MARIN EMERGENCY RADIO AUTHORITY

NEXT GENERATION RADIO SYSTEM

IMPLEMENTATION

FEASIBILITY STUDY

Marin County Department of Public Works

On December 11, 2013 the MERA Governing Board reviewed this report, accepted this report, and determined that a 700 MHz P25 Phase 2 system per the estimated budget be the basis for the Next Generation system being proposed in an upcoming ballot measure

Table of Contents

The purpose of this report is to analyze the needs for radio communications by Public Safety Agencies, and other Public Agencies in Marin County and ways to provide for those needs. The present system structure is discussed, and feasible alternatives are examined. The recommended systems with their associated costs are including in this report.

Background

In June 1995, Marin County Department of Public Works issued a data collection request to acquire data from the governmental users of mobile radio in the County. The data was collected to determine how much radio equipment was in use, and a study was directed toward providing a unified approach for County Radio systems. The study also looked at needs of other governmental agencies, to determine if other needs could be satisfied with a joint system. The study also looked at existing dispatch centers. After detailed examination of the regulatory environment, frequency availability, technology trends, and end-user requirements, a trunked system was selected, with interconnection between these systems and public safety dispatch centers with an expansion of the County's microwave network.

A trunked system has all frequencies pooled and shared by all users. Users are assigned "talk groups" or digital group allocations, not individual channels. The larger the trunking frequency pool, the more efficient the system. For pooled systems, ideally users should not have all the same function, and not have peak periods that coincide. Trunking is based on statistical probability that all the users will not want to transmit at the same time. Trunking has been used in telephone lines for decades. The Emergency button on the radio has the highest priority. Trunking utilizes busy queuing to maintain established user priorities.

Of prime importance to all agencies was the availability of radio communications during any type of emergency. At the time, the recent Mt. Vision fire, floods, and earthquakes pointed out that the best method of communications for operational needs is a Communications System solely dedicated to the protection of life and property.

Topography

Marin County presents a very challenging design situation for radio communications. The topography of the County changes continuously from north to south, and from the west to the east. There are multiple hills, mountains, and valleys. The west side is sparsely populated, with the majority of the population on the east side.

The vegetation coverage varies from grasslands to heavy forestation, providing a unique propagation environment for a radio system. This environment has presented unique problems for radio broadcasters and cellular phone providers for years.

Existing Communication Systems

In February 1998, the Marin Emergency Radio Authority (MERA), a partnership of Marin's Cities, Towns, County, Water, and Fire Protection Districts was established to build a replacement for obsolete emergency radio systems. A 400 MHz T-Band system was designed

and purchased by MERA in December 1998. It has both limited capacity and limited coverage. The system was designed to accommodate 1,580 mobile and portable radios. Today it serves about 2,875 radios, which is far above the total originally anticipated. A summary of agencies and current radio quantities is attached as Appendix A. System usage for the year 2012 is attached as Appendix B.
MERA has identified frequencies or systems that are, or can be, tied/patched into the MERA system for local/regional/state/federal interoperability. These are channels that are licensed for mutual aid only or are actually licensed by others for mutual aid. The only exception is the MERA conventional channels which were licensed by the FCC as mobile only, and couldn't be licensed for mountain top. A complete listing is attached as Appendix C

Following is a summary of the elements of the existing system:

a. Motorola Smartzone Version 3.0
b. Phase 1 complaint system (narrowbanded to 12.5 KHz spacing)
c. Over 200 digital talk groups
d. Uses 33 radio frequencies (expanded from 30 to 33 in 2010)
e. Of the contractually covered area reliability is as follows: 97% portable on hip outdoors in urban areas, 95% indoors in designated urban areas, and 95% mobile coverage in rural areas
f. Fire Station alerting system to alert all Fire Stations by Dispatch
g. Radio sites located in both Marin and Sonoma Counties: 14 RF (Radio Frequency) sites (Mt. Tam in both east and west); 1 prime site with the central computer, and 8 dispatch console locations:

9 East Simulcast Sites – 11 Channels
- Big Rock
- San Pedro
- Dollar Hill
- Burdell
- Forbes
- Mill Valley City Hall (including microwave relay at Mill Valley Police Department)
- Mt. Tiburon
- Civic Center (Prime Site)
- Mt. Tam

3 West Simulcast Sites – 7 Channels
- Pt. Reyes
- Barnabe
- Mt. Tam

3 Intelli-repeater sites
- Sonoma Mt. – 6 channels
- Bay Hill Road in Bodega – 5 channels
- Stewart Point for Bolinas Area – 5 channels

8 Dispatch Console Locations with 28 total consoles
- Civic Center: (10) Positions, includes SR Fire
- Jail: (1) Position (not a dispatch site)

- Woodacre: (3) Positions
- San Rafael Police: (4) Positions
- Novato PD: (3) Positions
- Central Marin PD: (4) Positions
- Fairfax: (1) Position
- Backup Dispatch Center: (2) Positions

h. MERA uses digital technology called "ASTRO" and FDMA (Frequency Division Multiple Access) modulation on 12.5 KHz channels, which:
   - Provides improved and consistent audio quality over a wide range of system variations
   - Provides more user information with each transmission
   - Is more secure
   - Provides a system design based on bit error rate and forward error correction, not just signal strength

i. Narrow band receivers have better adjacent channel rejection for less interference

j. All sites are tied together with digital links

k. All dispatch consoles are on a Wide-area-network

Timing of Existing System Obsolescence

Computer and software systems have a limited life, and over time elements are no longer supported by their manufacturers.

Motorola has provided an update on the support status of MERA's Smartzone 3.0 system currently serving Marin County. This includes:

- Cancellation dates (or current production where applicable) for the high-level components of a 3.0 System.
- Motorola's anticipated support period for the respective components.
- Identification of critical network components rapidly approaching "End of Life".
- Replacement options for "End of Life" critical network component.
- Motorola resources for ongoing product support updates.

