Department of Electrical Engineering, IIT Madras
EE6141: Multicarrier Communications (Jan-Apr, 2017)

1. A generalized multicarrier system uses the F-DOSS type symbol repetition followed by frequency shifting in order to build an uplink multiple access system. Given that the total number of subcarriers is N=512, and that there are 4 uplink users labeled as #1, #2, #3, and #4, each requiring 25% of the sub-carrier resources, make a neat sketch of the transmit side block diagram and also provide the frequency shifting values required for each of these users.

2. In a F-DOSS type symbol repetition system, N=256 is used to support only 3 uplink users labeled as #1, #2, and #3, requiring 50%, 25%, and 12.5%, of the sub-carrier resources, make a neat sketch of the transmit side block diagram. Label the diagram by clearly indicating for each user the QAM-block size, and the number of repetitions of this QAM-block, and also provide the frequency shifting values required for each of these users.

3. How can we use the IFDMA framework (which uses a smaller DFT followed by an N-point IFFT operation) to exactly match the FDOSS output in Question 1.?

4. Again, how can we use the IFDMA framework (which uses a smaller DFT followed by an N-point IFFT operation) to exactly match the FDOSS output in Question 2.?