



Lab 3: Outdoor Propagation at 880 MHz

EE432: RF Engineering for Telecommunications

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Objectives

- Gain experience making cell site control channel measurements.
- Produce an outdoor coverage map.
- Use simple models to analyze outdoor propagation.

Equipment and materials needed

- Champ Ultralite AMPS field strength meter
- Map of Pullman showing route
- GPS unit (Magellan GPS 300)
- Table for recording field strengths

Procedure

You will use the AMPS model UltraLite field meter, a GPS unit, a data sheet, and a map provided in lab. Your lab team will make one of four groups of measurements: Pioneer, College, Sunnyside, or Military Hills on the local AMPS A block channel. The A block channel is 329 (879.87 MHz) and the antennas are on top of the Military Hill water tower: latitude 46°44'48"N, longitude 117°10'52"W, ground elevation 2580 ft.

Follow the route on your map. At (more or less) the marked locations record: latitude, longitude, elevation, distance, and received power (RSSI). The measurements should be possible in less than two hours walking so there is no need to drive anywhere. Make the measurements standing on the sidewalk with the antenna vertical. Move the field meter around to determine the maximum RSSI and record this value on your data sheet.

If your channel setting gets goofed up during your measurements you can reset it as follows:

Press ENTER

Press the Up Arrow six times. You should see "ENTER CHAN #" on the display.

Press ENTER twice.

Press the Up Arrow three times then Press ENTER.

Press the Up Arrow two times then Press ENTER.

Press the Up Arrow nine times then Press ENTER.

The channel will now be set on 329.

To use the GPS unit:

Press PWR to turn it on.

Press GOTO. You should see "ABLK" blinking.

Press ENTER. You should see "To: ABLK" at the top of the display.

Use the arrow pad to move between the three possible displays. One shows DISTANCE. Another shows "SAT STATUS" and gives latitude and longitude in "deg min sec" format.



Press the MENU button and use the arrow pad to view ELEVATION. You can now use the NAV and MENU buttons to switch between elevation and lat/lon and distance measurements.

If you get confused, start over at the “Press GOTO” step above.

Analysis

1. Use Excel to plot RSSI (in dBm) vs. log of the distance between the receiver and transmitter in the form $\log \frac{r}{r_0}$. Use a reference distance of 0.1 mi.
2. Fit a straight line to your plot. Determine the slope (dB per decade) and standard deviation of the fit.

