

>>> Assignment #5 for Computer Networks (CNT 4004) <<< Due on 11/17/10 at the beginning of class

This assignment covers material from chapter 5 and 6 of the textbook and from class lecture.

Problem #1

For this problem you will analyze the effectiveness of parity for detecting bit errors in asynchronously transmitted words. Assume that each word has 2 start bits, 1 stop bit, 8 data bits, and 1 parity bit. Also assume that bit errors are “iid” (that is, independent and identically distributed) unless otherwise noted. Assume that start and stop bits are never in error.

- a) If the $P_b = \text{Pr}[\text{bit error}] = 0.001$, what is the probability of a word being in error (that is, a received word is not the same as when it was transmitted)?
- b) If the probability of a word being in error must be less than 0.005, what is the maximum allowable value of P_b ?
- c) If $P_b = \text{Pr}[\text{bit error}] = 0.001$, what is the probability that a received word contains undetectable errors?

Problem #2

Given a message (M) of 11110100 and a generator polynomial (P) of 101. Determine the CRC for the message and give the frame (T) to be transmitted.

Problem #3

Precisely define what a Local Area Network is. Discuss how a LAN is different from a Wide Area Network (WAN) where you may consider the Internet to be a WAN.

Problem #4

Metcalfe invented Ethernet. Dig a little and determine the “rest of the story”. Why did Metcalfe invent Ethernet? Was Metcalfe the first to use contention for multiple access? If not, who was and in what context? Give other examples (in the broad IT field) of the first inventor not being the person who gets rich off an idea.

Problem #5

Do problem P19 (page 516) in the textbook. Also answer the following, is a minimum frame size needed for switched (full-duplex) Ethernet, explain why or why not.

Problem #6

Early IBM Token Ring had a data rate of 4 Mb/s. It was argued at that time that 4 Mb/s Token Ring had greater throughput than 10 Mb/s Ethernet. How was this argument made and why was it incorrect? Hint: Metcalfe’s first published paper on Ethernet can be found online, the paper is “Ethernet: Distributed Packet Switching for Local Computer Networks”.

Problem #7

Carefully read Section 5.9 (“A Day in the Life of a Web Page Request”) in the text book. State here that you have *fully understood everything* described in this section. If there is anything you do not understand, do not make this statement until you have resolved anything you do not understand by asking questions (and understanding the answers!) to the TA or me.

Problem #8

Give the Transparent Bridge (TB) learning and forwarding algorithm. Explain what there must be no loops in the interconnected network for this algorithm to function properly.

Problem #9

Do problems R1, R3, and R4 (page 588) from the textbook.

Note:

The TA and I are here to help you! Make use of help if you need it.