Based on this review, it was found the existing system is aging and approaching obsolescence. We recommend a new replacement system be operational in 2018 to ensure reliable emergency communications. We occasionally experience component malfunctions today, with the system reliability decreasing over time. Operating budgets for the existing system are forecasted to track at current rates through 2017. After 2017, we forecast exponential annual increases to maintain the existing system. Following is a summary of system components:

Component	Production Status
Master Site Expansion	December 2004 cancelled, cannot expand existing system
Simulcast/Voting CH	December 2007 cancelled, cannot add any new channels to existing system
Remote Sites	December 2007 canceled, cannot add any new sites to existing system
Console Positions	December 2009 cancelled, cannot add any new consoles to existing system
IR Channels	December 2009 cancelled, cannot add any new IR sites to existing system
Technical System Support	December 2009, limited technical system support on a year by year basis
Audio Switch (AEB) existing	December 2009 cancelled, cannot add or replace entire switch in system
Quantar – Site Radio	December 2011 cancelled, cannot add or replace entire radios in existing system

Component	Support
3000 Series Radios	2009 cancelled support
5000 Series Radios	Cannot buy after October 2013, support through November 2018, parts might be available through 2018
Master Site	December 2011, 6809 system and site controllers are no longer supported. Spare units were obtained from other agencies – limited capability
Simulcast/Voting CH	December 2014 scheduled support cancellation, repair parts might be available until 2018
Remote Sites	December 2014 scheduled support cancellation for 6809 system and site controllers. Spare units were obtained from other agencies – limited capability.
Console Positions	December 2016 scheduled support cancellation, repair parts might be available until 2018
IR Channels	December 2016 scheduled support cancellation, repair parts might be available until 2018
Technical System Support	December 2009, limited technical system support scheduled on a year by year basis
Quantar – Site Radio	December 2018 scheduled support cancellation, repair parts might be available until 2018
Audio Switch (AEB)	December 2018 scheduled support cancellation, repair parts might be available until 2018

For no longer produced system components, Motorola's indicates their support goal is to maintain parts and repair for up to 7 years from the cancellation date. The 7 year support plan is a goal, and not intended to be contractual or guaranteed, as parts and repair availability is dependent on product demand and production (for both Motorola and third party providers).

With all of this information provided the main items of concern are: Master Site and Remote Site System Components, i.e. 6809 system and site controllers. Through September 2013 Motorola has an upgrade option that would allow for continued support of the 6809's until 2018. This option includes the purchase and integration of a Master Site Switch, Smart X interface and Motorola Console interface. This project is currently being implemented in the Marin County

Emergency Operations Facility (EOF) project. The project is funded by County secured grants and County funds.

Existing System Indebtedness

MERA used bond financing for the existing Smartzone 3.0 system. The last participating agency payment on the bond is due August 1, 2020.

Volunteer Fire Department Paging

The existing volunteer paging system is a low band radio network owned by the Marin County Fire Department, independent of the MERA system. Today it serves approximately 100 pagers. This system serves the following volunteer fire departments:

Bolinas Fire Protection District
Inverness Public Utility District
Muir Beach Volunteer Fire Department
Nicasio Volunteer Fire Department
Stinson Beach Fire Protection District
Tomales Volunteer Fire Company

The Volunteer Paging system patches transmit only voice dispatch calls to individual receive only audio pagers. It does not provide digital paging (text) services. The Volunteer Paging system is only used to activate personal pagers worn by the volunteers or paging monitors used in their homes, offices, etc. The volunteer paging system does not activate any fire station alerting systems or sirens, open doors or sound station bells. Station alerting is accomplished on the MERA system and is different from volunteer paging.

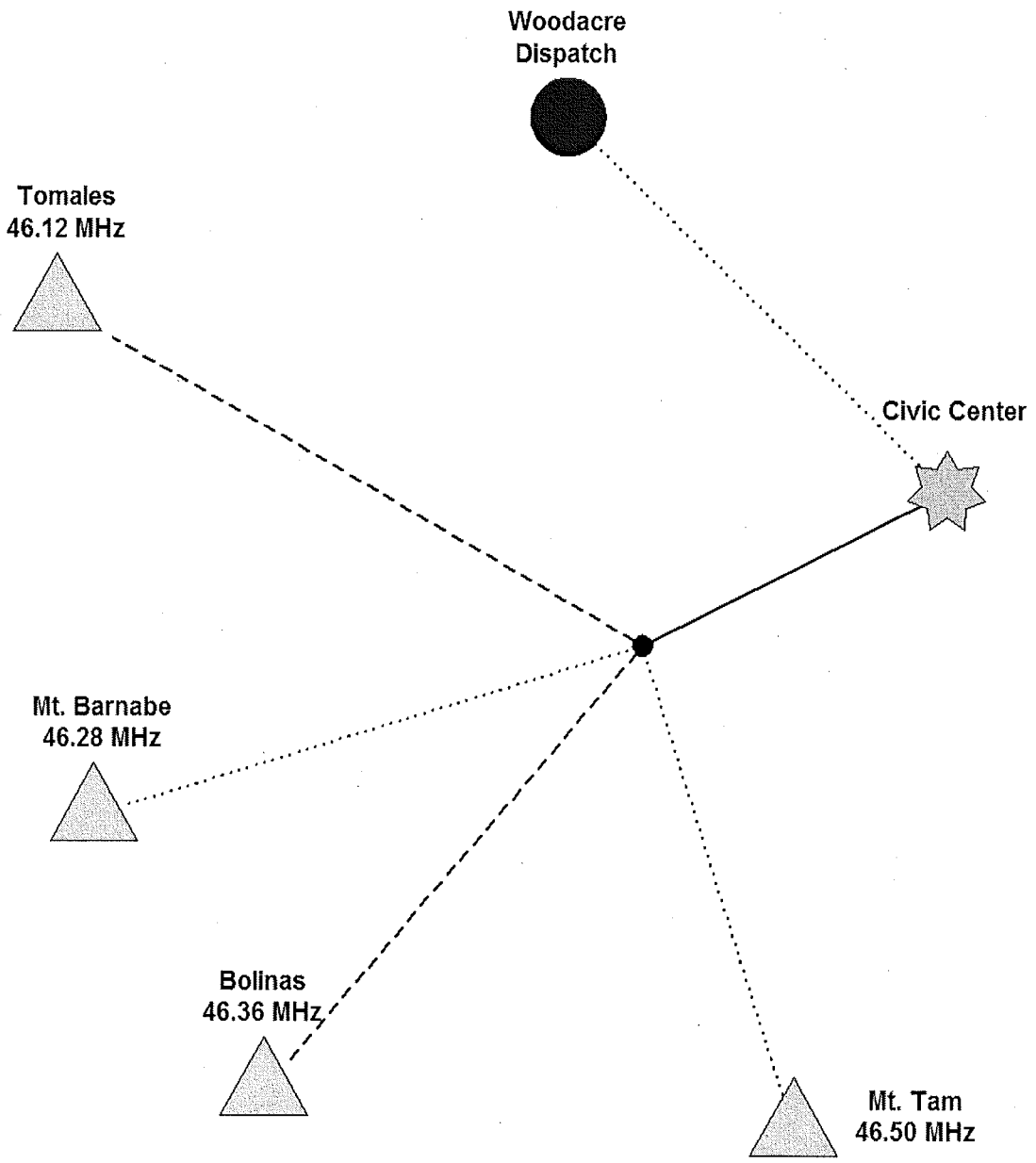
Paging codes are: 1) selected by the Marin County dispatchers on their radio console; 2) generated from the radio dispatch consoles; and 3) sent simultaneously to the paging radio base stations at Mt. Barnabe, Mt. Tam, Bolinas Fire Station and Tomales Fire Station. Volunteers cannot talk back to dispatch on the one-way paging channels. Dispatch voice traffic is patched from the CTL-H2 talkgroup to the analog low band paging base stations so that any dispatch voice information is heard by the pagers. The pager does not hear communication from MERA radios directly.

