



Alaska Land Mobile Radio Communications System

2011 Business Case Update

Version 5

October 14, 2011

Table of Contents

Table of Contents	i
Document Revision History	ii
Acronyms and Definitions.....	iii
1.0 Executive Summary	1
2.0 Operational Benefits	4
2.1 National Standards.....	5
2.2 The Case for Interoperability.....	5
2.3 Stakeholder Requirements	6
2.4 Capabilities	8
3.0 Economic Feasibility.....	10
3.1 Efficiency of Operations	10
3.2 Shared Cost Savings.....	10
3.3 Cost Benefit	11
3.3.1 2005 TCO Study.....	11
3.3.2 2008 TCO Study.....	12
3.4 Economic Analysis (EA)	12
3.5 Separation Study.....	13
3.6 Benefits of the Shared System Approach	14
4.0 Risks and Limiting Factors.....	15
4.1 Operational Risks.....	15
4.1.1 Loss of interoperability.....	15
4.1.2 Failure to Meet the FCC Mandate	16
4.1.3 Training.....	16
4.2 Economic Risks.....	16
4.3 Political Risks	18
4.4 Technology Cost Risks.....	18
4.5 Other Risks	19
5.0 Conclusions and Recommendation	20



Document Revision History

Name	Date	Reason for Changes	Version
Shafer, Sherry	5/11/2009	Approved by the User Council – Final; forwarded to the Executive Council for acceptance.	3
Shafer, Sherry	6/17/2009	Accepted by the Executive Council.	3
Shafer, Sherry	10/20/2010	Annual review/update. Approved by the User Council - final.	4
Shafer, Sherry	10/14/2011	Annual review/update. Approved by the User Council - final.	5



Acronyms and Definitions

Alaska Federal Executive Association (AFEA): federal government entities, agencies and organizations, other than the Department of Defense, that will operate on the shared ALMR system infrastructure.

Alaska Land Mobile Radio (ALMR) Communications System: the ALMR Communications System, which uses but is separate from the State of Alaska Telecommunications System (SATS), as established in the Cooperative Agreement.

Alaska Municipal League: a voluntary non-profit organization in Alaska that represents member local governments.

AST: Alaska State Troopers

Department of Administration (DOA): a State of Alaska (SOA) department that maintains the SOA Telecommunication System (SATS) and provides information technology (IT) and communications technical support to state agencies.

Department of Defense – Alaska: Alaskan Command, US Air Force and US Army component services operating under United States Pacific Command.

Executive Council: the ALMR Executive Council which is made up of three voting members and two associate members representing the original four constituency groups: the State of Alaska, the Department of Defense, Non-DOD Federal agencies (represented by the Alaska Federal Executive Association), and local municipal/government (represented by the Alaska Municipal League and the Municipality of Anchorage).

Federal Communications Commission (FCC): for the purposes of ALMR, the Federal level governing body that approves the use of commercial, maritime, state, local and other agencies that are not a part of the Department of Defense or other Federal agencies radio frequency spectrum through the issuance of radio station authorizations once coordination with all potentially affected agencies has been completed. The approvals will in most cases (exceptions might be waivers or special temporary authority) be for use of a particular portion of a frequency band that has been pre-authorized through the frequency band table of allocations. In addition, the FCC maintains the communications tower registration program.

Help Desk: where repair, maintenance and programming issues/problems are reported; under the ALMR System Management Office.

Local Governments: those Alaska political subdivisions defined as municipalities in AS 29.71.800(13).

Member: a public safety agency including, but not limited to, a general government agency (local, State or Federal), its authorized employees and personnel (paid or volunteer), and its service provider, participating in and using the System under a Membership Agreement.

Mobile Radio: a radio that is installed in a vehicle and has a medium to high power output.

Municipality of Anchorage (MOA): the MOA covers 1,951 square miles with a population of approximately 278,000. The MOA stretches from Portage, at the southern border, to the Knik River at the northern border, and encompasses the communities of Girdwood, Indian, Anchorage, Eagle River, Chugiak/Birchwood, and the native village of Eklutna.

Operations Management Office (OMO): develops recommendations for policies, procedures, and guidelines; identifies technologies and standards; and coordinates intergovernmental resources to facilitate communications interoperability with emphasis on improving public safety and emergency response communications.

Party/Parties: one or more Parties who have signed the Agreement. The Parties to the agreement are: Department of Defense - Alaska, the Alaska Federal Executive Association, the State of Alaska Department of Administration's commissioner or commissioner's designee, respectively or collectively.

Service Level Agreement: the Service Level Agreement (SLA) outlines the operations and maintenance services as required by the User Council membership for the sustainment and operation of the ALMR infrastructure. The performance metrics contained in the SLA describe the maintenance standards for the ALMR system infrastructure. ALMR cost share services are also outlined in the SLA.

State of Alaska (SOA): the primary maintainer of the SATS (the State microwave system), and shared owner of the System.

State of Alaska Telecommunications Systems (SATS): the State of Alaska statewide telecommunications system microwave network.

System: the ALMR Communications System, as established in the Cooperative Agreement, and any and all System Design/System Analysis (SD/SA) and System Design/System Implementation (SD/SI) documents.

System Management Office (SMO): the team of specialists responsible for management of maintenance and operations of the System.

User/Member: an agency, person, group, organization or other entity which has an existing written Membership Agreement to operate on ALMR with one of the Parties to the Cooperative Agreement. The terms user and member are synonymous and interchangeable.



User Council: the User Council is responsible for recommending all operational and maintenance decisions affecting the System. Under the direction and supervision of the Executive Council, the User Council has the responsibility for management oversight and operation of the System. The User Council oversees the development of System operations plans, procedures and policies under the direction and guidance of the Executive Council.

1.0 Executive Summary

The Alaska Land Mobile Radio (ALMR) Communications System Operations Management Office (OMO) is required to conduct an annual review/update to the ALMR Business Case. The purpose of the Business Case is to examine the ALMR Cooperative Partnership and to validate its continued existence as the appropriate solution for Alaska's interoperability needs, and whether that partnership should continue as the provider of shared, interoperable, land mobile radio (LMR) service to Alaska's emergency first responders within its coverage area.

