CNT5505 Homework No. 4

(Given October 9, due October 16)

(Note: you can either do this as an individual homework or form a group of 2 to do this homework.)

1. (Problem 2, page 351) A group of N stations share a 56-kbps pur ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e.g. the stations can buffer outgoing frames). What is the maximum value of N?
2. (Problem 3, page 351) Consider the delay of pure ALOHA versus slooted ALOHA at low load. Which one is less? Explain your answer.
3. (Problem 6, page 351) What is the length of a contention slot in CSMA/CD for (a) a 2-km twin-lead cable (signal propagation speed is 82% of the signal propagation speed in vacumm)? and (b) a 40-km multimode fiber optic cable (signal propagation speed is 65% of the signal propagation speed in vacumm)?
4. (Problem 9, page 351) Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention?
5. (Problem 15, page 352) A 1-km-long, 10Mbps CSMA/CD LAN (not 902.3) has a propogation speed of 200m/usec. Repeaters are not allowed in this system. Data frames are 256 bits long, including 32 bits of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel in order to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming that there are no collision?
6. (Problem 18, page 352) Ethernet frames must be at least 64 bytes long to ensure that the transmitter is still going in the event of collision at the fat end of the cable. Fast Ethernet has the same 64-byte minimum frame size but can get the bits out ten times faster. How is it possible to maintain the same minimum frame size?
7. (Problem 38, page 353) Consider the extended LAN connected using bridges B1 and B2 in Fig. 4-41(b). Suppose the hash tables in the two bridges are empty. List all ports on which a packet will be forwarded for the following sequence of data transmissions:

(a) A sends a packet to C.

(b) E sends a packet to F.

(c) F sends a packet to E.

(d) G sends a packet to E.

(e) D sends a packet to A.

(f) B sends a packet to F.