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COSC 328 – LAB 8
Introduction to Networks
2020 Winter Term 1

Deadline: Dec 4th, 2020 at 11:59 PM Pacific Time (Sharp). Delayed assignments will receive penalty as described in the course outline.

Introduction

In this lab, we will do some practice questions on link layer. All work must be shown for marks. This lab should be electronically submitted on Canvas.

Review Questions (70 Marks)

Question 1) Suppose two nodes start to transmit at the same time a packet of length L over a broadcast channel of rate R. Denote the propagation delay between the two nodes as d_{prop}. Will there be a collision if $d_{prop}<L/R$? Why or Why not? (10 marks)

Question 2) Why would the token ring protocol be inefficient if a LAN had a very large perimeter? (10 marks)

Question 3) Consider the 5-bit generator, G = 10011, and suppose that D has the value 1010101010. What is the value of R? (10 marks)

Question 4) In this problem, we explore some of the properties of the CRC. For the generator G = 1001 given is Section 6.2.3 of your textbook, answer the following questions. (10 marks)
   a) Why can it detect any single bit error in data D?
   b) Can the above G detect any odd number of bit errors? Why?

Question 5) Graph the efficiency of slotted ALOHA and pure ALOHA as a function of p for the following values of N: (10 marks)
   a) N=15.
   b) N=25.

Question 6) Suppose nodes A and B are on the same 10 Mbps broadcast channel, and the propagation delay between the two nodes is 245 bit times. Suppose A and B send Ethernet frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, can the retransmissions from A and B collide? For our purposes, it suffices to work out the following example. Suppose A and B begin transmission at t = 0 bit times. They both detect collisions at t = 245 bit times. Suppose KA = 0 and KB = 1. At what time does B schedule its

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retransmission? At what time does A begin transmission? (Note: The nodes must wait for an idle channel after returning to Step 2—see protocol.) At what time does A's signal reach B? Does B refrain from transmitting at its scheduled time? (20 marks)