The ALMR System:

- Achieves the highest level of the U. S. Department of Homeland Security (DHS) SAFECOM Continuum guideline for interoperability and is in the top five percent of systems nationwide
- Robustness of the infrastructure, services provided, and System performance validate its cost reasonableness
- Achieves regulatory compliance of Project 25 (P25)/Telecommunications Industry Association (TIA) 102-A standards for narrowband migration and equipment for all member agencies
- Reduces costs for narrowband migration, particularly for the State of Alaska, through Federal funding/contribution of Department of Defense (DOD) assets for System development
- Negates the need to replace legacy equipment to meet narrowband standards for local agencies by providing a narrowband compliant infrastructure for use
- Promotes economy of scale/efficiency through the use of shared spectrum and infrastructure agreements between the DOD and the State of Alaska (SOA) resulting in reduced costs for user agencies
- Aligns State/local government agencies to be eligible to receive grant funding from DHS
- Meets user agency needs for day-to-day communications and interoperability in multi-agency, multi-jurisdiction responses

The Executive Council (EC), formally chartered in 1997, has operated this cooperative partnership, not just for narrowband migration, but also for improving public safety communications and interoperability¹ throughout Alaska. The partnership was, and still is, responsible for assessing, assembling, and consolidating requirements, drafting and submitting plans, agreements, budget actions, and procurement actions to provide a common interoperable and cost-effective LMR service that is compliant with Federal, State and local regulatory guidance and is responsive to the mission needs of all participating agencies in the State of Alaska.²

¹ Interoperability is defined by the FCC as "...an essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results."

² Charter for the Alaska-Wide Land Mobile Radio Executive Council, April 10, 2003

Although ALMR, as initially planned, is not fully implemented, its coverage includes all major highways and over 80 percent of the State's population. Additionally, the ALMR P25, trunked, digital, voice-over-Internet Protocol (VoIP) technology provides the capability to also pass real-time data such as maps, profiles, telemetry data, and photographs, which surpasses traditional conventional systems that only allow transmission of voice.

Because ALMR is a shared system utilized by the DOD, all users enjoy the benefits of security requirements maintained at the highest level. It also provides users the ability to selectively encrypt communications, either manually or through over-the-air re-keying (OTAR). Prior to implementation, almost all law enforcement systems operated without encryption, potentially exposing sensitive transmissions to interception by non-law enforcement personnel.

ALMR has focused on developing a system that not only reflects the SAFECOM Continuum, but also provides Alaska's emergency first responders from the DOD, Federal Non-DOD agencies, SOA, tribal governments, and local agencies with a capability to talk day to day on the same radios they use during catastrophic events involving multi-agency, multi-jurisdictional responses.

This capability has been tested and proven through numerous joint exercises, as well day-to-day operations. The technology employed meets the Federal mandates and provides greater capabilities than the previous legacy system. At the end of 2010, the System supported 106 agencies utilizing 14,428 subscriber units. Additionally, supported voice and data transmissions were 9,833,178 and 3,925,293, respectively, with a less than approximately two tenths of a percent system busy rate.

Overall, ALMR has proven to be the logical solution to Alaska's interoperability needs from the perspective of its operational capabilities in meeting national standards, stakeholders' requirements, interoperability training opportunities, System coverage and security, and shared cost savings benefits.

To properly assess the value and benefit gained from becoming, and continuing as, an ALMR member, agency decision makers need to understand the benefits derived from being on the System. These same decision makers must also ensure their funding bodies understand that any costs that may be associated with membership are justified by the level of service and interoperability achieved with other agencies and that the services these agencies provide via ALMR benefit the citizens of the State.

The fact that ALMR provides significant value, meets public safety operational requirements and is reasonably priced compared to other separate systems and alternatives has previously been supported by stakeholder-substantiated opinions in face-to-face interviews and on in-depth written surveys, and based on experience and analysis.³

³ Alaska Land Mobile Radio (ALMR) Economic Analysis (EA) Executive Summary, 5 March 2009, Tecolote Research, Inc., Pages 1-2.

The following critical, success factors were identified through these interviews and validate the need for ALMR.

- **Interoperability** – the ability to seamlessly and effectively communicate both internally within the agency and externally to outside agencies on demand, in real time, when needed and as authorized
- **Efficiency of operations** – the ability to respond efficiently to day-to-day and emergency operations
- **Expanded coverage** – ability to provide communication coverage to areas not previously covered by the original legacy radio systems
- **Expanded capabilities** – the ability to provide better information through advanced technology
- **Reduced risk** – improved communications reduces the risk to the general populace and to public safety first responders
- **Shared cost savings** – the ability to reduce the costs associated with technology by sharing it with multiple agencies

The contributions of all parties involved deliver a system that is an economically sound solution, whose total benefit and capability could not be obtained separately by any major stakeholder group without considerable capital and sustainment costs. Contribution by any one of the stakeholders brings economic benefit to all others.

When the ALMR System transitioned to operational status on July 1, 2008, the ALMR Cost Share Cooperative Agreement established an approach and method for cost share by the parties. The cost share approach states the owner of the infrastructure equipment will pay for the maintenance of that equipment in accordance with the requirements defined in the SLA. The cost share method states the costs of the Operations Management Office and the System Management Office will be shared 50/50 between the Federal government (meaning DOD and AFEA) and State/Local government (meaning SOA and the Local governments that SOA represents). Federal agencies, as well as State and Local governments, were to develop a method to apportion the costs among themselves.

