Senior Design Project in Electrical & Computer Engineering

DGPS Antenna Modeling

1/c Lars McCarter | Advisor: Dr. Michael McKaughan | Sponsor: USCG C2CEN

Figure 1: Teams from C2CEN and CGA working at a possible transmission site for DGPS at LSU Wildwood, NJ.

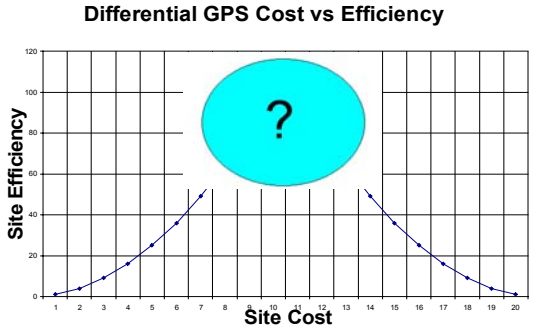

Figure 2: Simulated Cost-Efficiency Curve

Figure 3: DGPS tower at Kenai, Alaska

Project Background

The Differential Global Positioning System (DGPS) augments the GPS system by broadcasting differential corrections to a local area. In May 1999, the Coast Guard declared the system at full operational capability (FOC).

However, several system problems have occurred, including antenna insulator disintegration and transmitter outages in inclement weather. The Coast Guard RF Working Group was created to address these problems. The Academy contributes technical expertise in antenna performance and modeling to this group.

Project Goals

The primary objective of this project is to predict the overall efficiency of DGPS antennas in various configurations. Using a powerful computer modeling application, characteristics of actual antennas can be predicted. These predictions will be compared to an actual installed antenna in order to confirm the theoretical measurements. Ground characteristics near antennas will be examined to determine the best site properties.

A second goal of the project is to develop an antenna configuration that will permit DGPS signals to be transmitted from the same antenna structure used at Loran-C transmitting sites. If successful, this co-location effort will result in significant installation and operational savings for the Coast Guard.

Project Plan

In the short term this project will work with members from C2CEN and LSU Wildwood to test the possibility of co-locating Loran-C and DGPS. Modeling of these possible antenna configurations will be useful for predicting coverage.

The long term plan will be to continue to examine the efficiency of DGPS antennas, and making predictions on how to better the overall system.