

## 2018 EBU5302 Week Four Problems

1. For MFSS, with  $f_c = 250\text{kHz}$ ,  $f_d = 25\text{kHz}$  and  $M=8$ , list all the frequency assignments for each of the data combinations. What is the data rate?
2. A system transmits at 30 kbps, sending 3 bits per symbol. The time between hops for a FHSS system is 0.125ms. Is the system using slow-frequency-hop spread spectrum or fast-frequency-hop spread spectrum?
3. A multilevel digital communication system sends of 16 possible levels over the channel every 0.8ms?
  - 1) what is the number of bits corresponding to each level?
  - 2) What is the baud rate?
  - 3) What is the bit rate?
4. If the received signal level for a particular digital system is -151dBW and the receiver system effective noise temperature is 1500 K, what is  $E_b/N_0$  for a link transmitting 2400bps?
5. In a simple free-space radio propagation model, the received signal power is proportional to  $1/d^4$ , where  $d$  is distance. Calculate the interfering power from the co-channel cells in a 7-cell cluster ( $P_{i7}$ ) and compare it with the interfering power in a 3-cell cluster – i.e. evaluate  $P_{i7}/P_{i3}$  in dB. Assume the cell radius is the same in each case.