These conclusions can be drawn:

- The cooperative partnership is a sound solution for Federal, State and local government agencies, both operationally and financially
 - ALMR is in compliance with national policy for LMR systems, which provides a robust product with notable benefits
 - Stakeholders, even those with pockets of responsibility where a less robust system might be sufficient, recognize and appreciate the benefits and the perceived value as highly desirable
- The cost of separating is greater than the cost of maintaining ALMR
 - Economic analysis demonstrates that it is more valuable to all stakeholders, due to economies of scale, to retain the current ALMR cooperative partnership than to operate and maintain separate systems

- Stakeholders derive great benefits, such as technical expertise, narrowband compliance, and greater levels of interoperability they could not achieve autonomously

However, the future funding of ALMR, and thus the cooperative, is in question. The U.S. Army is divesting itself of RF equipment housed in 41 SOA sites beginning January 1, 2012 and ending June 30, 2012. Although, the State has agreed to accept the equipment from the initial 13 sites, long-term issues of cost share and sustainment, decisions on how governance may change, at what level maintenance will occur, and how this will affect future participation by the agencies currently using the System have yet to be addressed.

Notwithstanding the changes currently underway, this Business Case update still validates the shared ALMR System approach is still the best solution to meeting a majority of Alaska's public safety first responder interoperability needs, based on both the operational and economic benefits it provides to the users and the stakeholders, and should be sustained, maintained and fully funded.

2.0 Operational Benefits

The Business Case, and its annual updates, addresses the operational and economic benefits of ALMR. It does this by analyzing the capabilities agencies had before, compared to what they have now, the cost to sustain the current level of performance/technology⁴, the cost to separate the System⁵, and the many additional risks/costs produced by such a separation.

Today, more than ever, the need for communications interoperability between Federal, State, tribal and local government public safety entities plays a significant role in the choice and implementation of technologies to support their communications needs. National and State events continue to create awareness at all levels of government that interoperability is required for day-to-day, mutual aid, and emergency task force operating environments.

Strength, in improving interoperability, is built by working together with agencies and jurisdictions and with open, equitable discussions among leadership and stakeholders. In Alaska, agencies from all levels of government came together to create a modern, effective and efficient, shared interoperable LMR system and a partnership to achieve needed interoperability, as well as to maximize the benefits of sharing infrastructure and maintenance costs.

⁴ Alaska Land Mobile Radio Communications System Total Cost of Ownership Study, September 18, 2008.

⁵ SDID for Alaska Land Mobile Radio, July 1, 2008 and Appendix A, Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation.

2.1 National Standards

Members of the SAFECOM Emergency Response Council (ERC) have identified the need for interoperability nationally. Likewise, the Department of Homeland Security Office for Interoperability and Compatibility (OIC) has stressed the importance of implementing and supporting an effective interoperable communications system which:⁶

- Saves and protects citizens
- Saves and protects emergency responder lives
- Increases emergency responder effectiveness and coordination
- Improves response times in multi-jurisdiction responses
- Reduces property loss

In the interests of nationwide interoperability and spectrum efficiency, Congress mandated in the National Telecommunications Authorizations Act of 1992, that the Federal Government foster the development of, and standards for, narrowband LMR systems operating in the 162 – 174 MHz band.⁷

In 1995, the Federal Communications Commission (FCC) adopted a regulatory strategy, and a narrowband channel transition plan, to promote more efficient use of the existing private land mobile radio (PLMR) spectrum allocations below 800 MHz⁸ Only equipment capable of operating on a channel bandwidth of 12.5kHz or less, or equipment which operates on a channel bandwidth of up to 25kHz if certain narrowband efficiency standards are met, would be accepted.⁹

To facilitate mandated migration to narrowband radio technology, the DOD (through Alaskan Command) formed an Alaska-wide Federal LMR Executive Council in September 1995. Membership was initially only open to federal agencies in Alaska;¹⁰ however, in 1997, the Commander, Alaskan Command stated his intent to seek a partnership with State and local agencies in order for the DOD to more effectively perform one of its key missions: Defense Support of Civilian Authorities. Therefore, the Alaska-wide Federal LMR Executive Council expanded its membership to include the State of Alaska and the Alaska Municipal League.¹¹

2.2 The Case for Interoperability

The safety of the general public should always be high priority. Ultimately, the public expects their lives and property to be protected by all levels of government – local, tribal, State, or Federal – without distinction as to who responds to their needs.¹² A key

⁶ Department of Homeland Security S&T Stakeholders Conference, June 2, 2008

⁷ National Telecommunications Act of 1992, P.L. 102-538 (IRAC Doc. 29764)

⁸ NEWSReport No. DC 95 86, PR Docket 92-235, FCC 95-255, June 15, 1995, ¶ Para 1, 1-3
http://www.fcc.gov/Bureaus/Wireless/News_Releases/1995/nrml5026.txt

⁹ Report & Order and Further Notice of Proposed Rule Making (FCC 95-255), June 15, 1995

¹⁰ Charter for the Alaska-Wide Land Mobile Radio Executive Council, September 19, 1995

¹¹ Memorandum of Understanding Between Department of Defense, Alaskan Command, State of Alaska, Federal Executive Association of Alaska, and Alaska League of Municipalities

¹² See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>

element to successfully meeting that priority in responding to incidents at all levels is a solid interoperable communications infrastructure.

Since its formal chartering in 1997, Federal, State, tribal and local agencies have operated as a cooperative partnership, not just for narrowband migration, but for improving public safety communications and interoperability¹³ throughout Alaska. The partners created a broad charter of duties and responsibilities, including:

“...assessing, assembling and consolidating requirements, drafting and submitting plans, agreements, budget actions, and procurement actions to provide a common interoperable and cost effective LMR service that is compliant with federal, state and local regulatory guidance and is responsive to mission needs of all participating agencies in the State of Alaska.”¹⁴

These key decisions were integral to the initial business case for building, operating, maintaining, and funding a cost-burden shared, standards-based, wide-area, trunked land mobile radio system.¹⁵ Interoperable communications allow emergency response agencies to communicate across disciplines and jurisdictions. Without interoperable communications, and the ability to exchange voice and/or data with one another on demand, in real time and when needed among the police, fire, emergency medical services (EMS), transportation and other needed emergency responders, the lives of citizens and practitioners are potentially at risk.

Maintaining the ALMR communications infrastructure requires the same level of commitment, support and funding from public leaders as building and maintaining roads or bridges. Just like roads and bridges, sustainable interoperable communications infrastructure requires continual upkeep, maintenance and improvements. Funding bodies, especially at the state level, must realize the importance of interoperable communications and address these costs, as an inherent part of the annual budget.

