

1.0 General Information

MERA has requested that Motorola support the engineering firm hired by various residents of the City of Tiburon, inCode, in researching and analyzing alternative sites and various antenna configurations to replace the Mt. Tiburon radio site. The requirements for this analysis were:

- The solution must consist of a single site,
- The coverage from this site must meet or exceed the Motorola's contractual coverage with MERA for the MERA system,
- The solution must be licensable by the FCC

Motorola worked with inCode in analyzing the Wolfback Ridge site using Hydra, our improved coverage analysis tool from the tool used originally. Motorola and inCode analyzed Motorola's original antenna configuration and several other configurations suggested by inCode.

1.1 Project Identification

Identifying Name	Wolfback Ridge Analysis
Customer or Buyer	MERA
Customer End User	MERA
Customer Project Manager	Marty Nichols (415-883-9100) Email: mnichols@marin.org

2.0 Sequence of Analysis with inCode

October 20, 2004 – Motorola received a list of questions from inCode regarding the history of the Wolfback Ridge analysis, coverage plots with and without Mt. Tiburon, and a list of tasks for Motorola to perform to assist with the analysis of Wolfback Ridge.

October 26, 2004 – Motorola responded to the list of questions with a Statement of Work and price identifying the tasks and costs that Motorola proposed to perform to answer the questions posed by inCode and to provide the data that was requested.

November 9, 2004 – Motorola received a list of questions from inCode requesting clarification on the Statement of Work delivered on October 26.

November 12, 2004 – Motorola and inCode engineers had a conference call to review the questions that were presented to Motorola on November 9. During this conference call we discussed each question on the list, the capabilities of Motorola's upgraded coverage prediction tool, the issues associated with predicting simulcast coverage vs. single site coverage, and various other topics related to analyzing the Wolfback Ridge site.

November 17, 2004 – Motorola received a request from inCode to modify the Statement of Work to a "phased approach" in such a manner that Motorola would provide support to inCode as they requested it, rather than providing the complete set of tasks and deliverables outlined in the Statement of Work delivered on October 26.

November 29, 2004 – Motorola received the notice to proceed with the Wolfback Ridge analysis with inCode from MERA.

December 2, 2004 – Motorola received the first request for information from inCode. This request consisted of:

Step 1 – Provide a coverage analysis of Wolfback Ridge using an omnidirectional antenna to verify that Wolfback Ridge will provide coverage in the required areas.

Step 2 – Review the antenna configuration for Wolfback Ridge that Motorola originally presented to MERA in 1998.

December 15, 2004 – Motorola delivered the requested coverage maps and summary sheets to inCode. These maps showed that the coverage from this site still had some holes in Sausalito and Tiburon Peninsula. These maps also showed that the omnidirectional antenna caused interference within the simulcast system. This interference was expected and the challenge is to identify an antenna configuration that provides the required coverage in Sausalito and Tiburon Peninsula that does not cause interference to the rest of the system.

December 16, 2004 – inCode presented a list of questions to Motorola regarding the coverage maps which Motorola answered the same day.

December 30, 2004 – Motorola provided inCode with the data regarding the antenna that was originally presented to MERA for the Wolfback Ridge site, including a description of the unique configuration requirements to optimize coverage and reduce interference. Motorola also provided data regarding alternative antennas and antenna configurations that were evaluated from Wolfback Ridge. It is clear that a problem with Wolfback Ridge is that the antenna radiation pattern points back into the simulcast system causing interference in other areas.

January 6, 2005 – Motorola received a list of four antennas that inCode requested Motorola review and provide feedback. Motorola responded the same day identifying any problems that we anticipated in using these antennas.

January 12, 2005 – inCode requested that Motorola perform a coverage analysis using the antennas inCode presented.

January 17, 2005 – Motorola presented several coverage maps using three different antennas with several different antenna configurations, an explanation of the evaluation process, and an explanation of each attempted scenario. These coverage maps consisted of plots zoomed in to show the required coverage area in great detail as well as plots that identify the interference caused by the various antenna configurations. The plots that were zoomed in to the required coverage area were run with the highest resolution terrain database available to Motorola. These maps were presented with the Mt. Tiburon coverage shown in the background to highlight the areas where the various Wolfback Ridge antenna configurations had coverage holes that Mt. Tiburon picked up. The Mt. Tiburon coverage was always superior, to any of the antenna configurations at Wolfback Ridge. The end result is that there were no antenna configurations from the Wolfback Ridge site that met or exceeded the contractual coverage requirements in the Motorola/MERA contract.

3.0 Summary

Motorola worked closely with inCode to evaluate several antennas with many different antenna configurations from the Wolfback Ridge site. Motorola was able to take advantage of the upgraded prediction tool that used an improved terrain database, 1 arc second, to rerun the original antenna configurations, as well as other configurations presented by inCode. There were no scenarios where the coverage provided by Wolfback Ridge met or exceeded the coverage that Motorola is contractually obligated to provide to MERA. Due to the fact that there were no coverage scenarios that met the contractual requirements from the Wolfback Ridge site, there were no FCC licensing activities or interference analysis performed by Motorola.

Additional difficulties with the Wolfback site are:

1. The angle of the antenna pattern from the from the Wolfback Ridge site is back into the simulcast system. The interference coverage maps identified that the Wolfback Ridge site did cause some interference to the overall simulcast system. In addition to the interference identified with the coverage prediction tool, there may be other factors (like terrain reflections), that may create some unpredictable interference from this arrangement. The angle of the antenna pattern from the from the Mt. Tiburon site is away from the main simulcast, which significantly reduces the possibility of interference within the system.
2. The antenna used at Wolfback Ridge would require extreme mechanical downtilt to provide coverage in the desired coverage area. This radiation angle would potentially pose an EME threat to technicians working at the site in the vicinity of the antenna.

4.0 inCode

The Motorola and inCode relationship was very professional and we worked together quite closely. I believe that the engineer from inCode, Diego Ballesteros generally agrees with the conclusions of this review.

Jeff Van Dell

System Engineer
Motorola - CGISS