



Alaska Land Mobile Radio Communications System

2019 Annual Business Case

February 4, 2020

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Table of Contents

Document Revision History	ii
Acronyms and Definitions.....	iii
1.0 Executive Summary	1
2.0 Operational Benefits	4
2.1 National Standards.....	6
2.2 The Case for Interoperability.....	7
2.3 Stakeholder Requirements.....	8
2.4 Capabilities	9
3.0 Economic Feasibility.....	12
3.1 Efficiency of Operations	12
3.2 Shared Cost Savings.....	12
3.3 Cost Benefit	13
3.3.1 2005 TCO Study.....	13
3.3.2 2008 TCO Study.....	14
3.4 Economic Analysis.....	14
3.5 Separation Study.....	16
3.6 ALMR Feasibility Study.....	16
3.7 Benefits of the Shared System Approach.....	17
4.0 Risks and Limiting Factors.....	19
4.1 Operational Risks.....	19
4.1.1 Loss of interoperability.....	20
4.1.2 Training.....	20
4.2 Economic/Political Risks.....	21
4.3 Technology Risks.....	22
4.4 Other Risks	23
5.0 Conclusions and Recommendation.....	25

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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 Alaska Public Safety Communications Service (APSCS), as established in the Cooperative and Mutual Aid Agreement.

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

Alaska Public Safety Communications Service (APSCS): the State of Alaska statewide telecommunications system microwave network.

AST: Alaska State Troopers

Department of Administration (DOA): a State of Alaska (SOA) department that maintains the APSCS 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 and United States Northern 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, Federal Non-DOD 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 over 300,000. 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 and the State of Alaska Department of Administration's commissioner or commissioner's designee, respectively or collectively.

SAFECOM: formed in 2001 after the terrorist attacks of September 11, 2001, as part of the Presidential E-Government Initiative to improve public safety interoperability, allowing emergency responders to communicate effectively before, during, and after emergencies and disasters.

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 State microwave system, and shared owner of the System.

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: 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 and Mutual Aid 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 of 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
- Equipment and system operational cost are justified by the robust infrastructure, services provided and system performance
- Achieved regulatory compliance of Project 25 (P25)/Telecommunications Industry Association (TIA) 102-A standards for narrowband migration and equipment for all member agencies
- Reduced costs for narrowband migration, particularly for the State of Alaska (SOA), through Federal funding/contribution of Department of Defense (DOD) assets for System development
- Negated 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 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 as a 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; as well as drafting and submitting plans, agreements, budget actions, and procurement recommendations 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 and may never be, its coverage includes all major highways and over at least 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 traffic.

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 entities, local agencies and tribal entities 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 and natural disasters, as well as daily operations. The technology employed meets Federal mandates and provides greater capabilities than the previous legacy systems. At the end of calendar year 2019, the System supported 128 agencies utilizing 22,191 subscriber units. Additionally, ALMR supported 13,300,919 group calls³, 24,623,138 push to talks⁴ and with a .0006 System busy rate for the entire year.

Overall, ALMR has proven time after time through numerous studies 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 other agencies provide, via ALMR, benefit the citizens of the State.

ALMR is a very effective system that greatly enhances wide area interoperable communications. Some of the perceived shortcomings can be attributed to insufficient user training, poor subscriber equipment maintenance by user agencies, lack of coordination between stakeholders or a general lack of knowledge on how the System

³ A group call is a specific conversation between individual subscriber units on the system.

⁴ A push to talk (PTT) is each individual key up of a subscriber unit which accesses the system.

operates and the benefits it provides to the public safety community. There is even greater potential for ALMR as users become more familiar with the System and fully utilize their radio's capabilities properly. Much of the Business Case remains the same year-to-year in order to provide a historical baseline. Strengths and weaknesses of the System, as well as the need for additional ALMR training, have been addressed in past annual Business Case updates, as well as in the ALMR Strategic and Operational Plan. The need continues to find funding to provide regular and agency-specific training which is essential to solving these challenges.

The following critical success factors 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
- **Enhanced security** - the ability to encrypt communications, and shared cyber security across the system

The contributions of all parties involved in ALMR 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 stated the owner of the infrastructure equipment pays for the maintenance of that equipment in accordance with the requirements defined in the Service Level Agreement (SLA). The cost share method also stated the costs of the OMO and the System Management Office (SMO) would 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).