2.3 Stakeholder Requirements

Interoperability requires a certain amount of shared management, control, and policies and procedures. It requires policymakers across jurisdictions to work together for the common good – to plan, fund, build, operate, and maintain interoperable public safety communications systems.¹⁶

A successful strategy for improving interoperability must also be based on user needs.¹⁷ Therefore, continually identifying and validating stakeholder operational requirements for the ALMR System, is key to updating the Business Case. The critical success

¹³ Interoperability is defined by the FCC as “...an essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results.”

¹⁴ Charter for the Alaska-Wide Land Mobile Radio Executive Council, April 10, 2003

¹⁵ Alaska Land Mobile Radio Executive Council, “Interoperability Plan for the State of Alaska,” dated April 2003.

¹⁶ See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>

¹⁷ Department of Homeland Security S&T Stakeholders Conference, June 2, 2008

factors are essentially the same for each of the entities. However, they vary in importance from agency to agency. ALMR is not everything to every agency, but from an interoperability standpoint, and from an economical standpoint for the Alaska first responder community, it is the solution that meets stakeholder needs.

The Cooperative Agreement sets out the terms according to which the System will be governed, managed, operated, and modified. The ALMR System is managed as a consortium under authority and oversight of the EC. Day-to-day management functions are performed by the Operations Manager, on behalf of the EC. The OMO provides guidance and oversight of the System in cooperation and coordination with the User Council (UC),¹⁸ who is responsible for all operations and maintenance (O&M) decisions, and for fulfilling other duties and tasks as set out in the Cooperative Agreement.¹⁹ Stakeholder requirements are addressed through support provided by the governance bodies, operations and maintenance organizations, and infrastructure.

- Governance support includes:
 - Executive Council - chartered to define, develop and coordinate an implementation, migration, operations, maintenance and management plan to provide a cost shared LMR Project 25/TIA102-A standards based communications trunked and conventional infrastructure encompassing participating Federal, State, and local users within Alaska²⁰
 - User Council - responsible for creating and maintaining a collaborative user-based management system to establish policy and operational procedures, and to operate and maintain the System under the oversight of the EC²¹

- Operational support includes:
 - Operations Management Office - oversees day-to-day operations of the ALMR shared infrastructure; coordinates and performs a range of operational and administrative activities in direct support of delivering 24/7 ALMR services; develops and administers strategic and operating plans; develops and maintains relationships with program managers of the ALMR stakeholders and with current and prospective ALMR users; and provides administrative support, reports, and recommendations to the UC and EC²²
 - System Management Office (SMO) - provides the technical expertise to accomplish wide area system management, system maintenance and technical support, network operations and support, radio frequency spectrum management support, and security and information assurance²³

¹⁸ ALMR Cooperative Agreement, Article 6, November 21, 2007

¹⁹ ALMR Cooperative Agreement, Article 8, November 21, 2007

²⁰ Charter for the Alaska Land Mobile Radio Executive Council, January 28, 2008

²¹ Alaska Land Mobile Radio Communications System User Council Charter, December 29, 2006

²² Operations Management Office (OMO) Customer Support Plan (CSP), January 3, 2008

²³ System Management Office (SMO) Customer Support Plan, February 6, 2008

- Technical support includes:
 - Equipment Maintenance - operations and maintenance services associated with the ALMR shared infrastructure were developed at a level to support a system that is operational at least 99.999% of the time.²⁴
 - Circuit Usage - primarily SATS circuits, which are also utilized by ALMR
 - System Updates - expected to be released approximately every three years through 2022, which is the System lifecycle. Acquisition of System updates is dependent on useful enhancements and funding availability

2.4 Capabilities

Any system is only as good as the capabilities it offers. The following key points were provided in the initial Business Case and still apply today. They provide a comparison in functionality and features between the legacy conventional systems and the ALMR System.

- Legacy Conventional System
 - Different radios/frequencies/bands
 - Limited standards for technology/equipment
 - Limited funding/lack of available replacement parts
 - Limited/fragmented planning/cooperation among local, State and Federal agencies
 - Limited/fragmented radio spectrum available to public safety
 - SAFECOM Continuum Technology Level 1 or 2²⁵
 - Inconsistent encryption capabilities across different agencies (manual re-keying required additional dedicated equipment)
 - No data capabilities; paging available²⁶
 - Limited redundancy; constrained by a single radio channel²⁷
 - Inconsistent security applications/standards²⁸
 - Constricted wide area coverage; when within range of a single repeater²⁹
 - Non-compliant with federal mandates³⁰
- ALMR System
 - Single system supporting interoperability at all levels
 - Complies with Homeland Security SAFECOM Continuum guidelines for Interoperability³¹
 - Oversight and management of Alaska's Public Safety radio spectrum asset
 - Regulatory compliance of P25/TIA 102-A standards for narrowband migration/equipment

²⁴ Service Level Agreement, February 26, 2008

²⁵ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

²⁶ *ibid*

²⁷ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

²⁸ *ibid*

²⁹ *ibid*

³⁰ *ibid*

³¹ See <http://www.safecomprogram.gov/NR/rdonlyres/65AA8ACF-5DE6-428B-BBD2-7EA4BF44FE3A/0/Continuum080106JR.pdf>

- Reduced cost for State and local governments for narrowband migration through federal funding/contribution of DOD assets
- Provides for wide area coverage along major highways in the state³² at a significantly reduced cost over an independent approach
- Provides Federal/State infrastructure for local government use
- Promotes economy of scale/efficiency through shared spectrum/infrastructure between DOD and the State of Alaska; reduced capital/operating costs
- Maximizes/optimizes management/use of PLMR spectrum; increased capability for interoperable communications
- Standards-based P25 technology aligns state/local government agencies to receive grant funding from the DHS
- Flexible, scalable, and adaptable communication infrastructure; incorporates/provides use of latest wireless digital solution, backwards compatibility prevent obsolescence
- SAFECOM Continuum Technology Level 5
- Advanced Encryption Standards (AES); able to utilize multiple encryption keys³³ (OTAR on existing trunk infrastructure)
- Secure data with wide/personal/local area network capabilities³⁴
- Available redundancy; multiple communications channels exist³⁵
- Security certification and accreditation provided at the DOD Mission Assurance Category II level (mission essential system carrying sensitive information whose degradation or loss is unacceptable)
- Availability of multiple equipment vendors³⁶
- Improved voice quality³⁷
- Enhanced functionality including data and other capabilities³⁸

These benefits and functionality were not available to all public safety agencies with the previously existing conventional systems. The shared system approach makes these benefits available to all the participants in the ALMR partnership. Transition from many individual conventional systems to the ALMR shared system has had many positive impacts for agencies.

