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ARMER System

(Allied Radio Matrix for Emergency Response)

ARMER
Allied Radio Matrix for Emergency Response

Biennial Report to the Legislature

March 2009

Prepared by
Minnesota Department of Public Safety
Emergency Communication Networks Division

2009 ARMER Biennial Report

Executive Summary

Established in 2004, the Allied Radio Matrix for Emergency Response (ARMER) Program, administered in coordination with the Statewide Radio Board, manages the implementation of the 700/800 megahertz (MHz) shared digital trunked radio communication system.

The ARMER backbone, which is owned and operated by the Minnesota Department of Transportation (MnDOT), is a robust, scalable, state-of-the-art system that will be shared with every city, county, state agency, tribal government and non-government public safety entity in the state. The ARMER system is the fundamental infrastructure necessary for emergency responders to achieve seamless interoperable communications.

The system has been planned and designed for implementation in six phases. Phases 1 and 2 of the ARMER implementation are in the nine-county Minneapolis–St. Paul metropolitan area. Phase 3, which will provide coverage in 23 additional counties, is currently under construction and nearing completion in central and southeastern Minnesota. With the passage of full funding to complete the ARMER system by the 2007 Legislature, the state Departments of Public Safety and Transportation, with approval from the Statewide Radio Board, are completing the construction of the system in the remaining 55 counties as one project — Phase 456.

The ARMER Program anticipates that a sufficient expanse of the backbone will be in place across the state in 2010 to provide 75 percent statewide coverage. The Statewide Radio Board has set an operating standard for the ARMER system to provide 95 percent mobile coverage in each county of the state by the end of 2012, prior to the Federal Communications Commission (FCC)-mandated narrowbanding deadline.

Statutory Requirement

Minnesota Statutes 403.36, Subdivision 4, requires the Statewide Radio Board to submit a biennial status report to the governor, and the chairs and ranking minority members of the House of Representatives and Senate committees with jurisdiction over capital investment and criminal justice funding and policy.

The report must include a substantive assessment and evaluation of each significant part of the implementation of the statewide public safety radio plan with (1) to the extent possible, an update on risks and mitigation strategies; and (2) quantitative information on the status, progress, costs, benefits, and effects of those efforts.

Background

Planning for a Twin Cities metropolitan area interoperable radio communication system started in the 1980s. In 1993 a request for proposal was developed through the Metropolitan Council for the construction of a regionwide shared radio system in the metropolitan area.

In 2001, a plan was developed to extend the metro system into a statewide system. The original plan called for six phases. Phase 1 was the initial metro-area backbone; Phase 2 was local enhancements to the metro-area backbone; and Phases 3 through 6 provided for the extension of the backbone into Greater Minnesota. Use of the metro system began in 2002 when the City of Minneapolis, Hennepin County, metro operations of the State Patrol and Department of Transportation (MnDOT), Metro Transit, Carver County and several suburban agencies in Hennepin County transitioned on the shared communication system.

There are a number of important factors driving a national effort to coordinate public safety interoperability. Foremost is the inability of emergency responders to communicate with each other at emergency events. Additionally, the FCC narrowbanding mandate will require substantial replacement of legacy communication systems, currently being operated by most local governments and state agencies, prior to 2013.

To address the narrowband requirement, Phase 3 was funded by the Minnesota Legislature in 2005. In 2007, the Legislature provided funding for the completion of the ARMER backbone in the remaining 55 counties in Greater Minnesota. The operating and maintenance costs, and the debt service on the 911 revenue bonds issued to construct the system, are paid for out of the 911 special revenue account.

Costs

Phase 1

The planning and development of Phase 1 began in 1995 with the formation of the Metropolitan Radio Board (MRB). The statute creating the MRB provided that the Department of Transportation would own, operate and maintain the shared trunked radio system. The initial backbone, which included basic communication and interoperability infrastructure, cost approximately $36 million. It was funded by the state and through revenue bonds supported by a dedicated portion of the 911 fees. Phase 1 improvements, which included coverage, capacity, mobile and portable radios, in Carver and Hennepin counties and Minneapolis cost approximately $32 million. This was paid for by the local entities.

Phase 2

Phase 2 implementation was aided by the allocation of $7.5 million from 2003 federal Homeland Security funds, which purchased public safety portable and mobile radios for local communities. Additional funds from the Minnesota Department of Public Safety (DPS) Division of Homeland Security and Emergency Management (HSEM) were allocated to cover a portion of local costs for developing the interoperable radio system.

Phase 3

In 2005, the Legislature appropriated $45 million for Phase 3 construction. Another $9.5 million was made available to local governments for local enhancements in Phase 3. The same funding package also contained $8 million in local enhancement grants for Phase 2 enhancements for Chisago, Isanti, Scott and Washington counties in the metro area.

Phase 456

The state has authorized $186 million for the completion of the Phase 456 backbone with an additional $3.75 million appropriated for advanced Phase 456 site work. The total available funding for the Phase 456 is $189.75 million.

System design criteria will increase mobile coverage reliability to 95 percent county-by-county, resulting in an additional 40 towers (183 sites to 224 sites) in Phase 456 and nine additional towers in Phase 3.

Construction Budget Status as of March 9, 2009

Project Funding	Original Budget	Spent to Date	Balance Remaining	Estimate to Complete	Contingency
Phase 3	$45,000,000	$33,262,811	$11,737,189	$11,737,189	$0
Phase 456 Advance Funding	$3,750,000	$470,772	$3,279,228	$3,279,228	$0
Phase 456 (FY 09)	$62,000,000	$11,574,028	$50,425,972	$50,425,972	NA
Phase 456 (FY 10)	$62,000,000	$0	$62,000,000	$62,000,000	NA
Phase 456 (FY 11)	$62,000,000	$0	$62,000,000	$46,885,110	$15,114,890
Total	**$234,750,000**	**$45,307,611**	**$189,442,389**	**$174,327,499**	

Bonds Sold in 2008

In 2008, the state of Minnesota issued and sold 911 revenue bonds for the ARMER system through CITI Financial totaling $42,085,000. The bonds will accrue at 4.6 percent over a 15-year term. The bonds, which received a high 3-A rating from all bond-rating agencies, are backed with a dedicated funding source in the 911 Special Revenue account. The rating and sustainable funding contributed to the sale of all the bonds even in the current challenging economic period.

Bond Sale in 2009

MnDOT, which is building the system, and DPS are determining cash flow needs for 2009. The departments are working with Minnesota Management and Budget (MMB) to arrange a bond sale for later this year.

911 Fees

The 2007 legislation permitted DPS to raise the 911 fee 10 cents on July 1, 2008, 2009 and 2010. The fee, currently 65 cents, can be raised up to 30 cents over the three years not to exceed 95 cents per 2007 Minnesota Session Law, Chapter 54. DPS chose not to raise the fee in 2008 because there was no need at that time to generate revenue for debt service on bonds. It is expected that DPS will raise the 911 fees by 10 cents on July 1, 2009.

Status and Progress

In 2005, the Minnesota Legislature provided funding for the continued implementation of the ARMER backbone in 23 counties of central and southeastern Minnesota. Implementation is underway and will be substantially complete in 2009. Implementation in the remaining 55 counties of the state was authorized in 2007; MnDOT has completed the detail design and began initial implementation in July 2008.

In early 2009, following Scott and Washington counties' migration, all seven metro-area counties and respective cities will be operating on the ARMER system. In Phase 3, Olmsted and Stearns counties, including the cities of Rochester and St. Cloud, are operating on the ARMER system. In southeast Minnesota, the counties of Freeborn, Goodhue, Wabasha, and Winona are in the process of migrating to the ARMER system. In central Minnesota, Benton, Douglas, Grant, Kandiyohi, Otter Tail, Sherburne and Wright counties are in the process of transitioning
to ARMER. The balance of Phase 3 counties are in the process of studying their radio communication options and have yet to make a business decision related to their radio communications future.

With the authorization and funding to complete the statewide implementation provided by the Legislature in 2007, and the ARMER Program having completed the studies required by that legislation, Phases 4, 5 and 6 were rolled in to a single phase referred to as "Phase 456." In that phase, Itasca County built a compatible infrastructure that has been integrated into the system.

The remaining counties in Phases 456 have partnered with the ARMER Program to complete county-specific assessments of their communications systems. The assessments will assist county boards and emergency responders to make informed business decisions related to updating their radio communications systems prior to the FCC-mandated narrowbanding deadline of January 1, 2013.

The map on page 5 shows the planned location of the more than 300 towers that will comprise the backbone of the ARMER system once implementation is complete. As owner and operator, MnDOT is at various stages in the site development process throughout Phases 3 and Phase 456. The process includes land acquisition, construction of towers, and equipping the towers with microwave and radio frequency equipment. Approximately one year to 20 months is required to construct an operable tower and bring it online.

The ARMER Program anticipates that a sufficient expanse of the backbone will be in place across the state in 2010 to provide 75 percent statewide coverage. The goal of the ARMER Program is to provide 95 percent mobile coverage in each county of the state by the end of 2012, prior to the FCC-mandated narrowbanding deadline.

ARMER-specific milestones and targets are provided for the remaining elements in Phase 3 and Phase 456.

Milestone	Total Sites	Sites Not Started	Sites In Progress	Sites Complete	Completion Target
Phase 3 ARMER Backbone Construction	59 Sites				
Tower Site Acquisition	59	0	0	59	Complete
Tower Construction and Site Development Work	59	0	19	40	See targets below
Microwave Connectivity and RF Deployment	59	2	28	29	See targets below
Added Sites for 95% Coverage	8	4	4	0	As needed
Phase 456 ARMER Backbone Construction	224 Sites				By July 2009
Tower Site Acquisition	224	0	133	91	
Tower Construction and Site Development Work	224	134	13	77	
Microwave Connectivity and RF Deployment	224	147	63	14	50

Controlled Caution Critical

Completion Targets

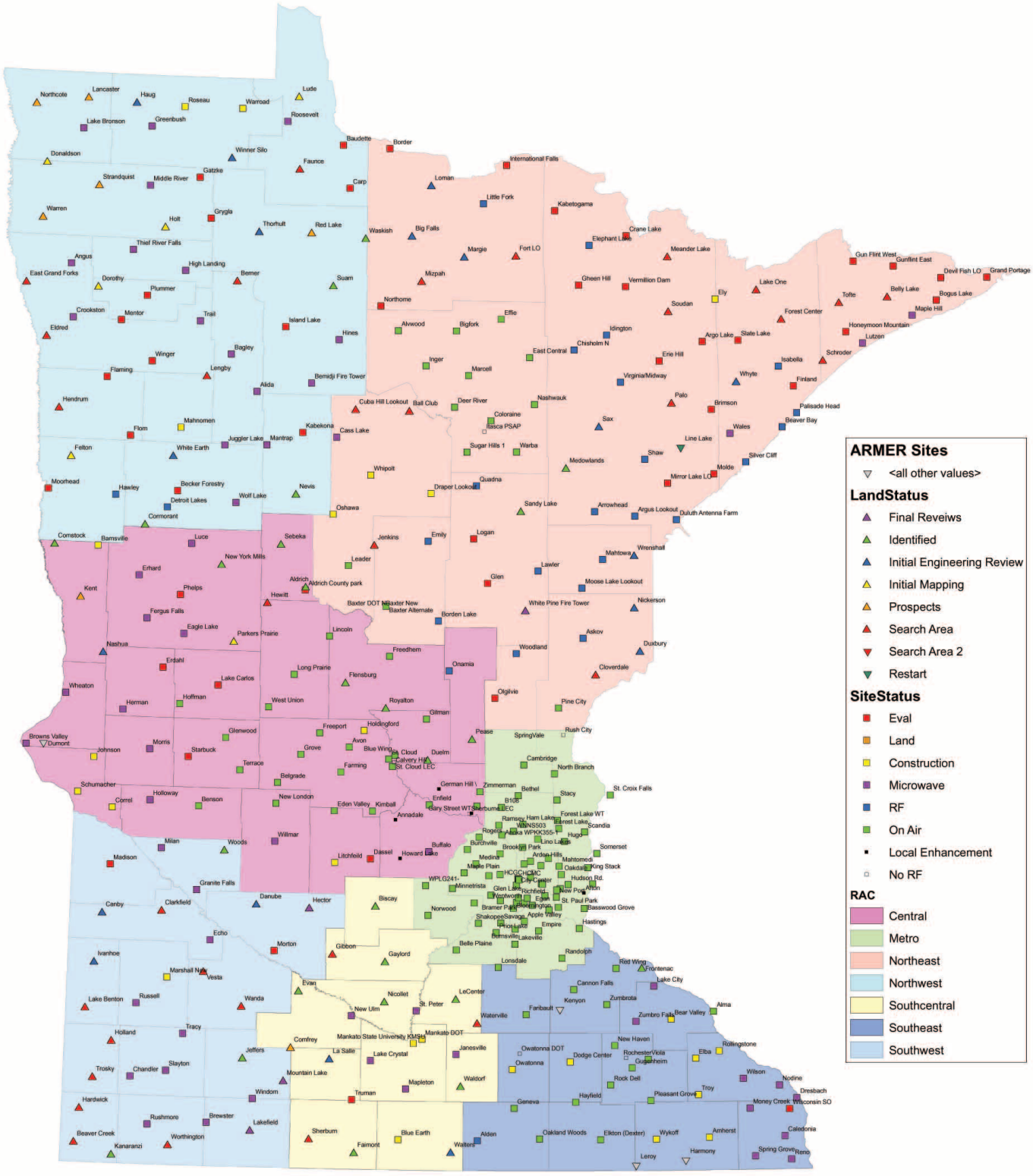
Phase 3

- 100% site acquisition completed by September 2008
- 100% tower site work completed by January 2009
- 100% microwave and RF deployment by April 2009

Phase 456

- 50 towers complete by July 2009 (FY 09)
- 50 more towers complete by July 2010 (FY 10)
- 50 more towers complete by July 2011 (FY 11)
- 50 more towers complete by July 2012 (FY 12)
- 24 more towers (100%) complete by July 2013 (FY 13)

Proposed ARMER Tower Sites



Risks and Mitigation Strategies

With the passage of the funding package for Phase 456, the Legislature required the Department of Public Safety (DPS) to validate MnDOT's cost estimates, to ensure the final phases could be completed for the $186 million authorized in the bill.

DPS hired L. Robert Kimball & Associates in 2008 to perform an independent cost audit for Phase 456. The cost audit was required before the 911 fee, which is the funding mechanism to pay the debt service on the bonds, could be raised.

Kimball developed a cost projection model based on the factors most likely to affect MnDOT's cost estimates.

Kimball determined that the following factors can impact ARMER costs:

- Motor gasoline
- Steel mill products
- Real estate costs
- Consumer price index
- Employment cost index
- Producer price indexes for ready-mix concrete, materials and components for construction, and long-distance freight.

A number of potential factors represent risk, which if realized, pose greater risk. Examples include rising cost of steel and other resources, and legislative utilization of funds from the 911 Special Revenue Account for purposes other than emergency networks. These in turn could result in the loss of the 3-A rating on the 911 revenue bonds issued to fund ARMER construction. Lower bond ratings could impede the sale of bonds in the current economic environment or could result in prohibitive interest rates which would lead to a lack of funding to cover the debt service on the bonds.

It should be noted, however, that in the current economic climate, the price of significant resources such as fuel, steel and real estate have stabilized or eroded and that pattern is likely to continue for the near future.

The DHS National Emergency Communications Plan also defines a series of federal goals that establish a minimum level of interoperable communications. Lack of compliance with the goals and respective deadlines carries risk, primarily in federal support. The three strategic goals are:

- By 2010, 90 percent of all high-risk urban areas designated within the Urban Area Security Initiative (UASI) are able to demonstrate response-level emergency communications within one hour for routine events involving multiple jurisdictions and agencies.
- By 2011, 75 percent of non-UASI jurisdictions are able to demonstrate response-level emergency communications within one hour for routine events involving multiple jurisdictions and agencies.
- By 2013, 75 percent of all jurisdictions are able to demonstrate response-level emergency communications within three hours of a significant event as outlined in national planning scenarios.

Additional Considerations

- The Phase 456 build-out of 224 sites is scheduled to be near completion by December 31, 2012. However, it is estimated that approximately 20 sites may not be completed by that date due to complications with acquiring land. Consequently, select site acquisition and equipment purchase will be delayed until imminent need is realized.
- The current prices for microwave equipment to be purchased are valid through May 2010.
- Pricing with Motorola for Phase 456 will remain stable as benefited by a contract extension through June 2011.
- Any costs for removing existing equipment at tower sites will be funded from MnDOT's operating budget except for existing microwave dishes that are being replaced. Additionally, all site plots are sufficient for their purposes.
- MnDOT indicated that they would maintain spare parts and components at their 17 service shops. Spare parts have not been included in budget; any requisite spare parts will be purchased from contingency funds or other funding sources.

Benefits

The ARMER Program will ultimately provide Minnesota with the infrastructure and resources to allow its emergency responders to communicate with each other at any time regardless of the nature or scope of an event.

The availability and efficiency of this specific communication structure — interoperability — is not only a safety issue for emergency responders, but it also can be a life-or-death issue for those requiring assistance.

Interoperability is also a force multiplier; it allows personnel that would otherwise be dedicated to communications to be used more effectively and efficiently in an event response.

Local and state government investment in the ARMER system has yielded a high return relating to performance at large-scale planned and unplanned events (see sidebar). However, it is most critical to note that the system provides continual, day-to-day benefits to emergency responders on routine calls. While the benefit the firefighter gains by being able to communicate three floors below ground or the benefit the police officer has to instant communication with officers from another jurisdiction in a felony pursuit is not easily quantifiable, ARMER does result in enhanced public safety for emergency responders as well as the citizens they serve.

A Tale of Two Cities

The I-35 Bridge Collapse

On August 1, 2007, the I-35W bridge catastrophically failed during evening rush hour, plunging dozens of vehicles and occupants into the Mississippi River and onto its riverbanks.

The ARMER system, a shared region-wide, two-way radio infrastructure was in place for virtually all state and local public safety agencies in the Twin Cities metro area when the bridge collapsed. During the peak hour of activity surrounding the initial response and rescue efforts (7–8 p.m., August 1), more than 16,000 radios were turned on and linked to the ARMER system in the Twin Cities area. These radios accessed the ARMER system over 27,000 times and utilized more than 2,500 minutes of radio airtime. This represents more than twice as much activity on the system as during the peak drive-time traffic period immediately preceding the bridge collapse

While the bridge collapse will forever be remembered for the tragic loss of 13 lives and hundreds of injuries, the emergency response community will remember it as the landmark large-scale event in which for the first-time emergency responders from more 100 jurisdictions were able to effectively communicate and coordinate life-saving activities. This communication was made possible by the ARMER system.

The ARMER System I-35W Bridge Collapse Report reviewed the performance of ARMER following the public safety response to the bridge collapse and offered the following findings:

Emergency responders and dispatchers operating on the ARMER system who responded to the survey reported:

- 96 percent felt the ARMER system performed well during the incident
- 95 percent felt the digital audio clarity (including signal coverage) of ARMER was good

Participants in the focus group agreed:

- "Without the ARMER system, this incident (response) would have been a catastrophe."
- "We have removed communications as an element of failure in disasters. Now we can only blame our use of the system, not the technology."

Response to the I-35W bridge collapse documents that Minnesota is in compliance with the U.S. Department of Homeland Security (DHS) National Emergency Communications Plan (NECP), 2010 goal, and on track to comply with the 2011 and 2013 goals.

A Tale of Two Cities

2008 Republican National Convention

National attention was focused on Saint Paul when the city hosted the 2008 Republican National Convention (RNC) for four days in September 2008. The event drew 45,000 visitors — delegates, dignitaries and media — as well as thousands of activists and protestors.

As with any modern political convention, security and massive logistical coordination were the pre-eminent concerns. Nearly 3,500 law enforcement personnel from 60 local, state and federal agencies contributed to 24-hours-a-day security efforts at venues across the metro area. Participating personnel represented police departments and county sheriffs' offices from across Minnesota, as well as the State Patrol, Department of Natural Resources, FBI and U.S. Secret Service

The RNC law enforcement command staff primarily utilized 18 ARMER system talk groups over the course of the week. During the convention period, no communication issues were identified. Reports from participants in the command center lauded the audio clarity and system functionality. No elements of the ARMER system were taken out of service and the system functioned as it does on a daily basis.

With the exception of a few operational user issues which typically were training issues, the RNC was considered to be a non-event for communications, meaning no system issues were identified.

Conclusion

Then and Now

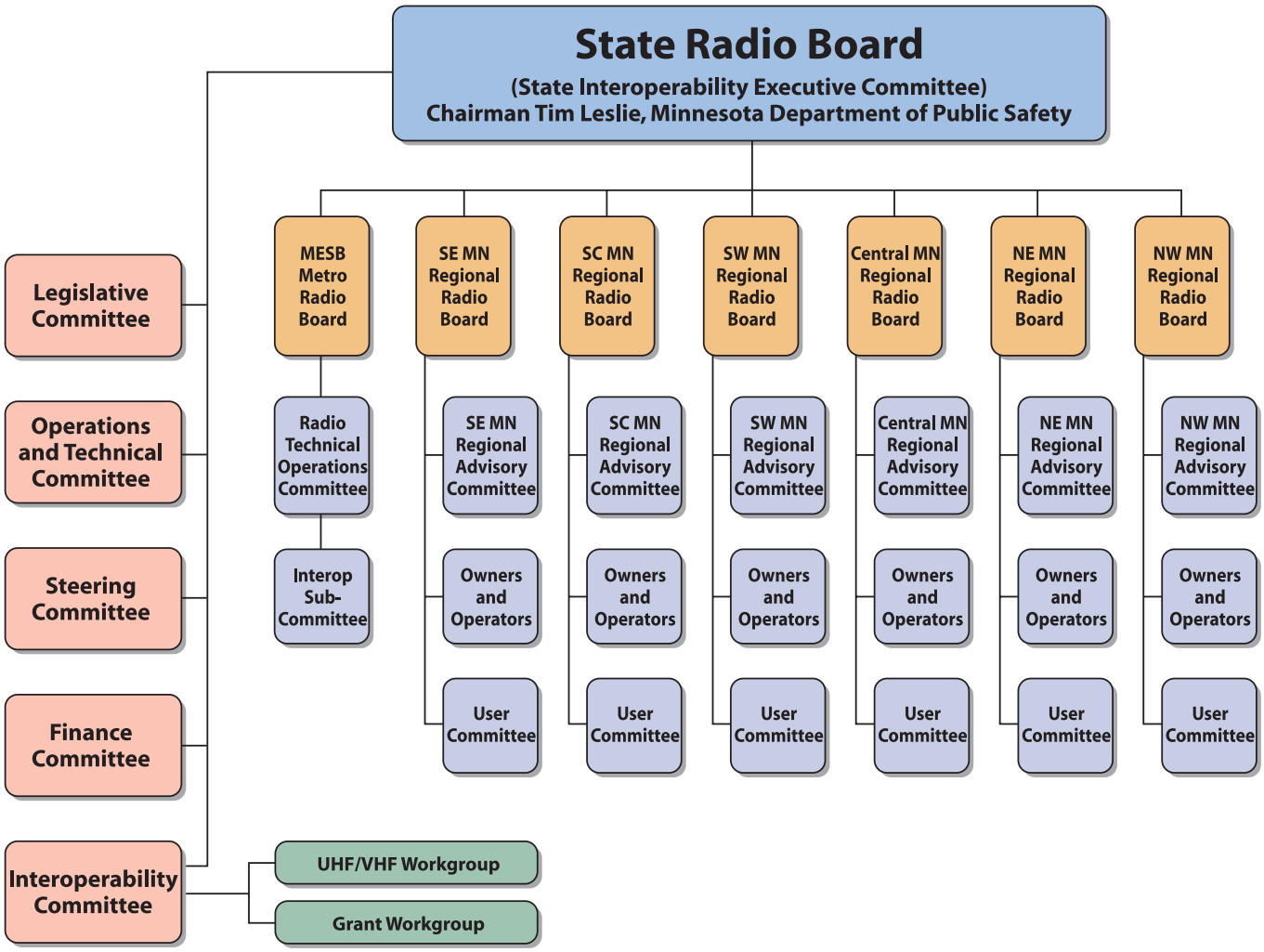
Eighteen months ago, Minnesota had two regional radio boards: the Metropolitan Emergency Services Board and the Central Minnesota Regional Radio Board.

Also only 18 months ago, only five counties were operating on the ARMER system. Today, more than 20 counties are on the ARMER system or have committed through county board resolution to join. The level of local participation puts Minnesota in the top five states in the country in terms of local and state collaboration.

Today, all 87 counties and a number of cities are participating in regional governance structures. These legally recognized joint powers boards are made up of elected county commissioners and city council members. The boards' mission is to fill the interoperability gaps on a regional level and manage local migration to the ARMER system. The Regional Advisory Committees and Regional Radio Boards are the core of Minnesota's governance structure (see chart on next page).

Local officials across our state readily recognize that a lack of communications interoperability is a significant public safety issue for their citizens and emergency responders. As a result, many elected officials have willingly embraced participation on joint powers boards, and joint powers agreements have been reached among many county and city attorneys — clear testament to the value and importance of the ARMER system and the goal of achieving seamless statewide interoperability.

In its continually forward-moving progress of communications interoperability as evidenced by the ARMER system, the state of Minnesota is a nationally acknowledged leader. At the request of the National Governors' Association, Scott Wiggins, director of the Department of Public Safety Emergency Communications Network (ECN) presented on Minnesota's governance structure at the association's annual meeting in New Orleans. Wiggins has also met with representatives from the states of Iowa and Missouri as they attempt to model their governance and radio systems on Minnesota's success. Additionally, ECN staff has addressed inquiries about the ARMER system and governance from the states



of Arizona, Arkansas, Idaho, Montana, Nebraska, Oregon and Virginia.

Of particular note, the Department of Homeland Security Office of Emergency Communication (DHS-OEC) has asked ARMER representatives to share best practices before a national audience at a conference on inter-operable communications in Chicago, April 2009. The DHS-OEC has also requested Minnesota's Statewide Radio charter and the joint powers agreements created by the regional radio boards as models for the rest of the county.

It is of particular financial note that in the worst lending marketplace in decades, the ARMER system has been able to keep moving forward because the debt service for its bonds is backed by the 911 funds, a dedicated source of funding.

Most other states and entities trying to replicate ARMER's functionality have relied heavily on federal influence and funding to move their processes along. In Minnesota, the implementation was initiated long before the well-documented communications problems of September 11 in New York City, with no federal directive or funding. The availability of federal funding incentives has allowed the state and local agencies to accelerate the already envisioned implementation and growth of ARMER.

Resolving communications interoperability gaps is fundamentally changing how emergency services are delivered across Minnesota — and the success to-date as well as future success is only possible with the continued support of Minnesota's state and local elected officials.

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