

INFSCI 1072/TELCOM 2700: Wireless Networks Homework 8

Answer the following questions.

1. If a wireless system employs direct sequence spread spectrum and the chip rate is 1.2288 Mcps and the bit rate associated with this chip rate is 9.6 kbps, what is the processing gain?
2. Consider Slides 12/13 of Lecture 8. Compute the periodic autocorrelation of the 7-chip sequence shown there.
3. Consider a cellular system that uses frequency hopping and has 124 frequency channels of spectrum. The hopping pattern for a user in a cell that has 31 frequency channels assigned to it is shown below.
 - a. Is the hopping pattern random or cyclic?
 - b. Is this a slow or fast frequency hopping system? Why?

Time	0	1	2	3	4	5	6	7	8	9	10	11
Input data	0	1	1	1	1	1	1	0	0	0	1	0
Frequency	f_1		f_3		f_{27}		f_{28}		f_0		f_{16}	

Time	12	13	14	15	16	17	18	19
Input data	0	1	1	1	1	0	1	0
Frequency	f_{11}		f_3		f_2		f_{14}	

4. Compute the asymptotic cell capacity of a CDMA cellular system if the E_b/I_t requirement is 7 dB, $f = 0.56$, and the other parameters are the same as those used in class.
5. Consider a 4 carrier OFDM system. Let the frequencies of the carriers be f_c , $f_c + 1/T$, $f_c + 2/T$, and $f_c + 3/T$, where $T = 100/f_c$ is the symbol duration. If BPSK is used on all carriers and $f_c = 1$ MHz, plot one OFDM symbol where the bits carried by each carrier is "0". Assume that the amplitude of each carrier is 1.
6. How is spatial multiplexing with MIMO different from diversity gain with MIMO?