All Next Generation digital radio consoles, available today, are capable of generating the required paging codes and "patching" to the existing analog Volunteer Paging system.

It is recommended that any Request for Proposal issued by MERA for a Next Generation system include the following an option for consideration:

1) Volunteer Paging through a dual mode system that provides patching to the existing analog system for existing voice personal pagers
2) Volunteer Paging through digital paging to new digital voice personal pagers
3) Other alternatives for voice personal pagers recommended by the vendor

Marin County Fire
Volunteer Fire Paging System



Transmitter

Dispatch Center

Existing Phone Line

Existing Microwave

46.28 MHz - County Fire F4

46.36 MHz - Novato Fire - F35

46.50 MHz - Southern Marin Fire - F6

46.12 MHz - County mutual Aid - F13

Federal Legislation summary

Requirement to Narrowband

In the Federal Communications Commission's "Communications Act of 1934 as Amended; Promotion of Spectrum Efficient Technologies on Certain Part 90 frequencies Report and Order and Further Notice of Proposed Rule Making - WT Docket No. 99-87 (1999) and Second Report and Order and Second Further Notice of Proposed Rule Making (2003) the FCC mandated several items:

Dates mandated for radio manufacturers:

- 1/1/2011: Equipment operating at greater than 12.5Khz shall not be manufactured or imported unless it demonstrates a 12.5KHz or less equivalent spectrum efficiency.
- 1/1/2011: Any new equipment submitted to the FCC for certification must be capable of operating at 6.25KHz channels or demonstrate equivalent spectrum efficiency.
- 1/1/2015: Any new 700MHz equipment submitted to FCC for certification and sale must be capable of operating in 6.25KHz channels or demonstrate equivalent spectrum efficiency.

Date mandated for radio users:

- 1/1/2011: Applications for new systems using 25KHz channels or a modification application that expands the authorized contour of an existing 25KHz station will not be accepted
- 1/1/2013: Phase 1 Narrowbanding, radio systems must operate in 12.5KHz or narrower channels.
- 1/1/2015: All new 700MHz systems must operate in 6.25KHz channels or demonstrate equivalent spectrum efficiency.
- 1/1/2017 Phase 2 Narrowbanding, tentative date for systems other than 700MHz to operate in 6.25MHz channels or demonstrate equivalent spectrum efficiency. In the notice, the FCC solicited comments on their preliminary determination, but has not yet issued a final notice.

The existing MERA system was designed to meet the FCC's Phase 1 Narrowbanding requirements. MERA's existing system does not comply, nor is it upgradeable in its present state, to operate in 6.25MHz channels or demonstrate equivalent spectrum efficiency. Due to the FCC's mandates to manufacturers that all equipment after January 2011 must be 6.25MHz technology, any Next Generation system MERA purchased will meet the FCC Phase 2 Narrowbanding requirements.

Requirement to Vacate T-Band Spectrum

On February 22, 2012, the President signed into law H.R. 3630, the "Middle Class Tax Relief and Job Creation Act of 2012," which provided that not later than 9 years after the date of enactment, or February 21, 2021, the T-Band spectrum currently in use by MERA must be reallocated. The legislation also provides that the Assistant Secretary can use auction proceeds from a competitive bidding process for new licenses in this spectrum to make grants to recover

relocation costs for the relocation of public safety entities from the T-Band spectrum. Agencies will have two years after the competitive bidding date to relocate.

Also under this same legislation is direction to the Federal Communications Commission to investigate the reallocation of microwave frequencies. MERA does have microwave frequencies that could be affected.

Next Generation System

System Design Report

A System Design Report, Marin County by AECOM was finalized for MERA on April 29, 2010, attached as Appendix E. The report presented plans for wireless voice and supporting interconnection systems for Marin County. These plans were jointly developed by the Marin County Project Team and AECOM and are focused on meeting the long term needs of Marin County.

Options identified included:

a. MERA continue as currently configured and include 700MHz overlay.
b. Upgrade MERA into a single P25 Phase 1 simulcast with present site layout.
c. Upgrade MERA into a single P25 Phase 1 simulcast and add new sites.
d. Countywide 700 MHz P25 Phase 2 system.

A detailed implementation schedule is contained in the report, see Figure 6-1. Below is a brief summary of the major milestones:

RFP	250 days
Contract Negotiations	12 days
DDR(s)	164 days
Radio system, Microwave, facilities Implementation	493 days
Cutover	87 days
Acceptance	45 days

Additional study of coverage options in included in a presentation prepared based on analysis by DELTAWRX, titled Motorola Coverage Improvement Proposal, dated November 2008, attached as Appendix D.

Licensing Potential

An Engineering Report for the County of Marin, Licensing Potential of the Radio Frequency Compatibility Report was finalized by CSI Telecommunications on June 1, 2010, and is attached as Appendix F. The report analyzes Table 4-3 of the AECOM report titled Radio Frequency Compatibility Report, which was a preliminary report issued prior to the AECOM System Design

Report described above. The AECOM System Design Report contains the same information in Table 3-2, which is included in the discussion on UHF T-Band frequency availability.