In 2012, with the divestiture of the U.S. Army-Alaska (USARAK) radio frequency (RF) equipment housed in 41 SOA-owned sites to the State, the EC directed the Federal

agencies, as well as State and local governments, to form a Cost Share Working Group and develop a new approach and method. The group reached consensus that the cost share should be apportioned according to infrastructure owned. The proposed method was deemed the 88/12 method, whereas the SOA owns 88 percent of the infrastructure and the DOD owns 12 percent. As the majority infrastructure owner, SOA would have to decide whether or not they would seek to collect funds from non-infrastructure owners (NIOs) to offset some of their costs. The SOA, DOD, Federal Non-DOD and local agencies concurred with this approach and method.

Despite the on-going issue of cost share, the following factors remain constant:

- 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 areas 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 that would be difficult, if not impossible to achieve autonomously

In 2016, the cost share method language changed to specify that for Master Site maintenance, both the State of Alaska and DOD Alaska would each pay 50 percent, or in other words, each would pay 100 percent of their owned Master Site costs.

This Business Case update continues to validate the shared ALMR System 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 throughout the System lifecycle.

2.0 Operational Benefits

The Business Case 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/technology⁵, the cost to

⁵ Alaska Land Mobile Radio Communications System Total Cost of Ownership Study, September 18, 2008.

separate the System⁶ and the many additional risks/costs produced by such a separation.

One such example of the benefit of the System would be the severe windstorms in September 2012, which disabled cell phone service and disrupted power for several days in the Anchorage and Matanuska-Susitna areas. During this weather event, ALMR remained online providing critical communications to first responders. If responders had to rely on their cell phones or their previous conventional systems, they could have been out of contact from several hours up to several days.

Other events demonstrate where a lack of System coverage also hinders first responders. In June 2013, the Stuart Creek fire, caused by an artillery training exercise, consumed some 85,018 acres northeast of Fairbanks. Evacuation of residents in the Chena Hot Springs Road area was hampered because it is outside of the ALMR coverage footprint and conventional frequencies had to be utilized. The trunked ALMR System includes both regional and statewide incident command zones, allowing multiple agencies from multiple jurisdictions/disciplines to communicate utilizing assigned talkgroups, where they can coordinate their actions. Conventional radio operations don't have any such function. Limited communications such as this can hamper coordination of evacuations in an emergency situation such as this fast spreading fire, and put both citizens and first responders in danger.

In 2016, the use of ALMR during the McHugh Creek fire in July provided critical interoperability needed to coordinate both firefighting efforts and to evacuate citizens in danger zones. ALMR was also a key component for efforts during the Sunrise fire in May, the Tudor Road fire in May, the Tetlin fire in June and the Moose Creek fire in October, as well as a serious vehicle accident involving a tourist bus in the Copper River area in August.

In April of 2017, during the Seward Highway fire, sites at Hope and Portage carried the majority of the radio traffic with no busies.

Additionally, in June of 2017, a fire burning at milepost 308 of the Richardson highway threatened a subdivision 1/2 mile to the east, as well as structures 1/2 mile to the southwest. ALMR was essential to operations on the fire and was really the only radio system available in that area. The Canyon Creek site was heavily utilized by the Division of Forestry and by the Alaska State Troopers, who closed the road for most of the fire.

In October 2018, a quadruple fatality near Cantwell brought seven agencies together in a coordinated response effort.

⁶ SDID for Alaska Land Mobile Radio, July 1, 2008 and Appendix A, Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation.

Most recently, in November 30, 2018, the Anchorage and Wasilla area experienced a 7.0 earthquake, which severely damaged road infrastructure and some residential and business structures. All ALMR sites remained fully functional during and after the earthquake providing critical communications for first responders, once again proving the value of the System and the benefits it provides to member agencies. ALMR supported 143,599 push to talks (PTTs) and AWARN supported 53,940 PTTs, which is almost twice the daily amount on a normal day.

Events like these emphasize the absolute need for reliable communications to maintain interoperability between Federal, State, tribal and local government public safety entities as well as the need to sustain funding for ALMR and continue to expand site capacity and the coverage footprint. National and State events create an awareness at all levels of government that interoperability is not only required for day-to-day operations, but it is imperative for mutual aid and emergency task force operating environments.

The State, as the primary infrastructure owner, continues to participate in critical discussions with leadership, stakeholders and participating agencies to ensure a modern, effective and efficient, shared interoperable LMR system is available.

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 (DHS) Office for Interoperability and Compatibility (OIC) has stressed the importance of implementing and supporting an effective interoperable communications system which:⁷

- 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 interest of nationwide interoperability and spectrum efficiency, Congress mandated in the National Telecommunications Authorization Act of 1992, that the Federal Government foster the development of, and standards for, narrowband LMR systems operating in the 162 – 174 MHz band.⁸

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 800MHz.⁹ Only equipment capable of operating on a channel bandwidth of 12.5kHz or less, or

⁷ Department of Homeland Security S&T Stakeholders Conference, June 2, 2008

⁸ National Telecommunications Act of 1992, P.L. 102-538 (IRAC Doc. 29764)

⁹ 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

equipment which operates on a channel bandwidth of up to 25kHz, if certain narrowband efficiency standards are met, would be accepted.¹⁰

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;¹¹ 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.¹²

2.2 The Case for Interoperability

The safety of the general public is, and should always be, a 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.¹³ A key 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 also for improving public safety communications and interoperability¹⁴ 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.”¹⁵

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.¹⁶ 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

¹⁰ Report & Order and Further Notice of Proposed Rule Making (FCC 95-255), June 15, 1995

¹¹ Charter for the Alaska-Wide Land Mobile Radio Executive Council, September 19, 1995

¹² Memorandum of Understanding Between Department of Defense, Alaskan Command, State of Alaska, Federal Executive Association of Alaska, and Alaska League of Municipalities

¹³ See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>

¹⁴ 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.”

¹⁵ Charter for the Alaska-Wide Land Mobile Radio Executive Council, April 10, 2003

¹⁶ Alaska Land Mobile Radio Executive Council, “Interoperability Plan for the State of Alaska,” dated April 2003.

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 does the building and maintaining of roads or bridges. And just like State 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.

Independent studies by the State of Alaska, over the past several years, have examined the ALMR System and validated its invaluable contributions to the public safety community in Alaska.

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.¹⁷

A successful strategy for improving interoperability must also be based on user needs.¹⁸ Therefore, continually identifying and validating stakeholder operational requirements for the ALMR System, is key to updating the Business Case. The critical success 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 in Alaska now, nor may it ever be, but from both an interoperability and economics standpoint for the Alaska first responder community, it is the solution that meets stakeholder needs.

The Cooperative and Mutual Aid 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. The Operations Manager performs day-to-day management functions on behalf of the EC. The OMO provides guidance and oversight of the System in cooperation and coordination with the User Council (UC),¹⁹ which is responsible for all operations and maintenance (O&M) decisions, and for fulfilling other duties and tasks as set out in the Cooperative and Mutual Aid Agreement.²⁰

Stakeholder requirements are addressed through support provided by the governance bodies, operations and maintenance organizations and infrastructure owners.

¹⁷ See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>

¹⁸ Department of Homeland Security S&T Stakeholders Conference, June 2, 2008

¹⁹ ALMR Cooperative Agreement, Article 6, September 7, 2018

²⁰ ALMR Cooperative Agreement, Article 7, September 7, 2018

- 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 Alaska²¹
 - 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 EC²²
- 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 EC²³
 - System Management Office - 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 assurance²⁴
- 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.²⁵
 - Circuit Usage - primarily SATS circuits, which are also utilized by ALMR
 - System Updates - expected to be released approximately every year through 2022, which is currently the projected System lifecycle. ALMR migrated to Motorola 7.17.3 software platform on between May and December 2019.

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

²¹ Charter for the Alaska Land Mobile Radio Executive Council, January 28, 2008

²² Alaska Land Mobile Radio Communications System User Council Charter, August 28, 2019

²³ Operations Management Office (OMO) Customer Support Plan (CSP), August 19, 2019

²⁴ System Management Office (SMO) Customer Support Plan, February 25, 2019

²⁵ Service Level Agreement, July 2, 2019

- 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 2²⁶
 - Inconsistent encryption capabilities across different agencies (manual re-keying required additional dedicated equipment)
 - No data capabilities; paging available²⁷
 - Limited redundancy; constrained by a single radio channel²⁸
 - Inconsistent security applications/standards²⁹
 - Constricted wide area coverage; when within range of a single repeater³⁰
 - Non-compliant with Federal mandates³¹
- ALMR System
 - Single system supporting interoperability at all levels
 - Complies with Homeland Security SAFECOM Continuum guidelines for Interoperability³²
 - Oversight and management of Alaska's Public Safety radio spectrum asset
 - Regulatory compliance of P25/TIA 102-A standards for narrowband migration/equipment
 - 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 state³³ 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
 - SAFECOM Continuum Technology Level 5
 - Advanced Encryption Standards (AES); able to utilize multiple encryption keys³⁴ (OTAR on existing trunk infrastructure)

