CSE 475 Spring 2012

HOMEWORK 1

1. Suppose we have N users who share the same medium using slotted ALOHA scheme. However, the users are not perfectly synchronized. Half of the users have their slots shifted by 1/2. That is, suppose half of the users have slots starting at time 0, 1, 2, $\cdots$, the other half of the users start their slots at time 1/2, 3/2, $\cdots$. Assume that each user has a probability p to transmit at each slot. What is the maximum throughput?

2. How does the near/far effect influence TDMA systems? What happens in CDMA systems? What are the countermeasures in TDMA systems, what about CDMA systems?

3. Redo the simple example of section 3.5 in the textbook (Schiller), but now add random 'noise' to the transmitted signal (-2,0,0,-2,+2,0). Add, for example, (-1,0,1,1,0,-1). In this case, what can the receiver detect for sender A and B respectively? Now include the near/far problem. How does this complicate the situation? What would be possible counter-measures?

4. Assume all stations hear all other stations. One station wants to transmit and senses the carrier idle. Why can a collision still occur after the start of transmission?

5. What are the benefits of reservation schemes? How are collisions avoided during data transmission, why is the probability of collisions lower compared to classical Aloha? What are disadvantages of reservation schemes?

Note 1: You are supposed to answer all questions. But, selected questions will be graded.
Note 2: Write everything in your own words and sentences (your own English, even if it is broken!). Do not copy-paste from any Internet resource or from each other. Otherwise you will get a zero grade.
Note 3: You may bring hard copy of your homeworks to the class, or send a soft copy via e-mail (omer.korcak@marmara.edu.tr)