CSI's task was to determine if the T-Band frequencies listed in the report could be licensed in compliance with 90.303 and 90.187 of the Federal Communications Commission Rules. Of the frequencies listed in the "Radio Frequency Compatibility Report" CSI found eight frequencies that possibly could be licensed without limitation of the 27 identified as needed in the AECOM report. Another ten frequencies might be licensed if Letters of Concurrence from other agencies were obtained. Sixteen frequencies have co-channel or adjacent channel issues that appear to make obtaining a Letter of Concurrence unlikely.

For this reason, Options b. and c. listed above in the AECOM System Design Report are likely infeasible.

Summary of Options

Option	Frequencies available	Meets new federal regulations	Status
a	yes	Yes	Completed 2010
b	no	No	Not recommended
c	no	No	Not recommended
d	yes	Yes	Recommended

Planned System Life

Systems are typically planned with a 15 to 20 year lifespan. This lifespan is used to forecast potential growth in users over that period, which determines the number of channels needed. For future planning purposes we recommend that fixed core equipment be planned for replacement in 15 years. Other infrastructure components will have a physical life in excess of 20 years which can be used with any replacement equipment.

An option to extend the life of the system is to enter into a system upgrade agreement with the selected vendor to provide system technology refresh including hardware and software. Various terms are available, typically from 1 to 10 years. Historically, the industry has developed new platforms every 6-7 years, then has a manufacturing run for 9-10 years, then supports the systems for 5 years.

It is recommended that any Request for Proposal (RFP) issued by MERA for a Next Generation system include options for system upgrades for consideration. It is also recommended that the RFP responders be asked to identify any required radio upgrades or replacements needed with system upgrades.

Marin County Issues Request for Proposal

In an effort to improve public safety communications, in June 2010, the County of Marin invited proposals using the above described template (attached as Appendix G). Key elements of the project:

- P25 Phase 2 would allow MERA to utilize the allocated 700MHz channels
- Equipment is available from major manufacturers today
- Infrastructure change-out is required
- Mobile and Portable change-out would be required
- 700 MHz is the new frequency spectrum allocated to Public Safety
- 700 MHz channels in the Bay Area have been allocated and there is not a sufficient of channels available for everyone to convert to 700 MHz
- Marin has been allocated 27 - 700 MHz channels countywide
- The 700 MHz allocation includes all radio users in Marin County
- P25 Phase 2, network is required to meet future technical requirements
- Update of network microwave equipment is required due to the age of the existing equipment and increased data requirements of the newer technologies

The system will improve interoperability with all adjacent Bay Area Counties, and state and federal public safety mutual aid users and improve coverage.

The RFP established the following as criteria for proposal evaluation:

- RFP compliance
- Coverage guarantee
- Vendor experience
- Cost of system
- Lifecycle costs
- Unit costs of subscriber equipment
- Capability, features, and functionality of the system
- Feasibility of design
- Warranty, maintenance, and support

In November 2010, presentations by proposal responders were given to a Marin County panel consisting of the following members: Jeff Franzini (SRPD); Mike Ridgway (SO); Jason Weber (CO FD); Jim Berg (NVPD); Eric Nickel (NVFD); Michael Frost, Shelly Nelson, Richard Chuck (CO DPW); Jim Irving(SMFD). The panel was asked to evaluate the options from the System Design Report above. The panel recommended Option d: a Countywide 700 MHz P25 Phase 2 system.

These proposals have now lapsed and MERA will need to issue a new RFP and conduct a new competitive process once funding is secured.

Estimated Project Costs

The project budget is based on a system designed for 5,000 users, with initial acquisition of 3,000 radios, which exceeds the current radio usage. The additional 2,000 radios, if needed for future expansion, are not included in the recommended project budget.

During preparation of an RFP for a new system we recommend that MERA inventory the number of radios currently in use by MERA members, and identify which type of radio is needed for the end user types:

Model 1: Basic model, typically identified with no keypad or display
Model 2: Mid model, typically identified with limited keyboard and display
Model 3: Advanced model, typically identified with full keypad and display

We recommend that a consideration of cache type deployment be evaluated. This method is available with Next Generation systems due to consoles being able to change/update aliases when needed (shift change). We are unable to do this with the current system. This would need to be balanced with the benefits of individual responsibility to care for assigned radios.

Following is a summary of estimated project costs, which includes a 17% contingency. A more detailed cost estimate is attached as Appendix G.

Backbone Radio System: Radio Communications System, Remote Site Equipment, Dispatch Console System, four new coverage improvement sites	$13,900,000
Microwave: System replacement, network upgrade	5,000,000
System Support: Site upgrades, site alternatives, environmental compliance, permits, lease/property acquisition, FCC licensing, manufacturer training, end user training, test equipment, spare parts	10,600,000
Member Mobile and Portable Radios: 2,800 units	10,500,000
Total	**$40,000,000**

Estimated Operations and Maintenance Costs

A detailed cost estimate of operations and maintenance costs, and assumptions are attached as Appendix H. A detailed cost estimate of capital costs (other than the Next Generation project) is attached as Appendix I. A summary which includes debt cost projections is included as Exhibit J.

FCC Licensing Status

In August 2011 Marin County Department of Public Works staff received approval from the California Region 6 700MHz Committee for allocation of the Marin County allotted 700MHz frequencies. This process took about a year. Once funding for frequency coordination is identified, and the FCC grants approval, the plan requires a five-year build out.

Alternative Coverage Options

A vendor specific, detailed simulcast computer simulation is required to get a true picture of what coverage could be expected from an individual site or a series of sites when used in a simulcast environment. We recommend that proposals be required to take into consideration all existing and new site options, delineating a design that will address as many of the known coverage issues as possible within the constraints of funding.

The baseline proposal budget above includes four new sites, in addition to the existing 14 site locations listed under Existing Communications Systems above. The cost to add new MERA sites can vary due to the unique nature of each site. This includes items like access roads, sitework, environmental compliance and permitting, and acquiring easements/property rights. We estimate the cost for a new MERA site could vary between $2.5 and $4 million. Several additional coverage areas were requested for consideration by MERA members in a new system. The Executive Board requested that the MERA Operational Issues Working Group review the requests and prioritize the list. This work was completed in June and July 2013.