Additional capabilities include:

- Expanded Coverage - level of coverage provided by ALMR is possible through the use of the State's existing microwave infrastructure. This infrastructure is the State's network backbone for data communication and must be maintained and supported regardless of the ALMR System. The potential exists for the ALMR System to expand further into less populated areas of Alaska by adding additional sites to the network backbone.

³² *ibid*

³³ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

³⁴ *ibid*

³⁵ *ibid*

³⁶ P25 Systems Training Guide, Daniels Electronics, 2007

³⁷ *ibid*

³⁸ *ibid*

- Expanded Capabilities - the ALMR System allows for data transmission (9600 baud rate) including maps, profiles, telemetry data, and photographs. This information expands the capability and efficiency by allowing emergency responders to react to new information as it becomes available.
- Consolidated Dispatch Centers - anyone can potentially be dispatched from any location. Due to this capability/cost of modern dispatch equipment, consolidation of smaller dispatch functions into more regional dispatch centers occurred. However, agencies still maintain their day-to-day talk groups.
- Standardized System O&M - universally adopted and, to a degree, centralized. The Cooperative Agreement calls for outsourced O&M independent of the stakeholders to prevent a conflict of interest, and to ensure equitable treatment of all agencies operating on ALMR. This is accomplished through the contracted OMO and SMO in accordance with the System requirements as stated in the SLA.³⁹
- Security Improvements - because ALMR is a shared system, the security requirements at the highest level must apply to all users. Anti-virus software and other safeguards must exist on all devices that attach to the ALMR network. ALMR also provides the ability to selectively encrypt communications, either manually or through OTAR.

3.0 Economic Feasibility

3.1 Efficiency of Operations

A seamless communication infrastructure between, and within, agencies provides real-time response capabilities not typically available with a conventional system. Inter-agency response activity on a conventional system could require multiple radios swapped between agencies, programming of shared channels, relaying information to responders on the ground by switching radios and re-transmitting, or relaying the information in person, any of which could result in the loss of life. With ALMR, all responders are able to share information in real time with the same radio they use on a day-to-day basis.

3.2 Shared Cost Savings

The majority of ALMR capital costs have already been paid. They include the network infrastructure, State of Alaska Telecommunications System (SATS) sites, and the trunked radio equipment. There are currently 82 sites and 2 transportable communications systems, providing coverage to the population centers, major roadways, and portions of the Marine Highway in Alaska. When completed, as planned, there will be 105 sites, which include 15 Anchorage Wide Area Radio Network (AWARN) sites. Costs associated with the on-going support and maintenance of the System will continue to exist. Currently, they include:

³⁹ The ALMR Service Level Agreement was developed jointly by the User Council and the Project Team and was approved by the Executive Council on August 21, 2008

- Executive oversight and change control
- Operations and system maintenance management of network infrastructure
- Expanding coverage (capital costs)
- System security
- New technology research/testing
- Updating software/infrastructure equipment (funded through either O&M or capital costs)

3.3 Cost Benefit

This section utilizes data gathered from both the 2005 and 2008 TCO studies. It compares the cost of continuing to operate and maintain the ALMR System versus dismantling the System and creating separate systems. It also provides a list of intangible System benefits that exist because of the shared system approach.

Three cost benefit alternatives were previously identified:

- agencies fund, implement, operate, and maintain their own independent infrastructure, as in the past
- Federal, State, and local governments cooperate to share a standards-based fixed infrastructure
- agencies can purchase a few ALMR radios to use when required and continue to maintain their own in-house infrastructure

ALMR was chosen for the cost benefits identified in the second alternative. The following historical information confirms the rationale behind this decision.

3.3.1 2005 TCO Study

The first TCO Study was completed in February 2005, was completed by Market Strategy Group LLC, who interviewed more than 60 organizations and collected not only quantitative data on these organization's current LMR costs, but also qualitative data regarding issues with the conventional network.⁴⁰

The aggregated unit cost per subscriber for the conventional LMR network for the organizations interviewed was \$40. The study found that the DOD had the lowest per unit costs due to their economies of scale in procurement and usage, the limited area their network covered, and a strict adherence to LMR policies and procedures. Trunked networks are typically more expensive on a per unit basis because these networks contain more modern technology and have enhanced feature functionality.⁴¹

In addition to the costs for conventional systems already in place within Alaska, the 2005 study benchmarked 13 state trunked systems to gain a comparative baseline for O&M and subscriber unit costs. The associated fees were all based on trunked networks and many of the networks did not cover the subscriber unit O&M, as it is

⁴⁰ ALMR Total Cost of Ownership (TCO) Detailed Briefing Report, Market Strategy Group, March 2005

⁴¹ *ibid*

considered the responsibility of each individual agency. Additional fees were generated from activation and re-programming and extra charges for associated services such as: wide-area roaming, inter-connect and direct inward dialing (DID), among others. These amounts exclude any data related charges.

3.3.2 2008 TCO Study

In July 2007, the Executive Council commissioned a second TCO with two primary objectives: 1) to document all costs associated with System build out, implementation, and cutover; and 2) to document the projected future O&M costs for the remaining lifecycle of the ALMR shared system infrastructure. The total build out cost was \$195 million

Based on the projected costs identified in the study, in August 2008 the EC agreed upon a cost share approach and method, wherein infrastructure owners pay to maintain their infrastructure and all other costs will be shared equally based on subscriber units registered on the System.⁴² This approach and method are still in effect today but are likely to change as the balance of equipment ownership changes.

3.4 Economic Analysis (EA)

The Alaska Land Mobile Radio (ALMR) DOD Project Manager contracted Tecolote Research, Inc., in 2008, to perform an Economic Analysis (EA) of the ALMR enterprise. The scope of the EA was to examine two ALMR alternatives: 1) keeping the cooperative intact, or 2) dividing it into separate entities. This was a non-advocate analysis to compare the benefits and disadvantages, cost and non-cost factors (both tangible and intangible) of these two alternatives. The analysis included positive and negative aspects of both alternatives from each major stakeholder's perspective.⁴³

Additionally, the survey was intended to gather information to be shared with the DHS, Office of Emergency Communications (OEC) to determine whether ALMR compliance with Presidential and DHS directives is, in fact, beneficial to agencies in responding to day-to-day and emergency situations, and to show the economic impact associated with that compliance.

An EA survey was distributed in October 2008 to key ALMR stakeholders in order to gather data on the value of ALMR to first responder agencies on the System and the potential for further enhancing its value to user agencies.⁴⁴

Comments from stakeholder interviews indicated:

- Building separate capabilities provided by ALMR would cost more and work much less effectively.⁴⁵

⁴² Alaska Land Mobile Radio (ALMR) Cost Share Update briefing to the Executive Council, August 21, 2008

⁴³ Tecolote ALMR Stakeholder Interview Letter, distributed by Mr. Del Smith via email, 10/8/2008 3:37 PM

⁴⁴ ALMR Economic Analysis participant stakeholder email, sent Wed 10/8/2008 3:37 PM

⁴⁵ ALMR Stakeholder Interview, USARAK G6, Colonel Darin Talkington, October 15, 2008

- There are tremendous benefits with ALMR technology and the interoperability it affords them.⁴⁶
- The system is better now and cheaper than the legacy system.⁴⁷
- Interoperability levels achieved by the ALMR consortium model are not achievable with independent systems⁴⁸.
- Independent systems could not be built or maintained with the same cost efficiencies generated by the consortium model⁴⁹.
- Splitting ALMR would eliminate or complicate interoperability between MOA and State law enforcement agencies and emergency response units which would be detrimental to public safety in fringe areas around Anchorage where cooperation is often essential⁵⁰
- Splitting ALMR will cause degradation to interoperability even for the MOA. It will be more of a challenge to provide training whereas now it's easier with everyone using the same equipment⁵¹.

An Independent Validation for Cost Reasonableness (IVCR) was also conducted as part of the Economic Analysis and validated that the cost of ALMR was reasonable when compared to two other benchmark systems: Pacific Land Mobile Radio (PLMR), in Hawaii, and Fort Lewis Land Mobile Radio in Washington State. It concluded, "The robustness of the system, the services provided, and the cost performance ratios validate that ALMR costs are reasonable." The total benefit and capability could not be obtained separately by any major stakeholder group when considering the estimated capital and sustainment costs.⁵²

3.5 Separation Study

In addition to the operational considerations, a rational decision of whether or not to continue a particular course of action also requires an examination of alternatives from a technical perspective. In this case, the two logical alternatives are either continuing with the ALMR System as currently implemented, or dissolving the partnership and returning to separate systems.

MotorolaTM was also tasked in 2008 with conducting an analysis that examined the pros and cons of these two alternatives and the costs associated with each.⁵³

⁴⁶ ALMR Stakeholder Interview, 354 Communications Squadron, Eielson AFB, Major Amy Osterhout, October 16, 2008

⁴⁷ ALMR Stakeholder Interview, Drug Enforcement Agency, US Department of Justice, Mr. Fred Smith and Mr. Adrian DeLuna, October 20, 2008 and October 24, 2008 (respectively)

⁴⁸ ALMR Stakeholder Interview, Alaska Department of Administration, Deputy Commissioner Rachael Petro with Commissioner Special Assistant Carol Beecher, November 13, 2008

⁴⁹ ALMR Stakeholder Interview, Alaska Department of Administration, Deputy Commissioner Rachael Petro with Commissioner Special Assistant Carol Beecher, November 13, 2008

⁵⁰ ALMR Stakeholder Interview, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008

⁵¹ ALMR Stakeholder Interview, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008

⁵² Alaska Land Mobile Radio (ALMR) Economic Analysis (EA) Executive Summary, 5 March 2009, Tecolote Research, Inc., Pages 7-8.

⁵³ Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation, June 3, 2008

The separation analysis discussed numerous options for each entity and provided a recommendation based on rating each alternative to determine the best possible solution considering both technical feasibility costs and operational criteria.

In the end, it was determined to separate ALMR would cost all stakeholders an additional \$120+ million in new equipment costs over the cost of the current investment, and more than double the annual cost of current O&M. The overarching recommendation was to retain the ALMR System as presently configured and operated.

3.6 Benefits of the Shared System Approach

To properly judge the merits of the shared System, and to further validate the findings of the TCO, the EA, and the Separation Study, tangible and intangible benefits can be considered.

- Tangible benefits include:
 - Shared frequencies/infrastructure
 - 24/7 operational availability/reliability
 - Remote monitoring
 - Seamless interoperability
 - Dedicated and priority talkgroups
 - Highly-reliable, redundant network
 - Newest technologies available to all users (when updated as prescribed)
 - Expanded coverage areas along the roadway; minimum dead zones
 - Agencies operate day-to-day as they would in an event/crisis
 - Compliance with national framework for interoperability
 - Centralized points of contact for System issues
 - Higher security levels than legacy conventional system
 - Fully-deployable site capability with the North and South Area Transportable units
 - Third party preventive maintenance with quality assurance/quality control oversight (exception of SATS)

