Arab Academy for Science, Technology & Maritime Transport
School of Engineering
Computer Department
Local Area Networks II (CC514)

Midterm No. 2	May, 12, 2002
Time: 90 minutes	Lecturer: Prof. Dr. Magdy Saeb

Answer <u>only four</u> of the following problems:

Problem 1:

Consider a 10 Mbps, 1km LAN, with 10 stations and frame size=10,000 bits. Determine throughput and delay for the token ring and throughput for CSMA/CD. The propagation velocity is 2×10^8 m/s.

Hint: For Token Ring: $S = 1/(1 + a/N)$ for $a < 1$ or $S = 1/a(1 + 1/N)$ for $a > 1$,
For CSMA/CD : $S = 1/[\ 1 + 2a\ (1-A)/A]$, where
a = Propagation time/transmission time, and $A = (1 - 1/N)^{N-1}$

Answer:

Problem 2:

2.1 Discuss the following LLC services:

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

2.2 Discuss the LLC Protocol Data Units format.

Answer:

Problem 3:

3.1 Using a schematic, describe CSMA in its three cases: non-persistent, 1-persisitent, and p-persistent.

3.2 Using a schematic, describe the CSMA/CD operation for four stations A, B, C, and D showing at least one collision.

Answer:

Problems 4:

For p-persistent CSMA, consider the following situation. A station is ready to transmit and is listening to the current transmission. No other station is ready to transmit, and there will be no other transmission for an indefinite period. If the time unit used in the protocol is T, show that the average number of iterations of step 1 of the protocol is 1/p and that therefore the expected time that the station will have to wait after the current transmission is T ((1/p) -1).

Hint: Use the equality

$$\sum_{i=1}^{\infty} iX^{i-1} = 1/(1-X)^2$$

Answer:

Problem 5:
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?

Answer:

Problem 6:
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-to-end propagation delay. For the ring, assume a delay of 1 bit time per station, and assume that a round robin assignment is used. Stations monitor all time slots for reception. Assume a propagation time of $2x10^8$ m/s. For 10 stations, what is the throughput per station for a 100 Mbps ring with a total length of 2 km.

Answer: