

STATEWIDE EMERGENCY COMMUNICATIONS BOARD OPERATIONS & TECHNICAL COMMITTEE

June 9, 2015 1:00 – 3:00 p.m.
MnDOT Arden Hills Training Center
1900 West County Road I, Shoreview MN
Chair: Joe Glaccum

Video conferencing sites:

dot r d3b St Cloud
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Call-in Number: 1-888-742-5095

Code: 2786437892#

AGENDA

Call to Order

Approval of Agenda

Approval of Previous Meeting's Minutes

Action Items

1. ARMER Participation Plan for Lake of the Woods County (Rey Freeman)
2. ARMER Participation Plan for Roseau County (Rey Freeman)
3. Outdoor BDA Proposal from Lac qui Parle County (Mike Hamann)
4. Isanti County Console Upgrade and Addition (Sheriff Caulk or Mike Kahl)
5. Rice and Steele County JPB PSAP Participation Plan Amendment (Jeff Nelson)
6. Local Repeater Coverage for ARMER request from Stevens and Kandiyohi Counties (Ace Bonema, Dave Sisser, Sheriff Dingman)

New Business

Old Business

Regional Reports

- Northwest (Richard)
- Northeast (Hegrenes)
- Northern RIC (Bruning)
- Central (Justin)
- Metro (Gundersen)
- Central/Metro RIC (Juth)
- South Central (Wesley)
- Southeast (Timm)
- Southwest (Hamann)
- Southern RIC (Donahue)

Other Reports

- MnDOT (Lee)
- System Managers Group (Lee)
- DPS Standing Report (Mines)
- Status Board Report (Anderson)

Adjourn

STATEWIDE EMERGENCY COMMUNICATIONS BOARD
OPERATIONS & TECHNICAL COMMITTEE

May 12, 2015
MnDOT Arden Hills Training Center

MEETING MINUTES

ATTENDANCE

Members Present

Member/Alternate

Chair Joe Glaccum/Vacant- Minnesota Ambulance Assn
Vice Chair Dave Thomson/Vacant - MN Chiefs of Police Assoc.
John Gundersen/Ron Jansen - MESB
Tim Lee/Jim Mohn/Mukhtar Thakur- MnDOT
Tim Boyer/- MN State Patrol
Shane Richard/Brian Zastoupil- NW Region
Bruce Hegrenes/Monte Fronk - NE Region
Terry Wesley/Darrin Haeder - SC Region
Tom Justin/Ace Bonnema / Paul McIntyre - CM Region
Nate Timm/ Rick Freshwater - SE Region
Mike Hamann/Kimberly Hall - SW Region

*Members attending are marked with yellow highlight.

Guests reporting:

Name	Representing
Jackie Mines	ECN
Rubin Walker	ECN
Cathy Anderson	ECN
Rick Juth	ECN
Marcus Bruning	ECN
Randy Donahue	ECN
Jill Rohret	MESB
Rod Olson	City of Minneapolis
Jake Thompson	Anoka County
John Thompson	Elert
Mike Fink	Motorola
Carrie Oster	Motorola
Jeff Nelson	PSC Alliance
Kristen Lahr	Central ESB

CALL TO ORDER

Vice Chair Thomson calls the meeting to order at 1:00 p.m. with a quorum.

AGENDA REVIEW

Vice Chair Thomson requests to bring the StatusBoard Wish List report to the top of the agenda.

Terry Wesley moves to approve the agenda as amended.

Bruce Hegrenes seconds.

Motion carries.

APPROVE PREVIOUS MEETING'S MINUTES

John Gundersen states last month's minutes show Jill Rohret as having been in attendance, but she was not at the meeting.

Gundersen moves to approve the previous meeting minutes as amended.

Nate Timm seconds.

Motion carries.

STATUSBOARD REPORT & WISH LIST (SHANNON O'KEEFE / CURT KOEHN)

Shannon O'Keefe reports that MNIT has been working on StatusBoard for a few months and introduces Curt Kohn, who is the application developer who has been helping with StatusBoard. She volunteered to come and talk about StatusBoard and to talk about the email that requested everyone update their email addresses for user accounts.

O'Keefe explains that there are two potential solutions for the bumping situation that people are concerned about. One is to add a second email line to user accounts so bump notifications would go to the group email. The second solution would be to not allow bumping. She asks if the ability to bump is needed.

Jackie Mines says we need a systematic plan to address StatusBoard issues. She advocates for Cathy Anderson to keep an ongoing list of issues reported to her and also that regions work within the region to identify issues. There is a person from every region on the StatusBoard workgroup. Mines would like people to use the person within the region to address regional issues and determine what to bring to the workgroup. Then the workgroup can determine what is critical, medium, and low priority and what is on the wish list. This keeps ECN out of having to determine the criticality of each problem that comes up; that should be the role of the workgroup and regions. A more systematic approach will also help prevent us from having to push back other 911 projects that need MNIT attention.

Mines reads the list of the Regional StatusBoard Administrators: Ron Jansen (MESB), Al Fjerstad (Central), Rick Freshwater (Southeast), Pat Wallace (South Central), Amber Scholten (Southwest), and Brian Zastoupil (Northwest).

Vice Chair Thomson says it makes sense that regions give input and prioritize before bringing issues to ECN. He asks if there is a list of what updates have happened with each version so we can get that out to committee members to discuss with their PSAPS. The regions can see the advances we've made and can give feedback on must-haves and like-to-haves.

O'Keefe returns to the topic of updating email addresses on accounts and StatusBoard. She emphasizes that this is not optional, and everyone needs to have an individual email listed since that is where password resets go. The two options are that everyone either updates all the user accounts so they have a unique email address or we add an additional email field to the user account where bump notifications go.

She says there is an upcoming release in the next couple weeks. They have fixed the profile issue that was causing errors and corrupt profiles not to work. If you are in a corrupt profile, you could not even log in at all. The system fix for that should be implemented in a couple weeks. Curt also fixed a profile performance issue, so instead of taking ten to fifteen minutes to load, it should take about three or four seconds now. There were also some spelling fixes found, and in the future, you will be able to sort by alpha order on the profile page instead of by the create date.

Anderson asks O'Keefe to explain why a bumped calendar reservation cannot be returned.

O'Keefe says it doesn't matter how you reserve a resource and once you are bumped by someone, the reservation is deleted. It is not possible to know when someone's reservation should be brought back.

Mines says at the back of this meeting's packet, there are reports that were mentioned at the April Statewide Emergency Communications Board meeting. It would be helpful if the workgroup and OTC provided direction on what statistical benchmarks they want ECN to make regarding StatusBoard.

Anderson mentions she has been doing a poll regarding the group email issue and there have been many agencies and counties who have reported it is not an issue, so it does not seem to be a big issue for everyone.

O'Keefe says the email that went out gave everyone until the 30th of April to update email addresses, and it wasn't done. She says we will give everyone a little more time, but if they don't do it, we have to lock their accounts, because we cannot send password resets to a generic email address.

Mines asks Curt Koehn if there is any downside to having a second group email address or if it could cause any other issues with StatusBoard.

Koehn states there would be no impact on the StatusBoard application, just on other projects, and that users would have to manage two email addresses.

Vice Chair Thomson asks if it would be possible to do it by domain - i.e. DCC.org.

Koehn says if we did anything different than just adding the second email line, it would be a more extensive change. The application is set up by user. If it is done by group email for notifications, it would be the smallest amount of change for the application.

Gundersen says he wonders if most people are aware of the problem that if someone enters a reservation and then that person is gone on the day the resource will be used, there is no way of knowing if it has been bumped. He says this could be a problem for any PSAP with more than one dispatcher. He thinks it's more than the metro and more than three agencies having issues with this.

Anderson relays some comments that came from larger PSAP supervisors, including that with all the resources available, there should really be no bumping and another who said that just because they have a reservation doesn't mean they have that talkgroup. This agency said they always check before they use it. Anderson says it would be no different than what they did with the old StatusBoard and always had to check to ensure the reservation was still valid before using it.

Mines asks if we could hear back from the Regional StatusBoard Administrators in one week, so we can know what is critical, what to push out, and for how long we will push everything back.

Anderson will send out information to Regional Administrators and have a meeting within seven days.

Further discussion about how to solve the problem of bumping and notification.

Ace Bonnema raises a concern about the two-hour time limit.

Chair Thomson suggests this be brought to the regional StatusBoard Administrator to bring forward to the work group.

Mines says she appreciates everyone looking at that process. She reiterates that we want to make the best application possible for the most people and that we can't always meet everyone's expectation but strive to do the best we can and have consistency.

O'Keefe asks for clarification if there will be a decision made within a week about group email.

Mines says yes, we will give everyone a chance to weigh in on the group email versus getting rid of bumping.

ST. LOUIS PARK PARTICIPATION PLAN AMENDMENT (JEFF NELSON)

Jeff Nelson reports that St. Louis Park came on the ARMER system in 2006 with three Gold Elite consoles and has operated that way since then. They would like to upgrade to MCC 7500's. This proposal went before the metro TOC in April where it was approved for three primary MCC 7500 console positions, one patched position, two 4-port CCGWs for support of Legacy resources and local control stations. All 8 CCGWs will be used. The OTC and metro TOC approved a connectivity plan last year, and there is no change to that as part of this submission.

They are currently connected to zone 2, and would continue to require 2 ports on the zone 2 master site. Logging is proposed to be done over the air; no master site logging. They will turn back 212 console I.D's - they currently have 216.

Gundersen says it was reviewed and recommended by the metro TOC and makes a motion to approve. Hegrenes seconds. Motion carries.

MINNEAPOLIS PARTICIPATION PLAN AMENDMENT (ROD OLSON)

Rod Olson introduces the City of Minneapolis' request to amend its Participation Plan. The city would like to upgrade 16 Gold Elite consoles to MCC 7500s and one patch console. The city would turn in one T1 or possibly 2, depending on if they go with AIS or not. They were granted a block of 5,000 ID's, so they have both radio I.D.s and console I.D.s, and they would like to keep the I.D.s that will be vacated for now but may return spare I.D.s sometime in the future.

Vice Chair Thomson asks how many I.D.s they are looking at for the consoles. Olson says 900. They will have radios available now for a cache, and they want to keep some of the I.D's for the cache in the future.

Vice Chair Thomson asks if they will use 16 CCGW's. Olson says two 8-port CCGWs are requested; 14 ports will be used for cutover.

Gundersen says the metro TOC recommended approval and support of this Participation Plan Amendment and moves to approve. Nate Timm seconds.

Discussion

Tim Lee says if they keep analog logging for now, that will go away with the 7.15 upgrade.

Olson says they log off their consoles so they're all onsite and they will continue to do that. Vice Chair Thomson asks if they're still going through CEEB and BIM. Olson says yes.

Motion carries.

LIMITED INTEROPERABILITY PARTICIPATION PLAN, CITY OF LA CROSSE (NATE TIMM)

Nate Timm introduces the plan by saying it is not unlike the XCEL nuclear plant plan that the committee previously considered. The plan submitted today is a limited participation plan for the City of La Crosse. The city is upgrading from a type-2 trunk to a system similar to ARMER. They can have both systems, and this will be used only for interoperability.

John Thompson from Elert, who is working with La Crosse, says the city is building a three-site simulcast system across from Houston County so they can interop with those agencies when they need to.

Vice Chair Thomson asks if they are looking for 300 radio I.Ds. John Thompson says there are 300 police and fire units that would be involved.

Timm says the plan is for the standard suite of interops – SE region, MN zone, 8C zone.

Bonnema asks if this has been through the SE Committee, because he didn't see an attachment with the necessary documents including talkgroups.

Timm says that will be coming up with the next SE RAC and the SECB. This could be contingent upon Regional Board approval.

Gundersen asks about the concern that SOA's are only permitted within the state of Minnesota and wonders if there is something in the plan that says where the units would be able to operate within these frequencies.

Timm says there is nothing in the plan to that effect, and it is kind of standard for limited participation plans – there is no language for SOA's outside the state line.

Thomson questions if we have a standard around SOA use.

Tim Lee clarifies that the SOA's are licensed statewide only for use in Minnesota.

Vice Chair Thomson says there should be a document somewhere for training talking about Minnesota users wandering out of the state or limited users in another state.

Ron Jansen asks about the LTACs and wants to make sure they will be used only by law enforcement. He asks if they're going to be approved radios on the ARMER system and if they have to follow ARMER standards.

Vice Chair Thomson says if they are on the ARMER system, they must be approved radios.

Timm says these are Motorola APX radios, so there should be no concern about that. He says the LTACs will be in law radios only and FTACs will be in fire radios only.

Gundersen asks if they are getting a system key for programming since there are standards for using that and wonders if they have selected an authorized company.

Timm says Rick Freshwater will do it and it is authorized in the future. They have to come to do the MnDOT approved procedure, and this will apply to them as it does to anyone else. They have to meet MnDOT standards to get the key.

Rick Freshwater clarifies he is not going to be doing the programming. He agreed to be the system administrator, and he thinks they have hired a vendor to do the training through MnDOT.

Gundersen asks if the Regional Radio Board (RRB) will have information about the vendor by the time they make the decision.

Vice Chair Thomson says either Rick Freshwater, Nate Timm, or he will make sure that they have that.

John Thompson clarifies that the participation plan includes the vendor information.

Tim Lee says after they are approved, they need to get an agreement with MnDOT that they are approved for limited participation. It spells out that they have to follow all the ARMER Standards.

Hegrenes asks if there has been any thought about interoperability between La Crosse and the ARMER system.

Timm says he's not sure of any discussion where La Cross would share the ARMER system, but if they have the capability, he would expect that they would.

John Thompson says they could set that up if requested and if there is a need to do that.

Hegrenes ask if the coverage is for Minnesota-based sites.

John Thompson says that is on the Minnesota side and on the La Crosse system, they're all on the La Crosse side.

Vice Chair Thomson asks how coverage is in to the La Crosse side.

John Thompson says it looks right into the city of La Crosse and there are currently control stations at the PSAP.

Jake Thompson asks if we are going to charge subscriber fees for interoperability for out-of-state agencies since they are not covered by Minnesota fees.

Tim Lee says there is currently no fee for interop users but we will have to watch to make sure it is only used for interoperability.

Vice Chair Thomson says he does not see any La Crosse specific talkgroups.

John Thompson says that will happen on the La Crosse system.

Timm says Wisconsin's WISCOM agreement is also free and he assumes it would be the same if we wanted to use their system for interoperability.

Nate Timm makes a motion to approve the request with the contingency of Southeast Regional Board approval, in addition to MnDOT satisfaction over the contract. Hegrenes seconds.

Gundersen asks a question about use of talk groups. Thompson responds that they are only assigned to Houston County and will be only used if they need assistance from the City of La Crosse.

Motion carries.

LAKE COUNTY PARTICIPATION PLAN AMENDMENT (BRUCE HEGRENES)

Bruce Hegrenes introduces a request for a participation plan amendment for Lake County. The original plan was approved in August of 2010. Lake County would like to operate two MCC 7500's with three CCGWs with 12 ports. Sixty radio I.D.s will be returned, from the 594 that were approved in 2010. The plan includes a three-year projection for radio I.D. additions. Lake County operates its own microwave to provide T1's to the zone 5 MSO in Duluth. One additional channel has been added at the Silver Cliff ASR site. They are contracted with St. Louis County Sheriff's office for ARMER system maintenance and system administration. This has gone through the RAC, O&O, and RRB and has been approved.

Tim Lee moves to approve the Lake County Participation Plan Amendment.

Hegrenes seconds.

Motion carries.

ST. LOUIS COUNTY VARIANCE (BRUCE HEGRENES)

Bruce Hegrenes reports that St. Louis County has been in the process for over a year of preprogramming, retuning, and upgrading firmware for almost 5000 subscriber units. The county has also done a 100% audit. The project has taken longer than anticipated. The June 24 deadline could be met but then the county would have to go back and tune radios and upgrade firmware. St. Louis County is requesting a variance of final implementation for all agencies covered in the St. Louis County ARMER participation plan from the standard naming requirements in ARMER Standards 3.15.0, 3.16.0, and 3.19.0 until August 31, 2015.

Questions about dual naming and training.

Timm moves to approve the St. Louis County request for a variance from standards 3.15.0, 3.16.0, and 3.19.0.

Gundersen seconds.

Hegrenes adds that this has been approved by the RRB and the RAC.

Motion carries.

STATE STANDARD 1.11.1--TRAINING SYSTEM ADMINISTRATORS (CATHY ANDERSON)

Cathy Anderson introduces edits to Standard 1.11.1. The Standard has been reviewed by a work group, by the SMG, and by the Interoperability Committee.

Mines asks who determines if a vendor has equivalent experience for formal factory training – if it's not Motorola and someone else is doing system admin training--whose responsibility is it to make sure that they have equivalent experience?

Thomson says he doesn't believe the IOC and the workgroup addressed that specifically. The problem is that equivalent experience changes all the time based on what system we're on, what version we're on, where they have worked. That was specifically not addressed because that would turn into a never ending quagmire.

Anderson reviews some of the proposed edits for clarification. She says on the bottom of page one, the second to last sentence "include equivalent experience and/or ARMER infrastructure formal factory training" was left that way because it was assumed it would be Motorola. There was a lot of discussion about that. On page 2, the first sentence should end after "equipment manufacturer" (as noted in the comments section of the mark up) and "or a trained individual designated by the Local System Admin" was taken out.

Mines says she heard Anderson say that the thinking was that it would be assumed that it would be Motorola factory training but she is getting calls from other organizations that are asking if they can do system admin training. If it's very clear that it's only Motorola she thinks we should put that in there.

Discussion about what the training should be and by whom. Discussion of different levels of training for different levels of system administrators. Discussion of whether or not "equivalent experience and/or" from the second paragraph under 4. Recommended Protocol / Standard was stricken at the IOC meeting. This was not reflected in the meeting minutes.

Gundersen moves to strike the language “equivalent experience/and/or” in paragraph two under 4. Recommended Protocol/ Standard. Motion fails for lack of a second.

Continued discussion about the difficulty of determining what is equivalent experience and how to/who would define it. Discussion about how it works in practice. MnDot gives ARMER best practices before giving a log on but training should have happened first. The ARMER best practices are intended by MnDot to supplement training. Discussion about whether the Standard should name MnDot at all, as in the second paragraph on page two, or leave MnDot out of the Standard.

Mike Fink adds a note that if anyone has taken Motorola factory training, they would have a certificate. Motorola does not keep a list of those trained so it would be up to the individual to produce their certificate.

Agreement that the Standard needs more work in committee.

Timm moves to return the Standard to the committee and SMG for further revision. Hegrenes seconds. Motion carries.

REGIONAL REPORTS

Northwest (Zastoupil)

Brian Zastoupil reports that Lake of the Woods County and Roseau County will be presenting their full participation plans to the RAC tomorrow.

Northeast (Hegrenes)

Hegrenes reports that the RAC and RRB met in April and the two items on the agenda were presented here today for approval. The substance of the conversation was to find out where everyone was with change management and to make recommendations to this committee to poll the rest of the regions as to where they are with change management and if they'll be finished by June 24 with respect to talk group re-naming and re-programming. In the NE, everything should be finished before June 24 with the exception of the variance that was brought before this meeting today. Suggestion that it might be added to each region's report to say if they anticipate meeting the June 24 deadline.

Northern RIC (Bruning)

Marcus Bruning says as was reported previously there are a couple of key participation plans coming before the RAC tomorrow. He also continues to work with the Northwest on an agreement with Manitoba to achieve interoperability with ARMER and there is an interoperability project with Ontario nearing completion. Some long overdue training will be taking place tomorrow in Pine County.

Central (Bonnema)

Ace Bonnema reports that the firewall work has been done on the regional recorder. They are waiting for a vendor to finish and to start training.

Metro (Gundersen)

Gundersen reports that the MESB Radio TOC met on April 22 and recommended approval of the St. Louis Park and Minneapolis console updates that we heard here today. It discussed resurrecting the old metro roaming standard and asked subsystem owners to see what talkgroups are roaming onto their subsystems. The committee heard an update regarding the removal of voting from the metro interoperability system. The committee also discussed increasing usage from Metro Mobility. We are finding that Metro Mobility had an extensive amount of use on their voice system. They implemented a solution with mobile data computers and that did make a difference. The

problem is that they are experience growth in their service requests. We discussed at some point adding channels in the metro region to deal with their increased traffic.

Central and Metro RIC Report (Rick Juth)

Rick Juth says the Metro and Central Regions are both working on their budgets and grant opportunities and prioritizing various infrastructure and coverage enhancements.

He asks Tim Lee—as agencies migrate off the Gold Elite and turn back radio I.D.s—are those reflected in John Anderson’s monthly radio count report?

Lee responds that it doesn’t come out as a separate item. It just shows how many I.D.s are active in the system. It won’t show by agency. All the console ones are grouped together. As people are turning them back and removing the CEEBs we should see that count dropping.

Juth asks if agencies have the option of retaining those radio I.D.’s.

Lee and Thomson respond that it has to be approved by the OTC, as in the example of the city of Minneapolis’ request at today’s meeting.

South Central (Wesley)

Wesley reports that the RAC and the SC-ECB have not met since the last OTC meeting. The O/O group met a week ago and discussed cross county border dispatching and looking to try and standardize how it operates from county to county. The discussion was to move more to using regional talkgroups to be consistent with the way counties and the state patrol work in an interop mode. It will be discussed further at the RAC meeting tomorrow. He says it was great to see everyone at the Interop Conference.

Southeast (Timm)

Timm reports that he recently returned from a communications drill in Oshkosh which he attended with his Wisconsin counterpart. They patched ARMER and WISCOM together and talked from portables in Oshkosh to Brian Zastoupil in Fargo. He thanks Zastoupil for his help. He wasn’t able to make the ECB meeting and the RAC hasn’t met yet.

Southwest (Hall)

Kimberly Hall reports that the region has not met since the end of March. However, they are working on a couple of grants –the SECB grant and SHSP grant for infrastructure and BDA. The region had good representation at the Interop Conference. The Southwest has scheduled an NG911 kickoff meeting next week for PSAP managers, GIS professionals and other invested committee members. The next regional ECB meeting is May 27.

Southern RIC

Randy Donahue says, in addition to what was reported by Hall, his focus has been on FirstNet activities with Televate, collecting data, and preparing for upcoming meetings.

OTHER REPORTS

MnDOT (Lee)

Lee reports that MnDot is still at 97% with 317 sites on the air. A couple of towers are moving along under construction. MnDot is working on land acquisition and just got Island Lake in Beltrami County. A couple of towers that were on the air were replaced. The card key system for the MnDot sites is 75% complete. Dual routes are basically done. There are a couple to do in the Northeast area but MnDot is waiting for some microwave links. Last week the Itasca site was converted to the IT based simulcast and Bear Valley is scheduled for the middle of the month.

System Managers Group

Lee and Jansen report that the SMG talked about the Hennepin County outage with the power system in the UPS, had an update from Motorola and talked about Standard 1.11.1. Confirmed a firm date for 7.15 to freeze the system as of April 1, 2016. The SMG will now meet every other month. A new metro owners group is starting up and is open to anyone who wants to attend. The owners group will meet on the opposite months from the SMG meetings. The group will discuss things that primarily affect metro system owners but may affect greater Minnesota as well.

DPS Standing Report (Jackie Mines)

Mines reports that ECN's budget was accepted by the both the House and the Senate with no changes although there has been some indication that there will be a special session with a lights on only budget approved in the interim. That should not affect ECN's budget.

The SECB grant contract has been delivered to each region. They should be signed before the end of June. An ARMER integration notice of grants opportunity has gone out to the NW region only for those agencies that have not migrated to ARMER. If any other agencies, for example tribal governments in any other regions, want to take advantage of this grant Mines would need to know that right away.

ECN is working on the 7.19 grant contract language right now. As soon as the budget approval is secure, Mines will coordinate a meeting with Tim Lee and the subsystem owners for finalization of that grant.

Anderson announces that there is one spot left for the COMT course in Rochester on September 21 – 25. She thanked Rick Freshwater for volunteering to help with that.

Meeting adjourns at 2:40 p.m.



Lake of the Woods County, Minnesota

ARMER Radio System Participation Plan

May 2015

I.	Introduction	I
A.	ARMER System Application – Lake of the Woods County, Minnesota	I
B.	Project Summary	I
C.	Jurisdictional Coverage of System	2
D.	Entities and Users Participating in the Planned System	2
E.	Existing VHF System Configuration	3
2.	ARMER System Technical Review	4
A.	System Design	4
i)	System Infrastructure and Tower Site Planning	4
ii)	Local Equipment Additions and Enhancements	6
iii)	PSAP Console Planning and Logging	6
iv)	PSAP Connectivity	7
v)	Subscriber Radios	9
vi)	System Talk group Planning and ID Requirements	11
vii)	800 MHz Traffic Loading and Frequency Planning	11
viii)	Legacy VHF Equipment	15
B.	Coverage Review	15
i)	Design Parameters	15
ii)	Coverage Propagation Mapping	16
C.	Contingency Planning	23
D.	Training	24
E.	Interoperability	24
F.	Standards	25
G.	Alarms and Monitoring	25

H.	Maintenance.....	26
I.	System Administration.....	26
J.	Other Local Enhancements	26
3.	Project Costs and Budget.....	27
4.	Project Implementation	28
A.	Schedule.....	28
	Attachment 1: Lake of the Woods County Fleet Map	29
	Attachment 2: References.....	30

ARMER Participation Plan

I. Introduction

A. ARMER System Application – Lake of the Woods County

Lake of the Woods County, Minnesota, and the city and county agencies within the county, request approval for participation in and use of the State of Minnesota Allied Radio Matrix for Emergency Response (ARMER) radio system. The county and its agencies plan to be “Full Participants” in the ARMER system, and will eventually migrate primary voice communications services to the network, once fully implemented.

The county requests that this application and plan be reviewed and approved by the following agencies:

- Northwest Minnesota Regional Advisory Committee (NW RAC)
- Northwest Minnesota Regional Radio Board (NW RRB)
- State of Minnesota Radio Board Operations and Technical Committee (OTC)

Lake of the Woods County law enforcement agencies (Sheriff and Police) have been using the ARMER system on a trial basis for operational communications for about one year, and are now ready to move ahead with a full ARMER participation plan. The law agencies are now fully equipped with ARMER-capable mobile and portable radios, and the EMS agencies within the county are planning the same. Fire agencies will consider a move to ARMER when funding allows for the purchase of mobile and portable radios.

Lake of the Woods County’s plan has been developed based on the requirements and operational standards established for participation in and use of the ARMER radio system.¹ The county desires to contract as required with the Northwest Regional Radio Board and the State of Minnesota Department of Transportation (Mn/DOT) for use of the ARMER system once approved.

A list of the local city and county agencies within the county that plan to be included in the use of this system is provided in Section I.D of this planning document.

B. Project Summary

Lake of the Woods County, Minnesota, and the public safety entities within Lake of the Woods County have developed a plan for the migration from existing VHF public safety radio systems currently used by those agencies to the ARMER network. A comprehensive radio system analysis was conducted in 2009,

¹ All endnotes are attached at the end of the report (Attachment 2) under the heading of “References.”

which presented options for either continued VHF radio operations, or a migration to the 800 MHz ARMER system.

The primary goals of a new radio communications system are:

- Provide improved radio system reliability, coverage, and capacity
- Provide expanded county and region wide interoperability between public safety agencies, whether utilizing VHF or 800 MHz radio systems
- Replacement of the existing aging VHF radio system equipment (as needed)

After a thorough review of the options available, the county has determined that a migration to the 800 MHz ARMER radio system, utilizing the system's multi-site, digital, and Trunking technologies would best meet the county agencies radio communications goals, and will provide the required level of interoperability between public safety agencies in the region.

The primary points of contact for this project are:

Sheriff Gary Fish
Lake of the Woods County Sheriff's Office
206 – 8th Ave. SE.
Baudette, MN 56623
218-634-1143 Phone
gary_f@co.Lake-of-the-Woods.mn.us

Rey Freeman
RFCC
13517 Larkin Drive
Minnetonka, MN 55305
952-541-0747 Phone
rfreeman@isd.net

C. Jurisdictional Coverage of System

The radio system is intended to provide radio communications throughout the geographic area of Lake of the Woods County, Minnesota. Lake of the Woods County is located in the far northern area of Minnesota, covering 1,298 square miles, with a population of 4,045 people; the county seat is located in Baudette. The terrain of Lake of the Woods County is relatively flat, with ground elevations ranging from 1,050 feet in the northern areas to 1,250 feet in the southwestern area. The county is bordered by Koochiching County (east), Roseau County (west), Beltrami (south) and Ontario, Canada to the north.

D. Entities and Users Participating in the Planned System

It is the intent of Lake of the Woods County and the agencies within to implement a shared radio system that will incorporate both public safety and additional governmental agencies. The list contains all of the agencies planning to participate in the system at this time.

Participating Public Safety Agencies (7)	
Lake of the Woods County Sheriff's Office	Williams Fire Department
Baudette Police Department	Roosevelt 1 st Responders
Baudette Fire Department	Lakewood Health Center
Lake of the Woods Ambulance	
Participating Public Works and School Departments (2)	
Lake of the Woods County Highway Department	Lake of the Woods School District

E. Existing VHF System Configuration

The existing Lake of the Woods County voice radio systems operate on VHF (150-160 MHz) frequencies, providing radio channels for law enforcement, fire, and Emergency Medical Service (EMS)/ambulance operations. The dispatch center is physically located at the Lake of the Woods County Sheriff's Office in Baudette, Minnesota.

The existing Lake of the Woods County radio system consists of multiple VHF base and repeater stations located at tower sites around the county. The following primary tower site(s) are used for the Lake of the Woods County system.

- Lake of the Woods County Sheriff's Office
- Williams tower

All radio equipment located at the tower or other remote sites is controlled from the dispatch center via in-house telephone circuits or VHF radio links. The primary VHF radio system infrastructure equipment used by the county is a variety of Harris base and repeater stations. Most stations are in good operating condition, and are operating on narrowband (12.5 kHz) radio frequencies. A single-position Zetron 4010 radio control console is used in the Lake of the Woods dispatch center.

The radio system consists of separate VHF channels and base/repeater stations for Sheriff/law, and fire/EMS operations, which are located at the tower site(s) noted above, as well as at various fire halls throughout the county. The Sheriff/law radio network consists of multiple law repeater channels and sites, along with local Minnesota Statewide Emergency Frequency (MNSEF/VLaw31) and point-to-point stations. The fire/EMS radio networks consist of multiple independent stand-alone base stations located at various tower sites around the county, which also provides tone-and-voice paging capabilities. The radio users and dispatchers manually select the proper tower site based on the radio or service location.

2. ARMER System Technical Review

A. System Design

During the local ARMER system implementation planning process, work was done to determine what type of configuration would be appropriate for the Lake of the Woods County radio system. Since the basic structure of the ARMER system as a multicast digital trunked radio system will meet the needs of Lake of the Woods County agencies, they plan to utilize the system in this planned multicast configuration.

Primary planning factors:

- System infrastructure and equipment plans
- Tower site planning
- Tower site and Public Safety Answering Point (PSAP) connectivity
- 800 MHz channel requirements
- 800 MHz talk group requirements
- Quantity of end user radios

Specific details of how these system parameters will be addressed are provided in this section of the document.

i) System Infrastructure and Tower Site Planning

The ARMER system plan that exists for the Lake of the Woods County area includes five tower sites within the county borders, as well as additional sites outside the county borders that will provide some level of coverage within the county. The following sites are planned for within Lake of the Woods County:

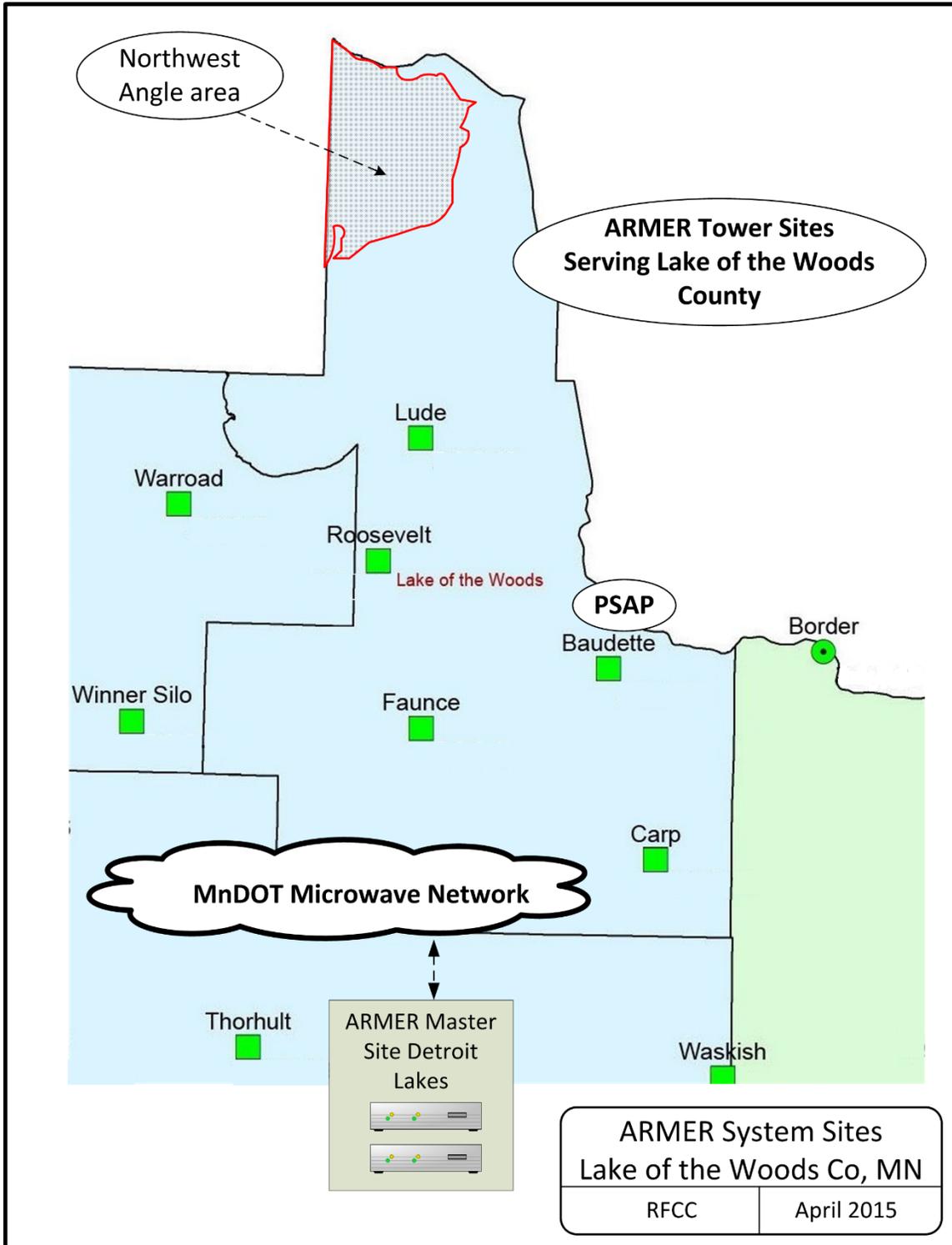
Baudette	Faunce	Roosevelt
Lude	Carp	

The following sites are located outside of but on or near the county border and will provide coverage within Lake of the Woods County:

Border	Thorhult
Warroad	Winner Silo

Refer to the diagram below for a high-level overview of the ARMER tower site details for the proposed system implementation for Lake of the Woods County.

Lake of the Woods County ARMER System Tower Site Architecture



ii) Local Equipment Additions and Enhancements

The ARMER planning study conducted for Lake of the Woods County determined that no additional local enhancement, tower sites (coverage), or channel capacity are required or planned. The ARMER tower sites in Lake of the Woods County and surrounding areas have demonstrated a high level of reliable coverage for the county's agencies, based on use over the past year, and no additional tower sites are planned. Refer to Section B of this plan for a review of 800 MHz coverage.

The only area of concern for Lake of the Woods County is the far northern area of the county, known as the "Northwest Angle", which is a land area of 473 square miles, bordered mostly by Canada, located across Lake of the Woods (water body), north of the county proper. Most of the land is property of the Red Lake Tribal Nation. Access to the Northwest Angle from the U.S. is possible only by boat, or via road by crossing the border into Canada. The official population of the Angle is approximately 152 (year 2000 census).

Radio usage in this area includes Lake of the Woods law enforcement, Fire/EMS, and US Border Patrol. The closest tower site to this area is Lude, located on the south shore of the lake. The distance from the Lude tower to the south shore of the Angle is 17 miles, directly across the lake. As shown in the coverage maps in this plan, the signal levels from the Lude tower site drop off significantly once the signals hit the shoreline. Radio testing in the Angle has shown very poor coverage in most situations.

Potential solutions for the area would be either the addition of an ASR trunked site, or a standalone non-networked 800 MHz repeater "Booster" site, setup to repeat one or more local talk groups. However, there is no current plan on a local level to address the coverage problems at this time.

A review of the number of radios planned for use in Lake of the Woods County, along with the number of talk groups, in conjunction with current and expected radio traffic levels was conducted to determine if any additional 800 MHz channel capacity will be needed at the local ARMER tower sites. Considering these factors, and the resulting traffic loading calculations included in this ARMER Plan, no channel expansion should be needed at the ARMER sites serving the county. Refer to Section A. vii) of this plan for a review of calculated 800 MHz channel traffic loading.

iii) PSAP/Dispatch Center Equipment and Logging/Recording

The Lake of the Woods County dispatch center currently utilizes a one-position Zetron 4010 radio console. This console system is now connected to the county's existing VHF system equipment, as well as two (2) 800 MHz RF control stations, for use on local Lake of the Woods County talk groups, NW Region talk groups, as well as selected statewide talk groups.

Lake of the Woods County is considering a replacement of this older console with a newer Zetron product, but will be retaining control station operation. They have no plan to implement an MCC7500 console system or direct network connectivity.

Their current configuration of two 800 MHz RF control stations will be expanded with up to eight 800 MHz RF control stations for access to the local, regional and statewide talk groups available to Lake of the Woods County.

A high-level system connectivity diagram is provided on the following page.

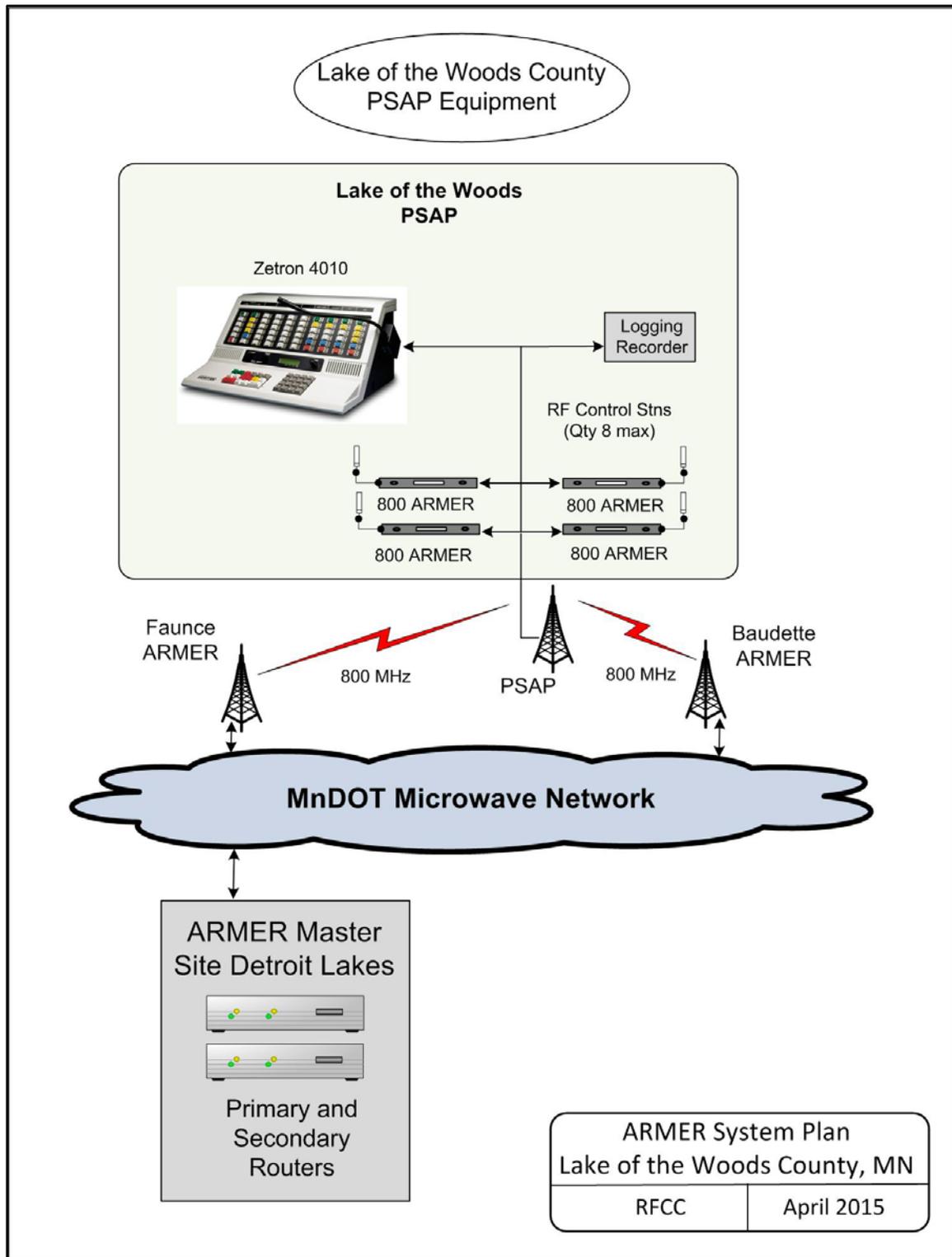
Voice Logging: The dispatch center will continue to use its existing local voice logging recorder for the recording of ARMER and conventional channel radio traffic. A limited number of local ARMER talk groups will be recorded at the PSAP, and will be handled through the local 800 MHz RF control stations.

iv) PSAP Connectivity

Connectivity between the Lake of the Woods County dispatch center and the ARMER system is required for operation of the system talk groups, as well other non-trunked conventional channel resources.

The existing Zetron console, or replacement consoles, are connected to 800 MHz RF control stations located at the county's PSAP. These stations communicate on-channel with the Baudette and other ARMER tower sites.

Lake of the Woods County PSAP ARMER Architecture



v) Subscriber Radios

The 800 MHz subscriber (mobile and portable) radio inventory planning work conducted with Lake of the Woods County agencies has identified the following maximum estimated quantities of radios to be utilized on the system:

Agency Type	Mobile	Portable	Base
Law Enforcement	8	9	9
Fire/EMS	9	18	3
Public Works	4	4	0
Schools/Other	2	2	0
Totals	23	33	12

A total of 68 mobile, portable and control base radios would be implemented in the system, if all agencies purchase or obtain the radios identified within this plan. This includes the total potential for three year growth for the agencies within the county. The county agencies currently have a total of 12 radios on hand, which are now being used on the ARMER system. A detailed breakdown of Lake of the Woods County's mobile, portable, and VHF radio pager inventory requirements and cost estimates is provided on the next page. Agencies throughout the county will be able to use this opportunity to purchase and implement standard radio types for use within the system, which will promote user commonality and interoperability between the various agencies.

**Lake of the Woods County MN
800 MHz Radio Inventory and Cost Data**

Total of 800 MHz Mobile and Portable Radio Equipment Required for System Implementation											Totals
Agency	Dual Band Mobile @ \$6,000	Mid-Tier Mobile Radios w/DES @ \$4,000	Mid-Tier Mobile Radios no DES @ \$3200	Mid-Tier Mob Radios Dual Control @ \$3800	Dual Band Portable @ \$6,000	Mid-Tier Port Radios w/DES @ \$3,300	Mid-Tier Port Radios no DES @ \$2500	Low-Tier Mobile Radios @ \$2,150	Low-Tier Portable Radios @ \$1,550	800 Mhz RF Control Stations @ \$6,000	Total Agency Radio Equipment Costs (Maximum)
LoW Co Sheriff (on hand)	5						6				NA
Baudette Police (on hand)							1				NA
Baudette Police (future)			3				2			1	\$ 20,600
Low County 911 Dispatch (on hand)										2	NA
Low County 911 Dispatch (future)										6	\$ 36,000
Law Agency Totals	5	0	3	0	0	0	9	0	0	9	\$ 56,600
Baudette Fire (future)			3						12	1	\$ 34,200
Williams Fire (future)			4							1	\$ 18,800
Lake of the Woods Ambulance (future)				2							\$ 7,600
Roosevelt 1st Responders (future)								6			\$ 9,300
Lakewood Health Center (future)										1	\$ 6,000
Fire/EMS Agency Totals	0	0	7	2	0	0	0	0	18	3	\$ 75,900
LoW County Highway Dept								2	2		\$ 7,400
LoW Public Works (future)								2	2		\$ 7,400
LoW School District (future)								2	2		\$ 7,400
Public Works Agency Totals	0	0	0	0	0	0	0	6	6	0	\$ 22,200
GRAND TOTALS	5	0	10	2	0	0	9	6	24	12	\$ 154,700
Total Quantity of Radios:	68										

vi) System Talk Group Planning and ID Requirements

The Fleetmap for Lake of the Woods County has a total of 32 talk groups, which was developed based on the needs of the county agencies.

In addressing the talk group needs for the county agencies, the following basic outline will be used:

- Primary and secondary dispatch talk groups for law enforcement
- Primary and secondary dispatch talk groups for fire service
- Primary and secondary dispatch talk groups for EMS service
- Individual dispatch talk groups for non-traditional public safety agencies
- Countywide talk groups for special events
- Countywide talk groups for interoperability
- Individual talk group(s) for each participating agency

Refer to Attachment I for a copy of the preliminary Lake of the Woods County fleet map.

A total of 68 ARMER system IDs are expected for the Lake of the Woods County implementation, which includes three year estimated totals:

- 60 for mobile and portable subscriber units total expected on the system for all agencies
- 8 for PSAP operations

vii) 800 MHz Traffic Loading and Frequency Planning

The ARMER system sites within Lake of the Woods County will operate in a trunked multicast mode of operation. The state has planned for a group of five 800 MHz frequency pairs to be implemented at each site, and these channels will be shared by all users of the system/sites in the area. These users will include:

- Lake of the Woods County agency users
- Neighboring county agency users
- State of Minnesota and Federal agency users

The county recognizes that in a trunked radio system it is important that the tower sites be established with a sufficient number of 800 MHz channels to ensure that all radio users are able to access the system when needed for both routine and emergency radio communications traffic. However, a balance must be established between providing a sufficient number of channels and the cost of implementing those channels, as well as the increasingly limited number of 800 MHz frequencies available for the channels.

With a maximum radio inventory of 68 local radio units planned for this system, it is expected that the planned five channels will be sufficient at the Lake of the Woods County ARMER sites.

When neighboring county and state radios are added to this total, it is possible that a greater number of channels would be needed at the sites. To better calculate the expected traffic loading the Lake of the Woods County radio would have on the local tower sites, the industry-standard Erlang-C process has been used in this plan to determine the expected voice traffic on the ARMER system. This process can be used for both telephone and radio networks, where a shared and limited number of communications paths (trunks) are used to handle the voice traffic.

A full discussion of how this process works is beyond the scope of this plan; however, several critical factors are used to determine the expected radio traffic usage of the tower sites:

- Number of local (Lake of the Woods County) radios
- Number of neighboring county agency radios that are likely to use any given tower site
- Number of State of Minnesota agency radios that are likely to use the sites
- Number of 800 MHz radio channels available at the site(s)
- Estimation of how many radios are in use/service at a point in time
- Average radio transmission length of time (in seconds)
- Average expected number of transmissions from the radios (per hour)

When these radio inventory and usage parameters are entered into the Erlang calculation formula, a resulting Grade of Service (GOS) parameter is generated, indicating the calculated or expected availability of the radio system channels for the radio users. This GOS number could also be viewed as a “likelihood of getting a busy signal” when pressing the transmit button on a radio. The lower the number, the better GOS.

Public Safety Wireless Network (PSWN), the governmental agency which establishes operational standards and recommendations for public safety radio communications, has established a minimum GOS for these radio systems at “equal or less than two percent.”

In other words, there should be less than a two percent chance that a radio user’s transmission would be blocked by the system due to radio traffic levels. This could also be viewed as “greater than 98 percent” chance of a radio user’s transmission being properly handled by the system when needed. This two percent GOS is considered a “Standard Busy Hour” level of usage. It should be noted that many agencies have elected to move beyond the PSWN recommendation and a common goal in Public Safety today is a GOS of 1 or better.

The parameters used for the Lake of the Woods County radio traffic calculations are as follows:

- Quantity 68 Lake of the Woods County radios (three year maximum)
- Quantity 80 neighboring county radios (interoperability use in Lake of the Woods County)
- Quantity 100 State of Minnesota and Federal agency radios
- 33 percent estimate percentage of how many radios are in use/service at one time
- 8 seconds average radio transmission length of time (in seconds)
- .51 average expected number of transmissions from the radios (per hour)
- 1.5 seconds average busy time (in seconds)

The GOS is then calculated for each site, based on the number of radio channels planned for the sites, to show the impact of the differing number of channels that would be implemented at the sites.

This formula does not necessarily incorporate any parameter for the number of talk groups being planned for use by the local county agencies. The number of talk groups can have a dramatic effect on system loading, as the larger the number of talk groups, the greater potential for spreading the traffic among the RF channels. Nonetheless, it remains the most reliable method for calculating radio traffic levels.

The table shown below contains the predicted 800 MHz radio channel and tower site traffic loading for typical operational radio activity for the sites that are located within Lake of the Woods County, based on the parameters in the previous data table:

Predicted 800 MHz Standard Voice Channel Traffic Loading for Lake of the Woods County

Site and GOS	Number of Voice Channels Normal Conditions			
	1	2	3	4
Baudette	18.6%	1.5%	0.1%	0.0%
Faunce	15.6%	1.1%	0.1%	0.0%
Carp	15.6%	1.1%	0.1%	0.0%
Lude	11.7%	0.6%	0.1%	0.0%
Roosevelt	23.3%	2.3%	0.2%	0.0%

One channel at each site is allocated as the Control Channel, which is not used for voice and not reflected in the table above. As shown, a GOS of better than one percent is achieved with two or three channels per site (highlighted in yellow), less than the total quantity being installed by the state at each of the county sites. This would indicate that no additional channels should be needed at the county sites.

The above calculations are again based on the PSWN “Standard Busy Hour” calculations, and do not account for the increased traffic loads that would be expected during emergency periods (tornado, large fire, multiple events). PSWN has established a recommendation of an additional 20 percent capacity for

these events. Refer to the following table for the predicted ARMER system traffic loading and GOS for the Lake of the Woods County sites when the PSWN 20 percent additional emergency operations data is incorporated into the usage calculations.

Predicted 800 MHz Voice Channel Traffic Emergency Loading for Lake of the Woods County

Site and GOS	Number of Voice Channels Emergency Conditions			
	1	2	3	4
Baudette	36.2%	5.2%	0.5%	0.0%
Faunce	35.4%	5.0%	0.5%	0.0%
Carp	35.4%	5.0%	0.5%	0.0%
Lude	28.8%	3.4%	0.3%	0.0%
Roosevelt	46.6%	8.2%	1.1%	0.1%

As shown, three voice channels are adequate to maintain the minimum recommended GOS during emergency traffic periods at all sites. The State of Minnesota will be implementing four voice channels at all sites, so no additional channels should be needed at the ARMER sites. Based on the limited number of radios and talk groups planned by Lake of the Woods County agencies, it appears that Lake of the Woods County’s implementation will have not a significant impact on the system loading at the system sites, and should not be a factor requiring additional RF channel capacity. This also includes additional future capacity for the local sites in the event that other governmental agencies (schools, transportation) elect to join the system in the future.

The State of Minnesota has obtained the 800 MHz frequency assignments for the basic five channel configuration needed for the five tower sites within Lake of the Woods County. The table on the following page is the current available 800 MHz frequency data for the Lake of the Woods County ARMER tower sites. The channels listed as “Lake of the Woods Co.” have been assigned to Lake of the Woods County via the state’s 800 MHz NPSPAC channel plan, and while they have not yet been assigned to a specific site, they could be used for the system at some point.

800 MHz Frequency Assignments for ARMER Sites in Lake of the Woods County

Site	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
Lake of the Woods County	55	120	199	219	NA
Baudette	24	34	64	185	PS
Faunce	60	128	148	167	221
Lude	4	80	182	224	PS
Carp	132	146	172	183	223
Roosevelt	14	145	189	201	PS

(PS = Public Safety/Non-NPSPAC channels)

viii) Legacy VHF Equipment

The county will continue to operate and control a number of existing or updated VHF radio system channels, for local paging and interoperability. Emergency paging for fire and EMS operations is currently conducted via county-owned VHF system(s). These existing systems will be retained and modified or expanded as needed for improved paging coverage. This expansion could include the installation of some equipment at ARMER tower sites for improved coverage and reliability.

In addition, the existing law enforcement VHF repeater channels may be utilized for local interoperability between VHF and 800 MHz radio system users.

B. Coverage Review

i) Design Parameters

The overall system design and resulting communications coverage of the ARMER system can be affected by the following goals and concerns:

- Desire to obtain in-building coverage as best as possible in more densely populated areas of the county
- Need to cover the geographic area with a reasonable number of tower sites
- Cost of developing new tower sites, including structures, land acquisition, Federal Aviation Administration (FAA)/FCC/National Environmental Policy Act (NEPA) considerations, as well as local zoning
- Availability of and costs associated with existing and planned tower sites

The existing and planned tower sites planned for this project are being provided by the State's ARMER network. The coverage goal for Lake of the Woods County is 95 percent "on-the-street/outdoor" reliability to a portable radio with a standard antenna held at a height of five feet above ground level.

ii) Coverage Propagation Mapping

In the planning for this project, coverage modeling and propagation analysis was done to determine if the basic tower site planning assumptions were valid and could be expected to result in a system that would meet Lake of the Woods County’s coverage needs.

These coverage maps were generated with the RadioSoft© ComStudy2© software program. The modeling for the coverage analysis was done with both the Okumura and Longley-Rice propagation models. The coverage maps were done for portable talk-in and talk-out usage, as this is the most difficult coverage scenario. If the basic system design shows the portable goals are attainable, then mobile coverage should not be a concern.

Provided below are the parameters used for the coverage modeling:

Site Parameters	Value
Transmit Antenna Gain	9 db, omnidirectional
Transmit Output Power (into main line)	35 watts
Transmission Line Size (tower over 300 feet)	1.25 inch Heliax®
Transmission Line Size (tower under 300 feet)	7/8 inch Heliax®
Transmission Line Length	Based on tower height
Receive Antenna Gain	9db, omnidirectional
Receive Tower Top Amplifier Gain	5db
Receive Transmission Line Size	7/8 inch Heliax®
Receive Transmission Length	Based on tower height
Field Unit Parameters	Value
Type of Unit	Portable radio
Environment	Outdoors, on-street
Antenna Height	5 feet
Transmit Power	3 watts

Preliminary coverage maps for portable radio talk-in and talk-out are shown on the following pages. The color coding for these maps is:

- Light Green: Reliable signal coverage 40 dBu or greater
- Yellow: Reliable signal coverage 33 dBu or greater
- Red: Marginal signal coverage 19 dBu or greater
- White: No useable coverage expected 10 dBu or less

Five predicted-coverage maps are provided in this plan; all maps utilize all tower sites within and outside of the county that provide coverage in the target service area:

1. State of Minnesota prepared coverage map for Lake of the Woods County (from 2008).
2. Mobile (vehicle-mounted) radio coverage
3. On-Street portable radio coverage
4. In-building countywide coverage
5. In-building coverage in the Baudette area

As shown in the predicted coverage maps on the following pages, the potential coverage for the system, using the selected sites and parameters is very good and is expected to meet the project coverage goals.

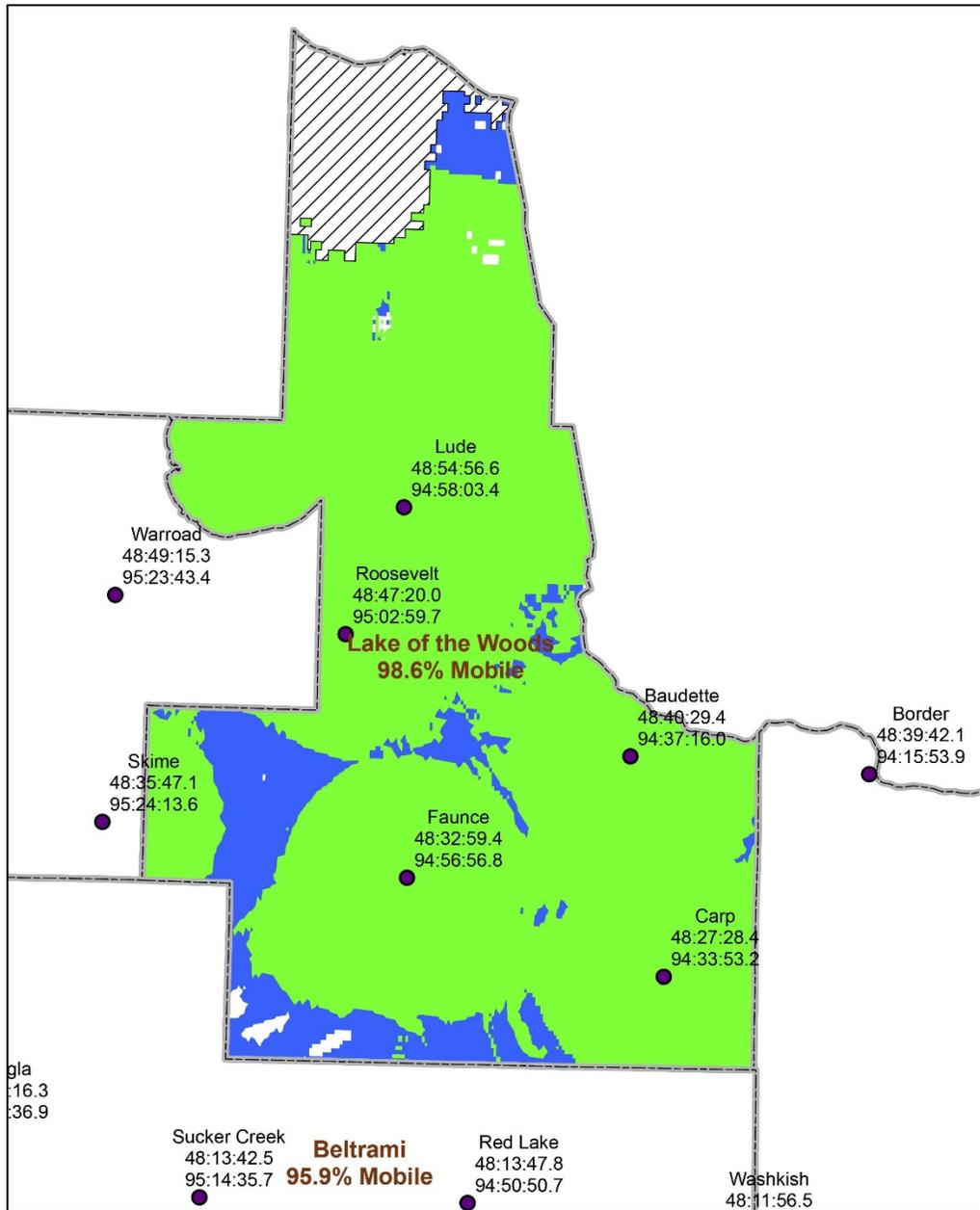
The first map presented in this plan is the original predicted coverage map provided by the State of Minnesota for the Lake of the Woods County geographical area.

All maps were created using RadioSoft© ComStudy2© software program, and the modeling for the coverage analysis was done with the Longley-Rice and Okumura propagation models. The modeling parameters used by the State and RFCC are similar, however a somewhat different color-coding scheme is used. The State's maps use green areas represent a 40 dBu level of radio signal, which can generally be translated into a level where reliable portable and mobile radio coverage can be expected. The areas shaded in blue represent a 33 dBu level of radio signal, which typically reflects mobile (vehicle-mounted) radio coverage.

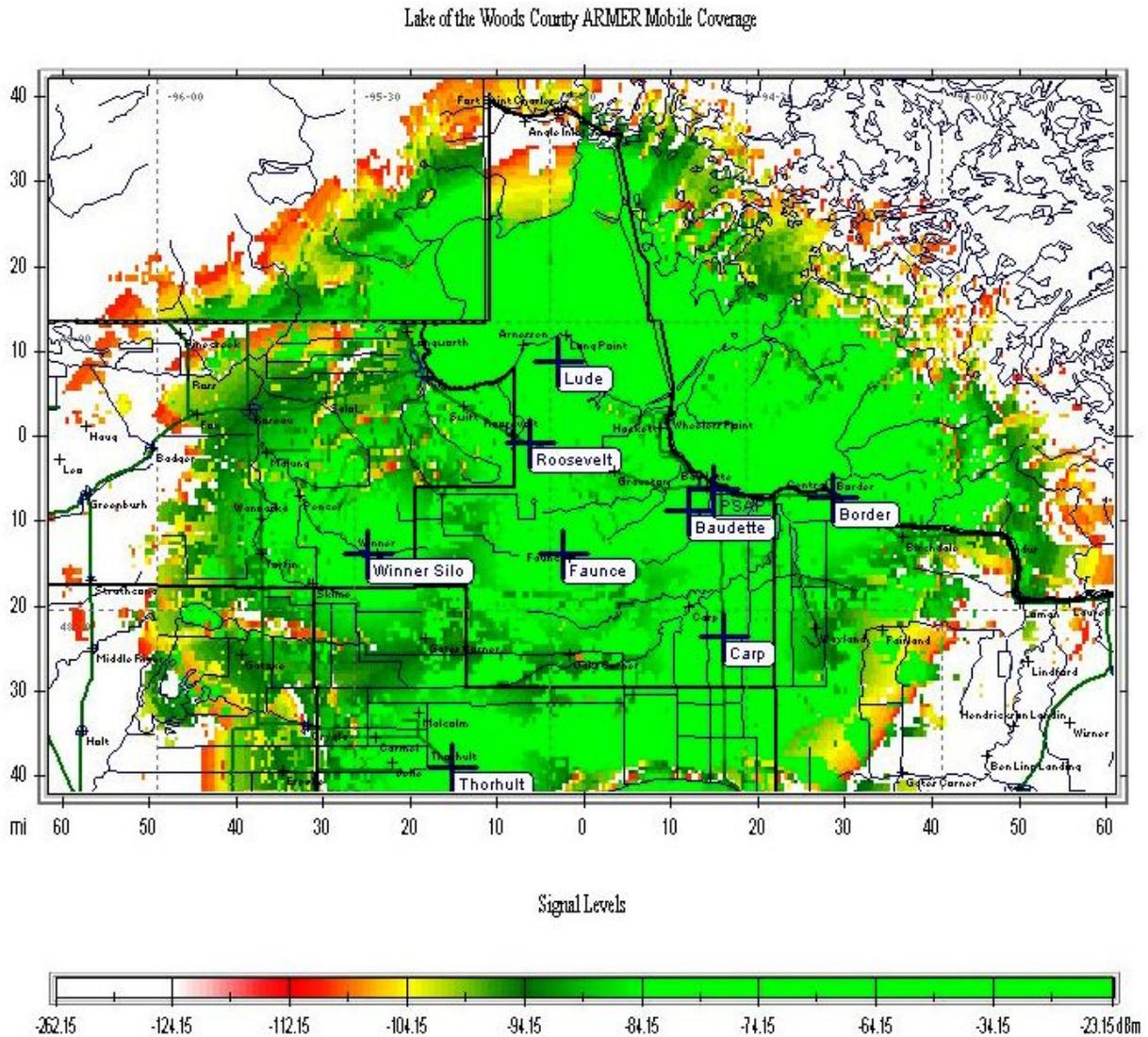
The areas shaded in white reflect a lower level of signal where coverage cannot be predicted, and can be interpreted to represent very weak areas of coverage. The only areas of the county where this is predicted to exist are in the far west and east corner of the county, and are not expected to be problematic.

Map I: Lake of the Woods County Predicted ARMER Coverage

(Originally provided by the State of Minnesota in 2008; this map is provided for reference only, and is considered outdated due the changes in tower site locations that have been established since the time of original publication).

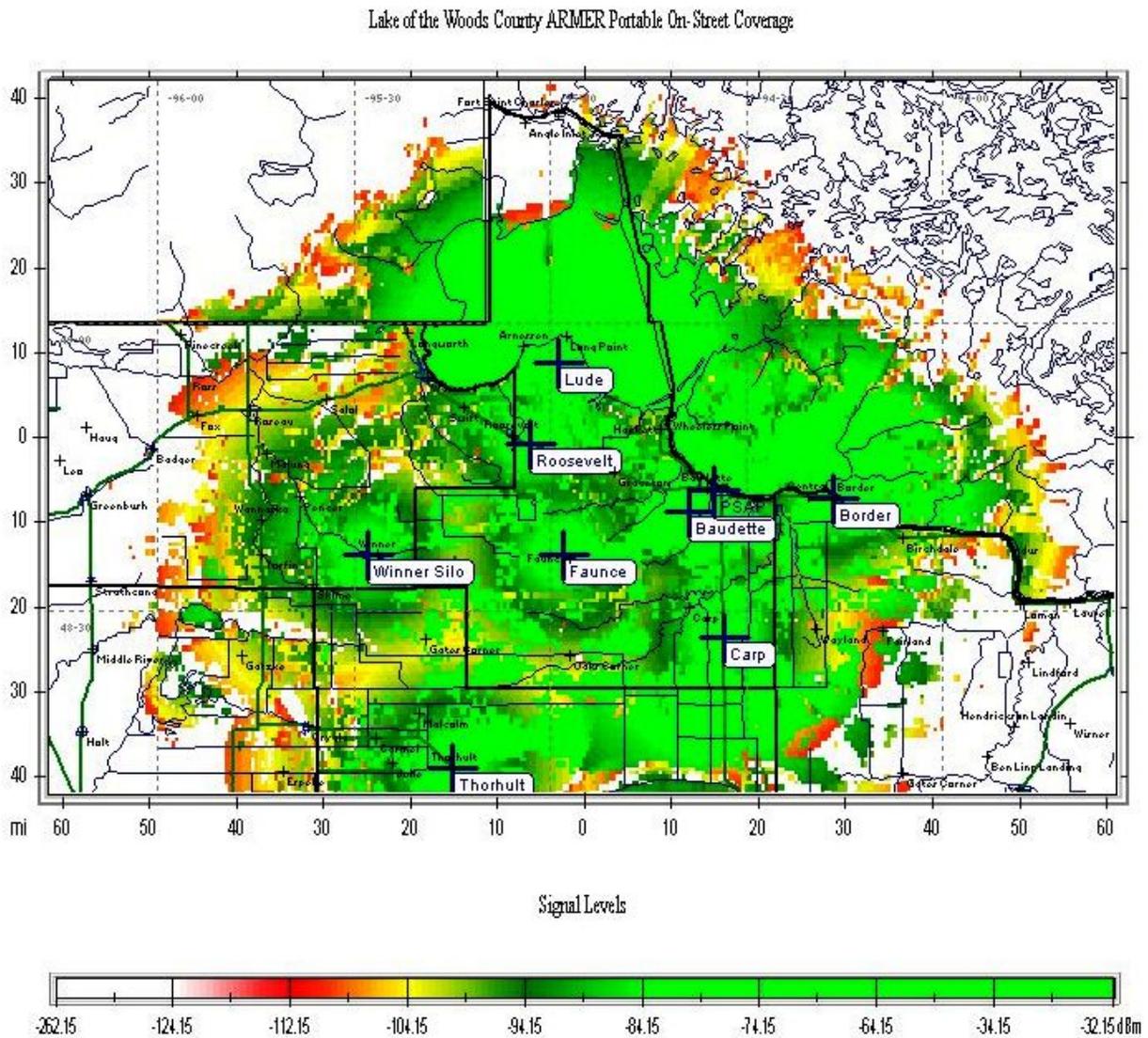


Map 2: The map shown below, prepared by RFCC for the county’s ARMER planning process, demonstrates the predicted coverage to be expected for Mobile (vehicle-mounted) radios from the ARMER tower sites to be located within Lake of the Woods County, including the first-tier sites outside the county borders.



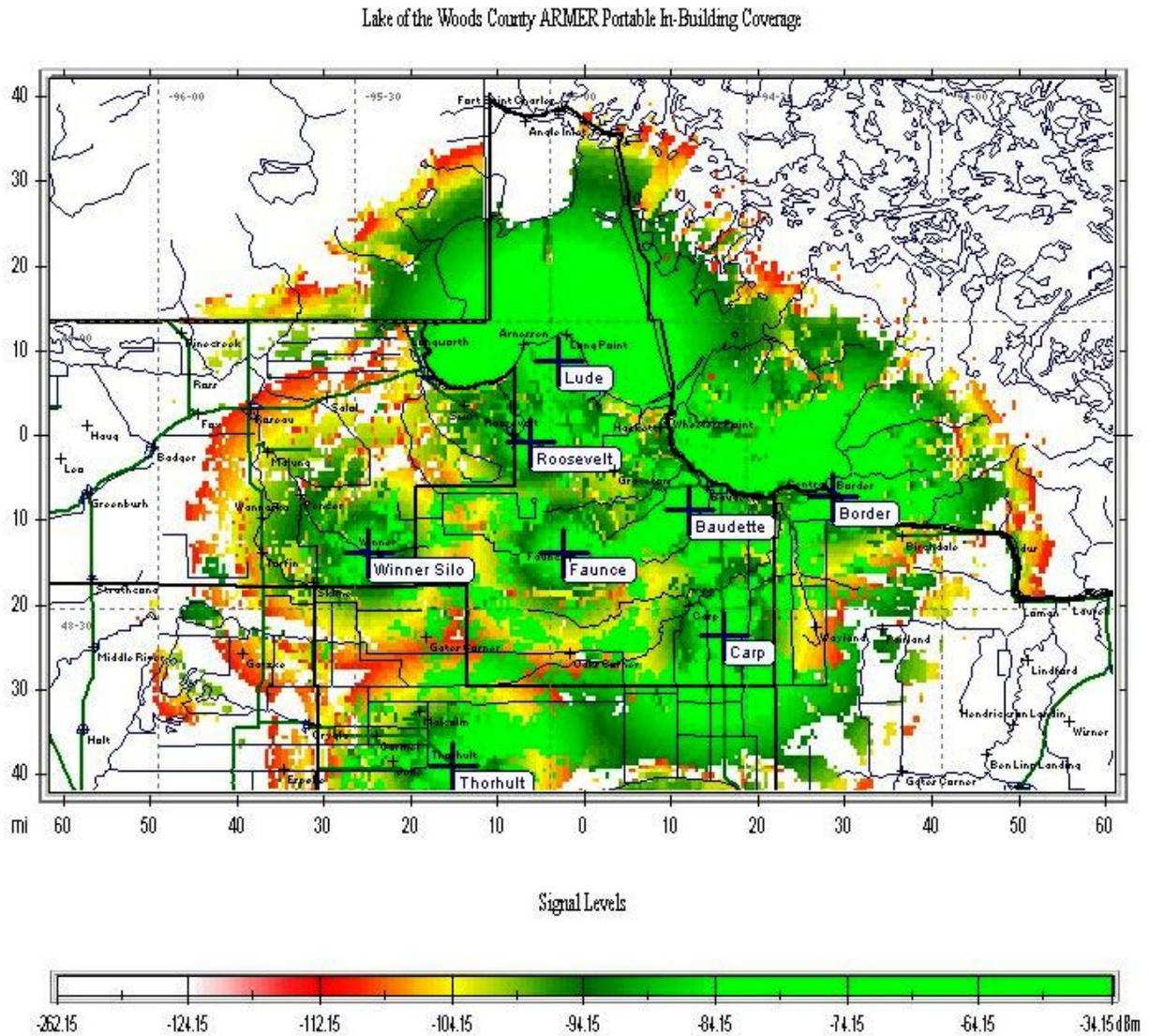
The predicted mobile radio coverage throughout the county is excellent with the planned tower sites, and coverage within the county is enhanced by tower sites outside of the county borders. The only area of concern is up in the far northern area (“Northwest Angle”) of the county.

Map 3: The map shown below demonstrates the predicted coverage to be expected for portable (handheld) radios “On Street/Outdoors” from the ARMER tower sites to be located within Lake of the Woods County, including the first-tier sites outside the county borders.



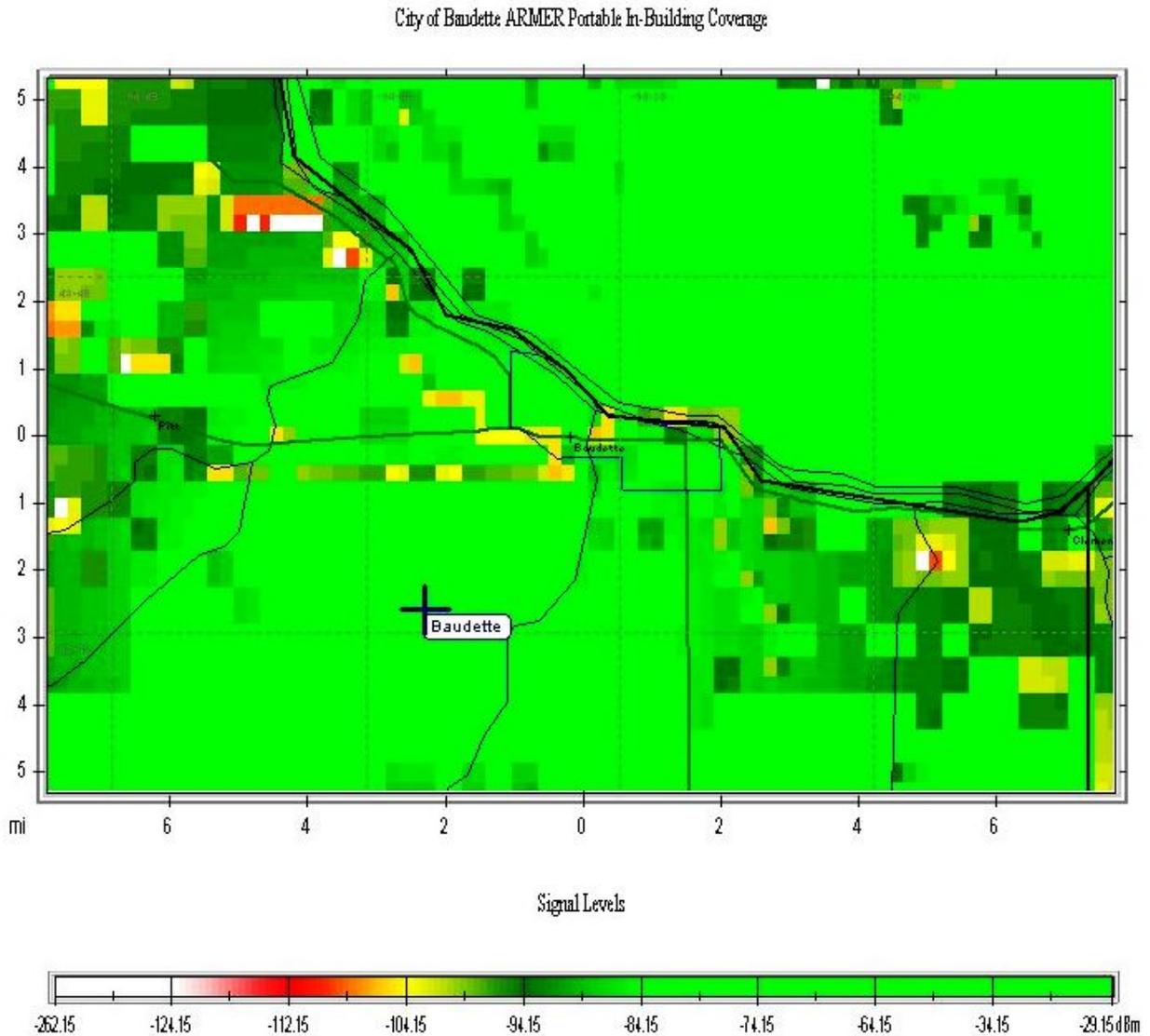
The predicted portable radio coverage throughout most of the county is very good with the planned tower sites, and coverage within the county is enhanced by tower sites outside of the county borders. The primary area of concern again is the Northwest Angle; testing has been conducted with portable radios, with the results confirming the poor coverage as predicted on the map.

Map 4: The map shown below demonstrates the predicted in-building (6db loss) coverage to be expected for portable/hand held radios in Lake of the Woods County from the ARMER system when all tower area sites in the region are included in the calculations.



The predicted 6db in-building coverage for Lake of the Woods County is good in many areas, including the city of Baudette. Refer to the map on the next page for more detail of the predicted coverage in the Baudette area. County deputies have observed good in-building coverage in some areas, and poor coverage in others. No coverage is provided in the Northwest Angle.

Map 5: This map demonstrates the predicted in-building (6db loss) portable radio coverage to be expected in the Baudette area from the ARMER system when all tower area sites in the region are included in the calculations.



The blue lines on the map indicate the city limits of Baudette, and the dark blue lines indicate highways and main roads. The predicted in-building coverage should be good within the city, although this will depend on the type of building involved. Recent coverage testing has shown good results in wood-framed residential structures, but weaker signal conditions and coverage in higher-density buildings such as the high school.

C. Contingency Planning

In planning for ARMER system migration and connecting to the ARMER system the following failure modes are being addressed:

1. Loss of connectivity between the dispatch center and the ARMER system.
2. Loss of microwave network (to ARMER tower sites), which will result in the system reverting to site trunking mode.

The primary method of redundancy for Lake of the Woods County operations will be the implementation of multiple 800 MHz RF control stations at the main PSAP location. This would typically include one control station for each primary public safety discipline, such as:

- Law operations
- Fire operations
- EMS operations

Scenario 1 would only occur if multiple RF control stations failed at the PSAP, or the console controlling the stations failed. A separate stand-alone RF control station in the PSAP would be used for dispatch operations if this situation occurred.

If scenario 2 occurs, (local ARMER sites lose connectivity to the master site in Detroit Lakes, or the master site experiences a failure), the sites will revert to a Site Trunking mode, which results the sites operating independently from each other. The effect on field units is that they can only communicate with each other if they are in range of the same tower site. If they are not, communication is not possible. This is due to the local sites and network operating in a multicast mode of operation (rather than simulcast).

The resulting effect on the dispatch center is the same; however, the County will program one or more RF control stations for backup “Site Trunking” operation, which will allow access to at least some of the local tower sites in the county. It is unlikely that the dispatch center would be able to access the Roosevelt or Lude tower sites, due to the dispatch from the dispatch center, but Baudette, Faunce and Carp should not be a problem.

D. Training

ARMER system implementation and associated operational standards require that all personnel who will be using the system receive proper training on the use, capabilities, and features of the system. Trunked radio systems, including the ARMER system, have operational requirements that differ from traditional conventional repeater systems, and it is necessary that dispatchers and end users be trained on the capabilities and proper operation of the system.

Lake of the Woods County agencies recognize this need, and have conducted initial in-house training for the current radio system users. Additional training is planned through the services of independent contractors recognized by the state as proficient in the operation of the ARMER radio system. The program will include training for the following workgroups and functions:

- Radio end user training
- PSAP dispatchers
- Local system administrator
- Interoperability

Funding for the end user and dispatcher training has been included in the project budget.

E. Interoperability

The need for interoperability exists on multiple levels within public safety radio operations. Establishing or enhancing interoperability at each of these levels has been a primary consideration in Lake of the Woods County's decision to migrate to the ARMER system. The areas specifically addressed are:

Internal: Between the many agencies within the general jurisdictional area of Lake of the Woods County (i.e. law enforcement, fire service, and EMS agencies). The implementation of a common 800 MHz trunked radio system for all public safety agencies, as well as other units of local government, should resolve most interoperability communications issues that may currently exist. To make the ARMER system work effectively will require careful fleet map planning and the proper training of all radio system users.

External: Between the county agencies and other public safety (law, fire, and EMS) and government agencies operating both within and sharing borders with Lake of the Woods County, to include the following:

- Roseau agencies
- Beltrami County agencies
- Koochiching County agencies
- Minnesota State Patrol, Mn/DOT, Department of Natural Resources (DNR) enforcement, and fire agencies
- Border Patrol and other Federal law enforcement and fire agencies
- Canadian public safety agencies

Many agencies within the Northwest Region of Minnesota have been moving forward with the ARMER participation planning and implementation process, which will improve communications interoperability for those agencies. Lake of the Woods County is currently bordered by county agencies operating both on 800/ARMER and VHF systems, which will require a combination of solutions to ensure reliable communications between all agencies in the region, regardless of radio system type. Lake of the Woods County will have neighboring agencies operating on both types of systems for the foreseeable future.

To accommodate communications between agencies that may operate with Lake of the Woods County that are not on the ARMER system in the short-term using legacy system technology, access to the ARMER radio system, a variety of interconnectivity options will be needed:

- The most basic requirement will be for Lake of the Woods County to continue operation of their VLaw31 155.4750 MHz base station. This can be patched to an 800 MHz talk group via the PSAP console system when required.
- All Lake of the Woods County Law Enforcement agencies use dual-band radios, capable of both VHF and ARMER/800 MHz operations.
- Lake of the Woods County Fire and EMS agencies will maintain the use of VHF radios in their vehicles, in conjunction with the eventual use of ARMER/800 MHz radios.
- Lake of the Woods County repeater channels will be retained, and will become local “interoperability” channel resources, capable of being patched to the ARMER system, to allow local VHF radio users a simple and effective link to county agencies operating on the ARMER system.

F. Standards

The primary technology standard applied to this project is that of the Project 25 (P25) ARMER system. The P25 standard is specifically for digital radios systems for public safety. In this case, the Phase I Frequency Division Multiple Access (FDMA) standard is currently in use.

Lake of the Woods County will adopt and comply with the standards published by both the State Radio Board and the Northwest Minnesota Regional Radio Board. Use of these standards will ensure that users in Lake of the Woods County will adopt the same naming conventions, talk group usage, and other operational and technical standards that are in use throughout the state.

G. Alarms and Monitoring

Mn/DOT – ARMER will have the primary tower site alarm monitoring for sites in the county.

H. Maintenance

Maintenance of the primary ARMER tower sites within Lake of the Woods County will be handled by the Mn/DOT staff. Lake of the Woods County currently contracts with a local authorized service facility for maintenance of any additional 800 MHz system equipment planned for the Lake of the Woods County implementation, including the PSAP equipment.

I. System Administration

Local system administration for Lake of the Woods County will be the responsibility of the Lake of the Woods County Sheriff's Office.

J. Other Local Enhancements

The primary local enhancements to the planned system implementation are:

- VHF interoperability systems

No other tower site or 800 MHz channel expansion local enhancements are planned for the system.

3. Project Costs and Budget

Funding for the purchase of the ARMER system equipment for Lake of the Woods County is being considered from three different sources:

- Local bonding
- Local levy
- Grant opportunities

Grant funding has been received for the purchase of the existing 800 MHz mobile and portable radios for law enforcement agencies in the county. Funding for the remaining system infrastructure equipment has not yet been finalized, but is being reviewed by the county and considered for year 2015 or beyond.

Project Cost Estimates:

Item/Category	Estimated Costs
Zetron Console Modifications	\$ 15,000
800 RF Control Stations (Dispatch)	\$ 36,000
800 MHz Subscriber Radios (Law Enforcement)	\$ 20,600
800 MHz Subscriber Radios (Fire agencies)	\$ 75,900
Total Estimated Costs	\$ 147,500
Optional: Public Works/School Radios	\$ 22,200

4. Project Implementation

A. Schedule

Implementation of the ARMER radio network for an organizational group the size of Lake of the Woods County, with the number of agencies, quantity of radios being planned and dispatch equipment would typically be expected to require 6 to 12 months to complete.

However, Lake of the Woods County law enforcement has migrated to ARMER system use over the past year, and the Law agency radio operations are now conducted via the ARMER system. The county agencies will continue to seek the funding needed to obtain the remaining ARMER-capable mobile and portable radios needed for Fire agencies. The County is also considering replacement of the existing Zetron radio dispatch console with a newer product, but will continue the use of 800 MHz RF control stations.

The County will continue to utilize their existing VHF radio systems over the next few years, and will retain such equipment as needed for Interoperability purposes. The PSAP console equipment is configured to operate both systems (legacy VHF and ARMER).

Attachment I: Lake of the Woods County Fleet Map

	Law Enforcement Operations	TG Alias
1	Lake of the Woods County Law 1 (main)	LW Law 1
2	Lake of the Woods County Law 2	LW Law 2
3	Lake of the Woods County Law 3 Encrypted	LW Law 3E
4	Lake of the Woods County Law Car-Car	LW L C2C
5	Lake of the Woods County Law Admin	LW L ADM
6	Baudette Police Department	LW BPD
7	Lake of the Woods County Emergency Mgmt/EOC	LW EM/EOC
	Fire and EMS Operations	TG Alias
8	Lake of the Woods County Fire 1 (main)	LW Fire 1
9	Lake of the Woods County Fire 2	LW Fire 2
10	Lake of the Woods County EMS (main)	LW EMS
11	Lake of the Woods County Baudette Fire TAC	LW BFD TAC
12	Lake of the Woods County Williams Fire TAC	LW WFD TAC
13	Lake of the Woods County Ambulance/EMS TAC	LW EMS TAC
14	Lake of the Woods County Fire/EMS Admin	LW F/E ADM
15	Lake of the Woods County SRU/Rescue	LW SRU
	Local Interoperability	TG Alias
16	Lake of the Woods County Announcement Group	LW ANN ALL
17	Lake of the Woods County Emergency Button	LW EMER
18	Lake of the Woods County 911	LW 911
19	Lake of the Woods County Statewide Roam	LW SW ROAM
20	Lake of the Woods County Public Safety Common 1	LW COM 1
21	Lake of the Woods County Public Safety Common 2	LW COM 2
22	Lake of the Woods County Public Safety Common 3	LW COM 3
	Public Works and Schools	TG Alias
23	Lake of the Woods County Highway Operations 1	LW HWY 1
24	Lake of the Woods County Highway Operations 2	LW HWY 2
25	Future Public Works 1	LW PW 1
26	Future Public Works 2	LW PW 2
28	Lake of the Woods School Security	LW SCH SEC
29	Lake of the Woods County School Transportation 1	LW School 1
30	Lake of the Woods County School Transportation 2	LW School 2
31	Lake of the Woods County Future Use 1	LW Future 1
32	Lake of the Woods County Future Use 2	LW Future 2

All regional and statewide interoperability talk groups will be incorporated into Lake of the Woods County radios as defined by ARMER standards.

Attachment 2: References

1. State of Minnesota “Local Agency and Regional Planning and Contracting for ARMER Participation” (sic) dated September 8, 2008, as published at www.srb.state.mn.us
2. Federal Engineering “Radio System Needs Assessment and Alternatives Report for Lake of the Woods County” October, 2009
3. RadioSoft™ ComStudy2™ Terrain Database
4. ARMER Status Map, as posted at <http://www.srb.state.mn.us/> dated March 2015
5. Region 22 (Geographic State of Minnesota) 800 MHz Regional Planning Committee “Regional Band Plan” as filed with the FCC, General Docket 87-112; 800 MHz NPSPAC Plan Amendment WT Docket No. 20-55; NPSPAC PR Docket No 93.130 dated June 2009

**REQUEST FOR SPECIAL
WIDE AREA SITE ACCESS
FOR AN ARMER TALKGROUP**

Talkgroup/ Announcement Group Name(s): Lake of the Woods County Statewide Roam
(LW SW Roam)

If Announcement Group List all Contained Talkgroups: _____

Sites Requested:

- Statewide (Requires Statewide Radio Board Approval)
- Other (Specify Sites or Regions):

Talkgroup Owner Agency (Include Point of Contact Information):

Agency Name: Lake of the Woods County Sheriff's Office
Contact Name: Sheriff, Lake of the Woods County (Gary Fish)
Address: 206 - 8th Ave SE
Baudette, MN 56623
Phone: 218-634-1143
Email: Gary_f@co.lake-of-the-woods.mn.us

Talkgroup or Announcement Group Type (Check all that Apply):

- Shared
- Private
- Special Roaming Only Talkgroup - Occasional Use.
- Special Operations Tactical Talkgroup - Occasional Use. **If yes**, describe or list the counties or regions covered by a mutual aid agreement, memorandum of understanding, joint powers agreement, incident response plan or other relevant agreements here: _____
- Main Dispatch or Tactical Talkgroup - Day to Day Use. **If yes**, applicant must demonstrate that the users of this talkgroup conduct their "Normal Day to Day Business Operations" throughout the requested coverage area. Describe or list the counties or regions where the users of this talkgroup conduct their "Normal Day to Day Business Operations" here: _____

Describe the users, entities or agencies that will operate on this talkgroup:

The "LW SW Roam" talk group is intended to allow Lake of the Woods County public safety agency personnel the ability to contact Lake of the Woods County dispatch when outside of the Lake of the Woods County geographical service area. It may also be used for two Lake of the Woods County public safety personnel to communicate with each other when operating outside of the county geographical area (and outside the operational range of an SOA channel).

Describe the type of operations that will occur on this talkgroup:

The two most common uses of this talk group are 1) Prisoner transports, and 2) Communications between two Lake of the Woods County field units when outside of the county geographical operating area.

Describe the anticipated frequency, duration and extent of use of this talkgroup:

The use of this talk group will be very minimal, perhaps twice a week, primarily for prisoner transport. There will NOT be any routine dispatch or operational traffic on this talk group.

Describe why the Statewide Shared Incident Response talkgroups or other shared roaming talkgroups are not suitable to meet these operational requirements:

It is unlikely that the Lake of the Woods County PSAP would be monitoring the various Statewide Shared Incident Response or Roaming talk groups, and the purpose for which Lake of the Woods County units would need to communicate would not necessarily appear to fit the intended use of those talk groups.

 Jill Hasbungen Olson
Talkgroup Owner Agency Authorized Official - Signature & Date 5/26/2015

Gary Fish, Sheriff – Lake of the Woods County MN
Printed Name and Title



Roseau County, Minnesota

ARMER Radio System Participation Plan

May 2015

I.	Introduction	I
A.	ARMER System Application – Roseau County, Minnesota	1
B.	Project Summary	2
C.	Jurisdictional Coverage of System	2
D.	Entities and Users Participating in the Planned System	2
E.	Existing VHF System Configuration	3
2.	ARMER System Technical Review	4
A.	System Design	4
i)	System Infrastructure and Tower Site Planning	4
ii)	Local Equipment Additions and Enhancements	6
iii)	PSAP Console Planning and Logging	6
iv)	PSAP Connectivity	7
v)	Subscriber Radios	10
vi)	System Talk group Planning and ID Requirements	12
vii)	800 MHz Traffic Loading and Frequency Planning	12
viii)	Legacy VHF Equipment	16
B.	Coverage Review	16
i)	Design Parameters	16
ii)	Coverage Propagation Mapping	17
C.	Contingency Planning	25
D.	Training	26
E.	Interoperability	26
F.	Standards	27
G.	Alarms and Monitoring	28

H.	Maintenance.....	28
I.	System Administration.....	28
J.	Other Local Enhancements	28
3.	Project Costs and Budget.....	29
4.	Project Implementation	30
A.	Schedule.....	30
	Attachment 1: Roseau County Fleet Map	31
	Attachment 2: References.....	33

ARMER Participation Plan

I. Introduction

A. ARMER System Application – Roseau County

Roseau County, Minnesota, and the city and county agencies within the county, request approval for participation in and use of the State of Minnesota Allied Radio Matrix for Emergency Response (ARMER) radio system. The county and its agencies plan to be “Full Participants” in the ARMER system, and will migrate all primary voice communications services to the network, once fully implemented.

The county requests that this application and plan be reviewed and approved by the following agencies:

- Northwest Minnesota Regional Advisory Committee (NW RAC)
- Northwest Minnesota Regional Radio Board (NW RRB)
- State of Minnesota Radio Board Operations and Technical Committee (OTC)

In 2011 Roseau County had submitted a “Limited ARMER Interoperability Plan” which outlined the county’s intent to use both ARMER and VHF radio system resources for the next several years, while updates were being made to their radio networks. Decisions were also being made regarding what level of ARMER system use and involvement were desired by the county. Since that time, all law enforcement operations have migrated to the ARMER system and no longer use VHF, other than for interoperability with neighboring agencies. The fire and EMS agencies within the county now also have some number of ARMER radios, and are slowly migrating to ARMER use.

The plan now being presented replaces the previous plan, and reflects the county’s increased and continued use of the ARMER system. VHF resources will continue to be used for interoperability and voice paging services.

Roseau County’s plan has been developed based on the requirements and operational standards established for participation in and use of the ARMER radio system.¹ The county desires to contract as required with the Northwest Regional Radio Board and the State of Minnesota Department of Transportation (Mn/DOT) for use of the ARMER system once approved.

A list of the local city and county agencies within the county that plan to be included in the use of this system is provided in Section I.D of this planning document.

¹ All endnotes are attached at the end of the report (Attachment 2) under the heading of “References.”

B. Project Summary

Roseau County, Minnesota, and the public safety entities within Roseau County have developed a plan for the migration from existing VHF public safety radio systems currently used by those agencies to the ARMER network. A comprehensive radio system analysis was conducted in 2009, which presented options for either continued VHF radio operations, or a migration to the 800 MHz ARMER system.

The primary goals of a new radio communications system are:

- Provide improved radio system reliability, coverage, and capacity
- Replacement of the existing aging VHF radio system equipment
- Provide expanded county and region wide interoperability between public safety agencies, whether utilizing VHF or 800 MHz radio systems

After a thorough review of the options available, the county has determined that a migration to the 800 MHz ARMER radio system, utilizing the system's multi-site, digital, and Trunking technologies would best meet the county agencies radio communications goals, and will provide the required level of interoperability between public safety agencies in the region.

The primary points of contact for this project are:

Sheriff Steve Gust
Roseau County Sheriff's Office
605 – 5th Ave SW
Roseau, MN 56751
218-463-1421 Phone
steve.gust@co.roseau.mn.us

Rey Freeman
RFCC
13517 Larkin Drive
Minnetonka, MN 55305
952-541-0747 Phone
rfreeman@isd.net

C. Jurisdictional Coverage of System

The radio system is intended to provide radio communications throughout the geographic area of Roseau County, Minnesota. Roseau County is located in the northwest area of Minnesota, covering 1,672 square miles, with a population of 15,629 people. The terrain of Roseau County is relatively flat, with ground elevations ranging from 984 feet in the north western areas to 1,250 feet in the southeastern area.

D. Entities and Users Participating in the Planned System

It is the intent of Roseau County and the agencies within to implement a shared radio system that will incorporate both public safety and additional governmental agencies. The list contains all of the agencies planning to participate in the system at this time.

Participating Public Safety Agencies (11)	
Roseau County Sheriff's Office	Greenbush Fire Department
City of Roseau Police Department	Greenbush EMS
Warroad Police Department	Roosevelt First Responders
City of Roseau Fire Department	Warroad Fire Department
Roseau EMS	Wannaska First Responders
Badger Fire Department	
Participating Public Works and School Departments (2)	
Roseau County Highway Department	Roseau School District

E. Existing VHF System Configuration

The existing Roseau County voice radio systems operate on VHF (150-160 MHz) frequencies, providing radio channels for law enforcement, fire, and Emergency Medical Service (EMS)/ambulance operations. The dispatch center is physically located at the Roseau County Sheriff's Office in the city of Roseau, Minnesota.

The existing Roseau County radio system consists of multiple VHF base and repeater stations located at tower sites around the county. The following primary tower site(s) are used for the Roseau County system.

- Roseau County Sheriff's Office

All radio equipment located at the tower or other remote sites is controlled from the dispatch center via in-house telephone circuits or VHF radio links. The primary VHF radio system infrastructure equipment used by the county is a variety of newer Harris base and repeater stations. Most stations are in good operating condition, and are operating on narrowband (12.5 kHz) radio frequencies. A 2-position Zetron 4048 PC-based radio control console is used in the Roseau dispatch center.

The radio system consists of separate VHF channels and base/repeater stations for Sheriff/law, and fire/EMS operations, which are located at the tower site(s) noted above, as well as at various fire halls throughout the county. The Sheriff/law radio network consists of multiple law repeater channels and sites, along with local Minnesota Statewide Emergency Frequency (MNSEF/VLaw31) and point-to-point stations. The fire/EMS radio networks consist of multiple independent stand-alone base stations located at various tower sites around the county, which also provides tone-and-voice paging capabilities. The radio users and dispatchers manually select the proper tower site based on the radio or service location.

2. ARMER System Technical Review

A. System Design

During the local ARMER system implementation planning process, work was done to determine what type of configuration would be appropriate for the Roseau County radio system. Since the basic structure of the ARMER system as a multicast digital trunked radio system will meet the needs of Roseau County agencies, they plan to utilize the system in this planned multicast configuration.

Primary planning factors:

- System infrastructure and equipment plans
- Tower site planning
- Tower site and Public Safety Answering Point (PSAP) connectivity
- 800 MHz channel requirements
- 800 MHz talk group requirements
- Quantity of end user radios

Specific details of how these system parameters will be addressed are provided in this section of the document.

i) System Infrastructure and Tower Site Planning

The ARMER system plan that exists for the Roseau County area includes four tower sites within the county borders, as well as additional sites outside the county borders that will provide some level of coverage within the county. The following sites are planned for within Roseau County:

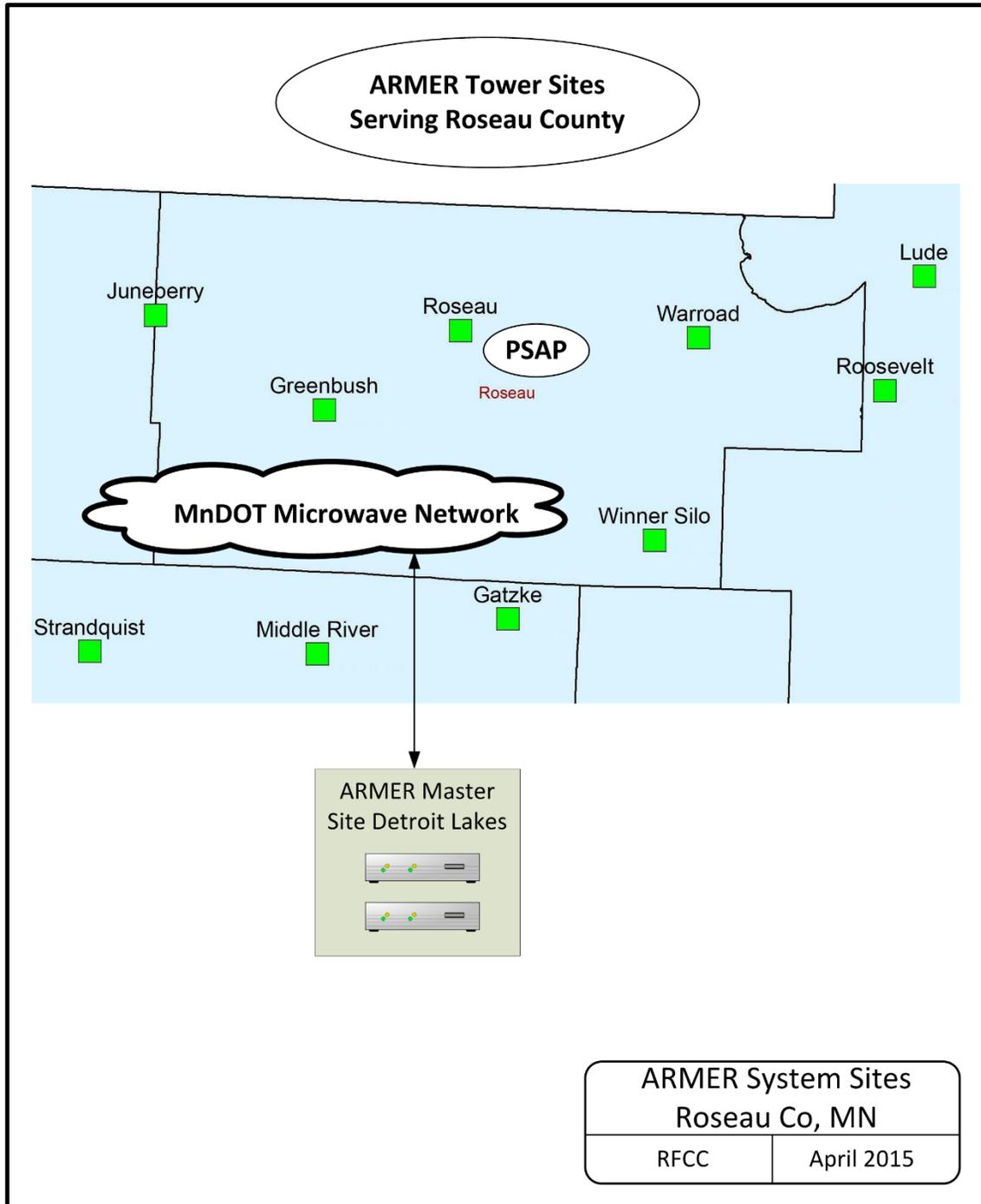
Roseau	Greenbush	Warroad	Winner Silo
--------	-----------	---------	-------------

The following sites are located outside of but on or near the county border and will provide coverage within Roseau County:

Juneberry	Middle River	Gatzke
Roosevelt	Lude	Strandquist

Refer to the diagram below for a high-level overview of the ARMER tower site details for the proposed system implementation for Roseau County.

Roseau County ARMER System Tower Site Architecture



ii) Local Equipment Additions and Enhancements

The ARMER planning study conducted for Roseau County determined that no additional local enhancement, tower sites (coverage), or channel capacity are required or planned. The ARMER tower sites in Roseau County and surrounding areas have demonstrated a high level of reliable coverage for the county's agencies, based on use over the past year, and no additional tower sites are planned. Refer to Section B of this plan for a review of 800 MHz coverage.

A review of the number of radios planned for use in Roseau County, along with the number of talk groups, in conjunction with current and expected radio traffic levels was conducted to determine if any additional 800 MHz channel capacity will be needed at the local ARMER tower sites. Considering these factors, and the resulting traffic loading calculations included in this ARMER Plan, no channel expansion should be needed at the ARMER sites serving the county. Refer to Section A. vii) of this plan for a review of calculated 800 MHz channel traffic loading.

iii) PSAP/Dispatch Center Equipment and Logging/Recording

The Roseau County dispatch center currently utilizes a two-position Zetron 4048 PC-based radio console control system. This console system is now connected to the county's existing VHF system equipment, as well as eight (8) 800 MHz RF control stations, for use on local Roseau County, NW Region talk groups, as well as selected statewide talk groups.

Roseau County is including a two-phased approach for PSAP console equipment in this ARMER participation plan:

Phase 1 of the implementation plan, which is their current configuration, will retain the existing Zetron 4048 console equipment and eight 800 MHz RF control stations for access to the local, regional and statewide talk groups available to Roseau County. It is expected that this configuration will be used for the next two to three years.

Phase 2 of the implementation plan, which is being considered as a long-term option (dependent on funding), will replace the existing Zetron consoles with a new Motorola MCC7500 3-position console system for use with the ARMER system. The county would notify the Region, State and OTC at the time the Phase 2 transition was being planned.

A total of 20 Conventional Channel Gateway (CCGWs) ports are being planned for the Phase 2 (MCC7500) implementation.

High-level system connectivity diagrams are provided on the following pages.

Voice Logging: The dispatch center will continue to use its existing local voice logging recorder for the recording of ARMER and conventional channel radio traffic. A limited number of local ARMER talk groups will be recorded at the PSAP, and will be handled via local 800 MHz RF control stations.

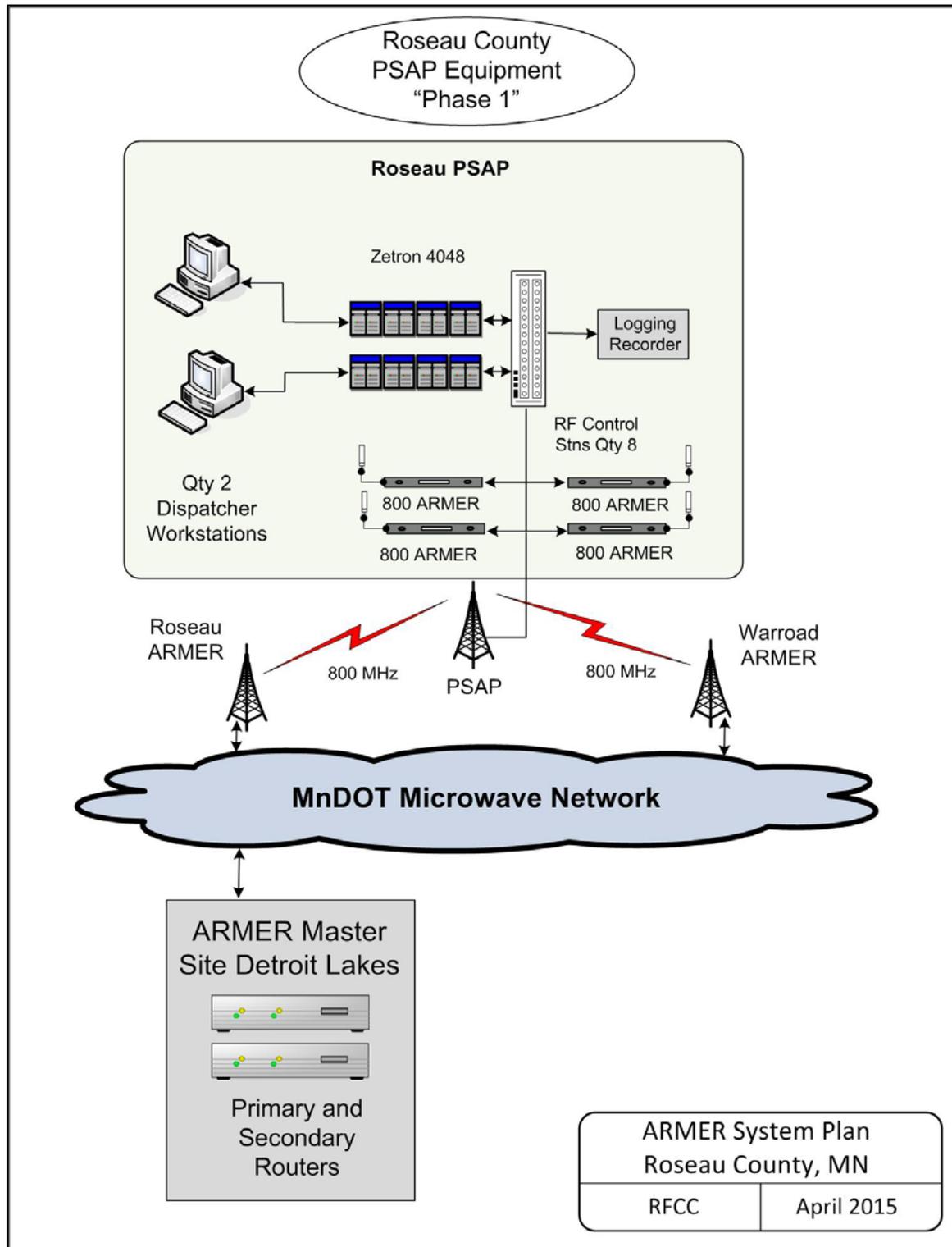
iv) PSAP Connectivity

Connectivity between the Roseau County dispatch center and the ARMER system is required for operation of the system talk groups, as well other non-trunked conventional channel resources.

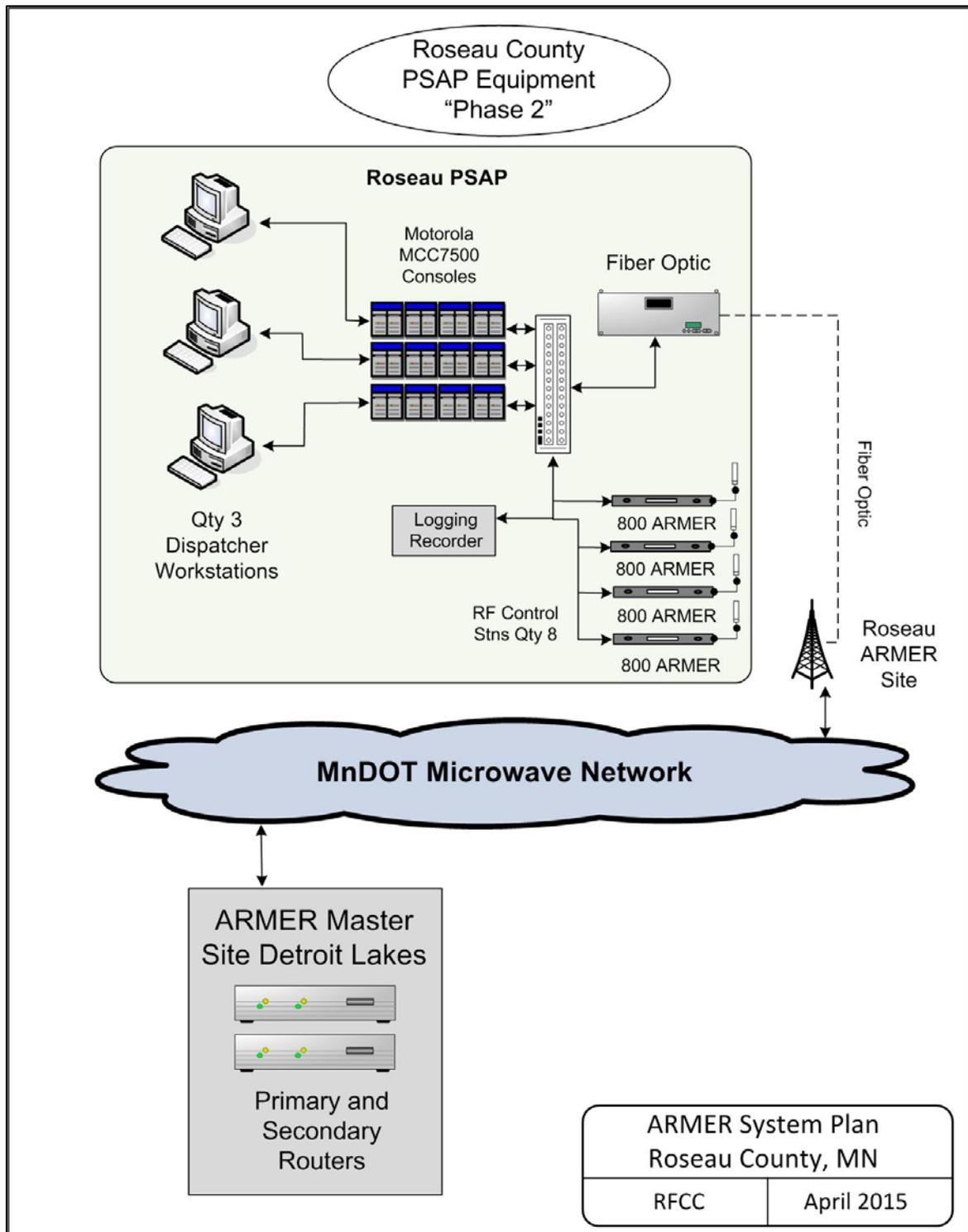
Phase 1: The Zetron consoles currently being used by the county are connected to a group of eight (8) 800 MHz RF control stations located at the county's PSAP. These stations communicate on-channel with the Roseau and other ARMER tower sites.

Phase 2: Roseau County has an existing fiber optic link between the PSAP in Roseau to the Roseau ARMER tower site, which is located approximately three miles west of the PSAP. The county will utilize this fiber optic link if/when new MCC7500 consoles are implemented at the PSAP.

Roseau County PSAP ARMER Architecture (Phase I)



Roseau County PSAP ARMER Architecture (Phase 2)



v) Subscriber Radios

The 800 MHz subscriber (mobile and portable) radio inventory planning work conducted with Roseau County agencies has identified the following maximum estimated quantities of radios to be utilized on the system:

Agency Type	Mobile	Portable	Base
Law Enforcement	14	29	8
Fire/EMS	27	127	3
Public Works	2	2	0
Schools/Other	0	14	0
Totals	45	174	11

A total of 230 mobile, portable and control base radios would be implemented in the system, if all agencies purchase or obtain the radios identified within this plan. This includes the total potential for three year growth for the agencies within the county. The county agencies currently have a total of 61 radios on hand, which are now being used on the ARMER system. A detailed breakdown of Roseau County's mobile, portable, and VHF radio pager inventory requirements and cost estimates is provided on the next page. Agencies throughout the county will be able to use this opportunity to purchase and implement standard radio types for use within the system, which will promote user commonality and interoperability between the various agencies. As noted previously, the Sheriff's Office has purchased all mobile and portable radios required for law enforcement operations on the ARMER system.

**Roseau County MN
 800 MHz Radio Inventory and Cost Data**

Total of 800 MHz Mobile and Portable Radio Equipment Required for System Implementation											Totals
Agency	Dual Band Mobile @ \$6,000	Mid-Tier Mobile Radios w/DES @ \$4,000	Mid-Tier Mobile Radios no DES @ \$3200	Mid-Tier Mob Radios Dual Control @ \$3800	Dual Band Portable @ \$6,000	Mid-Tier Port Radios w/DES @ \$3,300	Mid-Tier Port Radios no DES @ \$2500	Low-Tier Mobile Radios @ \$2,200	Low-Tier Portable Radios @ \$1,900	800 Mhz RF Control Stations @ \$6,000	Total Agency Radio Equipment Costs (Maximum)
Roseau Co Sheriff (on hand)	10					14					NA
Roseau Police (on hand)	2					8					NA
Warroad Police (on hand)	2					7					NA
RS County 911 Dispatch (on hand)										8	NA
Law Agency Totals	14	0	0	0	0	29	0	0	0	8	\$ -
Badger Fire (on hand)							2				NA
Badger Fire (near term)			8							1	\$ 31,600
Badger Fire (long term)									26		\$ 49,400
Greenbush Fire (on hand)							2				NA
Greenbush Fire (near term)			5							1	\$ 22,000
Greenbush Fire (long term)									26		\$ 49,400
Roseau Fire (on hand)							4			1	NA
Roseau Fire (near term)			5								\$ 16,000
Roseau Fire (long term)									24		\$ 45,600
Warroad Fire (on hand)							2				NA
Warroad Fire (near term)			6								\$ 19,200
Warroad Fire (long term)									24		\$ 45,600
Greenbush EMS (on hand)				1			2				NA
Roseau EMS (on hand)				2			3				NA
Warroad EMS (on hand)				2			2				NA
Wannaska First Responders									6		\$ 11,400
Roosevelt First Responders									6		\$ 11,400
Fire/EMS Agency Totals	0	0	24	5	0	0	17	0	112	3	\$ 301,600
Roseau County Highway Dept								2	2		\$ 8,200
Roseau Public Works								2	2		\$ 8,200
Roseau School District									10		\$ 19,000
Public Works Agency Totals	0	0	0	0	0	0	0	4	14	0	\$ 35,400
GRAND TOTALS	14	0	24	5	0	29	17	4	126	11	\$ 337,000

Total Quantity of Radios: 230

vi) System Talk Group Planning and ID Requirements

The original Roseau County Limited/Interoperability ARMER plan submitted in 2011 included 83 talk groups for use by the agencies within the county. A recent check of the ARMER system database indicates that there are 59 talk groups currently affiliated with Roseau County, with eight (8) of these talk groups showing system traffic (March 2015).

The Fleetmap for Roseau County has been updated based on the revised needs of Roseau County agencies, and will have a total of 59 talk groups, using the same talk group ID's currently active in the ARMER system database. Some revision of the talk group names in the database will be needed once the new plan is completed.

In addressing the talk group needs for the county agencies, the following basic outline will be used:

- Primary and secondary dispatch talk groups for law enforcement
- Primary and secondary dispatch talk groups for fire service
- Primary and secondary dispatch talk groups for EMS service
- Individual dispatch talk groups for non-traditional public safety agencies
- Countywide talk groups for special events
- Countywide talk groups for interoperability
- Individual talk group(s) for each participating agency
- Non-trunked tactical talk groups for "Scene of Action" use

Refer to Attachment I for a copy of the preliminary Roseau County fleet map.

A total of 230 ARMER system IDs are expected for the Roseau County implementation, which includes three year estimated totals:

- 220 for mobile and portable subscriber units total expected on the system for all agencies
- 10 for PSAP operations

vii) 800 MHz Traffic Loading and Frequency Planning

The ARMER system sites within Roseau County will operate in a trunked multicast mode of operation. The state has planned for a group of five 800 MHz frequency pairs to be implemented at each site, and these channels will be shared by all users of the system/sites in the area. These users will include:

- Roseau County agency users
- Neighboring county agency users
- State of Minnesota and Federal agency users

The county recognizes that in a trunked radio system it is important that the tower sites be established with a sufficient number of 800 MHz channels to ensure that all radio users are able to access the system when needed for both routine and emergency radio communications traffic. However, a balance must be

established between providing a sufficient number of channels and the cost of implementing those channels, as well as the increasingly limited number of 800 MHz frequencies available for the channels.

With a maximum radio inventory of approximately 226 local radio units planned for this system, it is expected that the planned five channels will be sufficient at the Roseau County ARMER sites.

When neighboring county and state radios are added to this total, it is possible that a greater number of channels would be needed at the sites. To better calculate the expected traffic loading the Roseau County radio would have on the local tower sites, the industry-standard Erlang-C process has been used in this plan to determine the expected voice traffic on the ARMER system. This process can be used for both telephone and radio networks, where a shared and limited number of communications paths (trunks) are used to handle the voice traffic.

A full discussion of how this process works is beyond the scope of this plan; however, several critical factors are used to determine the expected radio traffic usage of the tower sites:

- Number of local (Roseau County) radios
- Number of neighboring county agency radios that are likely to use any given tower site
- Number of State of Minnesota agency radios that are likely to use the sites
- Number of 800 MHz radio channels available at the site(s)
- Estimation of how many radios are in use/service at a point in time
- Average radio transmission length of time (in seconds)
- Average expected number of transmissions from the radios (per hour)

When these radio inventory and usage parameters are entered into the Erlang calculation formula, a resulting Grade of Service (GOS) parameter is generated, indicating the calculated or expected availability of the radio system channels for the radio users. This GOS number could also be viewed as a “likelihood of getting a busy signal” when pressing the transmit button on a radio. The lower the number, the better GOS.

Public Safety Wireless Network (PSWN), the governmental agency which establishes operational standards and recommendations for public safety radio communications, has established a minimum GOS for these radio systems at “equal or less than two percent.”

In other words, there should be less than a two percent chance that a radio user’s transmission would be blocked by the system due to radio traffic levels. This could also be viewed as “greater than 98 percent” chance of a radio user’s transmission being properly handled by the system when needed. This two percent GOS is considered a “Standard Busy Hour” level of usage. It should be noted that many agencies have elected to move beyond the PSWN recommendation and a common goal in Public Safety today is a GOS of 1 or better.

The parameters used for the Roseau County radio traffic calculations are as follows:

- Quantity 230 Roseau County radios (three year maximum)
- Quantity 150 neighboring county radios (interoperability use in Roseau County)
- Quantity 150 State of Minnesota agency radios
- 33 percent estimate percentage of how many radios are in use/service at one time
- 8 seconds average radio transmission length of time (in seconds)
- .51 average expected number of transmissions from the radios (per hour)
- 1.5 seconds average busy time (in seconds)

The GOS is then calculated for each site, based on the number of radio channels planned for the sites, to show the impact of the differing number of channels that would be implemented at the sites.

This formula does not necessarily incorporate any parameter for the number of talk groups being planned for use by the local county agencies. The number of talk groups can have a dramatic effect on system loading, as the larger the number of talk groups, the greater potential for spreading the traffic among the RF channels. Nonetheless, it remains the most reliable method for calculating radio traffic levels.

The table shown below contains the predicted 800 MHz radio channel and tower site traffic loading for typical operational radio activity for the sites that are located within Roseau County, based on the parameters in the previous data table:

Predicted 800 MHz Standard Voice Channel Traffic Loading for Roseau County

Site and GOS	Number of Voice Channels Normal Conditions				
	1	2	3	4	5
Roseau	30.5%	3.7%	0.3%	0.0%	0.0%
Greenbush	26.5%	2.9%	0.2%	0.0%	0.0%
Juneberry	19.7%	1.6%	0.1%	0.0%	0.0%
Roosevelt	26.5%	2.9%	0.2%	0.0%	0.0%
Warroad	25.7%	2.7%	0.2%	0.0%	0.0%
Winner Silo	19.7%	1.6%	0.1%	0.0%	0.0%

One channel at each site is allocated as the Control Channel, which is not used for voice and not reflected in the table above. As shown, a GOS of better than one percent is achieved with three channels per site (highlighted in yellow), less that the total quantity being installed by the state at each of the county sites. This would indicate that no additional channels should be needed at the county sites.

The above calculations are again based on the PSWN “Standard Busy Hour” calculations, and do not account for the increased traffic loads that would be expected during emergency periods (tornado, large fire, multiple events). PSWN has established a recommendation of an additional 20 percent capacity for

these events. Refer to the following table for the predicted ARMER system traffic loading and GOS for the Roseau County sites when the PSWN 20 percent additional emergency operations data is incorporated into the usage calculations.

Predicted 800 MHz Voice Channel Traffic Emergency Loading for Roseau County

Site and GOS	Number of Voice Channels Emergency Conditions				
	1	2	3	4	5
Roseau	67.8%	15.3%	2.7%	0.4%	0.0%
Greenbush	58.7%	12.2%	2.0%	2.0%	0.0%
Juneberry	26.9%	2.9%	0.2%	0.0%	0.0%
Roosevelt	58.7%	12.2%	2.0%	2.0%	0.0%
Warroad	61.1%	12.8%	2.1%	0.3%	0.0%
Winner Silo	26.9%	2.9%	0.2%	0.0%	0.0%

As shown, three voice channels are adequate to maintain the minimum recommended GOS during emergency traffic periods at all sites other than Roseau and Warroad, where 4 channels are needed. The State of Minnesota will be implementing four voice channels at all sites, so no additional channels should be needed at the ARMER sites. Because of the reasonable number of talk groups planned by Roseau County agencies (59), we do not believe that Roseau County’s implementation will have a significant impact on the system loading at the remaining sites, and should not be a factor requiring additional RF channel capacity. This also includes additional future capacity for the local sites in the event that other governmental agencies (schools, transportation) elect to join the system in the future.

The State of Minnesota has obtained the 800 MHz frequency assignments for the basic five channel configuration needed for the five tower sites within Roseau County. The table on the following page is the current available 800 MHz frequency data for the Roseau County ARMER tower sites. The channels listed as “Roseau Co.” have been assigned to Roseau County via the state’s 800 MHz NPSPAC channel plan, and while they have not yet been assigned to a specific site, they could be used for the system at some point. Channels and sites with a “?” listed may have been assigned a non-NPSPAC 800 MHz channel, but this information is not readily available at this time.

800 MHz Frequency Assignments for ARMER Sites in Roseau County

Site	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
Roseau County	91	118	138	197	217
Roseau	22	38	58	157	174
Greenbush	16	132	146	172	PS
Juneberry	2	70	88	183	PS
Warroad	7	66	126	151	191
Winner Silo	36	78	143	160	PS

(PS = Public Safety/Non-NPSPAC channels)

viii) Legacy VHF Equipment

The county will continue to operate and control a number of existing or updated VHF radio system channels, for local paging and interoperability. Emergency paging for fire and EMS operations is currently conducted via county-owned VHF system(s). These existing systems will be retained and modified or expanded as needed for improved paging coverage. This expansion will include the installation of some equipment at ARMER tower sites for improved coverage and reliability.

In addition, the existing law enforcement VHF repeater channels may be utilized for local interoperability between VHF and 800 MHz radio system users.

B. Coverage Review

i) Design Parameters

The overall system design and resulting communications coverage of the ARMER system can be affected by the following goals and concerns:

- Desire to obtain in-building coverage as best as possible in more densely populated areas of the county
- Need to cover the geographic area with a reasonable number of tower sites
- Cost of developing new tower sites, including structures, land acquisition, Federal Aviation Administration (FAA)/FCC/National Environmental Policy Act (NEPA) considerations, as well as local zoning
- Availability of and costs associated with existing and planned tower sites

The existing and planned tower sites planned for this project are being provided by the State's ARMER network. The coverage goal for Roseau County is 95 percent "on-the-street/outdoor" reliability to a portable radio with a standard antenna held at a height of five feet above ground level.

ii) Coverage Propagation Mapping

In the planning for this project, coverage modeling and propagation analysis was done to determine if the basic tower site planning assumptions were valid and could be expected to result in a system that would meet Roseau County's coverage needs.

These coverage maps were generated with the RadioSoft® ComStudy2® software program. The modeling for the coverage analysis was done with both the Okumura and Longley-Rice propagation models. The coverage maps were done for portable talk-in and talk-out usage, as this is the most difficult coverage scenario. If the basic system design shows the portable goals are attainable, then mobile coverage should not be a concern.

Provided below are the parameters used for the coverage modeling:

Site Parameters	Value
Transmit Antenna Gain	9 db, omnidirectional
Transmit Output Power (into main line)	35 watts
Transmission Line Size (tower over 300 feet)	1.25 inch Heliac®
Transmission Line Size (tower under 300 feet)	7/8 inch Heliac®
Transmission Line Length	Based on tower height
Receive Antenna Gain	9db, omnidirectional
Receive Tower Top Amplifier Gain	5db
Receive Transmission Line Size	7/8 inch Heliac®
Receive Transmission Length	Based on tower height
Field Unit Parameters	Value
Type of Unit	Portable radio
Environment	Outdoors, on-street
Antenna Height	5 feet
Transmit Power	3 watts

Preliminary coverage maps for portable radio talk-in and talk-out are shown on the following pages. The color coding for these maps is:

- Light Green: Reliable signal coverage 40 dBu or greater
- Yellow: Reliable signal coverage 33 dBu or greater
- Red: Marginal signal coverage 19 dBu or greater
- White: No useable coverage expected 10 dBu or less

Six predicted-coverage maps are provided in this plan; all maps utilize all tower sites within and outside of the county that provide coverage in the target service area:

1. State of Minnesota prepared coverage map for Roseau County (from 2008).
2. Mobile (vehicle-mounted) radio coverage
3. On-Street portable radio coverage
4. In-building countywide coverage
5. In-building coverage in the City of Roseau area
6. In-building coverage in the City of Warroad area

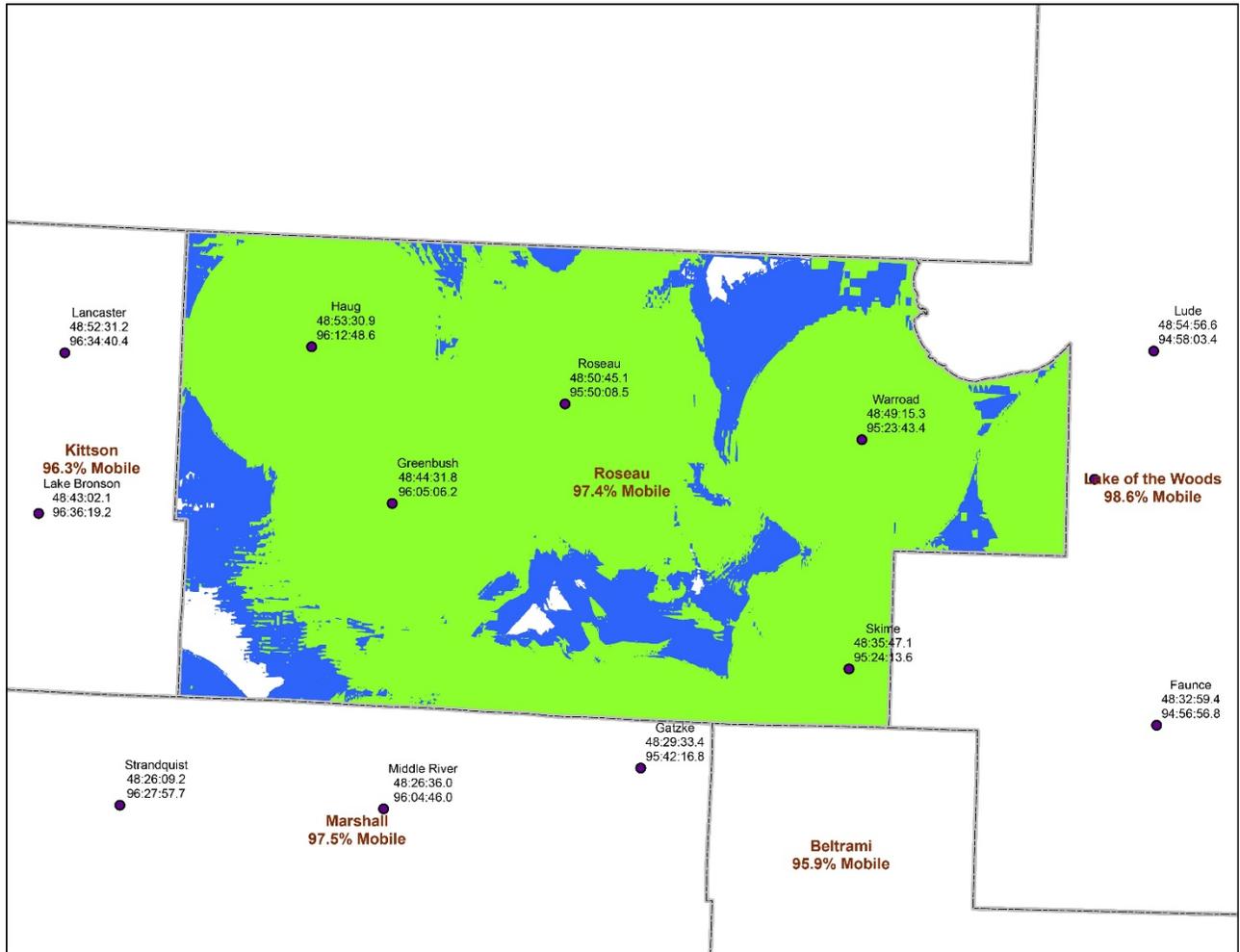
As shown in the predicted coverage maps on the following pages, the potential coverage for the system, using the selected sites and parameters is very good and is expected to meet the project coverage goals. The first map presented in this plan is the predicted coverage map provided by the State of Minnesota for the Roseau County geographical area.

All maps were created using RadioSoft© ComStudy2© software program, and the modeling for the coverage analysis was done with the Longley-Rice and Okumura propagation models. The modeling parameters used by the State and RFCC are similar, however a somewhat different color-coding scheme is used. The State's maps use green areas represent a 40 dBu level of radio signal, which can generally be translated into a level where reliable portable and mobile radio coverage can be expected. The areas shaded in blue represent a 33 dBu level of radio signal, which typically reflects mobile (vehicle-mounted) radio coverage.

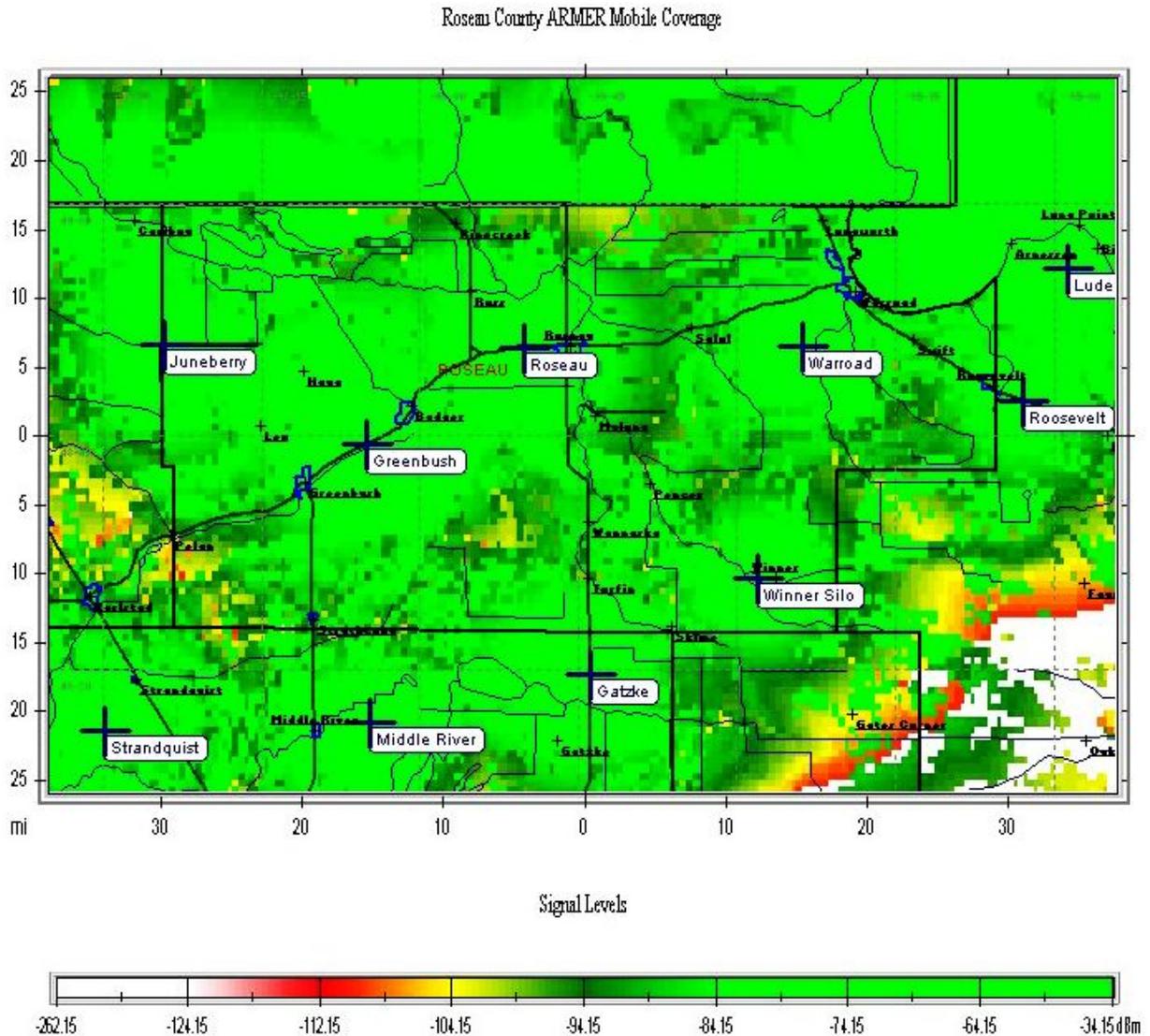
The areas shaded in white reflect a lower level of signal where coverage cannot be predicted, and can be interpreted to represent very weak areas of coverage. The only areas of the county where this is predicted to exist are in the far west and east corner of the county, and are not expected to be problematic.

Map I: Roseau County Predicted ARMER Coverage

(Originally provided by the State of Minnesota in 2008; this map is provided for reference only, and is considered outdated due the changes in tower site locations that have been established since the time of original publication).

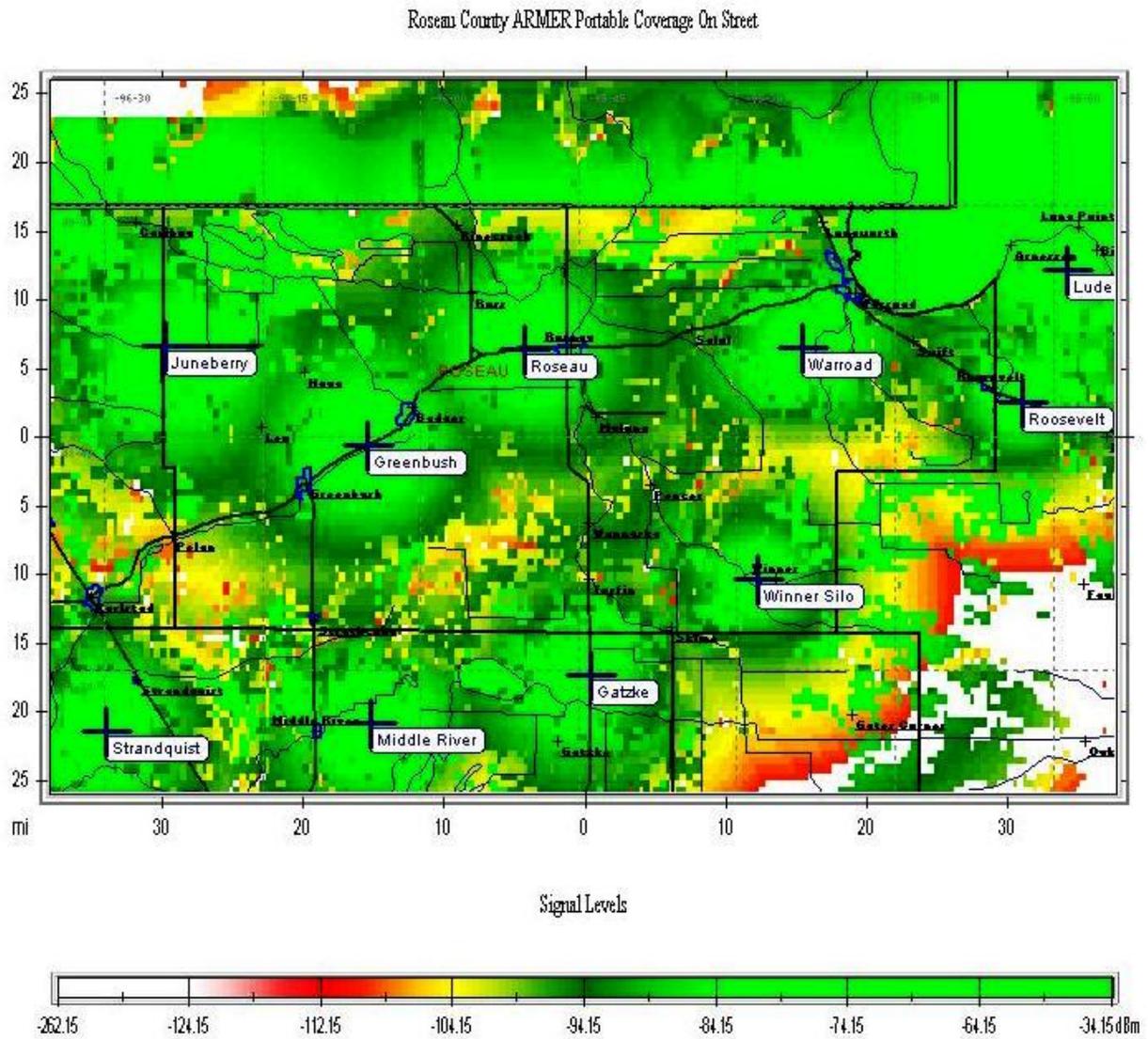


Map 2: The map shown below, prepared by RFCC for the county's ARMER planning process, demonstrates the predicted coverage to be expected for Mobile (vehicle-mounted) radios from the ARMER tower sites to be located within Roseau County, including the first-tier sites outside the county borders.



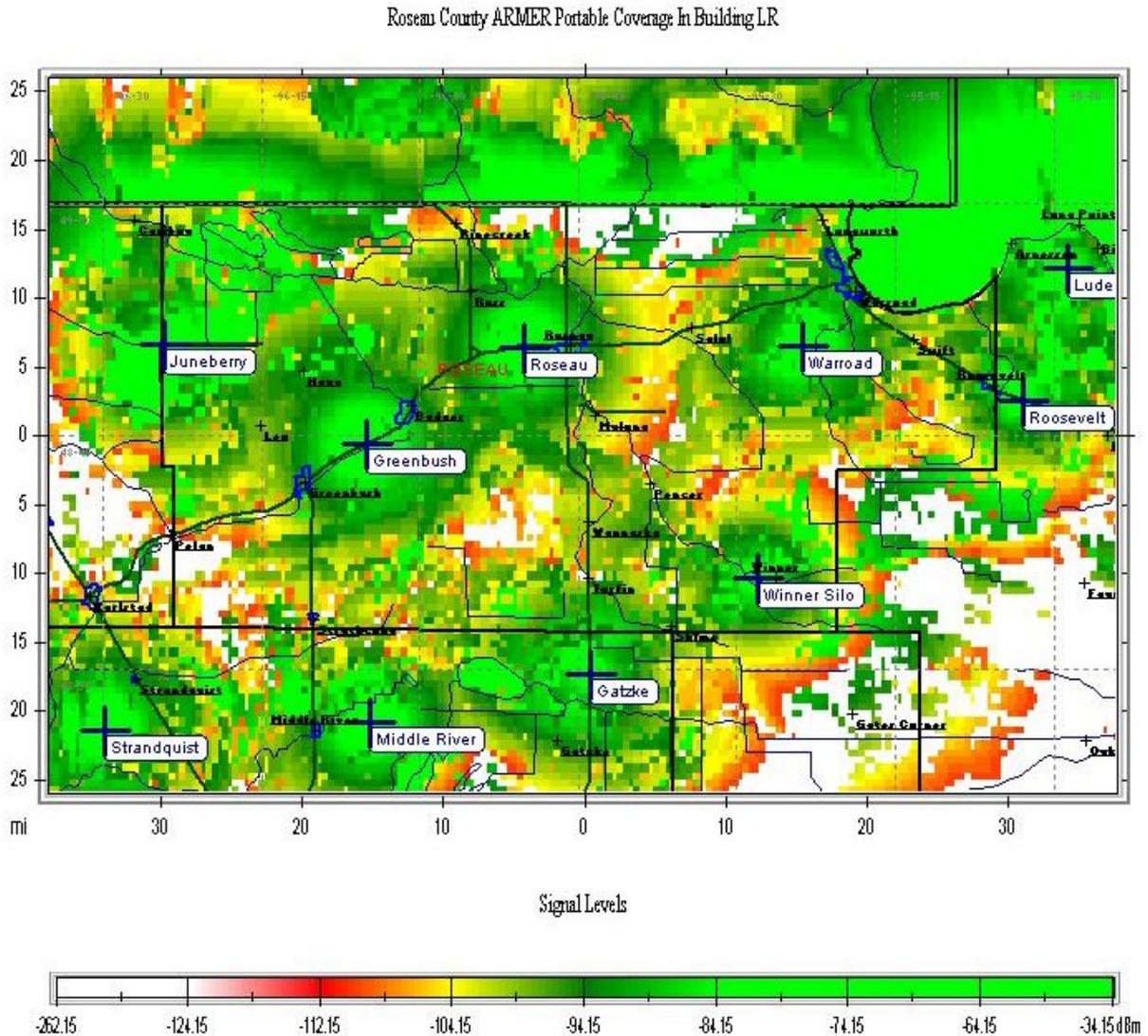
The predicted mobile radio coverage throughout the county is excellent with the planned tower sites, and coverage within the county is enhanced by tower sites outside of the county borders.

Map 3: The map shown below demonstrates the predicted coverage to be expected for portable (handheld) radios “On Street/Outdoors” from the ARMER tower sites to be located within Roseau County, including the first-tier sites outside the county borders.



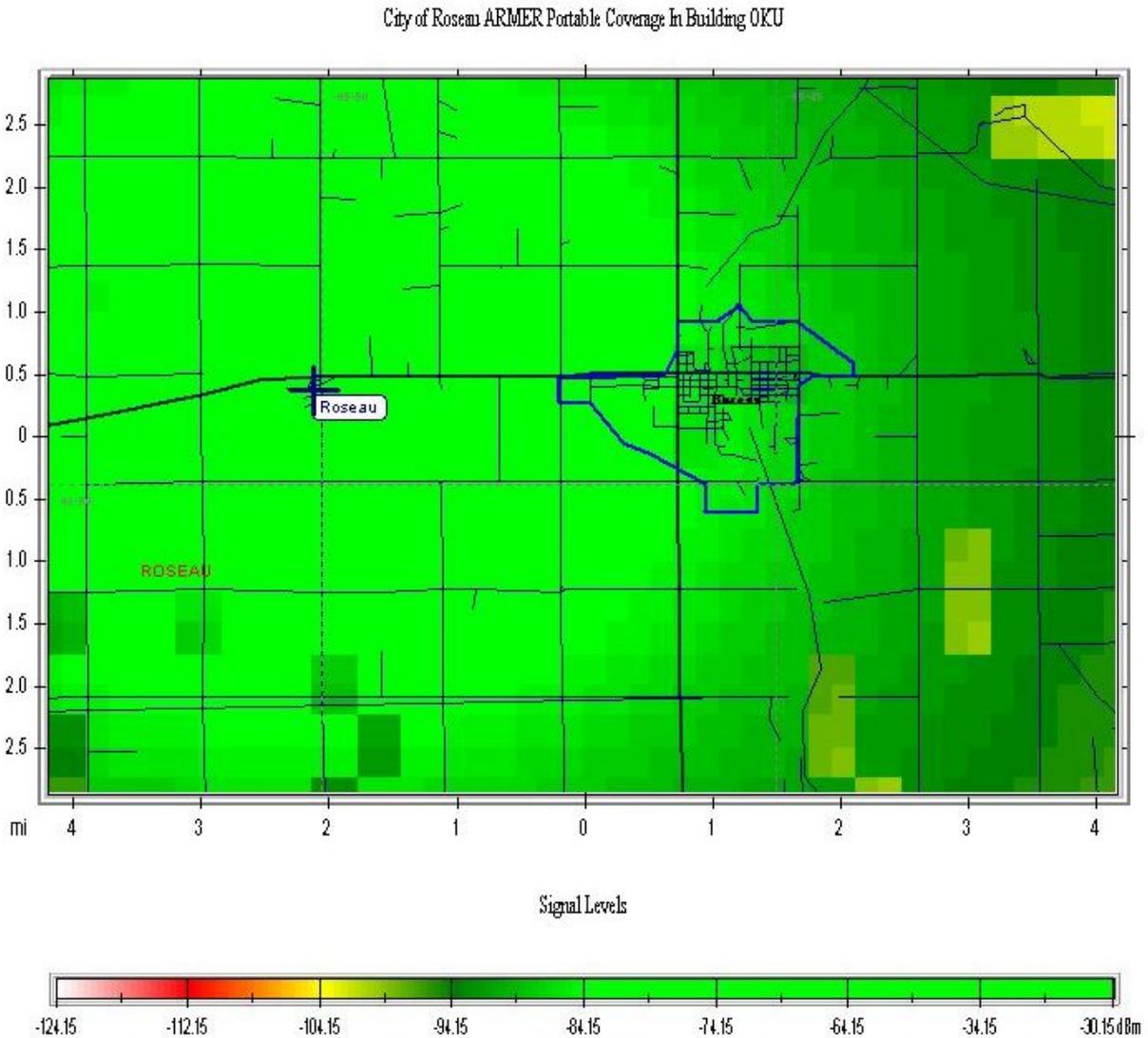
The predicted portable radio coverage throughout most of the county is very good with the planned tower sites, and coverage within the county is enhanced by tower sites outside of the county borders. The only areas of potentially weak coverage would be southeast of Greenbush, and in the far southwest corner of the county.

Map 4: The map shown below demonstrates the predicted in-building (6db loss) coverage to be expected for portable/hand held radios in Roseau County from the ARMER system when all tower area sites in the region are included in the calculations.



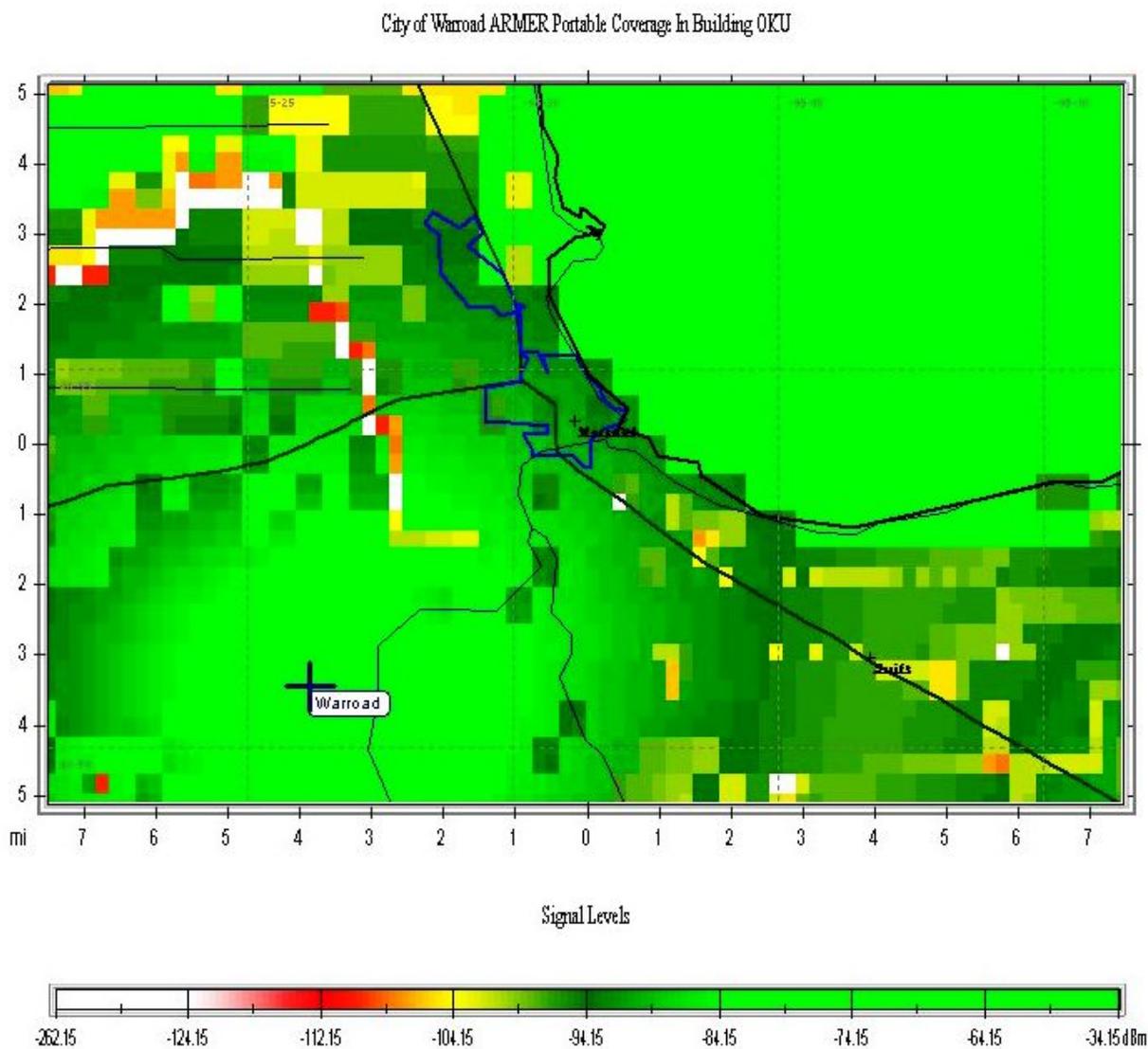
The predicted 6db in-building coverage for Roseau County is good in many areas, including the cities of Roseau and Warroad. Refer to the maps on the next pages for more detail of the predicted coverage in these two areas. Roseau County is fortunate that the ARMER sites exist in close proximity to the more populated cities in the county.

Map 5: This map demonstrates the predicted in-building (6db loss) portable radio coverage to be expected in the City of Roseau area from the ARMER system when all tower area sites in the region are included in the calculations.



The blue lines on the map indicate the city limits of Roseau, and the dark blue lines indicate highways and main roads. The predicted in-building coverage should be good within the city, although this will depend on the type of building involved. As an example, testing has been conducted in the high school, located in east central area of town; it has been determined that an in-building booster (BDA) will be needed for reliable coverage. Other facilities will be tested as well.

Map 6: This map demonstrates the predicted in-building (6db loss) coverage to be expected for portable radios in the City of Warroad area from the ARMER system when all tower area sites in the region are included in the calculations.



The blue lines on the map indicate the city limits of Warroad, and the dark blue lines indicate highways and main roads. The predicted in-building coverage should be good within the city, although this will depend on the type of building involved. The Warroad tower site is located 5.8 miles southwest of the city. Coverage testing within the Marvin Windows facilities has shown good results, primarily due to existing BDA's installed for cellular telephone coverage. Coverage within schools is not good, and will require additional equipment be installed.

C. Contingency Planning

In planning for ARMER system migration and connecting to the ARMER system the following failure modes are being addressed:

1. Loss of connectivity between the dispatch center and the ARMER system.
2. Loss of microwave network (to ARMER tower sites), which will result in the system reverting to Site Trunking mode.

The primary method of redundancy for Roseau County operations will be the implementation of multiple 800 MHz RF control stations at the main PSAP location. This would typically include one control station for each primary public safety discipline, such as:

- Law operations
- Fire operations
- EMS operations

If scenario 1 occurs, the PSAP loses direct connectivity with the ARMER network, and talk group access and control is lost. The control stations will allow the PSAP staff to access the county-specific and system interoperability talk groups over the air and function much like a mobile or portable radio.

If scenario 2 occurs, (local ARMER sites lose connectivity to the master site in Detroit Lakes, or the master site experiences a failure), the sites will revert to a site trunking mode, which results the sites operating independently from each other. The effect on field units is that they can only communicate with each other if they are in range of the same tower site. If they are not, communication is not possible. This is due to the local sites and network operating in a multicast mode of operation (rather than simulcast).

The resulting effect on the dispatch center is the same; however, it is possible to implement multiple RF control stations at the dispatch center, with access to all of the tower sites within the county. The challenge with this approach is that the number of stations could be cumbersome and difficult to manage, depending on the number of talk groups incorporated in the backup station plan.

No final determination has been made for Roseau County as to the specific number of 800 MHz RF control stations that will be implemented at the PSAP, but a plan will be based on the county's final dispatch console implementation decisions.

D. Training

ARMER system implementation and associated operational standards require that all personnel who will be using the system receive proper training on the use, capabilities, and features of the system. Trunked radio systems, including the ARMER system, have operational requirements that differ from traditional conventional repeater systems, and it is necessary that dispatchers and end users be trained on the capabilities and proper operation of the system.

Roseau County agencies recognize this need, and have conducted initial in-house training for the current radio system users. Additional training is planned through the services of independent contractors recognized by the state as proficient in the operation of the ARMER radio system. The program will include training for the following workgroups and functions:

- Radio end user training
- PSAP dispatchers
- Local system administrator
- Interoperability

Funding for the end user and dispatcher training has been included in the project budget.

E. Interoperability

The need for interoperability exists on multiple levels within public safety radio operations. Establishing or enhancing interoperability at each of these levels has been a primary consideration in Roseau County's decision to migrate to the ARMER system. The areas specifically addressed are:

Internal: Between the many agencies within the general jurisdictional area of Roseau County (i.e. law enforcement, fire service, and EMS agencies). The implementation of a common 800 MHz trunked radio system for all public safety agencies, as well as other units of local government, should resolve most interoperability communications issues that may currently exist. To make the ARMER system work effectively will require careful fleet map planning and the proper training of all radio system users.

External: Between the county agencies and other public safety (law, fire, and EMS) and government agencies operating both within and sharing borders with Roseau County, to include the following:

- Lake of the Woods County agencies
- Beltrami County agencies
- Kittson County agencies
- Marshall County agencies
- Minnesota State Patrol, Mn/DOT, Department of Natural Resources (DNR) enforcement, and fire agencies
- Border Patrol and other Federal law enforcement and fire agencies
- Canadian public safety agencies

Many agencies within the Northwest Region of Minnesota have been moving forward with the ARMER participation planning and implementation process, which will improve communications interoperability for those agencies. Roseau County is currently bordered by county agencies operating both on 800/ARMER and VHF systems, which will require a combination of solutions to ensure reliable communications between all agencies in the region, regardless of radio system type. Roseau County will have neighboring agencies operating on both types of systems for the foreseeable future.

To accommodate communications between agencies that may operate with Roseau County that are not on the ARMER system in the short-term using legacy system technology, access to the ARMER radio system, a variety of interconnectivity options will be needed:

- The most basic requirement will be for Roseau County to continue operation of their VLaw3 I 155.4750 MHz base station. This can be patched to an 800 MHz talk group via the PSAP console system when required.
- All Roseau County Law Enforcement agencies use dual-band radios, capable of both VHF and ARMER/800 MHz operations.
- Roseau County Fire and EMS agencies will maintain the use of VHF radios in their vehicles, in conjunction with new ARMER/800 MHz radios.
- Roseau County repeater channels will be retained, and will become local “interoperability” channel resources, capable of being patched to the ARMER system, to allow local VHF radio users a simple and effective link to county agencies operating on the ARMER system.

F. Standards

The primary technology standard applied to this project is that of the Project 25 (P25) ARMER system. The P25 standard is specifically for digital radios systems for public safety. In this case, the Phase I Frequency Division Multiple Access (FDMA) standard is currently in use.

Roseau County will adopt and comply with the standards published by both the State Radio Board and the Northwest Minnesota Regional Radio Board. Use of these standards will ensure that users in Roseau County will adopt the same naming conventions, talk group usage, and other operational and technical standards that are in use throughout the state.

G. Alarms and Monitoring

Mn/DOT – ARMER will have the primary tower site alarm monitoring for sites in the county.

H. Maintenance

Maintenance of the primary ARMER tower sites within Roseau County will be handled by the Mn/DOT staff. Roseau County currently contracts with a local authorized service facility for maintenance of any additional 800 MHz system equipment planned for the Roseau County implementation, including the PSAP equipment.

I. System Administration

Local system administration for Roseau County will be the responsibility of the Roseau County Sheriff's Office.

J. Other Local Enhancements

The primary local enhancements to the planned system implementation are:

- VHF interoperability systems

No other tower site or 800 MHz channel expansion local enhancements are planned for the system.

3. Project Costs and Budget

Funding for implementation of the ARMER system within Roseau County is being considered from three different sources:

- Local bonding
- Local levy
- Grant opportunities

Grant funding has been received for the purchase of a many of the existing 800 MHz mobile and portable radios for public safety agencies in the county. Funding for the remaining system infrastructure equipment has not yet been finalized, but is being reviewed by the county and considered for year 2015 or beyond.

Project Cost Estimates – Phase 1:

Item/Category	Estimated Costs
Zetron Console Modifications	\$ NA
800 RF Control Stations	\$ NA
800 MHz Subscriber Radios (Law Enforcement)	\$ NA
800 MHz Subscriber Radios (Fire agencies)	\$ 88,000
Grand Total Estimated Costs	\$ 88,000

Project Cost Estimates – Phase 2:

Item/Category	Estimated Costs
MCC7500 ARMER Console Equipment	\$350,000
Other System Equipment	\$ 50,000
800 MHz Subscriber Radios (Fire and EMS)	\$212,800
800 MHz Radios (Public Works and Schools)	\$ 35,400
Other Services	\$ 25,000
Grand Total Estimated Costs	\$637,800

4. Project Implementation

A. Schedule

Implementation of the ARMER radio network for an organizational group the size of Roseau County, with the number of agencies, tower sites, and quantity of radios being planned, would typically be expected to require a 12-month period to complete.

However, Roseau County has slowly migrated to ARMER system use over the past two years, and all Law agency radio operations are now conducted via the ARMER system. Local EMS agencies have also obtained ARMER radios, and are using the system. The county agencies will continue to seek the funding needed to obtain the remaining ARMER-capable mobile and portable radios needed for Fire agencies. The County is also planning and budgeting for the long-term replacement of its existing Zetron radio dispatch console with a new Motorola console, and direct connectivity into the ARMER network, although no specific time frame has been established for this work. Roseau County will notify the regional and state technical committees at such time that this change is being planned.

The County will continue to utilize their existing VHF radio systems over the next few years, and will retain such equipment as needed for Interoperability purposes. The PSAP console equipment is configured to operate both systems (legacy VHF and ARMER).

Attachment I: Roseau County Fleet Map

	Law Enforcement Operations	TG Alias
1	Roseau County Law 1 (main)	RS Law 1
2	Roseau County Law E1 Encrypted	RS Law E1
3	Roseau County Law 2	RS Law 2
4	Roseau County Law E2 Encrypted	RS Law E2
5	Roseau County Law Car-Car	RS C2C
6	Roseau Sheriff's Office Ops 1	RS RSO Ops 1
7	Roseau Sheriff's Office Ops 1 Encrypted	RS RSO Ops E1
8	Roseau Sheriff's Office Admin	RS RSO Adm
9	Roseau Police Dept. Ops 1	RS RPD Ops 1
10	Roseau Police Dept. Ops 1 Encrypted	RS RPD Ops 1E
11	Roseau Police Dept. Admin	RS RPD Adm
12	Warroad Police Dept. Ops 1	RS WPD Ops 1
13	Warroad Police Dept. Ops 1 Encrypted	RS WPD Ops 1E
14	Warroad Police Dept. Admin	RS WPD Adm
15	Roseau County Emergency Management/EOC	RS EOC 1
16	Roseau County EOC Ops 1	RS EOC Ops 1
	Fire and EMS Operations	TG Alias
17	Roseau County Fire 1 (main)	RS Fire 1
18	Roseau County Fire 2	RS Fire 2
19	Badger Fire Dept. Ops	RS BFD Ops
20	Badger Fire Dept. Admin	RS BFD Adm
21	Badger First Responders Ops	RS B1st Ops
22	Greenbush Fire Dept. Ops	RS GFD Ops
23	Greenbush Fire Dept. Admin	RS GFD Adm
24	Roosevelt First Responders Ops	RS R1st Ops
25	Roseau Fire Dept. Ops 1	RS RFD Ops 1
26	Roseau Fire Dept. Ops 2	RS RFD Ops 2
27	Roseau Fire Dept. Admin	RS RFD Adm
28	Wannaska First Responders Ops	RS W1st Ops
29	Warroad Fire Dept. Ops 1	RS WFD Ops 1
30	Warroad Fire Dept. Ops 2	RS WFD Ops 2
31	Warroad Fire Dept. Admin	RS WFD Adm
32	Roseau County EMS 1 (main)	RS EMS 1
33	Roseau County EMS 2	RS EMS 2
34	Roseau County EMS 3	RS EMS 3

Attachment I: Roseau County Fleet Map (continued)

	Fire/EMS Operations (cont.)	TG Alias
35	Roseau County EMS Admin	RS REMS Adm
36	Greenbush EMS Admin	RS GEMS Adm
37	Roseau County EMH 1	RS EMH 1
38	Roseau County EMH 2	RS EMH 2
	Local Interoperability	TG Alias
39	Roseau County Announcement Group	RS ANNC ALL
40	Roseau County Call	RS Call
41	Roseau County Emergency Button	RS EMER
42	Roseau County Emergency 911	RS 911
43	Roseau County Public Safety Statewide Roam	RS Roam
44	Roseau County Public Safety Common 1	RS Com 1
45	Roseau County Public Safety Common 2	RS Com 2
46	Roseau County Public Safety Common 3	RS Com 3
47	Roseau County Public Safety Common 4	RS Com 4
48	Roseau County Public Safety Common 5	RS Com 5
	Public Works and Schools	TG Alias
49	Roseau County Highway Operations 1	RS Hwy 1
50	Roseau County Highway Operations 2	RS Hwy 2
51	Roseau County Transit	RD TRNST
52	Future Public Works 1	RS PW 1
53	Future Public Works 2	RS PW 2
54	Future Public Works 3	RS PW 3
55	Roseau County School Security	RS SCH SEC
56	Roseau County School Transportation 1	RS School 1
57	Roseau County School Transportation 2	RS School 2
58	Roseau County Future Use 1	RS Future 1
59	Roseau County Future Use 2	RS Future 2

All regional and statewide interoperability talk groups will be incorporated into Roseau County radios as defined by ARMER standards.

