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# Memo

To: Farhad Mansourian, Shelly Nelson  
From: DELTAWRX Team  
Date: May 16, 2008  
Re: MERA Coverage Improvement Project Progress

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As you are aware, MERA retained DELTAWRX to achieve a better understanding of several perceived coverage problems and identify alternatives available to improve coverage. In addition, DELTAWRX is providing support to MERA to address Motorola's inability to provide the fire station printing solution that was required in the MERA Radio system procurement. This memorandum provides an update on our progress made to date.

During a previous project with MERA, DELTAWRX documented several areas within the County with less than desired radio coverage. Some of these poor coverage areas are within the tolerance as allowed by the acceptance test procedures, while others reflect desired improvements beyond the regional system as originally designed. DELTAWRX prepared a questionnaire in order to gather information from all concerned agencies and to build upon the interviews from our previous work. The questionnaire was circulated among stakeholders by County staff.

DELTAWRX subsequently used radio propagation modeling software to develop a predictive coverage model for the MERA radio system. We refined the model using existing coverage maps and local knowledge of system performance. Once the propagation model was validated, we examined the areas in which users reported coverage problems. DELTAWRX was then able to use the model to investigate the viability of various coverage improvement alternatives.

Throughout this analysis process County staff examined the hardware configuration of affected units to eliminate hardware, connection and installation issues. County staff also took signal strength measurements to investigate actual radio propagation in the geographic areas of concern.

Based upon this analysis, we developed a list of alternatives that were likely to improve coverage. DELTAWRX met with Motorola engineering staff to review the viability of these alternatives. In addition, for recommendations that involved any change to member agency operations, we discussed the proposed solution with the potentially affected agency. Based on technical viability, cost and user input, DELTAWRX recommended the following changes to improve coverage:

1. Modify antennas at Sonoma Mt. to slightly improve coverage along Highway 101 in northern Marin

2. Modify the simulcast timing at Mt. Tiburon to improve coverage in Sausalito and southern Marin
3. Move the Bay Hill site equipment to a new location where Verizon is currently developing a new site to improve coverage around Tomales and Dillon Beach
4. Install MERA equipment at the Twin Peaks site in San Francisco to improve coverage in southern Marin, along the southeast and southwest coastlines, including Tiburon
5. Pilot a fixed conventional repeater (a Motorola DVRS) to temporarily improve coverage in Tiburon, until a long-term solution (Twin Peaks site) can be implemented

MERA quickly implemented the first two recommendations, which involved little cost and posed minimal risk of adverse consequences. The first modification involved changing the angle of the transmission antenna and installing a new receive antenna at the Sonoma Mt. site. Novato Fire Department, which submitted the complaint for this area, reported a significant coverage improvement due to this modification.

During implementation of the second recommendation, which involved changing the simulcast timing at the Mt. Tiburon site, we found that the timing had already been adjusted during system optimization. However, users reported this problem after the timing was changed. DELTAWRX met with Motorola to discuss alternative coverage options in this area and is still attempting to identify viable options.

The third and fourth recommendations involve development of new radio sites. These are longer term alternatives which should provide significant coverage improvements but also require significant capital investment. We are working with Verizon and their consultant to further investigate the viability of moving the Bay Hill site closer to Tomales. The new site near Tomales will require investments to upgrade the radio tower, provide a new equipment shelter and supporting infrastructure, as well as backhaul connectivity to the MERA system. As a part of the Bay Hill site lease agreement, MERA will be required to maintain the site improvements.

DELTAWRX is also working with the City of San Francisco to further investigate the viability of installing MERA equipment at the Twin Peaks site. This recommendation requires purchase of new radio equipment and other potential equipment and facilities pending review of the Twin Peaks site. MERA will need cooperation from Motorola to purchase the current generation of MERA system equipment, which has been discontinued. The new site will also need frequencies that can be licensed in this area and which do not interfere with existing radios at Twin Peaks. The frequencies at Bay Hill are potential candidates for this service.

Our last recommendation is to pilot an in-band digital vehicular repeater system (DVRS) at a fixed location in Tiburon. A DVRS creates coverage in a limited area, but users must change channels to access the system and work with limited capacity (one channel in this case). Because of these operational constraints, a DVRS is only recommended where no better alternative is available. The

southeast end of Tiburon was selected because it is fairly isolated and the number of agencies that respond to that location is generally limited. This allows us to test a DVRS with a limited number of units to see if the benefits of coverage outweigh the operational and financial costs. We discussed this option with Tiburon's Police and Fire Departments and both agreed to try a pilot project. Motorola will provide detailed information for Tiburon agencies to begin finding a suitable location to test this technology alternative.

To address the station printing issue, we have met with Motorola several times throughout this project. Initial discussion focused on the failure of fire station printing and the need for compensation from Motorola. While Motorola's position is that they have already provided compensation to MERA, they have agreed to provide some form of discount to a future purchase in acknowledgement of MERA's dissatisfaction. The details of this discount have been pending the details of the purchase.

After development of the aforementioned recommendations, DELTAWRX requested that Motorola prepare a proposal including the discount to implement the latter three recommendations, including the two radio sites and the DVRS. DELTAWRX will continue to work with Motorola to facilitate their development of an acceptable proposal to implement our recommendations in consideration of their failure to provide fire station printing to MERA.