²⁶ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

²⁷ *ibid*

²⁸ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

²⁹ *ibid*

³⁰ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

³¹ *ibid*

³² See <http://www.safecomprogram.gov/NR/rdonlyres/65AA8ACF-5DE6-428B-BBD2-7EA4BF44FE3A/0/Continuum080106JR.pdf>

³³ *ibid*

- Secure data with wide/personal/local area network capabilities³⁵
- Available redundancy; multiple communications channels exist³⁶
- Security certification for mission essential system carrying sensitive information whose degradation or loss is unacceptable
- Availability of multiple equipment vendors³⁷
- Improved voice quality³⁸
- Enhanced functionality including data and other capabilities³⁹

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.
- 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 talkgroups.
- Standardized System O&M - universally adopted and, to a degree, centralized. The Cooperative and Mutual Aid 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.⁴⁰
- 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.

³⁴ Alaska Land Mobile Radio Total Cost of Ownership Project, Market Strategy Group, LLC, February 2005

³⁵ *ibid*

³⁶ *ibid*

³⁷ P25 Systems Training Guide, Daniels Electronics, 2007

³⁸ *ibid*

³⁹ *ibid*

⁴⁰ The initial 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. The latest update is dated July 2, 2019.

ALMR also provides the ability to selectively encrypt communications, either manually or through OTAR.

Like any information technology (IT) system, the software and hardware updates for ALMR are critical to ensuring public safety first responders have the most current technology to perform their life-saving missions, as well as providing a solid security defense against the threats posed by malware, denial of service attacks and intrusion attempts that are so prevalent today. Regularly scheduled software/hardware updates should occur every two years.

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 delays and the potential for injury or 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, Alaska Public Safety Communications Service (APSCS) sites, and the trunked RF equipment. There are currently 85 ALMR sites, 12 Anchorage Wide Area Radio Network (AWARN) sites and 2 transportable communications systems, providing coverage to the population centers, major roadways and portions of the Marine Highway in Alaska. The site on St Paul Island (SPI), which had no reach back capability, is still assigned an ALMR site number. (**NOTE:** The SPI site was officially shut down on July 7, 2018, and the equipment is to be retrieved by the State of Alaska.)

If the System had been completed, as originally planned, there would have been a total of 105 fixed ALMR sites, which includes 15 AWARN sites. Costs associated with on-going support and maintenance of the System will continue to exist as long as the System exists.

Currently, support and maintenance costs include:

- 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 Total Cost of Ownership (TCO) studies, an Economic Analysis conducted in 2008, and a Feasibility Study conducted in 2011. 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.

In the past, three cost benefit alternatives were 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 and the interoperability provided in the second alternative. The following historical information from the listed studies 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.⁴¹

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.⁴²

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 considered the responsibility of each individual agency. Additional fees were generated

⁴¹ ALMR Total Cost of Ownership (TCO) Detailed Briefing Report, Market Strategy Group, March 2005

⁴² *ibid*

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.⁴³

As previously noted, in CY2012/FY2013, with the divesture of RF equipment by USARAK, costs for shared services were split 88/12 between the SOA and the DOD. Non-infrastructure owners would pay based on negotiations with the SOA.⁴⁴

The Executive Council was presented a briefing containing this information at their April 19, 2012, meeting and voted to move the approach and method forward to their respective represented agencies for consideration. At the November 29, 2012, meeting the approach and method were approved by the Executive Council for implementation starting in State FY14 and Federal FY13, effective beginning July 1, 2013.⁴⁵

3.4 Economic Analysis

The 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.⁴⁶

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.

⁴³ Alaska Land Mobile Radio (ALMR) Cost Share Update briefing to the Executive Council, August 21, 2008

⁴⁴ Cost Share Working Group Closeout Briefing, given by Mr. Pat Shier, 4/19/2012.

⁴⁵ November 29, 2012 Executive Council Meeting Minutes, dated January 27, 2013.

