HOME WORK ASSIGNMENT#3

Due Date Nov 9, 2007 (10x100=1000 points)
CS 4/55201 COMPUTER NETWORKS
Fall 2007, Department of Computer Science, Kent State University

1. (Chapter 4, Problem 11) What properties do the WDMA and GSM channel access protocols have in common?

2. (Chapter 4, Problem 14) Suppose that A, B, and C are simultaneously transmitting 0 bits using a CDMA system with the chip sequences of Fig. 4-16(b). What is the resulting chip sequence?

A: 0 0 0 1 1 0 1 1
B: 0 0 1 0 1 1 1 0
C: 0 1 0 1 1 1 0 0
D: 0 1 0 0 0 0 1 0

(a)

A: (−1 −1 −1 +1 +1 −1 +1 +1)
B: (−1 −1 +1 −1 +1 +1 +1 −1)
C: (−1 +1 −1 +1 +1 +1 −1 −1)
D: (−1 +1 −1 −1 −1 −1 +1 −1)

(b)

Six examples:

− − 1 −	C	S_1 = (−1 +1 −1 +1 +1 +1 −1 −1)
− 1 1 −	B + $\underline{C}$	S_2 = (−2 0 0 0 +2 +2 0 −2)
1 0 − −	A + $\underline{B}$	S_3 = (0 0 −2 +2 0 −2 0 +2)
1 0 1 −	A + B + C	S_4 = (−1 +1 −3 +3 −1 −1 −1 +1)
1 1 1 1	A + B + $\underline{C}$ + D	S_5 = (−4 0 −2 0 +2 0 +2 −2)
1 1 0 1	A + B + $\bar{C}$ + D	S_6 = (−2 −2 0 −2 0 −2 +4 0)

(c)

S_1 • C = (1 +1 +1 +1 +1 +1 +1 +1)/8 = 1
S_2 • C = (2 +0 +0 +0 +2 +2 +0 +2)/8 = 1
S_3 • C = (0 +0 +2 +2 +0 −2 +0 −2)/8 = 0
S_4 • C = (1 +1 +3 +3 +1 −1 +1 −1)/8 = 1
S_5 • C = (4 +0 +2 +0 +2 +0 −2 +2)/8 = 1
S_6 • C = (2 −2 +0 −2 +0 −2 −4 +0)/8 = −1

(d)

Fig. 4-16. (a) Binary chip sequences for four stations. (b) Bipolar chip sequences. (c) Six examples of transmissions. (d) Recovery of station C's signal.

3. (Chapter 4, Problem 19) A 1-km-long, 10-Mbsp CSMA/CD LAN (not 802.3) has a propagation speed of 200m/usec. Data frames are 256 bits long, including 32 bit of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel to send a 32-bit acknowledgment frame. What is the effective data rate, excluding overhead, assuming that there are no collisions?

4. (Chapter 4, Problem 21) Consider building a CSMA/CD network running at 1Gbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?

5. (Chapter 4, Problem 22) Sketch the Manchester encoding for the bit stream: 0001110101.

6. (Chapter 4, Problem 25) What happens in a token bus if a station accepts the token and then crashes immediately? How does the protocol described in the text handle this case?

OR

The 1000Base-SX specification states that the clock shall run at 1250 MHz, even though gigabit Ethernet is only supposed to deliver 1 Gbps. Is this higher speed to provide for an extra margin of safety? If not, what is going on here?

7. (Chapter 4, Problem 27) The delay around a token ring must be enough to contain the entire token. IF the wire is not long enough, some artificial delay must be introduced. Explain why this extra delay is necessary in the content of a 24-bit token and a rig with only 16 bits of delay?

OR

Two CSMA/CD stations are each trying to transmit long (multi-frame) files. After each frame is sent, they content for the channel using the binary exponential back-off algorithm. What is the probability that the contention ends on round *k,* and what is the mean number of rounds per contention period.

8. (Chapter 4, Problem 30) A 4-Mbps token ring has a token-holding timer value of 10msec. What is the longest frame that can be sent on this ring?

OR

A switch designed for use with fast Ethernet has a backplane that can move 10 Gbps. How many frames/sec can it handle in the worst case?

9. (Chapter 4, Problem 36) Ethernet frames must be at least 64 bytes long to ensure that the transmitter is still going in the event of a collision at the far 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?

10. (Chapter 4, Problem 41) A large FDDI ring has 100 stations and a token rotation time of 4msec. The token holding time is 10msec. What is the maximum achievable efficiency of the ring?

OR

A seven-story office building has 15 adjacent offices per floor. Each office contains a wall socket for a terminal in the front wall, so the sockets form a rectangular grid in the vertical plane, with a separation of 4 m between sockets, both horizontally and vertically. Assuming that it is feasible to run a straight cable between any pair of sockets, horizontally, vertically, or diagonally, how many meters of cable are needed to connect all sockets using

   a. (a) a star configuration with a single router in the middle?
   b. (b) an 802.3 LAN?

All problems are from Computer Networks, Andrew S Tanenbaum, Third Edition. If there is any inconsistency please email TA (ydrabu@cs.kent.edu)