- Intangible benefits include:
 - Facilitates implementation of National Incident Management System (NIMS)
 - Coordinated response through created talkgroups for specific incidents
 - Denial of access for specific subscriber IDs; disable lost or stolen units
 - End-to-end radio transmission encryption capability; secure statewide operation
 - OTAR; rapidly provides secure operational keys to users in the field
 - Compliance with federal interoperability/technology directions; positions users for eligibility of federal grant funding
 - Backward compatible with legacy conventional systems; provides for a gradual transition to the full P25 digital, trunked, shared system

- Interoperability with disparate systems (inside/outside the ALMR footprint) through gateways
- Ability to evolve as technology advances through updates to system/subscriber unit software
- Positioned to increase communication capabilities with other jurisdictions as Inter-RF Sub-system Interface (ISSI) technology evolves
- Agencies have opportunity for input; System operated through the EC, UC, and third party O&M contractors
- Inability for typical off-the-shelf scanner to receive the ALMR digital signal; difficulty for monitoring by the general public (mitigates law enforcement concerns short of encryption)
- Interoperability across jurisdictional lines at all levels of government
- Meets SAFECOM Continuum Technology Level 5 standard for non-proprietary shared system
- Most robust/mature capability; top five percent of US in interoperability capability⁵⁴

4.0 Risks and Limiting Factors

4.1 Operational Risks

The inability to interoperate and have real-time communications between responders during an emergency increases the risk to emergency responders, the public, personal property, and natural resources. Therefore, risk reduction is a key factor for most agencies. Clearly, the more effectively emergency responders can communicate situational information and resource needs, the greater the ability to reduce the risk to all.

4.1.1 Loss of interoperability

Numerous after-action reports from major incidents throughout the history of emergency management in our Nation have cited communication difficulties among the many responding agencies as a major failing point and a continued challenge to policymakers. Congress and the Administration recognized a successful response to a future major incident, either a terrorist attack or natural disaster, requires a coordinated, interoperable response by both public and private safety, health, and emergency management agencies at Federal, State, tribal, territorial, regional, and local levels.

From the beginning, the ALMR partners recognized the benefits of interoperability and the cost efficiencies of a shared system.

The technology involved in ALMR, coupled with deliberative planning (i.e. development of a statewide ICS zone, six regional ICS zones, a statewide OP zone, talk group sharing agreements, and the implementation of NIMS) ensures a coordinated and efficient response, when properly used. ALMR technology and deliberative planning place powerful tools and resources at the disposal of the majority of Alaskan first

⁵⁴ ALMR Self Assessment performed at <http://www.safecomprogram.gov/SAFECOM/selfassessment>, 12/2/2008

responders in a crisis. A retreat from the current capability would severely hamper any multi-agency, multi-jurisdiction response to incidents in Alaska.

4.1.2 Failure to Meet the FCC Mandate

In December 2004, the FCC mandated that all private LMR users operating below 512 MHz move to 12.5 kHz narrowband voice channels and highly-efficient data channel operations by January 1, 2013. This migration complements the NTIA mandate for Federal agency migration to 12.5 kHz narrowband operation that went into effect January 1, 2008.

Although ALMR members are in compliance with the mandates, any public safety agency not on ALMR must aggressively develop a strategy to meet narrowband deadlines, if they have not already done so, to avoid cancellation of existing wideband FCC authorizations.

Should the current ALMR consortium collapse, agencies who rely on the shared DOD/SOA frequencies may find there are no frequencies available to them.

4.1.3 Training

With increased capability and capacity, comes the need for established processes, procedures, and training. The typical legacy radio is conventional, has 12-16 channels and is fairly simple to use. The subscriber units used on ALMR can contain hundreds of channels and talkgroups spread across multiple zones (make/model dependent). For these reasons, far more radio usage and operational training is required for each radio user. Failure to address this training has manifested itself repeatedly during joint exercise when new radio users try operating on the System.

Agencies at all levels of government must make a concerted effort to train their personnel on subscriber use and protocols (changing channels, encryption, locating regional and incident command zones) prior to issuing them an ALMR radio. A \$5K radio in the hands of someone who doesn't know how to properly use it is tantamount to handing them a brick and expecting them to call out on it.

4.2 Economic Risks

In 2002, during the implementation stage of the ALMR System, Market Solutions was contracted to identify economic challenges that could affect the ALMR cooperative strategy. The challenges, identified in their 2002 Communication Plan Overview⁵⁵ Executive Study, still exist today.

- There is a lack of confidence among some users about the successful implementation of the system due to support and funding issues from the State

⁵⁵ ALMR Communication Plan Overview, October 5, 2002

- Some groups are critical of the State of Alaska's lack of adequate capital maintenance funding (referring to SATS) and expect that it also may not support the radio infrastructure (referring to ALMR) once it is developed
- There may be a lack of understanding among some public officials about the need for the project⁵⁶

In 2004, a Risk Assessment⁵⁷ was also conducted on the ALMR System, including the cooperative partnership. Five critical risks were identified at that time, which related to governance and funding and posed a high risk to the cooperative partnership.

The identified risks included:

- Conflicting priorities of the different agencies
- Governmental agencies cannot establish and maintain cooperative consortium
- Sufficient funds cannot be approved for system implementation by government agencies that would benefit and wish to participate
- Sufficient funds are not available for ongoing O&M of the system
- Funds are allocated and then withdrawn for other priorities

Previous mitigating actions included the formation of the UC and the development of the cost share approach. However, these risks are still applicable today, as demonstrated by the on-going divestiture of the USARAK LMR RF equipment. The State has confirmed that it will accept the equipment and, therefore, the additional costs for infrastructure maintenance of these sites will also be borne by the State. The amount of those additional costs will be dependent on the level of maintenance the State determines it is willing to fund.

Additionally, the contracted services of the Operations Management Office and the System Management Office are funded 50/50 between the State (meaning SOA and the Local governments) and the DOD (meaning ALCOM and the AFEA). Each is responsible for developing a method to apportion the costs among themselves for collecting funds to be applied to their respective portions of the contracts.

At this time, neither the DOD nor the State has developed a final process by which funds can be received and applied.