⁴⁶ Tecolote ALMR Stakeholder Interview Letter, distributed by Mr. Del Smith via email, 10/8/2008 3:37 PM

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.⁴⁷

Comments from stakeholder interviews indicated:

- Building separate capabilities provided by ALMR would cost more and work much less effectively.⁴⁸
- There are tremendous benefits with ALMR technology and the interoperability it affords them.⁴⁹
- The system is better now and cheaper than the legacy system.⁵⁰
- Interoperability levels achieved by the ALMR consortium model are not achievable with independent systems⁵¹.
- Independent systems could not be built or maintained with the same cost efficiencies generated by the consortium model⁵².
- 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 essential.⁵³
- 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 type of equipment⁵⁴.

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, 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.⁵⁵

⁴⁷ ALMR Economic Analysis participant stakeholder email, sent Wed 10/8/2008 3:37 PM

⁴⁸ ALMR Stakeholder Interview, USARAK G6, Colonel Darin Talkington, October 15, 2008

⁴⁹ ALMR Stakeholder Interview, 354 Communications Squadron, Eielson AFB, Major Amy Osterhout, October 16, 2008

⁵⁰ 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)

⁵¹ ALMR Stakeholder Interview, Alaska Department of Administration, Deputy Commissioner Rachael Petro with Commissioner Special Assistant Carol Beecher, November 13, 2008

⁵² ALMR Stakeholder Interview, Alaska Department of Administration, Deputy Commissioner Rachael Petro with Commissioner Special Assistant Carol Beecher, November 13, 2008

⁵³ ALMR Stakeholder Interview, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008

⁵⁴ ALMR Stakeholder Interview, Traffic Department, Mr. Trygve Erickson, and Assistant City Manager, Ms. Heather Handyside, October 14, 2008

⁵⁵ Alaska Land Mobile Radio (ALMR) Economic Analysis (EA) Executive Summary, 5 March 2009, Tecolote Research, Inc., Pages 7-8.

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.

Motorola® 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.⁵⁶

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.

In late 2018, Motorola was asked to update the cost figures to separate the System and has provided information on only the DOD costs, to date.

3.6 ALMR Feasibility Study

In 2011, the SOA Legislature requested an independent study⁵⁷ of ALMR to evaluate the operational and economic impact of the U.S. Army Alaska (USARAK) equipment divestiture. Additionally, an assessment of recent advances in technology was made to determine if feasible alternatives to ALMR exist. The evaluation also included an approximate cost/benefit analysis.⁵⁸

The study also noted that although the System is shared by numerous agencies which all have common public safety responsibilities, all agencies had communications systems prior to ALMR that met their daily operational needs.⁵⁹

Utilizing that information, agencies were asked how the use of ALMR for day-to-day operations, emergency response and law enforcement had affected their operations and what the effect would be should ALMR interoperability be lost. Responses resonated to the effectiveness and benefit of the interoperability, as well as the cost benefit for everyone involved by having a combined system approach.

⁵⁶ Alaska Land Mobile Radio System Feasibility Analysis for DOD/SOA Separation, June 3, 2008

⁵⁷ ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc.

⁵⁸ Ibid, page2

⁵⁹ Ibid, page 11

Quoted comments included:

- ALMR has greatly increased the ability to interoperate. Continued funding for communications in that area must be secured as the legacy system has a very limited coverage area. This is a big public safety issue to the residents of Alaska.
- ALMR is used together with alternative systems, which provide extended coverage for remote regions in AK. Reducing the existing ALMR coverage area would create a severe safety issue for law enforcement personnel.
- Because of the shared system infrastructure and shared spectrum approach, a separation of the system would require each agency to completely replace their entire portion of the system with an independent stand-alone replacement. The loss of operational capability most important of which is interoperability is severe and significant. There is a cost for interoperability but not having the interoperability when it is needed has historically proven to be much more costly.
- We recently investigated the operational and economic feasibility of using a conventional system in a similar fashion to ALMR (talkgroups for dispatch and tactical response). This would only be possible with a significant capital investment to purchase the new equipment and to reprogram the radios.
- Our legacy system is not used anymore, but could possibly serve as a backup. However, the legacy system is not compliant with the FCC narrowband mandate and costly upgrades would have been necessary at some point. If ALMR became unavailable, a reduction in workforce would have to be considered in order to maintain basic communications.
- Without ALMR, the capability for interoperations between the State of Alaska and our city would be diminished and the encryption capability would be lost
- ALMR provides critical interoperable and long distance communication ability. Without ALMR, the ability to reach airports and mass transit locations would be virtually eliminated when standard lines of communication are inoperable.⁶⁰

3.7 Benefits of the Shared System Approach

The ALMR System build-out was funded by the infrastructure owners based upon their independent requirements. A Joint Project Team was established to collaborate and coordinate the build-out to be mutually beneficial for the infrastructure owners, while executing it in a fiscally and legally correct manner.

The DOD negotiated with the SOA to place DOD LMR infrastructure into SOA communications shelters and on towers on SOA real property, in exchange SOA would operationally benefit from the DOD capital investment in infrastructure, which would replace the State's infrastructure, which was 30 years old and at its end of life and no longer supportable.

⁶⁰ ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc., page 13-18

Aside from the significant increase in interoperability, the DOD gained coverage along major State roadways, at the cost of procuring, installing and maintaining LMR equipment while benefitting from the SOA shelters, towers and microwave backbone and the State benefitted by not having to incur a large initial capital investment to replace the end-of-life equipment in 41 State-owned sites, while also gaining operational improvements in communications capabilities, coverage and interoperability.

The SOA, Federal and Municipal partners recognized the necessity for an interoperable communications system for all-hazard emergency response. The lack of interoperable communications had historically proven to be a major issue of any catastrophic event, hindering disaster response and relief efforts. Such a situation not only increases recovery costs, but also endangers the safety of first responders and citizens.

As a result of these considerations, the ALMR Communications System was designed to facilitate the FCC-mandated migration to narrowband radio equipment and to improve public safety communications across all jurisdictions. Through the ALMR cooperative partnership, the State of Alaska was able to offset substantial capital expenses for necessary equipment upgrades. In its present form, ALMR infrastructure is compliant with FCC narrowband requirements and is designed to enable the highest degree of interoperability as defined by the SAFECOM guidelines.⁶¹

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

- Tangible benefits include:
 - Shared frequencies and infrastructure
 - 24/7 operational availability and 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 Transportable Area North and South units
 - Third party preventive maintenance
- Intangible benefits include:
 - Facilitates implementation of National Incident Management System (NIMS)

⁶¹ ALMR Feasibility Study, State of Alaska, October 2011, World Wide Technology, Inc., page 2-3

- 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 capability⁶²

On February 21, 2018, the Project 25 (P25) Technology Interest Group (PTIG) published a list showing there are currently 38 states utilizing P25 statewide communications systems and one state currently building out a new state system. It is not a coincidence that so many states are using P25 systems for their public safety interoperable communications platforms.

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.

⁶² ALMR Self Assessment performed at <http://www.safecomprogram.gov/SAFECOM/selfassessment>, 12/2/2008

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. We only have to look at the events of September 11, 2001, to verify this. Congress and the incumbent administration recognized a successful response to any future major incident, either a terrorist attack or natural disaster, required 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 statewide incident command zones, talkgroup 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 responders in a crisis and in their day-to-day operations. A retreat from the current capability, or failure to adequately support System operations and maintenance efforts, would severely hamper any multi-agency, multi-jurisdiction response to incidents in Alaska, as well as the day-to-day operations for agencies utilizing ALMR.

4.1.2 Training

With increased capability and capacity, comes the need for established processes, procedures, and training. The typical legacy radio is conventional, had 12-16 channels and was fairly simple to use. The subscriber units used on ALMR can contain hundreds of 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 training has manifested itself repeatedly during joint exercise when new radio users try operating on the System.

Agencies at all levels of government were encouraged to take advantage of the training previously funded by the SOA to train their personnel on subscriber use and protocols (changing channels, encryption, and locating Incident Command Zones) prior to issuing them an ALMR radio. Personnel who are untrained on the use of their equipment, might as well not be properly equipped. Unfortunately, funding for training is no longer available and incidences are once again occurring, which demonstrate a lack of basic knowledge regarding radio use, as well as incident response procedures.

The detriment caused by the lack of proper training cannot be stressed enough and can certainly be highlighted by a sequence of events that played out in a January 2018 vehicle crash. A Kenai Peninsula agency responding to the crash complained of problems in which the responders were not receiving the calls from the dispatch center.

After reviewing the radios in question and the call logs, it was discovered there were multiple associated issues. The radios in question appeared to have never been aligned, since they were originally sent to the field, and the radio codeplugs had preferred sites in a zone in which they did not operate. It was also discovered the dispatcher was on the wrong Regional Incident Command Zone from the responders and some of the responders were on the wrong channel. This single incident demonstrates a compounding of errors reflecting the need for on-going training to be conducted at designated intervals.

