ECE195:55 Lab I Spring 2005

RSSI Investigation

The experiment/investigation consists of performing an RRSI survey inside and between IIHR' Wind Tunnel Annex and Model Annex as follows:

1. Set up a so-called *echo server*/repeater in the Sensors Lab. This is a transceiver that retransmits everything it receives. This can be accomplished very simply by connecting a loop-back adaptor to a Maxstream XIBR.

2. Create a roaming node that send a message to the echo server, interrogates its receiver for the RSSI for that message, and displays it on the node's LCD. This is accomplished by writing a short C program. A template C program that contains all the initializations and hardware interfaces will be supplied. Routines for sending messages, interrogating the transceiver for RSSI, and writing to the node's LCD will be supplied.

3. Take the roaming node to a number of locations in the two IIHR buildings (floor plans will be supplied) and recording RSSI.

4. Move the echo server/transceiver outside to the south of the IIHR WTA and perform an RSSI as a function of distance between the roaming node and echo server for distances 10, 20, 30, 40, and 50 m. This should be done with the transceivers 0.5 m above the ground and 2 m above the ground.

5. Summarize the results from the surveys in the form of plots accompanied with brief explanations.

Step 5 can be performed after the lab. The Maxstream XCite ® 900 MHz radios will be used for the experiment. Information and Applications Notes on the radios are on the class website. Null modem adaptors, loopback adapters, power supplies, etc will be supplied. I will be at the labs walking you through the experiment.

Preparation

To prepare for the lab, read through the PDF files above. Familiarize yourself with the terminology used in the documentation. Find out how to switch to command mode, switch back to normal mode, what X-CTU is, etc.

Report Writing

To complete the lab, write a report on your findings. A group can write one group report, or individuals may choose to submit their own reports. How you present the information is your decision, but here are some ideas. Imagine you work at a company that deploys wireless networks and you were asked to do an RSSI survey for a potential wireless network in the IIHR labs, using the XCite 900 MHz radios. Now summarize your results for your supervisor. You could classify link strength into "excellent", "very good",

"good", "marginal", and "poor/no link". Overlay the maps of the labs with 20×20 feet squares and color code those with the classifications. The maps are on the class website. This is just one approach and you are free to use other methods. Think of ways to present the information in some visual manner. Alternatively, you could mathematically model the RSSI similar to what we did in class: $Path\ Loss = kF+LW$. Relate the values presented in that lecture with what you measured. For the part of the experiment where you investigated the $1/R^n$ dependence, simple plots with good captions can go a long way. What are the values for n? You could/should relate the numbers you measured with what the company claims for the radios: what is the transmitted power, how sensitive are the receivers, what is a typical range one would expect from your measurements, and how do that compare with what the company claims.

A well-thought out report could be as short as two pages. **The report is due Friday, April 15.**