This has already affected timely accomplishment of System maintenance. Portions of the SLA were suspended when the initial 13 divested sites were placed in a break/fix funded status by USARAK through the end of calendar year 2011. The State has agreed to accept the equipment from these sites effective Jan 1, 2012. Once they receive the equipment, it may remain in break/fix. The remaining 28 sites will be divested effective Jul 1, 2012.

Although the final plan for maintenance of these sites is unknown at this time, it is highly likely this change in ownership would result in revision of the SLA and the Cooperative

⁵⁶ *Ibid*

⁵⁷ ALMR Risk Assessment, 5 Star Team, December 2005

Agreement. This could lead to possible degradation in the quality and level of performance of the System.

4.3 Political Risks

State funding for ALMR, particularly involving shared costs for the OMO and SMO, has met with resistance in the Legislature in the past. Through reductions in Department of Administration general funds, and intent language in the Budget, the Legislature has stated their desire that local agencies participate in the ALMR shared costs to reduce the State's portion.

Most local agencies on ALMR have responded by indicating they will cancel their ALMR membership and leave the System. They have little or no available operating funds to pay to be on the System. Additionally, they maintain that they are providing services that are the State's inherent responsibility. Key to a resolution of this disagreement between the State and local agencies over cost share is the recognition that the value of the capabilities and interoperability provided by ALMR is critical to effectively serving the citizens of Alaska.

4.4 Technology Cost Risks

The expanded capabilities of ALMR technology bring an increased cost. Radios that cost \$500 - \$1,000 on a conventional system cost \$3,500 - \$5,000 for a trunked system. However, with the increase of the number of manufacturers offering P25-capable radios, costs for trunked radios are continuing to drop.

Newer, more sophisticated equipment in the field also results in higher maintenance costs. Systems of this nature are expensive to build and expensive to maintain and would be particularly onerous for a single agency. This makes the continued ALMR shared partnership approach the logical option.

Like any IT system, ALMR software requires periodic updates. The System software in use is ten updates behind the current version available. Motorola supports backwards compatibility and pre-tested software patches for up to three System updates. Patches and updates for many of the software applications being used by the ALMR operating systems (Microsoft®, Sun Systems®, Linux®, etc.) will no longer be pre-tested by Motorola beginning June 30, 2012. This could put the System at risk of potential failure if new patches/updates are applied that are not compatible with the operating system in use. Additionally, many of the hardware components are no longer manufactured, and spares are increasingly hard to obtain.

An update of the entire System to the current Motorola® software/hardware release and implementation of a life-cycle management strategy provides a structured approach for ensuring continuity of operations through regular updates and a long-term outlook in preparation for future product and technology changes.

The governance bodies (UC and EC) have been apprised of this need and the costs for both a onetime update, and a system lifecycle update package. No decision has been made at this time as to when, or if, the System update will be funded.

4.5 Other Risks

Lack of capital and O&M funding, or failure between the cooperative partners to come to an amicable agreement regarding the final cost share after the divestiture, could result in the split of ALMR.

As previously mentioned in the Section 3.5, the 2008 a Motorola System Design and Implementation Document, and its Appendix A - ALMR System Feasibility Analysis for DOD/SOA Separation,⁵⁸ provided the 'big picture' of the actions required should this path be chosen. The analysis focused on providing costs to implement two entirely separate systems - one DOD and one SOA.

Although the study specifically addressed the costs associated to separate the hardware and sites, it did not address any of the associated costs for the personnel involved in such actions, the actual dismantling and movement of all equipment, and reinstallation/storage of the equipment, or the subsequent costs/risks to regain the level of interoperability provided by ALMR. The following are some of the identified risks, which still remain very relevant, were the ALMR System to be dismantled or the cooperative fail.

- State/Local level:
 - Local communities expected to take the lead in any regionalized, large-scale event
 - Loss of OEM certified system technologists
 - Loss of security monitoring
 - Loss of shared spectrum
 - Possible forfeiture of equipment purchased through federal grant funds
 - Responsible for meeting FCC mandate individually
 - Costs associated with project management to implement separate system
 - Costs to support O&M functions
 - Development of individual agency processes, procedures, and protocols
 - Volunteer agencies withdraw rather than pay fees
- National level:
 - Inadequate number of available frequencies to support all users
 - Lack of centralized system/incident command structure for out-of-state agencies responding to multi-jurisdictional, multi-agency events
 - Failure to meet NIMS requirements; inability to interoperate
 - Federal agencies responsible for meeting NTIA mandate individually

⁵⁸ System Design & Implementation Document (SDID) for Alaska Land Mobile Radio, July 1, 2008

- Cooperative partners/infrastructure owners:
 - Cost to travel to sites (includes high mountain sites) to remove equipment; technicians from all entities involved plus the contracted removal agency (assumed at the time to be Motorola®)
 - Cost to inventory/store equipment
 - Current equipment compatibility with older conventional systems
 - Loss of funds expended on implementing ALMR
 - Loss of central points of contact (POCs) for first responding agencies
 - Systems revert to break/fix status (already occurring)
 - No redundancy
 - Loss of central POC for the public safety community, as a whole

5.0 Conclusions and Recommendation

Creating and maintaining interoperability requires leadership, planning, and the development of partnerships among disparate groups at the Federal, State and local levels. In order to effectively respond to emergencies, all levels of government and industry must plan for interoperability among all parties from the outset,⁵⁹ as well as lifecycle funding and maintenance of the systems required to meet those needs.

This annual Business Case update has examined the ALMR shared system approach historically, operationally, economically, and with regard to both short- and long-term risks.

The future funding of ALMR and the cooperative is in question. As previously mentioned, the U.S. Army is divesting itself of RF equipment housed in 41 SOA sites beginning January 1, 2012 and ending June 30, 2012. Long-term issues of cost share and sustainment, decisions on how governance may change, at what level maintenance will occur, and how this will affect future participation by the agencies currently using the System have yet to be addressed, although the State has agreed to accept the equipment.

This Business Case update continues to validate the shared ALMR System approach is still the best solution to meeting a majority of Alaska's public safety first responder interoperability needs. It provides users and the stakeholders, alike, operational and economic benefits and should be sustained, maintained, and fully funded.

⁵⁹ See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>