Name(s)

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Project Number

J0925

Project Title

Can You Hear Me Now? Terrain Blockage of FM Radio Wave Propagation

Abstract

Objectives/Goals
My objective is to test my hypothesis that FM radio waves are blocked by terrain along the line of sight.

Methods/Materials
Materials:
Car
Maps
Computer
Google Earth
Java Programming Language
Data about terrain
Procedure:
I drove around the city and recorded the sound quality of two FM radio stations on a scale of 1-5 at 50 places. Then I wrote a program with the java programming language that calculates terrain blockage along the line of sight. In the program, the parameters were adjusted to match the data as best as possible. Then 6 more points were chosen from a new data collection and tested. Lastly I printed maps with colored pushpins on Google Earth with the data and compared it to the predicted data.

Results
Fifty points were tested for two radio stations. When I created the program to see if the points were blocked, for both radio stations, 87/100 points were correct after increasing the antenna height to 1.1 times its original length and taking away the variable of the Earth radius by making it infinite. If the antenna height is unchanged, the total error is 14/100. If the radius of the Earth variable is put in, then the total error is 63/100. If it increased by 4/3 like one source said, then the total error is 49/100. The second set of data tested after the program was written had a total error of 5/12.

Conclusions/Discussion
Terrain blockage did in fact cause the loss of signal. The program predicted which points were blocked and the data showed that those points were blocked, thus the hypothesis is true.

Summary Statement

My project tests why FM radio waves are blocked in specific locations.

Help Received

Mother helped lay out the board; Dad drove me to collect data points.