Attachment 2: References

1. State of Minnesota “Local Agency and Regional Planning and Contracting for ARMER Participation” (sic) dated September 8, 2008, as published at www.srb.state.mn.us
2. Federal Engineering “Radio System Needs Assessment and Alternatives Report for Roseau County” December, 2009
3. RadioSoft™ ComStudy2™ Terrain Database
4. ARMER Status Map, as posted at <http://www.srb.state.mn.us/> dated March 2015
5. Region 22 (Geographic State of Minnesota) 800 MHz Regional Planning Committee “Regional Band Plan” as filed with the FCC, General Docket 87-112; 800 MHz NPSPAC Plan Amendment WT Docket No. 20-55; NPSPAC PR Docket No 93.130 dated June 2009

**REQUEST FOR SPECIAL
WIDE AREA SITE ACCESS
FOR AN ARMER TALKGROUP**

Talkgroup/ Announcement Group Name(s): Roseau County Statewide Roam (RS Roam)

If Announcement Group List all Contained Talkgroups: _____

Sites Requested:

- Statewide (Requires Statewide Radio Board Approval)
- Other (Specify Sites or Regions):

Talkgroup Owner Agency (Include Point of Contact Information):

Agency Name: Roseau County Sheriff's Office
Contact Name: Sheriff, Roseau County (Steve Gust)
Address: 605 - 5th Ave SW
Roseau, MN 56751
Phone: 218-463-1451
Email: Steve.Gust@co.roseau.mn.us

Talkgroup or Announcement Group Type (Check all that Apply):

- Shared
- Private
- Special Roaming Only Talkgroup - Occasional Use.
- Special Operations Tactical Talkgroup - Occasional Use. **If yes**, describe or list the counties or regions covered by a mutual aid agreement, memorandum of understanding, joint powers agreement, incident response plan or other relevant agreements here: _____
- Main Dispatch or Tactical Talkgroup - Day to Day Use. **If yes**, applicant must demonstrate that the users of this talkgroup conduct their "Normal Day to Day Business Operations" throughout the requested coverage area. Describe or list the counties or regions where the users of this talkgroup conduct their "Normal Day to Day Business Operations" here: _____

Describe the users, entities or agencies that will operate on this talkgroup:

The "RS Roam" talk group is intended to allow Roseau County public safety agency personnel the ability to contact Roseau County dispatch when outside of the Roseau County geographical service area. It may also be used for two Roseau County public safety personnel to communicate with each other when operating outside of the county geographical area (and outside the operational range of an SOA channel).

Describe the type of operations that will occur on this talkgroup:

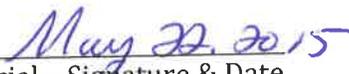
The two most common uses of this talk group are 1) Prisoner transports, and 2) Communications between two Roseau County field units when outside of the county geographical operating area.

Describe the anticipated frequency, duration and extent of use of this talkgroup:

The use of this talk group will be very minimal, perhaps twice a week, primarily for prisoner transport. There will NOT be any routine dispatch or operational traffic on this talk group.

Describe why the Statewide Shared Incident Response talkgroups or other shared roaming talkgroups are not suitable to meet these operational requirements:

It is unlikely that the Roseau County PSAP would be monitoring the various Statewide Shared Incident Response or Roaming talk groups, and the purpose for which Roseau County units would need to communicate would not necessarily appear to fit the intended use of those talk groups.

Talkgroup Owner Agency Authorized Official - Signature & Date

Steve Gust, Sheriff - Roseau County MN

Printed Name and Title

Lac qui Parle County – City of Dawson BDA Proposal

The Lac qui Parle County Sheriff's Office presents the following proposal to install a bi-directional amplifier (BDA) to enhance ARMER coverage in the City of Dawson and requests consideration for grant funding.

Background

Dawson is located in Lac qui Parle County, approximately 6 miles east of the US Highway 212 and US Highway 75 intersection. The population is approximately 1,500 people. The City is approximately 1.5 square miles. The west branch of the Lac qui Parle River flows through Dawson, and Dawson is the only densely populated area in Lac qui Parle County that has river flooding concerns. The racial makeup of the city is 97.4% White, 0.4% African American, 0.4% Native American, 0.1% Pacific Islander, 0.6% from other races, and 1.1% from two or more races. Hispanic or Latino of any race is 2.3% of the population.

Risk

The City of Dawson has deficient ARMER signal coverage. The City is surrounded by ARMER towers, but at great distances. While in the City of Dawson, a radio can receive signal from the following tower sites: Madison, Canby, Clarkfield, Montevideo, and Milan – however all signals are relatively weak. Indoor coverage is a bigger issue in the City. Officers are often unable to receive calls via radio due to the poor signal. Due to the size of the community, officers work alone almost all the time, and radio contact is there only back-up. This leads to great risk for officers, firefighters, and ambulance personnel.

Solution

The Lac qui Parle Sheriff's Office has investigated several solutions to this issue. MNDOT has performed studies, and finds Dawson to be in compliance with its outdoor requirements for ARMER (there are no MNDOT guarantees for indoor coverage). Therefore MNDOT will not place a State-owned tower in Dawson. The placement of a locally-owned ARMER tower has proven cost-prohibitive in this case. Mobile radios have been placed in the Dawson City Office (which houses the Dawson Police Department) to allow for radio coverage while officers are in the office, however, this only solves the coverage issue for that building. The cost-effective solution appears to be the installation of an outdoor BDA.

The Lac qui Parle Sheriff's Office requested bids for this project from the following vendors:

- Fiplex – \$107,370.87
- Milbank Communications – no bid submitted
- RACOM - \$35,345.57

- West Central Communications – no bid submitted

Proposal

The Lac qui Parle Sheriff's Office respectfully requests consideration for funding to complete this project. AGP has tentatively agreed to allow the installation of the equipment, pending a review by the corporate office and lawyers. The City and several community organizations are looking into their ability to support the on-going electrical and maintenance costs of the BDA. If these groups are unable to pay the on-going costs, the Lac qui Parle County Sheriff's Office will fund the costs.

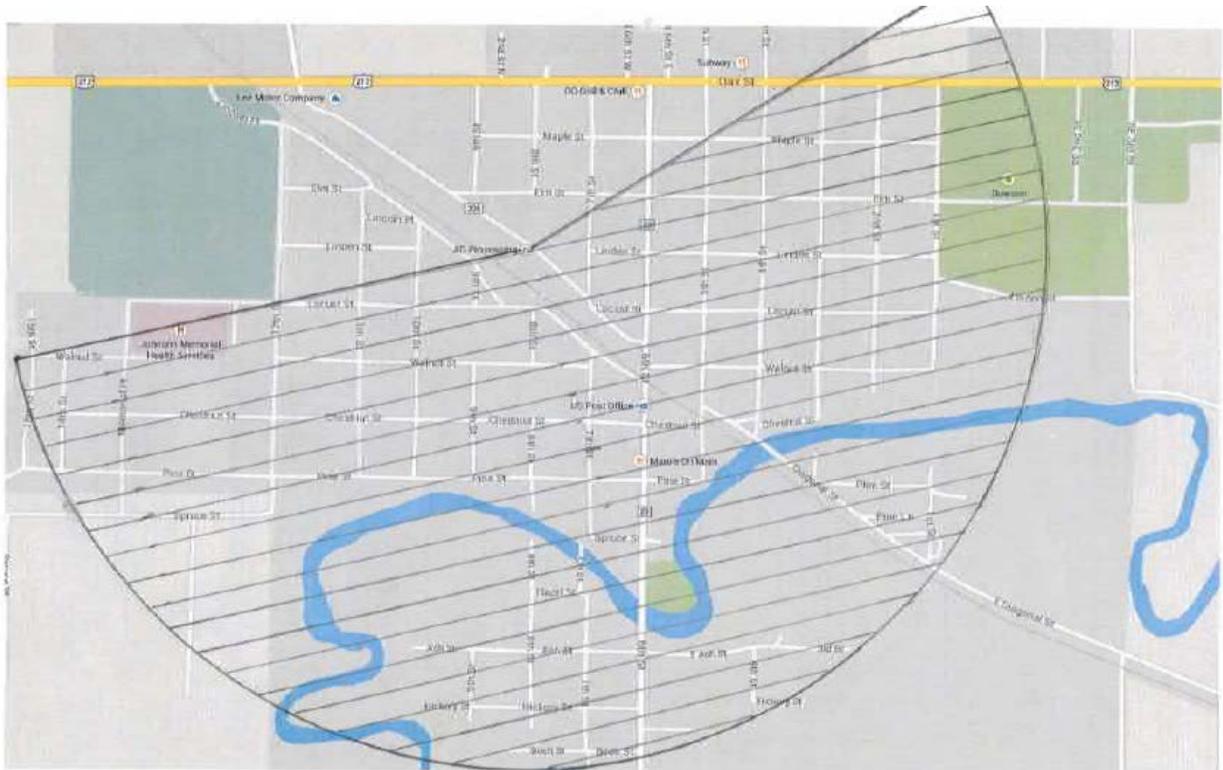
Respectfully submitted,

John Maatz

Lac qui Parle County – Dawson External BDA Proposal

RACOM Bid - \$35,345.57

The goal of the project is to improve in-town Public Safety radio coverage. To do this at a reasonable cost it was necessary to find an existing structure to mount the system on. The location picked seems to have the least tradeoffs between coverage area and improved signal strength. The edges of the community is low density housing which we found during our survey had a common signal of -100 dBm to -90 dBm. In the downtown business district and school area the signal strength was considerably lower, which is where we focused our attention.



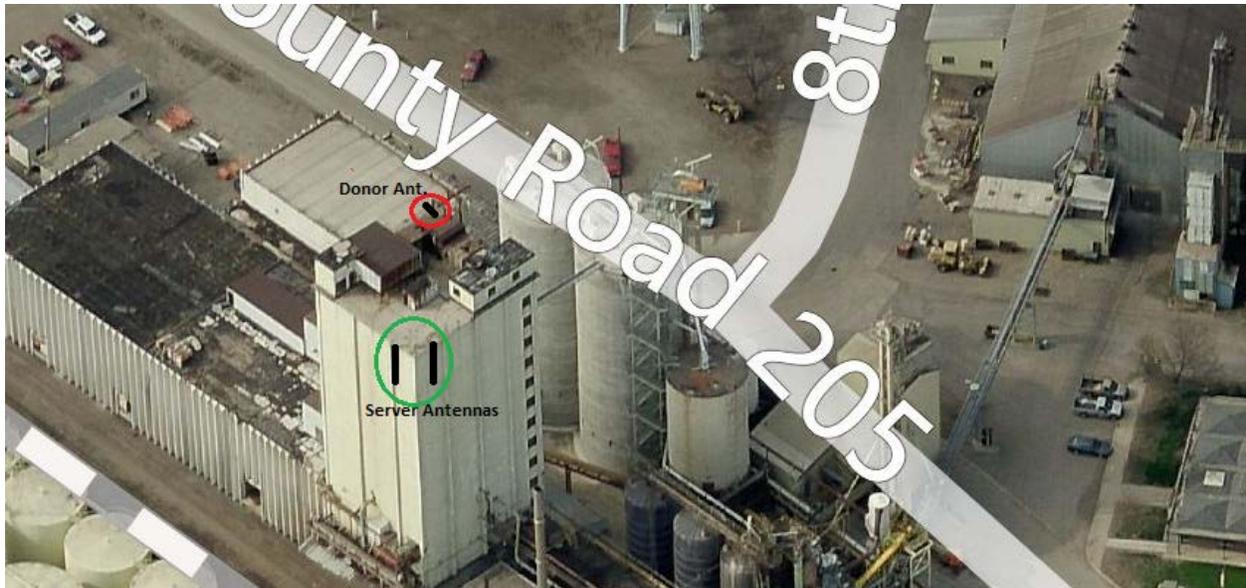
We would put a BDA on top of the AGP building, donor antenna pointed at Madison, and two server antennas pointed southeast and southwest. We expect a 20 dBm signal improvement in the shaded area.



Donor antenna.



Server antennas.



All antennas would be mounted to the side of the building with custom brackets. The reasons for mounting to the side of the building are; provide isolation between donor and server antennas, be out of the way of maintenance workers, and future building changes.



The BDA would be mounted inside the penthouse. The RF coax cables will have in-line lightning protectors attached to a ground bar.

The total cost for this project is \$35,345.57. This quote will be honored for 60 days. No major price changes are anticipated beyond that time. Please do note that this project will require Regional and State Radio Board approval also.

Thank you.

Marv Kuipers

RACOM 1521 Oxford ST, Worthington MN 56187

marv.kuipers@racom.net

Office 507-376-4250 Cell 507-370-4752



ISANTI COUNTY SHERIFF'S OFFICE

May 7, 2015

Metro Emergency Services Board

Isanti County is requesting a resolution authorizing Isanti County to replace the existing Motorola Gold Elite with a four position Motorola MCC7500 console system. There will be three dispatch positions and a patch position. Eleven existing conventional resources will be connected to CCGW ports; the existing remote position at the Emergency Operations Center will not be replaced.

Isanti County will also acquire one MCC 7100 remote capable radio console configured in a laptop. This laptop will access the ARMER system through a proxy server that will be placed at the Isanti County dispatch site. Connection will be done using a VPN connection to the Isanti County firewall and then to the Motorola firewall to gain access to the Zone Controller.

The current Gold Elite Console IDs will of 144 will be replaced with 5 MCC7500 IDs. There are no additional talkgroups being requested so the existing number of authorized talkgroups will remain at 31.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Caulk", written over a horizontal line.

Sheriff Christopher L. Caulk

Sheriff Chris Caulk • Chief Deputy Lisa Lovering
Isanti County Law Enforcement Center
509 - 18th Avenue SW • Cambridge, MN 55008-9386
(763) 689-2141 DL: (763) 691-2408 Fax: (763) 689-3691

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From: Michael Kahl [<mailto:MikeK@GraniteElectronics.com>]

Sent: Thursday, May 28, 2015 12:46 PM

To: Chris Caulk

Cc: Ron Jansen

Subject: Additional Info on Console Upgrade

Chris, here is the information you requested in regards to the MCC7500 console upgrade:

Conventional Channel Gateway: The MCC7500 will be installed with two 8 port GGM8000 conventional gateways, of which only 11 ports of the 16 will be activated. These CCGWs will also provide analog audio for the logging recorder on the County's primary talkgroups and VHF channels.

T1 Connections: Current connection of the Motorola Gold Elite is utilizing three T1 links over the MNDOT microwave, after the MCC7500 console is in operation, one of these T1 connections will no longer be needed and will be disconnected at the Cambridge tower. Each of the remaining two T1s will be connected to a dedicated Site Gateway that will be placed in service to give a redundant link if possible on the MNDOT microwave.

Gold Elite Centracom Decommission: Once the MCC7500 console is in operation the Gold Elite Console will be shut down and removed from operation. Console IDs will be de-activated.

I would be happy to answer any other questions in regard to this upgrade, please feel free to contact me via any of the following methods.

Michael Kahl

Office 320-252-1887

Mobile 320-980-1948

MikeK@GraniteElectronics.com

**Rice & Steele County
Consolidated Joint Powers Board
Technical Plan**

For

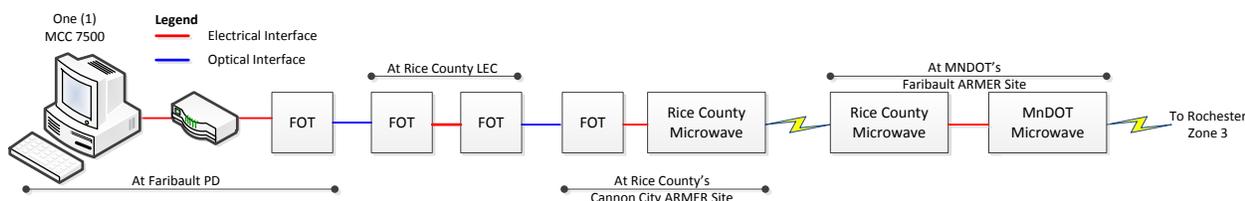
PSAP Participation Plan Amendment on the ARMER Radio System

1. Introduction & Background

In 2010 the Southeast Region and Statewide Radio Board approved the participation of the Rice-Steele Consolidated Joint Powers Board (PSAP) on the ARMER system with four (4) fully equipped MCC 7500 radio positions plus a patching position. This equipment was installed at the primary PSAP location in Owatonna.

Now the PSAP requests approval to add a fifth (5th) MCC 7500 position at a backup location inside the Faribault Police Department. This fifth position would be connected to the Zone 3 master site in Rochester, MN. Proposed connectivity would be established as described in the block diagram below. One (1) T1 is requested on the MnDOT microwave to Zone 3. There will be no local CCGWs associated with the 5th console position. There will be no changes to the previously approved recording mechanisms used at the primary PSAP. No other changes to the previously approved plan for the PSAP are requested. The targeted in-service date for the new, 5th backup console position would be not later than July 30, 2015. The first year's warranty maintenance for the 5th position addition would be via Motorola. The 5th position equipment would be installed in a secure location at the Faribault Police Department to control access to the system. Intended use of the equipment is via the PSAP's previously trained dispatch staff who are already familiar with ARMER system operation and policies.

2. Connectivity Block Diagram



3. Questions & Contact Information

Questions concerning this Plan may be directed to:

For the Consolidated PSAP
Jill Bondhus, Interim Administrator
Rice & Steele County Consolidated PSAP
204 E. Pearl Street
Owatonna, MN 55060
Voice (507) 444-0341
e-mail: jbondus@rsc-psap.org

PSAP's Consultant
Jeff Nelson
PSC Alliance Inc.
7900 International Drive – Suite 300
Bloomington, MN 55425
Voice (612) 216-1502
e-mail: jeff.nelson@psc Alliance.com

Notes:

- 1) Blue font reflects modifications to originally adopted ARMER participation plan.



May 29 2015

Local Repeater Coverage to ARMER. (LRCA)

The purpose of the LRCA is to provide portable indoor coverage in areas where the ARMER signal does not penetrate structures, where the outdoor coverage from ARMER is adequate for portable and mobiles.

ARMER Coverage limitations:

Atwater in Kandiyohi county and Hancock in Stevens county both have the same coverage issues. ARMER signal to a mobile covers the city. ARMER signal coverage in some buildings and outside in town for portables is useable. ARMER signal coverage within brick and metal structures does not work. In this case both towns have Schools with no in building coverage.

System Tested:

We have used a Quantar 800Mhz repeater with an antenna system low enough to give us town coverage, yet contain the signal to the areas that need indoor coverage and a small radius around the town, for our test we used 8TAC94.

A gateway system, consisting of two mobile radios, one on the 8TAC94 and the other on a County ARMER talk group as the interface.

Test Results:

In both cases (Atwater and Hancock) we found no internal buildings that we could not penetrate using the 8TAC94 repeater. The Dispatch centers choose to use a lower County interop talk group which dispatch would monitor, and patch when required. All users inside and outside of the structures understand what channels and "talk groups" to use.

Audio Delays and bonk tones:

A concern of ours was if the audio delays in our system design would cause users on the 8TAC94, ARMER subscriber radios and dispatchers too much delay and make the system unusable. We did not find this to be the case, technically there is a slight delay, but not much more than what users experienced on a VHF repeater system. One drawback we did find is that if an ARMER talk group would be denied, the 8TAC94 user would not know this, as well as the ARMER subscriber or dispatcher not knowing if the 8TAC94 users did hear the talk group traffic.

LRCA/ASR/BDA:

In both of our cases we found the coverage is not bad enough for the Counties to justify an ASR site and use valuable 800 channels. There are too many buildings with poor coverage to implement indoor BDA's. An outdoor BDA system would not guarantee in building penetration.

Frequency to be used and interoperability.

For our test we used 8TAC94 channel which all subscribers have which is good for interoperability even if it is an analog channel. The use of a 8TAC channel makes a strong case for increased coverage within the communities, and would support agencies from across the nation access to dispatch centers. If permitted on nationwide basis it could fill a nationwide access to whatever system each state or territory might. However understanding Region 22 NPSPAC plan, the use of the 8TAC is controlled at the national level and meant only "for interop between agencies not sharing any other compatible communication system, and not meant to be used for routine, daily operations".

Each County was assigned 800Mhz NPSPAC channels that could be used, however some counties have used up their channels. A new licensed channel for each community could be issued at the expense of the 800Mhz spectrum. However in both cases we would forfeit interoperability between agencies.

Therefore we are asking for a Statewide repeater channel to be assigned for the use of the LRCA which could be used by multiple agencies across the state and maintain interoperability, in time through programming of radios.

If there are no state wide repeater channels available, could a 8SOA-R repeater channel be implemented for this purpose across the state, it would again maintain interoperability, in time through programming of radios.

We feel that the use of the LCRA repeater channel will be used infrequently on a daily basis, however provide significant assurance to emergency responders when entering these no coverage areas.

David Sisser, West Central Communications on behalf of Sheriff Dan Hartog of Kandiyohi County and Sheriff Jason Dingman of Stevens County.

StatusBoard CY 2015

	Total Hours Month	Total hours SCHEDULED MAINTENANCE Tues. 0900 - 1100 Wed. 1900 - 2300	Total Hours SCHEDULED Availability	Actual Duration of maintenance Rounded up to nearest hour	Total hours available AFTER scheduled maintenance	UNSCHEDULED OUTAGES Rounded up to nearest hour	TOTAL HOURS AVAILABLE
January*	744	24	720	16	728	0	728
February**	672	24	648	24	648	1	647
March	744	24	720	2	742	1	741
April	720	28	692	8	712	0	712
May	744	24	720	4	740	0	740
June	720	28	692		720		
July	744	24	720		744		
August	744	24	720		744		
September	720	28	692		720		
October	744	24	720		744		
November	720	28	692		720		
December	744	24	720		744		

* January 16-22: URL issues. Some users report unable to access application.

**February 17: URL issues. Some users unable to access application

StatusBoard Monthly Up Time			
Month	% of Time Up	Total Hours in Month	Total Up Time (HRS)
January	98.91%	744	728
February	96.54%	672	647
March	99.73%	744	741
April	98.88%	720	712
May	99.46%	744	740

