

EECS 562
Homework 14

1. In OFDM why is a cyclic prefix needed?
2. What is used in LTE for synchronization?
3. A subchannel in OFDM is 15 kHz. Is the multipath fading channel response approximately constant over a subchannel?
4. How does OFDM mitigate multipath fading?
5. LTE uses only TDMA, TRUE or FALSE
6. In LTE OFDM systems the symbol time is $1/15,000$ sec. Why is the spacing between the subcarriers must be 15 kHz?
7. To deploy their LTE system a telecommunications company has leased 13.515 MHz of occupied bandwidth which supports 901 downlink subcarriers. Assume that every subcarrier uses 64-QAM. What is the downlink bit rate in Mb/s?
8. When an LTE operator uses a 20 MHz channel bandwidth in the downlink there are 1200 occupied subcarriers. In LTE the OFDM symbol time, $T=1/15000$ sec with a subcarrier separation of 15kHz.
 - a. If all 1200 subcarriers use 16-QAM what is the total bit rate of in Mb/s.
 - b. If all 1200 subcarriers use 64-QAM what is the total bit rate of in Mb/s.
9. What is CSI?
10. What is AMC?
11. All the OFDM symbols in an RB are assigned the same modulation format. Calculate the bit rate in (kb/s) for an RB with the following modulation assignments,
 - a. QPSK
 - b. 16-QAM
 - c. 256-QAM
12. How many RBs are available with a 10MHz channel assignment.
13. What is the relationship between the maximum delay spread and the length of the CP?