquire the channel during this slot in terms of p and N is given by:

$$P_a = N.\ p.\ (1\text{-}p)^{N-1}$$

Find also the maximum value of Pa given that N = 50 stations.

Problem 4:

For 1-persistent CSMA the relation between S and G is given by:

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

Plot this relation for 0.01 <= G <= 1.0, and find the channel capacity.

Problem 5:

Consider an S-ALOHA system with a finite number of stations N and a =0. The offered load from each station is G_i, the throughput S_i . Derive an equation for S as a function of G_i. Assume that the G_is are identical; what is the equation for S? Verify that this approaches Ge^{-G} as $N \rightarrow \infty$. Above what value of N is the difference negligible?

Problem 6:

6.1 Discuss the following LLC services:

1. Unacknowledged connectionless service
2. Connection-mode service
3. Acknowledged connectionless service

6.2 Discuss the LLC Protocol Data Units format.
6.3 What the parameters usually encountered in LAN performance analysis.
6.4 Define Reliability in LAN for series and parallel systems.