All dispatch centers provided call data and information for the period June 2012 to June 2013. There were over 300,000 calls. The calls were plotted using GIS and reviewed at the areas where coverage improvements were requested. The Group considered the data and map coverage and developed the following recommendation for priority of new sites.

These priorities also take into consideration the following points:

- Improving coverage to areas where private property will be paying a parcel tax.
- Call volume
- Areas that have sites that can be added quickly.
- Areas that already have a known and viable work-around situation were given a lower priority.
- Partnerships should be pursued with other agencies for coverage areas that serve state and federal lands, such as Cal Trans, NPS, TAM, etc.

<u>Recommended Priority:</u>

1. Tomales
2. Tiburon
3. Wolfback Ridge
4. Muir Beach/Stinson Beach
5. 101/Redwood Landfill
6. East Marshall
7. Golden Gate Bridge Toll Plaza

MERA can establish which additional sites are to be included in the proposed system at this time, or establish a prioritization process and make a final decision at the system implementation phase, or a hybrid of the two. At the implementation stage, MERA will have more detailed cost information based on proposals, and information about any additional grant funds that are secured.

Likely Grant Resources

Following is a summary of grants received to date towards a Next Generation system:

UASI 2008 – $362,250 AECOM/CTA to conduct Public Radio Network Engineering Studies to include a System Design Report

UASI 2008 – $1,200,000 Bay Area UASI contracted with Federal Engineering to develop a RFP template that could be used by area Counties; Counties that utilized the template: Marin, North Bay HUB – Marin, Sonoma, Napa and Solano, Santa Clara and San Francisco

UASI 2009 – $650,000 limited 700 MHz Conventional Interoperability system

UASI 2010 – $1,238,402 Expansion of 700 MHz Conventional Interoperability system

UASI Bay Loop – $946,551 for interoperability microwave equipment.

CALEMA FY09 – $101,813 to enhance VHF and UHF mutual aid interoperability

IECGP FY09 – $275,000 to enhance mutual aid interoperable communications within the County

UASI 2011 – $1,254,829 for fully redundant Master Switch

UASI 2012 - $128,856 for IP Platform Dispatch Control Consoles

Total grants received: $6,157,701

Following is a summary of possible grants over the next 5 years that might contribute towards the next generation system. Marin County Sheriff and DPW will continue to collaborate on the UASI formula grant programs. However, there is forecasted a reduction in grant funding from 2011 levels from the federal government, including Homeland Security.

There are other competitive grants that might be able to assist MERA with funding opportunities:

- COPS – Law enforcement grant
- PSIC – Public Safety Interoperable Communications Grant
- Byrne JAG – Byrne Justice Assistance Act Program – Law enforcement grant
- Flood Emergency Response Projects - Delta Communications Equipment Grant (Grant), the Grant Program to ensure that State and local agencies have a robust regional communication system in the Delta region to provide effective response to high water and flood emergencies
- SHSGP-State Homeland Security Grant Program

Bay Area Regional Interoperable Communications System (BayRICS) Project

BayRICS is a collaborative planning effort that includes all 10 Bay Area Counties:

Alameda County
Contra Costa County
Marin County
Napa County
City and County of San Francisco
San Mateo County
Santa Clara County
Santa Cruz County
Solano County
Sonoma County

The goal of the BayRICS project is multi-system interoperability throughout the Bay Area region. The interoperable BayRICS system-of-systems will provide reliable and cost-effective radio-to-radio voice communications for first responders within the region. The systems will be developed such that any radio can communicate with any other radio in the Bay Area, as defined and authorized within the BayRICS rules of use. The BayRICS project includes two key components to accomplish this level of interoperability:

- Development of 700 MHz P25 Phase 1 conventional simulcast systems in the Bay Area
- Development of 700 MHz P25 Phase 2 trunked systems in the Bay Area

The P25 Inter-RF Subsystem Interface (ISSI) is a key component of BayRICS. Since BayRICS is considered a system-of-systems, the ISSI is designed to allow each radio communications system to be interconnected into a complete wide-area network of systems.

Under the guidance of Regional Interoperable Communications Workgroup and the allocation of UASI 2008 funds by the Bay Area Urban Area Security Initiative (Bay Area UASI) Funding Authority, a consultant was hired, Federal Engineering, to develop a Request for Proposal template that could be customized by individual operational areas, including Marin County. Federal Engineering developed a Requests for Proposals for a Marin County system.

The request is to provide a 700 MHz APCO Project 25 (P25) radio communications system to support mission critical communications within the County. The proposed communications system shall provide enhanced, two-way wireless communications capabilities to all users. The proposed system shall be capable of interoperable communications with the counties of the Bay Area.

Status of Other Agency Transitions to 700 MHz

Completed 700 MHz P25 Phase 2 systems:

- City and County of San Francisco – 2010
- San Francisco International Airport – 2011
- East Bay Region Communications System (Alameda and Contra Costa Counties, not including Oakland) – 2011
- Oakland – 2011
- San Mateo County - 2012
- Other California agencies: Riverside, San Diego

Currently Transitioning to 700MHz P25 Phase 2 Systems

- Golden Gate Bridge District – 2011-2013

Currently Planning 700MHz P25 Phase 2 System projects

- Solano County – 700MHz Conventional 2012-2014 (project is not similar to Marin's because they have no interoperable system today, and no single platform)
- Napa County – 700MHz Conventional 2012-2013 (project is not similar to Marin's because they have no interoperable system today, and no single platform)
- Santa Clara County – 700MHz Conventional 2012-2014 (project is not similar to Marin's because they have no interoperable system today, and no single platform)
- Santa Cruz County – 700MHz Conventional 2012-2014 (project is not similar to Marin's because they have no interoperable system today, and no single platform)
- Nationwide agencies planning on using 700MHz is estimated to be greater than 100 agencies

