

**CS 6097 Wireless and Mobile Networking**  
**Homework No. 4 dated Wednesday September 24, 2014**

**P1.19.** If a total of 33 MHz of bandwidth is allocated to a particular cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice channels, compute the number of simultaneous calls that can be supported per cell if a system uses:

- (a) FDMA
- (b) TDMA with 8-way time multiplexing

Assume that additional bandwidth is reserved for the control channels.

**P 6.5** In a given system with shared access, the probability of “n” terminals communicating at the same time is given by

$$p(n) = \frac{(1.5G)^n e^{-1.5G}}{(n-1)!},$$

where  $G$  is the traffic load in the system. What is the optimally condition for  $p$ ?

**P 6.8** Can we use CSMA/CD in cellular wireless networks? Explain your answer with solid reasonings.

**P 6.13** What in your opinion should be the criteria to select the value of the contention window? Also explain how you will decide the value of the time slot for CSMA/CA.

**P 6.17** Suppose the propagation delay is  $\alpha$ , SIFS is  $\alpha$ , DIFS is  $3\alpha$ , and RTS and CTS are  $5\alpha$ , respectively, for CSMA/CA with RTS/CTS.

- (a) What is the earliest time for the receiver to send the CTS message?
- (b) If the data packet is  $100\alpha$  long, what is the shortest time for the receiver to send the ACK signal?
- (c) Explain why SIFS is kept smaller than DIFS.
- (d) Can you make SIFS = 0?