

CSE590 Fall 2009 Wireless and Mobile Networks

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Due **October 08th** in class. Each problem, unless specified otherwise, has a maximum of 10 points. (i) You write down the solution clearly. If we can not recognize your writing then you may lose points. (ii) Avoid unnecessary details.

Homework 3

- Combing.** Each user uses a combing code. It transmits if the corresponding bit is 1 and listens to the channel if the bit is 0. A user who hears other transmissions will withdraw from the competition in this round. The user who has not heard anything wins and transmits in the following data slot.
 - What should be the criteria for the combing code, to allow this scheme to work (i.e., no conflict and one user is able to transmit)?
 - Design the combing code for 5 users with minimum length of the combing code.
- Random network, connectivity and random access.** Consider three nodes X_1, X_2, X_3 randomly placed.
 - If the three nodes are randomly placed on a line segment of length 1, conditioned on (1, 2) and (2, 3) being an edge with transmission range r , calculate the probability that (1, 3) is an edge. (5pts)
 - If the three nodes are randomly placed inside a unit square, conditioned on (1, 2) and (2, 3) being an edge with transmission range r , calculate the probability that (1, 3) is an edge. (5pts)
 - Explain the reason for poor throughput of using random access methods (such as ALOHA or slotted ALOHA) with *broadcast* in an ad hoc network, i.e., a node delivers a message to all other nodes by flooding. Recall that in a flooding algorithm, every node that has received the message the first time will retransmit until all nodes receive the message. (5pts)
- 802.11 and Bluetooth.** Do a literature search on the random access mechanism for bluetooth and compare it with WiFi 802.11.

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