Not currently planning a 700MHz P25 System at this time

- Sonoma County

Appendix A

MERA
Mobile and Portable Radios

Agency	MERA Member	5-1-11 Mob/Port	1-11-11 Mob/Port	1-16-13 Mob/Port
AMR	No	12	12	12
AMER. RED CROSS	No	1	1	2
CA State Parks	No	8	8	8
CHP	No	10	10	10
Fish & Game	No	0	0	2
GGNRA FIRE	No	8	8	8
GGNRA NPS LAW	No	4	4	4
Humane Society	No	16	16	16
NOR-CAL Ambulance	No	5	5	5
Pro Transport	No	0	0	7
San Antonio Volunteer Fire Company	No	18	18	18
PT.REYES NAT. SS	No	42	42	42
Sonoma Co. SO	No	3	3	3
St. Joe's Ambulance Svc.	No	7	7	7
USCG CAMSPAC	No	3	3	3
XSN CA OES COMM	No	1	1	1
City of Belvedere PD & PW	Yes	21	21	21
Bolinas Fire Protection District	Yes	23	23	23
Town of Corte Madera Fire & PW	Yes	59	59	59
Town of Fairfax PD & PW	Yes	35	35	35
Inverness Public Utility District	Yes	19	19	19
Kentfield Fire Protection District	Yes	23	23	23
City of Larkspur Fire & PW	Yes	55	55	55
Marin Community College District	Yes	15	15	15
County of Marin (All Departments)	Yes	976	988	991
Marin County Transit District	Yes	75	75	75
Marinwood Community Services District	Yes	21	21	21
City of Mill Valley FD, PD, PW	Yes	114	114	114
Marin Municipal Water District Rangers	Yes	60	60	60
Novato Fire Protection District	Yes	124	124	128
City of Novato PD & PW	Yes	182	182	182
Town of Ross FD & PD	Yes	29	29	29
Ross Valley Fire Service	Yes	34	34	34

	MERA	5-1-11		1-11-11		1-16-13
Agency (Continued)	**Member**	**Mob/Port**		**Mob/Port**		**Mob/Port**
Town of San Anselmo PD & PW	Yes	58		59		59
City of San Rafael FD, PD, PW	Yes	426		426		430
City of Sausalito PD & PW	Yes	45		45		46
Skywalker Ranch Fire Brigade	Yes	14		14		14
Southern Marin Fire Protection District	Yes	65		65		67
Stinson Beach Fire Protection District	Yes	26		26		26
Tiburon Fire Protection District	Yes	37		37		37
Town of Tiburon PD & PW	Yes	38		38		38
Twin Cities Police Authority	Yes	61		61		61
		=======		======		=======
		2,773		2,786		2,810
Anticipated system design in 1998 *		1,580		1,580		1,580
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Increase over 1998 design *		1,193		1,206		1,230
*Totals do not reflect fixed fire station alerting radios and MERA training radios.						

Appendix B

MERA 2012 SYSTEM USAGE

Entity	Radio Calls	Radio Hours	Busy Count	Busy Seconds	Busy Sec. Per Count	Busy Sec. Per Call	Percent Busy
SO	862,890	1,444.1	235	114	0.485	0.000	0.002
TWC & SAP	700,265	1,033.3	54	29	0.537	0.000	0.001
SRP	623,747	926.2	37	17	0.459	0.000	0.001
SMP	544,349	923.8	54	27	0.500	0.000	0.001
NPD	576,146	873.1	25	10	0.400	0.000	0.000
JAIL	299,297	411.0	9	8	0.889	0.000	0.001
MCTD	213,758	363.6	64	39	0.609	0.000	0.003
FP	213,370	318.9	30	13	0.433	0.000	0.001
LAW	143,998	272.9	8	4	0.500	0.000	0.000
FSA	61,159	268.8	37	80	2.162	0.001	0.008
MCF	145,824	257.4	130	69	0.531	0.000	0.007
COURT	129,852	226.9	10	5	0.500	0.000	0.001
SMF	124,999	200.3	57	58	1.018	0.000	0.008
SRF	127,305	198.5	12	6	0.500	0.000	0.001
EMS	62,216	188.3	9	1	0.111	0.000	0.000
PUB WKS	92,238	184.7	25	22	0.880	0.000	0.003
PARKS	83,828	166.4	18	7	0.389	0.000	0.001
MMWD	78,832	145.7	14	3	0.214	0.000	0.001
CMF	79,227	128.9	18	7	0.389	0.000	0.002
NFD	70,315	121.1	14	6	0.429	0.000	0.001
FD DSP	38,262	113.4	19	13	0.684	0.000	0.003
HUMANE	58,948	110.6	6	8	1.333	0.000	0.002
MUT AID	21,758	36.6	13	2	0.154	0.000	0.002
ICS	18,792	33.1	11	0	0.000	0.000	0.000
FIRE	3,924	8.3	0	0	0.000	0.000	0.000
OTHER	1,469	2.1	0	0	0.000	0.000	0.000
MWCSD	537	1.1	0	0	0.000	0.000	0.000
TEST	751	0.8	0	0	0.000	0.000	0.000
CHP	85	0.1	0	0	0.000	0.000	0.000
RPD	57	0.1	0	0	0.000	0.000	0.000
SCHOOL	6	0.0	0	0	0.000	0.000	0.000
Totals:	5,378,204	8,960.3	909	548	0.603	0.000	0.002
Previous Year:	5,338,856	8,783	1,872	1,148	1	0	0
Change:	39,348	177.1	-963	-600	-0.010	0.000	-0.002

Appendix C

Following are frequencies or systems that are, or can be, tied/patched into the MERA system for local/regional/state/federal interoperability:

UHF Mutual Channels programmed into subscriber units
MERA T-Band convention channels – 8 channels i.e. Car 1 &2, Flag 1 & 2, etc.
Petaluma PD 1, 2, and 3
Sonoma Sheriff Channels 1-5
GG Transit Channels 1-3
UCALL 40 + 4-Tacs
CALAW 4 (UHF CLEMARS)

Hard patched to MERA System (24/7)
Volunteer Fire Paging System – Low Band 46.12MHz at Tomales, 46.28MHz at Barnabe, 46.36MHz at Bolinas, and 46.50MHz at Tam

Capable of being patched into system on an as needed basis
White Fire/VFIRE
CDF CMD 1/CMD 2
UHF Medical Channels
EMS Mutual Aid
CAEMA Fire
San Rafael Fire VHF
CALAW 1 (VHF CLEMARS)
CHP CHANNELS
CLEARS 3 (VHF)
CLEARS 7 (UHF)
VCALL 10 + 3-TACs
7CALL 50 + 28-TACs
8CALL90 + 8-TACs
US Coast Guard
PRNSS
GGNRA
CESRS (State)

Standalone Interoperability
MCOE (Schools)
CALCORD

Appendix D

System Design Report; Marin County was finalized for MERA on April 29, 2010.

