

EE 567

Homework 11

(Not to be handed in)

Problem 1 (from Sklar, Digital Communications, 2nd ed.). Suppose an airplane terminal communicating with a satellite is equipped with a frequency hopping spread spectrum system transmitting with an EIRP of 20 dBW (dB Watts). The data rate is $R = 100$ bits/sec. The jammer is transmitting wideband Gaussian noise continually with $\text{EIRP}_J = 60$ dBW. Assume that $(E_b/J_0)_{\text{reqd}} = 10$ dB and that the path loss is identical for both the airplane terminal and the jammer.

- a. Should the communicators be more concerned with jammer trying to jam the uplink or the downlink?
- b. If it is desired to have an AJ margin of 20 dB, what should be the value of the hopping bandwidth W_{ss} ?

Problem 2 (from Sklar, Digital Communications, 2nd ed.). Assume that a repeat-back jammer is located $d = 30$ km away from the communicator. Assume further that the jammer can monitor any uplink transmission from the communicator to a nearby satellite. How fast must the communicator hop his frequency to evade the repeat-back jammer? Assume that the jammer can change its jamming frequency in zero time and that the only differential delay between the communicator's uplink signal and the jamming uplink signal is the propagation delay from the communicator to the jammer.