

INFSCI 1072/TELCOM 2700: Wireless Networks Homework 9

Answer the following questions.

1. If there are 60 subscribers in a cell, 25 making a call an hour for 10 minutes each, 15 making 2 calls an hour for 6 minutes each, 10 making 3 calls an hour for 4 minutes each and 10 making 5 calls an hour for a minute each, what is the overall traffic intensity and the traffic intensity per user?
2. Assume that a cellular network operator has 600 kHz of spectrum each for the uplink and downlink. With 30 kHz channels and AMPS-like FDMA, and a reuse cluster size of $K = 4$, determine how many users a cell can support for a 5% call-blocking rate. Assume that each user produces 35mE of load in the busy hour.
3. If IS-136-like TDMA is used in Problem 2, how many users can be supported per cell?
4. If a GSM-like TDMA system is used with 200 kHz carriers in Problem 2, eight time slots per carrier, and a reuse cluster size of $K = 3$, how many users can be supported per cell?
5. If a GSM user has a call in progress on a full rate traffic channel and receives a SMS message, the SMS message is sent to the user over the slow associated control channel (SACCH). The SACCH uses one slot of each 26 slot traffic multi-frame. If a SMS message consists of a 140 byte payload with a 20 byte header – determine how long it will take the mobile to receive the SMS message.
6. What is the percentage overhead (tail bits, guard bits, training bits, etc.) in relation to data in a normal GSM traffic timeslot?