Available at: http://www.meraonline.org/mera_docs.cfm

Presentation MERA Radio Consulting Services, Motorola Coverage Improvement Proposal, DELTAWRX, November 2008.

Available at: http://www.meraonline.org/mera_docs.cfm

Appendix E

An Engineering Report for the County of Marin, Licensing Potential of the Radio Frequency Compatibility Report was finalized by CSI Telecommunications on June 1, 2010.

Available at: http://www.meraonline.org/mera_docs.cfm

Appendix F

County of Marin Radio Communications System RFP - 6/7/10 — w/attachments
- — Appendix B: Proposal Pricing Summary
- — Appendix C: Compliance Matrix
- — Appendix G: Marin Coverage Map
- — Appendix H: Site Surveys

Available at: http://www.meraonline.org/mera_docs.cfm

Appendix G: Estimated Costs

(IN THOUSANDS OF DOLLARS)

	Next Gen Radio	M/W Equip	Shelter improvements	Civil	Freq. Coord. including M/W needs	Environmental Compliance	Legal Planning permits leases	Staff Support
Tomales *	608	167	223	262	11	28	38	77
Pt Reyes *	608	250	223	0	11	28	38	77
Barnabe *	608	250	223	0	11	28	38	77
Stewart Pt *	608	167	223	0	11	28	38	77
Sonoma *	608	0	223	0	11	28	38	77
Burdell *	608	250	0	0	11	28	38	77
Big Rock *	608	167	223	0	11	28	38	77
San Pedro *	608	250	223	0	11	28	38	77
Forbes *	608	250	223	0	11	28	38	77
Dollar *	608	250	223	0	11	28	38	77
Tam *	608	250	223	0	11	28	38	77
Millvalley *	608	250	0	0	11	28	38	77
Tiburon *	608	250	223	0	11	28	38	77
Wolfback *	608	250	223	262	11	28	38	77
Martha	608	250	223	0	11	28	38	77
Muir	608	167	223	262	11	28	38	77
Bayhill	608	167	223	87	11	28	38	77
Civic Center/EOF *	608	167	700	0	11	28	38	77
2nd M/W site1		250	223	262	11	28	38	77
Subtotal	10,942	4,000	4,264	1,135	216	528	713	1,468
System Equipment/backbone costs	23,266							
Subscribers: 3,000 - 200 non-member	8,204							
unit cost with discount $2930.10								
Total 18 site w/subcriber (no tax)	31,470							
Tax @8.25%	2,596							
Sub Total	34,066							
Contingency 17%	5,934							
TOTAL	40,000							

Appendix H MERA: Operating/Maintenance Cost Projections

(IN THOUSANDS OF DOLLARS)

	APPROVED BUDGET 2013-14	ESTIMATED BUDGET 2014-15	ESTIMATED BUDGET 2015-16	ESTIMATED BUDGET 2016-17	ESTIMATED BUDGET 2017-18 (building out new system)	MERA NEXT GEN ESTIMATED BUDGET 2018-19 (both systems on line)	MERA NEXT GEN ESTIMATED BUDGET 2019-20 (new system out of warranty)	MERA NEXT GEN ESTIMATED BUDGET 2020-21	MERA NEXT GEN ESTIMATED BUDGET 2021-2022	MERA NEXT GEN ESTIMATED BUDGET 2022-2023
Preventive and Corrective	$420	$433	$447	$462	$476	$596	$615	$635	$656	$676
Programming	0	0	0	0	0	0	0	0	0	0
Parts, Materials, and Factory Repairs	80	84	88	93	97	102	107	113	118	124
Training	31	32	33	34	62	64	38	39	40	41
Technical Services	100	100	100	100	100	100	100	100	100	100
Administrative Services	155	160	165	171	176	182	188	195	201	208
Communications Engineer	170	190	196	203	209	216	223	230	237	245
Contract Services	158	164	170	176	182	188	195	202	209	216
Auditing	15	15	16	16	17	18	19	20	21	22
Legal	10	10	10	10	11	11	12	13	13	14
Misc.	1	1	1	1	2	2	2	2	2	2
Contingency	20	20	20	20	30	30	30	30	30	30
Site Utilities - Current	85	91	97	104	222	237	127	136	145	156
Site Utilities - With Next Gen					46	49	53	57	61	65
Site Maintenance	13	13	13	14	14	15	15	15	16	17
Site Maintenance - With Next Gen					6	6	6	6	7	7
Insurance	40	44	48	53	59	64	71	78	86	94
Insurance - With Next Gen					24	27	30	32	36	39
Current Leases	354	372	390	410	430	452	474	480	523	549
Next Gen Tomales, Martha, Wolfback, Stinson, EOF					210	220	231	242	254	265
TOTAL MERA Operating Costs:	**1,650**	**1,728**	**1,795**	**1,866**	**2,374**	**2,580**	**2,536**	**2,624**	**2,753**	**2,870**
Optional System User Upgrade	0	0	0	0	0	0	450	450	450	450
TOTAL MERA Operating Costs with Option:	**1,650**	**1,728**	**1,795**	**1,866**	**2,374**	**2,580**	**2,986**	**3,074**	**3,203**	**3,320**

NOTES TO ACCOMPANY PRELIMINARY MERA NEXT GEN OPERATING/MAINTENANCE COST PROJECTIONS

MERA OPERATING FUND 70030

ASSUMPTIONS:

1) REFLECTS COST ESTIMATES FROM FY14-15 THROUGH FY22-23
2) ESTIMATES BASED ON TWO-YEAR CONCURRENT OPERATION OF CURRENT SYSTEM AND NEXT GEN, EFFECTIVE FY17-18 AND FY18-19

DEPARTMENT OF PUBLIC WORKS:

PREVENTIVE AND CORRECTIVE MAINTENANCE - 3.2% EACH YEAR, ASSUME MERA PURCHASES ONE YEAR WARRANTY FROM VENDOR, INCREASE IN FY 18-19 WITH NEW SITES.