4.2 Economic/Political Risks

Separate studies were conducted in 2002⁶³ and 2004⁶⁴, which identified critical risk factors. Although several of those factors have been mitigated, others still existed as was demonstrated by the 2012 divestiture of the USARAK LMR RF equipment.

The State Legislature has expressed their desire that local agencies participate in the ALMR shared costs to reduce the State's costs. It is important that the User Council and the Executive Council strive to communicate the benefits derived from interoperability between all agencies on ALMR to ensure the safety and security of the Alaskan public. If we are not successful with this endeavor, and local agencies are required to contribute at a level that is unacceptable to them, we risk losing their participation.

It is also imperative to maintain the ALMR partnership, not only with the infrastructure owners, but also with the local government and volunteer emergency services to ensure 24/7 continuity of operations during emergencies and day-to-day operations. We can only achieve this if there is adequate funding and an acceptable approach to a cost share.

Some examples of possible long-term funding solutions that would mitigate the impact on agencies participating in the cost share could be as simple as adding fees to driver's licenses, using a portion of fines, a tax on fuel sales, or adding phone technology fees. The biggest objection to these solutions is that they may present a minor political risk. However, these types of actions or similar measures are currently used by other states and provide a continuous funding stream and therefore, merit serious consideration as the SOA Department of Administration and the Legislature seek to establish long-term funding strategies to support public safety communications in Alaska.

Currently, the shared contracted services of the Operations Management Office and the System Management Office are funded between the State and the DOD, and each pays for their own Master Site costs. Both are also responsible for developing a method to apportion the costs among the agencies they represent as ALMR cooperative partners and for collecting funds to be applied to their respective portions of the contracts.

⁶³ ALMR Communications Plan Overview, October 5, 2002

⁶⁴ ALMR Risk Assessment, 5 Star Team, December 2005

The State has struggled year to year to put in place a process by which funds from non-state agencies and organizations can be received and applied to their portion of the ALMR shared costs.

It is critical that the ALMR partnering agencies maintain a long-term, adequately funded maintenance and operations strategy for ALMR. As previously experienced, APSCS underfunding and poor maintenance practices were leading to a degradation in the quality and level of performance of the System. This is not an acceptable risk to the Department of Defense and they have expressed their willingness to disband the partnership, if the System is not properly maintained. This would have disastrous consequences for all involved.

In the meantime, State continues to look at possibilities for revenue generation that would directly support public safety and therefore ALMR, but has not implemented any.

4.3 Technology Risks

The expanded capabilities of technology like the ALMR system bring an increased cost. Radios that operate on a conventional system used to cost from \$500 to \$1,000, while radios on a trunked system can cost between \$2,000 and \$8,000. However, with the increase of the number of manufacturers offering P25-capable radios, costs for trunked radios have decreased. Currently, there are eight manufacturers who have completed an Acceptance Test Procedure (ATP) and have subscribers approved to operate on ALMR, thus allowing agencies a wider variety of price ranges and manufacturers from which to choose.

Unfortunately, more sophisticated equipment in the field also potentially 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 information technology (IT) system, ALMR software and some hardware components require periodic update and/or replacement. Motorola® supports backwards compatibility and pre-tested software patches for up to five System software platform releases. In 2019, ALMR underwent a System software and hardware update and currently operates on the 7.17.3 platform.

Risks on the immediate horizon, include the replacement of all SOA Quantar® site radios and XTS® and XTL® subscriber units which are now at or approaching end of life and will need to be replaced in the near term. A funding plan must be put in place now for the replacement of these units, before they are no longer supportable.

Long-term evolution (LTE, or Voice-over LTE (VoLTE)) has yet to be proven as the end all, be all for public safety first responders. The thought process at national levels, with

regard to the use of LTE technology by first responders, now envisions it as augmenting LMR systems and not replacing them.

The 129 ALMR member agencies, like other first responder agencies nationwide currently use land mobile radio networks for mission critical voice communications. ALMR public safety agencies see a future in which LMR systems and wireless broadband services will converge to complement each other, but they do not see the nationwide public safety broadband network (NPSBN), known as FirstNet, replacing their LMR systems. Agencies recognize LMR systems provide key mission-critical voice communications, which currently are not available through FirstNet and, at best, are years away from realization.

The NPSBN is initially providing data, video and other high-speed features, such as location information and streaming video, as well as non-mission critical voice. Public safety entities will continue to use LMR networks for their mission-critical voice needs. Along with video and data, FirstNet has plans to offer mission-critical voice services over the NPSBN, but only when voice over LTE functionalities meet or exceed first responders' mission-critical needs. Unfortunately, FirstNet can't accurately predict the arrival of mission-critical voice, in part because the standards are still under development. The standards work will determine the functionality and performance requirements for mission-critical VoLTE. FirstNet is actively involved in the standards-setting process and the industry, at large, is working to accelerate the development of this new worldwide standard.

ALMR members, such as the Department of Defense (DOD) and the Federal Non-DOD agencies, have indicated that LMR will remain their primary means of communication for the foreseeable future. Any plans to ultimately transition to FirstNet as their primary communications platform would require a minimum of five years planning on the part of the DOD. At this point in time, no decisions have been made to utilize FirstNet, even if only to complement LMR communications. ALMR, remains a critical requirement for Alaska public safety first responders across all disciplines.

4.4 Other Risks

The lack of a long-term funding solution between the cooperative partners continues to be the greatest single risk to the ALMR System and year after year, it has failed to be adequately addressed. Underfunding of the System by the SOA in FY15, and again in FY16 and FY17 severely hampered the ability to respond promptly to equipment failures. A maintenance contract re-negotiation in 2016 resolved some of the near-term maintenance cost issues, but the long-term outlook did not change.

Aging microwave also equipment began to fail in 2017 causing site outages, sometimes on a weekly basis. The SOA Office of Information Technology worked diligently throughout 2019 performing a microwave refresh/upgrade of the APSCS.

Additionally, some US Air Force and US Army Alaska sites have had issues with their sites power systems, leading to degradation of service and recurring site outages at their northern region sites. US Army-Alaska and the US Air Force have begun taking the necessary steps to correct deficiencies at their sites. Any subsequent failure to adequately address the necessary funding to maintain the infrastructure could cause the cooperative to fail, resulting in the dissolution of the ALMR System. Should this occur, the costs to regain the level of interoperability provided by ALMR, and the risks associated with such a collapse, remain very relevant.

Areas affected could include:

- State/Local level:
 - Volunteer agencies withdraw rather than pay fees negatively impacting current interoperability between first responders.
 - Cost to implement and maintain separate communications systems
 - Loss of shared spectrum and lack of available spectrum to replace it
 - Loss of cyber security monitoring/protection
 - Inability to meet future FCC mandates by some agencies.
 - Possible forfeiture of equipment purchased through Federal grant funds
 - Loss of OEM certified system technologists and support for O&M
 - Lack of sufficient number of trained technicians for the State
 - Local communities expected to take the lead in any regionalized, large-scale event without sufficient resources or the ability to immediately interoperate with responding SOA and Federal agencies
 - Loss of established processes, procedures and protocols
- National level:
 - Lack 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
 - Loss of FirstNet/LTE infrastructure; failure to meet national directives
- 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 (currently 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
 - System reverts to break/fix status (**NOTE:** This has previously occurred)
 - No redundancy
 - Loss of central POC for the public safety community, as a whole

Lastly, the above areas don't address the time it would take to plan, fund and implement any type of new system, let alone whether the spectrum would be available to support it.

5.0 Conclusions and Recommendation

Creating and maintaining interoperability requires the foresight of leadership at all levels through continuous discussions, planning and the advancement of partnerships at the Federal, State, tribal and local levels. In order to effectively respond to emergencies, both government and industry must plan for, and continually reassess, interoperability requirements,⁶⁵ as well as lifecycle funding and maintenance of the systems required to meet those needs.

The annual Business Case update continues to examine the historical ALMR shared system approach both operationally and economically with respect to short- and long-term risks and to emphasize those areas affecting the System's operational health and future outlook.

A viable long-term strategy for the funding of ALMR continues to be a major stumbling block. It is imperative the State Legislature address this issue and implement a solution, which involves a solid funding stream tied directly to public safety interoperable communications. If the partnership were to dissolve, the cost of building a separate, comparable system would be far greater than the cost of sustained operations and maintenance funding of the current ALMR System.

The 2019 update of the Business Case validates previous decisions that the shared approach still remains the best solution to Alaska's public safety first responder interoperability needs. It also validates the operational and economic benefits for both agencies and stakeholders, and emphasizes the critical need for funding to fully sustain and maintain the ALMR System.

⁶⁵ See <http://www.ncjrs.gov/pdffiles1/nij/211512.pdf>