PROGRAMMING - 3.2% EACH YEAR

PARTS, MATERIALS, FACTORY REPAIRS - 5% EACH YEAR

TRAINING - 3.3% EACH YEAR TO 16-17, THEN INCREASED WITH NEW SYSTEM FOR ALL USERS. TO INCLUDE: TRAIN THE TRAINER, END USER, DISPATCH, SUPERVISOR AT $60,000, THEN 3.3% EACH YEAR

TECHNICAL SERVICES - 3.2% EACH YEAR, MOTOROLA TECHNICAL SUPPORT AGREEMENT COSTS FY 14/15 $25,689, FY 15/16 $26,973, FY 16/17 $28,052, FY 17/18 $29,174. THEN ESTIMATED AT FY 18/19 $26,590, FY 19/20 $28,620, FY 20/21 $29,765, FY 21/22 $30,955, FY 22/23 $32,194.

ADMINISTRATIVE SERVICES - 3.3% EACH YEAR

SYSTEM UPDGRADE AGREEMENT - THIS IS PRESENTED AS AN OPTIONAL ITEM. MERA DOES NOT HAVE A SYSTEM UPGRADE AGREEMENT WITH THE CURRENT SYSTEM. DETAILS CAN BE FOUND IN THE PLANNED SYSTEM LIFE SECTION ON PAGE 11. COST IS ESTIMATED AT $450,000 PER YEAR, STARTING IN FY 19/20

MERA (NON-DPW COSTS):

CONTRACT SERVICES - 3.5% EACH YEAR

AUDITING SERVICES - 3.0% EACH YEAR THRU FY16-17 AND 5.0% BEGINNING FY17-18

LEGAL SERVICES - 3.0% EACH YEAR THRU FY16-17 AND 5.0% BEGINNING FY17-18

MISCELLANEOUS EXP - NO % INCREASE - BEGINNING FY17-18 ADDED $1,000 EACH YR

CONTINGENCY EXP - NO % INCREASE - BEGINNING FY17-18 ADDED $10,000 EACH YR

NOTE: LINE ITEMS BELOW AFFECTED BY ADDITION OF 5 NEW SITES IN FY17-18 (TOMALES, MARTHA/TIBURON, WOLFBACK, STINSON AND EOF)

SITE UTILITIES - 7.0% EACH YEAR & W/INCREASE OF 5 SITES BEGINNING FY17-18

SITE MAINTENANCE - 3.0% EACH YEAR & W/INCREASE OF 5 SITES BEGINNING FY17-18

INSURANCE - 10.0% EACH YEAR & W/INCREASE OF 5 SITES BEGINNING FY17-18

CURRENT SITE LEASES - 5.0% EACH YEAR

NEXT GEN SITE LEASES – BEGINNING FY17-18

TOMALES - FY17-18 ANNUAL LEASE IS $10,200 – REFLECTS 1.0% EACH YR
MARTHA/TIBURON, WOLFBACK, STINSON AND EOF:
NO LEASES SIGNED AS OF NOVEMBER 1, 2013
ESTIMATED COSTS BASED ON AVERAGE OF ALL CURRENT SITE LEASES (8)
W/INCREASE OF 5% FOR EACH SITE BEGINNING FY18-19

Appendix I MERA: Capital Cost Projections

(In thousands of dollars)

	APPROVED BUDGET 2013-14	ESTIMATED BUDGET 2014-15	ESTIMATED BUDGET 2015-16	ESTIMATED BUDGET 2016-17	ESTIMATED BUDGET 2017-18 (building out new system)	MERA NEXT GEN ESTIMATED BUDGET 2018-19 (both systems on line)	MERA NEXT GEN ESTIMATED BUDGET 2019-20 (new system out of warranty)	MERA NEXT GEN ESTIMATED BUDGET 2020-21	MERA NEXT GEN ESTIMATED BUDGET 2021-2022	MERA NEXT GEN ESTIMATED BUDGET 2022-2023
System Analysis (Buildings repairs, generators, small equipment projects	**$185**	**$132**	**$208**	**$100**	**$100**	**$100**	**$100**	**$100**	**$100**	**$100**

Appendix J MERA: Operating, Capital and Debt Cost Projections

Without Optional System Upgrade Agreement (in thousands of dollars)

	APPROVED BUDGET 2013-14	ESTIMATED BUDGET 2014-15	ESTIMATED BUDGET 2015-16	ESTIMATED BUDGET 2016-17	ESTIMATED BUDGET 2017-18 (building out new system)	MERA NEXT GEN ESTIMATED BUDGET 2018-19 (both systems on line)	MERA NEXT GEN ESTIMATED BUDGET 2019-20 (new system out of warranty)	MERA NEXT GEN ESTIMATED BUDGET 2020-21	MERA NEXT GEN ESTIMATED BUDGET 2021-2022	MERA NEXT GEN ESTIMATED BUDGET 2022-2023
MERA Operating Costs	1650	1728	1795	1866	2374	2580	2536	2624	2753	2870
Capital Costs	185	132	208	100	100	100	100	100	100	100
2010 Refunding Revenue Bonds	2347	2347	2347	2347	2347	2347	2347	2347		
TOTAL Operating, Capital and Debt Costs	**4182**	**4207**	**4350**	**4313**	**4821**	**5027**	**4983**	**5071**	**2853**	**2970**

With Optional System Upgrade Agreement (in thousands of dollars)

	APPROVED BUDGET 2013-14	ESTIMATED BUDGET 2014-15	ESTIMATED BUDGET 2015-16	ESTIMATED BUDGET 2016-17	ESTIMATED BUDGET 2017-18 (building out new system)	MERA NEXT GEN ESTIMATED BUDGET 2018-19 (both systems on line)	MERA NEXT GEN ESTIMATED BUDGET 2019-20 (new system out of warranty)	MERA NEXT GEN ESTIMATED BUDGET 2020-21	MERA NEXT GEN ESTIMATED BUDGET 2021-2022	MERA NEXT GEN ESTIMATED BUDGET 2022-2023
MERA Operating Costs	1650	1728	1795	1866	2374	2580	2986	3074	3203	3320
Capital Costs	185	132	208	100	100	100	100	100	100	100
2010 Refunding Revenue Bonds	2347	2347	2347	2347	2347	2347	2347	2347		
TOTAL Operating, Capital and Debt Costs	**4182**	**4207**	**4350**	**4313**	**4821**	**5027**	**5433**	**5521**	**3303**	**3420**